

NAVSHIPS 95898

(Non-Registered)

★
TECHNICAL MANUAL

for

TELETYPEWRITER SETS
AN/TGC-14(V) and 14A(V)
TELEPRINTERS

TT-298A/UG and TT-298B/UG
and

TELETYPEWRITERS
TT-299A/UG and TT-299B/UG

Manufactured by
MITE CORPORATION
New Haven, Connecticut

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

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06515

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Approved: 13 October 1964



TABLE OF CONTENTS

SECTION A1 - DESCRIPTION

Paragraph		Page
A1-1	General Information	A1-1
A1-2	Identifying Characteristics	A1-1
A1-4	Basic Differences Between TT-298 and TT-299 Series Equipment	A1-1
A1-5	Differences Between Units Manufactured Under Each of the Contracts	A1-1
A1-6	Line Feed on Carriage Return	A1-1
A1-7	Keyboard Interlock	A1-1
A1-8	Signal Code	A1-1
A1-9	Fuse Complement	A1-1
A1-10	Front Cover Reflector	A1-1
A1-11	Dimmer Switch	A1-1
A1-12	Spring Retainers	A1-1
A1-13	Keyboard and Chassis RFI Shielding	A1-1
A1-14	Function Lever Clevis Pin Retaining Plate	A1-1
A1-15	Movable Idler Gear Plate	A1-1
A1-16	Spring Loaded Printer Protective Foot (Printer Support Assembly)	A1-1
A1-17	Heater Installation	A1-1
A1-18	Motor Conversion Capability	A1-1
A1-19	Service Cables	A1-1

SECTION A2 - INSTALLATION CONSIDERATIONS

A2-1	General Information	A1-4
A2-3	Component Selection	A1-4
A2-4	Special Unpacking Instructions	A1-4
A2-5	Fuse Complement	A1-5
A2-6	Service Cables	A1-5
A2-7	Keyboard Removal and Installation	A1-5

SECTION A3 - OPERATOR'S SECTION

A3-1	General Information	A1-5
A3-3	Operating Instructions Not Applicable to the TT-298 and TT-299 Series Units	A1-5

SECTION A4 - TROUBLE-SHOOTING

A4-1	Introduction	A1-6
A4-2	Overall Trouble-Shooting	A1-6
A4-4	Theory of Operation	A1-6
A4-5	Keyboard Interlock	A1-6
A4-7	Automatic Line Feed on Carriage Return	A1-7

SECTION A5 - MAINTENANCE

A5-1	General Information	A1-14
A5-4	Disassembly of Automatic Line Feed on Carriage Return Mechanism	A1-14
A5-5	Assembly of Automatic Line Feed on Carriage Return Mechanism	A1-14
A5-6	Disabling Line Feed on Carriage Return Mechanism	A1-17
A5-7	Keyboard Interlock Disassembly	A1-17
A5-8	Keyboard Interlock Assembly	A1-20
A5-9	Keyboard Interlock Adjustment	A1-20

ADDENDUM

TABLE OF CONTENTS (Cont)

SECTION A5 - MAINTENANCE (Cont)

Paragraph		Page
	A5-10 Disabling the Repeat Key for Keyboard Interlock Operation	A1-22
	A5-11 Disabling the Keyboard Interlock Mechanism	A1-22
A5-12	Function Lever Clevis Pin Retaining Plate Removal	A1-22
A5-13	Replacement of Function Lever Clevis Pin Retaining Plate	A1-22
	A5-14 Movable Idler Gear Plate Replacement	A1-22
	A5-15 Printer Support Assembly	A1-22

LIST OF ILLUSTRATIONS

Figure		Page
A2-1	Front View of Teletypewriter TT-299B/UG Showing Calendar Lubrication Requirements	A1-4
A3-1	Control Locations of TT-299B/UG Teletypewriter	A1-6
A4-1	Schematic Diagram, TT-299B/UG	A1-9
A4-2	Wiring Diagram Chassis 1A1, TT-299B/UG	A1-10
A4-3	Bench Test Cable	A1-11
A4-4	Schematic Diagram, TT-299A/UG	A1-12
A4-5	Electrical Chassis 1A1, Wiring Diagram, TT-299A/UG	A1-13
A5-1	Automatic Line Feed on Carriage Return Mechanism	A1-15
A5-2	3/4 Bottom View of Keyboard Interlock Mechanism	A1-16
A5-3	Bottom View of Keyboard With Interlock Mechanism	A1-18
A5-4	Keyboard Interlock Mechanism	A1-19
A5-5	Pin Retaining Plate	A1-20
A5-6	Movable Idler Gear Plate	A1-20
A5-7	Printer Support Assembly	A1-21

LIST OF TABLES

Table		Page
A1-1	BuShips Serial Numbers and Corresponding MITE Corp. Manufacturing Numbers	A1-2
A1-2	Similarity Table	A1-3
A4-1	Trouble-Shooting Chart	A1-8

ADDENDUM

to

T. M. 03315-15

for

TT-298A and B/UG TELEPRINTERS and TT-299A and B/UG TELETYPEWRITERS

The information contained in the attached addendum is intended to supplement the information contained in T. M. 03315-15 for Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V) by incorporating the information necessary for relatively inexperienced maintenance personnel to adequately maintain all TT-298 and TT-299 series equipment manufactured under Contracts NObsr 87611, NObsr 89451, and NOm 72994. In addition to the information contained in Table A1-1, a listing of the serial numbers assigned to each of the teletypewriters on the following pages can also be used to differentiate between the various equipments.

When using this addendum, first read the description of the TT-298 and TT-299 series units in an effort to become familiar with the various differences between them and the equipments described in the technical manual. The previously mentioned comparison chart which follows immediately after the descriptive material, also points out the various differences and will be very useful in determining similarities at a glance.

This addendum is sectionalized to correspond with the sections in the existing manual. Section A1-General Information, corresponds to Section 1 already in the manual. Section A2-Installation Information, corresponds to Section 2 etc.

The parts list, which comprises Section 6 of this addendum, is in no way correlated to the exploded views in the maintenance section (Section 5). This list is complete in itself and can, if necessary, be removed from the remainder of the addendum.



SECTION A1
DESCRIPTION

A1-1 GENERAL INFORMATION

are also different as noted in the following chart:

A1-2 IDENTIFYING CHARACTERISTICS

A1-3 For ease of description, the equipment discussed in this addendum will be divided into three discrete groups; one for each of the contracts under which the TT-298 and TT-299 series equipments have been manufactured. Each of the equipments is identified with the contract by Bureau of Ships and MITE Corporation serial numbers in order to preclude all possible equipment identification errors.

Fuse Designation	TT-299A/UG	TT-299B/UG
F-1	5 amps	5 amps
F-2	1 amp	1 amp
F-3	.500 amp	.500 amp
F-4	.25 amp	Spare

A1-4 BASIC DIFFERENCES BETWEEN TT-298 and TT-299 SERIES EQUIPMENT. The TT-298 and TT-299 series units within any one of the before mentioned contract groups are identical in circuitry, size, and mechanics with one exception; the keyboard cavity of the TT-298 series units has been sealed off, rendering the unit suitable for receive only operation. The TT-298 and TT-299, less keyboard.

A1-10 FRONT COVER REFLECTOR. The front cover has a hinged reflector, which when opened, picks up light from the copy lamps and directs it downward onto the keyboard. This feature permits the operator to illuminate the keyboard without having to illuminate the entire area about him.

A1-5 DIFFERENCES BETWEEN UNITS MANUFACTURED UNDER EACH OF THE CONTRACTS. Table A1-1 lists all of the units manufactured under Contracts NObsr 87611, NObsr 89451, and NOM 72994. The identifying characteristics of the units manufactured within these three groups are cited in Table A1-2. Each of the characteristics not identified with an asterisk in Table A1-2 is discussed in full in the following paragraphs.

A1-11 DIMMER SWITCH. The dimmer switch (S2), permits the operator to reduce copy glare by dimming the three copy lamps. The dim position is preset and is determined by the size of the resistor R4.

A1-6 LINE FEED ON CARRIAGE RETURN. A special mechanism has been incorporated into Groups 2 and 3 (refer to Table A1-1) units the purpose of which is to cause automatic and simultaneous actuation of the line feed mechanism, upon actuation of the carriage return mechanism. Procedures for adjusting and/or disabling this mechanism are contained in the adjustment section of this addendum.

A1-12 SPRING RETAINERS. A new type spring retainer for holding the sensing finger lever springs has been incorporated into the TT-299B/UG and TT-298B/UG series equipments. The purpose of the new clip is twofold; it facilitates installation of the springs and reduces wear of the spring hook, increasing reliability as well as maintainability.

A1-7 KEYBOARD INTERLOCK. A mechanism incorporated into Groups 2 and 3 units (refer to Table A1-1), mechanically prevents transmission of intelligence after depression of a key or inadvertent or intentional depression of any other keys without first releasing the interlock solenoid with an externally generated synchronous pulse. Theory and maintenance procedures for this mechanism are contained in the appropriate sections of this addendum.

A1-13 KEYBOARD AND CHASSIS RFI SHIELDING. The Group 3 (refer to Table A1-1) series have grounded cable shields incorporated into the keyboard and chassis in an effort to reduce RFI. Figure A4-1 shows the grounded shield schematically.

A1-8 SIGNAL CODE. Refer to Table A1-2.

A1-14 FUNCTION LEVER CLEVIS PIN RETAINING PLATE. A function lever clevis pin retaining plate has been incorporated into the units of Group 3. The plate negates the possibility of having the clevis pin drop out as a result of "E" ring failure as was the case in the earlier TT-299 models. Maintenance procedures applicable to the new retaining plate are contained in Section A5.

A1-9 FUSE COMPLEMENT. The fuse complements of the A and B series units are completely different. In addition to the A series units utilizing Belling and Lee (L754) fuses and the B series units utilizing Bussman (FM01), the fuse designations themselves

A1-15 MOVABLE IDLER GEAR PLATE. A movable idler gear plate, which has been incorporated into Group 3 units, greatly facilitates the conversion of units from 7.0 to 7.42 unit code, or vice versa, by negating the requirements for changing the frame members to accommodate the different sized idler gears. Instructions for the additional changes that must be made to the gear train during conversion procedures and the parts required are available in kit form from MITE Corporation.

ADDENDUM

A1-16 SPRING LOADED PRINTER PROTECTIVE FOOT (PRINTER SUPPORT ASSEMBLY). See Figure A5-7. The spring loaded protective foot prevents damage to the line feed on carriage return mechanism which extends below the bottom of the printer. When the printer is removed from the chassis, the spring loaded foot automatically pivots into position so that it extends past the bottom of the front plate, preventing damage to the automatic line feed on carriage return mechanism. This feature applies to Groups 2 and 3 (refer to Table A1-1) units only.

A1-17 HEATER INSTALLATION. Although heaters are not supplied with any of the TT-298 and TT-299 series units, the chassis circuitry has provisions for use of a 200 watt heater, which can be obtained from MITE Corporation.

A1-18 MOTOR CONVERSION CAPABILITY. As supplied, the TT-298 and TT-299 series units have 115 vac, 60 cycle (PD-82/U) motors installed. However, if it is desirable, 115 vac, 400 cycle (PD-83/U) motors can be used in place of the 60 cycle motor supplied simply by changing the motor as instructed in the basic manual.

A1-19 SERVICE CABLES. Service cables, as described in the basic manual, are not supplied with TT-298 and TT-299 series units. An unwired Amphe-nol Connector, type 165-10 is furnished with the equipment and service cables are fabricated by the using activity. If required, Bench Test Cable #561 can be obtained directly from MITE Corporation, 446 Blake Street, New Haven, Connecticut, attention Spare Parts Manager.

Table A1-1

BuShips Serial Numbers and Corresponding
MITE Corp. Manufacturing Numbers

Group 1		Group 2	
Contract NObsr 87611 (FBM)		Contract NObsr 89451	
TT-299A/UG Teletypewriters		TT-299B/UG Teletypewriters	
BuShips Serial No.	MITE Mfg. No.	BuShips Serial No.	MITE Mfg. No.
A-1	No Number	A-1	4447
A-30	No Number	A-2	4439
A-31 through A-56	2633 through 2658	A-3	4445
A-57 through A-74	3151 through 3168	A-4 through A-543	3897 through 4436
Group 3			
Contract NOm 72994			
TT-298B/UG Teleprinters			
BuShips Serial No.		MITE Mfg. No.	
A001 through A302		4895 through 5196	
TT-299B/UG Teletypewriters			
BuShips Serial No.		MITE Mfg. No.	
B001 through B522		5197 through 5718	

Table A1-2
Similarity Table

Features	AN/TGC-14A(V) NOm 72646	TT-299A/UG NObsr 87611	TT-299B/UG NObsr 89451	TT299B/UG NOm 72994	TT-298B/UG NOm 72994
Quick Release Ribbon Feed	Yes	Yes	Yes	Yes	Yes
Line Feed on Carriage Return	No	No	Yes	Yes	Yes
Keyboard Interlock	No	No	Yes	Yes	No (no keyboard)
Signal Code	7.0	7.0	7.42	7.42	7.42
Fuse Type					
Bussman (FM01)	No	No	Yes	Yes	Yes
Belling & Lee (L754)	Yes	Yes	No	No	No
Sprocket Feed, Multiply, Fan Fold Paper Handling Capabilities	Yes	Yes	Yes	Yes	Yes
Keyboard Reflector	No	Yes	Yes	Yes	Yes
Copylight Dimmer Switch	No	No	Yes	Yes	Yes
Spring Retainers, Sensing Fingers	No	No	Yes	Yes	Yes
Spring Retainers, Ribbon Vibrators	Yes	No	Yes	Yes	Yes
Moveable Idler Gear Plate (adjustable to 7.0 or 7.42 operation)	No	No	No	Yes	Yes
Function Lever Clevis Pin Retaining Plate	No	No	No	Yes	Yes
Spring Loaded Printer Support	No	No	Yes	Yes	Yes
115 vac 60 cy motor installed (400 cy capability)	Yes (1)	Yes	Yes	Yes	Yes
Heater Wiring Incorporated Chassis Assembly	Yes	Yes	Yes	Yes	Yes
(1) Refer to paragraph A1-18					

SECTION A2

INSTALLATION CONSIDERATIONS

A2-1 GENERAL INFORMATION

A2-2 The basic installation considerations for the TT-298 and TT-299 series teletypewriters are identical to those contained in T. M. 03315-15. The exceptions involved are of a minor nature and are discussed in the following paragraphs.

A2-3 COMPONENT SELECTION. No component selection is necessary when installing the TT-298 and TT-299 series units in that they are complete with 115 vac, 60 cycle motors when shipped. If operation on 115 vac, 400 cycle power supplied is desirable, instructions for motor replacement are contained in the basic manual. Although heaters are not supplied with the equipment, provisions for heater installation

have been provided in the chassis. Instructions for heater installation are also contained in the basic manual.

A2-4 SPECIAL UNPACKING INSTRUCTIONS. A card stating, "Do not place into service after (the date) without first lubricating in accordance with technical manual" is attached to the case front cover. See Figure A2-1. The date on this card is important. Do not place the equipment into service without first lubricating the teletypewriter if the date on the card is passed. The dessicants packed in the air tight container with the teletypewriter have a drying effect on all of the lubricants, and as a result, it is not safe to operate the unit without first replenishing the lubricants if the unit has been in storage for 12 or more months.



Figure A2-1. Front View of Teletypewriter TT-299B/UG Showing Calendar Lubrication Requirements

A2-5 FUSE COMPLEMENT. The fuse complements for teletypewriters TT-299A/UG, TT-299B/UG, TT-299B/UG, and AN/TGC-14A(V) are as follows:

Fuse Designation	TT-299A/UG	TT-299B/UG TT-298B/UG	AN/TGC-14A(V)
F-1	5 amps	5 amps	5 amp
F-2	1 amp	1 amp	1 amp
F-3	.500 amp	.500 amp	.500 amp
F-4	.250 amp	Spare	*
F-5	Spare	.100 amp	.100 amp

* AC Heater operation 2.5 amps
DC Heater operation 10 amps

NOTE

It is important that maintenance personnel be aware of the correct fuses to be used on units in each of the three groups. Group 1 (refer to Table A1-1) uses Belling and Lee (L754) fuses and Groups 2 and 3

use Bussman (FM01) fuses, the values for which are shown in the previous chart.

A2-6 SERVICE CABLES. Service cables, as described for the AN/TGC-14A(V) Teletypewriter Set are not supplied as part of the TT-298 and TT-299 series units. Instead, an Amphenol Connector Type 165-10 is furnished and is wired by the using activity. Refer to Figures A4-1 and A4-4 contained in Section A5 of this addendum. If cables for bench tests are required, order Bench Test Cable #561 directly from MITE Corporation, 446 Blake Street, New Haven, Connecticut, attention Spare Parts Manager. A schematic diagram for Bench Test Cable #561 is shown in Figure A4-3.

A2-7 KEYBOARD REMOVAL AND INSTALLATION. It is important to notice that the keyboards of Group 3 units (refer to Table A1-1) have a ground strap extending from the chassis to the keyboard. This strap must be removed from the keyboard when the keyboard is to be removed and reinstalled when the keyboard is to be replaced. Failure to replace the ground strap will prevent optimum operation.

SECTION A3

OPERATOR'S SECTION

A3-1 GENERAL INFORMATION

A3-2 Operating instructions for the TT-298 teleprinters and TT-299 teletypewriters are identical to those contained in Section 3 of T. M. 03315-15. With the exception of the elimination of the keyboard on the TT-298 series units, there are very few differences between the 14 series units and those described in this addendum. Additional considerations not covered in the basic manual are as follows:

a. **KEYBOARD REFLECTOR.** A keyboard reflector has been added to the front cover, enabling the operator to illuminate the keyboard without having to illuminate the entire area about him. See Figure A3-1.

b. **DIMMER SWITCH.** A dimmer switch has been incorporated into Groups 2 and 3 units (refer to Table A1-1) to permit operation of the copy lights during all phases of operation by providing two degrees of intensity for the copy lights. Figure A4-1 shows the circuitry schematically.

c. **KEYBOARD INTERLOCK.** When in use, the keyboard interlock system enables the operator to depress any of the keyboard levers, without actually transmitting the intended character. Upon receipt of a synchronous pulse, the intelligence stored in the keyboard by the depression of the key lever, is transmitted, clearing the keyboard for the next character to be transmitted.

d. **LINE FEED ON CARRIAGE RETURN.** The units in Groups 2 and 3 (refer to Table A1-1) automatically perform line feed on carriage return. Instructions for disabling and/or adjusting this mechanism are contained in Section A5 of this addendum.

A3-3 OPERATING INSTRUCTIONS NOT APPLICABLE TO THE TT-298 and TT-299 SERIES UNITS.

A3-4 Information contained in T. M. 03315-15, but not applicable to the TT-298 and TT-299 series units is as follows:

a. **115 VAC, 400 CYCLE PRIMARY POWER SUPPLIES.** The TT-298 and TT-299 series units are equipped with 115 vac, 60 cycle motors when shipped. However, it is possible to operate the equipment on 115 vac, 400 cycle power supplies by replacing 60 cycle motor (PD-82/U) with 400 cycle motor (PD-83/U). Replacement procedures are contained in Section 5 of the basic manual.

b. **UPPER CASE "H" MOTOR STOP.** All TT-298 and TT-299 series units are equipped with a Time Delay Motor Stop device rather than an Upper Case "H" Motor Stop device. Although actuation of the FIGS and then the H key will have no effect on any of the TT-298 series units, it will still affect any other unit on the circuit having an Upper Case "H" Motor Stop device.

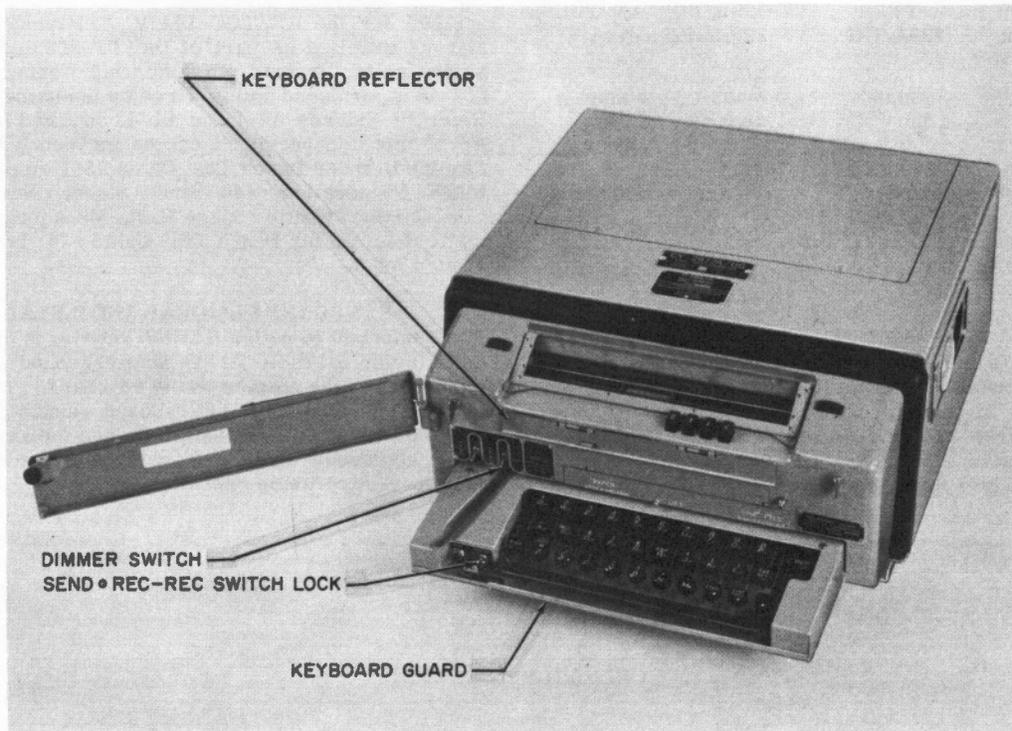


Figure A3-1. Control Locations of TT-299B/UG Teletypewriter

SECTION A4

TROUBLE-SHOOTING

A4-1 INTRODUCTION. This addendum contains supplementary information required to trouble-shoot those electrical and mechanical systems of the TT-298 series teleprinters and TT-299 series teletypewriters not described in T. M. 03315-15. The trouble-shooting philosophy and set-up procedures used in the basic manual are applicable to the equipment described in this addendum.

NOTE

The service cable referred to in T. M. 03315-15 is not supplied with TT-298 and TT-299 equipments. Bench Test Cable #561 must be used in its place. All instructions for the service cable also apply to the Bench Test Cable.

A4-2 OVERALL TROUBLE-SHOOTING

A4-3 The information contained herein is intended to complement that which is already contained in the basic manual. No special set-ups are required for the testing of the special features of the TT-298 and TT-299 series units other than a suitable pulse generator required for checking out the Keyboard Interlock on the TT-298 series units. Table A4-1 contains detail trouble-shooting information for the Keyboard Interlock, the Line Feed on Carriage Return Mechanism, and Dimmer Switch. Schematic and wiring diagrams are shown in figures A4-1 through A4-5.

A4-4 THEORY OF OPERATION

A4-5 KEYBOARD INTERLOCK. The keyboard interlock mechanism permits depression of any one key.

Depression of the key positions the keyboard code bars, storing the intelligence for that key depressed and mechanically locks out all other keys. Upon receipt of a synchronous pulse, the interlock solenoid actuates the clutch release lever, releasing the keyboard clutch. The stored intelligence is then transmitted and the keyboard code bars are released, enabling the next character to be set up. Prior to receipt of this pulse, spring loaded release pin (2, figure A5-4) remains positioned under clutch release lever (3), preventing the release of keyboard clutch and cam assembly (6). Key depression is not possible because prevent lever (4) has locked code bars (5), preventing any movement until receipt of the next pulse. The pulse energizes interlock solenoid (1) and retracts release pin (2). Clutch release lever assembly (3) pivots, releases keyboard clutch and cam assembly (6) and allows the last intelligence set up on the code bars to be transmitted.

A4-6 Depression of any key moves the clutch ball downward, pulling clutch release cam follower (7), actuate lever (8), release lever link (9) and release lever assembly (10) to the front of the printer. Release lever assembly (10) clears tab (11) on prevent lever (4), releasing the prevent lever so that it can ride on cam. This movement permits sufficient pivoting of clutch release lever (3) to allow release of clutch (6) when the next synchronous pulse is received. Receipt of a pulse allows the transmission of intelligence through keyboard operation and the lack of a pulse to the keyboard effectively locks out the local equipment from the signal loop.

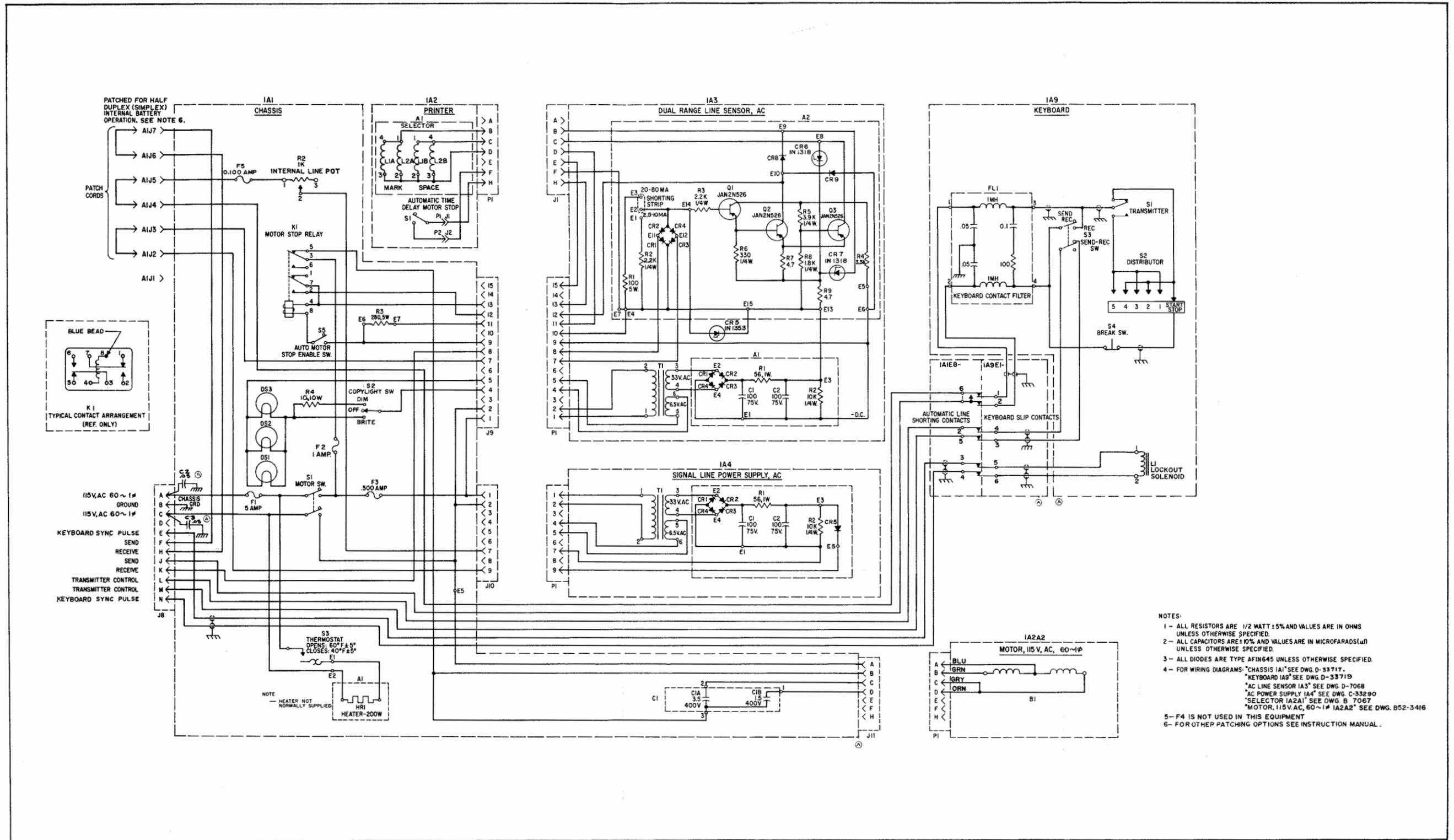
A4-7 **AUTOMATIC LINE FEED ON CARRIAGE RETURN.** Whenever a carriage return signal is received during operation, line feed is automatically effected by a series of spring loaded levers. When the carriage return function is selected and the function bar strikes the carriage return sensing finger lever driving it to the rear, the extension of carriage return clutch release arm (9, figure A5-1) engages latch assembly (1). Latch assembly (1) activates carriage return lever (2) and line feed lever assembly (3). Line feed lever assembly (3) strikes the extension of the line feed clutch release arm (10), releasing the line feed clutch.

A4-8 When the carriage return sensing finger is deflected from under the function bar, its bias spring restores it to the standby condition. Spring (4) attached to the carriage return lever and cancellation lever assembly (5), returns the automatic line feed linkage to a standby condition.

A4-9 The off-line functions, line feed, and carriage return, may still be independently selected by depressing their respective off-line function controls on the front cover. When the off-line carriage return control is activated, an adjustable slide (6) engages an extension of the cancellation lever (5). The cancellation lever rotates in a counterclockwise direction and a tab on the lever engages and withdraws the latch from under carriage return clutch release arm (9). This allows activation of carriage return without line feed. Line feed may be selected by depressing the off-line control on the front cover. The off-line function pusher which rides under the line feed lever assembly activates only the line feed clutch release arm (10).

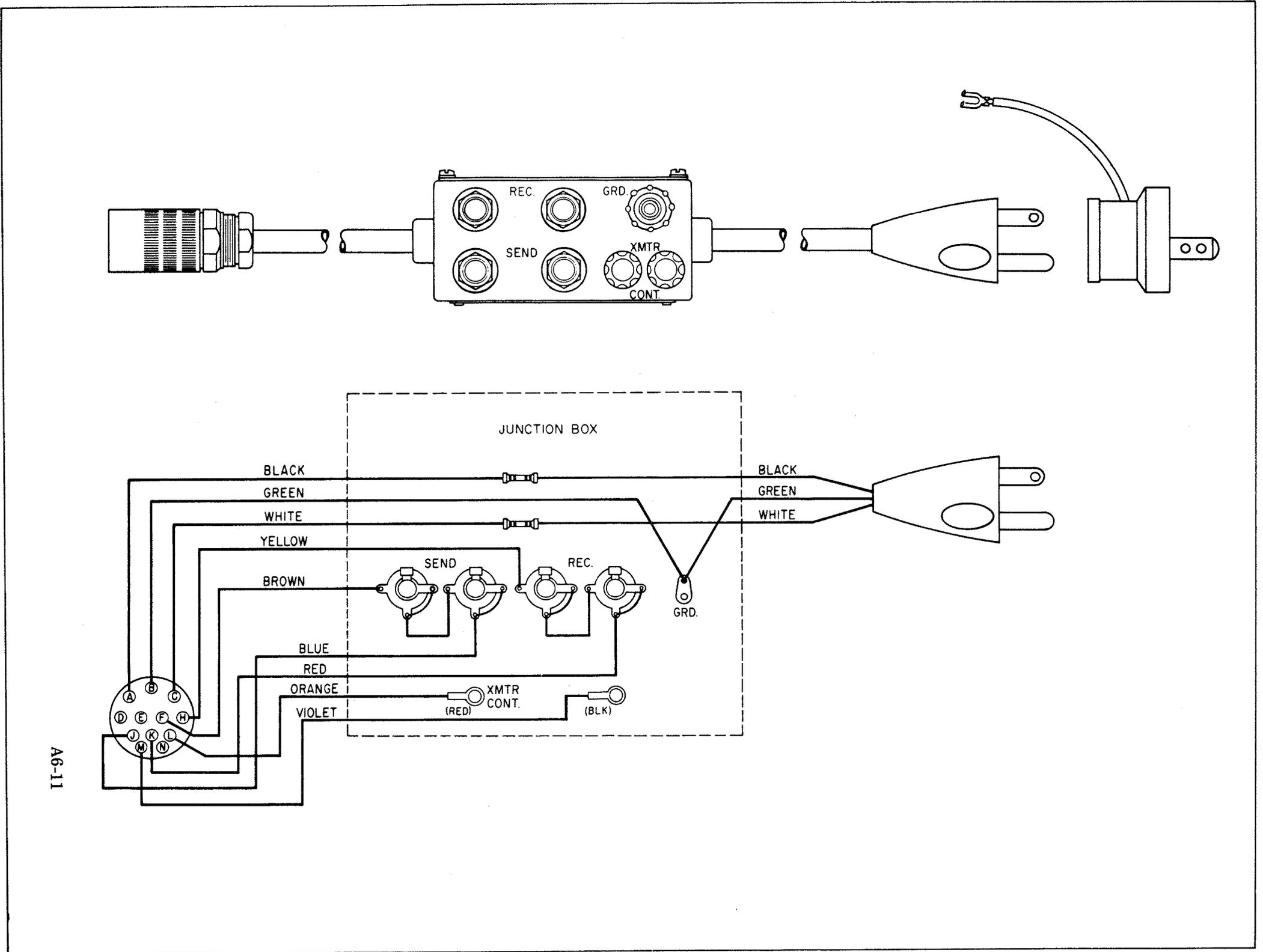
TABLE A4-1 TROUBLE-SHOOTING CHART

MECHANISM	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Automatic Line Feed On Carriage Return	Continuous line feed.	Automatic/carriage return mechanism is jammed.	Lift up printer, free line feed on carriage return mechanism and check springs.
	No automatic line feed on carriage return.	Latch assembly not positioning under carriage return arm eccentric not adjusted properly.	Readjust the line feed on carriage return mechanism and check springs.
	Occasional line feed on carriage return.	(Same as above.)	(Same as above.)
	Line feed is supplied when off-line carriage return control is actuated.	Adjustable slide is not pivoting the cancellation lever and latch assembly out of the way of carriage return arm.	Readjust the adjustable slide.
	No automatic line feed on carriage return.	Jammed assembly, assembly spring hooked to disable post, or defective spring.	Free assembly, reposition and/or replace spring.
Keyboard Interlock	Keyboard does not operate properly, when pulse is being received.	Faulty interlock adjustment.	Readjust.
		Solenoid dirty or defective.	Clean or replace.
		Solenoid release pin does not clear clutch release lever when solenoid is actuated. Words per minute is not synchronized with pulse rate.	Check leaf spring adjustment.
Keyboard does not operate.	No synchronous pulse received.	Check pulse current.	Check for pulse at J8 pins E and N, notify pulse source.
Keyboard interlock mechanism sticks in disable position.	Keyboard interlock mechanism sticks in disable position.	Defective or dirty solenoid.	Clean and/or replace solenoid assembly.
		Keyboard interlock mechanism incorrectly adjusted.	Perform adjustment sequence. Refer to Section A5.
		Interlock disabled by interlock stop arm. Release pin jammed.	Move stop arm to correct position. Refer to Section A5. Check release pin and its seat for burrs or other foreign matter. Clean and/or replace as necessary. Refer to Section A5.
Dimmer Switch	Copy Lights operate in "ON" position. No Copy Lights in "DIM" position.	R2 defective.	Replace.
		Copy Light Switch (S2) defective.	Replace



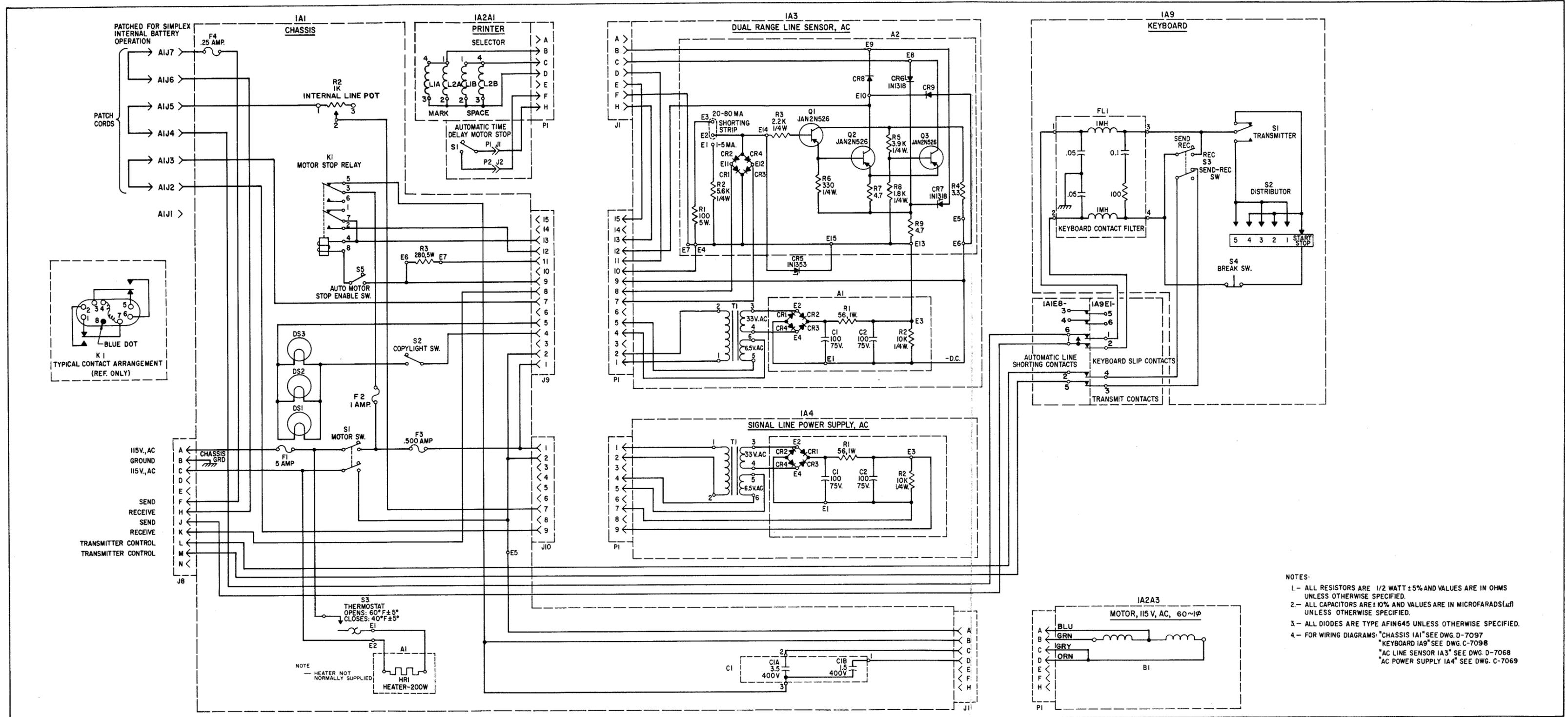
- NOTES:
- 1 - ALL RESISTORS ARE 1/2 WATT ± 5% AND VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
 - 2 - ALL CAPACITORS ARE 10% AND VALUES ARE IN MICROFARADS (μ) UNLESS OTHERWISE SPECIFIED.
 - 3 - ALL DIODES ARE TYPE AFIN645 UNLESS OTHERWISE SPECIFIED.
 - 4 - FOR WIRING DIAGRAMS: CHASSIS IA1 SEE DWG. D-33717; KEYBOARD IA9 SEE DWG. D-33719; AC LINE SENSOR IA3 SEE DWG. D-7068; AC POWER SUPPLY IA4 SEE DWG. C-33290; SELECTOR IA2A1 SEE DWG. B 7067; MOTOR, 115V, AC, 60~1ϕ IA2A2 SEE DWG. B52-3416
 - 5 - F4 IS NOT USED IN THIS EQUIPMENT
 - 6 - FOR OTHER PATCHING OPTIONS SEE INSTRUCTION MANUAL.

Figure A4-1. Schematic Diagram TT-299B/UG



A6-11

Figure A4-3. Bench Test Cable



- NOTES:
- 1 - ALL RESISTORS ARE 1/2 WATT ± 5% AND VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
 - 2 - ALL CAPACITORS ARE ± 10% AND VALUES ARE IN MICROFARADS (μF) UNLESS OTHERWISE SPECIFIED.
 - 3 - ALL DIODES ARE TYPE AFIN645 UNLESS OTHERWISE SPECIFIED.
 - 4 - FOR WIRING DIAGRAMS: "CHASSIS IA1" SEE DWG. D-7097
"KEYBOARD IA9" SEE DWG. C-7098
"AC LINE SENSOR IA3" SEE DWG. D-7068
"AC POWER SUPPLY IA4" SEE DWG. C-7069

Figure A4-4. Schematic Diagram, TT-299A/UG

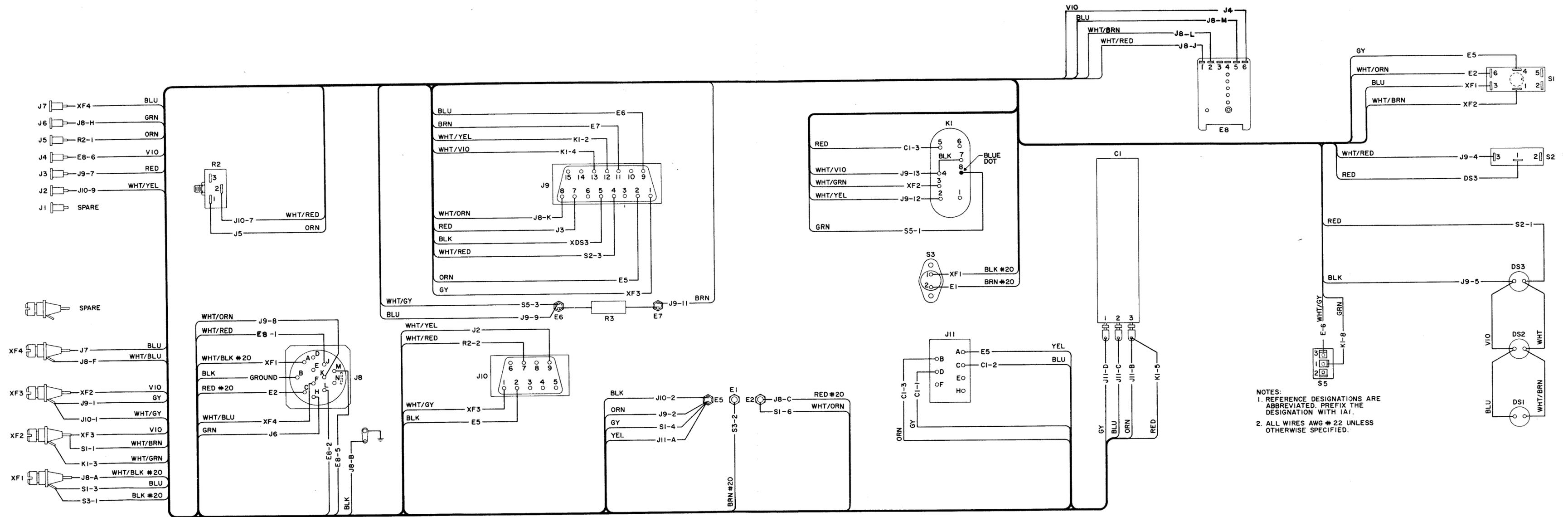


Figure A4-5. Electrical Chassis 1A1, Wiring Diagram, TT-299A/UG

SECTION A5
 MAINTENANCE

A5-1 GENERAL INFORMATION

A5-2 The information contained in this section supplements that already contained in T.M. 03315-15 with additional disassembly, assembly, and adjustment procedures required for maintenance of the TT-298 and TT-299 series equipment. It will be noted while using this T.M. 03315-15 that all of the legends for the exploded views in Section 5 of the basic manual contain item numbers. These item numbers are keyed to the official Marine Corps Stock List (SL-4-03315) and are to be disregarded when maintaining the TT-298 and TT-299 series units.

A5-3 When using this manual for the maintenance of TT-298 and TT-299 series units, disregard all information applicable to:

a. Upper Case "H" Motor Stop Mechanism - all units have Time Delay Motor Stops.

b. Service Cable - the using facility is supplied with a blank connector and is responsible for the preparation of all interface connections. If required, Bench Test Cable #561 can be obtained directly from MITE Corporation, 446 Blake Street, New Haven, Connecticut; attention, Spare Parts Manager.

c. D-C Line Sensor and D-C Power Supply - no D-C components are used with any of the TT-298 and TT-299 series units.

A5-4 DISASSEMBLY OF AUTOMATIC LINE FEED ON CARRIAGE RETURN MECHANISM

NOTE

The automatic line feed on carriage return mechanism should be disassembled only when absolutely necessary. The manual function slide assembly (16, figure A5-1) can be disassembled from printer with the line feed on carriage return mechanism intact by removing four screws (5).

Step 1 Position printer on its backplate.

Step 2 Unhook and remove cancellation lever spring (6, figure A5-1).

Step 3 Remove five retaining rings that secure line feed on carriage return mechanism to the manual function slide and levers of mechanism to other levers.

A1-14

Step 4 Unhook latch spring (8) from carriage return lever (9).

NOTE

Latch spring (8) is partially obscured in figure A5-1.

Step 5 Remove carriage return lever from three posts.

Step 6 Unhook and remove latch spring (8) from the latch (11) post.

Step 7 Remove line feed lever (12) from post (13) on manual function slide.

Step 8 Remove socket head cap screw (14) and eccentric (15) from manual function slide.

Step 9 Remove hex-nut (4), lock washer, flat washer and adjustable slide (3).

A5-5 ASSEMBLY OF AUTOMATIC LINE FEED ON CARRIAGE RETURN MECHANISM

Step 1 Place line feed lever (12, figure A5-1) on post (13) of manual function slide assembly (16).

Step 2 Secure line feed lever to post (13) on manual function slide (16) with retaining ring.

Step 3 Hook one end of latch spring (8) onto latch (11), the other end onto carriage return lever (9) and then place lever (9) over the post of latch (11).

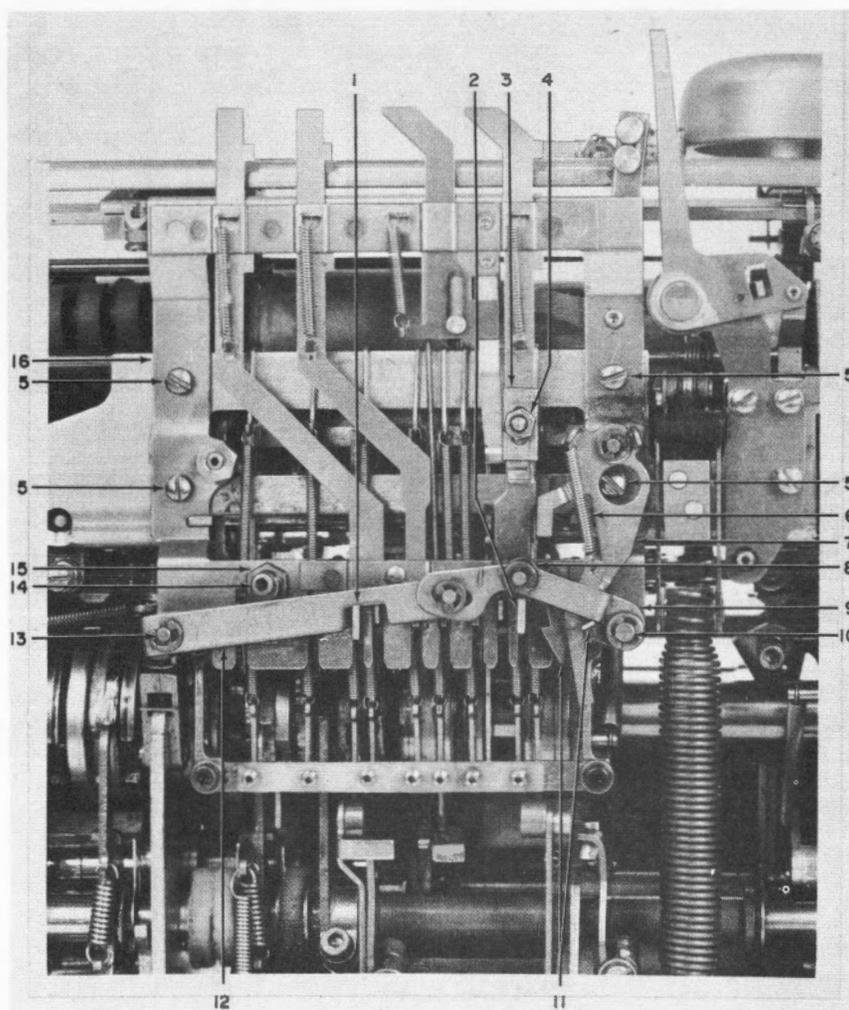
Step 4 Position carriage return lever (9) on post (10) mounted on manual function slide assembly, while aligning slot on other end of carriage return lever over post on end of line feed lever (12).

Step 5 Secure carriage return lever, latch and spring assembly to latch post and manual function slide assembly with retaining rings as indicated.

Step 6 Place cancellation lever (7) on post on manual function slide, with leg of cancellation lever positioned under carriage return lever (9) and to the left of tab on latch (11) as indicated.

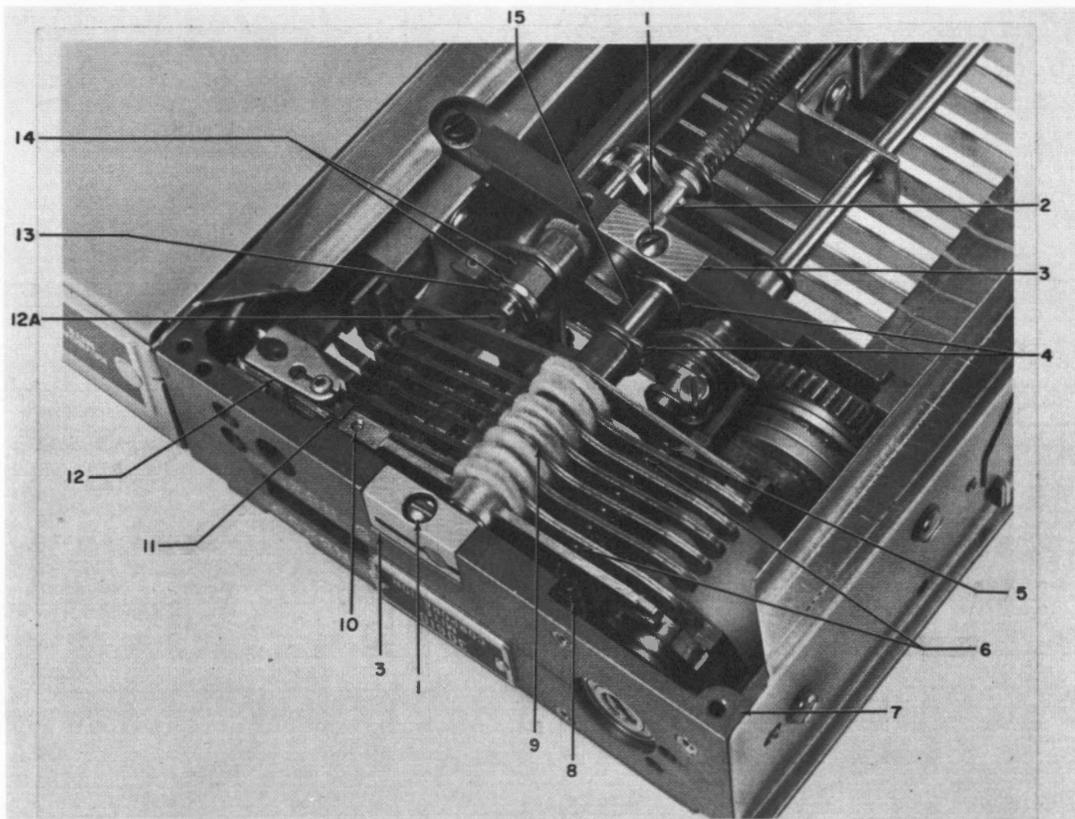
Step 7 Secure cancellation lever with retaining ring.

Step 8 Hook cancellation spring (6) to right eyelet on cancellation lever and to the eyelet on carriage return lever (9) to make the line feed on carriage return mechanism operative.



ITEM	DESCRIPTION
1	Line feed clutch release arm (extension)
2	Carriage return clutch release arm (extension)
3	Adjustable slide
4	Hex-nut
5	Slotted head screws
6	Cancellation spring (in disable position)
7	Cancellation lever
8	Latch spring
9	Carriage return lever
10	Carriage return lever post (mounted on slide assembly)
11	Latch
12	Line feed lever
13	Line feed lever post (mounted on slide assembly)
14	Socket head cap screw
15	Eccentric
16	Manual function slide assembly

Figure A5-1. Automatic Line Feed on Carriage Return Mechanism



ITEM	DESCRIPTION
1	Slotted Head screw
2	Release pin
3	Shaft clamps
4	Grip rings
5	Prevent lever spring
6	Pulsing finger springs
7	Lower keyboard frame
8	Master pulsing cam follower spring
9	Pulsing finger and prevent lever assembly
10	Master pulsing contact actuator screw
11	Contact actuator
12	Master pulsing contact assembly
12A	Bail support shaft
13	Grip ring
14	Release lever and eccentric assembly
15	Prevent lever and pulsing finger shaft

Figure A5-2. 3/4 Bottom View of Keyboard Interlock Mechanism

NOTE

When hooked as illustrated in Figure A5-1, spring (6) disables the line feed on carriage return mechanism.

Step 9 Place adjustable slide (3), flat washer and lock washer and secure with hex-nut (4) on the threaded post on manual function slide assembly (16).

Step 10 Insert socket head cap screw (14) through eccentric (15) and secure to manual function slide in position as indicated.

NOTE

Readjust the automatic line feed on carriage return mechanism after any disassembly or reassembly.

A5-6 DISABLING LINE FEED ON CARRIAGE RETURN MECHANISM

Step 1 Hook spring (6, figure A5-1) to the cancellation lever (7) eyelet on the left of the pivot pin.

NOTE

Latch (11) is held out from under carriage return clutch release arm extension (2), thus disabling the line feed on carriage return mechanism.

A5-7 KEYBOARD INTERLOCK DISASSEMBLY

NOTE

The disassembly procedure in this addendum is applicable to the Interlock Mechanism only. Upon completion of this procedure, refer back to paragraph 5-5f of T. M. 03315-15 for keyboard disassembly.

Step 1 Unhook and remove finger springs (6, figure A5-2) master pulsing cam follower spring (8), and prevent lever spring (5).

Step 2 Remove two screws (1) and lock-washers.

Step 3 Unhook clutch release spring and clutch backstop spring from grip rings (4) on pulsing finger and prevent lever shaft (15).

Step 4 Loosen master pulsing contact actuator screw (10) and pivot master pulsing contact actuator (11) from between master pulsing contact (12) leaves.

Step 5 Slide two shaft clamps (3) off ends of pulsing finger and prevent lever shaft (15).

NOTE

If solenoid release pin (2) prevents removal of the inboard shaft clamp (3), remove solenoid bracket mounting screw (9, figure A5-3 under bracket) and move entire solenoid assembly away from frame wall. The spacers under the shaft clamps should be set aside for use during reassembly.

Step 6 Remove pulsing finger and prevent lever assembly (9) from lower keyboard frame (7).

Step 7 Remove grip spring (13) from bail support shaft (12A).

Step 8 Slide release lever and eccentric assembly (14) off bail support shaft (12A).

Step 9 Loosen clamping screw (12, figure A5-3) and remove repeat key actuator arm from repeat key shaft (11).

Step 10 Unhook bias spring (13) from actuate lever (14).

Step 11 Slide off bail support shaft (15) and repeat key shaft (11) the following assembled parts as a unit; release lever assembly (10, figure A5-4), release lever link assembly (9) and actuate lever assembly (8).

Step 12 Remove two retaining rings to disassemble release lever, release lever link, and actuate lever assemblies.

Step 13 Slide clutch release lever assembly (16, figure A5-3) and bias spring (13) off repeat key shaft (11).

Step 14 Loosen screw (17) and remove solenoid stop assembly from bail support shaft (15).

Step 15 Remove two attaching screws and right rear keyboard cover (3A) from the right keyboard frame.

Step 16 Remove two repeat key lever clamp screws (24, figure A5-4).

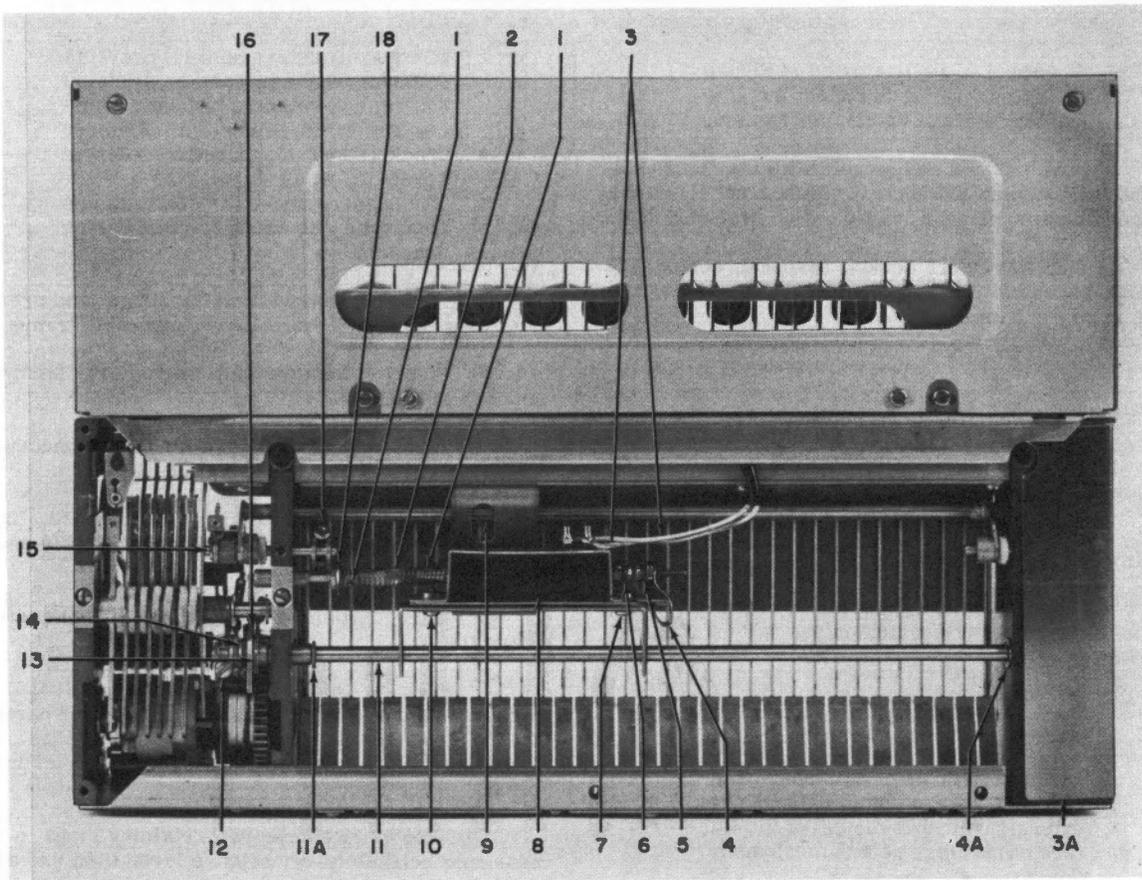
Step 17 Loosen repeat key lever clamp screw (25) and slide clamp off repeat key shaft.

Step 18 Slide grip ring off (behind repeat key lever clamp) off repeat key shaft.

Step 19 Remove retaining ring (4A) from repeat key shaft.

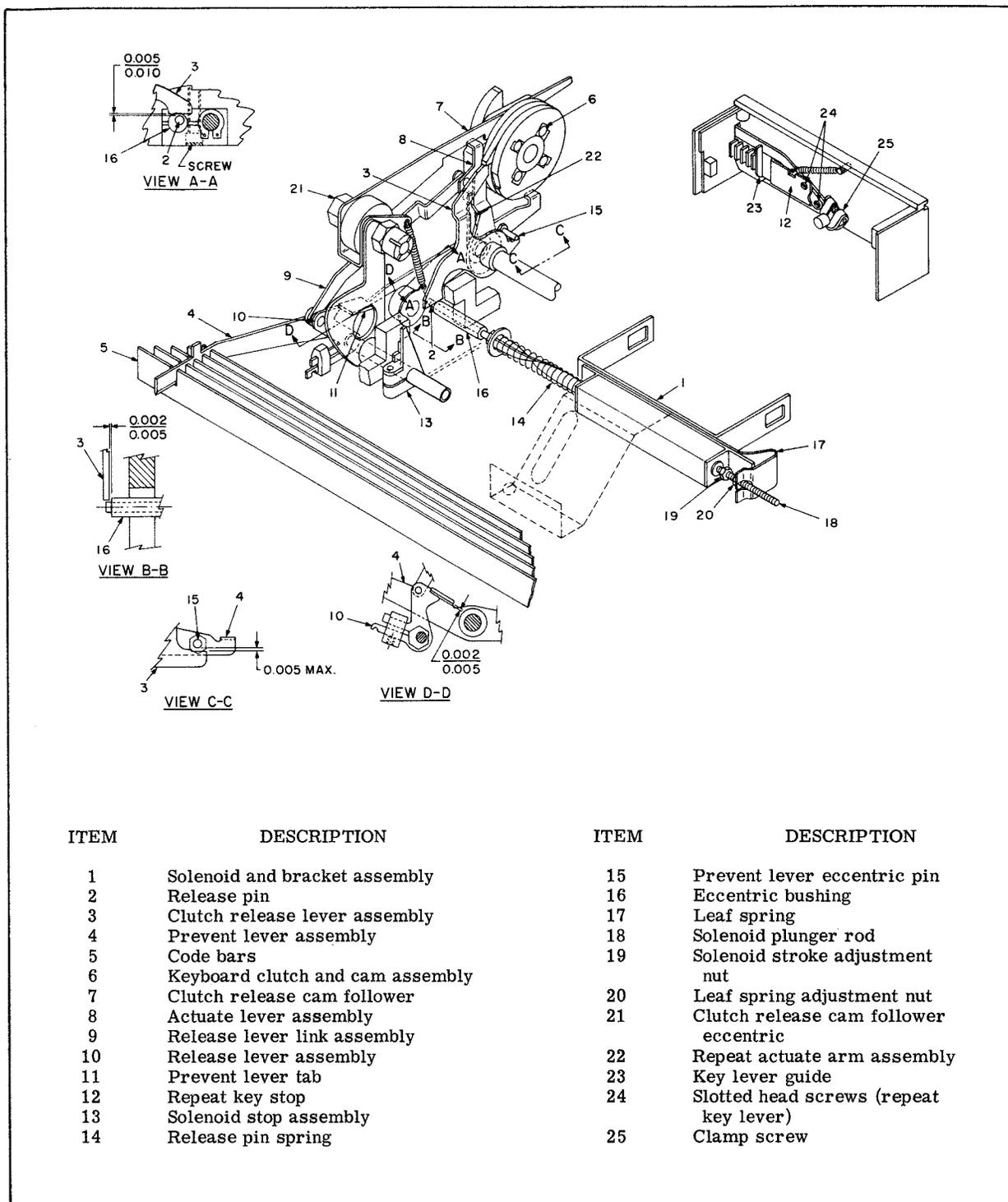
Step 20 Slide repeat key shaft to the right, until end of shaft is free from left keyboard frame (7, figure A5-2).

Step 21 Slide remaining grip ring (11A) off repeat key shaft.



ITEM	DESCRIPTION
1	Pin
2	Solenoid plunger extension
3	Wire leads
4	Leaf spring
5	Hex-nut and flex-lock nut
6	Hex-nut and flex-lock nut
7	Slotted head screw
8	Solenoid
9	Slotted head screw (solenoid bracket)
10	Slotted head screw
11	Repeat key shaft
11A	Grip ring
12	Repeat actuate arm
13	Bias spring
14	Actuate lever assembly
15	Bail support shaft
16	Clutch release lever assembly
17	Solenoid stop assembly
18	Washer

Figure A5-3. Bottom View Of Keyboard With Interlock Mechanism



ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Solenoid and bracket assembly	15	Prevent lever eccentric pin
2	Release pin	16	Eccentric bushing
3	Clutch release lever assembly	17	Leaf spring
4	Prevent lever assembly	18	Solenoid plunger rod
5	Code bars	19	Solenoid stroke adjustment nut
6	Keyboard clutch and cam assembly	20	Leaf spring adjustment nut
7	Clutch release cam follower	21	Clutch release cam follower eccentric
8	Actuate lever assembly	22	Repeat actuate arm assembly
9	Release lever link assembly	23	Key lever guide
10	Release lever assembly	24	Slotted head screws (repeat key lever)
11	Prevent lever tab	25	Clamp screw
12	Repeat key stop		
13	Solenoid stop assembly		
14	Release pin spring		

Figure A5-4. Keyboard Interlock Mechanism

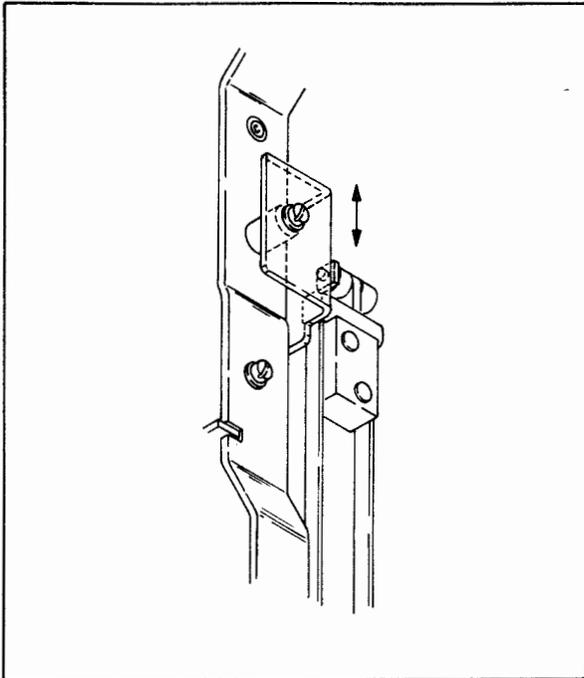


Figure A5-5. Pin Retaining Plate

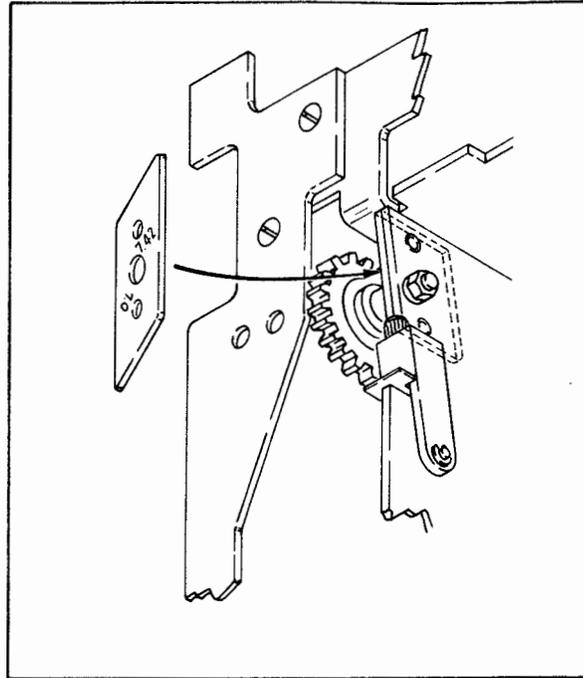


Figure A5-6. Movable Idler Gear Plate

Step 22 Complete removal of repeat key shaft by sliding shaft to the right and out of frame.

Step 23 Remove mounting bracket screw (9, figure A5-3), under bracket not visible.

NOTE

To free solenoid and mounting bracket completely from keyboard assembly unsolder two wire leads (3) to solenoid. This should be done only when absolutely necessary.

Step 24 Remove two screws (7, 10, figure A5-3) to disassemble solenoid mounting bracket, solenoid (8) and leaf spring (4).

Step 25 Remove two screws (5, 6, figure A5-3) and withdraw solenoid plunger assembly from solenoid.

Step 26 Remove solenoid spring (2), and washer (18) from solenoid plunger extension shaft.

NOTE

Further disassembly requires the pressing of two pins (1) from release pin and solenoid plunger and this disassembly should be done only when absolutely necessary.

A5-8 KEYBOARD INTERLOCK ASSEMBLY. The keyboard interlock mechanism is assembled by reversing the procedure in paragraph A5-7 of this addendum.

NOTE

The assembly procedure for the keyboard (less interlock mechanism) is contained in T.M. 03315-15, paragraph 5-5 ao.

A5-9 KEYBOARD INTERLOCK ADJUSTMENT. The adjustment of the keyboard interlock mechanism is performed as follows:

Step 1 Rotate keyboard clutch and cam assembly (6, figure A5-4) until prevent lever (4) is on the high of its cam.

Step 2 Loosen release lever (10) clamp screw.

Step 3 Rotate release lever (10) eccentric on the bail shaft until the release lever is positioned under prevent lever tab (11) with approximately 0.002 to 0.005 inch clearance between prevent lever tab (11) and release lever (view D-D).

Step 4 Tighten the release lever clamp screw when the clearance is established.

Step 5 With the prevent lever on the high of its cam, loosen eccentric pin lock nut (15).

Step 6 Hold clutch release lever (3) against the clutch cage (6) and simultaneously adjust eccentric pin (15) until 0.002 to 0.005 inch clearance is established between the prevent lever eccentric pin and the clutch release lever. (View C-C).

Step 7 Tighten the eccentric pin lock nut when the clearance is established.

Step 8 Loosen the release pin eccentric bushing clamp screw (View A-A).

Step 9 Slide eccentric bushing (16) to the left until 0.002 to 0.005 inch clearance is established between clutch release lever (3) and eccentric bushing (16, View B-B).

Step 10 Tighten release pin eccentric (16) bushing clamp screw when clearance is established.

Step 11 Loosen solenoid bracket (1) mounting screws.

Step 12 Hold the solenoid plunger against its seat in the solenoid and simultaneously position the entire solenoid and mounting bracket assembly (1) so that the end of the release pin (2) is flush with or slightly below the left face of eccentric bushing (16).

Step 13 Tighten the solenoid mounting bracket screws.

Step 14 Loosen leaf spring mounting screws (17).

Step 15 Adjust the leaf spring so that the threaded position of solenoid plunger rod (18) is allowed to pass freely through the slot in the leaf spring.

Step 16 Tighten the leaf spring mounting screws.

Step 17 Loosen the solenoid stroke adjustment nut (19), lock nut.

Step 18 Adjust solenoid stroke adjustment nut (19) so that the solenoid plunger has a maximum forward stroke of 3/64 inch.

NOTE

At this time release pin (2) should engage at least one half the thickness of clutch release lever (3). If this requirement is not met, recheck steps 10, 11, and 12.

Step 19 Manually hold the solenoid plunger in its seated (energized) position and simultaneously adjust leaf spring adjustment nut (20) so that the leaf spring is deflected approximately 1/32 inch.

Step 20 Tighten leaf spring adjustment nut (20), lock nut.

Step 21 Rotate the keyboard clutch to the stop position. (Clutch release lever holding against the clutch tab).

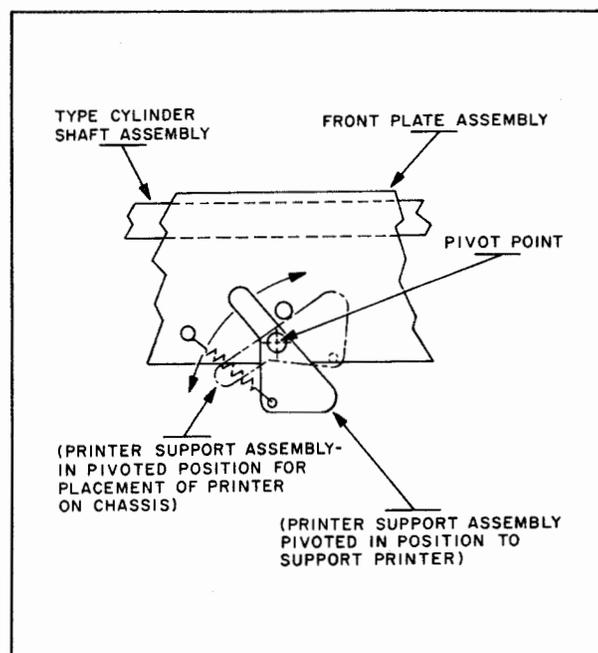


Figure A5-7. Printer Support Assembly

Step 22 Loosen release pin eccentric bushing (16) clamp screw.

Step 23 Rotate the eccentric bushing until there is a 0.005 to 0.010 inch clearance between the lower edge of the clutch release lever and the top of the release pin (View A-A).

Step 24 Tighten the release pin eccentric bushing clamp screw (View A-A).

Step 25 Loosen the clutch release cam follower eccentric, lock nut (21) while the keyboard clutch is still in the stop position.

Step 26 Adjust clutch release cam follower eccentric (21) so that a minimum amount of follower (7) travel is required to pull the release lever (10) out from under the prevent lever tab (11) when a key is depressed.

Step 27 Tighten the clutch release cam follower eccentric lock nut.

Step 28 Loosen the repeat arm clamp screw (22).

NOTE

The repeat key is normally disabled when the keyboard interlock mechanism is in use. Repeat key stop (12) must be disengaged from under the repeat key lever in the key guide (23) before performing step 28. Refer to paragraph A5-10.

ADDENDUM

Step 29 Position repeat arm (22) against actuate lever (8) with the repeat key depressed until release lever (10) is tripped out from under the tab (11) on the prevent lever (4).

Step 30 Tighten the repeat arm clamp screw.

NOTE

The repeat key must be disabled after performing steps 28 and 29. Refer to paragraph A5-10 for repeat key disabling procedure.

A5-10 DISABLING THE REPEAT KEY FOR KEYBOARD INTERLOCK OPERATION. The repeat key should be disabled when the interlock mechanism is in use. The method of disabling the repeat key is as follows:

Step 1 Remove the keyboard right side, rear cover attaching screw.

Step 2 Remove right side, rear cover.

Step 3 Loosen repeat key stop (12, figure A5-3) clamp screw.

Step 4 Slide repeat key stop (12) forward so that its extension is between the bottom of the repeat key lever and key lever guide (23).

Step 5 Tighten the repeat key stop clamp screw.

NOTE

The repeat key should be disabled whenever the keyboard interlock mechanism is in use.

Step 6 Replace the right side rear cover with its attaching screws.

A5-11 DISABLING THE KEYBOARD INTERLOCK MECHANISM. The keyboard interlock mechanism may be disabled to permit use of the keyboard without receipt of a synchronous pulse. The procedure for disabling the keyboard interlock is as follows:

Step 1 Loosen adjustable solenoid stop (13, figure A5-4), clamping screw.

Step 2 Position the adjustable stop against the shoulder on release pin (2) so that the release pin is held even with or slightly below the left face of eccentric bushing (16).

Step 3 Tighten the adjustable stop clamping screw when the release pin is properly positioned.

NOTE

The keyboard interlock mechanism should not be disabled without specific authorization to do so.

A1-22

A5-12 FUNCTION LEVER CLEVIS PIN RETAINING PLATE REMOVAL (See figure A5-5).

Step 1 Remove slotted head screw, its washer, and function lever clevis pin retaining plate.

Step 2 Grasp function spring yoke to relieve the tension and slide function lever clevis pin out to the left.

NOTE

Disassembly procedures requiring the separation of the front and rear halves of the printer necessitate removal of the function lever clevis pin.

A5-13 REPLACEMENT OF FUNCTION LEVER CLEVIS PIN RETAINING PLATE

NOTE

If function lever clevis pin has been removed, insert the clevis pin through the function lever and function spring yoke before performing the following steps.

Step 1 Place lockwasher on slotted head screw and insert the screw into the retaining plate.

Step 2 Thread the screw into the hole in off-line function slide bracket just far enough to secure the clevis pin retaining plate.

Step 3 Align the pin retaining plate in a manner that allows the free fall of the function lever and function spring yoke assemblies while the printer is on the back plate.

A5-14 MOVABLE IDLER GEAR PLATE REPLACEMENT (See figure A5-6). As previously explained in Section A1 of this addendum, the movable idler gear plate is installed in Group 3 equipments only. However, it is possible that new frames incorporating this plate will go into the field on a spare parts basis, making it very important that the individual ascertain the correct signal code. When the code has been ascertained install the plate as follows:

Step 1 Place the printer on its backplate.

Step 2 Observe the engraved numbers on the movable plate and position that number representing the unit code in the right-side up.

Step 3 Slide the plate over the locating pins and secure the idler gear and movable plate assembly with the appropriate hardware.

A5-15 PRINTER SUPPORT ASSEMBLY. No maintenance, other than changing defective springs, is required on the Printer Support Assembly. See figure A5-7.

FUSE TYPE

<p>Belling & Lee (L754)</p> <p>Cartridge NObsr 87611 TT-299A TT-298A MITE Drawing #7097</p> <p>Fuse Complement</p> <p>F1 (5AMP) Main Power F2 (1AMP) Motor F3 (.500AMP) Signal Line Power Supply & Line Sensor F4 (.25AMP) Signal Loop F5 Spare</p>	<p>Bussman (FM01)</p> <p>Plug-in NObsr 98451 TT-299B TT-298B MITE Drawing #33342</p> <p>Fuse Complement</p> <p>F1 (5AMP) Main Power F2 (1AMP) Motor F3 (.500AMP) Signal Line Power Supply & Line Sensor F4 (Not Used) F5 (.100AMP) Internal Line Pot.</p>	<p>Bussman (FM01)</p> <p>Plug-in NOm 72994 TT-299B TT-298B MITE Drawing #33718</p> <p>Fuse Complement</p> <p>F1 (5AMP) Main Power F2 (1AMP) Motor F3 (.500AMP) Signal Line Power Supply & Line Sensor F4 (Not Used) F5 (.100AMP) Internal Line Pot.</p>
<p>Trouble & Corrective Action</p>	<p>Trouble & Corrective Action</p>	<p>Trouble & Corrective Action</p>
<p>F1 Symptom: Motor & copy lights inoperative. (Replace defective fuse.)</p>	<p>F1 Symptom: Motor & copy lights inoperative. (Replace defective fuse).</p>	<p>F1 Symptom: Motor & copy lights inoperative. (Replace defective fuse).</p>
<p>F2 Symptom: Motor inoperative; copy lights operative. (Replace defective fuse).</p>	<p>F2 Symptom: Motor inoperative; copy lights operative. (Replace defective fuse).</p>	<p>F2 Symptom: Motor inoperative; copy lights operative. (Replace defective fuse).</p>
<p>F3 Symptom: Printer runs open, no signal line current, no copy lights. (Replace defective fuse).</p>	<p>F3 Symptom: Printer runs open, no copy lights. (Replace defective fuse).</p>	<p>F3 Symptom: Printer runs open no copy lights. (Replace defective fuse).</p>
<p>F4 Symptom: Printer runs open. (Replace defective fuse).</p>	<p>F4 (Not Used)</p>	<p>F4 (Not Used)</p>
<p>F5 (Not Used)</p>	<p>F5 Symptom: Printer runs open. Line current excessive. (Replace; blown fuse and have a signal line battery source adjust line current supplied.)</p>	<p>F5 Symptom: Printer runs open. Line current excessive. (Replace; blown fuse and have a line battery source adjust line current supplied.)</p>

ADDENDUM

LUBRICATION INSTRUCTIONS FOR LINE FEED ON CARRIAGE RETURN,
KEYBOARD INTERLOCK, PIN RETAINING PLATE

FIGURE AND INDEX NO.	LUBRICATION OR CHECK POINT	Any Assembly or Reassembly	Every 250 Hours	Every 500 Hours	Every 1000 Hours	Every 3000 Hours
CAUTION						
DO NOT OVERLUBRICATE. APPLY ONE OR TWO DROPS OF OIL BY DIPPING A PIECE OF NO. 22 BARE WIRE ONE-HALF INCH INTO THE OIL AND IMMEDIATELY TOUCH THE WIRE TO THE LUBRICATION POINT. THIS METHOD PREVENTS OVERLUBRICATION. APPLY LUBRICANTS TO GEARS AND CAMS WITH A BRUSH AND TO OTHER MOVING PARTS WITH AN APPLICATOR THAT WILL APPLY ONE DROP AT A TIME. AFTER APPLYING LUBRICANT, SPREAD IT EVENLY AND IMMEDIATELY REMOVE ANY EXCESS. LUBRICANT COMING IN CONTACT WITH PARTS OTHER THAN MOVING PARTS MAY CAUSE DAMAGE.						
15, figure A5-1	Eccentric	G			G	W
2, 1, figure A5-1	Carriage return and line feed clutch release arm, extensions.	G		G		
6, figure A5-1	Cancellation spring	O		O		
8, figure A5-1	Latch spring	O		O		
11, figure A5-4	Release lever, (point).	G		G		
11, 9, 8, figure A5-4	Release lever, link, and actuate lever assembly, pivot points)	O		O		
3, figure A5-4	Clutch release	G		G		
2, figure A5-4	Release pin	O	O			
figure A5-5	Clevis pin (point of contact by pin with retaining plate)	G	G			
KEY						
G-Standard Oil Beacon Lubricant No. 325, MIL-G-3278A FSN 9150-261-8297, 8-ounce tube						
O-Pioneer Ball Bearing Oil, PD14926-51, MIL-6085A FSN 9150-223-4129, 1-quart can						
W-Inspect these points for wear and/or proper clearances.						

TABLE OF CONTENTS

SECTION 1 - GENERAL INFORMATION		SECTION 2 - INSTALLATION (Cont)	
Paragraph	Page	Paragraph	Page
1-1.	Scope	1-1	
1-2.	General Description	1-1	
	a. Purpose of Equipment	1-1	
	b. Operating Options	1-1	
	c. Principles of Operation	1-1	
	d. Operating Features	1-2	
1-3.	Reference Data	1-4	
	a. Nomenclature	1-4	
	b. Special Features	1-4	
	c. Power Requirements	1-5	
	d. Type of Installation	1-5	
	e. Ambient Temperature Limits	1-5	
	f. Operating Speed	1-5	
	g. Signal Code Type	1-5	
	h. Keyboard	1-5	
	i. Type of Characters	1-5	
	j. Type Face	1-5	
	k. Printer Line Spacing	1-5	
	l. Characters Per Line	1-5	
	m. Input Impedance	1-5	
	n. Alarm Devices	1-5	
	o. Copy Paper	1-6	
1-4.	Equipment Supplied	1-6	
1-5.	Equipment and Publications Required But Not Supplied	1-6	
1-6.	Factory or Field Changes	1-6	
1-7.	Equipment Similarities	1-6	
1-8.	Preparation For Reshipment	1-6	
SECTION 2 - INSTALLATION			
2-1.	Introduction	2-0	
2-2.	Unpacking and Handling	2-0	
	a. Removing Equipment From Shipping Container	2-0	
	(1) General	2-0	
	(2) Teletypewriter TT-297/UG or TT-297A/UG	2-0	
	(3) A-c Components	2-0	
	b. Inspection	2-0	
2-3.	Power Requirements and Distribution	2-2	
	a. Power Requirements	2-2	
	b. Power Distribution	2-2	
2-4.	Site Selection	2-2	
2-5.	Component Selection	2-2	
	a. Electrical Components Selection	2-2	
	b. Case Selection	2-2	
2-6.	Installation of Case	2-2	
	a. Tactical Case CY-2976/PG	2-2	
	(1) Low Vibration Installation	2-3	
	(2) High Vibration and Shock Installations	2-3	
	b. Non-Tactical Case CY-2977/UG or CY-2977A/UG	2-3	
	(1) Office Installations	2-3	
	(2) Airborne Installations	2-3	
2-7.	Installation of Electrical Components	2-3	
	a. Motor and Fan Outlet Duct	2-4	
	b. Signal Line Power Supply Installation	2-4	
	c. Line Sensor Installation	2-5	
	d. A-c Heating Element Installation	2-5	
2-8.	Initial Performance Check and Adjustments	2-5	
	a. General	2-5	
	b. Service Cable Connection	2-6	
	c. Initial Turn-On Procedure	2-6	
	d. Initial Performance Check	2-6	
	e. Adjustments	2-6	
	(1) AN/TGC-14(V) Local Range Adjustment	2-6	
	(2) AN/TGC-14(V) Local Range Adjustment	2-7	
	(3) Line Sensor Range Adjustment	2-8	
	(4) Signal Line Current Adjustment	2-9	
2-9.	Patching Options	2-9	
	a. Half-Duplex Mode Operation (Simplex)	2-9	
	(1) Line Battery Supplied Internally (Mode 1)	2-9	
	(2) Local Loop	2-9	
	(3) Line Battery Supplied Externally (Mode 2)	2-9	
	b. Full-Duplex Mode Operation	2-9	
	(1) Receive Line Battery Supplied Internally, Send Line Battery Supplied Externally (Mode 3)	2-9	
	(2) Receive Line Battery Supplied Externally, Send Line Battery Supplied Externally (Mode 4)	2-9	
	(3) Send Line Battery Supplied Internally, Receive Line Battery Supplied Externally (Mode 5)	2-9	
	c. External Line Patching of Converters	2-12	
2-10.	Speed Change Gear Replacement	2-12	
2-11.	Final Preparation for Use	2-13	
SECTION 3 - OPERATION			
3-1.	Introduction	3-0	
3-2.	Functional Operation	3-0	
	a. Purpose of Equipment	3-0	
	b. Capabilities and Limitations	3-0	

SECTION 3 - OPERATION (Cont)

SECTION 4 - TROUBLE SHOOTING (Cont)

Paragraph	Page
(1) Primary Power Source Options	3-0
(2) Operating Speed Options	3-0
(3) Operating Mode Options	3-0
c. Basic Principles of Operation	3-0
3-3. Operating Procedures	3-0
a. Description of Controls	3-0
b. Description of Indicators	3-0
c. Sequence of Operation	3-0
(1) Preliminary Starting Procedure	3-0
(2) Installation of Ribbon	3-0
(3) Installation of Paper	3-4
(4) Starting Procedure	3-6
(5) Operating Procedure and Checks	3-6
(6) Stopping Procedure	3-6
3-4. Summary of Operating Procedures	3-6
3-5. Operator's Maintenance	3-6
a. Replacement Procedures	3-7
(1) Ribbon Replacement	3-7
(2) Paper Replacement	3-7
(3) Fuse Replacement	3-7
(4) Copy Lamp Replacement	3-7
b. Operating Checks and Adjustments	3-7
(1) Range Calibration Check and Adjustment	3-7
(2) Letter Spacing Check	3-7
c. Preventive Maintenance	3-7

SECTION 4 - TROUBLE SHOOTING

4-1. Introduction	4-1
4-2. Test Equipment and Special Tools	4-1
4-3. Logical Trouble Shooting	4-1
4-4. Overall Functional Description	4-1
a. Overall Operation	4-1
b. Off Line Local Mode	4-2
c. Half-Duplex Mode (Simplex)	4-2
d. Full-Duplex Mode	4-3
4-5. Overall Trouble Shooting	4-3
a. General	4-3
(1) Equipment Already in Use	4-3
(2) Equipment of Unknown Condition	4-3
(3) Newly Installed Equipment	4-3
b. Test Setup and Preliminary Checks	4-3
c. System Trouble-Shooting Procedure	4-4
4-6. Functional Section Trouble Shooting	4-4
a. Preliminary Procedures	4-4
b. Test Setup	4-4
c. Test Points	4-4
4-7. Send Functional Section Trouble Shooting	4-4
a. Theory of Operation	4-4
(1) Mechanical Functions	4-4
(2) Electrical Functions	4-5
b. Trouble-Shooting Procedure	4-6

Paragraph	Page
4-8. Receive Functional Section Trouble Shooting	4-6
a. Line Sensor Theory of Operation	4-6
(1) Block Diagram Discussion	4-7
(2) Simplified Schematic Diagram Discussion	4-7
(3) Line Sensor Motor Stop Function	4-8
b. Line Sensor Trouble-Shooting Procedure	4-9
c. Printer Theory of Operation	4-9
(1) Block Diagram Discussion	4-10
(2) Selector Mechanism	4-10
(3) Start Clutch Release System	4-11
(4) Printer Main Shaft Clutch and Cam Assembly	4-11
(5) Print Cylinder Positioning System	4-13
(6) Function Selector	4-15
(7) AN/TGC-14(V) Figures H Motor Stop Function	4-19
(8) AN/TGC-14A(V) Automatic Time Delay Motor Stop Function	4-20
(9) Ribbon Feed Mechanism	4-21
(10) Printer Motors	4-21
d. Printer Trouble-Shooting Procedure	4-21
4-9. Power Supply and Distribution Functional Section Trouble Shooting	4-21
a. General	4-21
b. Signal Line Power Supply Theory of Operation	4-22
c. Signal Line Power Supply Trouble-Shooting Procedure	4-22
d. Electrical Chassis Trouble-Shooting Procedure	4-22
4-10. Voltage, Current, and Resistance Measurements	4-22
4-11. Signal Distortion in Teletypewriter Systems	4-22
a. General	4-22
b. Bias Distortion	4-22
c. Characteristic Distortion	4-23
(1) General	4-23
(2) Negative Characteristic Distortion	4-23
(3) Positive Characteristic Distortion	4-24
d. Fortuitous Distortion	4-24
e. End Distortion	4-24

SECTION 5 - MAINTENANCE

5-1. Introduction	5-1
5-2. Test Equipment and Tools	5-1
5-3. Preventive Maintenance	5-1

SECTION 5 - MAINTENANCE (Cont)

Paragraph	Page
a. General	5-1
b. Preventive Maintenance for Operating Personnel	5-1
c. Preventive Maintenance for Maintenance Personnel	5-1
5-4. Maintenance Standards	5-1
5-5. Repair	5-2
a. Failure Reports	5-2
b. Removal Procedures	5-2
(1) Case Cover Removal	5-2
(2) Service Cable Removal	5-2
(3) Printer Front Cover and Electrical Chassis Removal	5-2
(4) Keyboard Removal	5-2
(5) Paper Guide Removal	5-2
(6) Printer Removal	5-2
(7) Line Sensor Removal	5-2
(8) Signal Line Power Supply Removal	5-2
c. Replacement Procedures	5-3
(1) Rotary Cable Replacement	5-3
(2) Return Cable Replacement	5-3
(3) Print Hammer Cable Replacement	5-4
(4) Lateral Control Belt Replacement	5-4
(5) Master Pulsing Contact Assembly Replacement	5-4
d. Disassembly Procedures	5-5
e. Disassembly of Printer Into Three Main Subassemblies	5-5
(1) Main Shaft Disassembly	5-5
(2) Rear Half Disassembly	5-6
(3) Front Half Disassembly	5-9
(4) Ribbon Feed Top Plate Disassembly	5-14
f. Keyboard Disassembly	5-15
g. Electrical Chassis Disassembly	5-16
h. Line Sensor Disassembly	5-16
i. Signal Line Power Supply Disassembly	5-17
j. Service Cable Disassembly	5-17
k. Cleaning	5-17
l. Inspection	5-17
(1) Mechanical Components	5-17
(2) Electrical Components	5-17
m. Lubrication	5-17
n. Assembly Procedures	5-17
o. Mark and Space Clutch Release Selector Shaft, Timing Cam Shaft, and Backstop Shaft Assembly	5-17
(1) Timing Cam Shaft Assembly	5-17
(2) Mark and Space Clutch Release Selector Shaft Assembly	5-18
(3) Backstop Shaft Assembly	5-19
p. Third Reduction Pinion Assembly	5-19
q. Idler Gear Assembly	5-19
r. V Lever and Linkage Assembly	5-20

SECTION 5 - MAINTENANCE (Cont)

Paragraph	Page
s. Rear Frame Assembly	5-20
t. Motor and Motor Mount Assembly	5-20
u. Selector Assembly, Installation, and Check	5-20
v. Back Plate Assembly and Installation	5-22
w. Time Delay Mounting Base Plate Assembly and Installation	5-22
x. Main Shaft Assembly and Installation	5-22
(1) Selector Main Shaft Assembly	5-22
(2) Function Main Shaft Assembly	5-23
(3) Main Shaft Installation	5-23
y. Feed Mechanism and Motor Stop Assembly and Installation	5-24
z. Front Frame Assembly	5-24
(1) Rear Side Assembly	5-24
(2) Front Side Assembly	5-25
aa. Function Slide Assembly	5-25
ab. Strip Assembly	5-26
(1) Lateral Control Belt Strip Assembly	5-26
(2) Rotary Cable Strip Assembly	5-26
ac. Function Backstop Assembly	5-26
ad. Advance Drum Assembly and Installation	5-27
ae. Front Frame and Main Shaft Assembly	5-27
af. Takeup Bracket Assembly and Installation	5-28
ag. Print Lever Shaft Installation	5-29
ah. Function Shaft and Right-Hand Section Assembly and Installation	5-29
ai. Paper Feed Assembly and Installation	5-30
aj. Print Cylinder Shaft Assembly and Installation	5-31
ak. Print Cylinder Yoke Shaft Assembly and Installation	5-31
al. Print Hammer Shaft Assembly and Installation	5-31
am. Front Plate Assembly and Installation	5-31
an. Ribbon Feed Top Plate Assembly	5-32
ao. Keyboard Assembly	5-33
ap. Electrical Chassis Assembly	5-34
aq. Line Sensor Assembly	5-34
ar. Signal Line Power Supply Assembly	5-34
as. Service Cable Assembly	5-35
at. Adjustment Procedures	5-35
au. Printer Adjustments	5-35
(1) Standard Procedures	5-35
(2) Clutch Backstop Adjustment	5-36

SECTION 5 - MAINTENANCE (Cont)

SECTION 5 - MAINTENANCE (Cont)

Paragraph	Page	Paragraph	Page
(3) Selection Adjustments	5-36	ay. Paper Brake Adjustment	5-47
(4) Preliminary Positioning of Range Dial	5-37	az. Ribbon Feed Adjustments	5-47
(5) Chain and Cable Adjustments	5-37	ba. Keyboard Adjustments	5-47
(6) Function Section Adjustments	5-38	(1) Overall Adjustments	5-47
(7) Print Section Adjustments	5-41	(2) Oscilloscope Adjustment of Keyboard	5-48
av. Automatic Lateral Control Chain Takeup Adjustment	5-45	(3) Field Adjustment of Keyboard	5-49
aw. Figures H Motor Stop Adjustment	5-45	bb. Sprocket-Feed Paper Adjustment	5-50
ax. Automatic Time Delay Motor Stop Adjustment	5-46	5-6. Reference Data	5-51
		a. Seating Torque Values	5-51
		b. Tension Values	5-51
		5-7. Overall Schematic and Wiring Diagrams	5-51

LIST OF ILLUSTRATIONS

SECTION 1 - GENERAL INFORMATION		SECTION 3 - OPERATION (Cont)	
Figure	Page	Figure	Page
1-1.	Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V)	1-0	
1-2.	Five-Level Baudot Code	1-2	
1-3.	Teletypewriter Set Ready For Operation	1-3	
1-4.	Teletypewriter Set, Rear View	1-3	
1-5.	Teletypewriter Set, Case and Cover Removed	1-4	
1-6.	Service Cable Assembly	1-5	
1-7.	Tactical Case CY-2976/PG	1-5	
1-8.	Tactical Case CY-2976/PG, Cover Compartment	1-6	
1-9.	Heating Element	1-6	
SECTION 2 - INSTALLATION			
2-1.	Printer and Electrical Chassis, Parts Location	2-1	
2-2.	Tactical Case CY-2976/PG, Overall Dimensions	2-2	
2-3.	Tactical Case CY-2976/PG, Low Vibration Installation, Mounting Holes Location	2-3	
2-4.	Tactical Case CY-2976/PG, Shock Mounted Installation, Mounting Holes Location	2-3	
2-5.	Non-Tactical Case CY-2977/UG or CY-2977A/UG, Overall Dimensions	2-4	
2-6.	Non-Tactical Case CY-2977/UG or CY-2977A/UG, Shock Mounted Installation, Mounting Holes Location	2-5	
2-7.	Range Dial Adjustment, Parts Location	2-7	
2-8.	Printer and Electrical Chassis, Left-Side View	2-8	
2-9.	Line Sensor Range Adjustment, Parts Location	2-8	
2-10.	Patching Mode 1, Simplified Wiring Diagram	2-10	
2-11.	Patching Mode 2, Simplified Wiring Diagram	2-10	
2-12.	Patching Mode 3, Simplified Wiring Diagram	2-11	
2-13.	Patching Mode 4, Simplified Wiring Diagram	2-11	
2-14.	Patching Mode 5, Simplified Wiring Diagram	2-12	
2-15.	External Line Patching, Typical Connection Circuit	2-12	
2-16.	Printer and Electrical Chassis, Right-Side View	2-13	
SECTION 3 - OPERATION			
3-1.	Operator's Controls	3-1	
3-2.	Ribbon Threading Diagram	3-4	
3-3.	Paper Spool Assembly	3-4	
3-4.	Installation Diagram, Sprocket-Feed Paper	3-5	
SECTION 4 - TROUBLE SHOOTING			
4-1.	Functional Sections	A-33	
4-2.	Off-Line Local Mode, Functional Block Diagram	4-2	
4-3.	Half-Duplex Mode, Functional Block Diagram	4-2	
4-4.	Full-Duplex Mode, Functional Block Diagram	4-3	
4-5.	Trouble-Shooting Flow Chart	A-35	
4-6.	A-c Primary Power Distribution, Simplified Schematic Diagram	A-37	
4-7.	Keyboard 1A9, Mechanical Diagram	A-37	
4-8.	Keyboard 1A9, Simplified Schematic Diagram	4-6	
4-9.	Keyboard 1A9, Location of Test Points.	A-39	
4-10.	Line Sensor 1A3, Functional Block Diagram	4-7	
4-11.	Line Sensor 1A3, Simplified Schematic Diagram	4-8	
4-12.	Line Sensor 1A3, Motor Stop Function, Simplified Schematic Diagram	4-9	
4-13.	Line Sensor 1A3, Location of Test Points	A-39	
4-14.	Printer 1A2, Functional Block Diagram	A-41	
4-15.	Selector Mechanism	4-11	
4-16.	Selector, Clutch Release Mechanism	4-11	
4-17.	Start Clutch Release Mechanism	4-12	
4-18.	Printer 1A2, Main Shaft Assembly.	4-12	
4-19.	Print Cylinder and Print Hammer Positioning System	A-43	
4-20.	Print Cylinder Positioning Mechanism.	4-14	
4-21.	Print Cylinder, Developed View	4-14	
4-22.	Print Cylinder Positioning Clutch Release System	A-45	
4-23.	Rotary Function and Lateral Control Function Slides, Function Positions	4-16	
4-24.	Function Selector, Start of Function Cycle	A-47	
4-25.	Function Selector, Operating Cycle	A-49	
4-26.	Function Selector, Blank Linkage	4-16	
4-27.	Function Selector, Space Linkage	4-17	
4-28.	Function Selector, Letters Figures Linkage	A-51	
4-29.	Function Selector, Character Printing Linkage	4-18	
4-30.	Function Selector, Print Prevent Linkage	4-18	
4-31.	Function Selector, Character Advance Prevent Linkage	A-53	
4-32.	Function Selector, Off Line Function Control Linkage	4-19	
4-33.	Ribbon Feed Mechanism	4-21	

SECTION 4 - TROUBLE SHOOTING (Cont)

SECTION 5 - MAINTENANCE (Cont)

Figure	Page
4-34. Printer 1A2, Location of Test Points . .	A-55
4-35. Signal Line Power Supply 1A4, Simplified Schematic Diagram	4-22
4-36. Signal Line Power Supply 1A4, Location of Test Points	A-55
4-37. Electrical Chassis 1A1, Location of Test Points	A-55
4-38. Effect of Series Inductance On Pulse Lengths	4-23
4-39. Waveshapes Showing Characteristic Distortion	4-23

Figure	Page
5-32. Ribbon Feed and Front Plate Assemblies	A-131
5-33. Print Hammer, Print Cylinder, and Print Cylinder Yoke Assembly	A-133
5-34. Paper Feed Assembly	A-135
5-35. Takeup Drum and Linkage Assembly . .	A-137
5-36. Advance Drum and Linkage Assembly .	A-139
5-37. Function Selector Assembly	A-141
5-38. Front Frame Assembly (Rear View) . .	A-143
5-39. Ribbon Feed Top Plate Assembly . . .	A-145
5-40. Keyboard Assembly (Sheet 1 of 2) . . .	A-147
5-40. Keyboard Assembly (Sheet 2 of 2) . . .	A-149
5-41. Electrical Chassis Assembly	A-151
5-42. Line Sensor	A-153
5-43. Signal Line Power Supply	A-155
5-44. Service Cable	A-157
5-45. Printer Assembly	A-159
5-46. Selector Assembly	A-161
5-47. Advancing Clutches Manually	A-161
5-48. Clutch Backstop Adjustment	A-163
5-49. Start Clutch Release Adjustment	A-165
5-50. Selector Linkage Adjustment	A-165
5-51. Function Slide Alignment	A-167
5-52. Lateral Control Belt Adjustment, Clearance Requirements	A-167
5-53. Function Shaft Adjustment	A-169
5-54. Function Bar Adjustment, Screw Position	A-169
5-55. Function Bar and Function Sensing Finger Lever Alignment	A-169
5-56. Advance Prevent Lever Engaged with Advance Suppression Latch	A-169
5-57. Character Advance Pawl and Advance Ratchet Tooth Clearance	A-171
5-58. Check Pawl and Advance Ratchet Tooth Clearance	A-171
5-59. Carriage Return Linkage	A-171
5-60. Carriage Return Lever Adjustment . . .	A-171
5-61. Carriage Return Lock Lever Eccentric Bushing Adjustment	A-173
5-62. Automatic Carriage Return and Line Feed Linkage	A-173
5-63. Function Bar and Function Sensing Finger Lever Clearance Adjustment . .	A-175
5-64. Bell Function Linkage	A-175
5-65. Line Feed Linkage	A-177
5-66. Print Hammer Release Adjustment . . .	A-179
5-67. Print Hammer Backstroke Adjustment	A-179
5-68. Print Linkage Adjustment	A-179
5-69. Print Prevent Arm Engaged with Print Prevent Rod Lever	A-179
5-70. Plan View of Print Cylinder	A-181
5-71. Automatic Lateral Control Chain Takeup Adjustment	A-181
5-72. Figures H Motor Stop Adjustment	A-181
5-73. Time Delay Motor Stop Mechanism . . .	A-183
5-74. Paper Brake Adjustment, Parts Location	A-185
5-75. Clutch Release Cam Follower Eccentric Adjustment	A-187
5-76. Repeat Key Actuator Arm Adjustment . .	A-187
5-77. Backstop Eccentric Adjustment	A-187

SECTION 5 - MAINTENANCE

5-1. Printer Assembly, Top View	A-87
5-2. Printer Assembly, Left-Side View . . .	A-89
5-3. Teleprinter Assembly, Right-Side View	A-89
5-4. Printer Assembly, Right-Side View . . .	A-91
5-5. Printer Assembly, Top View (Ribbon Feed Top Plate Assembly Removed) . .	A-93
5-6. Printer Assembly, Bottom View	A-95
5-7. Start Clutch Release Mechanism, Exploded View	A-97
5-8. Keyboard Assembly, Bottom View	A-97
5-9. Keyboard Assembly, Top View	A-99
5-10. Selector Assembly, Lubrication Points .	A-99
5-11. Functional Section Block Diagram . . .	A-101
5-12. Rotary Cable Installation, Left-Side View	A-101
5-13. Rotary Cable Installation, Cable Threading Diagram	A-103
5-14. Rotary Cable Installation, Detail Views	A-103
5-15. Return Cable Installation, Cable Threading Diagram	A-103
5-16. Return Cable Installation, Securing Cable to Advance Drum	A-103
5-17. Print Hammer Cable Installation, Cable Threading Diagram	A-105
5-18. Print Hammer Cable Installation, Securing Cable to Advance Drum . . .	A-105
5-19. Lateral Control Belt Installation, Belt Threading Diagram	A-105
5-20. Automatic Time Delay Motor Stop Assembly	A-107
5-21. Selector Main Shaft Assembly	A-109
5-22. Function Main Shaft Assembly	A-111
5-23. Fan Outlet Duct Assembly	A-113
5-24. Motor (400-Cycle) and Gearhead Assembly	A-115
5-25. Motor (60-Cycle) Assembly	A-117
5-26. Selector Assembly (AN/TGC-14(V) Only)	A-119
5-27. Selector Assembly (AN/TGC-14A(V) Only)	A-121
5-28. Gear Train, Automatic Carriage Return, and Line Feed Assembly	A-123
5-29. Mark and Space Clutch Release Shaft, Timing Cam Shaft, and Backstop Shaft Assembly	A-125
5-30. Rear Frame Assembly	A-127
5-31. Front Frame Assembly (Front View) . .	A-129

SECTION 5 - MAINTENANCE (Cont)

Figure	Page
5-78. Keyboard Adjustment, Parts Location . .	A-189
5-79. Waveforms for Transmitting Letters R	A-191
5-80. Waveforms for Transmitting Letters Y	A-191
5-81. Waveforms for Transmitting Letters (LTRS)	A-193
5-82. Waveform for Timing Adjustment	A-193
5-83. Keyboard Timing Adjustment	A-193
5-84. Teletypewriter Set AN/TGC-14(V), Schematic Diagram (Sheet 1 of 2)	A-195
5-84. Teletypewriter Set AN/TGC-14(V), Schematic Diagram (Sheet 2 of 2)	A-197
5-85. Teletypewriter Set AN/TGC-14A(V), Schematic Diagram (Sheet 1 of 2)	A-199

SECTION 5 - MAINTENANCE (Cont)

Figure	Page
5-85. Teletypewriter Set AN/TGC-14A(V), Schematic Diagram (Sheet 2 of 2)	A-201
5-86. Teletypewriter Set AN/TGC-14(V), Wiring Diagram	A-203
5-87. Teletypewriter Set AN/TGC-14A(V), Wiring Diagram	A-205
5-88. Line Sensor, Wiring Diagram	A-207
5-89. Signal Line Power Supply, Wiring Diagram	A-209
5-90. Keyboard TT-318/UG and TT-318A/UG, Wiring Diagram	A-211
5-91. Service Cable, Wiring Diagram	A-213
5-92. Selector, Wiring Diagram	A-213

LIST OF TABLES

SECTION 1 - GENERAL INFORMATION

Table	Page
1-1. Equipment Supplied	1-7
1-2. Equipment Required But Not Supplied . .	1-9
1-3. Factory or Field Changes	1-9
1-4. Equipment Similarity	1-9

SECTION 2 - INSTALLATION

2-1. Primary Power Source Options	2-1
---	-----

SECTION 3 - OPERATION

3-1. Operator's Controls	3-1
3-2. Summary of Operating Procedures	3-7

SECTION 4 - TROUBLE SHOOTING

4-1. Test Equipment and Special Tools	A-1
4-2. Preliminary Checks For Equipment Already In Use	A-1
4-3. Preliminary Checks For Equipment Of Unknown Condition	A-3
4-4. System Trouble-Shooting Chart	A-3
4-5. Keyboard 1A9, Trouble-Shooting Chart	A-21

SECTION 4 - TROUBLE SHOOTING (Cont)

Table	Page
4-6. Line Sensor 1A3, Trouble-Shooting Chart	A-23
4-7. Function And Pulse Data	A-25
4-8. Printer 1A2, Trouble-Shooting Chart	A-27
4-9. Signal Line Power Supply 1A4, Trouble-Shooting Chart	A-27
4-10. Electrical Chassis 1A1, Trouble-Shooting Chart	A-29
4-11. Voltage and Current Measurements	A-31

SECTION 5 - MAINTENANCE

5-1. Test Equipment and Tools Required	A-57
5-2. Operator's Daily Checkoff List	A-57
5-3. Operator's Weekly Checkoff List	A-59
5-4. Preventive Maintenance Weekly Checkoff	A-59
5-5. Preventive Maintenance Semimonthly Checkoff	A-61
5-6. Preventive Maintenance Monthly Checkoff	A-65
5-7. Preventive Maintenance Bimonthly Checkoff	A-67
5-8. List of Maintenance Standards Procedures	A-69
5-9. Lubrication Instructions	A-69
5-10. Tension Values	A-81

WARNING

Dangerous voltages exist in this equipment. Do not take chances when adjusting or repairing the equipment. Contact with high-voltage circuits may result in serious injury or death.

INDEX

SUBJECT	PARAGRAPH (Figure) *Table	SUBJECT	PARAGRAPH (Figure) *Table
A		E	
Adjustments:		Electrical chassis:	
Automatic lateral control chain takeup	5-5av	Assembly	5-5ap
Automatic time delay motor stop . .	5-5ax	Disassembly	5-5g
Figures H motor stop	5-5aw	Removal	5-5b(3)
Initial performance check	2-8d	Trouble shooting	4-9d,*4-10
Keyboard	5-5ba	Equipment:	
Line sensor range	2-8e(3)	Illustration	(1-1)
Operating checks	3-5b	Required but not supplied	*1-2
Paper brake	5-5ay	Similarities	*1-4
Printer	5-5au	Supplied	*1-1
Ribbon feed	5-5az		
Signal line current	2-8e(4)	F	
Sprocket-feed paper	5-5bb	Factory or field changes	1-6,*1-3
Assembly procedures	5-5n	Failure reports	5-5a
		Function and pulse data	*4-7
B		Functional description	4-4
Belt replacement, lateral control	5-5c(4)	Functional sections	(4-1)
Block diagrams, functional:		G	
Full-duplex mode	(4-4)	Gear replacement, speed change	2-10
Half-duplex mode	(4-3)	General information	1
Line sensor 1A3	(4-10)		
Off-line local mode	(4-2)	H	
Printer 1A2	(4-14)	Handling:	
		Reshipment	1-8
C		Unpacking	2-2
Cable replacement:		Heating element	(1-9)
Print hammer	5-5c(3)		
Return	5-5c(2)	I	
Rotary	5-5c(1)	Indicators, description of	3-3a
Case cover removal	5-5b(1)	Initial performance check	2-8d
Case CY-2976/PG, Tactical	(1-7)	Initial turn-on procedure	2-8c
Checkoff list, operator's daily	*5-2	Inspection	5-5l
Checkoff list, operator's weekly	*5-3	Installation:	
Cleaning	5-5k	Airborne	2-6b(2)
Code, five-level Baudot	(1-2)	Case	2-6
Component selection:		Fuse	3-5a(3)
Case	2-5b	Heating element	2-7d
Electrical	2-5a	Line sensor	2-7c
Controls, description of	3-3a	Motor and fan outlet duct	2-7a
Controls, operator's	(3-1),*3-1	Office	2-6b(1)
Cover compartment, Tactical Case CY-2976/PG	(1-8)	Paper	3-5a(2),(3-4)
		Ribbon	3-5a(1),(3-2)
D		Signal line power supply	2-7b
Data, reference	1-3	K	
Diagrams:		Keyboard:	
Block, overall functional	(4-2),(4-3),(4-4)	Adjustment	5-5ba
Primary power distribution	(4-6)	Assembly	5-5ao
Schematic, Overall	(5-84),(5-85)	Disassembly	5-5f
Wiring, overall	(5-86),(5-87)	Removal	5-5b(4)
Disassembly procedures	5-5d		
Distortion, signal	4-11		

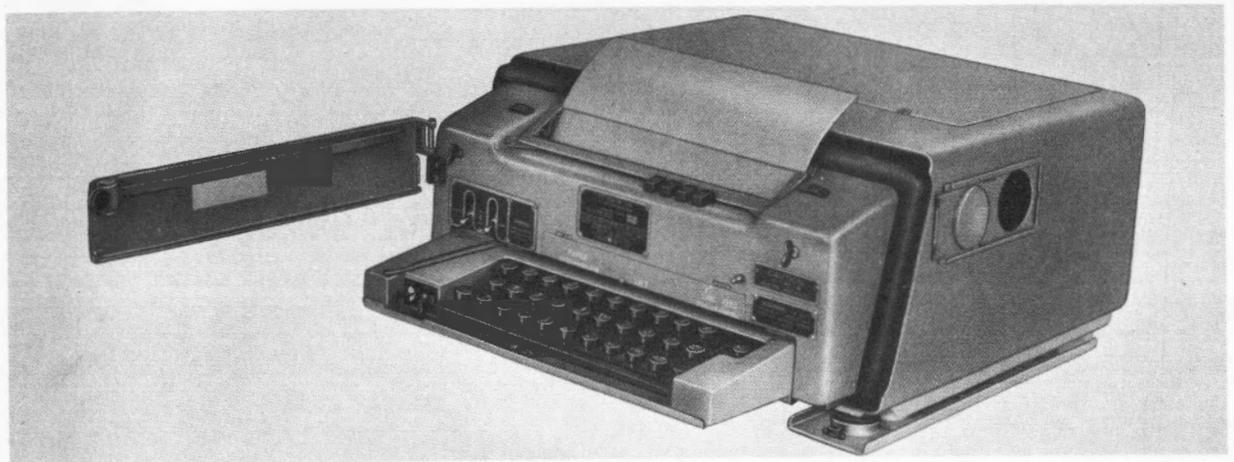
SUBJECT	PARAGRAPH (Figure) *Table	SUBJECT	PARAGRAPH (Figure) *Table
Keyboard—Continued		R	
Theory of operation	4-7a	Reference data	1-3,5-6
Trouble shooting	4-7b,*4-5	Removal procedures	5-5b
Wiring diagram	(5-90)	Replacement procedures:	
		Cables and belt	5-5c
L		Copy lamp	3-5a(4)
Line sensor:		Fuse	3-5a(3)
Adjustment	2-8e(3)	Master pulsing contact	5-5c(5)
Assembly	5-5aq	Paper	3-5a(2)
Disassembly	5-5h	Ribbon	3-5a(1)
Removal	5-5b(7)	Speed change gear	2-10
Theory of operation	4-8a	Reshipment, preparation for	1-8
Trouble shooting	4-8b,*4-6		
Wiring diagram	(5-88)	S	
Lubrication	5-5m,*5-9	Schematic diagrams, overall	5-7
		Seating torque values	5-6a
M		Selector wiring diagram	(5-92)
Maintenance:		Service cable	(1-6),(5-91)
Failure reports	5-5a	Signal line power supply:	
Operator's	3-5	Assembly	5-5ar
Preventive	5-3,*5-4	Disassembly	5-5i
Removal procedures	5-5b	Removal	5-5b(8)
Repair	5-5	Theory of operation	4-9b
Standards	5-4,*5-8	Trouble shooting	4-9c,*4-9
		Wiring diagram	(5-89)
O		Site selection	2-4
Operating features	1-2d	Summary of operating procedures	*3-2
Operation:		T	
Functional	3-2	Tension values	5-6b,*5-10
Operating procedures	3-3,*3-2	Test equipment and special tools	*4-1,*5-1
Operator's controls	(3-1),*3-1	Test points	4-6c
Operator's maintenance	3-5	Trouble shooting:	
P		Electrical chassis	*4-10
Paper installation diagram	(3-4)	Equipment already in use	*4-2
Patching options	2-9	Equipment of unknown condition	*4-3
Power:		Flow chart	(4-5)
Distribution	(4-6)	Keyboard	*4-5
Primary power source options	*2-1	Line sensor	*4-6
Requirements	2-3a	Logical	4-3
Preparation for reshipment	1-8	Newly installed equipment	4-5a(3)
Preventive maintenance:		Overall	4-5
Maintenance personnel	5-3c,*5-4 to *5-7	Printer	*4-8
Operating personnel	5-3b,*5-2,*5-3	Signal line power supply	*4-9
Printer:		System	*4-4
Adjustment	5-5au	U	
Assembly	5-5o to 5-5an	Unpacking and handling	2-2
Cover and chassis removal	5-5b(3)		
Disassembly	5-5e	V	
Removal	5-5b(6)	Voltage, current, and resistance measurements	*4-11
Theory of operation	4-8c		
Trouble shooting	4-8d,*4-8	W	
		Wiring diagrams, overall	5-7



A. Installed in Shock-Mounted Tactical Case CY-2976/PG



B. Typical Installation in Tactical Case CY-2976/PG (Case not shock-mounted; copy holder closed.)



C. Installed in Shock-Mounted Non-Tactical Case CY-2977A/UG

Figure 1-1. Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V)

SECTION I

GENERAL INFORMATION

1-1. SCOPE.

This Technical Manual contains installation, operation, and maintenance instructions for Teletypewriter Set AN/TGC-14(V) and Teletypewriter Set AN/TGC-14A(V). The teletypewriter sets (figure 1-1) are manufactured by Mite Corporation, New Haven, Connecticut. This Technical Manual is in effect upon receipt and supersedes MARCORPS TM-03315A-15, 3 August 1961. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.

1-2. GENERAL DESCRIPTION.

a. PURPOSE OF EQUIPMENT. - Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V) are ruggedized, light-weight, miniature, alphanumeric-printing telegraph equipments for general service use under a wide range of operating conditions. The teletypewriter sets are fully compatible with other commercial and military teletypewriter equipments employing the standard Baudot code and can be integrated into existing land-line and radio-link communications systems. By appropriate signal patching, the equipment can be operated in either half-duplex (simplex) or full-duplex on-line and off-line circuits. Patching facilities are also provided to allow off-line local operation as an electric typewriter or for local testing. As figure 1-1 illustrates, the teletypewriter sets are furnished in either of two cases; the tactical case for use in field and mobile installations, or the non-tactical case for use in fixed-station and aircraft installations.

b. OPERATING OPTIONS. - Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V) consist of a basic group of components supplemented by other components which are selected to fit the requirements of a given installation. Hence the designations Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V) effectively cover not one but rather a series of teletypewriter sets. The basic teletypewriter set consists of a keyboard, a printer, and an electrical chassis. To this is added a power supply kit which contains a signal line power supply, line sensor, service cable, heating element, and fuses. The motor must be selected separately. An hysteresis-synchronous alternating-current motor is available for 115-volt, 60-cycles per second operation, and an additional 115-volt motor is available for 400-cycles per second, single-phase operation. For housing these components, either a tactical or a non-tactical case is selected. Optional shock mounts, available for either case, are used for installation sites in which the equipment will be subjected to severe shock or vibration. The versatility of the teletypewriter sets is further extended by the patching options which allow half-duplex (simplex), full-duplex, or off-line local operation. In addition, by proper patching, the tele-

typewriter sets will supply signal line current up to 100 milliamperes at 28 volts direct current. Operational speed can be varied; speed-change gears for 60, 75, and 100 words per minute are supplied with the AN/TGC-14(V); the AN/TGC-14A(V) is supplied with speed change gears for 45.45, 50, and 75 baud. Baud rate of 45.45 is compatible with 60 words per minute; baud rate of 50 is compatible with 66 words per minute; baud rate of 75 is compatible with 100 words per minute.

c. PRINCIPLES OF OPERATION. - Essentially, the teletypewriter sets provide the means of transmitting and receiving printed intelligence comprising the 26 letters of the alphabet, the digits 0 through 9, and a basic group of punctuation signs and other symbols. In addition to the printing of these characters, certain necessary mechanical operations are provided; spacing between words, letters-figures shifting, line feed, and carriage return. Other operating features include a bell function for signaling the remote station; provisions for stopping and starting the motors of both the local and remote machines; and a repeat key, which when depressed causes the last transmitted character to be continuously repeated until the key is released.

To effect the transmission of a character or mechanical operation, the operator depresses the applicable key on the keyboard. This action causes a coded series of pulses to be generated and transmitted over the line. (Signal line current can be supplied either externally or by the internal signal line power supply.) At the other end of the line, the train of pulses is received and decoded by the line sensor in the remote teletypewriter set and translated into the required mechanical action by the printer, resulting in either the printing of a character or the performance of a mechanical operation. For reception, the roles of the local and remote teletypewriter set are simply reversed. For off-line local operation, the keyboard, signal line power supply, line sensor, and printer of a single teletypewriter set are connected in a closed loop.

The signal code developed by the keyboard when a key is depressed is the standard five-level (7.42-unit for AN/TGC-14(V); 7.0-unit for AN/TGC-14A(V)) Baudot serial teletypewriter code. In this code, each keyboard function is represented by a discrete combination of mark pulses (current) and space pulses (no-current). Each pulse group contains five of these intelligence pulses; the letter J, for example, is represented by mark-mark-space-mark-space. In addition to the five intelligence pulses, each pulse group begins with a start pulse (spacing) and ends with a stop pulse (marking). The stop pulse is 1.42 (AN/TGC-14(V)) or 1.0 (AN/TGC-14A(V)) times as long as any of the other six pulses, each of which may be considered as one time-unit long. The entire pulse

group consisting of a start pulse, five intelligence pulses, and stop pulse is therefore 7.42 (AN/TGC-14(V)) or 7.0 (AN/TGC-14A(V)) units in length. The actual time duration of a pulse group is dependent upon operational speed. At 60 words per minute, each unit is 22 milliseconds in length and each pulse group is 163 milliseconds in length (7.42 times 22 milliseconds). At 45.45 baud, the length of 22 milliseconds for each unit may be calculated by dividing 1000 milliseconds by the baud rate of 45.45. The length of each pulse group is 22 times 7.0 or 154 milliseconds. The difference in length of pulse group (163 milliseconds for 7.42 unit code and 154 milliseconds for 7.0-unit code) is due to the different length of the stop pulses. The complete Baudot code is illustrated in figure 1-2.

Although the keyboard operates on a 7.42-unit or 7.0-unit basis, the receiving printer operates on a 6.7-unit basis. This feature increases both the reliability and the versatility of the teletypewriter set, allowing it to correct for slight speed differences between machines as well as to operate on any code between 7 and 8 units.

d. OPERATING FEATURES. - The teletypewriter sets employ a standard teletypewriter keyboard which, when the set is in the transport condition, may be stowed in a recess in the electrical chassis beneath the printer. Figure 1-3 shows the equipment with the keyboard extended and locked in the operating position. The 32 keys are arranged in three rows which are banked for operator comfort. Each of the keys on the keyboard (except FIGS, LTRS, LINE FEED, CAR RET, and blank keys and the space bar which normally do not cause printing) serves a dual purpose. When the teletypewriter set is in the figures condition, the symbol shown on the upper portion of the depressed key will be printed. When the teletypewriter set is in the letters condition, the letter shown on the lower portion of the depressed key will be printed. The blank key at the lower right is one of the 32 available characters, but normally does not cause printing to take place. The group of four buttons below the copy window control mechanically operated local off-line functions of line feed, figure shift, letters shift, and carriage return. These functions are purely local and have no effect on the signal line. The operating controls are grouped at the lower left side of the keyboard. Behind the LIFT panel are the PAPER pressure release lever and the LINE FEED shift arm. The AN/TGC-14(V) is equipped with a figure H motor stop feature which when actuated shuts off power to the motors of all teletypewriter sets in the circuit but maintains their heaters, line sensors, and signal line power supplies in a standby condition. The motor is reactivated upon receipt of the first start pulse or a break in the signal line. The AN/TGC-14A(V) is equipped with a time delay motor stop which turns off the motor and places the heater, line sensor, and signal line power supply in a standby condition when no mark-to-space transition is received for 90 seconds (45.45 baud) or 60 seconds (75 baud). Receipt of the first mark-to-space transition automatically restarts the motor. Transmitting figures H from an AN/TGC-14A(V) to another AN/TGC-14A(V) on the signal line will not stop either of the teletypewriters; however, any AN/TGC-14(V) on the same signal line will be stopped.

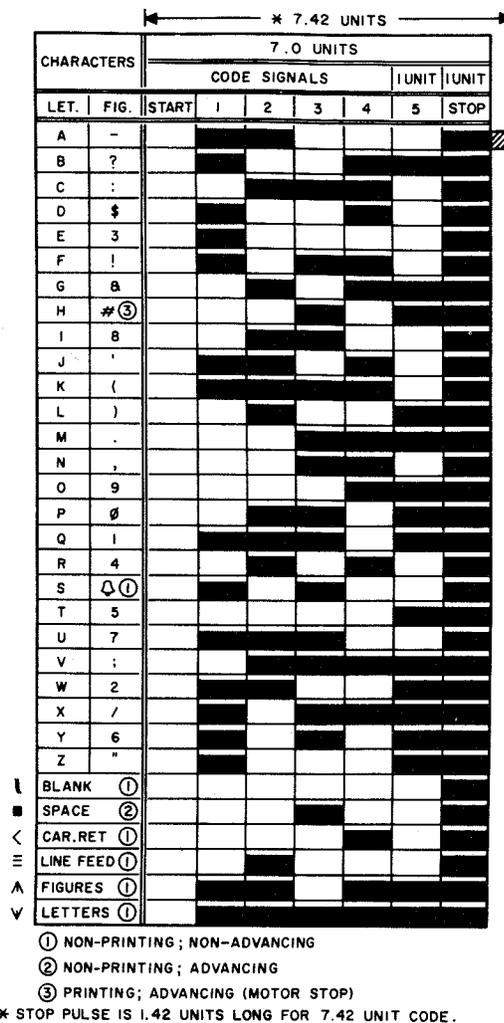


Figure 1-2. Five-Level Baudot Code

The AN/TGC-14(V) uses standard single or multiply rolls of copy paper 8-1/2 inches wide and of any diameter up to 5 inches, with a 1-inch hollow core. The paper supply roll is stored in the electrical chassis (figure 1-4). The AN/TGC-14A(V) uses either the same copy paper stored in the electrical chassis or fan-fold, sprocket-feed, multi-ply copy paper stored externally and fed into a slot in the rear of Non-Tactical Case CY-2977A/UG. Tactical Case CY-2976/PG does not have this provision.

The electrical chassis (figure 1-5) accommodates the printer and the copy paper. The printer prints six lines to the inch when set for single line feed and three lines to the inch when set for double line feed. Automatic carriage return and line feed occur when either 72 or 76 characters (depending on the adjustment of the carriage return mechanism) have been printed on a line and a carriage return signal has not been received.

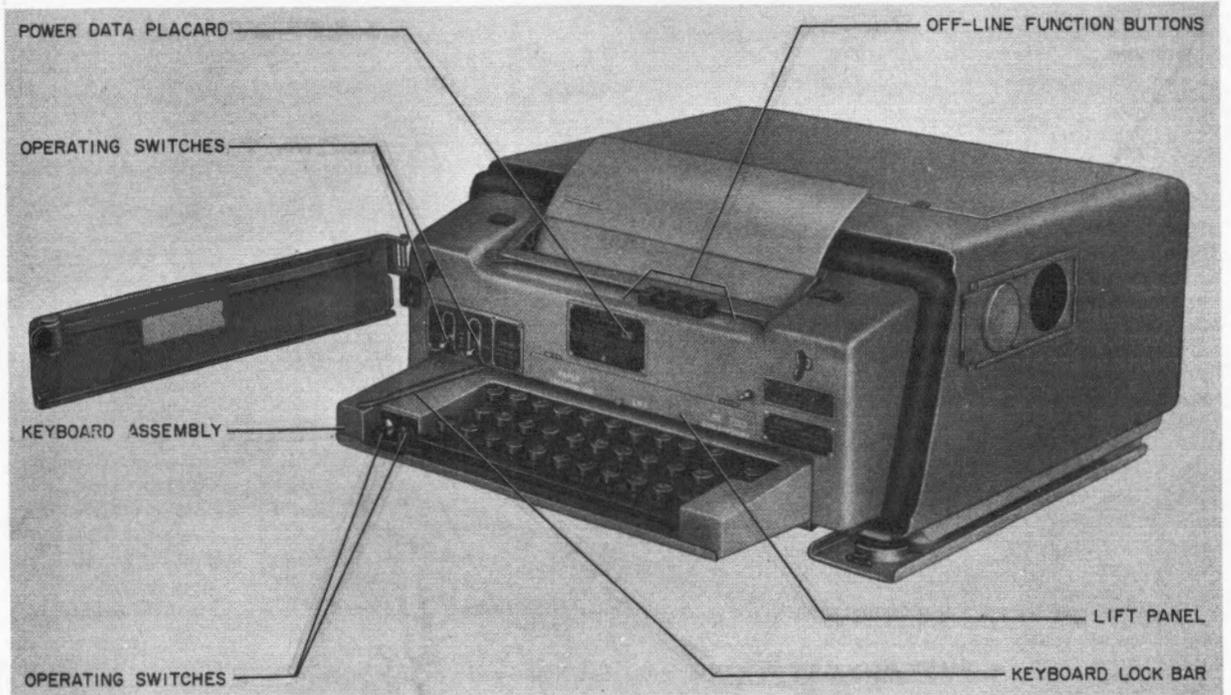


Figure 1-3. Teletypewriter Set Ready for Operation

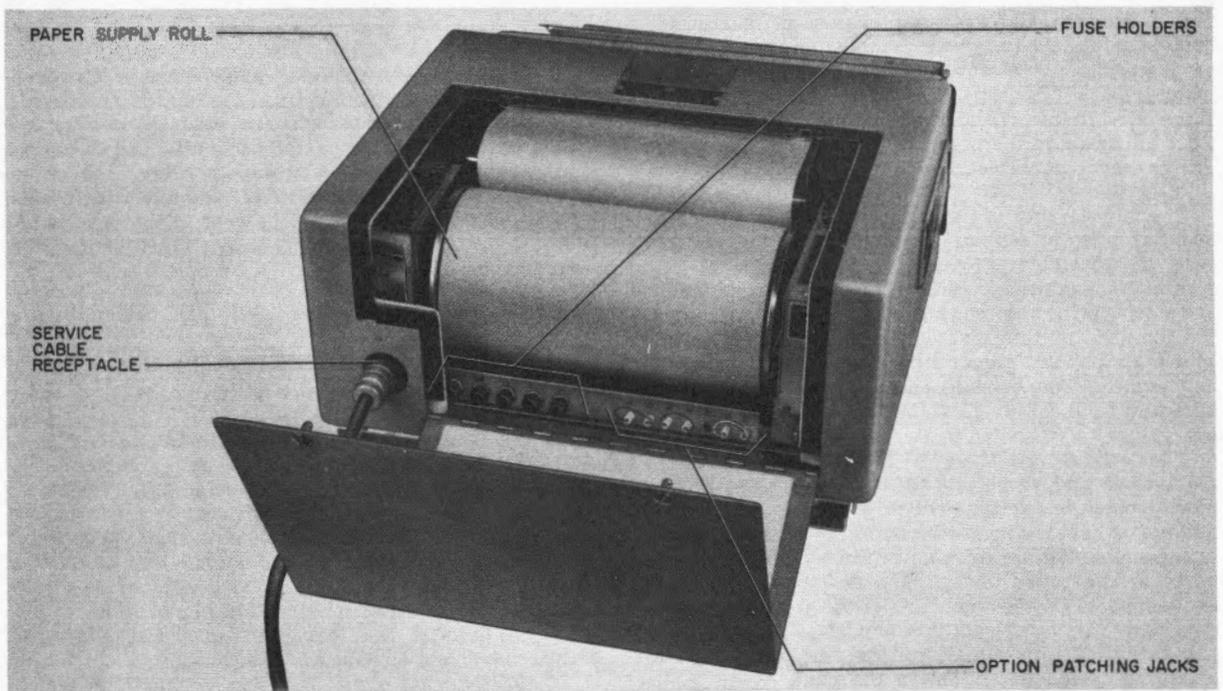


Figure 1-4. Teletypewriter Set, Rear View

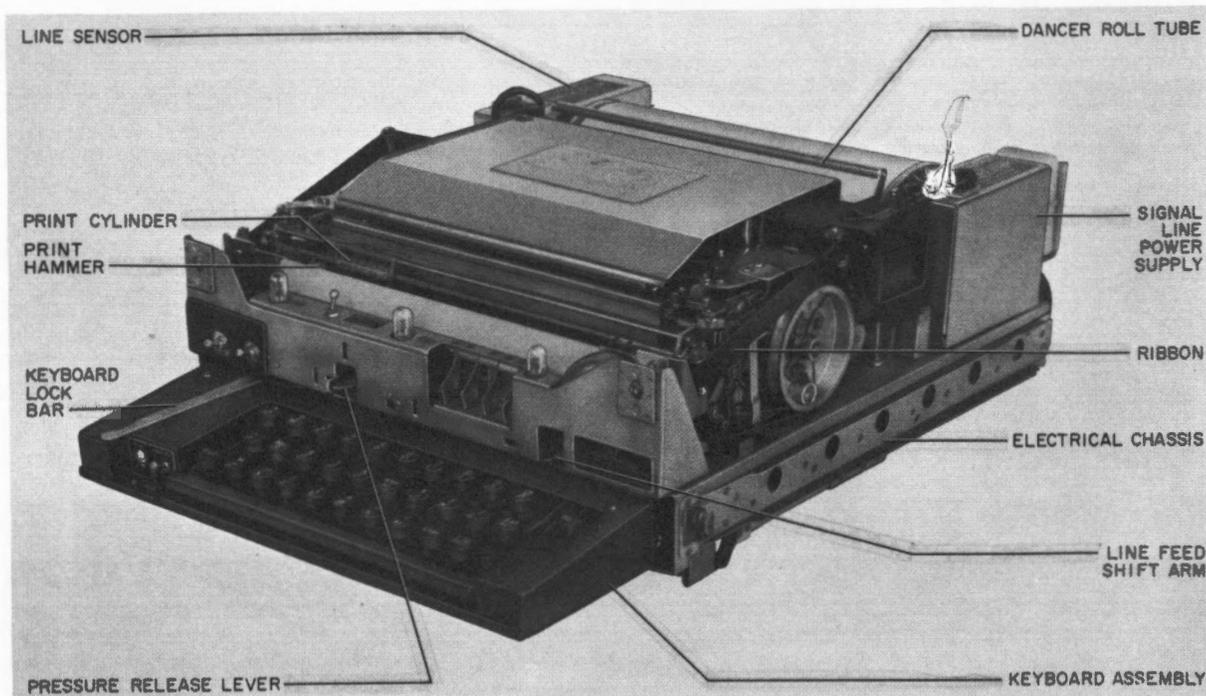


Figure 1-5. Teletypewriter Set, Case and Cover Removed

During operation of the printer, the copy paper feeds in front of an eight-sided print cylinder which contains 64 characters. This print cylinder is positioned so that the selected character is correctly located behind the paper; the print hammer then strikes the paper through a standard 1/2-inch Underwood-type inked ribbon, causing the character to be printed. Since the print cylinder never touches the ribbon, little cleaning of the print cylinder is required. Ribbon reversal is automatic.

The signal line power supply and line sensor are box-like plug-in assemblies mounted at the rear corners of the electrical chassis. The rear panel of the electrical chassis (figure 1-4) houses five fuse holders and seven option patching jacks. Figure 1-4 also shows the location of the service cable receptacle through which all power, signal line, and ground connections are made. The service cable and junction box are shown in figure 1-6.

The tactical case (figure 1-7) is of resin-reinforced glass fiber and, when closed, is air-tight and immersion-proof. A vacuum relief valve is provided to relieve excessive pressure within the case caused by changes in altitude or temperature. The ventilation ports at the sides of the case and the service cable access port at the rear are fitted with screw-type covers. The inlet ventilation port is also equipped with an air filter, which can be removed easily for cleaning. A compartment in the case cover (figure 1-8) provides stowage space for the service cable, spare ribbon, spare fuses and spare lamps. A thermostatically controlled heating element (figure 1-9) is

situated on the underside of the electrical chassis. The heating element is used when operating in an ambient temperature below 0° centigrade (32° fahrenheit).

The metal non-tactical case, shown in figures 1-1 and 1-4, may be opened from the top for replacement of paper and fuses without removing the printer from the case. The spare parts box is attached to the rear of the signal line power supply. Inlet and exhaust ventilation ports, an air filter, and a heating element are provided. A slot at the rear of the case is used for admitting the externally stored fan-fold, sprocket-feed copy paper.

1-3. REFERENCE DATA.

a. NOMENCLATURE. - Teletypewriter Set AN/TGC-14(V); Teletypewriter Set AN/TGC-14A(V).

b. SPECIAL FEATURES.

- (1) Internal signal line potentiometer.
- (2) Self-contained signal line power supply.
- (3) Automatic carriage return and line feed.
- (4) Input not polarity sensitive.
- (5) Provision for dual current range operation.
- (6) May be installed into signal line of 20 to 80 milliamperes without any internal adjustments.
- (7) Offers a resistive load to signal line.
- (8) Capable of either printing or not printing and spacing or not spacing on all functions.
- (9) External signal and test connections made to universal binding posts on service cable junction box without necessity of stripping field wire.
- (10) Integral copy holder.

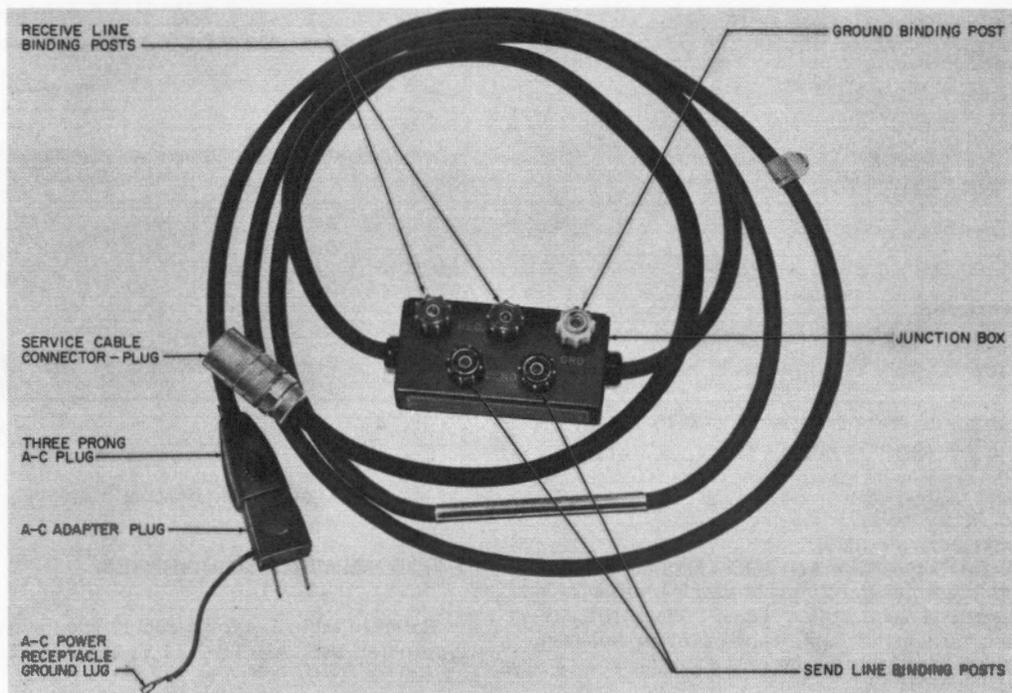


Figure 1-6. Service Cable Assembly

c. POWER REQUIREMENTS.

(1) 115 volts alternating current, 60 cycles per second, single-phase, 70 watts (additional 200 watts required for heating element when operating).

(2) 115 volts alternating current, 400 cycles per second, single-phase, 70 watts (additional 200 watts required for heating element when operating).

d. TYPE OF INSTALLATION.

(1) Tactical. - Mobile and field station.

(2) Non-Tactical. - Airborne and fixed station.

e. AMBIENT TEMPERATURE LIMITS. - Minus 55° Centigrade (-67° Fahrenheit) to plus 55° Centigrade (+131° Fahrenheit).

f. OPERATING SPEED. - Gears for 60, 75, or 100 words per minute are supplied with the AN/TGC-14(V). Gears for 45.45, 50, and 75 baud are supplied with the AN/TGC-14A(V). (Intermediate speed gears are obtainable.)

g. SIGNAL CODE TYPE. - Direct-current pulse, five-level, 7.42-unit (AN/TGC-14(V)) or 7.0-unit (AN/TGC-14A(V), Baudot serial, neutral line.

h. KEYBOARD. - Standard communications.

i. TYPE OF CHARACTERS. - English.

j. TYPE FACE. - Gothic, 12-point.

k. PRINTER LINE SPACING.

(1) Single Line Feed. - Six lines per inch.

(2) Double Line Feed. - Three lines per inch.

l. CHARACTERS PER LINE. - Adjustable for either 72 or 76.

m. INPUT IMPEDANCE.

(1) High Current Range (20 to 80 milliamperes). - 115 ohms, resistive, at 60 milliamperes.

(2) Low Current Range (1 to 5 milliamperes). - 2200 ohms, resistive, at 5 milliamperes.

n. ALARM DEVICES.



Figure 1-7. Tactical Case CY-2976/PG

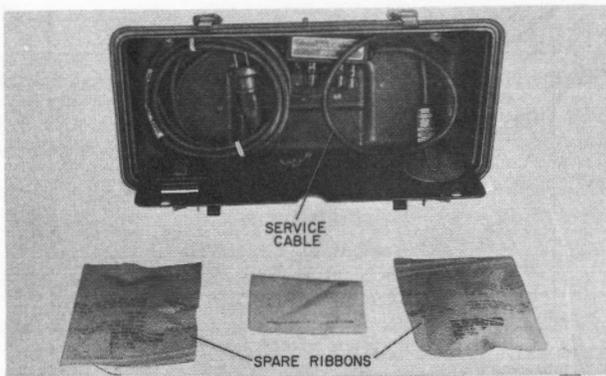


Figure 1-8. Tactical Case CY-2976/PG,
Cover Compartment

- (1) End of line bell.
- (2) Signal-activated bell.

o. **COPY PAPER.** - The AN/TGC-14(V) uses maximum 5-inch diameter (multi-ply or single) roll, 8-1/2-inch wide, with 1-inch hollow core. The AN/TGC-14A(V) uses either the same copy paper or fan-fold, sprocket-feed, multi-ply paper.

1-4. EQUIPMENT SUPPLIED.

The equipment supplied as Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V) is listed in table 1-1.

1-5. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED.

Refer to table 1-2 for the list of equipment and publications required but not supplied with the teletypewriter sets.

1-6. FACTORY OR FIELD CHANGES.

Refer to table 1-3 for the factory or field changes to the teletypewriter sets.

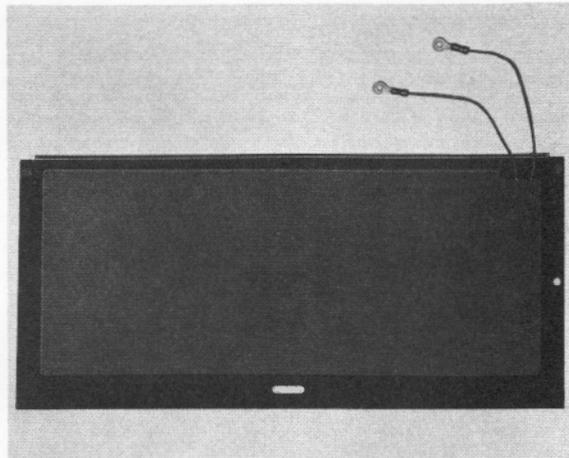


Figure 1-9. Heating Element

1-7. EQUIPMENT SIMILARITIES.

Refer to table 1-4 for a comparison between Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V).

1-8. PREPARATION FOR RESHIPMENT.

The teletypewriter sets require no special preparation for reshipment. The equipment may be shipped to another operating site or depot by repacking the complete teletypewriter set in the original shipping container in accordance with packing specification MIL-P-17555E. A teletypewriter set may also be shipped partially disassembled. Refer to table 1-5 for the sizes and weights of the shipping containers. Advise the packing and packaging facility as to the type of equipment and whether preparation shall be for domestic shipment-immediate use; domestic shipment and storage; or for overseas shipment. If the technical manual is to be included, advise the facility to mark the shipping container, **TECHNICAL MANUAL INSIDE.**

TABLE 1-1. EQUIPMENT SUPPLIED

QUANT. PER EQUIP.	NOMENCLATURE		UNIT NO.	*OVERALL DIMENSIONS (INCHES)			*VOLUME (CUBIC FEET)	*WEIGHT (POUNDS)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
	Teletypewriter Set (includes a Teletype- writer, a Power Sup- ply Kit, a Motor, a Case, and Shock Mounts, if required)	AN/TGC-14(V)	1					With Tactical Case 39
								With Tactical Case and Shock Mounts 43
								With Non- Tactical Case 37.9
								With Non- Tactical Case and Shock Mounts 40.8
1	Teletypewriter (includes) Keyboard Printer Electrical Chassis	TT-297/UG TT-318/UG 1-2-3-104 515-104	1A9 1A2 1A1	1-1/2 4-1/2 5-1/2	12 12-3/4 13-1/8	8-1/4 9 14-1/8	0.09 0.30 0.60	3.9 13.9 7.4
**1	A-c Power Supply Kit (includes) A-c Line Sensor A-c Signal Line Power Supply A-c Heating Element A-c Service Cable Assembly	MK-539/UG 543-104 533-104 3484 555-104	1A3 1A4 1A1A1 1A5	1-11/16 1-11/16 1/16	5-13/16 4-3/16 12-3/4	3-5/16 3-5/16 5-15/16	0.02 0.015 0.003	1.2 0.8 0.5
	Running Spares Kit (contains) Spare Patch Cord Spare Panel Lamp 16 Fuses	3271		3/4	2	2-3/16		1.0
**1	A-c Motor (60 cps, 1Ø)	PD-82/U	1A2A2	2-5/16	4-3/16		0.01	2.5
**1	A-c Motor (400 cps, 1Ø)	PD-83/U	1A2A3	2-5/16	4-3/16		0.01	2.5
**1	Tactical Case	CY-2976/PG		8	16-3/16	19-1/8	1.43	11.7
**1	Non-Tactical Case	CY-2977/UG		6-15/16	14-13/16	18-5/8	1.11	10.6
**1	Shock Mount (Non- Tactical Case)	5060-3		1-1/2	13-3/4	14-1/8	0.18	2.9
***1	Shock Mount (Tactical Case)	5060-2		1-3/4	2-1/8	11-1/2	0.02	2.9

* Including hardware.

** If used, one per equipment.

*** If used, one pair per equipment.

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

QUANT. PER EQUIP.	NOMENCLATURE		UNIT NO.	*OVERALL DIMENSIONS (INCHES)			*VOLUME (CUBIC FEET)	*WEIGHT (POUNDS)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
	Teletypewriter Set (includes a Tele- typewriter, a Power Supply Kit, a Motor, a Case, and Shock Mounts, if required)	AN/TGC-14A(V)	1					With Tactical Case 39
								With Tactical Case and Shock Mounts 43
								With Non- Tactical Case 37.9
								With Non- Tactical Case and Shock Mounts 40.8
1	Teletypewriter (includes) Keyboard Printer Electrical Chassis	TT-297A/UG TT-318A/UG 1-2-3-104 515-104	1A9 1A2 1A1	1-1/2 4-1/2 5-1/2	12 12-3/4 13-1/8	8-1/4 9 14-1/8	0.09 0.30 0.60	3.9 13.9 7.4
**1	A-c Power Supply Kit (includes) A-c Line Sensor A-c Signal Line Power Supply A-c Heating Element A-c Service Cable Assembly	MK-539/UG 543-104 33287 3484 555-104	1A3 1A4 1A1A1 1A5	1-11/16 1-11/16 1/16	5-13/16 4-3/16 12-3/4	3-5/16 3-5/16 5-15/16 115	0.02 0.015 0.003 0.003	1.2 0.8 0.5 1.0
	Running Spares Kit (contains) Spare Patch Cord Spare Panel Lamp 15 Fuses 10 Sprocket Teeth 0.050 hex wrench	30470		5/8	1-3/8	2-5/16		
**1	A-c Motor (60 cps, 1Ø)	PD-82/U	1A2A2	2-5/16	4-3/16		0.01	2.5
**1	A-c Motor (400 cps, 1Ø)	PD-83/U	1A2A3	2-5/16	4-3/16		0.01	2.5
**1	Tactical Case	CY-2976/PG		8	16-3/16	19-1/8	1.43	11.7
**1	Non-Tactical Case	CY-2977A/UG		6-15/16	14-13/16	18-5/8	1.11	10.6
**1	Shock Mount (Non- Tactical Case)	5060-3		1-1/2	13-3/4	14-1/8	0.18	2.9
***1	Shock Mount (Tactical Case)	5060-2		1-3/4	2-1/8	11-1/2	0.02	2.9

* Including hardware.

** If used, one per equipment.

*** If used, one pair per equipment.

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE
	NAME	DESIGNATION	
1	Multimeter	AN/PSM-4	Check resistance, current, and voltage.
1	Oscilloscope	AN/USM-105	Observe waveforms.
1	Electronic Multimeter	TS-505/U	Check voltages.
1	Teletypewriter Tool Kit	TK-122/U	Make adjustments.

TABLE 1-3. FACTORY OR FIELD CHANGES

CHANGE NUMBER	TITLE AND PURPOSE	SERIAL NO. AFFECTED	INDICATION OF ACCOMPLISHMENT
FSB-001	Instructions For Installation of Modification Kit Part No. 10121 on Keyboards Not Modified. Purpose is to prevent damage to the space bar and to prevent accidental shifting of the SEND-REC-REC switch.	All equipment not already modified.	A guard plate is attached to the keyboard.
FSB-003	Instructions For Installation of Modification Kit Part No. 30561 on Tactical Case CY-2976/PG. Purpose is to eliminate warping of the case and subsequent interference between the top of the case and the copy paper.	All equipment not already modified.	A striker bar is attached to the tactical case.
FSB-004	Recommended Retrofit of Ribbon Feed Assembly Through Use of Kit 30746. Purpose is to facilitate maintenance of the ribbon feed assembly.	All equipment not already modified.	Ribbon vibrator shafts are replaced.

TABLE 1-4. EQUIPMENT SIMILARITY

	AN/TGC-14(V)	AN/TGC-14A(V)
Primary Power Supply	115 vac, 60 cps, single phase 115 vac, 400 cps, single phase	Same as AN/TGC-14(V).
Signal Code	Sends and receives 7.42-unit Baudot code at speeds of 60, 75, and 100 wpm. Can also receive 7.0-unit code without adjustment.	Sends and receives 7.0-unit Baudot code at speeds of 45.45, 50, and 75 baud. Can also receive 7.42-unit code without adjustment.
Patching Options	Operates in duplex and half-duplex (simplex) modes; battery supplied internally or externally as desired.	Same as AN/TGC-14(V).
Line Length	Normally prints 72 characters per line; can be adjusted for 76 characters.	Same as AN/TGC-14(V).

TABLE 1-4. EQUIPMENT SIMILARITY (Cont)

	AN/TGC-14(V)	AN/TGC-14A(V)
Paper Feed Mechanism	Uses pressure feed; paper stored within case.	Same as AN/TGC-14(V); or uses sprocket-feed paper stored externally and admitted through slot in rear (non-tactical case only).
Motor Stop Mechanism	Uses figures H motor stop; depression of the FIGS key and then the H key automatically stops the motor, leaving the teletypewriter set in standby condition until receipt of first mark-to-space transition which automatically restarts the motor.	Uses time delay motor stop; turns off motor, leaving the teletypewriter set in standby condition if no mark-to-space transition is received for 90 seconds when operating at 45.45 baud, or for 60 seconds at 75 baud; receipt of first mark-to-space transition automatically restarts motor.
Keyboard TT-318/UG, TT-318A/UG Case	Transmits 7.42-unit Baudot code. Supplied in Tactical Case CY-2976/PG or Non-Tactical Case CY-2977/UG; either can be shock mounted.	Transmits 7.0-unit Baudot code. Normally supplied in shock mounted case CY/2977A/UG; can also be supplied in Tactical Case CY-2976/PG.

TABLE 1-5. SHIPPING DATA

NOMENCLATURE		UNIT NO.	*OVERALL DIMENSIONS (INCHES)			*VOLUME (CUBIC FEET)	*WEIGHT (POUNDS)	FEDERAL STOCK NUMBER
NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH			
Teletypewriter Set	AN/TGC-14(V)							
**Teletypewriter Set	AN/TGC-14A(V)							5815-078-5480
***Teletypewriter Set	TT-297/UG							5815-798-0351
****Teletypewriter Tactical Case	TT-297A/UG							
	CY-2976/PG		13	21-1/4	27	4.7	41 to 61	5815-798-0344
	Non-Tactical Case		13	19-3/4	23-1/2	4.1	41 to 61	
	CY-2977/UG or CY-2977A/UG							
A-c Power Supply Kit	MK-539/UG		12	30	24	5.5		5815-798-0345
A-c Line Sensor	543-104 or 33287	1A3	4-1/2	8	6	0.21	4	
A-c Signal Line Power Supply	533-104	1A4	4-1/2	7	6	0.2	5	
A-c Service Cable	555-104	1A5	6-1/2	11-1/2	7-1/2	0.45	4	5815-841-9101
A-c Heating Element	3484	1A1A1	3	16-1/2	9	0.35	6	4540-846-1916
Spare Parts Box	3271		2	4	4	0.05	3	
A-c Motor (60 cps, 1Ø)	PD-82/U	1A2A2	7-1/2	7	7	0.3	5	6105-798-0347
A-c Motor (400 cps, 1Ø)	PD-83/U	1A2A3	8	5-1/2	5-1/2	0.2	5	6105-798-0350

* Unless otherwise noted, dimensions are in inches, volume in cubic feet, and weight in pounds; equipment crated and ready for shipment.

** Completely assembled, including A-c Motor PD-82/U in Tactical Case CY-2976/PG.

*** Teletypewriter TT-297/UG will be shipped in Tactical Case CY-2976/PG or Non-Tactical Case CY-2977/UG as specified by the using facility.

**** Teletypewriter TT-297A/UG is part of the AN/TGC-14A (V).

SECTION 2
INSTALLATION

2-1. INTRODUCTION.

This section contains installation instructions for Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V). These instructions include information on site and component selection, unpacking, component installation, performance checks, and adjustments.

2-2. UNPACKING AND HANDLING.

NOTE

Retain the shipping containers in which the teletypewriter set is received for use in re-shipping the equipment.

a. REMOVING EQUIPMENT FROM SHIPPING CONTAINER.

(1) GENERAL. - The teletypewriter set is packed in accordance with packing specification MIL-P-17555E. Sizes and weights of the various shipping containers are listed in table 1-5.

If the teletypewriter set is received complete with the power supply kit installed, the entire teletypewriter set will be packed in a single shipping container. Examine the shipping container for external signs of damage and carefully open the container. Remove the equipment from the container and inspect as detailed in paragraph 2-2b.

(2) TELETYPEWRITER TT-297/UG or TT-297A/UG. - The teletypewriters (a keyboard, a printer, and an electrical chassis) are shipped in a single container already mounted in Tactical Case CY-2976/PG, Non-Tactical Case CY-2977/UG or Non-Tactical Case CY-2977A/UG. Examine the shipping container for external signs of damage and carefully open the container. Remove the equipment from the container and inspect as detailed in paragraph 2-2b.

(3) ALTERNATING-CURRENT COMPONENTS. - The alternating-current components are shipped in three separate containers. The alternating-current power supply kit (a line sensor, a signal line power supply, a service cable, a heating element, and a spare parts box) is shipped in one of the containers and the two alternating-current motors (60 cycles per second and 400 cycles per second) are shipped in the others. Since a given installation will require only one of the motors (depending on the primary power source) only two shipping containers will be required for the alternating-current components. Examine the shipping containers for external signs of damage and carefully open the containers. Remove the equipment from the containers and inspect as detailed in paragraph 2-2b.

b. INSPECTION. - Inspect the unpacked teletypewriter components as follows:

NOTE

Always open the vacuum relief valve on the tactical case cover to equalize the case pressure with that of the atmosphere prior to attempting case cover removal.

Step 1. Remove the service cable from its receptacle (figure 2-1).

Step 2. If the equipment is contained in the tactical case, disengage the four snap fasteners on the case cover and remove the cover from the case. The non-tactical case does not have a case cover.

Step 3. Place the teletypewriter set in the operating position.

Step 4. Disengage the two fastener studs on the front cover by turning them counterclockwise.

CAUTION

When the front cover is removed, the electrical chassis locking device is released and the chassis is free to slide out of the case.

Step 5. Carefully pull the top of the front cover out toward the front of the machine and then lift up the cover.

Step 6. Carefully slide the printer and electrical chassis forward and out of the case.

CAUTION

When placing the printer and electrical chassis assembly on a work surface, do not rest the assembly in any position which may damage the MOTOR and LAMP switches or other protruding parts.

Step 7. Inspect the unpacked components to insure that no damage was incurred during shipment and that all items called for on the shipping list have been included.

CAUTION

If the teletypewriter set has been shipped complete (motor, line sensor, and power supply installed), do not connect the equipment to the primary power source without first determining that the teletypewriter set is compatible with the power source. Refer to paragraph 2-5a for instructions on checking part numbers.

Step 8. Compare part numbers on the nameplates of the units in the power supply kit and motors with those called for in the shipping list and table 2-1.

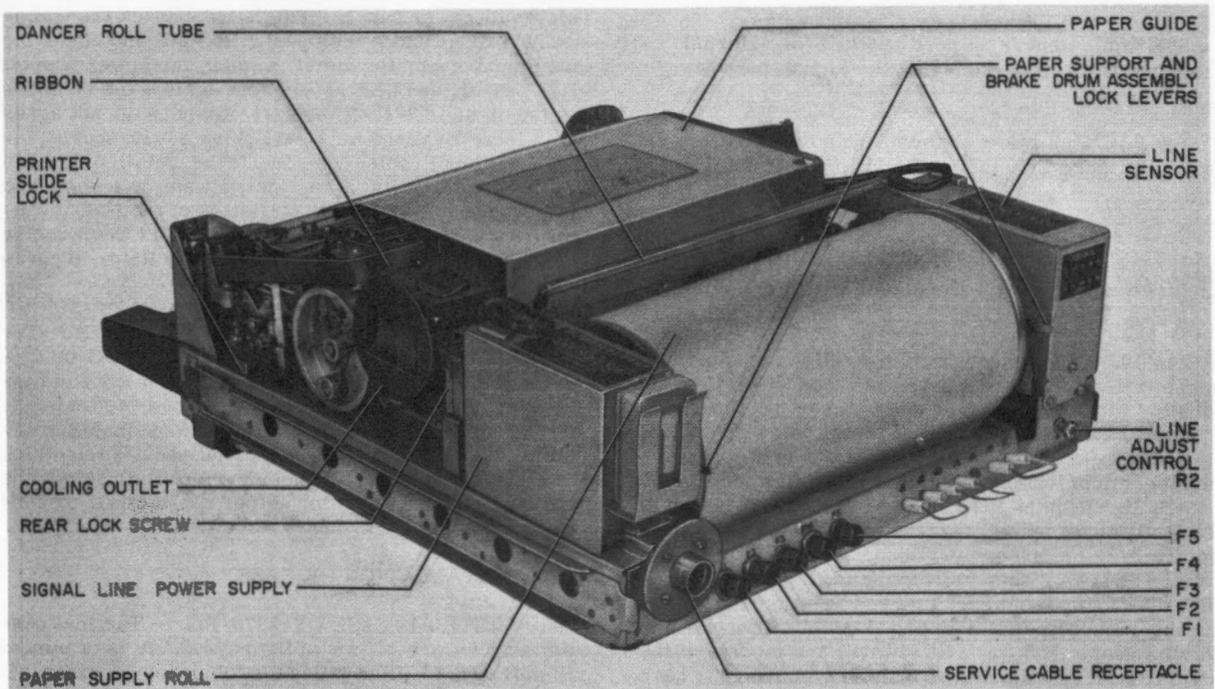


Figure 2-1. Printer and Electrical Chassis, Parts Location

TABLE 2-1. PRIMARY POWER SOURCE OPTIONS

PRIMARY POWER SOURCE	COMPONENTS REQUIRED	NOMENCLATURE	MITE PART NO.	POWER REQUIREMENTS (WATTS)
115 vac, 60 cps	Teletypewriter	TT-297/UG or TT-297A/UG		
	A-c Motor	PD-82/U	521-104	Motor and Power Supply Kit 70
	A-c Power Supply Kit	MK-539/UG		
	A-c Signal Line Power Supply		533-104 or 33287	
	A-c Line Sensor		543-104	
	A-c Heating Element*		3484	Heating Element 200
115 vac, 400 cps	A-c Service Cable Assembly		555-104	
	Spare Parts Box		3271	Total 270
	Teletypewriter	TT-297/UG or TT-297A/UG		
	A-c Motor	PD-83/U	523-104	Motor and Power Supply Kit 70
	A-c Power Supply Kit	MK-539/UG		
	A-c Signal Line Power Supply		533-104	
A-c Line Sensor		543-104		
A-c Heating Element*		3484	Heating Element 200	
A-c Service Cable Assembly		555-104		
Spare Parts Box		3271	Total 270	

*Identified by brown and red leads and 66.5 ohms ± 10% resistance.

NOTE

The equipment is shipped patched for external power to prevent damaging the signal line power supply.

Step 9. Patch the equipment for internal battery as shown in figure 2-10 (J2 to J3; J4 to J5; J6 to J7).

CAUTION

Do not connect J2 to J5 since this will place a direct short across the signal line power supply.

Step 10. Check mechanical operation of the printer by manually turning the mainshaft and observing for possible binds and for free operation of all clutches.

Step 11. Inspect all felt oil wicks for presence of oil and ascertain that all clutches and cam followers have been lubricated as detailed in Section 5.

Step 12. Inspect the ribbon to determine that it is correctly threaded through the reversing sensing arms (figure 3-2) and properly aligned with the four ribbon rollers and two ribbon vibrator guides. This will prevent the ribbon from breaking and twisting, thus binding the ribbon mechanism and possibly stripping the driving gear. The AN/TGC-14A(V) and models of the AN/TGC-14(V) with serial numbers above 1861 have a slip clutch to prevent gear damage in the event of jamming.

2-3. POWER REQUIREMENTS AND DISTRIBUTION.

a. **POWER REQUIREMENTS.** - Refer to table 2-1 for the power requirements of the two primary power source options.

b. **POWER DISTRIBUTION.** - Primary power distributions for the alternating-current configuration are shown in figure 4-6 (Appendix).

2-4. SITE SELECTION.

The primary considerations in selecting an installation site are the availability of a primary power source, signal line, and adequate facilities to make a good ground connection. If possible, select a site which is close enough to the primary power source and signal line to allow direct connections between the power source and signal line and the service cable junction box. Determine the exact nature of the primary power source so that the correct motor can be selected as instructed in paragraph 2-5.

2-5. COMPONENT SELECTION.

a. **ELECTRICAL COMPONENTS SELECTION.** - All of the AN/TGC-14A(V) equipment has been shipped with the motors, line sensors, signal line power supplies, and heaters installed. Although some AN/TGC-14(V) equipment has been shipped complete with power supply kits (motor, signal line power supply, and line sensor), most of the units are shipped with Teletypewriter TT-297/UG (Keyboard TT-318/UG, printer less motor, and electrical chassis) and the power kit packed separately. Table 2-1 lists the primary power sources and the components that must be used with each of these power sources.

If a teletypewriter set is ordered and received complete with power supply kit installed, unpack the equipment in accordance with paragraph 2-2 and check the part numbers on the motor, signal line power supply, line sensor, and heating element against the numbers listed in table 2-1. If the part numbers do not agree with those required for a particular power source, install the applicable components as detailed in table 2-1. Specific installation instructions are contained in paragraph 2-7. Upon installation of the power supply kit, change the placard on the front of the machine to identify the type of motor installed. Refer to paragraph 2-6g for instructions.

b. **CASE SELECTION.** - Teletypewriter TT-297/UG or TT-297A/UG is shipped in either Tactical Case CY-2976/PG or Non-Tactical Case CY-2977/UG or CY-2977A/UG. Select the tactical case for all field installations (mobile or fixed) and the non-tactical case for all office or permanent installations, including installations in aircraft. For installation sites which are subject to severe shock or vibration, select the optional shock mounts for either the tactical or non-tactical cases.

2-6. INSTALLATION OF CASE.

a. **TACTICAL CASE CY-2976/PG.** - Tactical case dimensions are shown in figure 2-2. It is of utmost importance to allow at least two inches of clearance on both sides of the teletypewriter set to insure adequate ventilation and also at least four inches of clearance in the rear to prevent severe bending of the service cable. The tactical case may be used in fixed plant or mobile installations having a low vibration factor by merely resting it on its rubber feet. If, however, the installation is to be permanent, the teletypewriter set should be bolted to the mounting surface. Installations subject to high vibration or shock should be shock mounted.

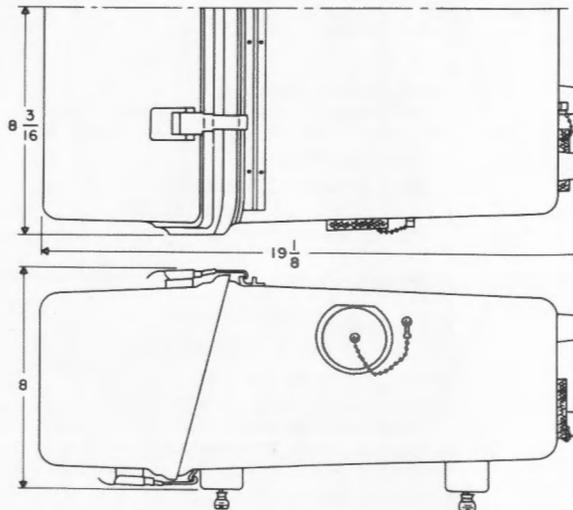


Figure 2-2. Tactical Case CY-2976/PG,
Overall Dimensions

(1) **LOW-VIBRATION INSTALLATION.** - Temporary installations require only that the case be placed on its rubber feet and the teletypewriter set connected. Permanent installations of the teletypewriter set should be mounted on the surface using the thumb screws supplied. Drill four 5/16-inch holes for the 1/4-20 thumb screws. Space the holes as shown in figure 2-3. Not more than 1/2 inch and not less than 3/8 inch of the mounting screw should project above the mounting surface.

(2) **HIGH VIBRATION AND SHOCK INSTALLATIONS.** - Installations subject to high vibration and shock factors should incorporate shock mounts. Refer to figure 2-4 and install the shock mounts as follows:

Step 1. Drill six 5/16-inch holes for the 1/4-28 mounting screws. Space the holes as shown in figure 2-4.

Step 2. Loosen and remove the nuts that secure the rubber feet to the threaded inserts protruding through the bottom of the case and remove the rubber feet.

Step 3. Place the rubber feet in the stowage compartment of the case cover.

Step 4. Insert the two threaded inserts through the case mounting holes in one shock mount and secure the case to the shock mount, using the nuts removed in step 2.

Step 5. Repeat steps 3 and 4 for the second shock mount.

Step 6. Position the case and shock mounts over the drilled holes. Insert the 1/4-28 screws up through the mounting surface and thread them into the captive nuts in the shock mount. Use lock washers between the screw head and the bottom of the mounting surface.

CAUTION

Insure that the screws do not hinder motion of the shock mount.

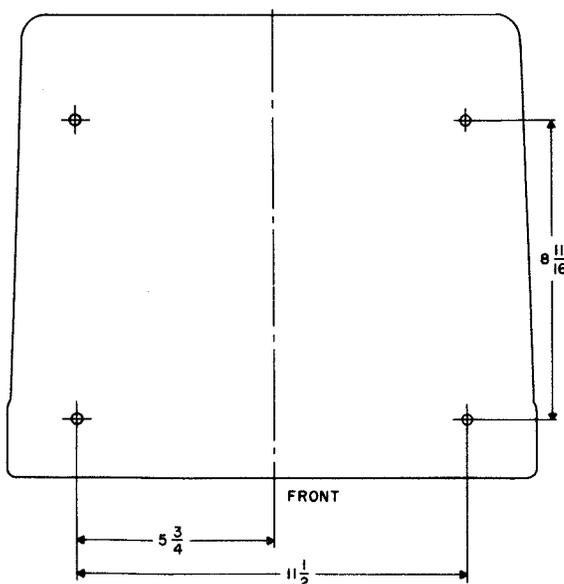


Figure 2-3. Tactical Case CY-2976/PG, Low Vibration Installation, Mounting Holes Location

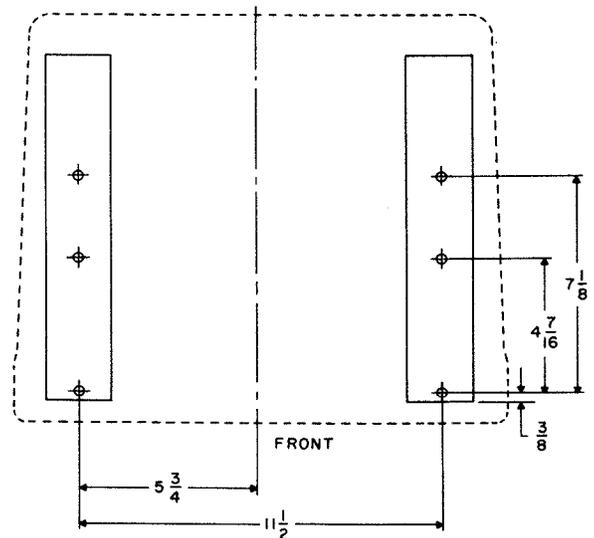


Figure 2-4. Tactical Case CY-2976/PG, Shock Mounted Installation, Mounting Holes Location

b. **NON-TACTICAL CASE CY-2977/UG or CY-2977A/UG.** - The non-tactical cases will perform all functions of the tactical case except that the non-tactical cases are not immersion-proof. They can be used in office as well as airborne installations. Refer to figure 2-5 for space requirements for the non-tactical cases.

(1) **OFFICE INSTALLATIONS.** - The non-tactical cases are normally not secured to the surface on which they rest in an office installation.

(2) **AIRBORNE INSTALLATIONS.** - The non-tactical cases will always be shock-mounted in airborne installations. Drill eight 5/16-inch holes, spaced as shown in figure 2-6, and secure the shock mount to the mounting surface. Secure the case to the shock mount as follows:

NOTE

Do not remove the rubber feet when mounting the case on the shock mounts.

Step 1. Place the case on the shock mounts.

Step 2. Engage the three hooks on the rear of the shock mounts with the three slots on the rear of the case.

Step 3. Turn the two clamp thumb screws clockwise until the clamps are fully engaged with the front of the case.

WARNING

Use care when opening the top of the non-tactical cases to avoid damaging the service cable.

2-7. INSTALLATION OF ELECTRICAL COMPONENTS.

Check that all switches are in the OFF position and then install the components as instructed in the follow-

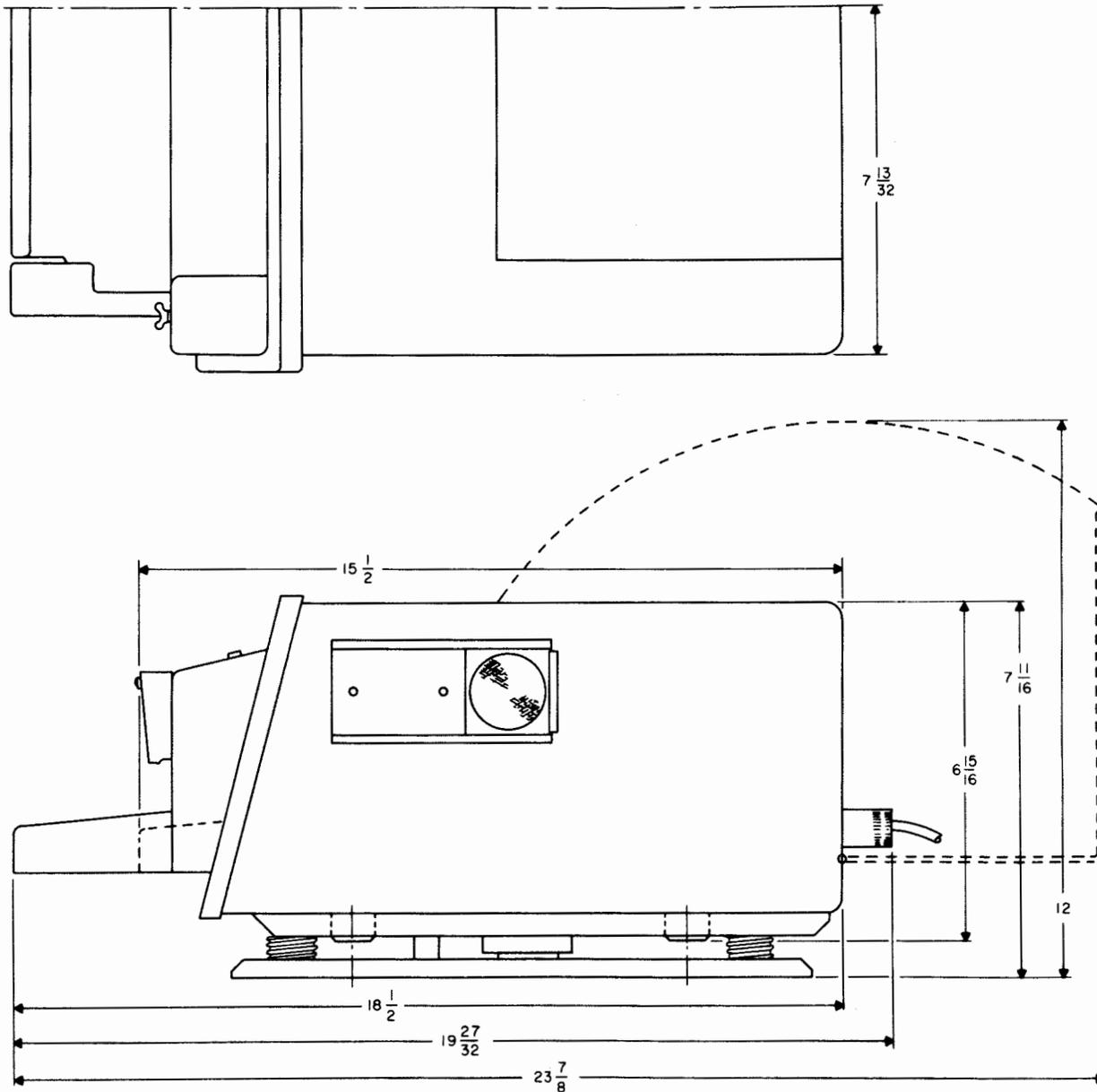


Figure 2-5. Non-Tactical Case CY-2977/UG or CY-2977A/UG, Overall Dimensions

ing paragraphs. Refer to figure 2-1 for parts location information.

a. **MOTOR AND FAN OUTLET DUCT INSTALLATION.** - Remove the printer from the electrical chassis by disengaging two rear lock screws and two slide locks. Remove the printer back plate (A3, figure 5-30, Appendix) and install the motor and fan outlet duct assembly as instructed in paragraph 5-5t. After the motor and fan outlet duct assembly has been installed in the printer, install the printer back plate.

NOTE

Do not install the printer in the electrical chassis prior to installing the electrical components.

b. **SIGNAL LINE POWER SUPPLY INSTALLATION.**
Step 1. Remove the four attaching screws from the electrical chassis.

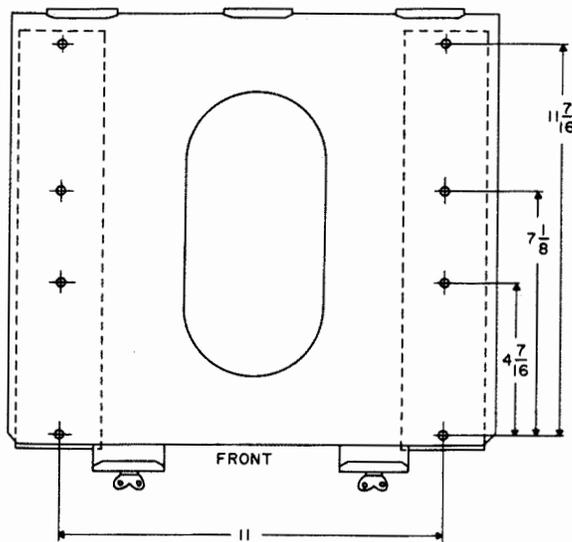


Figure 2-6. Non-Tactical Case CY-2977/UG or CY-2977A/UG, Shock Mounted Installation, Mounting Holes Location

Step 2. Position the signal line power supply plug over the receptacle on the right side of the electrical chassis and engage the plug and the receptacle.

Step 3. Secure the signal line power supply with four attaching screws.

c. LINE SENSOR INSTALLATION.

Step 1. Remove the four attaching screws from the electrical chassis.

Step 2. Align the line sensor plug with the receptacle on the left side of the electrical chassis and engage the plug and the receptacle.

Step 3. Secure the line sensor with four attaching screws.

d. ALTERNATING-CURRENT HEATING ELEMENT INSTALLATION. - If installed, the printer should be removed from the electrical chassis prior to installation of the heating element.

NOTE

The alternating-current heating element may be identified by either checking the part number or by noting the color of the leads (brown and red) and measuring the resistance across the terminals (66.5 ohms $\pm 10\%$).

Step 1. Place the electrical chassis on a bench upside down and insert the heating element (aluminum side toward the bottom) into the grooves provided.

Step 2. Connect the brown lead of the heating element to post E1 and the red lead to post E2 of the electrical chassis.

e. PRINTER INSTALLATION IN ELECTRICAL CHASSIS.

Step 1. Position the printer on the electrical chassis and engage the two printer slide locks and two rear lock screws.

Step 2. Connect the magnetic selector connector to the receptacle provided in the line sensor.

Step 3. Connect the motor connector to the receptacle just forward of the signal line power supply.

f. FUSE INSTALLATION. - The teletypewriter sets require the fuse complements indicated in the following lists. Refer to figure 2-1 for the location of fuses.

AN/TGC-14(V)

FUSE	F1	F2	F3	F4
SIZE	5 amp	1 amp	0.5 amp	0.25 amp

AN/TGC-14A(V)

FUSE	F1	F2	F3	F4	F5
SIZE	5 amp	1 amp	0.5 amp	2.5 amp	0.1 amp

Step 1. Turn the fuse holder cap counterclockwise and remove it.

Step 2. Insert the correct fuse, as indicated in the previous lists, into the fuse holder cap.

Step 3. Install and secure the fuse holder cap and fuse by turning clockwise.

g. POWER DATA PLACARD INSTALLATION. - Upon completion of power supply kit installation, move the red power data placard, located in the printer cover nameplate (figure 1-3), to indicate the type of motor and heater which has been installed.

Step 1. Remove the front cover to allow access to the rear of the nameplate.

Step 2. Gently grasp the power data placard with a pair of tweezers or similar tool and slide the placard out of the nameplate.

Step 3. Position the placard in the opening in the nameplate so that the desired portion of the placard will be visible from the front of the cover.

h. RIBBON INSTALLATION. - If the ribbon is not already installed in the machine, it will probably be found in a cloth bag attached to the printer mechanism. A spare ribbon is contained in the tactical case cover stowage compartment. Install the ribbon in accordance with the instructions in paragraph 3-3c(3).

i. PAPER INSTALLATION. - Install the paper in accordance with the instructions in paragraph 3-3c(2).

2-8. INITIAL PERFORMANCE CHECK AND ADJUSTMENTS.

a. GENERAL.

CAUTION

DO NOT SLIDE THE KEYBOARD IN OR OUT WHILE THE MOTOR IS RUNNING OR WHEN THE MOTOR STOP SWITCH IS IN THE ENABLE POSITION. MOVEMENT OF THE KEYBOARD WHILE THE MOTOR IS RUNNING WILL CAUSE SERIOUS DAMAGE TO THE EQUIPMENT.

Move the keyboard lock bar, located on the left side of the keyboard (figure 1-3), to the right and gently pull the keyboard out until it locks in the operating position. Manually rotate the motor shaft to insure that none of the components is binding. Patch the unit

for internal battery, local loop as instructed in paragraph 2-9; adjust the signal line current for 60 milliamperes.

NOTE

For operation above 0° centigrade (32° fahrenheit), open the ventilation ports on the case; for operation below this temperature, close the ports and allow up to 40 minutes warmup before operating the equipment.

b. SERVICE CABLE CONNECTION.

Step 1. Set all switches to the OFF position.

Step 2. Inspect the service cable receptacle (figure 2-1) to insure that no foreign matter is present.

CAUTION

If any interference or binding is encountered while performing the following steps, immediately remove the connector-plug from the receptacle and determine the cause of the interference.

Step 3. Align the key of the service cable connector plug with the keyway of the service cable receptacle.

Step 4. Carefully insert the service cable connector-plug into the service cable receptacle and then turn the connector-plug a quarter turn clockwise to secure it.

Step 5. Connect the other end of the service cable to the source of primary power.

CAUTION

Always ground the service cable by using a grounded receptacle and by grounding the lug on the junction box.

Step 6. Before applying power, make certain that equipment is patched for internal battery and not connected into a signal line supplying battery.

c. INITIAL TURN-ON PROCEDURE. - Set the MOTOR and LAMP switches to the ON position. The copy lamps should glow and illuminate the paper. The motor should start as evidenced by a humming sound.

d. INITIAL PERFORMANCE CHECK. - Set the SEND•REC-REC switch to the SEND•REC position and perform the following checks. Refer to figure 3-1 for the location of operating controls.

Step 1. Depress each of the alphanumeric keys at least three times to determine that each of the characters is printed satisfactorily.

Step 2. Depress the LTRS key and then the A key; the letter A should print. Depress the FIGS key and then the A key; a hyphen (-) should be printed. Repeat this sequence several times.

NOTE

Check that no print or space occurs when the LTRS or FIGS keys are depressed.

Step 3. Depress any alphanumeric key and the REP key simultaneously. Maintain pressure on the REP

key and release the alphanumeric key. The character for the key depressed should be repeated until the REP key is released.

Step 4. Depress the space bar and the REP key simultaneously. Release the space bar and allow the printer to operate through several lines. Automatic carriage return and line feed and end-of-line bell must function at the end of each line.

Step 5. Depress the FIGS key and then the S key. The bell must ring each time the S key is depressed.

Step 6. Depress the A key and the REP key simultaneously and then release the A key. Allow several characters to be printed and then quickly depress and release the off-line letters (↓) button; observe that a series of A's is printed. Quickly depress and release the off-line figures (▲) button and observe that a series of hyphens is printed. Repeat the previous sequence several times while maintaining constant pressure on the REP key.

NOTE

Advance is prevented as long as the off-line letters or figures buttons are depressed. The off-line letters and figures buttons have no effect when the printer is not running.

Step 7. Depress the off-line carriage return (<) button and observe that carriage return takes place. Type approximately a half line of characters and then depress the off-line carriage return button; observe that carriage return takes place.

Step 8. Depress the off-line feed button (≡) and observe that line feed takes place.

Step 9. For the AN/TGC-14(V), depress the FIGS key and the H key. The motor should stop. Push the BREAK push button switch and observe that the motor starts. Repeat this sequence several times. For the AN/TGC-14A(V), the motor will stop when there are no mark-to-space transitions for 90 seconds (45.45 baud) or 60 seconds (75 baud). Push the BREAK push button switch and observe that the motor starts. Repeat the sequence several times.

Step 10. Patch the equipment for full-duplex mode (paragraph 2-9).

Step 11. Request one of the remote operators to send a series of test messages. Set the SEND•REC-REC switch to the REC position and check the operation of the teletypewriter set. Upon satisfactory completion of the test message, set the SEND•REC-REC switch to the SEND•REC position in preparation for normal operation.

e. ADJUSTMENTS.

(1) AN/TGC-14(V) LOCAL RANGE ADJUSTMENT. - Check that the equipment is patched for local loop, line battery supplied internally.

NOTE

Because of the variations on the signal line bias, it may be necessary to check the range calibration setting several times during the course of operation.

The local range adjustment is performed using the keyboard installed on the teletypewriter set being tested. Rotation of the range dial is deliberately difficult and may be accomplished by using a coin or similar object.

CAUTION

Do not use a screwdriver for this purpose as unintended force may result in stripping gears.

- Step 1. Loosen the range dial lock screw (figure 2-7).
- Step 2. While an assistant types any test message, turn the range dial clockwise to the point where the characters start to distort.
- Step 3. Record this number.
- Step 4. Continue to type the test message and turn the range dial counterclockwise past the point of optimum operation until the message is again distorted.
- Step 5. Record this number.
- Step 6. Calculate the point of optimum operation using the following example:

$$\frac{\text{High} + \text{Low}}{2} = \text{Point of Optimum Operation}$$

Example: $\frac{100 + 20}{2} = 60$ (Optimum Setting)

Step 7. Calculate points of range as follows:

$$\text{High} - \text{Low} = \text{Points of Range}$$

Example: $100 - 20 = 80$ (Points of Range)

NOTE

The minimum desired points of range on a local loop is 70 points at 60 words per minute.

Step 8. Turn the range dial so that the pointer is directly over the number established as the point of optimum operation. If the uncalibrated portion of the range dial falls under the pointer, relocate the start

clutch gear in relation to the timing camshaft gear by one tooth advanced or retarded.

CAUTION

Tighten the range dial lock screw securely to insure that the adjustment will not vary during operation.

(2) AN/TGC-14A(V) LOCAL RANGE ADJUSTMENT. - Refer to figures 2-7 and 2-8 and proceed as follows:

Step 1. Check that the equipment is patched for local loop, line battery supplied internally.

Step 2. While typing a test message, unlock the range dial by pulling out the range finder knob; turn the knob clockwise to the point where the characters start to distort.

Step 3. Record the number indicated on the range dial.

Step 4. Continue to type the test message and turn the knob counterclockwise past the point of optimum operation until the message is again distorted.

Step 5. Record the number indicated on the range dial.

Step 6. Calculate the point of optimum operation using the following example:

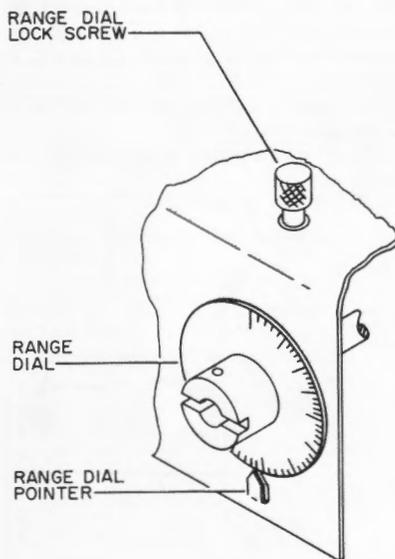
$$\frac{\text{High} + \text{Low}}{2} = \text{Point of Optimum Operation}$$

Example: $\frac{100 + 20}{2} = 60$ (Optimum Setting)

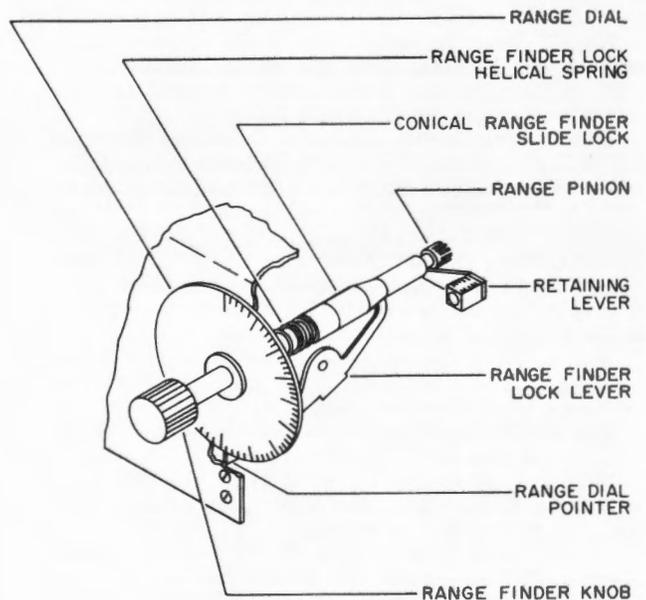
Step 7. Calculate points of range as follows:

$$\text{High} - \text{Low} = \text{Points of Range}$$

Example: $100 - 20 = 80$ (Points of Range)



AN/TGC-14(V)



AN/TGC-14A(V)

Figure 2-7. Range Dial Adjustment, Parts Location

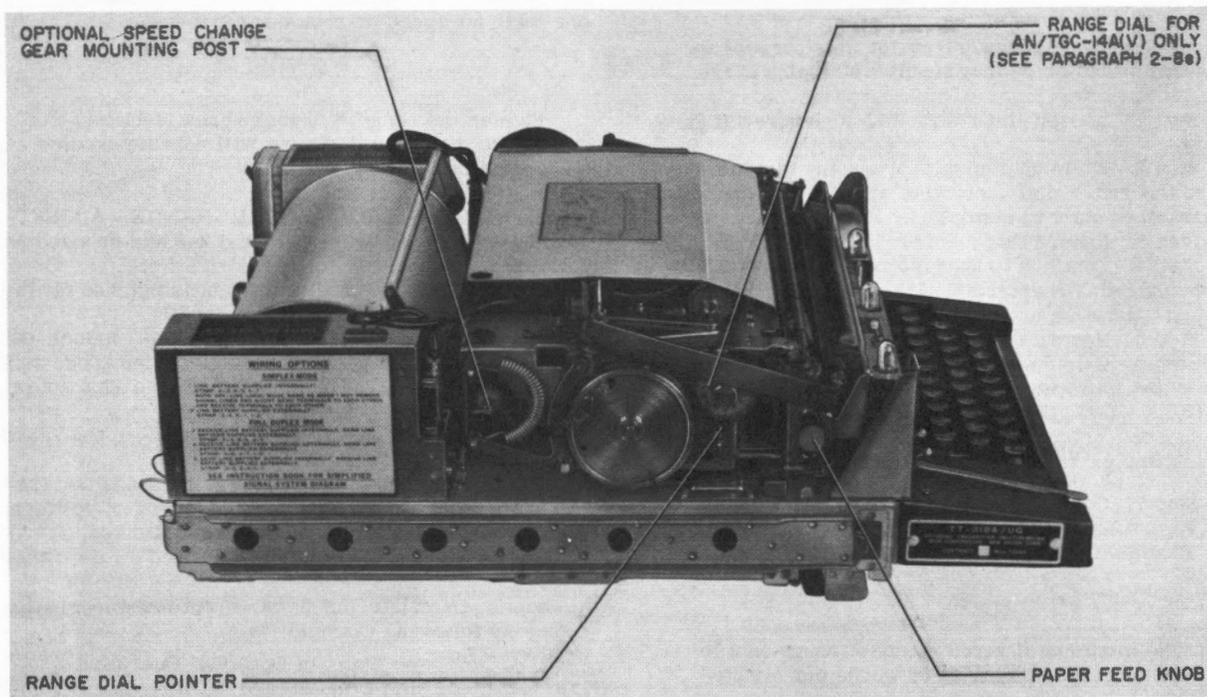


Figure 2-8. Printer and Electrical Chassis, Left-Side View

Step 8. Turn the knob so that the pointer is directly over the number established as the point of optimum operation.

Step 9. Push the knob in against the printer to ascertain that the mechanism is adequately locked.

If the uncalibrated portion of the range dial falls under the pointer, proceed as follows:

Step 1. Unlock the range dial by pulling the knob out as far as possible and turn the knob to its clockwise limit. Push the knob in toward the printer, locking it in this position.

Step 2. Unlock the retaining lever and pull the complete assembly out until the range pinion is no longer engaged with the range adjustment gear segment.

Step 3. Rotate the knob until the pointer is centered in the uncalibrated portion of the scale.

Step 4. Push the knob toward the printer, rotating slightly back and forth, until the gears mesh and the retaining lever locks the range dial.

Step 5. Unlock the range dial by pulling the knob out; set the dial at 60.

Step 6. Push the knob all the way into lock the dial.

Step 7. Repeat the range calibration procedure of the first part of this paragraph.

(3) LINE SENSOR RANGE ADJUSTMENT. - When shipped, the line sensor will be set in the high position to operate in the 20 milliampere to 80 milliampere range. If, however, the signal line current is in the range of 1 to 5 milliamperes, remove the printer and electrical chassis from the case (paragraph 2-14) and proceed as follows:

Step 1. Remove the four screws that secure the line sensor to the electrical chassis.

Step 2. Remove the line sensor from the electrical chassis.

Step 3. Remove the three screws that secure the cover to the line sensor frame.

Step 4. Remove the screw in post E3 (figure 2-9) and loosen the screw in post E2.

Step 5. Swing the high-low range strip so that it bridges posts E2 and E1.

Step 6. Insert the screw removed from post E3 into post E1 and tighten.

Step 7. Tighten the screw in post E2.

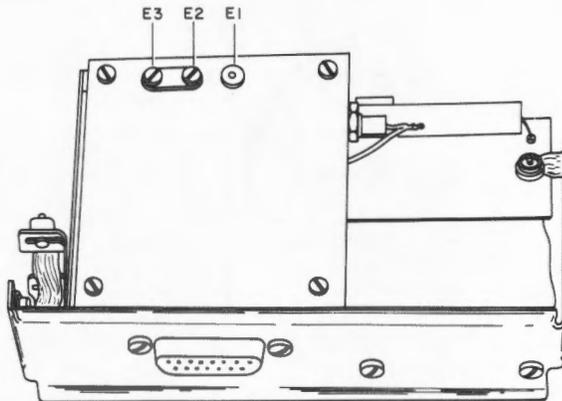


Figure 2-9. Line Sensor Range Adjustment, Parts Location

Step 8. Install the cover and secure with three attaching screws.

Step 9. Install the line sensor on the electrical chassis and secure it with four attaching screws.

(4) SIGNAL LINE CURRENT ADJUSTMENT. — This adjustment is required only when the teletype-writer set is operated on internal battery. To check and adjust the signal line current, proceed as follows:

CAUTION

When using internal signal line power supply for low current (1-5 milliamperes) operation, an external 50,000-ohm variable resistor must be placed in series with the REC (red) binding posts on the junction box. Note that the red and black posts do not designate polarity.

Step 1. Remove the jumper wires from the SEND binding posts on the service cable junction box if patched for local loop.

Step 2. Connect the negative lead of Multimeter AN/PSM-4, or equivalent, (set to read approximately 500 direct-current milliamperes) to one of the SEND (black) posts.

Step 3. Momentarily touch the positive lead of the multimeter to the remaining SEND post. If the meter reads in a negative direction, reverse the multimeter leads. If the meter reads in a positive direction, check for a reading of 60 milliamperes. If the reading is below or above 60 milliamperes, continue with step 4.

Step 4. Loosen the lock nut on LINE ADJUST control R2 (figure 2-1).

Step 5. Turn the control clockwise until a reading of approximately 60 milliamperes is obtained.

Step 6. Tighten the locknut on LINE ADJUST control R2.

2-9. PATCHING OPTIONS.

The patching options described in this paragraph are referred to as Modes 1 through 5 and are applicable to land line connections when converters are not in use. Refer to paragraph 2-9c for information on converter connections. These mode numbers are the same as those identified on the placard on the side of the line sensor. Jacks J2 and J5 are colored red for identification; the other patching jacks are white.

CAUTION

Always connect the signal line to the SEND (black) posts of the teletypewriter set supplying the signal line power.

When two or more teletypewriter sets are supplying signal line power, the signal line power supplies must be connected in series. The signal line power supplies are non-polar sensitive in the receive-only condition.

a. HALF-DUPLEX MODE OPERATION (SIMPLEX). - Half-duplex mode operation refers to communication on a circuit in only one direction at a time, with a break feature which enables the receiving station to interrupt the sending station.

CAUTION

Never patch option patching jack J2 to jack J5. This combination will seriously damage the equipment by placing a short circuit across the signal line power supply.

(1) LINE BATTERY SUPPLIED INTERNALLY (MODE 1). - Operation in Mode 1 means that the local teletypewriter set will supply its own signal line power as well as power to other teletypewriter sets in the circuit. (See figure 2-10.) Patch jacks J2 to J3, J4 to J5, and J6 to J7 to obtain Mode 1 operation.

NOTE

Although figure 2-10 shows one teletypewriter set supplying signal line power, it is possible in multiple teletypewriter circuits for more than one teletypewriter set to supply signal line power by connecting the signal line power supplies in series. When sets are connected in series, observe polarity carefully.

(2) LOCAL LOOP. - Local loop operation is established as described for Mode 1, except that the service cable junction box binding posts must be shorted, red-to-red and black-to-black.

(3) LINE BATTERY SUPPLIED EXTERNALLY (MODE 2). - Operation in Mode 2 means that signal line power will be supplied by some external source, either by another teletypewriter set or by an external power supply. (See figure 2-11.) Patch jacks J1 to J2, J3 to J4, and J6 to J7 to obtain Mode 2 operation.

b. FULL-DUPLEX MODE OPERATION. - Full-duplex (or duplex) operation refers to communication between two points in both directions simultaneously. This mode of operation does not normally allow the local station to keep a "home" copy of sent messages.

(1) RECEIVE LINE BATTERY SUPPLIED INTERNALLY, SEND LINE BATTERY SUPPLIED EXTERNALLY (MODE 3). - Operation in Mode 3 means that the local teletypewriter set is supplying power to the remote keyboard and the local printer, and the remote teletypewriter set is supplying signal line power to the remote printer and the local keyboard. (See figure 2-12.) Patch jacks J2 to J3, J5 to J6, and J4 to J7 to obtain Mode 3 operation.

(2) RECEIVE LINE BATTERY SUPPLIED EXTERNALLY, SEND LINE BATTERY SUPPLIED EXTERNALLY (MODE 4). - Operation in Mode 4 means that all signal line power is supplied by an external power supply or by a remote teletypewriter set. (See figure 2-13.) Patch jacks J1 to J2, J3 to J6, and J4 to J7 to obtain Mode 4 operation.

(3) SEND LINE BATTERY SUPPLIED INTERNALLY, RECEIVE LINE BATTERY SUPPLIED EXTERNALLY (MODE 5). - Operation in Mode 5 means that the local teletypewriter set is supplying power to the local keyboard and the remote printer, and that the remote teletypewriter set is supplying power to the remote keyboard and the local printer. (See figure 2-14.) Patch jacks J3 to J6, J2 to J4, and J5 to J7 to obtain Mode 5 operation.

Figure 2-10

TM-03315-15

AN/TGC-14(V) AND AN/TGC-14A(V)
INSTALLATION

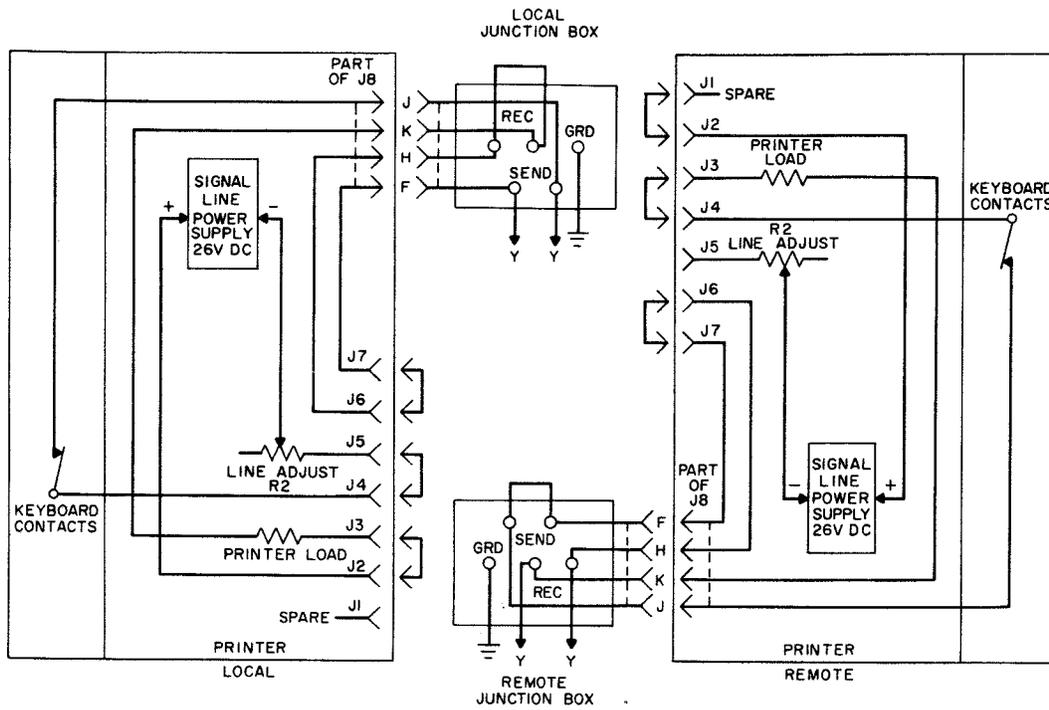


Figure 2-10. Patching Mode 1, Simplified Wiring Diagram

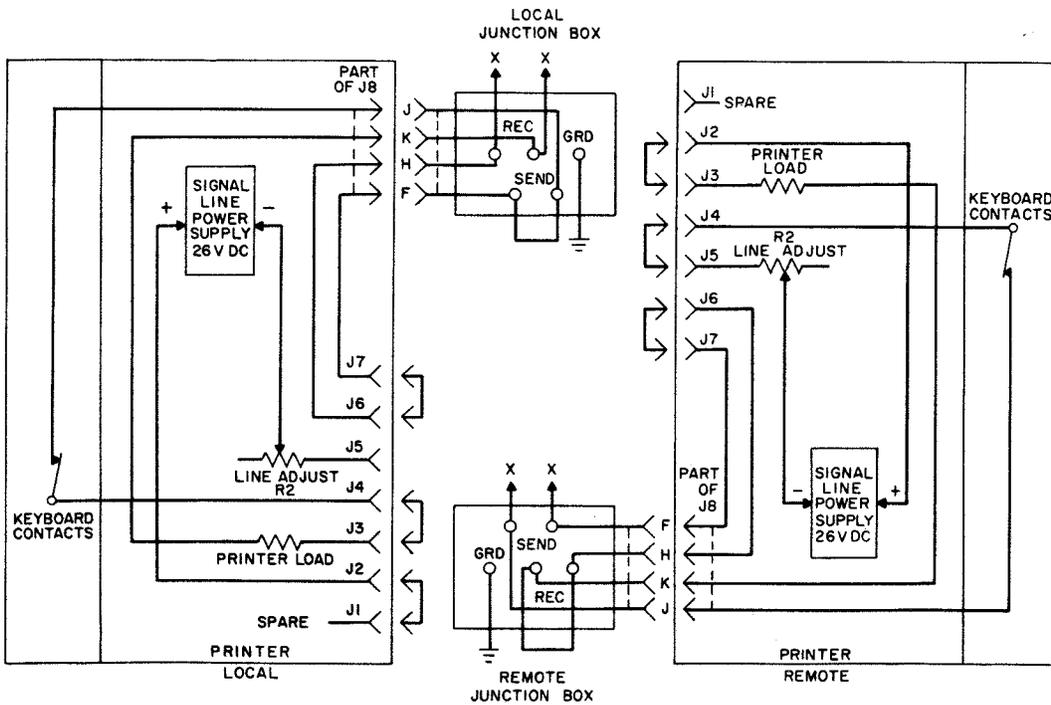


Figure 2-11. Patching Mode 2, Simplified Wiring Diagram

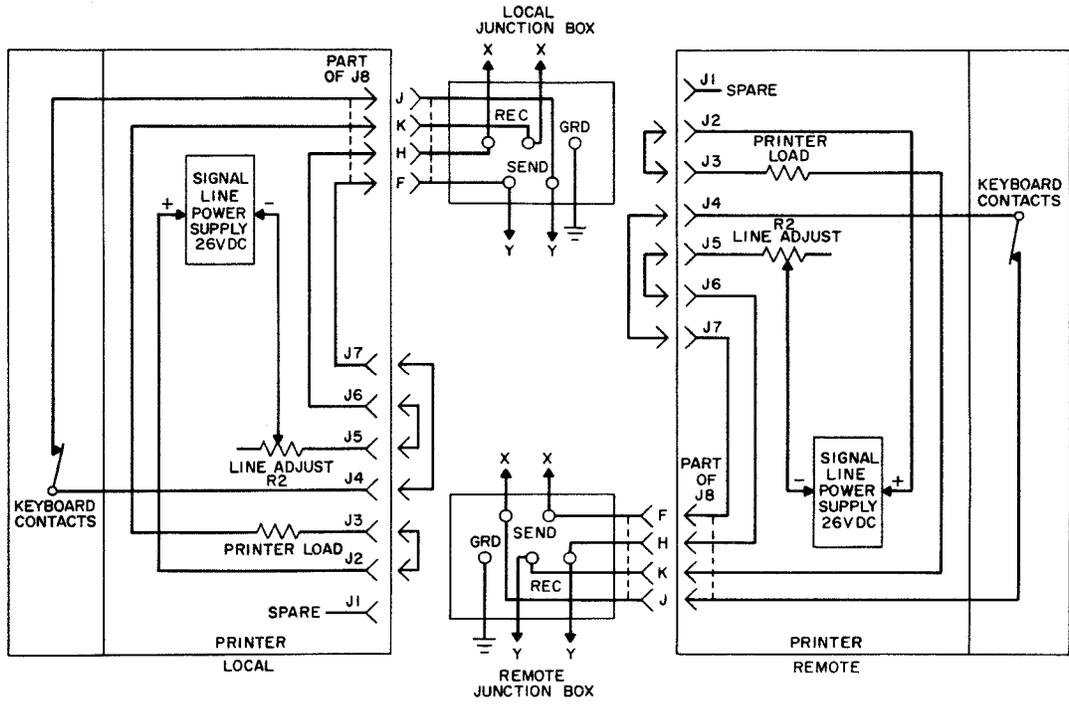


Figure 2-12. Patching Mode 3, Simplified Wiring Diagram

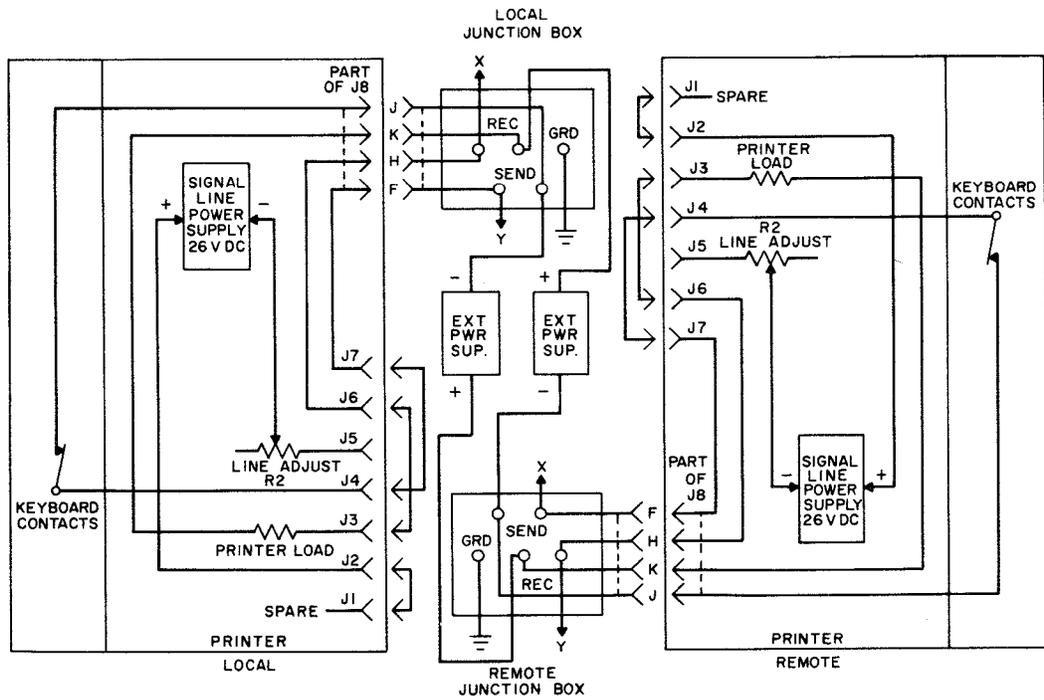


Figure 2-13. Patching Mode 4, Simplified Wiring Diagram

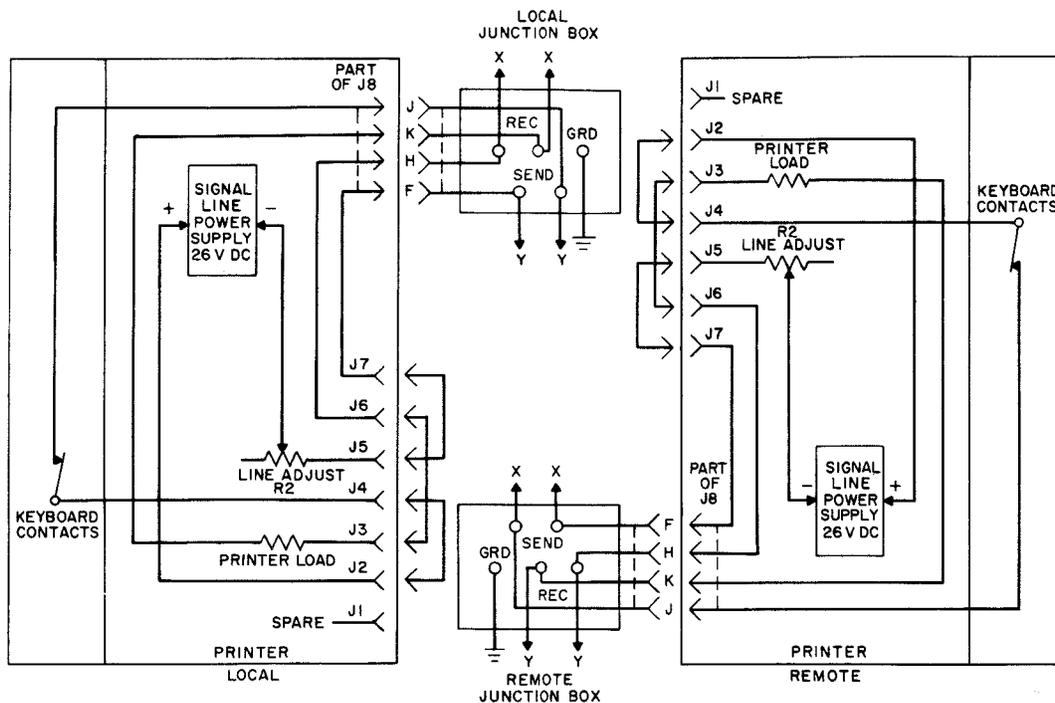


Figure 2-14. Patching Mode 5, Simplified Wiring Diagram

c. EXTERNAL LINE PATCHING OF CONVERTERS.

The AN/TGC-14(V) and AN/TGC-14A(V) equipments may be patched to converters using either two or four wire simplex or duplex connections. Determine the circuitry of the converters before making any connections. Figure 2-15 shows the connections to a typical converter circuit using Converter TH-5/TG, which supplies the line current, connected for full-duplex operation (Mode 4).

Step 5. Insure that the speed change gear is properly seated and install the speed change gear lock knob on the shaft.

Step 6. Swing the idler gear upwards against the speed change gear and mesh the two gears, taking care not to exert excessive pressure. Allow minimum backlash (distance between the gears).

2-10. SPEED CHANGE GEAR REPLACEMENT.

The teletypewriter sets are supplied with a choice of three speed change gears. Establish the operating speed and install the correct color-coded gear. For the AN/TGC-14(V), the 60 words per minute gear is coded blue, the 75 words per minute gear is coded green, and the 100 words per minute gear is coded white.

For the AN/TGC-14A(V), the 45.45 baud gear is coded orange, the 50 baud gear is coded brown, and the 75 baud gear is coded black. Refer to figure 2-8 for the location of the optional speed change gears. To replace a speed change gear, turn off the equipment and proceed as follows:

Step 1. Loosen the idler gear locknut (figure 2-16) and allow the idler gear and locknut to swing away from the speed change gear.

Step 2. Loosen and remove the speed change gear lock knob.

Step 3. Remove the speed change gear.

Step 4. Select the desired replacement speed change gear and install it so that its slot engages the pin on the post.

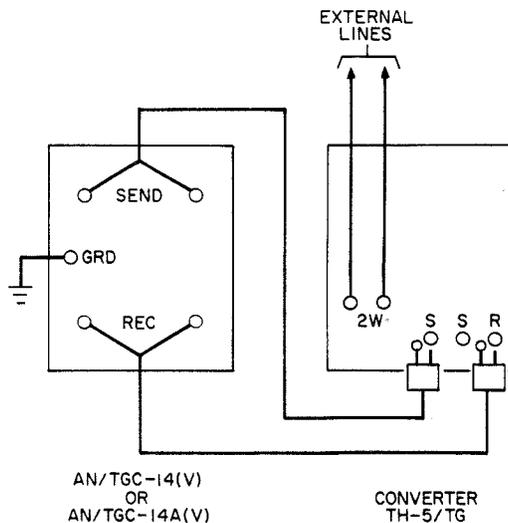


Figure 2-15. External Line Patching,
Typical Connection Circuit

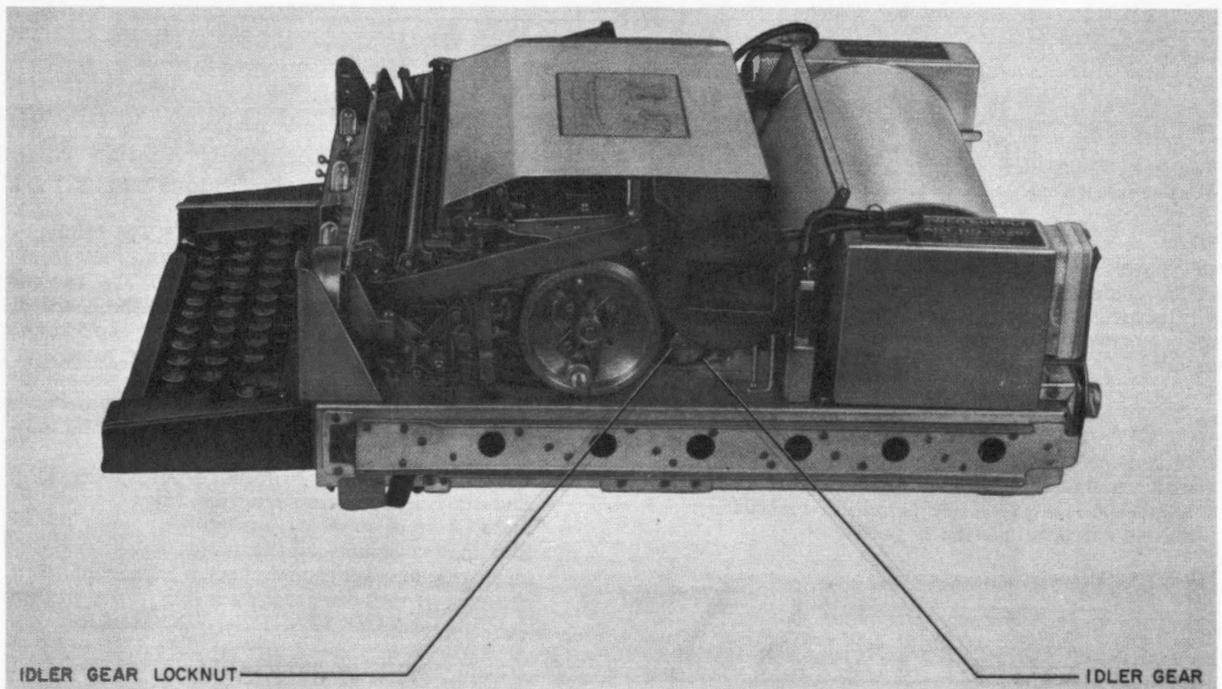


Figure 2-16. Printer and Electrical Chassis, Right-Side View

Step 7. Tighten the idler gear locknut while holding the speed change gear and idler gear in mesh with the other hand. Adjust the backlash to approximately 0.002 inches.

Step 8. Run the motor; if excessive gear noise indicates too much or too little backlash, stop the motor and readjust the backlash. Repeat this procedure for minimum gear noise.

2-11. FINAL PREPARATION FOR USE.

Upon completion of the adjustments and tests necessary to ascertain that the teletypewriter set is functioning properly, re-install it into the case as follows:

Step 1. Set all switches to the OFF position.

Step 2. Disconnect the service cable from the primary power source; then remove the connector-plug from the electrical chassis by carefully turning the connector-plug a quarter turn counterclockwise and pulling the connector-plug out.

Step 3. Align the electrical chassis groove with the slides in the case and insert the assembly into the case.

NOTE

The half-circle locks on each side of the electrical chassis have now come in contact with the half-circle locks in the case. These matching half circles are locked together by the fork located in the front cover.

Step 4. Secure the electrical chassis in the case by engaging the locking fork in the front cover. Press the bottom of the front cover down and then push the top in toward the case.

Step 5. Secure the front cover by engaging the two quick-disconnect fastener studs with a quarter turn clockwise.

Step 6. Connect the service cable as instructed in paragraph 2-8b.

SECTION 3

OPERATION

3-1. INTRODUCTION.

This section contains operating instructions for Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V). This section is written on the premise that the teletypewriter sets have been installed and completely checked in accordance with the instructions in Section 2.

WARNING

Operation of this equipment involves voltages which are dangerous to life. Do not service or adjust the teletypewriter set while it is running unless extreme caution is used.

3-2. FUNCTIONAL OPERATION.

a. PURPOSE OF EQUIPMENT. - The teletypewriter sets provide a means of exchanging typewritten page messages between two or more stations which are similarly equipped and connected by suitable transmission media.

b. CAPABILITIES AND LIMITATIONS.

(1) PRIMARY POWER SOURCE OPTIONS. - The teletypewriter sets are adaptable for use with 115 volts alternating current, 60 cycles per second or 400 cycles per second primary power by a change in the motors.

(2) OPERATING SPEED OPTIONS. - The AN/TGC-14(V) may be adapted to operate at speeds of 60, 75, and 100 words per minute by changing speed change gears normally provided with the equipment. The AN/TGC-14A(V) will operate at 45.45 baud, 50 baud, or 75 baud. However, gears for other operating speeds may be obtained from the manufacturer. Instructions for changing the gears are contained in paragraph 2-10.

(3) OPERATING MODE OPTIONS. - The teletypewriter sets can be patched for half-duplex (simplex) or full-duplex operation by changing patch cord arrangements. Refer to paragraph 2-9 for complete patching instructions.

c. BASIC PRINCIPLES OF OPERATION. - The teletypewriter sets provide a means of transmitting and receiving printed intelligence by means of exchanging series of coded pulses with similar equipment. The local teletypewriter set generates a standard five-level, 7.0 or 7.42-unit, Baudot serial teletypewriter code which is sent over a transmission medium to a remote teletypewriter set. At the remote station, the teletypewriter set receives, decodes, and prints the transmitted intelligence or performs appropriate functions.

3-3. OPERATING PROCEDURES.

a. DESCRIPTION OF CONTROLS. - Refer to table 3-1 for a listing of all operator's controls and func-

tions. All index numbers referred to in table 3-1 are shown in figure 3-1.

b. DESCRIPTION OF INDICATORS. - The teletypewriter sets are equipped with two aural indicators; an end-of-line bell to alert the operator that the end of the line is near, and a signal bell that the operator may use by striking the FIGS key and then the S key to alert the remote operator to a forthcoming message.

c. SEQUENCE OF OPERATION. - To operate the teletypewriter set, perform the following procedures in accordance with the instructions given in the indicated subparagraphs:

- Preliminary starting procedure-paragraph (1).
 - Installation of ribbon-paragraph (2).
 - Installation of paper paragraph (3).
 - Starting procedure-paragraph (4).
 - Operating procedure and checks-paragraph (5).
 - Stopping procedure-paragraph (6).
- (1) PRELIMINARY STARTING PROCEDURE.

CAUTION

If the ambient temperature is 0° centigrade (+32° fahrenheit), or above, open the ventilation ports on the teletypewriter case prior to commencing operation. If the temperature is below 0° centigrade (+32° fahrenheit), close the ventilation ports. As much as 40 minutes warmup time may be required in temperatures below 0° centigrade (+32° fahrenheit). Power is supplied to the heater thermostat as soon as the service cable is connected, regardless of the position of the MOTOR switch.

Step 1. Make certain that the service cable is connected between the source of primary power and the receptacle on the teletypewriter set.

Step 2. Check the ribbon; if it is damaged or dried out, replace it as instructed in paragraph 3-3c(2).

Step 3. Check the copy paper; if supply is low as indicated by a red or purple line, install a new roll of paper as instructed in paragraph 3-3c(3).

Step 4. Set the LINE FEED control arm (located beneath the LIFT panel) for either single or double spacing of lines.

(2) INSTALLATION OF RIBBON.

NOTE

If standard Underwood-type teletypewriter ribbons are not available, any 1/2-inch typewriter ribbon is usable, provided that an Underwood-type spool is used. If the ribbon does not have eyelets, knot the ribbon a few inches from each end.

Step 1. Remove the front cover by disengaging the fastener studs with a counterclockwise turn, pulling the top of the cover forward, and then lifting the cover up and away from the teletypewriter set.

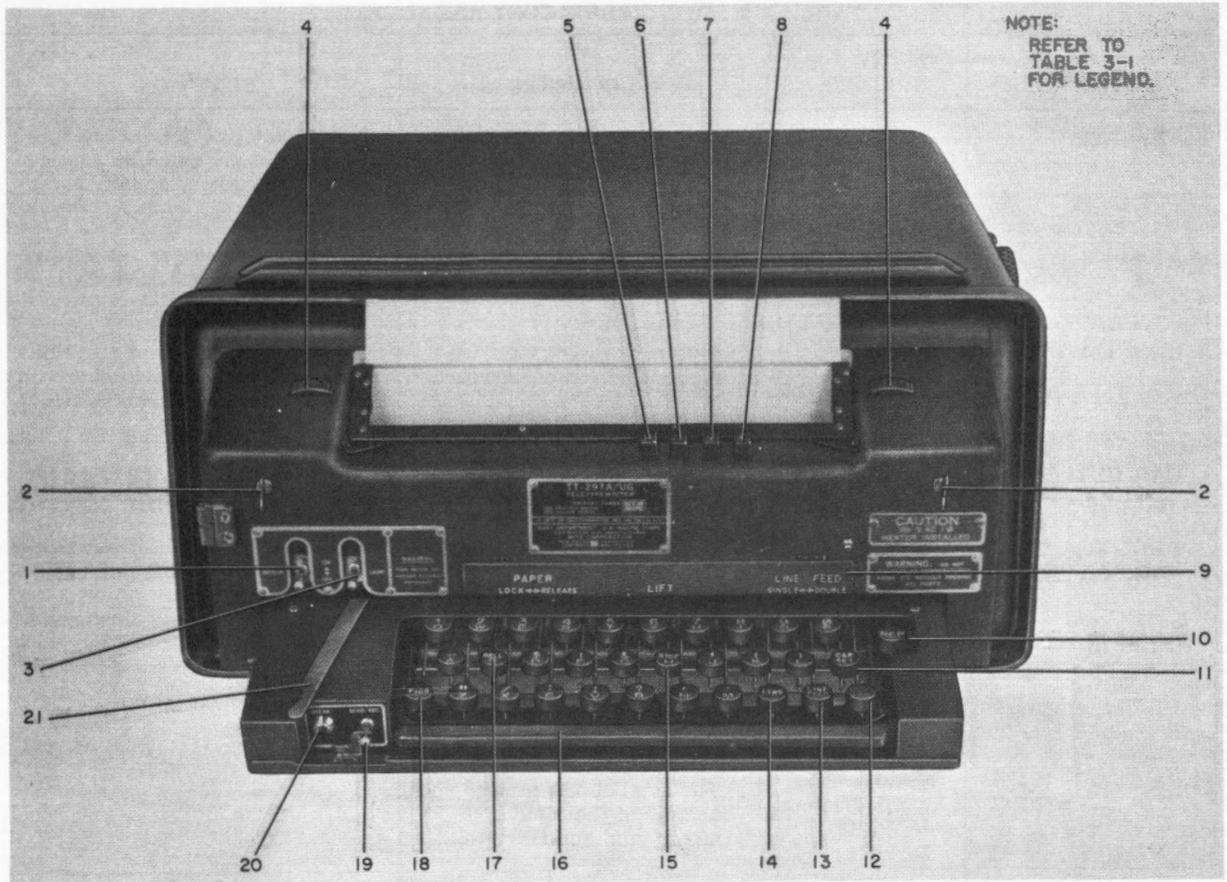


Figure 3-1. Operator's Controls

TABLE 3-1. OPERATOR'S CONTROLS

CONTROL	FIGURE 3-1 LEGEND	LOCATION	FUNCTION
MOTOR switch	1	Left side of printer, above keyboard.	ON position turns on all primary power, except heater. OFF position turns off all primary power, except heater.
LAMP switch	3	Left side of printer, above keyboard.	ON position lights the copy lamp. OFF position extinguishes the copy lamp.
SEND•REC-REC switch	19	Left side of keyboard cover.	REC position allows only reception, but not transmission; SEND•REC position allows both keyboard transmission and reception.
BREAK push button switch	20	Left side of keyboard cover.	Opens signal line; used to start motors when turned off by STOP key or time delay mechanism (AN/TGC-14A (V)).

TABLE 3-1. OPERATOR'S CONTROLS (Cont)

CONTROL	FIGURE 3-1 LEGEND	LOCATION	FUNCTION
FIGS key	18	Bottom row, extreme left-hand end of keyboard.	Shifts teletypewriter set to figures condition, enabling punctuation and other symbols to be typed.
LTRS key	14	Bottom row, third from right-hand end of keyboard.	Shifts teletypewriter set to letters condition, enabling all letters to be typed.
LINE FEED key	13	Bottom row, second from right-hand end of keyboard.	Moves paper up one or two line spaces on paper feed rubber roll depending on position of LINE FEED shift arm.
CAR RET key	11	Middle row, extreme right-hand end of keyboard.	Returns print cylinder to extreme left margin of paper.
BELL key (FIGS S)	17	Middle row, second from left-hand end of keyboard.	Rings the signal bell, if struck after FIGS key, not after LTRS key.
STOP key (FIGS H)	15	Middle row, fifth from right-hand end of keyboard.	In the AN/TGC-14(V), turns off motor to place machine in standby condition if struck after FIGS key, not after LTRS key.
NOTE			
The symbol # is printed upon receipt of the figures H motor stop signal.			
REP key	10	Top row, extreme right-hand end of keyboard.	Repeats the last character or function sent from the machine, for as long as the key is depressed.
Fastener studs	2	Both sides of front cover.	Lock front cover in place.
Alphanumeric keys		Keyboard.	Cause the printing of the letter, or symbol, as shown on the key top.
Blank key	12	Bottom row, extreme right-hand end of keyboard.	Transmits blank code group.
Space bar	16	Bottom of keyboard.	Causes print cylinder to move to the right without printing.
Off-line carriage return button (<)	8	Top right side of front cover.	Returns local teletypewriter set print cylinder to extreme left margin of paper.
Off-line letters button (↓)	7	Top right side of front cover.	Moves print cylinder of local teletypewriter set to letters position (will not operate unless an incoming signal or signals are being received).
Off-line figures button (↑)	6	Top right side of front cover.	Moves print cylinder of local teletypewriter set to figures position.

TABLE 3-1. OPERATOR'S CONTROLS (Cont.)

CONTROL	FIGURE 3-1 LEGEND	LOCATION	FUNCTION
Off-line line feed button (≡)	5	Top right side of front cover.	Feeds copy paper on local machine.
Paper feed knob		Under front cover.	Rolls the paper through the paper feed rubber roll to facilitate paper installation.
LINE FEED shift arm	9	Under LIFT panel.	In the left position, causes the proper feed rubber roll to move one space; in the right position, causes the paper feed rubber roll to move two spaces.
PAPER lock pressure release lever	9	Under LIFT panel.	Releases pressure on copy paper when moved to the right; grips paper firmly when moved to the left.
Keyboard lock bar	21	Left side of keyboard.	Unlocks keyboard to allow movement to either operate or stowage position.
Copy window release	4	Lever is located at top right and top left of front cover.	Unlocks copy window.
Time delay MOTOR STOP switch		Under front cover (AN/TGC-14A(V) only).	Enables or disables time delay motor stop feature.

Step 2. Remove the service cable from the teletypewriter set by turning the connector-plug counterclockwise and pulling straight out.

Step 3. Carefully slide the printer and electrical chassis out of the case and place the printer and electrical chassis on a clean work surface.

Step 4. Remove the paper, if installed, and then lift the paper guide off the ribbon feed mechanism.

NOTE

If the printer is equipped with the quick removal ribbon feed assembly (identified by lock clips 20, figure 3-2), the entire assembly may be removed by moving the clips to the right and carefully removing the plate and ribbon together. Do not remove the ribbon feed assembly to replace the ribbon.

Step 5. Remove the old ribbon, if installed; retain the old spool.

Step 6. Place the new ribbon and spool (17, figure 3-2) on post (18), insuring that pin (19) engages the slot in the spool.

Step 7. Thread the ribbon in front of left hand tension control brake arm (16), behind ribbon roller (15), and through the fork of left hand ribbon reversing sensing arm (14).

Step 8. Thread the ribbon around ribbon roller (13), around and outside ribbon guide roller (12), and then through left hand ribbon vibrator guide (11), by first

passing the ribbon down through the slit and then bringing it up behind the tab that points down.

Step 9. Pass the ribbon across the front of the printer, engaging right hand ribbon vibrator guide (10), around the front of ribbon guide roller (9), and around and behind ribbon roller (8).

Step 10. Engage the end of the ribbon with ribbon spool (1) and wind the new ribbon onto the spool until reversing eyelet (5) is on the spool.

Step 11. Thread the ribbon through the fork of right hand ribbon reversing sensing arm (7), around and behind ribbon roller (6), and in front of right hand tension control brake arm (4); then place ribbon spool (1) on post (2) with pin (3), engaging the spool.

CAUTION

Insure that reversing eyelet (5) is past right hand ribbon reversing sensing arm (7) and on ribbon spool (1). If not, the ribbon will continue to feed.

Step 12. Test the operation of the ribbon feed mechanism by starting the printer motor and then actuating ribbon reversing sensing arms (7 and 14) several times.

If the ribbon feed assembly has been removed, replace it by engaging the rear of the plate with the two clips on the printer; pull the bounce prevent lever up to prevent interference between the bounce prevent lever guide (on the ribbon feed assembly) and the

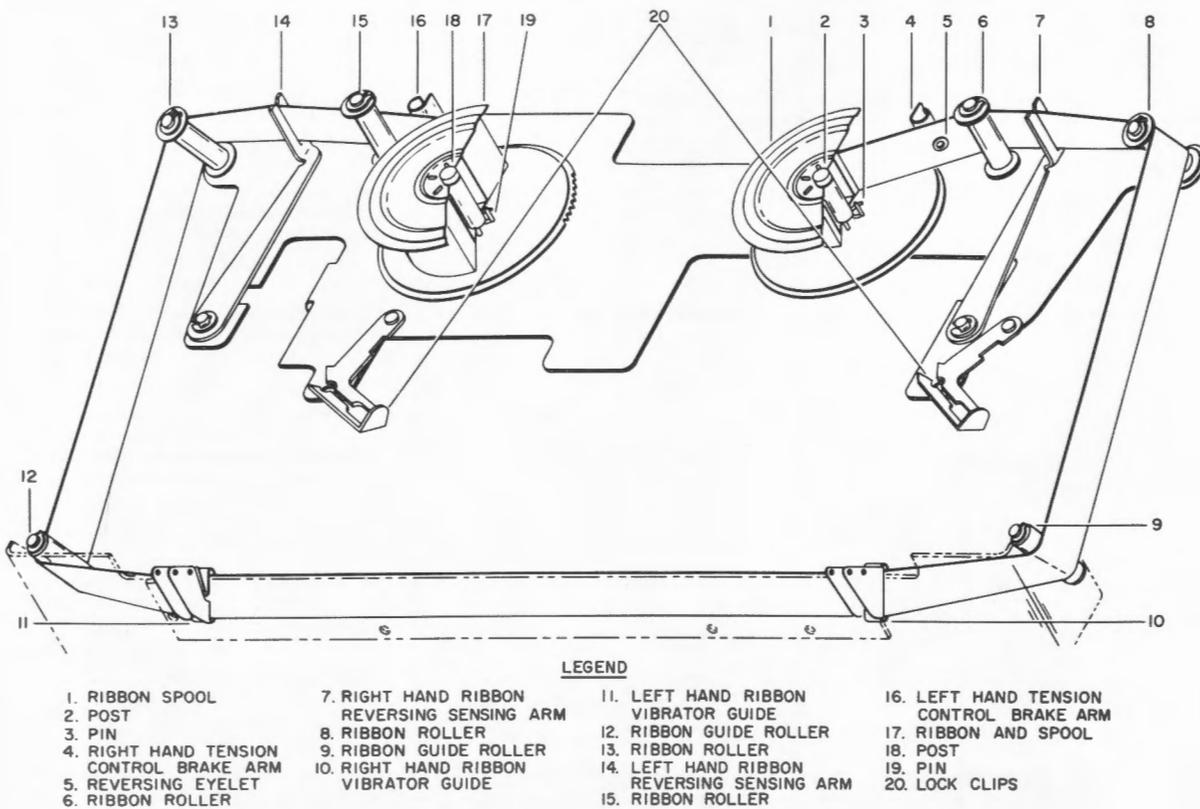


Figure 3-2. Ribbon Threading Diagram

bounce prevent lever spring. Engage lock clips (20, figure 3-2) by moving them to the left.

Replace the paper guide by engaging the rear apron mounting pins and then snapping the front edge down and over the paper guide retaining pins located on the front of the printer. Install the paper as instructed in paragraph 3-3c(3).

(3) INSTALLATION OF PAPER.

(a) TACTICAL CASE CY-2976/PG.

Step 1. Remove the front cover by loosening the two fastener studs, pulling the top of the cover forward, and then lifting the entire cover up and away from the teletypewriter set.

Step 2. Remove the service cable from the teletypewriter set by turning the connector-plug a quarter turn counterclockwise and pulling straight out.

Step 3. Carefully slide the printer and electrical chassis out of the case and place the printer and electrical chassis on a clean work surface.

Step 4. Raise the two paper support and brake drum assembly lock levers (figure 2-1) and lift the paper support and brake drum assembly out of the electrical chassis.

Step 5. Grasp knurled discs (3, figure 3-3) on both ends of the paper support and brake drum assembly and turn one end counterclockwise with respect to the other.

Step 6. Remove brake drum (2) from paper support shaft (1).

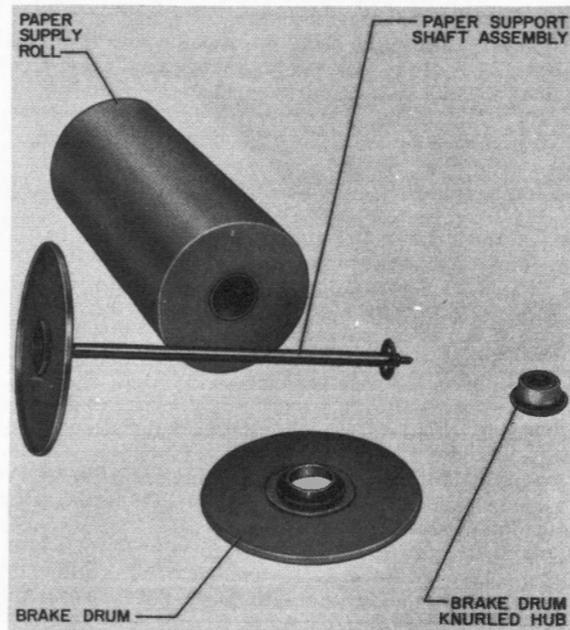


Figure 3-3. Paper Spool Assembly

Step 7. Insert paper support shaft (1) through the core of paper supply roll (4) and then install brake drum (2) by turning knurled discs (3) clockwise with respect to each other.

Step 8. Insert the paper support and brake drum assembly into the paper spool bearing receptacles of the electrical chassis and then lock into position by moving the paper support and brake drum assembly lock levers back and down.

Step 9. Thread the paper behind and over the dancer roll tube, and then over the paper guide.

Step 10. Fold back approximately three inches of the paper to provide a straight edge and then insert the paper down and behind the return cable and print cylinder.

Step 11. Gently press the paper down and against the paper feed rubber roll and pressure roll; then rotate the paper feed knob (figure 2-8) counterclockwise until the paper emerges at the top of the printer.

Step 12. If the paper is not straight in the printer, move the PAPER lock pressure release lever to the right, align the edges, and then lock the paper by moving the lever to the left.

Step 13. Align the electrical chassis slide with the track in the case and carefully slide the electrical chassis back into the case.

Step 14. If the front cover is to be reinstalled, thread the paper through the paper opening.

Step 15. Install the front cover by pressing the bottom of the cover into position to lock the electrical chassis in place and swinging the top of the cover into the closed position; then engage the two fastener studs by turning them clockwise.

Step 16. Install the service cable connector-plug in the receptacle by aligning the key of the connector-plug with the keyway of the receptacle, gently pushing in, and turning the connector-plug one-quarter turn clockwise.

(b) NON-TACTICAL CASE CY-2977/UG.

NOTE

The following procedure is applicable only when there is sufficient clearance over the teletypewriter set to allow the case cover to be opened.

Step 1. Remove the front cover by loosening the two fastener studs, pulling the top of the cover forward, and then lifting the entire cover up and away from the teletypewriter set.

Step 2. Disconnect the two captive fasteners on the hinged cover by turning them counterclockwise and lift the cover, being careful not to bend or chafe the service cable.

Step 3. Perform steps 4 through 12 of paragraph 3-3c(3).

Step 4. Close the cover and engage the two fastener studs by turning them clockwise.

Step 5. Thread the paper through the front cover.

Step 6. Install the front cover by pressing the bottom into position to lock the electrical chassis and swinging the top of the cover into the closed position; then engage the two fastener studs by turning them clockwise.

ORIGINAL

Step 7. If the paper is not straight in the printer, move the PAPER lock pressure release lever to the right, align the edges, and then lock the paper by moving the lever to the left.

(c) NON-TACTICAL CASE CY-2977A/UG. - Either pressure-feed or sprocket-feed copy paper may be used with this case. To install pressure-feed paper, refer to paragraph 3-3c(3)(b). To install sprocket-feed paper, proceed as follows:

NOTE

Check that sprocket teeth (AB, figure 5-34, Appendix) are installed in the paper feed rubber roll. If necessary, install the teeth using a 0.050-inch hex wrench.

Step 1. Remove the front cover by loosening the two fastener studs, pulling the top of the cover forward, and then lifting the cover up and away from the teletypewriter set.

Step 2. Disconnect the two captive fasteners on the hinged cover by turning them counterclockwise and lift the cover, being careful not to bend or chafe the service cable.

Step 3. Fill the front paper receptacle (figure 3-4) with a supply of fan-fold paper, being careful to position it so that when pulled off to the back, the master sheet faces the bottom of the teletypewriter.

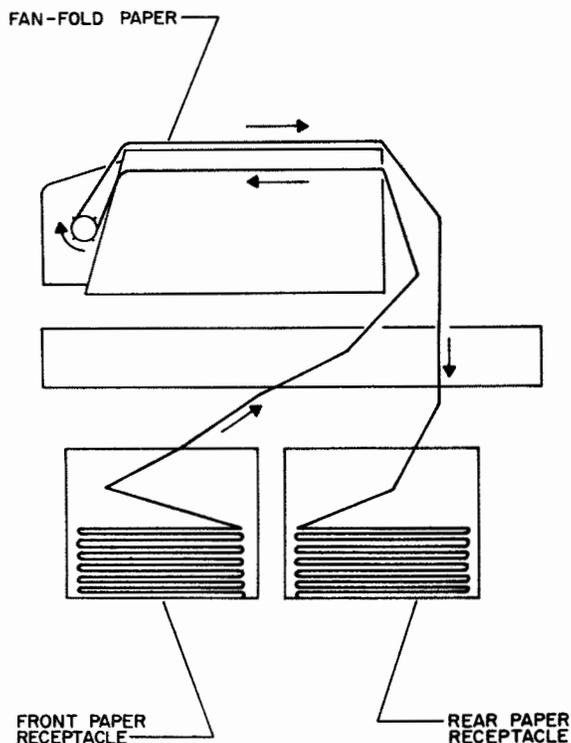


Figure 3-4. Installation Diagram,
Sprocket-Feed Paper

Step 4. Carefully tear off one corner or staple the front edge of the paper to facilitate installation into the equipment.

Step 5. Grasp the end of the paper, being careful to have the carbon paper facing in the correct direction, and feed the paper through the slot in the rear of the hinged cover.

Step 6. Draw the paper over the paper guide and out through the opening in the front of the case.

Step 7. Move the PAPER lock pressure release lever to the right and feed the paper down between and behind the return cable and print cylinder.

Step 8. Gently press the paper down and against the paper feed rubber roll and pressure roll; then rotate the paper feed knob counterclockwise until the paper emerges at the top of the printer.

NOTE

Insure that the sprocket teeth are properly engaged with the feed holes in the paper. Also make certain that the PAPER lock pressure release lever is in the RELEASE position.

Step 9. Open the window on the front cover and thread the paper through the cover; install the front cover by pressing the bottom of the cover into position to lock the electrical chassis in place and swinging the top of the cover into the closed position.

Step 10. Engage the two fastener studs by turning them counterclockwise.

Step 11. When operation has begun, check that the copy paper feeds into the rear paper receptacle as shown in figure 3-4.

(4) STARTING PROCEDURE.

Step 1. Set the MOTOR switch to the ON position.

Step 2. Set the SEND•REC-REC switch to the SEND•REC position for half-duplex or full-duplex operation or in the REC position for receive operation only.

Step 3. Set the LAMP switch to the ON position.

NOTE

To start the motor after it has been shut down by a motor stop or time delay function, check that the MOTOR switch is still in the ON position and then push the BREAK push button switch.

(5) OPERATING PROCEDURE AND CHECKS. — Perform the following operating checks prior to commencing operation:

Step 1. Check that the end-of-line bell rings when the 65th character is printed; automatic line feed and carriage return occur after the 72nd character is printed; and carriage return occurs when the carriage return code impulse is received.

Step 2. Observe the action of the ribbon while printing. The ribbon must be lifted each time an alphanumeric character is printed.

Step 3. Check the space bar, FIGS key, and LTRS key to see that they function properly.

Step 4. Depress the FIGS key and then depress the A key. Observe that the hyphen (-) prints. Depress the REP key and then depress the letters off-line button (↓) protruding through the front cover. The print cylinder should return to the letters position as indicated by a series of A's.

Step 5. Space the print cylinder toward the center of the page. Depress the carriage return off-line button (<) protruding through the front cover. The print cylinder should return to the left margin.

Step 6. Depress the LTRS key and then depress the figures off-line button (↑) protruding through the front cover. The print cylinder should return to the figures position.

Step 7. Depress the line feed off-line button (≡) protruding through the front cover. The paper should continue to advance as long as the button is depressed.

Step 8. Check the signal bell by depressing the FIGS key, then the S key; the signal bell should ring.

Step 9. On the AN/TGC-14(V), check the motor stop function by depressing the FIGS key, then the H key; the motor should stop. If the printer is shut off during normal operation by use of the figures H motor stop, the action will be indicated by the # symbol. Receipt of the first transmitted signal or any break in the signal line will start the motors of all teletypewriter sets in the circuit. On the AN/TGC-14A(V), check that the motor stops 90 seconds (45.45 baud) or 60 seconds (75 baud) after the last mark-to-space transition. If an AN/TGC-14A(V) is on the line with an AN/TGC-14(V) which sends a figures H function, the AN/TGC-14A(V) will print the # symbol, but will not stop until the required time delay has elapsed. Any other AN/TGC-14(V) sets on the line will print the # symbol and then stop.

Step 10. Push the BREAK push button switch; the motor should start.

Step 11. Depress any of the alphanumeric keys and then depress the REP key. Maintain pressure on the repeat key and release the alphanumeric key and note that the character will continue to be typed until the REP key is released.

Step 12. Commence sending or receiving operations.

Step 13. If the received message is garbled, perform the applicable range calibration check as instructed in paragraph 2-8e.

(6) STOPPING PROCEDURE.

Step 1. During operation, a teletypewriter operator at any sending station can stop the motors of all teletypewriter sets equipped with the figures H motor stop feature in the circuit by depressing the FIGS key, placing all machines in the figures position, and then the H key on standard communication keyboards. The motors of all teletypewriter sets in the circuit will be stopped and the teletypewriter set will remain in standby condition. On teletypewriter sets equipped with the time delay motor stop feature, the motor will shut off 90 seconds (45.45 baud) or 60 seconds (75 baud) after the receipt of the last mark-to-space transition.

Step 2. Stop the teletypewriter set and close it to traffic by setting the MOTOR and LAMP switches to the OFF position.

3-4. SUMMARY OF OPERATING PROCEDURES.

Refer to table 3-2 for a summary of the operating procedures.

3-5. OPERATOR'S MAINTENANCE.

The operator's maintenance consists of replacing ribbons, paper, fuses, and copy lamps. In addition,

the operator must check the range calibration and letter spacing as described in paragraph 3-5b. None of these procedures requires special tools or test equipment.

a. REPLACEMENT PROCEDURES.

- (1) RIBBON REPLACEMENT. - Replace the ribbon, when required, as instructed in paragraph 3-3c(2).
- (2) PAPER REPLACEMENT. - Replace the paper when required, as instructed in paragraph 3-3c(3).
- (3) FUSE REPLACEMENT. - To replace a defective fuse, proceed as follows:

NOTE

Step 1 is applicable to Tactical Case CY-2976/PG only, and step 2 is applicable to Non-Tactical Case CY-2977/UG or CY-2977A/UG only.

Step 1. Remove the printer and electrical chassis from the case as instructed in paragraph 2-2b.

Step 2. Loosen the two fastener studs on the top hinged cover of the case and then open and swing the hinged cover back.

Step 3. Turn the fuse holder cap counterclockwise and remove it and the defective fuse.

Step 4. Refer to the fuse data placard on the rear of the line sensor or on the chassis to determine the required size of the replacement fuse.

Step 5. Insert the fuse into the holder and install the fuse holder cap by turning the cap clockwise.

NOTE

Step 6 applies to Tactical Case CY-2976/PG only and step 7 to Non-Tactical Case CY-2977/UG or CY-2977A/UG only.

Step 6. Reinstall the printer and electrical chassis in the case according to paragraph 2-11.

Step 7. Close the front cover and secure it by engaging the two fastener studs with a clockwise turn.

(4) COPY LAMP REPLACEMENT.

CAUTION

The electrical chassis is free to slide out of the case upon removal of the front cover.

Step 1. Remove the front cover by loosening the two fastener studs, pulling the top toward the front, and then pulling the entire assembly up and away from case.

Step 2. Depress the defective copy lamp, turn counterclockwise, and then remove the lamp from the socket.

Step 3. Insert a new lamp in the socket, depress, and then turn clockwise approximately a quarter turn.

Step 4. Install the front cover by engaging the electrical chassis locking device, pressing down, pushing the top into position, and then engaging the two fastener studs with a clockwise quarter turn.

b. OPERATING CHECKS AND ADJUSTMENTS. - Operating checks and adjustments are those checks and adjustments which must be made during normal operations in order to maintain the efficiency of the teletypewriter set.

(1) RANGE CALIBRATION CHECK AND ADJUSTMENT. - Due to variations in signal line bias during the day, it may be necessary to check the range calibration several times. Check and, if necessary, adjust the range according to paragraph 2-8e.

(2) LETTER SPACING CHECK. - During daily operations, periodically check the spacing between letters or combinations of letters for variations. If letters close up, notify maintenance personnel and request that corrective action be taken.

c. PREVENTIVE MAINTENANCE. - Refer to tables 5-2 and 5-3 (Appendix) for preventive maintenance routine check charts which may be used by the operator if an Organizational Maintenance Program is in effect.

TABLE 3-2. SUMMARY OF OPERATING PROCEDURES

STEP NO.	OPERATION	ACTION
1.	Prepare for operation.	Ascertain that the equipment has been completely installed and is ready for operation.
2.	Position keyboard.	Move keyboard lock bar to right and pull on sides of keyboard until keyboard locks into position.
3.	Start equipment.	Set MOTOR and LAMP switches to ON.
4.	Warm up equipment.	Open case ventilation ports if temperature is 0° centigrade (+32° fahrenheit) or above. Close case ventilation ports if temperature is below 0° centigrade (+32° fahrenheit). As much as 40 minutes warm up time may be required when ambient temperatures below 0° centigrade (+32° fahrenheit) are encountered. Heater will be activated whether MOTOR switch is ON or OFF.
5.	Check operating adjustments.	Refer to paragraph 3-5b for adjustment procedures; perform adjustments, if required.
6.	Select operating condition.	Set SEND•REC-REC switch to proper position (up for both send and receive; down for receive only).

TABLE 3-2. SUMMARY OF OPERATING PROCEDURES (Cont)

STEP NO.	OPERATION	ACTION
7.	<p>Perform following on-line (both send and receive) functions as required:</p> <p>(a) Print digits and punctuation marks when selected key is depressed.</p> <p>(b) Print letters when selected key is depressed.</p> <p>(c) Advance paper.</p> <p>(d) Return print cylinder to left side.</p> <p>(e) Repeat last transmitted character.</p> <p>(f) Obtain space between characters.</p> <p>(g) Interrupt transmission from remote station.</p> <p>(h) Ring bell at both local and remote stations.</p> <p>* (i) Stop motor at both local and remote stations.</p> <p>(j) Restart motor at both local and remote stations.</p>	<p>Depress FIGS key.</p> <p>Depress LTRS key.</p> <p>Depress LINE FEED key.</p> <p>Depress CAR RET key.</p> <p>Depress REP key.</p> <p>Depress space bar.</p> <p>Push BREAK pushbutton switch.</p> <p>Depress FIGS key and then S key.</p> <p>Depress FIGS key and then H key.</p> <p>Push BREAK pushbutton switch.</p>
8.	<p>Perform following off-line (only local machine) functions, as required:</p> <p>(a) Provide shift to letters on local printer.</p> <p>(b) Provide shift to figures on local printer.</p> <p>(c) Provide carriage return on local printer.</p> <p>(d) Provide line feed.</p>	<p>Depress off-line letters button (↓) while receiving intelligence. (Off-line letters button will not operate unless intelligence is being received by printer.)</p> <p>Depress off-line figures button (↑).</p> <p>Depress off-line carriage return button (<).</p> <p>Depress off-line line feed button (≡).</p>
9.	<p>Change line feed rate.</p>	<p>Open LIFT panel and move LINE FEED shift arm to either single (six lines per inch) or double (three lines per inch) position, as required.</p>
10.	<p>Stop equipment.</p>	<p>Set MOTOR and LAMP switches to OFF.</p>
11.	<p>Secure equipment.</p>	<p>Move keyboard lock bar to right; push on sides of keyboard until it is recessed. Release lock lever and insure that keyboard is locked.</p>

*Only on AN/TGC-14(V); on AN/TGC-14A(V), motor will stop 90 seconds (45.45 baud) or 60 seconds (75 baud) after last mark-to-space transition.

SECTION 4
TROUBLE SHOOTING

4-1. INTRODUCTION.

This section contains instructions for trouble shooting the electrical and mechanical systems of Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V). Trouble-shooting procedures should be confined to that work which can be accomplished without complete disassembly, or with partial disassembly of the equipment, and not requiring the use of any tools or test equipment other than those found in the field maintenance shop. Instructions for major repairs, adjustments, disassembly procedures, and parts location information are included in Section 5.

4-2. TEST EQUIPMENT AND SPECIAL TOOLS.

The test equipment and special tools required for trouble shooting the teletypewriter sets are listed in table 4-1 (Appendix).

4-3. LOGICAL TROUBLE SHOOTING.

Due to the complex electro-mechanical nature of the teletypewriter sets, historical data based upon actual trouble shooting experience on operating installations has been compiled into trouble-shooting tables which will enable the electronics technician to quickly and efficiently locate the cause of an equipment malfunction or performance deterioration. The first group of overall trouble-shooting tables will isolate the trouble to a particular component, incorrect adjustment, or functional section; the second group of functional section trouble-shooting tables will isolate the trouble to the defective component or incorrect adjustment.

The overall trouble-shooting tables group the equipment as follows: Equipment Already In Use; Equipment of Unknown Condition; and Newly Installed Equipment. The technician chooses the category into which the defective equipment belongs, and follows the step-by-step procedures of the applicable table. If the preliminary procedures as outlined do not isolate the malfunction, the technician is instructed to proceed to the System Trouble-Shooting Chart. This chart lists the most often encountered symptoms of trouble, together with probable causes and corrective actions.

The functional section trouble-shooting tables list the most often encountered symptoms, their probable causes, and corrective actions. The corrective actions provide detailed directions to perform certain adjustments, make voltage and continuity checks, check for obvious damage, or check for incorrect switch settings.

To further assist in isolating malfunctions, both overall and detailed functional descriptions are provided, supported by functional block diagrams, servicing block diagrams, and simplified schematic diagrams.

Test points and significant waveforms are provided on the servicing block diagrams and parts location drawings for use with the functional section trouble-shooting tables.

The most rapid method of correcting a malfunction and getting the equipment back into operation is to replace entire defective units (keyboard, line sensor, or signal line power supply) with known good replacement units and then to perform the trouble-shooting procedures on the defective unit. In this manner, the operating equipment will be subjected to the minimum down time.

CAUTION

The electrical and mechanical systems of the teletypewriter set are delicate equipment and must be so treated. Many cases of equipment malfunction may be attributed to careless attempts at repair or adjustment by maintenance personnel. Caution must be exercised to prevent abuse to the various units.

4-4. OVERALL FUNCTIONAL DESCRIPTION.

a. OVERALL OPERATION. - Figure 4-1 (Appendix) is a simplified block diagram showing the functional arrangement of the major assemblies of the teletypewriter set. Electrical chassis 1A1 serves to route the incoming and outgoing signals and to distribute primary power to the appropriate assemblies. The purpose of the alternating current signal line power supply is to furnish a direct-current signal line source with a floating ground. For the transmission of intelligence, keyboard 1A9 functions as a switching device for the output of the signal line power supply. This output may be of either positive or negative polarity, since the teletypewriter set is not polarity-sensitive. Depressing a key or the space bar establishes a mechanical code which is converted into a coded motion of pulsing contacts. The output of these contacts is a coded pulse train which is routed through the electrical chassis to either the line sensor or to the send line.

The coded pulse train shown in figure 4-2 represents the letter D. This letter has a signal code combination of space (no-current) pulses on start, 2, 3, and 5 and mark (current) pulses on 1, 4, and stop. For further information on the signal code combinations, refer to figure 1-2.

Upon receipt of a signal, the line sensor functions as an electronic switch and switches the start pulse, the five intelligence pulses, and the stop pulse in sequence to a selector in printer 1A2. The selector converts the electrical pulses into mechanical functions to operate a system of clutches on the printer

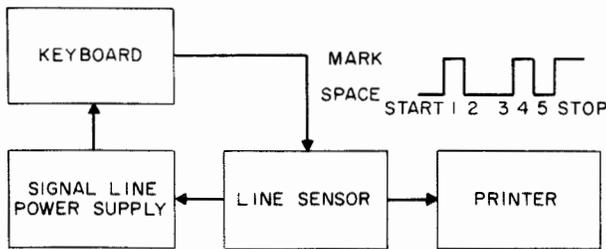


Figure 4-2. Off-Line Local Mode,
Functional Block Diagram

main shaft. These clutches operate cams and linkages to perform all mechanical and printing functions to reproduce the received intelligence.

When the pulse train ceases, a steady mark pulse will remain while the signal is applied to the equipment and the signal loop remains closed. Under this steady mark condition, the printer does not perform any mechanical functions and operates in a closed condition. However, if the signal loop is opened and a steady space condition exists, the printer will run open and will appear to be performing, except for printing and non-advancing.

The following paragraphs describe the overall operation of the teletypewriter sets in each of three modes of operation.

b. OFF LINE LOCAL MODE. - In off line local mode (figure 4-2), the teletypewriter set functions as

an electric typewriter and requires no connection to external equipment. The signal line power supply, keyboard, and line sensor of the local machine are connected in series to form a closed signal loop. The signal line power supply furnishes direct current for the signal loop.

c. HALF-DUPLEX MODE (SIMPLEX). - In half-duplex mode (figure 4-3), the functional units of both sending and receiving teletypewriter sets are all connected in series. The same signal loop is used for both machines, making it impossible to send and receive simultaneously. Figure 4-3 shows only two machines, but additional teletypewriter sets may be connected into the signal loop provided line current requirements do not exceed the capabilities of the signal line power supply.

When the local operator is sending, direct current flows through the signal loop which includes the input resistance of the remote line sensor, the closed and inactive remote keyboard pulsing contacts, the local line sensor, and the signal line power supply. Both the local and remote printers will print a copy of the message. A similar signal loop is followed when the remote operator is sending. Each keyboard has a BREAK switch connected in series with the signal loop. This switch is normally used to signal the remote operator to stop sending. If the BREAK switch is used, the signal loop will be opened. Both machines will then run open, as indicated by an interruption in printed copy. In addition to the BREAK switch, each keyboard has a SEND•REC-REC switch. With the switch in the SEND•REC position, the keyboard pulsing contacts are connected in series with the signal loop and permit either sending or receiving. With the

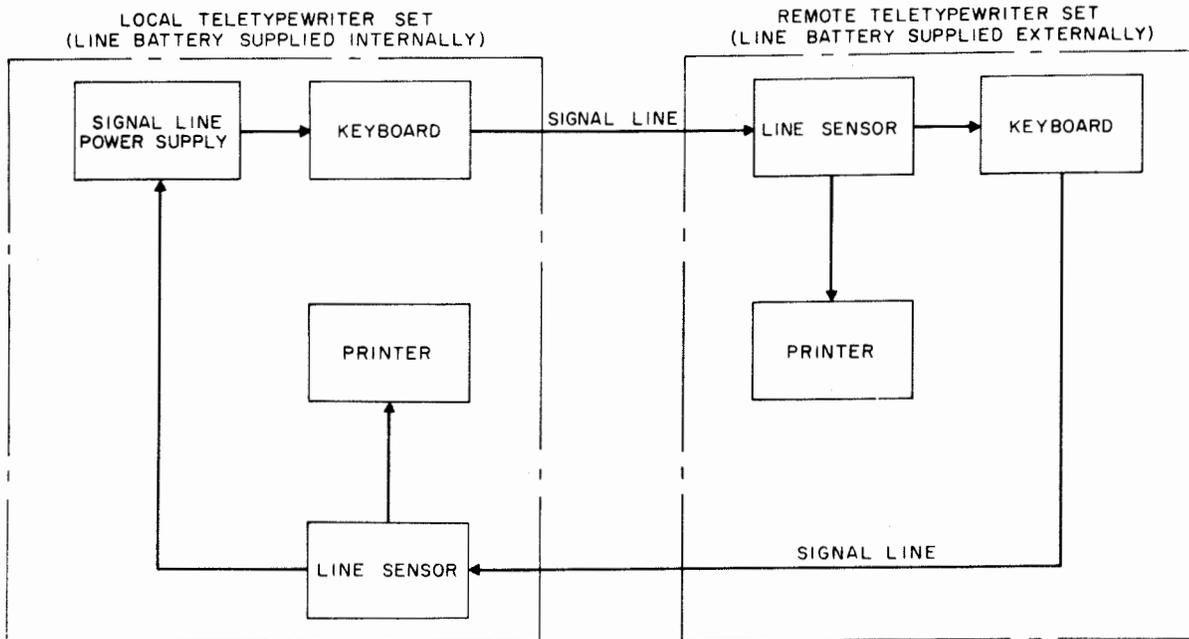


Figure 4-3. Half-Duplex Mode, Functional Block Diagram

switch in the REC position, the keyboard pulsing contacts and the BREAK switch function are both shorted out, resulting in a closed signal loop. Under this condition, the teletypewriter set will function as a receive-only printer.

d. **FULL-DUPLEX MODE.** - Full-duplex mode operation (figure 4-4) requires two separate signal loops and permits simultaneous sending and receiving. Since each keyboard is operated independently of its printer, no home copy of the message is available.

4-5. OVERALL TROUBLE SHOOTING.

WARNING

Voltages dangerous to life exist in the teletypewriter set. Use extreme caution when servicing this equipment.

a. **GENERAL.** - The teletypewriter sets considered in this section have been grouped as follows: Equipment Already In Use; Equipment of Unknown Condition; and Newly Installed Equipment.

(1) **EQUIPMENT ALREADY IN USE.** - Equipment already in use comprises equipment that has previously performed satisfactorily and is now malfunctioning. Refer to table 4-2 (Appendix) for preliminary checks and trouble-shooting instructions.

(2) **EQUIPMENT OF UNKNOWN CONDITION.** - Equipment of unknown condition is not usable due to an undetermined fault. Refer to table 4-3 (Appendix) for the trouble-shooting procedure.

(3) **NEWLY INSTALLED EQUIPMENT.** - Newly installed equipment comprises equipment which has been installed but never operated. Perform all tests

and adjustments in Section 2 and then proceed with the trouble-shooting procedure in table 4-4 (Appendix).

b. **TEST SETUP AND PRELIMINARY CHECKS.** - Operate the machine by hand through any single operation. Check for broken or binding parts. If trouble is not apparent, proceed as follows:

Step 1. Patch the equipment for off line local mode (paragraph 2-9a(1)).

CAUTION

Do not connect the equipment to the primary power source without first determining that the teletypewriter set is compatible with the power source. Refer to paragraph 2-5a for verification instructions.

Step 2. Connect the service cable to the electrical chassis receptacle and to the primary power source (paragraph 2-8b).

Step 3. Connect a jumper wire across the REC (red) binding posts on the service cable junction box.

Step 4. Connect Multimeter AN/PSM-4 (connected to read approximately 60 milliamperes), or equivalent, across the SEND (black) binding posts on the service cable junction box.

CAUTION

Do not slide the keyboard in or out while the motor is running or while the MOTOR STOP switch (AN/TGC-14A(V)) is in the ENABLE position. Movement of the keyboard at these times will cause serious damage to the equipment.

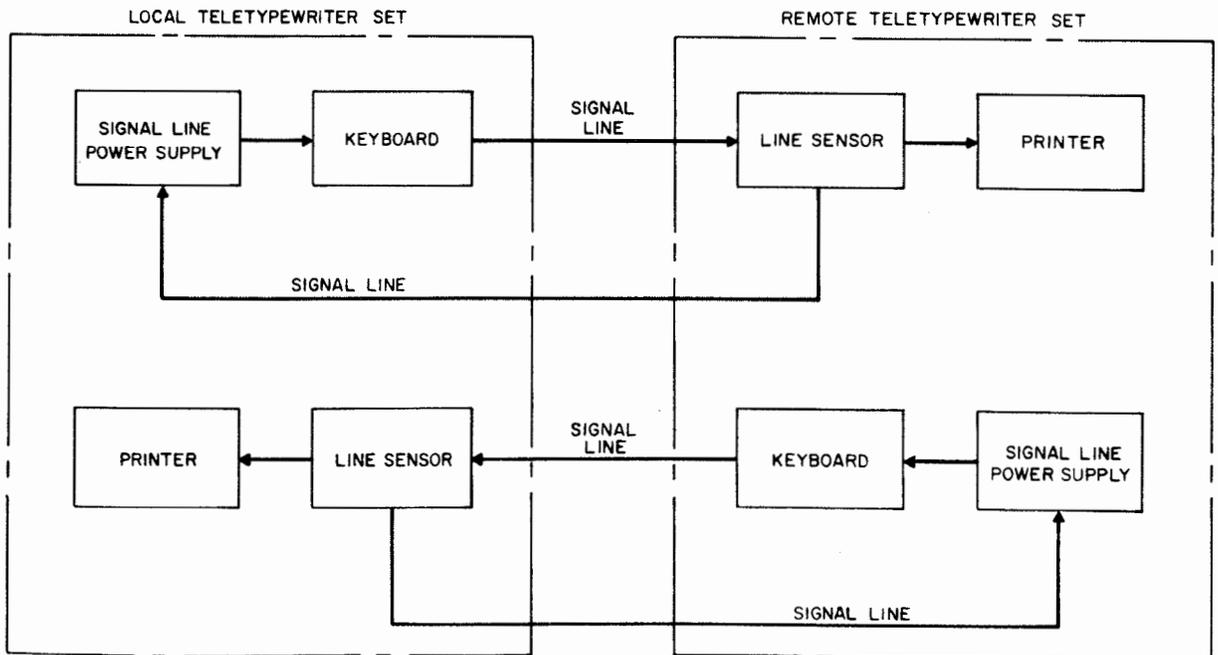


Figure 4-4. Full-Duplex Mode, Functional Block Diagram

Step 5. Set the SEND•REC-REC switch to the SEND•REC position; pull the keyboard out to the operating position.

Step 6. Set MOTOR and LAMP switches to ON position and check that multimeter reads in proper direction; if reading is reversed, reverse the test leads on the SEND (black) binding posts. Observe that copy lamps glow and motor runs; if either or both fail to energize, refer to table 4-4 (Appendix) for troubleshooting instructions.

Step 7. Using a small screwdriver, turn the LINE ADJUST control (figure 2-1) for a reading of 60 milliamperes on Multimeter AN/PSM-4. If reading cannot be obtained, refer to table 4-4 (Appendix) for troubleshooting instructions.

If the machine runs open or closed, recheck connections on the junction box and patch cords. If trouble persists, perform the following checks to determine whether the trouble is mechanical or electrical:

Step 1. Set the SEND•REC-REC switch to the REC position. If the machine runs closed, trouble is in the keyboard (table 4-5, Appendix). If the machine runs open, deenergize the equipment and remove the keyboard.

Step 2. Disconnect the motor connector and depress the line shorting contacts while observing the motion of the armatures on the magnetic selector. If the armatures do not move, check for any mechanical blocking or binding. If there are no mechanical defects, the trouble is electrical; refer to table 4-4 (Appendix) for further instructions.

A trouble-shooting flow chart (figure 4-5, Appendix) is provided for quickly isolating troubles in a systematic manner. Choose one of the symptoms in the top row and follow the indicated procedure. If trouble persists, refer to table 4-4 (Appendix) for further procedures.

c. SYSTEM TROUBLE-SHOOTING PROCEDURE. - Table 4-4 (Appendix) provides the trouble-shooting procedure for isolating the particular functional section (send, receive, or power supply and distribution) at fault. Refer to figure 4-6 (Appendix) for the primary power distribution diagram. Refer to Section 5 or the Appendix for overall wiring, schematic, and block diagrams; for removal, disassembly, adjustment, or reassembly procedures; and for parts location information.

4-6. FUNCTIONAL SECTION TROUBLE SHOOTING.

The teletypewriter sets consist of three functional sections as follows: send; receive; and power supply and distribution. The theory of operation for each functional section will be provided, followed by a detailed trouble-shooting procedure.

a. PRELIMINARY PROCEDURES.

Step 1. Perform any applicable preliminary checks in table 4-2 (Appendix).

Step 2. Refer to Section 5 for any required removal, disassembly, adjustment, or reassembly procedures and for parts location information.

b. TEST SETUP.

Step 1. Patch the equipment for off line local mode (paragraph 2-9a(1)).

Step 2. Connect the service cable to the electrical chassis receptacle and to the primary power source (paragraph 2-8b).

Step 3. Connect a jumper wire across the REC (red) binding posts on the service cable junction box.

Step 4. Connect Multimeter AN/PSM-4 (set for 60 milliamperes), or equivalent, across the SEND (black) binding posts on the service cable junction box.

Step 5. Set the SEND•REC-REC switch to the SEND•REC position.

Step 6. Pull the keyboard out to the operating position.

Step 7. Set the MOTOR switch to the ON position and check for reading on multimeter of approximately 60 milliamperes. If meter does not read in correct direction, reverse the connections to the SEND (black) binding posts.

c. TEST POINTS. - Test points for use in signal tracing and voltage and continuity tests are shown on the trouble-shooting tables and illustrations. The test points are divided into three categories: major, secondary, and minor.

Major test points for isolating the cause of a malfunction to a functional section are identified by an encircled Arabic number enclosed in a star; for example, major test point 1 is shown as

①

Secondary test points for isolating the cause of a malfunction to a specific circuit are identified by an encircled capital letter; for example, secondary test point A is shown as

Ⓐ

Minor test points for isolating the cause of a malfunction to a specific part are identified by an encircled capital letter and a subscript Arabic numeral; for example, minor test point A₁ is shown as

Ⓐ₁

4-7. SEND FUNCTIONAL SECTION TROUBLE SHOOTING.

The send functional section consists basically of keyboard 1A9 and its associated circuit.

a. THEORY OF OPERATION.

(1) MECHANICAL FUNCTIONS. - Keyboard 1A9 (figure 4-7, Appendix) consists of a keyboard drive gear (coupled to the printer motor), a drive shaft which rotates continuously as long as the motive power is applied, a clutch mechanism coupled to a set of five code pulsing cams, code pulsing contacts, and a set of five code bars which set up the mechanical code appropriate to the selected character or function.

The clutch, which is mounted on the drive shaft (figure 4-7, Appendix), consists of two housings, a cage, four rollers, four bias compression springs, and two spacers. The housings and the cage are connected by four rivets and two spacers so that the housings are rigidly connected and the cage is free to rotate approximately 20 degrees around the drive shaft in relation to the housings. Bias compression springs (between the cage and the spacers separating the housings) bias the housings in the direction of clutch travel. The four rollers pass through the four slots in the cage and both housings. The slots in the cage fit snugly around the rollers and permit the

rollers to travel the length of the slots. The ends of the slots in the housings contain close-fitting sloped surfaces which, when the clutch is engaged, restrict the motion of the rollers in such a manner as to force the rollers against the drive shaft.

When the clutch release finger disengages the stop tab on the cage, the cage is moved forward by the bias compression springs. This motion cams the rollers down on the drive shaft and the clutch rotates with the drive shaft. This initial camming action is reinforced by the jamming action exerted on the rollers by the sloped surfaces in the housing slots. The clutch will rotate 180 degrees until one of the cage stop tabs engages the clutch release finger. At this point, the forward motion of the cage will be stopped and the camming and jamming action of the rollers against the drive shaft will cease, resulting in the clutch being disengaged.

At the instant the cage is halted by the clutch release finger, the bias compression springs will tend to push the housings backward, thus reestablishing the camming effect. If unrestrained, this backward motion will result in the clutch chattering. Consequently, backstops are provided to prevent any backward motion of the clutch.

Depressing a keyboard key or space bar moves the five separate code bars (figure 4-7, Appendix) according to the alignment of a particular set of Baudot-code slots into which the key drops and moves the clutch release bail downward. As the clutch release bail moves, it pulls the cam follower clutch release toward the front of the keyboard. The clutch release finger, which is engaged with the cutout in the cam follower clutch release, is then moved away from the stop tab on the cage, allowing the clutch to become engaged and to begin rotating the pulsing cam nest. The clutch release cam rotates and raises the cam follower clutch release. This movement pulls the clutch release helical spring connected between the cam follower clutch release and the clutch release finger, thereby holding the clutch release finger close to the surface of the cage as the cage rotates.

During this time, motive power is also applied to the five code pulsing cams, the start-stop cam, and the master pulsing cam. The first motion of the cams releases the keyboard code bar prevent lever, which falls into one of two adjacent slots in each code bar, locking the code bars in place during the character or function generating cycle. The five-level code set up by the code bars is converted into a pulse train by five code pulsing cams, five pulsing fingers, five sets of code pulsing contacts, and the master pulsing contacts. The start-stop cam (actuating another set of pulsing contacts through the master pulsing cam follower) signals the beginning and end of the character transmitting cycle.

The code pulsing contacts are connected in series with the signal loop through the master pulsing contacts and the slip connector contact. When the start-stop pulsing finger moves downward, the associated start-stop pulsing contacts are closed resulting in a steady mark condition. Rotation of the start-stop cam at the beginning of the character cycle causes the start-stop pulsing finger to open the code pulsing contacts and transmit a start or space pulse. Rotation of the five code pulsing cams acts on the associated pulsing fingers which actuate the five code pulsing

contacts. Some of the code bars extend under the pulsing finger extensions and may stop the extension from dropping, depending upon the positioning of a code bar under the pulsing finger. When a code bar does not restrict the downward motion of a pulsing finger, the associated set of code pulsing contacts is closed and transmits a mark pulse. The blocking of a pulsing finger by a code bar holds the set of code pulsing contacts open, causing a space pulse to be transmitted. The pulsing finger normally holds the pulsing contacts open except when the pulsing finger drops into the cam for a mark pulse.

Under normal conditions, the six sets of code pulsing contacts (start-stop pulses and five intelligence pulses) would require careful adjustment as the result of switching high signal-line current. To remedy this, a set of master pulsing contacts is provided. These contacts comprise a single-pole, double-throw switch which is alternately switched from the upper to the lower spring leaf contacts by the master pulsing cam follower and master pulsing cam. When the switch is in the upper position, the code pulsing contacts used for transmitting the start-stop, 2, and 4 pulses are connected in the circuit; in the lower switch position, the pulsing contacts used for transmitting pulses 1, 3, and 5 are switched into the circuit. The gap through which the master pulsing contacts oscillate is adjusted to obtain the effect of simultaneously switching one circuit out and the other circuit in. In this manner, the six individual code pulsing contacts handle a minimum amount of current with the master pulsing contacts switching the greater amount, since the six individual pulse contacts close early and open late. The effect of this arrangement is to have six code pulsing contacts determine the presence or absence of a code pulse while the master pulsing contacts oscillate between the start-stop, 2, and 4 circuit and the 1, 3, and 5 circuit, accurately timing the duration of pulses in each circuit.

As the 180 degrees of clutch rotation ends, the keyboard code bar prevent lever is moved out of the code bar slots by the clutch release cam and the clutch is disengaged by the stop tab on the cage engaging the clutch release finger. If the REP (repeat) key is depressed, the clutch release finger will be held back from engaging the cage by the action of the repeat key shaft. As a result, the clutch will remain engaged and apply motive power to the code pulsing cams, retransmitting the last code combination set up on the code bars. This cycle will be repeated continuously as long as the repeat key is held down.

(2) ELECTRICAL FUNCTIONS. - The keyboard circuit (figure 4-8) is shown with filter FL1 separated into two filter sections. In addition, the keyboard slip connector contact and the electrical chassis-mounted contact block are also shown separated. The keyboard slip connector contact and the connector block are so constructed as to close the signal loop when the keyboard is not in the operating position, thus preventing the loop from remaining open.

In this circuit, the signal loop is completed from the negative side of the signal line power supply, through the contact block, keyboard slip connector contact, filter FL1-A, master pulsing contacts S1, code pulsing contacts S2, BREAK switch S4, filter FL1-B, keyboard slip connector contact, contact block, and through the input resistance of the line or load

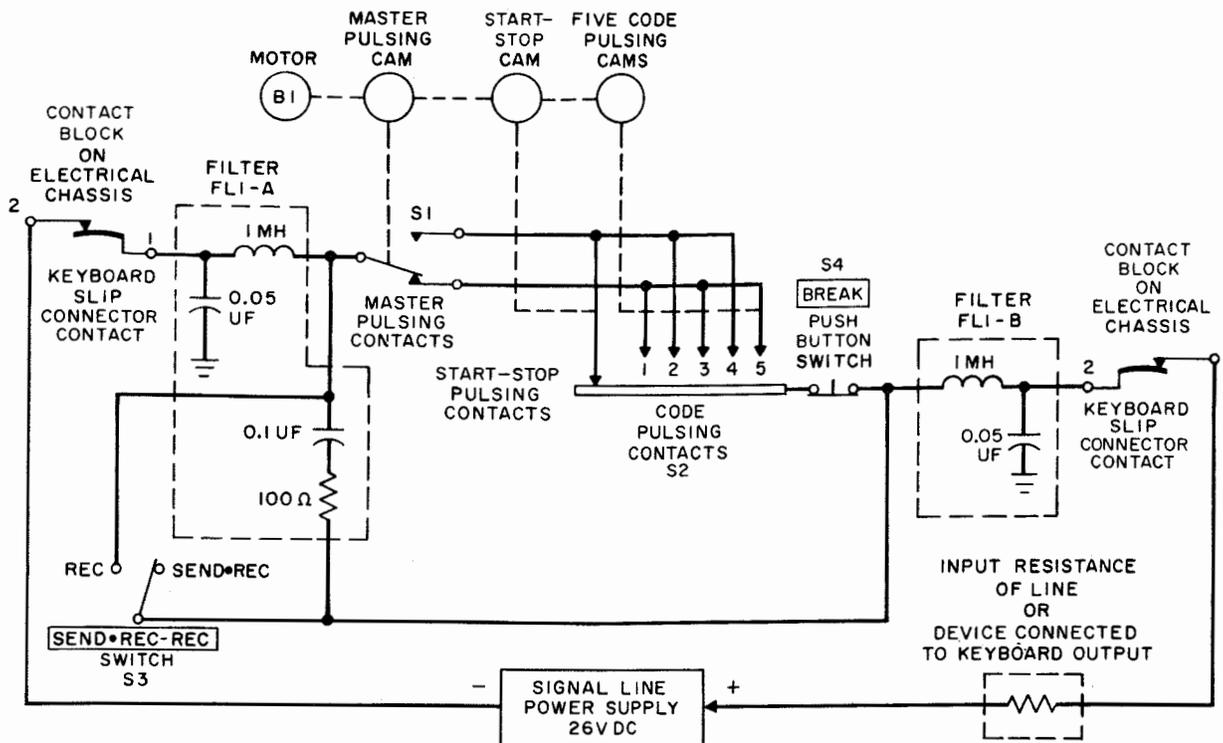


Figure 4-8. Keyboard 1A9, Simplified Schematic Diagram

device back to the signal line power supply. Although the signal line power supply is connected as shown for developing a current that flows in the direction shown, it may be connected so that current flows in the opposite direction, dependent upon the option patching arrangement.

The filter is used to suppress arcing across the switching contacts and to minimize interference with nearby radio equipment. The master pulsing contacts are used to switch current between the set of pulsing contacts that develops start-stop, 2, and 4 pulses, and the set of contacts for 1, 3, and 5 pulses. The BREAK switch is connected in series with the switching circuit and if depressed will open the signal loop, interrupting transmission. The SEND•REC-REC switch is connected across the master pulsing contacts, code pulsing contacts, and the BREAK switch. When this switch is in the SEND•REC position, the operator may either send or receive, since the code pulsing contacts are in the circuit to be used as required. In the REC position, the pulsing contacts and the BREAK switch are shorted out, resulting in a closed signal loop, effectively shorting out the output of the keyboard.

b. TROUBLE-SHOOTING PROCEDURE. - Refer to table 4-5 (Appendix) or figure 4-5 (Appendix) for the trouble-shooting procedure and to figure 4-9 (Appendix) for the location of test points for the keyboard. When making continuity checks on the keyboard, turn

the equipment off and remove the keyboard. Rotate the keyboard drive gear by pulling the top of the gear toward the front of the keyboard until the clutch is in the stop position. Make certain that the SEND•REC-REC switch is in the SEND•REC position. Connect Multimeter AN/PSM-4, set for direct-current resistance, across the test points as indicated in table 4-5 (Appendix).

NOTE

If an AN/TGC-14(V) equipment which is patched for internal battery is connected to a signal line supplying signal-line power, the capacitors in filter FL1 will be damaged. Check filter FL1 as described in Symptom 1. Similarly, an open line will occur with an AN/TGC-14A(V) equipment if the battery poles are crossed.

4-8. RECEIVE FUNCTIONAL SECTION TROUBLE SHOOTING.

The receive functional section (figure 4-1, Appendix) contains line sensor 1A3, printer 1A2, and their associated circuits.

a. LINE SENSOR THEORY OF OPERATION. - The line sensor comprises a direct-coupled, transistorized electronic switch and uses an internal power supply

identical in all respects to the circuit described in paragraph 4-9a for signal line power supply 1A4. The line sensor is of the printed-circuit type.

(1) **BLOCK DIAGRAM DISCUSSION.** - The line sensor (figure 4-10) consists of a semiconductor diode bridge to orient the polarity of the signal to a transistor functioning as a switch, a space coil power amplifier transistor to energize the space solenoid coils on the selector, and a mark coil power amplifier transistor to energize the mark solenoid coils on the selector and to act as a holding circuit for the figures H or time delay motor stop functions.

The semiconductor diode bridge receives direct-current pulses (either positive or negative polarity) from a signal source connected in the signal loop. The bridge orients the pulse polarity such that only negative pulses appear at the base of a PNP transistor functioning as a switch to control current to the space and mark power amplifier transistors. During a spacing condition (absence of a signal), the space coil transistor conducts and energizes the selector space coils in the printer; during a marking condition (presence of signal), the mark coil transistor conducts and energizes the selector mark coils. (The selector is mounted on the printer and has the function of converting the control current into the mechanical motions required for selecting various printing functions.) The mark transistor also sets up a holding circuit for a relay when the STOP key is depressed on AN/TGC-14(V) equipment or when the time delay motor stop mechanism is energized on AN/TGC-14A(V) equipment.

(2) **SIMPLIFIED SCHEMATIC DIAGRAM DISCUSSION.** - Figure 4-11 illustrates the line sensor circuit condition when receiving the letter R. The letter R pulse train consists of spacing pulses (absence of signal and no current) on start, 1, 3, and 5 and marking pulses (presence of signal and current) on 2, 4, and stop.

Current flow from the signal line power supply is through diode CR3, through the emitter and base circuit of transistor Q1, through diode CR2, and through the keyboard back to the negative side of the power supply. Diodes CR1 and CR4 present an open circuit to current flow. If the signal polarity is reversed (positive mark pulses), current will flow through the keyboard and diode CR1, through the emitter and base circuit of transistor Q1, and through diode CR4 back to the signal line power supply.

The base input circuit of transistor Q1 contains a high-low range strip which can be positioned to shunt either 100-ohm resistor R1 across the input circuit for the 20- to 80-milliampere input current range or 5600-ohm resistor R2 for the 1- to 5-milliampere range. Resistors R1 and R2 shunt portions of the signal current, thereby reducing the input resistance of the circuit. When the strip is positioned for the high range (20 to 80 milliamperes), the line sensor has an input resistance of approximately 125 ohms at 60 milliamperes. When the strip is positioned for the low range (1 to 5 milliamperes), the input resistance is approximately 2500 ohms at 5 milliamperes. (This strip is accessible when the line sensor metal cover is removed.) To avoid transistor damage through application of excessive signal current, zener diode CR5 will effectively shunt any excessive signal current and voltage level above 12 volts. In addition, this zener diode protects transistor Q1 against any transients or spikes caused by radio or other interference.

After the input signal is attenuated, it is applied as forward base bias to transistor Q1. The collector of this transistor is coupled to the base of power amplifier Q3 through resistor R5. The emitter is directly coupled to the base of power amplifier Q2. The base of transistor Q1 normally is held at cutoff by the positive voltage (reverse bias) received through resistor R3 and the attenuator network. With a mark signal applied (negative pulse), the negative signal current

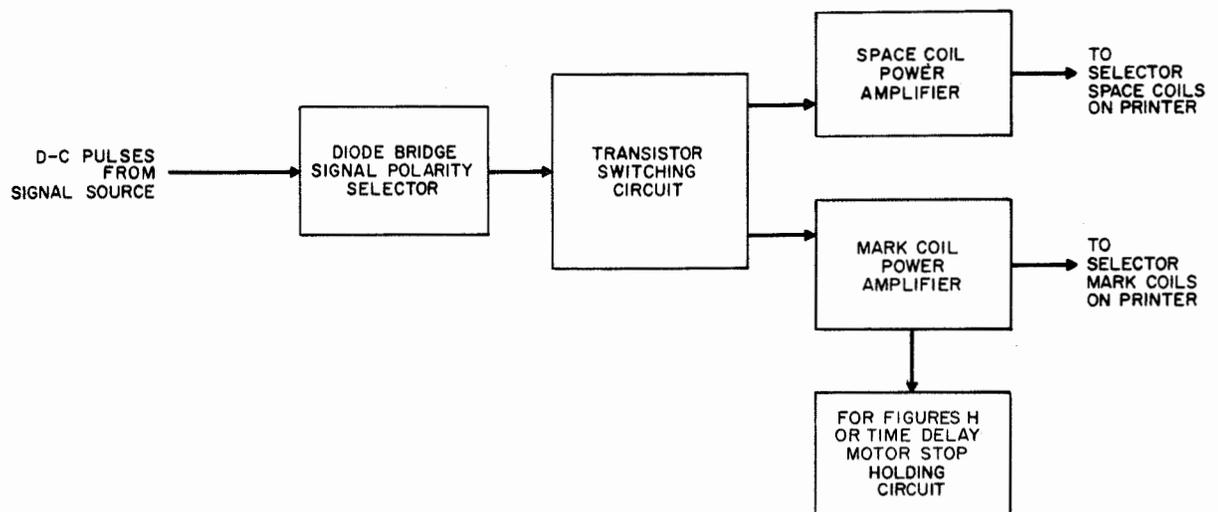


Figure 4-10. Line Sensor 1A3, Functional Block Diagram

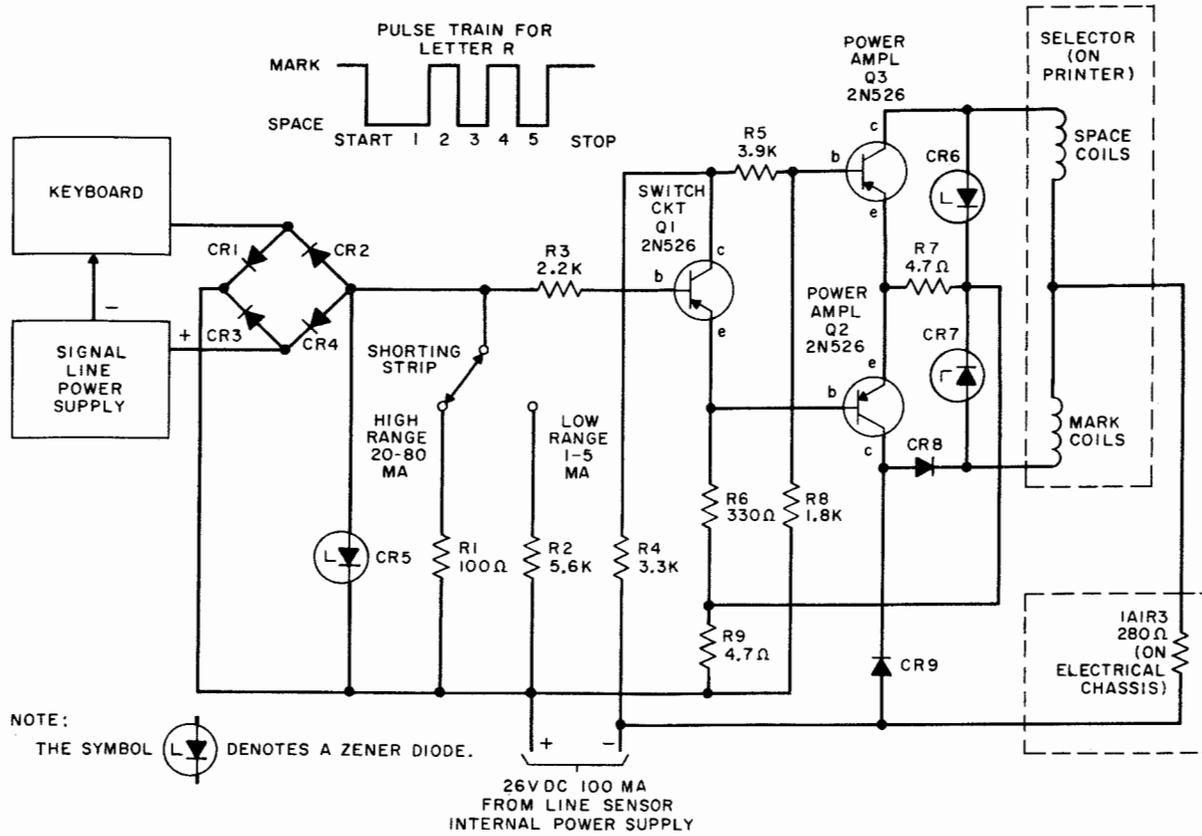


Figure 4-11. Line Sensor 1A3, Simplified Schematic Diagram

is sufficient to drive the transistor into saturation. The large collector current flowing through resistor R4 causes the negative voltage at the junction of resistors R4 and R5 to decrease (become more positive), resulting in a more positive voltage applied to the base of power amplifier Q3. Since this voltage is applied as reverse base bias, power amplifier Q3, which is normally held near cutoff by reverse base bias through resistor R8, will be cut off. The large current flowing through the emitter of conducting transistor Q1 develops a negative pulse across resistor R6, which causes current to flow in the base of power amplifier Q2. Power amplifier Q2, which is normally cut off by reverse base bias through resistors R6 and R9, is driven into saturation and energizes the mark coils for every mark signal of the input pulse train. When receiving the letter R, the mark coils will be energized on marking pulses 2, 4, and stop.

When space pulses are present, no input signal exists; this condition is the same as opening the signal loop. Consequently, no input signal is applied to the line sensor and transistor Q1 is cut off by the combination of reverse base bias and the high emitter bias through resistor R9. As a result, the collector of transistor Q1 approaches the negative supply voltage

level of approximately -26 volts. This negative voltage causes current to flow in the base of power amplifier Q3 and drives it into saturation, energizing the selector space coils. When receiving the letter R, the space coils will be energized on start, 1, 3, and 5 pulses. During a space condition, power amplifier Q2 is cut off by reverse base bias resistors R6, R7, and R9. Zener diodes CR6 and CR7 prevent inductively produced pulses exceeding a level of -25 volts from appearing on the collectors of power amplifiers Q2 and Q3.

(3) LINE SENSOR MOTOR STOP FUNCTION. - Power amplifier Q2 (figure 4-12) is used to set up a relay-holding circuit when the motor stop function is used. During normal teletypewriter set operation, the printer motor supplies motive power to the printer and keyboard and runs continuously. If standby operation is required, the printer motor may be made inoperative until either the remote or local keyboard operator presses the BREAK switch.

Stopping the printer motor is accomplished in the AN/TGC-14(V) equipment by first striking the FIGS key and then the STOP key. In the AN/TGC-14A(V) equipment, the printer motor will automatically stop either 60 seconds (75 baud) or 90 seconds (45.45 baud)

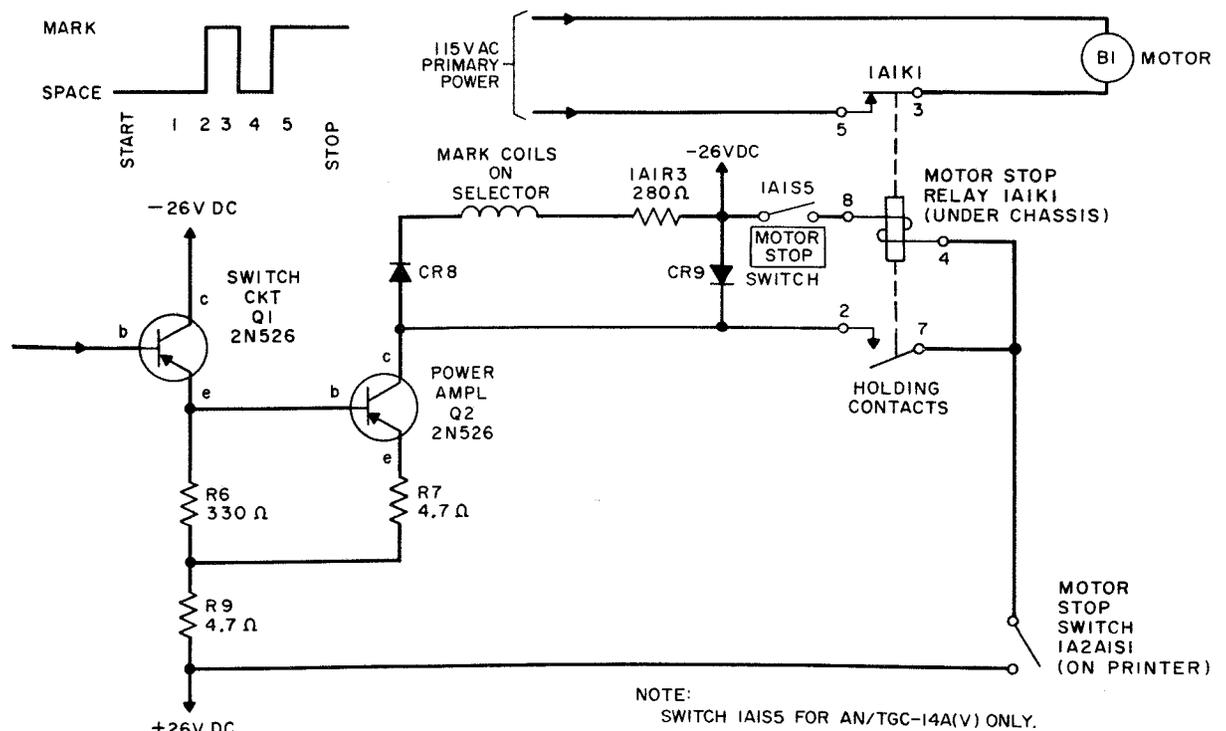


Figure 4-12. Line Sensor 1A3, Motor Stop Function, Simplified Schematic Diagram

after the receipt of the last mark-to-space transition. (For detailed descriptions of the motor stop functions, refer to paragraphs 4-8c(7) and 4-8c(8).) Either of these actions closes motor stop switch 1A2A1S1 and energizes motor stop relay 1A1K1. Energizing this relay closes relay contacts 2 and 7 and opens contacts 3 and 5, removing primary power from the printer motor. However, motor stop switch 1A2A1S1 remains closed momentarily and another method must be used to hold the motor stop relay energized. This holding circuit is accomplished through the conduction of mark power amplifier Q2 during a steady marking condition or on a stop pulse. When mark pulses occur, power amplifier Q2 conducts to energize the mark coils on the selector and to provide a voltage source which keeps the motor stop relay energized after the motor stop switch opens. Assuming that motor stop switch 1A2A1S1 has opened, removing voltage from one side of relay coil 1A1K1, the relay is held energized by the circuit which is completed from negative 26 volts through the relay coil, holding contacts, power amplifier Q2, resistors R7 and R9, and positive 26 volts. The collector of power amplifier Q2 draws current through two circuits in parallel; one circuit includes the relay coil and holding contacts, and the other circuit includes 1A1R3, the mark coils, and diode CR8.

At the instant a start pulse appears (first break in the signal loop), power amplifier Q2 cuts off and the

holding circuit is broken. Motor stop relay 1A1K2 is deenergized, closing contacts 3 and 5 to apply primary power to the printer motor.

b. LINE SENSOR TROUBLE-SHOOTING PROCEDURE. - Refer to table 4-6 (Appendix) or figure 4-5 (Appendix) for the trouble-shooting procedures for line sensor 1A3. Refer to figure 4-13 (Appendix) for the location of test points and to table 4-11 (Appendix) for correct voltage measurements under various conditions. Use Multimeter AN/PSM-4 for voltage and resistance checks. Unless otherwise specified, connect the negative lead to +26 volts direct-current common when making direct-current voltage readings.

The line sensor in the teletypewriter set utilizes printed circuit boards. These boards require more care during maintenance procedures than conventionally wired circuits in order to avoid damaging the circuit board or printed wiring. Voltage and resistance measurements may be made from either the component or wiring side of the board by use of a needle point probe for penetrating the preservative coating.

c. PRINTER THEORY OF OPERATION. - A selector incorporated in the printer receives direct-current impulses from the line sensor (space and mark pulses) and converts these pulses into the mechanical motions required to couple various clutches to a continuously rotating main shaft. The selector starts the character printing cycle and all other functions with the start

pulse and then translates each of the five intelligence pulses to start all mechanical functions in the printer. Upon reception of a stop pulse, the selector stops the function or character. Figure 4-14 (Appendix) provides a general concept of how all mechanical functions in the printer are selected. These functions will first be discussed on a block diagram basis, and then each functional system will be separately described in detail.

(1) **BLOCK DIAGRAM DISCUSSION.** (See figure 4-14, Appendix.) - The selector first receives a direct-current impulse representing start (space). This pulse energizes a set of solenoid coils which attracts an armature in such a manner that the start clutch release arm releases the start clutch mounted on the printer main shaft. The main shaft consists of two sections; a selector main shaft and a function main shaft. The two shaft sections are coupled and rotate as one shaft. All mechanical functions begin on the selector main shaft. When released by the start clutch release arm, the start clutch engages the selector main shaft for 180 degrees rotation. The clutch disengages the selector main shaft when the cage stop tab is blocked by the start clutch release latch. With a steady mark signal (stop pulse), operation of the start clutch release arm is blocked by the selector armature and the start clutch is held stationary by the start clutch release latch. Release time of the start clutch and subsequent sampling of the intelligence pulse is manually controlled by a range dial geared to the start clutch. The start clutch is also gear-coupled to a timing cam shaft assembly which times the selector clutch release functions in relation to the pulse train. A set of timing cams on the timing cam shaft times the operation of the clutch release fingers which release rotary and lateral clutches on the selector main shaft. The selector samples the five intelligence pulses and, by energizing space or mark solenoid coil sets, mechanically locks or unlocks the clutch release fingers that release (engage) the rotary and lateral clutches. The clutch release fingers are only permitted to release their associated clutches when their timing cams are positioned to set up the individual clutches as their respective pulse is received.

During rotation of the timing cam shaft (which rotates 360 degrees to every 180 degrees of the main shaft rotation) one finger of each pair of clutch release fingers is free to operate and correctly position its respective clutch and cam assembly. Upon completion of the clutch and cam assembly positioning cycle of the selector main shaft, the print and function cam assembly is released, regardless of the combination of pulses received, and either printing or a function is completed.

The selector main shaft accommodates two rotary clutches and three lateral clutches, numbered in accordance with the intelligence pulse that controls their positions. When no signal code transitions are taking place, the clutches are disengaged and free-wheel on the shaft. Number one and number two intelligence pulses have the effect of positioning the rotary clutches in one of two 180-degree positions as determined by mark or space pulses. These clutches position carriage pulleys which mechanically position the print cylinder in one of four 45-degree positions, or one of four rows of type. A letters figures carriage pulley,

actuated by the letters figures clutch and cam, is used to rotate the print cylinder to any one of two 180-degree positions representing letters or figures. The rotary carriage pulleys also position a rotary function slide in the function selector. Lateral clutches 3, 4, and 5 (operated from intelligence pulses 3, 4, and 5), operating in conjunction with the three lateral carriage pulleys, position the print cylinder laterally to one of eight positions and positions the lateral control function slide in the function selector. The two function slides, which move laterally with respect to one another, select mechanical functions such as blank, space, line feed, figures, bell, letters, and carriage return. Each function slide has various slots arranged so that the proper combination of pulses will align a pair of slots in both the rotary function and lateral control function slides and permit a function sensing finger lever to fall into the slots and perform the selected mechanical function. The function cam follower, when on the high part of the cam, allows the sensing finger levers to determine when two slots are in alignment on the rotary function and lateral control function slides and then select the function to be performed. On the downward motion of the function cam follower, all sensing finger levers are deflected and cammed away from the function slides by the function bar, thus freeing the slides to move to the next position during the subsequent cycle. If a function selection is accomplished by the sensing finger levers, the printing is prevented which would normally immediately follow. When the print function timing cam is free to act on the print hammer, printing is accomplished. The print hammer is moved in a lateral direction across the copy paper and in front of the print cylinder through action of the carriage return, takeup drum, and advance drum systems.

In summary, the function selector can be considered as a positioning servo operating in a closed loop. It receives mechanical positioning information from the rotary and lateral carriage pulleys and senses the information with function selector sensing finger levers. If the information is appropriate for the particular mechanical function (letters figures, carriage return, blank, bell, or line feed), the selected function takes place and printing and advance are suppressed.

(2) **SELECTOR MECHANISM.** (See figure 4-15.) - The selector mechanism, mounted at the back of the printer, receives pulse information from the line sensor. The selector consists of two armature and solenoid coil sets facing in opposite directions. Each armature set contains four solenoid coils connected so that like magnetic poles are diagonally opposite. The selector operates in polar fashion, using two sets of series coils for space and two sets of series coils for mark. In this manner, recovery time is reduced and the armature sets are mechanically divided so that the right armature set is controlled by start-stop, 2, and 4 pulses, and the left armature set is controlled by pulses 1, 3, and 5. Energizing either the space or mark coils positions the armature so that it blocks the inward motion of either the space or mark armature paddle latch. As shown in figure 4-15, the number 2 armature paddle latch (mark) is mounted on a movable shaft, to which the number 4 latch and start latch are also mounted. The number 3 armature paddle latch of the left armature set is also mounted on

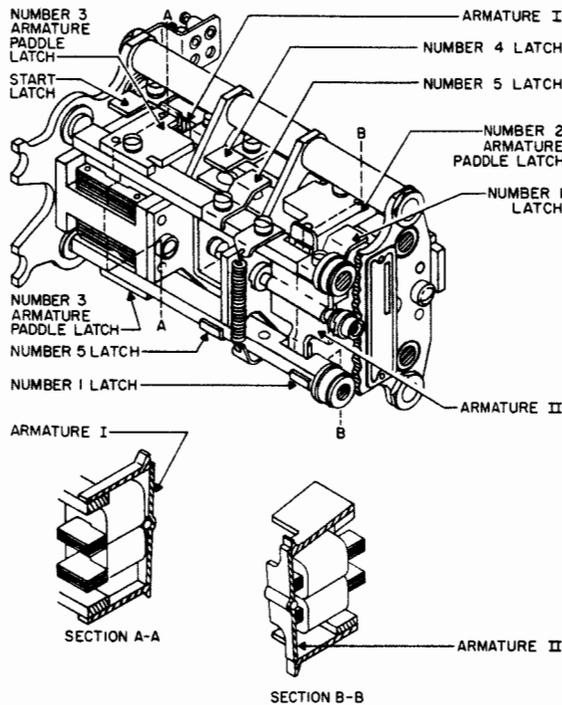


Figure 4-15. Selector Mechanism

a movable shaft to which latches 5 and 1 are attached. A similar pair of armature paddle latches is located on the bottom side of the selector.

Figure 4-16 shows a section of the selector with a pair of clutch release fingers bearing on the mark and space armature paddle latches. There are six clutch assemblies (figure 4-14, Appendix) on the selector main shaft of the printer, each controlled by its respective pulse. Two clutches are controlled by mark and space armature paddle latches and four clutches by latches. In operation, the clutch release fingers press down on the armature paddle latches or latches under spring pressure greater than that required to pull the armature paddle latches away from the armature. The clutch release fingers are free to press on the latches or armature paddle latches by the simultaneous positioning of the timing cam and the receipt of the appropriate intelligence pulse. If a clutch release finger is not blocked by the timing cam or armature, it will press downward on a latch or armature paddle latch. Normally, the high side or top clutch release finger holds on a mark pulse and the low side or bottom clutch release finger holds on a space pulse. When a space pulse arrives, the armature is pulled in toward the space solenoid and permits the mark armature paddle latch to be pressed downward by the top clutch release finger adjustment screw, thereby releasing the clutch on the mark or high side. When energized, the mark solenoid pulls the armature in at the top and releases the low side clutch release finger (space side). Release of a clutch on either the high

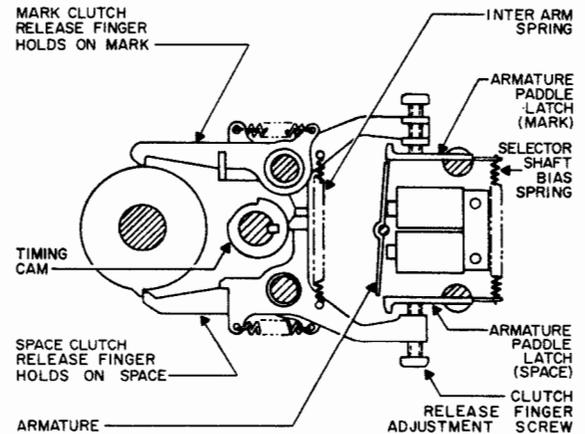


Figure 4-16. Selector, Clutch Release Mechanism

side (mark) or low side (space) allows the clutch to engage the selector main shaft and rotate 180 degrees, where it is stopped by the opposite clutch release finger.

(3) **START CLUTCH RELEASE SYSTEM.** (See figure 4-17.) - During receipt of a steady mark signal (stop pulse), the start latch, mounted on the same shaft as the number 2 armature paddle latch, locks the start clutch release arm in the stop position. When locked, the start clutch release arm holds the start clutch release latch against the clutch stop tab and the start clutch backstop lever rests in the cutout in the start cam. When a start pulse is received, the spring-loaded start clutch release arm moves down, pulling the start clutch release latch away from the clutch stop tab and thus releasing the clutch for 180-degree rotation. As the rotation of the clutch cams the start clutch backstop lever out, the start clutch release latch is moved back down to the stop position and the start clutch release arm is simultaneously moved out and away from the selector. As the clutch stop tab moves around to complete its 180-degree rotation, it is engaged by the start clutch release latch and start clutch backstop lever and held in position until the next start pulse is received. The start clutch backstop lever, which is adjustable to prevent clutch chatter, then drops into the start cam cutout. To permit manual adjustment of the timing cycle or the time relationship between the start of the timing cam shaft and sampling of the intelligence pulses, a range dial is provided. Adjusting this dial orients the start clutch and timing cam shaft translating cycle in the most favorable position in relation to the incoming pulse train.

(4) **PRINTER MAIN SHAFT CLUTCH AND CAM ASSEMBLY.** (See figure 4-18.) - The printer main shaft consists of the selector main shaft on the left side of the printer (facing the front) and the function main shaft on the right side. Main shaft power is supplied by the printer motor through third reduction gear (19) on the function main shaft. The keyboard

Figure 4-17

TM-03315-15

TELETYPEWRITER SETS AN/TGC-14(V)
AND AN/TGC-14A(V) - TROUBLE SHOOTING

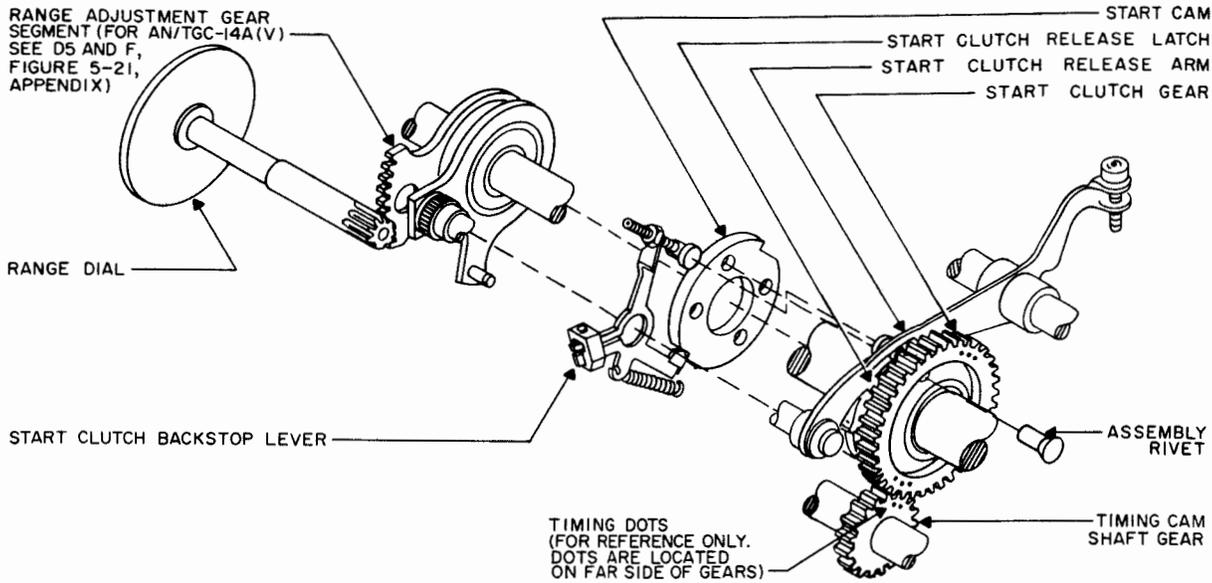
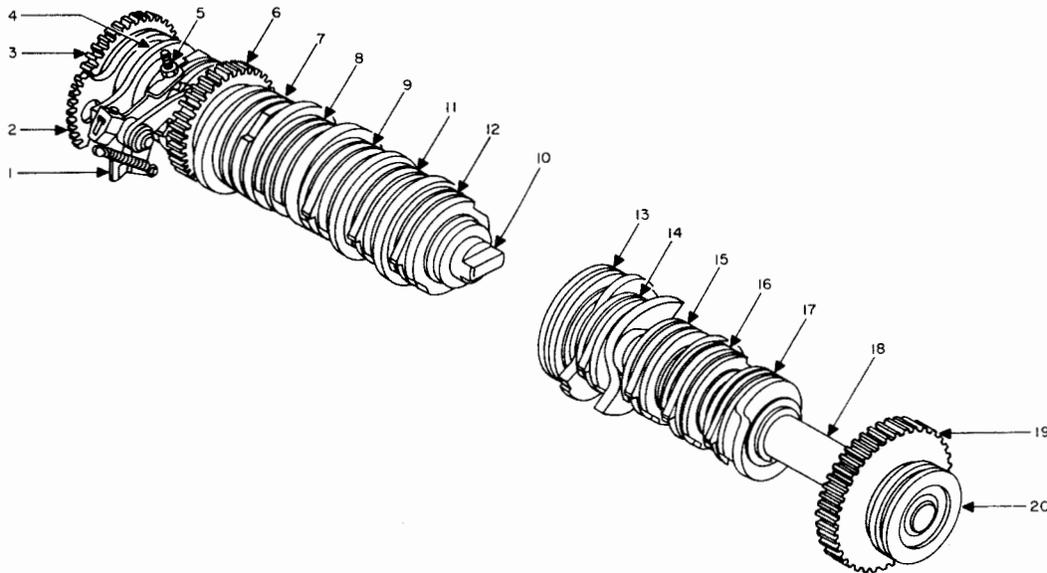


Figure 4-17. Start Clutch Release Mechanism



LEGEND

- | | |
|---|---|
| 1. START CLUTCH RELEASE | 11. NO. 2 ROTARY CLUTCH AND E CAM |
| 2. RANGE ADJUSTMENT GEAR SEGMENT* | 12. NO. 1 ROTARY CLUTCH AND F CAM |
| 3. PRINTER HELICAL GEAR | 13. CENTER BEARING AND RETAINER |
| 4. LEFT-HAND BEARING AND RETAINER* | 14. PRINT FUNCTION CLUTCH AND G AND H CAM |
| 5. START CLUTCH RELEASE ADJUSTMENT SETSCREW | 15. LINE FEED CLUTCH AND I CAM |
| 6. START CLUTCH GEAR | 16. LETTERS FIGURES CLUTCH AND J CAM |
| 7. NO. 3 LATERAL CLUTCH AND B CAM | 17. CARRIAGE RETURN CLUTCH AND K CAM |
| 8. NO. 4 LATERAL CLUTCH AND C CAM | 18. FUNCTION MAIN SHAFT |
| 9. NO. 5 LATERAL CLUTCH AND D CAM | 19. THIRD REDUCTION GEAR |
| 10. SELECTOR MAIN SHAFT | 20. RIGHT-HAND BEARING AND RETAINER |

*Refer to (D5 and F, figure 5-21, Appendix) for AN/TGC-14A(V) configuration.

Figure 4-18. Printer 1A2, Main Shaft Assembly

and ribbon feed mechanisms receive motive power through printer helical gear (3) on the selector main shaft; the timing cam shaft receives motive power from start clutch gear (6), which is attached to the start clutch.

The selector main shaft contains, from left to right, printer helical gear (3), range adjustment gear segment (2), left-hand bearing and retainer (4), start clutch release (1), start clutch release adjustment setscrew (5), start clutch gear (6), number 3 lateral clutch and B cam (7), number 4 lateral clutch and C cam (8), number 5 lateral clutch and D cam (9), number 2 rotary clutch and E cam (11), and number 1 rotary clutch and F cam (12). The clutch and cam assemblies are identified by a stamped capital letter. The operation of the individual components of the selector main shaft are discussed in their appropriate functional descriptions elsewhere in this section.

The function main shaft, from left to right, contains print function clutch and G and H cam (14), line feed clutch and I cam (15), letters figures clutch and J cam (16), carriage return clutch and K cam (17), and third reduction gear (19). The cams of these clutches also have capital letters stamped on them for identification. These clutches are not released directly through the action of the selector as are the selector main shaft clutches, but are released when a particular function is selected by the function selector. The print function clutch and cam assembly consists of a clutch and two cams which rotate 180 degrees for each character printed or function selected. The clutch is released by a print function clutch release timing cam mounted on the timing cam shaft (figure 4-14, Appendix). The function cam starts the mechanical function selection cycle and the print cam operates the print hammer. The line feed clutch and cam assembly operates the line feed mechanism when line feed is selected. The letters figures clutch and cam assembly moves a cam follower and pulley carriage to position the print cylinder in one of two 180-degree positions, representing either letters or figures. The carriage return clutch and cam assembly is used to return the print cylinder and print hammer to the left margin. The mechanical systems controlled by the clutches on the function main shaft are discussed in appropriate paragraphs elsewhere in this section.

(5) PRINT CYLINDER POSITIONING SYSTEM. (See figure 4-19, Appendix.) - The coding of the incoming signal, as interpreted by the selector mechanism, determines the position of the five type positioning cams and their corresponding cam followers. Each cam follower can be left in one of two positions by its positioning cam as follows:

- Number 1 Pulse Cam: High side for Mark/Low for Space
- Number 2 Pulse Cam: High side for Mark/Low for Space
- Number 3 Pulse Cam: Low side for Mark/High for Space
- Number 4 Pulse Cam: Low side for Mark/High for Space
- Number 5 Pulse Cam: Low side for Mark/High for Space

When the letter A is selected (mark pulse on 1 and 2, and space on 3, 4, and 5) all of the cam followers will be positioned on the high portions of their respective

cams. Upon selection of the letter M (space pulse on 1 and 2, and mark on 3, 4, and 5), all of the cam followers will be on the low portions of their respective cams. Since each of the cam followers is connected to a carriage pulley, the high and low positioning of the cam followers positions the carriage pulleys. Therefore, the chains that pass through the carriage pulleys are effectively lengthened and shortened by the motion of the cam followers. In practice, pulleys number 1 and 2 control motion of the rotary chain and pulleys 3, 4, and 5 control motion of the lateral control chain.

In both the rotary and lateral systems, the various cam followers move different preset distances, allowing four possible combinations in the rotary system and eight combinations in the lateral system. Figure 4-20 illustrates the units of travel accomplished by each carriage pulley and how the various combinations can be established.

(a) ROTARY MOTIONS OF PRINT CYLINDER. - As shown in figure 4-19 (Appendix), the effect of the combination of number 1 and 2 pulses is transmitted through the rotary chain, rotary function slide, and rotary cable to the end of the shaft to which the print cylinder is keyed. The cylinder shaft is turned in one direction by the rotary spring and in the other by the rotary cable pulling against the spring. The stroke of carriage pulley number 1 is 3/32 inch and the stroke of carriage pulley number 2 is 3/64 inch. The stroke of the number 2 pulley is exactly half that of number 1 pulley, so that four evenly spaced rotary positions are possible as follows:

ROTARY POSITION	CAM FOLLOWER POSITION		EFFECTIVE LENGTH OF ROTARY CABLE RELATIVE TO FIRST POSITION IN INCHES
	1	2	
I	High	High	First position
II	High	Low	3/16 longer
III	Low	High	3/8 longer
IV	Low	Low	9/16 longer

The developed view of the print cylinder (figure 4-21) shows the eight vertical (rotary) print cylinder positions. Four of the eight rotary positions correspond to letters; the other four correspond to figures. The letters figures cam follower and pulley system, as the pulley is moved to the high position for letters and low position for figures, determines within which group of four rows the subsequent rotary positioning will take place. The stroke of the pulley, through which the rotary cable passes, positions the print cylinder so that the subsequent selection will be within one of the two 180-degree segments of the cylinder.

(b) LATERAL MOTIONS OF PRINT CYLINDER. - The lateral motions of the print cylinder are similarly transmitted from the lateral control chain (figure 4-19, Appendix) through a transfer shaft, another length of chain, the lateral control function slide, and the lateral control belt to the print cylinder yoke. The actual strokes of the carriage pulleys are as follows:

- Carriage Pulley Number 3 - 3/16 inch
- Carriage Pulley Number 4 - 3/32 inch
- Carriage Pulley Number 5 - 3/64 inch

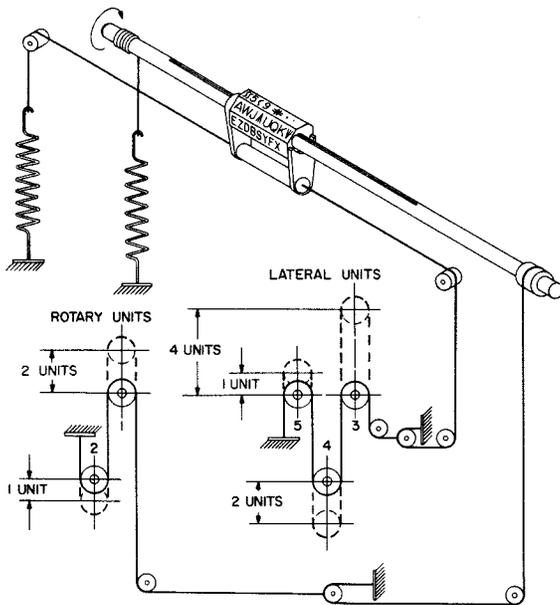


Figure 4-20. Print Cylinder Positioning Mechanism

Here again, the stroke for number 4 is twice that of number 5 and the stroke for number 3 is twice that of number 4, so that eight lateral positions are possible as follows:

LATERAL POSITION	CAM FOLLOWER POSITION			EFFECTIVE LENGTH OF LATERAL CONTROL CABLE RELATIVE TO FIRST POSITION IN INCHES
	3	4	5	
I	High	High	High	First position
II	High	High	Low	3/16 longer
III	High	Low	High	3/8 longer
IV	High	Low	Low	9/16 longer
V	Low	High	High	3/4 longer
VI	Low	High	Low	15/16 longer
VII	Low	Low	High	1-1/8 longer
VIII	Low	Low	Low	1-5/16 longer

(c) CHARACTER ADVANCE AND CARRIAGE RETURN. - Character advance is achieved by moving the print cylinder and print hammer space-by-space across the page. When the end of the line is reached, the print cylinder and print hammer are returned to the left side of the page.

Character advance is accomplished by the release of the function cam (figure 5-59, Appendix) and the subsequent rise of the function cam follower from the low side to the high side of the function cam. The function cam follower rising on the function cam rotates the character advance lever shaft assembly and the character advance pawl in a clockwise direction. As the function cam follower reaches the high side of the

A	W	J	Λ	U	Q	K	V
E	Z	D	B	S	Y	F	X
≡	L	R	G	I	P	C	V
⋈	T	<	O	■	H	N	M
-	2	'	Λ	7	1	(	v
3	"	\$	?	⊙	6	!	/
≡	)	4	&	8	∅	:	;
⋈	5	<	9	■	#	,	.

360°
180°

Figure 4-21. Print Cylinder, Developed View

function cam, the check pawl engages the teeth of the advance ratchet, preventing backward movement of the advance drum until the character advance pawl is again in position for the next cycle. As the function cam continues to rotate, the function cam follower falls to the low side of the cam, withdrawing the character advance pawl from the tooth previously engaged and the character advance pawl engages the next tooth on the character advance ratchet. The function cam continues to rotate to its stop position, leaving the function cam follower approximately one-third up the high side of the cam and the print cylinder advanced approximately one-half space.

As shown in figure 4-19 (Appendix), the lateral control belt, print hammer cable, and return cable originate in the advance drum. The advance drum is rotated by the action of the character advance pawl on the advance ratchet as previously described. As the advance drum rotates counterclockwise, the print hammer cable and lateral control belt advance the print hammer and print cylinder toward the right side of the page, tightening the carriage return spiral spring in the takeup drum. This advance continues across the page until, at a preset point, the advance ratchet and pawl system releases the advance drum and the spring-loaded takeup drum returns the print cylinder and print hammer to the left side of the page. The return cable serves to counteract the effects of inertia during carriage return by combining the rapid clockwise motion of the advance drum with the corresponding counterclockwise motion of the takeup drum.

(d) ISOLATION OF PRINT CYLINDER MOTIONS. - In the lateral direction, the print cylinder (paralleled by the print hammer) is subjected to simultaneous motions consisting of character advance (step-by-step) motions and type print motions. In addition, the print cylinder is subjected to two distinct rotary motions; the letters figures selection motions and the discrete type print positioning motions. Since simultaneous lateral or simultaneous rotary motions may be occurring, some method of isolation between these motions must be employed.

The lateral selection motions of the print cylinder are completely isolated from the step-by-step advance and carriage return motions by interposing the lateral control belt pulley (figure 4-19, Appendix) between the advance drum and the print cylinder to introduce lateral selection motion, and by interposing the belt pulley between the print cylinder and the takeup drum to bias the lateral selection motion of the print cylinder.

The rotary motions (letters figures and type positioning) of the print cylinder are completely isolated by interposing the rotary cable pulley (figure 4-19, Appendix) between the letters figures cam follower and the print cylinder shaft, and the use of a rotary spring on the end of the print cylinder shaft.

(e) OPERATION OF PRINT CYLINDER POSITIONING CAMS. - The selector interprets the sequence in which each of the five intelligence pulses is received and converts this series of electrical signals into mechanical motion. This is done by controlling the release of the print positioning cam clutches. Figure 4-22 (Appendix) illustrates the system of clutch release fingers, clutches, and cams controlled by the selector.

The system consists of a driven main shaft to which each of the print positioning cam clutches and the start clutch are capable of being coupled. The pair of release fingers straddling each clutch is capable of controlling the coupling of that clutch to the main shaft, and consequently of positioning the clutch in one of two 180-degree positions, corresponding to a marking or spacing pulse.

Each clutch is held in its mark or space position by one of the two clutch release fingers straddling it. Consequently, if in successive character cycles a given intelligence pulse is the same as in the previous cycle, the corresponding clutch remains stationary. For example, in a repeated RY combination, all clutches turn 180 degrees with each new character cycle because the mark and space combinations are exactly opposite for R and Y. In an RQ combination, however, the number 2 clutch will remain motionless because in both R and Q the number 2 is a marking pulse while all other clutches alternate between mark and space in changing from R to Q. (R has marking pulses on 2 and 4; Q has marking pulses on 1, 2, 3, and 5; Y has marking pulses on 1, 3, and 5.)

As described in paragraph 4-8c(2), more than one pair of clutch release fingers can be affected by the selector at one time. This would permit the wrong clutch to react to a specific pulse and would be completely incompatible with the time base concept of a sequential code. Therefore, the individual pairs of clutch release arms are freed to respond to the selector and release their clutches only during the period when their timing cams permit them to move outwards from the clutch. The timing cams are angularly displaced on a shaft which is gear-coupled to the main shaft through the start clutch. The first break in the neutral circuit (start pulse) through the selector releases the start clutch for 180 degrees rotation which, through the two-to-one gear ratio, drives the timing cam shaft 360 degrees. During this 360-degree turn of the timing cam shaft, each pair of clutch release arms is in turn freed to operate for a period of time corresponding to the pulse length at the appropriate operating speed. The print function clutch release

finger is then freed to operate as the last action of the timing cam shaft.

The angular relationship between the timing cams and the stop position of the timing cam shaft (the time relationship between the start of the timing cam shaft and the sampling of the intelligence pulses) is adjusted by the range dial (range check) in order to orient the start clutch and the timing cam shaft in the best possible position in relation to the signal source. An exploratory check is made for the leading and trailing edges of the usable signal; then the unit is set to the midpoint. If a distorted signal is received, the mechanism is then adjusted for the usable portion of the signal.

(6) FUNCTION SELECTOR. - As shown in figure 4-19 (Appendix), the rotary and lateral control chains terminate at slotted plates. These plates, which are called rotary function and lateral control function slides, are used to select mechanical functions as distinguished from the normal printing of a character. The function slides are part of the function selector mechanism which serves to sense various mechanical functions and select the particular function to be performed. Through movement of the five pulley carriages, various combinations of marking and spacing pulses will cause the function slides to move in lateral directions in relation to each other and to the front of the printer. In figure 4-23, the slots in the rotary function and lateral control slides are arranged so that a particular combination of pulses will align a pair of slots in the two slides at a point directly opposite a function sensing finger lever and permit the sensing finger lever (figure 4-19, Appendix) to engage the slots. A sensing finger lever will engage the two slots only momentarily to sense the mechanical function requested and will then be pushed out. A separate function sensing finger lever is provided for sensing each of the mechanical functions shown in figure 4-23. After sensing the mechanical function established by positioning the rotary function and lateral control function slides, the function selector engages the appropriate clutch on the function main shaft to perform the function. The particular combination of incoming pulses required for different functions of the mechanical results are listed in table 4-7 (Appendix).

The function sensing finger levers (figure 4-24, Appendix) are spring biased against the function slides and consequently will fall into a pair of properly aligned slots if not otherwise prevented. The function bar is supported by two arms and pivots on the character advance lever shaft, describing an arc tangent to the edge of the function sensing finger levers. The character advance lever shaft to which the lifter arm is clamped also supports the function cam follower; therefore, the function helical spring tends to hold the function cam follower against the function cam.

(a) START OF FUNCTION CYCLE. - In figure 4-24 (Appendix), the function cam shown is part of the print function clutch which has two cams; a print cam and a function cam. The print function clutch (on the function main shaft) is normally released or engaged at the same time as the number 5 clutch on the selector main shaft (during every character translating cycle, regardless of the pulse arrangement received). The print function clutch is released by a clutch release arm operated by the print function timing cam, which is located on the same timing cam shaft as the selector timing cams.

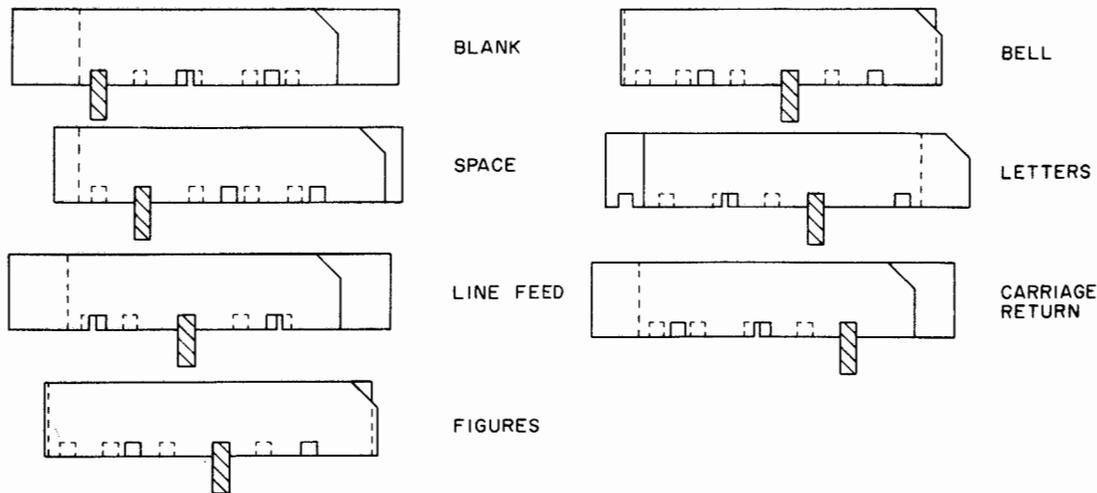


Figure 4-23. Rotary Function and Lateral Control Function Slides, Function Positions

When the print function clutch is in the stop position (disengaged from the function main shaft), the function cam follower is positioned approximately one-third of its movable distance upward on the function cam. Upon its release simultaneously with the receipt of the number 5 pulse, the print function clutch and cam combination rotates, moving the function cam follower toward a higher position. This movement rotates the character advance lever shaft and raises the function lever lifter arm which in turn raises the function bar beyond the tops of the function sensing finger levers. One finger lever is then permitted to fall into a pair of slots (in the rotary function and lateral control function slides) that are aligned by a particular combination of received pulses. During the time the function cam follower is rising on the function cam, positioning of the function slides has been completed and the function slides are stationary. After a function sensing finger lever has been permitted to fall into a pair of slots, the function cam follower drops off the high side of the function cam to the lower side. This allows the function helical spring and the function helical spring yoke link to pull the function bar downward, clearing the function sensing finger levers. The relationship of the function bar to the function sensing finger levers is such that the bar will hit the top of any sensing finger lever already in a pair of slots but will deflect outward toward the bottom of the printer any sensing finger levers which have not fallen into the slots. Only the single function which has been selected by the incoming pulse train can be operated.

(b) COMPLETION OF FUNCTION CYCLE. (See figure 4-25, Appendix.) - Any function sensing finger lever which has been selected to perform a function will be driven toward the rear of the printer by the function bar. This motion of the lever moves the function clutch release arm (to which it is pivotally connected and introduces its individual function, as will be described in succeeding paragraphs. The motion of the function bar continues beyond the

point at which the function is performed. This additional motion pushes the inner surface of the function sensing finger lever against a rod, camming the function sensing finger lever outward until it is kicked out from under the bar and is returned by its spring to the original sensing position. The function bar, after reaching its low point, is raised again about one-third by the function cam follower, at which time the print function clutch reaches its stop point and the cycle is completed. When no function is selected, the function bar rises, falls, and then rises part way again on the character cycle, merely deflecting all of the function sensing finger levers slightly outward. When, however, a function is selected, one particular function sensing finger lever will fall under the bar, be pushed toward the rear of the printer to release its clutch or otherwise perform its function, and then be cammed out to return to the waiting position.

(c) BLANK FUNCTION LINKAGE. (See figure 4-26.) - A combination of printing suppression and

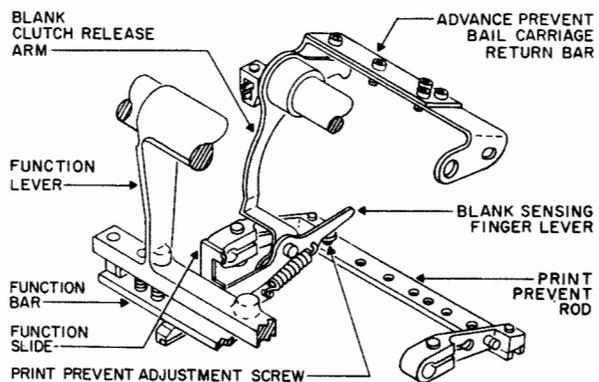


Figure 4-26. Function Selector, Blank Linkage

character advance suppression results from a blank function. The spring action of the blank function sensing finger lever falling into aligned slots in the function slides moves the rear end of the sensing finger lever outward, moving the spring-loaded print prevent rod with it. This positions the print prevent rod so that it blocks the print prevent arm and suppresses printing. The stroke of the sensing finger lever, caused by the function bar, pivots upward the blank clutch release arm to which the blank sensing finger lever is pivoted, contacting one of the adjustment screws on the advance prevent bail and pushes up the advance prevent bail; therefore, printing and advancing are prevented.

(d) SPACE FUNCTION LINKAGE. (See figure 4-27.) - The space function combines the advance function and print suppression. The space function sensing finger falls into the slides and moves the print prevent rod outward without moving the advance prevent bail. Printing will be suppressed, but advance will take place.

(e) BELL FUNCTION LINKAGE. (See figure 5-64, Appendix.) - Unlike other non-printing functions, bell can be selected only when the machine has been put in figures position. The bell prevent lever tab is affixed to the letters figures cam follower so that it prevents the bell sensing finger lever from falling into the slots in the function slides when the machine is in letters position. Operation of the bell sensing finger lever and the bell advance suppression arm prevents printing and advance in the same manner as the other functions. The bell advance suppression arm in this case does not release a clutch, but terminates in an arm to which the bell actuator connecting rod is attached. As the bell advance suppression arm moves it pulls the bell actuator connecting rod, causing the clapper to move away from the bell. As the bell sensing finger lever is cammed out, the bell advance suppression arm returns to its rest position, permitting the clapper to move rapidly towards the bell. As a result of its overtravel, the clapper then strikes the bell.

(f) LETTERS FIGURES FUNCTION LINKAGE. (See figure 4-28, Appendix.) - The letters figures functions operate a common clutch, each function capable of releasing the clutch for a 180-degree rotation. Print and advance prevention take place for

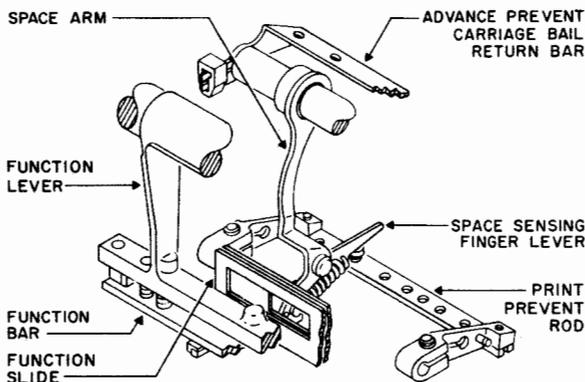


Figure 4-27. Function Selector, Space Linkage

ORIGINAL

either as described for the blank function, with the function clutch release arms serving as clutch releases for the common clutch. Therefore, if the clutch is resting in letters position, repeated letters selection will not release it, but a figures selection will permit a 180-degree rotation. The letters figures cam follower transmits its motions through a torque shaft to its arm and carriage pulley. The motion of the cam follower positions the letters figures pulley in one of two positions, thereby effectively shortening or lengthening the rotary cable the equivalent of 180 degrees on the print cylinder. In practice, the letters position has the cam follower on the high side and the cable is effectively shortened.

(g) LINE FEED FUNCTION LINKAGE. (See figure 5-65, Appendix.) - Line feed consists of print and advance suppression as well as a positive mechanical action. In this case, print and advance suppression are as described for the blank function. In addition to advance suppression, the line feed clutch release arm releases the line feed clutch which allows a 180-degree rotation of the line feed actuator cam follower arm affixed to it. The line feed actuator cam follower arm transfers its motion through a torque tube to the line feed pawl which moves the paper feed ratchet.

The change from double to single line feed is accomplished by positioning the line feed shift arm. Setting the line feed shift arm for single space moves the arm closer to the pawl teeth and holds the line feed pawl away from the ratchet so that only the second tooth engages.

(h) PRINTING ACTION. (See figure 4-29.) - The print cam is affixed to the same clutch as the function cam. This clutch is released once every character cycle, regardless of the combination of pulses received. The release of the print function clutch rotates the print cam and moves the print cam follower, which is spring-loaded against the cam by the print spring arm. The print spring arm is attached to the print lever shaft.

When printing is to be performed, the print cam follower will fall off the high portion of the cam (shortly after the function cam follower falls), rotating the print lever shaft and moving the terminal lever. This motion is transmitted through the print hammer actuator link to the print hammer shaft and thence to the print hammer. The print hammer release is moved with the terminal lever, forcing the print hammer actuator link away from the terminal lever just before print hammer impact. The inertia of the print hammer, however, is sufficient to complete the printing stroke although the driving force has been released.

(i) PRINT PREVENTION. (See figure 4-30.) - When a non-printing function is selected, the function sensing finger lever pushes out the spring-loaded print prevent rod. The pivoting action of the print prevent rod moves the print prevent rod lever under the print prevent arm, which just clears it when the print cam follower is on the high portion of the cam. There is a small step in the print cam, to which the print cam follower drops just prior to the fall of the function cam. This slight step allows time to lock the print prevent rod lever under the print prevent arm if a non-printing function is being selected. The function bar action precedes the final drop in the print cam in order to store the print or no-print action until the print cam follower drops.

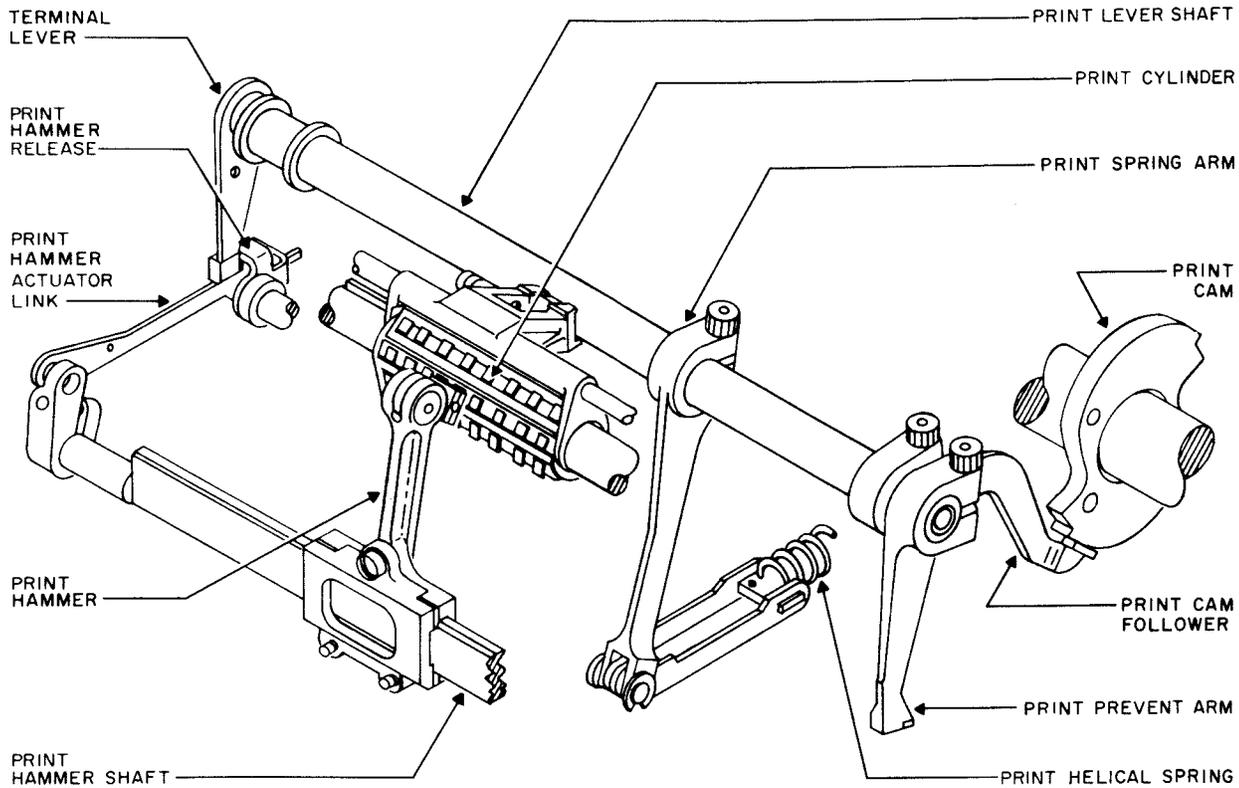


Figure 4-29. Function Selector, Character Printing Linkage

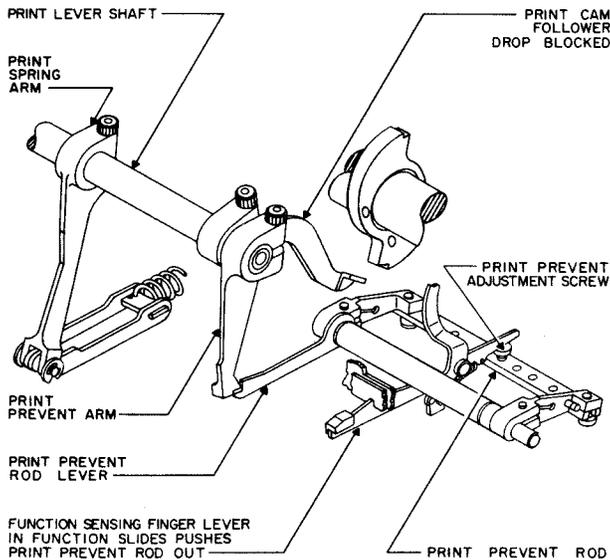


Figure 4-30. Function Selector, Print Prevent Linkage

The positioning of the print prevent lever beneath the print prevent arm blocks the final drop of the print cam follower, thereby preventing printing. The rising of the print cam follower on the next character cycle frees the print prevent lever. The print prevent rod will then be spring-returned to its sensing position. If desired, printing can be permitted on functions by disabling the print prevention linkage; the various function symbols will then be printed.

(j) CHARACTER ADVANCE PREVENTION. (See figure 4-31, Appendix.) - Character advance prevention takes place for all functions except space. The function clutch release arms (by contacting the advance prevent adjustment screws) move the advance prevent bail, which is affixed to the carriage return cam follower, upwards slightly. This motion is equivalent to about one-half the upward motion that is induced by the carriage return cam. This motion is transmitted through the carriage return shaft to the carriage return lever, whose motion is sufficient to withdraw the character advance pawl and engage it on the advance suppression latch but is not sufficient to release the check pawl. Consequently, advancing is prevented without permitting carriage return. If desired, character advance on functions may be allowed by disabling the character advance prevention linkage.

(k) CARRIAGE RETURN FUNCTION LINKAGE. (See figure 5-59, Appendix.) - Carriage return com-

bines print prevention and simultaneous action by the carriage return clutch release arm to release the carriage return clutch and cam. The rising motion of the carriage return cam moves its follower away until the carriage return lock lever intersects the notch in the carriage return cam follower. Movement of the cam follower rotates the carriage return shaft and lever, resulting in a downward motion of the check pawl link and advance prevent lever. This motion disengages the check pawl and character advance pawl from the advance ratchet until carriage return is completed. As the carriage return cycle is completed, the stop pin on the inner face of the advance ratchet strikes the V lever, which in turn rotates the lock lever actuator arm, disengaging the lock lever from the notch in the carriage return cam follower.

(l) **AUTOMATIC CARRIAGE RETURN AND LINE FEED.** (See figure 5-62, Appendix.) - Automatic carriage return and line feed are provided at the end of any line if carriage return has not been signaled to the machine. Function sensing finger levers similar to the other function levers are provided for these two functions. However, these levers do not actually sense the slide alignment but are spring loaded so that they tend to fall beneath the function bar regardless of the position of the function slides. This action is prevented, however, by the automatic carriage return and line feed actuator arm assembly which is affixed to the V lever shaft. The arm assembly and shaft are spring loaded against the automatic carriage return and line feed sensing finger levers in such a manner that the bias springs pulling or lifting the levers beneath the function bar are overcome. When the advance drum reaches the end of the line with no carriage return signal, the stop pin mounted on the drum pushes against the V lever, overcoming the shaft spring and turning the shaft. This relieves the pressure on the two function sensing finger levers through action of the automatic carriage return and line feed actuator arm on the actuator assembly. These levers fall beneath the function bar on its next stroke. Release of the carriage return and line feed clutches is effected by the pivoting action of their respective backstop clutch release arms.

(m) **OFF LINE FUNCTION INTRODUCTION.** (See figure 4-32.) - Off line function buttons are provided on the printer front cover to introduce, through appropriate linkage, off line functions of line feed, figures, letters, and carriage return into the printer. These functions, while operating only on the local printer, do not electrically affect the signal line or the selector, and thus can be introduced while receiving copy. With the exception of letters, the off line function buttons operate levers which push the function backstop clutch release arm in and release the appropriate clutches. Since the function sensing finger levers do not fall into the function slides in off line function selection, there is no print prevention motion. However, the motion of the function clutch release arm does prevent character advance, and printing will take place since the printer is receiving intelligence.

In the case of letters, there is a theoretical possibility that the release of the letters clutch at the wrong time may jam the machine. Therefore, the manual introduction of letters is accomplished differently. The letters off line function button moves a slide inward, camming a leaf spring against a sensing finger

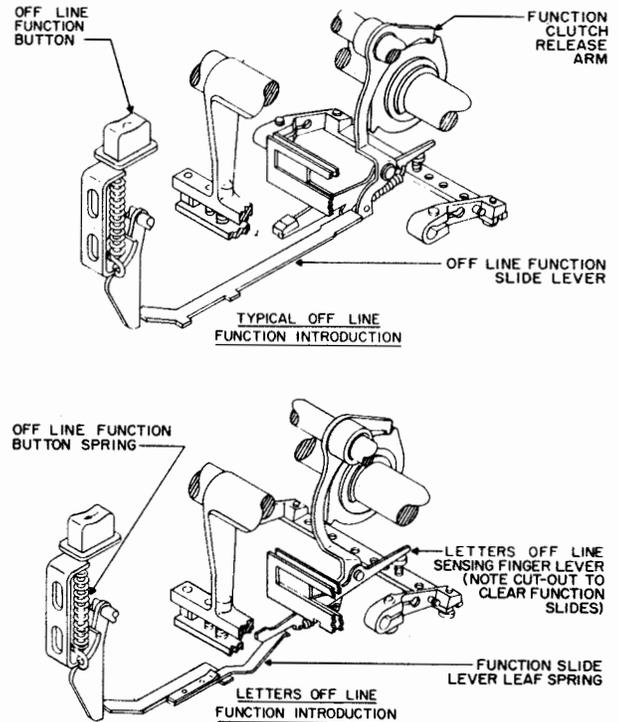


Figure 4-32. Function Selector,
Off Line Function Control Linkage

lever. This lever is urged against the function bar, beneath which it falls when the bar is at its high point. The lever falls under the function bar without interfering with the function slide and is driven downward by the bar, pivoting the function clutch release arm and releasing the letters clutch. In this manner, the off line introduction of letters is timed to the normal stroke of the function bar.

(7) **AN/TGC-14(V) FIGURES H MOTOR STOP FUNCTION.** (See figure 5-72, Appendix.) - This function can only be selected when the equipment is in the figures position and the H key has been depressed. Unlike the bell function which results in print and advance suppression, this function does not prevent printing and advancing.

Figures H is represented by the character #. When figures H is selected, the character # will be printed and the printer will then operate in a steady marking or standby condition until the next mark-to-space transition. Actual stopping of the printer motor is accomplished both mechanically and electrically. The mechanical system used is illustrated in figure 5-72 (Appendix). The mechanical components are mounted on top of the printer front frame assembly and the figures H motor stop switch is mounted on the rear frame assembly.

As shown in figure 5-72 (Appendix), the code bar and code bar extension are operated by the combined action of carriage pins 1, 3, 4, and 5, the code bar return stop, and the character advance lever shaft

assembly. During printing functions, the spring-loaded code bar and its extension are released by the character advance lever shaft and simultaneously blocked by the code bar return stop and one or more of the carriage pins. Upon initiation of the next printing function, the character advance lever shaft moves the code bar and extension to the right and away from the carriage pins and code bar return stop. The carriage pins and the return stop are then repositioned in preparation for the next character to be printed, and the code bar is again released by the character advance lever shaft. When the FIGS key is depressed, the high portion of the letters figures cam is positioned under the code bar return stop cam follower, and the code bar return stop is moved away from the code bar. The code bar, however, is still blocked by one or more of the carriage pins and will continue to be blocked until the H key is depressed. Upon depression of the H key, carriage pins 1, 3, 4, and 5 drop down and carriage pin 2 moves up, allowing the code bar to move to the left, approximately halfway across carriage pins 1, 3, 4, and 5, to actuate the stop switch. When the stop switch is actuated, a relay holding circuit is set up in the line sensor to prevent motor operation until the next start pulse is received.

(8) AN/TGC-14A(V) AUTOMATIC TIME DELAY MOTOR STOP FUNCTION. - The automatic time delay motor stop mechanism (figure 5-73, Appendix) is a controlled system of ratchets, pawls, and a switch which operates a relay control circuit to turn off the motor assembly after either a 60-second (75 baud) or 90-second (45.45 baud) period of inactivity (no mark-to-space transition). The printer is thus placed in stand-by condition.

NOTE

The electrical circuit is identical to the AN/TGC-14(V).

The time delay motor stop mechanism consists of an adapter assembly, a feed pawl assembly, a check pawl assembly, a time delay mounting base plate assembly, a cam shaft extension, a guide, and several springs. The pawl assemblies are spring-connected to the time delay mounting base plate assembly, which is secured to the printer. The springs keep the pawls engaged with their associated ratchets on the ratchet support shaft of the plate assembly. For each revolution of the ratchet support shaft, the feed pawl rotates the reduction ratchet one tooth clockwise; a secondary check pawl, located on an eccentric above this ratchet and spring-connected to the plate, checks the reduction ratchet.

The reduction ratchet has a deep tooth every ninth tooth. When the feed pawl enters a deep tooth, its wide tip also engages a tooth of the advance ratchet and stud assembly on the ratchet support shaft, moving it clockwise one tooth. Then a spring-connected check pawl assembly holds this advanced position of the advance ratchet.

On its outer face, the advance ratchet contains a spring post and a button, approximately 180 degrees apart. The spring post secures one end of a return spiral ratchet spring whose other end is held in a slit of the support shaft tip. As the advance ratchet and

stud assembly is advanced tooth-by-tooth during a speed reduction process (advance ratchet moving one tooth for every nine of the reduction ratchet) the return spiral spring is wound on the support shaft. The stud on the advance ratchet travels around clockwise to engage and push a lug on a yoke pivoted on the support shaft, moving the yoke approximately 45 degrees.

As the U-shaped yoke pivots through this distance, a long finger on the yoke moves clockwise against a roller on the switch actuator, closing switch 1A2A1S1. This energizes the motor stop relay which shuts off the teletypewriter motor; the holding circuit provided by transistor Q2 holds the relay energized until the next mark-to-space transition. At the same time, an arrowhead on the rear arm of the yoke overrides a roller on the end of a detent spring, providing tension to insure good switch contact. Then, a lug on the outer yoke arm moves a latch pivoted on the support shaft sufficiently to push the check pawl assembly away from and out of engagement with the advance ratchet.

The feed pawl is disengaged from the reduction ratchet when retracted by eccentric action of the shaft on the main shaft drive adapter assembly as the printer helical gear turns. Under these conditions, the advance ratchet, now free, snaps back counterclockwise due to tension of its return spiral spring coming to rest. In so doing, the button on this ratchet moves the yoke back counterclockwise so that the yoke finger allows the spring pressure switch to open; the yoke arrowhead overrides the roller of the detent spring assembly, and the yoke lug swings back the pivoted latch to release the check pawl assembly. Then, the check pawl springs back to reengage the advance ratchet for the start of another cycle.

The complete cycle for shutting off the motor (beginning with the eccentric action of the adapter, the closing of the pressure switch by the yoke, and the subsequent resetting of the mechanism by the return spiral spring) consumes approximately 60 to 90 seconds, depending on the speed change gear used. Furthermore, this cycle can be completed only if no mark-to-space transition is sent or received by the teletypewriter during this interval. This is due to the governing action of a cam shaft extension, which is a partly open sleeve on a hexagonal base secured to the timing cam shaft assembly. When the cam shaft rotates, the open plane of the sleeve is brought parallel to, and clear of, the feed and check pawls during every 180 degrees of cam shaft revolution. This allows these pawls to contact their ratchets. During the remaining 180 degrees of cam shaft revolution, the half-sleeve of the extension is brought toward the pawls, and the sleeve outside diameter cams the pawls away from the ratchets, preventing ratchet operation.

Whenever the teletypewriter set is sending or receiving, the cam shaft and its extension make many revolutions during a 60-second interval. Hence, the mechanical cycle required to operate the automatic motor stop time delay mechanism can never be completed, and the mechanism remains inoperative. When a lapse in sending or receiving occurs which is sufficiently long to permit completion of this cycle (about 60 to 90 seconds), the open part of the extension sleeve ultimately lines up in a plane parallel to the pawls and remains in this plane. Hence, the pawls can feed and check the ratchets to operate the mechanism which

closes the motor stop circuit to deenergize the teletypewriter motor. The motor is turned on again electrically when the first incoming character is received or when a break is sent to the signal line, thus causing a mark-to-space transition which in turn causes the associated electronics to energize the motor.

(9) **RIBBON FEED MECHANISM.** (See figure 4-33.) - The ribbon feed mechanism (located under the paper guide plate), automatically advances and reverses the direction of the ribbon. Motive power is supplied from a gear on the selector main shaft and the ribbon feed slip clutch, which transfers power through a worm gear assembly to a clutch and cam mechanism. Direction of ribbon travel is determined by that intermediate drive gear (left or right) which is engaged with its associated ribbon spool drive gear. Automatic ribbon reversal is accomplished when the ribbon eyelet touches a ribbon reversing sensing arm and moves it in an outboard direction. This results in pulling on a wire link which is attached to a clutch stop (left or right). The clutch stop releases the clutch, permitting it and its associated cam to rotate 180 degrees. A reversing cam follower is pivoted on a ribbon reversing slide plate; rotation of the cam associated with the clutch causes the slide plate to disengage the movable ribbon spool drive gear from its matching intermediate drive gear and engage the opposite ribbon spool drive gear, thus reversing the direction of ribbon travel. If the gears do not mesh during reversal, the spring-loaded pivoted cam followers are deflected long enough to allow correct meshing to be established. If after the gears do mesh

and the load is too great, the friction clutch on the ribbon feed drive mechanism will slip and prevent an overload condition from being placed on the mechanism. Instead of a slip clutch, some models have a shearpin across the worm hub for overload protection. There are two vibrator ribbon guides, one on each side of the front plate. These vibrator guides move the ribbon upward in front of the print hammer each time the print hammer performs a printing stroke.

(10) **PRINTER MOTORS.** - There are two types of motors which are available with the teletypewriter set; Alternating-current Motor PD-82/U and Alternating-current Motor PD-83/U. These motors are of the hysteresis-synchronous type. They require a capacitor in series with a stator winding to provide phase shift for directional starting and running. Alternating-current Motor PD-82/U requires 115-volts alternating current, 60-cycles per second primary power; Alternating-current Motor PD-83/U requires 115-volts alternating current, 400-cycles per second primary power.

d. **PRINTER TROUBLE-SHOOTING PROCEDURE.** - Refer to table 4-8 (Appendix) or figure 4-5 (Appendix) for the printer trouble-shooting procedure. Refer to figure 4-34 (Appendix) for location of test points.

4-9. **POWER SUPPLY AND DISTRIBUTION FUNCTIONAL SECTION TROUBLE SHOOTING.**

a. **GENERAL.** - The power supply and distribution functional section contains basically electrical chassis 1A1, signal line power supply 1A4, service cable 1A5, and their associated circuits.

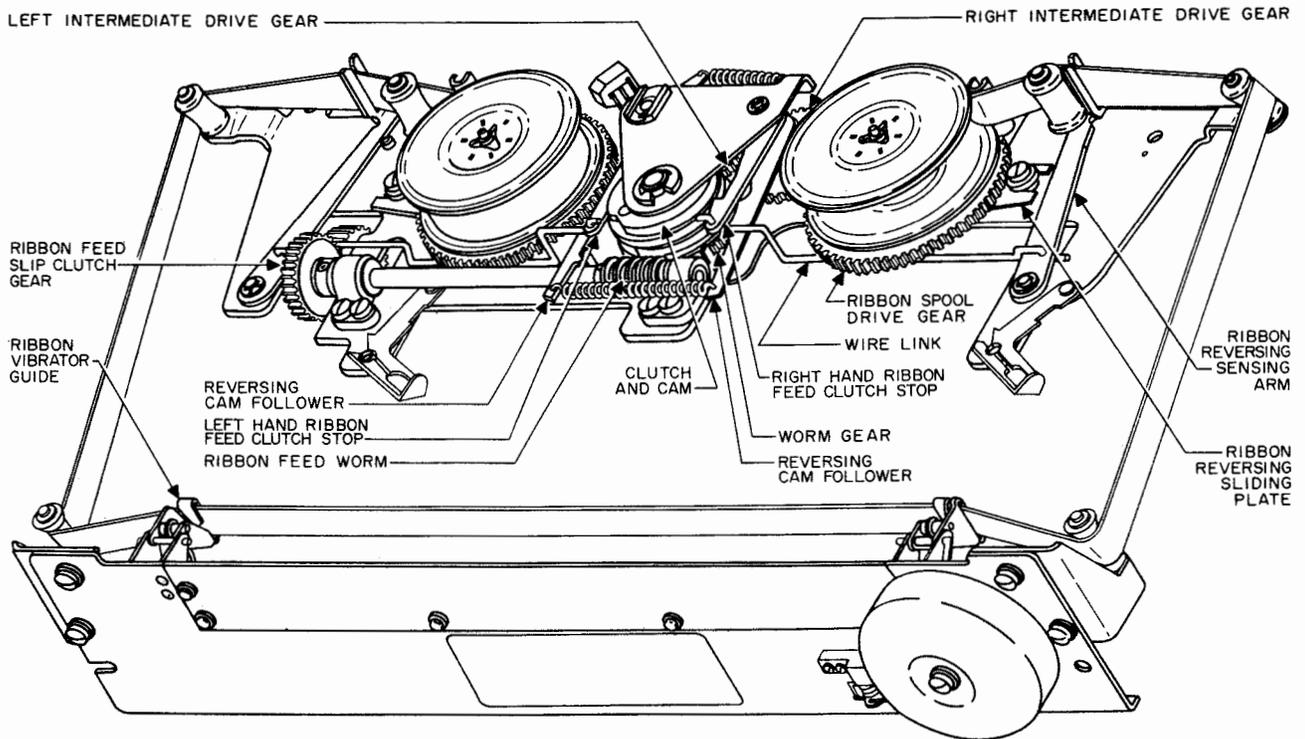


Figure 4-33. Ribbon Feed Mechanism

b. SIGNAL LINE POWER SUPPLY THEORY OF OPERATION. - Signal line power supply 1A4 (figure 4-35) functions as a source of direct-current signal line current for the operation of the local teletypewriter equipment or as an external signal line current source for other equipment requiring currents not exceeding 100 milliamperes at 26 volts direct current and a floating ground. The input to the power supply is 115 volts alternating current, either 60 or 400 cycles per second, single phase. The power supply consists of a power transformer capable of operating on either 60 or 400 cycles per second, a conventional full-wave bridge rectifier, and a resistance-capacitance filter network. With the exception of transformer T1, the components are mounted on a printed-circuit board. Power transformer T1 is a step-down transformer applying 33 volts alternating current across the rectifier formed by diodes CR1 through CR4. After filtering, the output voltage across bleeder resistor R2 is 26 volts direct current at 100 milliamperes of load current. The negative side of the power supply is returned through the outside signal loop (when used) through LINE ADJUST control 1A1R2. This control is used to adjust the signal line current on the equipment supplying line battery.

c. SIGNAL LINE POWER SUPPLY TROUBLE-SHOOTING PROCEDURE. - Refer to table 4-9 (Appendix) or figure 4-5 (Appendix) for the signal line power supply trouble-shooting procedure.

d. ELECTRICAL CHASSIS TROUBLE-SHOOTING PROCEDURE. - Refer to table 4-10 (Appendix) or figure 4-5 (Appendix) for the electrical chassis trouble-shooting procedure.

4-10. VOLTAGE, CURRENT, AND RESISTANCE MEASUREMENTS.

CAUTION

Perform continuity checks only on completely deenergized equipment. Make certain that there are no transistors connected indirectly into the circuit under test. Disconnect the unit under test from the equipment so that the transistor circuits are completely isolated.

NOTE
DIODE CR5 FOR AN/TGC-14A(V) ONLY.

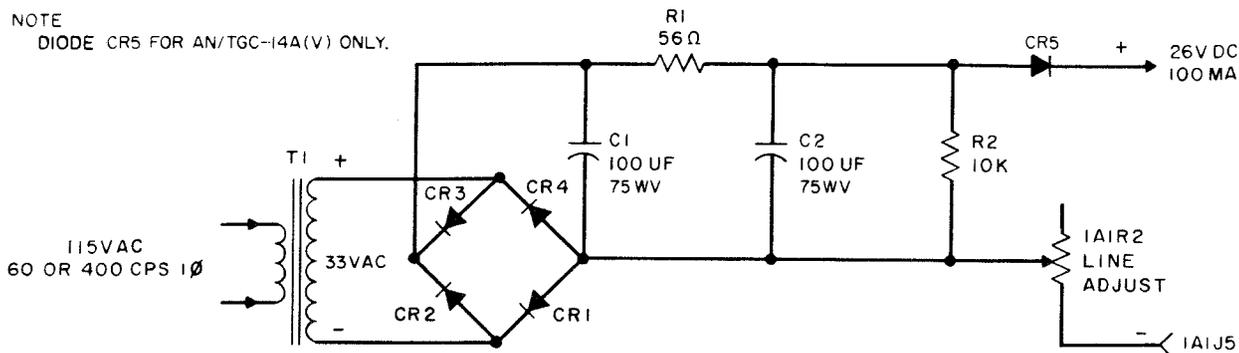


Figure 4-35. Signal Line Power Supply 1A4, Simplified Schematic Diagram

Table 4-11 (Appendix) provides typical operating voltages and currents for the various components of the teletypewriter set. Unless otherwise indicated, voltage measurements are taken with respect to ground (chassis). Since this equipment uses transistor circuits, the only resistance measurements which should be made are those for determining continuity in circuits other than the transistor circuits.

4-11. SIGNAL DISTORTION IN TELETYPEWRITER SYSTEMS.

a. GENERAL. - Teletypewriter signals, as well as all direct current signals, are subject to distortion. This distortion may be caused by the line facilities, natural and man-made electrical disturbances, cross-fire, or sporadic changes of operating speed at either the local or remote station. A possible cause of distortion would be to operate at a high transmitting speed into a long-line circuit, thereby resulting in the line current not reaching its steady-state value during the marking interval because of the inherent resistance and capacitance of the circuit.

The types of distortion (expressed in percent of a unit pulse) are classified as bias distortion, characteristic distortion, fortuitous distortion, and end distortion.

b. BIAS DISTORTION. - Bias, which is the simplest and common component of distortion, may be either marking (positive) or spacing (negative). Marking bias appears as a uniform lengthening of all of the marking pulses, and an equal uniform shortening of all of the spacing pulses. Spacing bias appears as a uniform shortening of all of the marking pulses, and an equal uniform lengthening of all spacing pulses. Zero bias is that state in which the marking pulses are equal in length to the spacing pulses.

Bias is caused by an improper relation between the levels at which the selector or other receiving device responds and the steady-state marking and spacing levels of the signal. This condition is caused by the presence of inductance and capacitance in the circuit, changes in the value of current, and improper values of operate and release currents of the receiving device. The value of current in the selector which causes the armature to pull up is called the operating current of

the selector. The value of current which causes the armature to fall back is called the release current of the selector. The release current is smaller in value than the operating current.

These values are indicated on the waveshapes in figure 4-38 as the points O and R. The duration of the signal repeated by the armature is the time T. In the theoretical waveshape shown in A, the operation and the release of the armature take place immediately upon the transmission and completion of the impulse. The operating time T is exactly equal to the duration of the pulse. B, C, and D show the waveshapes received over lines of different transmission characteristics, and the effect of waveform distortion on operating time.

In B, points O and R have been delayed because of the time T required for the current to reach the operating and release value. In C, the points O and R have been delayed even more, and by unequal amounts, because an increase in the inductance in the circuit causes the current to build up and decrease more slowly. In D, the points O and R are at greater values because the tension of the spring holding the armature in place has been increased, requiring the current to have a greater value for the armature to pull up. Here, also, there is a time delay before the armature

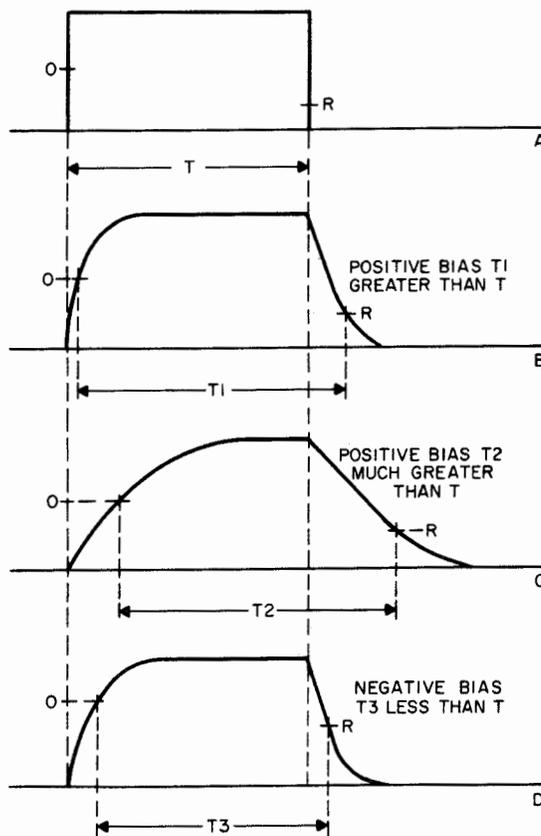


Figure 4-38. Effect of Series Inductance on Pulse Lengths

operates. Note that in B, C, and D operating time T, during which the armature repeats the signal, may be different from the duration of the transmitted pulses. Positive bias, the increase of the marking pulse, is illustrated in C. Negative bias, the decrease of the marking pulse, is illustrated in D. It is the unequal delay of the operating time T, that causes bias distortion.

c. CHARACTERISTIC DISTORTION.

(1) GENERAL. - Characteristic distortion is best defined in terms of its major properties. First, the distortion takes place when there is a transition, not from a steady-state marking or spacing current as in bias distortion, but from a changing current, because the steady-state value has not yet been reached. Second, it is a distortion of the transmitter pulses that is characteristic of the inductance, capacitance, and resistance of a particular circuit. For some other circuit with different circuit constants, the amount of characteristic distortion is different. Finally, the form of the distortion does not change in sign or magnitude when the marks and spaces are interchanged.

(2) NEGATIVE CHARACTERISTIC DISTORTION. - Waveshape A, figure 4-39, shows a theoretically perfect waveshape; waveshape B shows the same waveshape in which the steady-state value of current is not attained during the short pulse following a long pulse because of the characteristics of the line. The first marking pulse is a long one, allowing the current

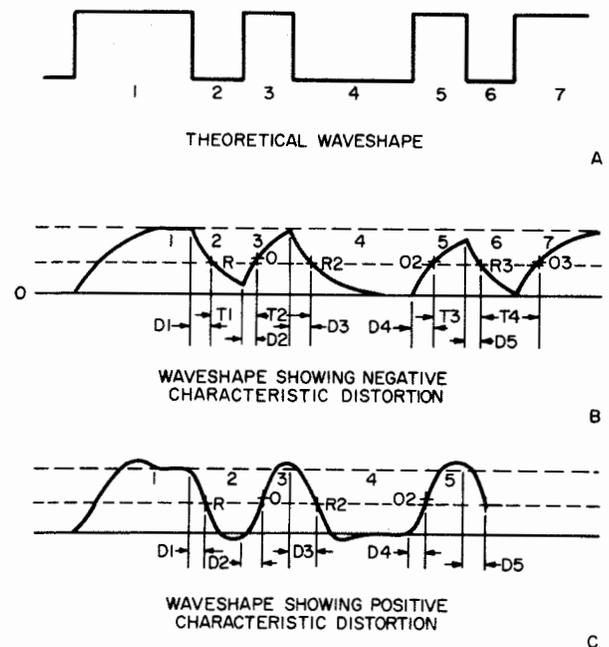


Figure 4-39. Waveshapes Showing Characteristic Distortion

to reach its steady-state value. The duration of the first space pulse is not long enough to allow the current to decrease to its zero steady-state value before the following space-to-mark transition. During interval 3, the current builds up to approximately the steady-state value before the mark-to-space transition for interval 4. The effect on the short pulse (interval 2) after a long pulse (interval 1) is to shorten it. The time delay from the mark-to-space transition and the point of the armature release at R (shown by D1) is greater than the time delay from the space-to-mark transition and the armature operating at O (shown by D2). The short pulse (interval 2) is shortened because the armature operation is delayed less after the short pulse than after the long one. This is shown in B where T1, the duration of short pulse 2, is shorter than T2, the duration of short pulse 3.

The current during pulse 4 decreases to its zero steady-state value before the space-to-mark transition of pulse 5 which is a short pulse. The current again does not reach the steady-state value before the mark-to-space transition of pulse 6. The current decreases to approximately the zero steady-state value during interval 6 before the space-to-mark transition of pulse 7. The time delay from the space-to-mark transition of pulse 5 to the operation of the armature at point O2 (shown by D4) is greater than the time delay from the mark-to-space transition of pulse 6 to the release point of the armature at point R3 (shown by D5). Thus, the short pulse again is shortened. This is apparent from B where T3, the duration of short pulse 5, is shorter than T4, the duration of short pulse 6. The effect of negative characteristic distortion is to shorten the short pulse after a long pulse, and this is true whether the pulse is marking or spacing.

(3) POSITIVE CHARACTERISTIC DISTORTION. - The effect of positive characteristic distortion is to lengthen the short pulse after a long pulse. This effect is caused by the operation of the armature being delayed less after a long pulse than after a short one. This is true whether the pulse is marking or spacing. Waveshape C shows a wave in which the current overshoots the steady-state value and fails to return to

the steady state within the duration of the shortest pulse. During the first long pulse, the current rises above the steady-state value but decreases approximately to the steady state before the first mark-to-space transition. During short pulse 2, the current decreases below the steady-state value and fails to return to it before the space-to-mark transition of pulse 3. During pulse 3, the current overshoots the steady-state value and does not complete the return to it during the pulse. With this condition D1 (the time delay between the transition and the armature release) is less than the time delay of the operation of the armature which is shown by D2. As a result, the duration of the short pulse 2 after the long pulse 1 is increased.

Since the time interval of D4 is less than the time interval of D5, the length of the short marking pulse 5 after the long spacing pulse 4 is also increased. When a short pulse is lengthened after a long pulse, while the pulse is marking or spacing, the effect is known as positive characteristic distortion.

If a wave performs a damped oscillation before settling to a steady state, it is possible that it will produce a negative characteristic effect on certain transitions and a positive characteristic effect on others. Because characteristic distortion is dependent on the previous history of the signal, it is referred to as inter-symbol interference.

d. FORTUITOUS DISTORTION. - In comparison with bias and characteristic distortion, both of which are systematic forms of distortion (that is, they occur in the same way at all times) fortuitous distortion causes the lengths of the received impulses to vary in an erratic manner. The reason for this is simply that the causes of fortuitous distortion do not occur in any regular way. The causes are the chattering or sparking of relays; paralleling telegraph circuits and the crossfire introduced by these circuits; natural causes such as lightning; paralleling power lines; and intermittent shorts, opens, and grounds on the transmission line.

e. END DISTORTION. - End distortion of start-stop teletypewriter signals is the shifting of the end of all marking pulses from their proper positions in relation to the beginning of the start pulse.

SECTION 5
MAINTENANCE

5-1. INTRODUCTION.

This section contains preventive maintenance, corrective maintenance, and repair information for Teletypewriter Sets AN/TGC-14(V) and AN/TGC-14A(V).

This section is divided into three subsections; Preventive Maintenance, Maintenance Standards, and Repair.

The Preventive Maintenance subsection contains tabular test procedures to be performed by the operator and maintenance personnel at specified intervals to detect areas of abnormal performance. The Maintenance Standards subsection contains the reference standards which will establish the proper performance of the teletypewriter sets.

The preventive maintenance procedures provide a systematic and efficient method for checking and performing routine preventive maintenance on the teletypewriter sets. Comparison of preventive maintenance results with the maintenance standards and proper analysis and correction of any abnormal results will avert impending equipment malfunction.

The Repair subsection contains information required to test, repair, adjust, and lubricate all electrical and mechanical assemblies of the teletypewriter sets.

NOTE

All references to direction in this section are based upon viewing the equipment as seen from the operator's position.

5-2. TEST EQUIPMENT AND TOOLS.

Table 5-1 (Appendix) lists the test equipment and tools required to service and repair the teletypewriter sets.

5-3. PREVENTIVE MAINTENANCE.

a. GENERAL. - Preventive maintenance tests and procedures arranged by time periods are provided in table 5-2 (Appendix) through table 5-8 (Appendix). When properly performed, these tests and procedures indicate the performance of individual electrical and mechanical functional circuits and also provide for systematic preventive maintenance of the teletypewriter sets.

The preventive maintenance tables establish a calendar inspection system. If, however, 250 hours operation time is accrued prior to the calendar due date, follow the lubrication and inspection requirements established in the lubrication table (table 5-9, Appendix) in addition to the regularly scheduled inspections.

A list of operating conditions which apply to the entire table (unless otherwise noted in a given step) is

provided at the top of each procedure table. Where illustrations are supplied, the step numbers of the procedures will correspond to the step numbers on accompanying illustrations. Arrows leading from a given step number on an illustration graphically present certain basic information given in the associated step of the procedure table. This basic information includes the point where the test equipment is to be connected to the teletypewriter set and similar information.

Prior to performing the scheduled preventive maintenance procedures, the teletypewriter set should be checked to insure that the equipment is operating within its design capabilities. The maintenance standards given in paragraph 5-4 should be performed to ascertain that the equipment is operating normally.

b. PREVENTIVE MAINTENANCE FOR OPERATING PERSONNEL. - Refer to tables 5-2 (Appendix) and 5-3 (Appendix) for the daily and weekly checkoff procedures to be performed by operating personnel as part of an Organizational Maintenance Program.

NOTE

If an Organizational Maintenance Program is not in effect, perform these procedures only as required.

Do not energize the equipment daily for the sole purpose of making the daily checks in table 5-2 (Appendix). These checks are intended only for equipment which is in daily use.

c. PREVENTIVE MAINTENANCE FOR MAINTENANCE PERSONNEL. - Refer to tables 5-4 (Appendix) through 5-7 (Appendix) for the checkoff procedures to be performed by maintenance personnel as part of an Organizational Maintenance Program.

NOTE

If an Organizational Maintenance Program is not in effect, perform these procedures only as required.

5-4. MAINTENANCE STANDARDS.

Table 5-8 (Appendix) lists the maintenance standards for the teletypewriter sets. These standards are arranged in functional groups in accordance with figure 5-11 (Appendix) and are listed in a suggested sequence for performing the tests. Deviations from the listed order will not affect the result or utility of the maintenance standards. The procedures and illustrations required for performing the maintenance standards tests are listed in the paragraph, step, or table reference column. The test equipment required for performing the maintenance standards tests for each functional section is listed in table 5-1 (Appendix).

Comparison of test results with the given maintenance standards will reveal any significant change in the operation of the teletypewriter sets. It is expected that the test results will occasionally show nominal variances, but this does not necessarily mean that the equipment is operating improperly. If, however, a particular step produces an indication which varies progressively each time the check is made, improper operation or impending failure are indicated and corrective measures should be taken.

5-5. REPAIR.

The following paragraphs contain instructions for repairing, adjusting, and lubricating the teletypewriter sets. Parts location illustrations are provided throughout the text or in the Appendix as required. Overall schematic and wiring diagrams are provided in the Appendix.

a. **FAILURE REPORTS.** - Report each failure of the equipment, whether caused by a defective part, wear, improper operation, or an external cause. Use **ELECTRONIC FAILURE REPORT** form DD787. Each pad of the forms includes full instructions for filling out the forms and forwarding them to the Marine Corps Supply Activity, Philadelphia, Pennsylvania. Be sure that you include the model designation and serial number of the equipment (from the equipment identification plate) and the type number and reference designation of the particular defective part (from this section). Describe the cause of the failure completely, continuing on the back of the form if necessary. Do not substitute brevity for clarity. And remember . . . there are two sides to the failure report . . .

YOUR SIDE

Every **FAILURE REPORT** is a boost for you:

1. It shows that you are doing your job.
2. It helps make your job easier.
3. It insures available replacements.
4. It gives you a chance to pass your knowledge to every man on the team.

HEADQUARTERS SIDE

1. Evaluate present equipment.
2. Improve future equipment.
3. Order replacements for stock.
4. Prepare field changes.
5. Publish maintenance data.

Always keep a supply of failure report forms on hand. You can get them from the Marine Corps Supply Activity, Philadelphia, Pennsylvania.

b. **REMOVAL PROCEDURES.** - The following procedures establish the manner in which the teletype-

writer sets are to be dismantled to their various component levels. Specific disassembly instructions for each of these components are contained in paragraphs 5-5d through 5-5j.

(1) CASE COVER REMOVAL.

Step 1. Place the case on its rear bumpers (handle up).

Step 2. Open the vacuum relief valve on the transit case cover to equalize case and atmospheric pressures.

Step 3. Disengage the four fasteners on the transit case cover from the case and remove the cover.

Step 4. Place the equipment in a horizontal position.

(2) **SERVICE CABLE REMOVAL.** - Turn the connector-plug one-quarter turn counterclockwise and then pull the connector-plug straight out.

(3) PRINTER FRONT COVER AND ELECTRICAL CHASSIS REMOVAL.

Step 1. Disengage the two stud fasteners on the printer front cover by turning them counterclockwise.

CAUTION

When the front cover is removed, the electrical chassis locking device is released and the chassis is free to slide out of the case.

Step 2. Carefully pull the top of the front cover out toward the front of the machine and lift up.

Step 3. Carefully slide the printer and electrical chassis forward and out of the case.

(4) KEYBOARD REMOVAL.

CAUTION

Insure that the printer motor has been turned off prior to attempting keyboard removal.

NOTE

The keyboard cannot be removed without first removing the printer front cover.

Step 1. Remove the front cover.
Step 2. Move the keyboard lock bar (figure 5-9, Appendix) to the right.

Step 3. Grasp the sides of the keyboard and carefully pull the keyboard out of the electrical chassis.

(5) PAPER GUIDE REMOVAL.

Step 1. Carefully hook index fingers under the front of the paper guide.

Step 2. Pull guide forward and then up.

Step 3. Remove the paper guide from the printer assembly.

(6) PRINTER REMOVAL.

Step 1. Disconnect the motor and selector connector plugs.

Step 2. Disengage the two printer slide locks (figure 5-3, Appendix) and the two rear lock screws.

Step 3. Lift the printer assembly away from the electrical chassis.

(7) **LINE SENSOR REMOVAL.** - Remove the four attaching screws and gently lift the line sensor away from the electrical chassis, being careful not to damage the connector.

(8) **SIGNAL LINE POWER SUPPLY REMOVAL.** - Remove the four attaching screws and gently lift the

signal line power supply away from the electrical chassis, being careful not to damage the connector.

c. **REPLACEMENT PROCEDURES.** - The replacement of the cables and lateral control belt as described in subparagraphs (1) through (4) requires only minor disassembly. Replace the cables and belt as required. Refer to figures 5-13 (Appendix) through 5-19 (Appendix) for installation diagrams and details.

The replacement of defective electronic components is accomplished using standard hand tools and soldering techniques. Replace all defective electronic parts with the correct replacement part listed in Repair Parts List SL4-03315B. (This list applies only to the AN/TGC-14 series.) Solder the replacement part into the circuit using resin-core solder, Federal Specification QQ-S-571c, Type Sn60WARP2 or equivalent. Use only enough solder to insure a sound connection. When soldering transistor leads, use a very light soldering iron and only enough heat to make the solder flow. In addition, hold the connection with a pair of long-nose pliers while soldering. The pliers will act as a heat sink and dissipate the excessive heat from the transistor body.

The replacement of worn or defective mechanical parts requires disassembly of the equipment as far as necessary to gain access to parts. Replace the part with the correct replacement part listed in Repair Parts List SL4-03315B.

CAUTION

Do not replace any special hardware identified by black markings with anything except the special hardware replacement part. Under no circumstances should this special hardware be replaced with similar standard hardware.

When replacing a worn cable or belt, the new cable or belt may be installed by joining it to the end of the old cable or belt and pulling the new cable or belt through.

The cables or belt may be joined by fusing (heat) or sewing their ends together. When replacing a broken cable or belt, follow the individual procedures in the subsequent paragraphs. Knot and fuse the ends of the replaced cables or belt into a ball to prevent fraying.

(1) ROTARY CABLE REPLACEMENT.

Step 1. Put the printer in letters A position by placing the number 1 and number 2 clutches in the mark position and the number 3, 4, and 5 clutches in the space position; leave all intelligence cam followers on the high portion of their respective cams.

CAUTION

In the next step, rapid unwinding of the rotary motion spring will seriously damage the spring. If the rotary motion spring retainer is released suddenly, remove the grip ring and the rotary motion spring retaining washer and verify that coils of the spring (figure 5-12, Appendix) have not been damaged.

Step 2. Hold the rotary motion spring retainer and loosen the print cylinder shaft bearing retainer screws (figure 5-12, Appendix). Allow the spring retainer to unwind slowly until tension of the spring is released.

ORIGINAL

Step 3. Place the printer on its back plate and turn the rotary cable adjustment screw (figure 5-13, Appendix) until the rotary cable adjustment bracket reaches the center of its travel. See figure 5-14 (Appendix).

Step 4. Cut a length of cable (or use replacement cable of exact length) approximately 15 inches long and knot one end tightly; fuse the end of the cable (figure 5-14, Appendix).

Step 5. Thread the end of the cable upward through the hole in the rotary cable adjustment bracket (figure 5-14, Appendix).

Step 6. Thread the free end of the cable over the top of the letter-figures pulley (figure 5-13, Appendix) under the next idler pulley, over and around the pulley on the rotary strip, through the hole in the right side frame, under the idler pulley, up and over the upper idler pulley, and then under and over the front of the index wheel.

Step 7. Check that the function cam follower is in the low position and then offset the index wheel counterclockwise two positions (figure 5-14, Appendix).

Step 8. Thread the cable through the hole in the index wheel and tie a tight knot in the loose end so that the knot is approximately 1/4 inch from the index wheel; fuse the end of the cable.

Step 9. Rotate the main shaft so that the function cam is in the stop position.

Step 10. Turn the rotary motion spring retainer four turns counterclockwise and clamp tightly.

Step 11. Turn the rotary cable adjustment screw until the dot on the index wheel opposes the rotary detent pawl pin.

Step 12. Perform all print cylinder positioning adjustments contained in paragraph 5-5 au(7).

(2) RETURN CABLE REPLACEMENT.

NOTE

If the takeup drum has been removed for any reason during maintenance procedures, insure that it has been properly installed and preloaded as instructed in paragraph 5-5af.

Step 1. Depress carriage return lever (4, figure 5-4, Appendix), disengaging check pawl (17); if necessary, manually rotate the advance drum clockwise to the full limit of its travel.

NOTE

Upon completion of step 1, both the takeup and advance drums should be at their clockwise limits of travel. This positions the print hammer and print cylinder at the left-hand margin.

Step 2. Cut a length of cable (or use replacement cable of exact length) approximately 31 inches long and knot one end.

Step 3. See figure 5-15 (Appendix). Hook the knotted end of the cable in the slot at the top inner groove of the takeup drum and thread the cable through the upper pulley at the top left front corner of the printer.

Step 4. See figure 5-16 (Appendix). Pull the cable across the front of the printer; thread over the pulley on the right front side and then to the inner groove of the advance drum.

Step 5. Wind the cable one turn clockwise around the advance drum and then thread it through the slot in the advance drum.

Step 6. Pull the cable across the groove in the adjacent guide drum and lightly clamp it under the upper left clamp, leaving several inches of loose cable. Knot and fuse the end of the cable.

Step 7. Perform all print cylinder positioning and carriage return adjustments contained in paragraph 5-5au(7).

(3) PRINT HAMMER CABLE REPLACEMENT.

Step 1. Depress carriage return lever (4, figure 5-4, Appendix), disengaging check pawl (17); if necessary manually rotate the advance drum clockwise to the limit of its travel.

NOTE

This positions the mechanism as it would be at the beginning of a line.

Step 2. Cut a length of cable (or use exact length replacement cable) approximately 31 inches long and knot one end; fuse the end of the cable.

Step 3. See Figure 5-17 (Appendix). Hook the knotted end of the print hammer cable in the slot in the outer groove on the takeup drum.

Step 4. Wind the cable one turn counterclockwise around the takeup drum, off the bottom of the drum, and through the pulley at the lower left-hand corner of the printer.

Step 5. Thread the cable through the clearance hole adjacent to the pulley; draw it across the front of the printer and through the clearance hole in the right front side of the frame.

Step 6. See figure 5-18 (Appendix). Thread the cable around the pulley just outside the clearance hole and directly into the slot in the bottom outer groove of the advance drum.

Step 7. String the cable under the clamp and secure the clamp.

Step 8. Allow several inches of cable to remain loose until all the necessary adjustments have been completed. Knot and fuse the end of the cable.

Step 9. Perform print hammer adjustments contained in paragraph 5-5au(7)(a).

(4) LATERAL CONTROL BELT REPLACEMENT.

NOTE

The lateral control belt may be replaced by fusing the new belt to the old belt extending from the right side of the printer. The new belt may then be drawn through the printer pulley and slide system by gradually pulling on the old lateral control belt from the left-hand side of the printer. Observe that the belt follows the pulley system correctly and has the required twists and one complete turn around the takeup drum.

Step 1. Depress carriage return lever (4, figure 5-4, Appendix), disengaging check pawl (17); if necessary, manually rotate the advance drum clockwise to the limit of its travel.

NOTE

This positions the mechanism as it would be at the beginning of a line.

Step 2. Cut a length of belt (or use exact length replacement belt) approximately 38 inches long and knot one end; fuse the end of the belt.

Step 3. See figure 5-19 (Appendix). Slip the knotted end of the belt under the lateral control belt clamp. Secure the belt clamp and thread the belt through the hole and up through slot at top center groove of the takeup drum; wind belt one full turn counterclockwise.

Step 4. See figure 5-19 (Appendix). Pass the belt under the bottom and around the top of the belt pulley and then to the pulley located on the top left corner of the printer, being careful to twist the belt one-quarter turn counterclockwise as shown.

Step 5. Pull the belt across the front of the printer to the top pulley on the right side.

Step 6. Thread the belt over the top and down to the pulley just under the top pulley; then bring the belt under the bottom pulley and toward the center of the machine.

Step 7. Thread the belt over and around the pulley on the lateral control function slide.

Step 8. See figure 5-19 (Appendix). Twist the belt one-quarter turn clockwise. Pass the belt through the hole in the frame and then around the pulley on the right side frame just outside of the hole.

Step 9. Twist the belt one-quarter turn clockwise. Pull the belt moderately tight and then slip the belt through the slot in the advance drum; twist the belt one-quarter turn clockwise and slip it under the lateral control belt clamp on the advance drum.

Step 10. Secure the belt in the clamp.

NOTE

Allow the excess belt to hang free until it is determined that none will have to be used; then knot and fuse the end of the belt.

Step 11. Perform all print cylinder and hammer adjustments contained in paragraph 5-5au(7).

(5) MASTER PULSING CONTACT ASSEMBLY REPLACEMENT.

NOTE

Six-leaf master pulsing contact assemblies may be identified by reddish-brown glyptol spot on end of mounting screw.

Step 1. Remove keyboard assembly from electrical chassis (paragraph 5-5b(4)).

Step 2. Loosen both upper and lower spring leaf adjustment setscrews (CD18, figure 5-40, Appendix) approximately four or five turns using the insulated 1/16-inch internal-hex wrench supplied in Tool Kit TK-122/U.

Step 3. Loosen master pulsing cam follower screw (AA12A).

Step 4. Swing keyboard contact actuator (Z) 90 degrees in a clockwise direction as observed from bottom of keyboard.

Step 5. Loosen and remove two screws (CE) and lock washers (CF).

Step 6. Pull master pulsing contact assembly (CD) out from bottom of keyboard and unsolder the three wires attached to the master pulsing contact assembly. It may be necessary to remove space bar safety guard cover (AG) to permit access to yellow wire to provide slack. Slack is available on all three wires by pulling gently through lacing or plastic tubing, whichever is provided.

Step 7. Solder the three wires to new master pulsing contact assembly (CD): green to top master pulsing contact adjustment screw bracket (CD8) near screw head; yellow to both upper and lower leaf contact assemblies (CE12 and CD13); red to lower master pulsing contact adjustment screw bracket (CD17).

Step 8. Slide master pulsing contact assembly (CD) up into place on keyboard frame and secure loosely with screws (CE) and lock washers (CF). The slack on all three wires must be taken up to reposition master pulsing contact assembly (CD). Reverse the procedure used in step 6.

Step 9. Replace space bar safety guard cover (AG).

Step 10. Swing keyboard contact actuator (Z) back into position between upper and lower leaf contact assemblies (CD12 and CD13). Tighten master pulsing cam follower screw (AA12a). When spreading upper and lower leaf contact assemblies (CD12 and CD13), do not bend contacts excessively.

Step 11. Place a shim (0.010 inch for six-leaf master pulsing contact assembly (CD) or 0.005 inch for two-leaf master pulsing contact assembly (CD)) under master pulsing cam follower (AA12) while on the low of the cam; move the master pulsing contact assembly until keyboard contact actuator (Z) is centered between upper and lower leaf contact assemblies (CD12 and CD13); tighten screws (CE) and lock washers (CF).

Step 12. Adjust master pulsing contacts in accordance with keyboard adjustments in paragraphs 5-5ba and 5-5bb. Use the insulated 1/16-inch internal-hex wrench supplied in Tool Kit TK-122/U.

d. **DISASSEMBLY PROCEDURES.** - Perform the following removal and disassembly procedures in the exact sequence indicated. Use extreme care not to damage any removed parts; do not disturb adjacent parts or adjustments. Carefully place disassembled parts on a clean dry surface in their approximate relative position to facilitate reassembly. The figure and index references used in the procedures refer to parts location illustrations in other parts of this section or in the Appendix.

e. **DISASSEMBLY OF PRINTER INTO THREE MAIN SUBASSEMBLIES.**

Step 1. Remove paper guide (A2, figure 5-32, Appendix) by pulling up and back.

Step 2. Remove ribbon from ribbon vibrator guides (D8 and D9) on the front plate of the printer.

Step 3. Detach the secondary number 3 cam follower spring from secondary number 3 cam follower (18, figure 5-6, Appendix) and ribbon feed mechanism or (on AN/TGC-14A(V)) from its post on the frame.

Step 4. Remove five mounting screws (AN/TGC-14(V) only) that secure ribbon feed top plate assembly (30, figure 5-1, Appendix) and the bounce prevent bracket to the printer frame; place ribbon feed top plate on a clean surface. For AN/TGC-14A(V), remove ribbon feed top plate by moving lock clips (9) to

the right and lift the ribbon feed top plate assembly away from ribbon feed base spring clips (T and U, figure 5-30, Appendix).

Step 5. On AN/TGC-14(V) only, remove guide covers (R and S, figure 5-31, Appendix).

Step 6. Position printer on its back plate, loosen three frame clamp screws (25, figure 5-5, Appendix) and three frame clamp screws (19, figure 5-6, Appendix); then disengage the three frame clamps on top of the printer and the three frame clamps on the bottom.

Step 7. Remove retaining ring (C2, figure 5-35, Appendix) from print spring yoke pivot stud (C1) and remove stud from print spring arm (C3).

Step 8. Remove retaining ring (AF2, figure 5-36, Appendix) from function spring yoke pivot stud (AF1) and remove the stud from function level (AF6b).

NOTE

Insure that the main shaft remains in the rear half of the printer while lifting off the front half.

Step 9. Carefully grasp front half of printer and lift it away from rear half.

NOTE

For AN/TGC-14(V), proceed to step 12; for AN/TGC-14A(V), continue with step 10.

Step 10. Remove time delay check pawl helical spring (A, figure 5-20, Appendix) and time delay feed pawl helical spring (B).

Step 11. Remove two screws (AC) and two lock washers (E) from printer helical gear (B, figure 5-21, Appendix), freeing feed mechanism and motor stop assembly (C, figure 5-20, Appendix).

Step 12. Grasp main shaft by its ends and lift it out of rear frame.

(1) **MAIN SHAFT DISASSEMBLY.**

Step 1. Separate the two halves of the main shaft at the center bearing.

Step 2. Remove retaining ring (A, figure 5-21, Appendix) from selector main shaft (T).

Step 3. Slide printer helical gear (B) off selector main shaft (T), being careful not to lose woodruff key (C).

NOTE

If the key does not come off the shaft when the gear is removed, push it out.

Step 4. Slide start clutch release retainer assembly (D) off the main shaft.

Step 5. Unhook start clutch backstop lever spring (D1) from range adjustment assembly (D5) and start clutch backstop lever (D4e).

Step 6. Remove retaining ring (D3); slide start clutch release latch (D2) and felt washer (U) off the pin on which they are mounted.

Step 7. Slide start clutch backstop lever assembly (D4) off the pin on which it is mounted.

Step 8. Loosen clamp screw (D4b) and slide clamp (D4a) off start clutch backstop lever (D4e).

Step 9. Remove start clutch backstop eccentric bushing (D4f) from start clutch backstop lever (D4e).

Step 10. Remove lock nut (D4c) and start clutch release adjustment setscrew (D4d) from start clutch backstop lever (D4e) by turning counterclockwise.

Step 11. Slide left-hand bearing (E) out of left-hand bearing retainer (F) by pressing out with fingers.

Step 12. Disassemble the remainder of the selector main shaft by removing the parts in the sequence established in figure 5-21 (Appendix).

CAUTION

Use extreme caution removing items (R) from clutches (G, H, J, K, L, and M) as each item consists of 28 rollers which can be easily lost.

Step 13. Remove center bearing retainer (A, figure 5-22, Appendix) and center bearing (B) from function main shaft (S).

Step 14. Remove center bearing (B) from center bearing retainer (A) by pushing it out with fingers.

Step 15. Remove items (C) through (M) from function main shaft (S) in the sequence shown in figure 5-22 (Appendix).

CAUTION

Use extreme care when removing items (F) from clutches (G, J, K, and M) as each item consists of 28 rollers which can be easily lost.

Step 16. Remove right-hand bearing (P) and right-hand bearing retainer (N) from function main shaft (S) and disassemble as instructed in step 14.

Step 17. Slide third reduction gear (Q) off function main shaft (S); remove third reduction gear key (R) from the shaft.

(2) REAR HALF DISASSEMBLY.

(a) AUTOMATIC TIME DELAY MOTOR STOP DISASSEMBLY.

NOTE

This procedure applies to AN/TGC-14A(V) only.

Step 1. Remove screw (J, figure 5-20, Appendix), lock washer (E), and timing cam shaft extension (H) from timing cam shaft assembly (AF, figure 5-29, Appendix).

Step 2. Remove time delay switch probe (M, figure 5-20, Appendix) from the selector connectors.

NOTE

In the following step, four sleeve spacers (F) and time delay feed and check pawl guide (G) will fall free when screw (D) and lock washer (E) are removed.

Step 3. Remove time delay mounting base plate assembly (X) and associated parts from rear frame by removing four screws (D) and four lock washers (E).

Step 4. Remove lock nut (K10), lock washer (K11), and ratchet support shaft lock (K12) from ratchet support shaft (K9).

Step 5. Remove ring (K2), sleeve (K3), one shim (K4), time delay latch (K1), and another shim (K4) from ratchet support shaft (K9).

Step 6. Slowly remove ratchet support shaft (K9) from time delay yoke (K8), picking off advance ratchet (K6), return spiral spring (K5), and reduction ratchet (K7) as the shaft is removed from the yoke.

Step 7. Remove return spiral spring (K5) from recess in advance ratchet (K6).

Step 8. Remove retaining ring (C1) and felt washer (C2) from main shaft drive adapter assembly (C7).

Step 9. Remove retaining ring (C3), time delay check pawl (C4), sleeve spacer (C5), and time delay feed pawl (C6) from main shaft drive adapter assembly (C7).

Step 10. Remove retaining ring (K14) and detent spring assembly (K13) from time delay mounting base plate assembly (X).

Step 11. Remove retaining ring (K13c) from detent spring pin (K13b), freeing detent spring roller (K13a).

Step 12. Loosen and remove screws (P) and washers (Q) from nut plate (AB), freeing spacer (R), time delay switch actuator (L), and time delay switch (N).

Step 13. Remove time delay secondary check pawl spring (S), screw (V), time delay secondary check pawl eccentric (U), time delay secondary check pawl (T), and spacer (W).

Step 14. Remove nut (Z), lock washer (AA), and post (Y).

(b) BACK PLATE REMOVAL AND DISASSEMBLY.

Step 1. Loosen and remove two screws, lock washers, and washers (B, C, and D, figure 5-23, Appendix).

Step 2. Loosen the six back plate clamp retaining screws and slide back plate (A3, figure 5-30, Appendix) to the left and then back to the right; remove the back plate.

(c) MOTOR, MOUNTING PLATE, AND FAN OUTLET DUCT REMOVAL.

Step 1. Remove lock nut (A1, figure 5-28, Appendix) from speed change gear (E); loosen idler gear lock nut (H1) and push idler gear assembly toward the bottom of the printer; slide speed change gear (E) off first reduction gear (A7).

Step 2. Remove three screws (B), lock washers (C), and washers (D); slide motor mounting plate (A8) and motor assembly out of rear frame.

Step 3. Remove three screws (E, figure 5-24, Appendix or D, figure 5-25, Appendix) and three lock washers (F, figure 5-24, Appendix or E, figure 5-25, Appendix); remove the motor mounting plate from the motor.

Step 4. Remove two screws (A, figure 5-23, Appendix) from cooling housing (F) and slide the motor out of the housing.

CAUTION

Do not remove the gear head and drive pinion on the 400-cycle motor. Gear tolerances are such that all repairs must be made at the factory.

Step 5. On the 400-cycle motor only, slide motor cover (D, figure 5-24, Appendix) off motor and gear head assembly (C).

Step 6. Loosen motor fan setscrew (A) and slide motor fan (B) off motor shaft.

Step 7. Disassemble the 60-cycle motor by following the index sequence established in figure 5-25 (Appendix).

(d) **SELECTOR REMOVAL AND DISASSEMBLY.** - Remove the printer back plate (paragraph 5-5e(2)(b), step 2) prior to removing the selector. For AN/TGC-14(V), remove the two figures H motor stop probes (insert, figure 5-30, Appendix) and proceed as follows:

Step 1. Loosen screws (AA1, figure 5-26, Appendix) in lock bar (AA3).

Step 2. Slide lock bar (AA3) to the left to pull out the right side of the bar and then to the right to pull out the left side of the bar.

CAUTION

In the next step, insure that none of the armature mark and space paddle latches (V and W) catch on the clutch release arms.

Step 3. Grasp the selector assembly and pull toward the back of the printer.

Step 4. Remove selector shaft bias springs (Q) from the selector assembly.

Step 5. Remove nuts (J) from selector tie rod studs (AF).

Step 6. Remove outer frame plate spacers (K) and inner frame plate spacers (AC).

CAUTION

In the next step, be careful not to drop armature (P), armature shaft spacers (N), lubricating wick non-metallic washers (L), and lubricating wick retainers (M) when removing left-hand outer frame plate (H3).

Step 7. Remove screw (C), lock washer (D), and cable strain relief bracket (B); pull left-hand outer frame plate (H3) off selector mark shafts (Y) and selector space shafts (Z).

CAUTION

Armature magnets and their respective armatures are matched at the factory and should be assembled accordingly. The left and right inner frames are not interchangeable and should be assembled in their original positions. In the next step, be careful not to drop armature (P), armature shaft spacers (N), lubricating wick non-metallic washers (L), and lubricating wick retainers (M) when removing right-hand outer frame plate (AG3).

Step 8. Remove screw (C) and lock washer (D); pull right-hand outer frame plate (AG3) off selector mark shafts (Y) and selector space shafts (Z).

Step 9. Remove selector mark shafts (Y) and selector space shafts (Z) from the selector assembly.

Step 10. Remove screws (S), lock washers (T), and latches (R) from selector mark shafts (Y) and selector space shafts (Z).

Step 11. Remove screws (S), lock washers (T), and selector shaft bias spring arms (U) from selector mark shafts (Y) and selector space shafts (Z).

Step 12. Remove screws (S), lock washers (T), armature mark paddle latches (V), and armature space paddle latches (W) from selector mark shafts (Y) and selector space shafts (Z).

Step 13. Remove selector magnet assemblies (E) by removing screws (C) and lock washers (D).

Step 14. Pull selector magnets off right-hand inner plate (AE2) and left-hand inner plate (AB4b).

For AN/TGC-14A(V) removal and disassembly of selector, proceed as follows (Serial 3706 and higher):

Step 1. Loosen screws (M1, figure 5-27, Appendix) in lock bar (M3).

Step 2. Slide lock bar (M3) to the left to pull out the right side of the bar and then to the right to pull out the left side of the bar.

CAUTION

Insure that none of the armature mark and space paddle latch portions of selector mark and space latch shafts (J and K) catch on the clutch release arms.

Step 3. Grasp the selector assembly and pull toward the back of the printer.

Step 4. Remove selector shaft bias springs (L) from the selector assembly.

Step 5. Remove nuts (F) and terminal plate assembly (E) from selector tie rod studs (N).

Step 6. Remove outer frame plate spacers (P) and inner frame plate spacers (Q).

Step 7. Remove screw (C), lock washer (D), and cable strain relief bracket (B); pull left-hand magnet frame assembly (G) away from selector mark latch shafts (J) and selector space latch shafts (K).

Step 8. Remove selector mark latch shafts (J) and selector space latch shafts (K) from right-hand magnet frame assembly (H).

(e) **GEAR TRAIN AND AUTOMATIC CARRIAGE RETURN AND LINE FEED ASSEMBLY REMOVAL.** - Refer to figure 5-28 (Appendix) and proceed as follows:

NOTE

Lock nut (A1) and speed change gear (E) must be removed prior to motor removal.

Step 1. Remove pin (A5) from first reduction gear (A7).

Step 2. Remove three screws (A3) and lock washers (A4) from motor mounting plate (A8).

Step 3. Remove bearing cup (A2) from motor mounting plate (A8).

Step 4. Remove first reduction gear (A7) from motor mounting plate (A8).

Step 5. Press bearings (A6) out of motor mounting plate (A8) and bearing cup (A2).

Step 6. Remove idler gear lock nut (H1) and slide idler gear stud (H7) out of idler gear arm assembly (H8).

Step 7. Remove ring (H2) and idler gear (H6) from idler gear arm assembly (H8).

Step 8. Pull idler gear bearing (H3), spacer (H4), and ring (H5) out of the shouldered side of idler gear (H6); press remaining idler gear bearing (H3) out of idler gear (H6).

Step 9. Remove four retaining rings (J1) from V lever shaft (J4).

Step 10. Loosen lock lever actuator arm screw (K1) and automatic carriage return and line feed actuator arm screw (L1).

NOTE

The parts on the V lever shaft are loose and will fall out of the printer when the V lever shaft is removed.

Step 11. Remove lock lever actuator arm helical spring (M) and automatic carriage return and line feed bail actuator helical spring (N); then slide V lever shaft (J4) out of the printer frame.

Step 12. Support third reduction pinion (F1), using a suitable fixture or block, and carefully press pin (F2) out of third reduction pinion (F1).

NOTE

Idler gear arm assembly (H8) is loose when ring (G) is removed.

Step 13. Slide third reduction pinion (F1) off the shaft on second reduction gear (F6). Slide second reduction gear (F6) out of bearing (F3), rings (F4) and (G), and spacer (F5).

(f) MARK (U) AND SPACE (AE) CLUTCH RELEASE SELECTOR SHAFT, TIMING CAM SHAFT, AND BACKSTOP SHAFT REMOVAL.

Step 1. Remove six inter-arm springs (F, figure 5-29, Appendix).

Step 2. Remove print and function clutch release arm spring (Y).

Step 3. Remove eight retaining rings (H) from mark clutch release selector shaft (U) and ten retaining rings (H) from space clutch release selector shaft (AE).

Step 4. Remove line feed pawl spring (G).

Step 5. Remove function timing cam wick (X) and timing cam wick (AD).

NOTE

If the mark and space shafts referred to in step 6 have a tapped hole in their left end, insert a 6-32 screw to aid in removing the shafts.

Step 6. Slowly pull mark clutch release selector shaft (U) to the left and pick off each part as it falls off the shaft; repeat this procedure for space clutch release selector shaft (AE).

NOTE

If the space shaft is tight, loosen line feed cam follower arm clamping screw (V2).

Step 7. Remove retaining ring (P4) and safety spring (P3); slide mark clutch release finger (P5) off mark clutch release arm assembly (P6); remove clutch release finger adjustment screw (P1) and lock nut (P2) from mark clutch release arm assembly (P6).

Step 8. Disassemble the remainder of the clutch release assemblies in the manner described in step 7.

Step 9. Loosen line feed cam follower arm clamping screw (V2) and slide line feed cam follower arm (V1) off line feed torque tube arm assembly (V3).

Step 10. Remove retaining ring (V3b) and slide roller (V3a) off line feed torque tube actuator (V3c).

NOTE

In the next step do not remove screw (M8) unless absolutely necessary; this is a factory-set adjustment.

Step 11. Remove screws (M2 and M5), washers (M3 and M6), screw (M8), and nuts (M7 and M9); then remove bell prevent lever (M1) from letters figures pulley carriage actuator and cam follower (M4).

Step 12. Remove retaining ring (J) and slide line feed pawl (L) off line feed motion amplify link (K).

Step 13. Remove two retaining rings (C) from backstop shaft (D).

Step 14. Unfasten clutch backstop springs (A) from clutch backstop lever (B4).

Step 15. Slowly pull backstop shaft (D) to the left and pick off each part as it falls off the shaft.

Step 16. Loosen clamp screw (B3) and slide clamp (B2) off clutch backstop lever (B4).

Step 17. Push clutch backstop eccentric bushing (B1) out of clutch backstop lever (B4).

Step 18. Remove three screws and three lock washers (N and V, figure 5-30, Appendix) from bearing retainer (AF12, figure 5-29, Appendix).

Step 19. Remove timing cam shaft assembly (items AF1 through AF14) by pulling to the left.

Step 20. Remove bearing retainer (AF12) and bearing (AF13) from timing cam shaft (AF14).

Step 21. Push bearing (AF13) out of bearing retainer (AF12).

Step 22. Remove retaining ring (AF11) and pull timing cam shaft gear (AF10) off timing cam shaft (AF14).

Step 23. Remove key (AF3) and spacer (AF9) from timing cam shaft (AF14).

Step 24. Remove timing cams (AF7) and keys (AF3).

Step 25. Remove bowed retaining ring (AF1) and pull function clutch release cam (AF2) off timing cam shaft (AF14).

Step 26. Remove key (AF3) and slide spacer (AF4) and bearing (AF5) off timing cam shaft (AF14); remove ring (AF6).

(g) REAR FRAME DISASSEMBLY.

Step 1. Remove print and function helical spring yoke link assemblies (K, figure 5-30, Appendix) from function helical spring (H) and print helical spring (J) by twisting links off springs counterclockwise.

Step 2. Remove function and print helical springs (H and J) from their mounting brackets by twisting them counterclockwise.

Step 3. See insert on figure 5-30, Appendix. Remove two screws (AN/TGC-14(V) only) and cable clamps; remove wires to the selector and then remove switch plate assembly.

NOTE

The switch plate assembly (AN/TGC-14(V) only) is comprised of all items shown in insert on figure 5-30 (Appendix).

Step 4. Disassemble the switch plate assembly (AN/TGC-14(V) only) by removing screws and washers. See insert on figure 5-30 (Appendix).

Step 5. Remove two screws (C) and advance prevent stop spring (B).

Step 6. Loosen screw (G2) and washer (G3); remove backstop spring clip (G1).

Step 7. Remove screws (R), blocks (S), and ribbon feed base spring clips (T and U).

Step 8. Remove screw (D1) and lock washer (D7); remove change gear post (D6) from the frame.

CAUTION

When pin (D3) is removed, change gear post (D6), detent ball (D4), detent helical spring (D5), and lock arm (D2) are free.

Step 9. Press pin (D3) out of change gear post (D6).

Step 10. Remove screw (M2), lock washer (M3), and start cam lubricating wick assembly (M1) from rear frame (P).

Step 11. Remove three retaining rings (L5) and one retaining ring (Q5); remove frame clamp stud pivots (L4 and Q4) from frame clamps (L3 and Q3).

Step 12. Remove frame clamp screws (L2 and Q2) and frame clamp pads (L1 and Q1) from frame clamps (L3 and Q3).

(3) FRONT FRAME DISASSEMBLY.

(a) TAKEUP DRUM AND LINKAGE DISASSEMBLY.

Step 1. Remove two screws (P, figure 5-31, Appendix) and two screws (AT).

Step 2. Hold takeup drum (E1, figure 5-35, Appendix) and loosen the return and print hammer cables by sliding the knots out of their respective slots; loosen the lateral control belt by removing screw (38), lock washer (39), and lateral control belt clamp (37) on the takeup drum. Release the carriage return spiral spring tension by allowing the takeup drum to slowly rotate.

Step 3. Remove the lateral control belt and print hammer and return cables.

Step 4. Pull takeup drum bracket assembly (E36) to the left to disengage it from the front frame.

Step 5. Remove two retaining rings (E13) and two flat washers (E14) from takeup arm (E18).

Step 6. Slide lateral tension helical spring (E12) from takeup arm (E18) and takeup drum bracket assembly (E36).

CAUTION

All pulley bearings are pressed into the pulleys at the factory and should not be pressed out.

Step 7. Remove ring (E19), flat washer (E20), and takeup arm (E18) from takeup drum bracket assembly (E36).

Step 8. Remove grip ring (E16) and spacer (E17); slide belt pulley bearing (E15b) and belt pulley (E15a) off takeup arm (E18).

Step 9. For AN/TGC-14(V), unscrew range pinion lock knob (insert, figure 5-35, Appendix) by turning counterclockwise. Press range pinion dial pin out of range pinion and remove range pinion dial, spacer, and range finder lock helical spring (E26) from range pinion. Remove range pinion from the takeup drum bracket assembly.

Step 10. For AN/TGC-14A(V), press groove pin (E24) out of range finder knob (E27) and remove conical range finder slide lock (E25) and range finder lock helical spring (E26); remove range finder knob (E27) from range dial (E23); then remove range dial (E23) from takeup drum bracket assembly (E36).

Step 11. Remove two screws (E29) to remove left-hand belt pulley bracket (E28e) from takeup drum bracket assembly (E36).

Step 12. Remove ring (E28b), spacer (E28c), belt pulley bearing (E28a1), belt pulley (E28a2), and spacer (E28d) from left-hand belt pulley bracket (E28e).

Step 13. Remove ring (E31), spacer (E32), cable pulley bearing (E30a), cable pulley (E30b), and spacer (E32) from takeup drum bracket assembly (E36).

Step 14. Remove nut (E10) and lock washer (E11); grasp takeup drum (E1) and pull to the left.

NOTE

In the next step, insure that carriage return spring holder (E7) remains close to takeup drum (E1) to prevent carriage return spiral spring (E6) from jumping out.

Step 15. Slide carriage return spring mounting cup (E9) off takeup drum shaft (E8).

Step 16. Remove retaining ring (E2) and pull takeup drum (E1) off takeup drum shaft (E8).

Step 17. Carefully remove carriage return spring holder (E7) and carriage return spiral spring (E6) from takeup drum (E1).

NOTE

Ring (E5) prevents bearings (E3) from being pushed out. Each bearing must be pushed from the center outward.

Step 18. Push bearings (E3) out of takeup drum (E1) and catch spacer (E4).

Step 19. Remove ring (E5) from takeup drum (E1).

Step 20. For AN/TGC-14A(V) only, remove two screws (E34) and two flat washers (E33) to remove range finder lock lever assembly (E35).

NOTE

In the next step, range finder lock lever (E35c) and range finder lock lever spring (E35d) will fall free as range finder lock lever shaft (E35a) is removed.

Step 21. Remove retaining ring (E35b) and pull range finder lock lever shaft (E35a) from range finder lock lever bracket (E35e).

(b) RIBBON FEED FRONT PLATE REMOVAL AND DISASSEMBLY.

Step 1. Disengage left-hand and right-hand ribbon vibrator guide assemblies (D8 and D9, figure 5-32, Appendix) from left-hand and right-hand vibrator arms (C22 and C6, figure 5-33, Appendix).

Step 2. Remove two screws (F, figure 5-31, Appendix) and remove ribbon feed front plate assembly (D, figure 5-32, Appendix).

Step 3. Remove screw (D4), lock washer (D12), and bell (D11).

Step 4. Remove retaining rings (D2) and slide ribbon guide rollers (D1) off left-hand and right-hand ribbon guide brackets (D3 and D10).

Step 5. Remove screws (D4) and flat washers (D5) to remove left-hand and right-hand ribbon guide brackets (D3) and D10).

Step 6. For AN/TGC-14(V), remove retaining rings (D7) and felt washers (D14); pull ribbon vibrator pivot shaft (D6) out to remove left-hand and right-hand ribbon vibrator guide assemblies (D8 and D9). For AN/TGC-14A(V), remove two spring clips freeing left-hand and right-hand ribbon vibrator guide assemblies (D8 and D9). See insert on figure 5-32 (Appendix).

Step 7. Remove retaining ring (D20) from the post on front plate assembly (D13), freeing end of line bell lever assembly (D19) and wire link (D18).

Step 8. Remove end of line bell bracket assembly (D17) from front plate assembly (D13) by removing screws (D16).

Step 9. Remove retaining ring (D17a), end of line bell lever (D17d), and torsion spring (D17c) from end of line bracket and shaft assembly (D17b).

(c) PRINT HAMMER SHAFT REMOVAL AND DISASSEMBLY.

Step 1. Remove four screws (C2, figure 5-33, Appendix) and four lock washers (C3).

Step 2. Unfasten print hammer actuator link helical spring (C19) from print hammer actuator link (C20).

Step 3. Remove print hammer return spring (C4) from pin on lower portion of print hammer shaft stop (C5a).

Step 4. Disengage print hammer cable from print hammer cable clamp (C15) by loosening print hammer cable clamp screw (C16).

Step 5. Lift print hammer shaft assembly (C) out of front frame.

Step 6. Slide left-hand and right-hand bearings (C18 and C1) and felt washers (C24) off print hammer shaft (C23).

Step 7. Remove grip ring (C21e), felt washer (C21d), and retaining ring (C21a); slide print hammer actuator link (C20) off print hammer actuator link lever (C21b).

Step 8. Loosen screw (C21c) and slide print hammer actuator link lever (C21b) off print hammer shaft (C23).

Step 9. Loosen screw (C5b) and slide print hammer shaft stop (C5a) off print hammer shaft (C23).

Step 10. Loosen screws (C7), lock nuts (C10), washers (C8), and lock washers (C9) from left-hand and right-hand vibrator arms (C22 and C6).

Step 11. Slide left-hand and right-hand vibrator arms (C22 and C6) off print hammer shaft (C23).

Step 12. Remove print hammer cable clamp screw (C16), lock washer (C3), and print hammer cable clamp (C15) from print hammer (C17).

Step 13. Remove three screws (C12) and three lock washers (C3) to remove print hammer cap (C11) from print hammer (C17).

Step 14. Remove print hammer (C17) from print hammer shaft (C23).

Step 15. Remove print hammer face pad clamp screw (C14) and print hammer face pad (C13) from print hammer (C17).

(d) PRINT CYLINDER YOKE SHAFT REMOVAL AND DISASSEMBLY.

Step 1. Remove retaining ring (A1, figure 5-33, Appendix) from print cylinder yoke shaft (A7).

Step 2. Slide print cylinder yoke shaft (A7) out of the front frame.

NOTE

It is necessary to remove the print cylinder yoke shaft prior to print cylinder shaft removal. However, the lateral control belt does not have to be removed from the print cylinder yoke.

Step 3. Remove lateral control belt from print cylinder yoke (A6b) by loosening screw (A4) and nylon lockstrip (A5).

Step 4. Remove belt clamp wedge (A2) and belt clamp (A3), thus freeing lateral control belt.

NOTE

Bushings (A6a) are close tolerance, press fit bushings and should not be replaced unless absolutely necessary.

(e) PRINT CYLINDER SHAFT REMOVAL AND DISASSEMBLY.

NOTE

If the print cylinder shaft is to be removed temporarily, allow the rotary cable to remain attached to the index wheel and allow the index wheel to hang on the side of the printer.

Step 1. Remove rotary cable from index wheel (B3, figure 5-33, Appendix).

Step 2. Remove screw (B8) and lock washer (B9) from right-hand bearing retainer (B7).

CAUTION

When performing step 3, the rotary motion spring will become loosened and may become damaged if not released slowly. See paragraph 5-5c(1).

Step 3. Remove two screws (B20) and two lock washers (B21) from left-hand bearing retainer (B18) while holding rotary motion spring retainer (B16) and allowing the spring to unwind slowly.

Step 4. Lift print cylinder shaft assembly (B) from the front frame.

Step 5. Loosen and remove special nut (B1) and sleeve spacer (B2).

NOTE

If the next step, do not lose machine key (B4) when removing index wheel (B3).

Step 6. Slide index wheel (B3) off print cylinder shaft (B23).

Step 7. Remove machine key (B4) if not already done.

Step 8. Remove sleeve spacer (B5), right-hand bearing retainer (B7), and bearing (B6).

Step 9. Push bearing (B6) out of right-hand bearing retainer (B7).

Step 10. Slide washer (B22) and print cylinder (B10) off print cylinder shaft (B23).

Step 11. Remove grip ring (B11), rotary motion spring retaining washer (B12), rotary motion spring retaining nylon washer (B13), and rotary motion spring retainer (B16) (containing rotary motion spring (B14) and rotary motion spring housing nylon washer (B15)) from print cylinder shaft (B23) by sliding them to the left.

Step 12. Slide bearing (B17), left-hand bearing retainer (B18), and threading flange (B19) to the left and off print cylinder shaft (B23).

(f) PAPER FEED REMOVAL AND DISASSEMBLY.

Step 1. Loosen screw (AA, figure 5-34, Appendix) and pull paper feed knob (Z) off paper feed rubber roll (AC).

Step 2. Remove two screws (N, figure 5-31, Appendix) and two paper guide retaining pins (Q); lift paper feed mechanism out of front frame.

Step 3. Remove two pressure roll springs (J, figure 5-34, Appendix).

Step 4. Remove four retaining rings (B) from paper feed pressure release shaft (A); remove paper pressure release lever spring (F) from paper pressure release lever (H) and paper feed pressure release shaft (A).

Step 5. Remove retaining ring (G2) and slide paper pressure release lever (H) off paper pressure release lever pivot clamp (G3).

Step 6. Loosen screw (G1) on paper pressure release lever pivot clamp (G3) and pressure release cam set-screws (C1); pull paper feed pressure release shaft (A) to the left, freeing pad springs (D), pressure pad (E), pressure release cams (C2), and paper pressure release lever pivot clamp (G3).

Step 7. Remove retaining rings (N) and pull pressure roll shaft (M) to the left, freeing pressure roll (P).

Step 8. Remove four retaining rings (L) and slide pressure roll pivot shaft (K) but to the right, freeing left-hand and right-hand pressure roll actuator arms (Q and R).

Step 9. Remove paper feed detent spring (S) from paper feed guide (AG) and paper feed detent arm (T3).

Step 10. Remove retaining rings (T2 and U) and slide detent roller (T1) off paper feed detent arm (T3).

Step 11. Slide paper feed detent arm (T3) off paper feed guide (AG).

Step 12. Remove screw (AA).

Step 13. Remove grip ring (AD), washer (AE), and ball bearing (AF) off the left side of paper feed rubber roll (AC).

Step 14. Press ratchet roll pin (W) out of paper feed rubber roll (AC) and slide paper feed detent and ratchet (V) off of paper feed rubber roll (AC).

Step 15. Remove lock washer (X) and ball bearing (Y) from paper feed rubber roll (AC).

Step 16. Lift out paper feed rubber roll (AC); on AN/TGC-14A(V) only, remove paper feed tooth sprockets (AB).

(g) PRINT LEVER SHAFT REMOVAL AND DISASSEMBLY.

Step 1. Loosen print prevent arm clamping screw (A2, figure 5-35, Appendix), print cam follower clamping screw (B2), and print spring arm clamping screw (C4).

NOTE

In the next step, print prevent arm (A1), print cam follower (B1); and print spring arm (C3) will fall free as print lever shaft assembly (D2) is removed.

Step 2. Remove two retaining rings (D1) and print lever shaft assembly (D2) by pulling to the left. Bearing (D2a) will have to be drilled or reamed if removal is necessary.

Step 3. Slide two felt washers (D3) off of print lever shaft (D2b).

(h) ADVANCE DRUM AND LINKAGE DISASSEMBLY.

Step 1. Remove bounce prevent lever spring (M, figure 5-36, Appendix).

Step 2. Loosen and remove three cable clamp screws (D5), lock washers (D6), and cable clamps (D4).

Step 3. Remove return cable (B), print hammer cable (C), and lateral control belt (BE) from advance drum (D7).

Step 4. Remove grip ring (D1) and pull advance drum (D7) off advance drum bracket (D10).

NOTE

Bearings (D2 and D9) must be removed by pushing outward from the center because of internal retaining ring (D8).

Step 5. Push bearings (D2 and D9) out of advance drum (D7), freeing spacer (D3).

Step 6. Remove internal retaining ring (D8) from advance drum (D7).

Step 7. Remove grip ring (A2), spacer (A3), rotary cable pulley (A4b), spacer (A3), and rotary cable pulley bearing (A4a) from rotary pulley shim (A5).

Step 8. Remove two screws (AB, figure 5-31, Appendix) freeing check pawl guide bracket (E, figure 5-36, Appendix).

Step 9. Pull advance drum bracket (D10) and rotary pulley shim (A5) from front frame.

Step 10. Press out dowel pins (A1) from rotary pulley shim (A5).

Step 11. Remove retaining ring (J), check pawl link (F), and spacer (G) from carriage return shaft assembly (L).

Step 12. Remove advance prevent lever spring (H) and character advance pawl spring (S).

Step 13. Remove retaining ring (X1), ring (Y), advance prevent lever (Q), and shim (R) from character advance lever shaft assembly (X4).

Step 14. Remove screw (U), character advance pawl eccentric bushing (V), and character advance pawl (T) from character advance lever shaft assembly (X4).

Step 15. Remove retaining rings (X2 and AK1) and slide index link (W) off character advance lever shaft assembly (X4) and rotary detent pawl actuator arm (AK2).

Step 16. Unhook check pawl spring (AQ) from check pawl (AT4) and advance suppression latch (AY).

Step 17. Remove screw (AR), check pawl eccentric bushing (AS), check pawl assembly (AT), spacer (AU), and felt washers (AV).

Step 18. Remove nut (AT3), lock washer (AT2), and check pawl eccentric stud (AT1) from check pawl (AT4).

Step 19. Unhook and remove rotary detent pawl spring (AM) from rotary detent pawl (AN3) and character advance lever shaft assembly (X4).

Step 20. Remove screw (AH), rotary detent pawl eccentric bushing (AJ), rotary detent pawl actuator arm (AK2), felt washer (AL), rotary detent pawl assembly (AN), and washer (AP) from front frame.

Step 21. Loosen nut (AN2) and remove rotary detent pawl adjustment screw (AN1) from rotary detent pawl (AN3).

Step 22. Remove felt strip clip (X5) and felt strip (X6) from character advance lever shaft assembly (X4).

Step 23. Remove screw (AW), advance suppression latch eccentric bushing (AX), advance suppression latch (AY), and felt washer (AZ) from advance suppression latch mounting stud (BA).

Step 24. Loosen and remove advance suppression latch mounting stud (BA) and screw (AF, figure 5-31, Appendix), freeing rotary cable pulley assembly (BC, figure 5-36, Appendix), lateral control belt pulley assembly (BF), and spacer bracket (BD).

Step 25. Remove grip ring (BC1), spacer (BC2), rotary cable pulley (BC3b), rotary cable pulley bearing (BC3a), and spacer (BC2) from rotary cable pulley shaft assembly (BC3c).

Step 26. Remove grip ring (BF1), spacer (BF2), lateral control belt pulley (BF3b), lateral control belt pulley bearing (BF3a), and spacer (BF4) from lateral control belt pulley bracket (BF5).

Step 27. Loosen code bar actuator clamp screw (AC2), lifter arm clamping screw (AD2), and function cam follower clamping screw (AG2).

Step 28. Remove screws (AP, figure 5-31, Appendix), lock washers (AQ), and print lever and character advance lever shaft support bracket assembly (AN).

NOTE

Function cam follower assembly (AG, figure 5-36, Appendix), function lever assembly (AF), lifter arm spring (AE), lifter arm assembly (AD), code bar actuator clamp assembly (AC), spacer (AB), ring (Z), and felt strip (X3) will be freed when character advance lever shaft assembly (X4) is removed in step 29.

Step 29. Slide character advance lever shaft assembly (X4) to the right and out of the front frame.

Step 30. Remove function cam follower clamping screw (AG2) from function cam follower (AG1).

Step 31. Remove two special screws (AF4), function bar (AF3), and compression springs (AF5) from function lever (AF6b).

Step 32. Remove retaining rings (K) from carriage return shaft assembly (L).

NOTE

Carriage return cam follower (P2), felt washer (BG), and bounce prevent lever assembly (N) will fall free when carriage return shaft assembly (L) is removed in step 33.

Step 33. Loosen carriage return cam follower clamping screw (P1) and slide carriage return shaft assembly (L) out of the front frame to the right.

Step 34. Remove carriage return cam follower clamping screw (P1) from carriage return cam follower (P2).

Step 35. Remove setscrew (N2) and slide clamp (N1) off bounce prevent lever (N4).

Step 36. Push bounce prevent lever eccentric bushing (N3) out of bounce prevent lever (N4).

(i) FRONT FRAME MIDSECTION DISASSEMBLY.

Step 1. Remove four screws (CP, figure 5-31, Appendix), and off line function slide assembly (F, figure 5-37, Appendix); slide out function sensing finger lever stop strip (E).

Step 2. Remove code bar spring (AN/TGC-14(V) only) shown in insert on figure 5-31 (Appendix).

Step 3. Remove function backstop springs (A1, figure 5-37, Appendix) and figures H code bar return stop spring (AN/TGC-14(V) only) shown in insert.

NOTE

Step 4 through step 8 are for AN/TGC-14(V) only; see insert on figure 5-31 (Appendix).

Step 4. Remove retaining ring, compression spring retainer, compression spring, and code bar guide.

Step 5. Remove screw, clamp plate, and washer.

Step 6. Remove figures H code bar.

Step 7. Remove retaining ring, figures H code bar actuator, actuator spring, actuator stud, and lock washer.

Step 8. Remove guide pin and code bar support.

Step 9. For AN/TGC-14A(V), remove two screws (T, figure 5-30, Appendix).

Step 10. Remove left-hand and right-hand guide covers (R and S), screw (V), and return cable pulley bracket assembly (U).

Step 11. Remove retaining ring (U2), sleeve spacers (U3), return cable pulley (U1b), and return cable pulley bearing (U1a) from return cable pulley bracket (U4).

Step 12. Remove three screws (AH) and lock washers (AJ).

Step 13. Lift line feed spacing arm assembly (AG) out of front frame.

Step 14. Remove shift lever adjustment screw (AG6) from shift bracket (AG7).

Step 15. Remove ring (AG4) and washer (AG5); pull out line feed shift arm (AG3).

Step 16. Remove retaining ring (AG2) and line feed shift (AG1) from line feed shift arm (AG3).

Step 17. Remove retaining rings (AL), sleeve spacers (AM), lateral control belt pulleys (AK2), and lateral control belt pulley bearings (AK1) from front frame.

Step 18. Remove retaining rings (B), sleeve spacers (C), pulleys (A2), and pulley bearings (A1) from front frame.

Step 19. Remove two retaining rings (AE) and frame clamp pivot (AD); slide off frame clamp assembly (AC).

Step 20. Remove frame clamp screws (AC2) and frame clamp pads (AC1) from frame clamps (AC3).

Step 21. Remove two lock nuts (AS) and pull printer electrical chassis locators (AR) out of front frame.

Step 22. Remove retaining ring (B), two sleeve spacers (C), pulleys (A2), and pulley bearing (A1) from pin (W).

Step 23. Remove nut (X) and pull pin (W) out of front frame.

Step 24. Remove retaining rings (Z) and pull straight pin (AA) out of front frame. Removal of straight pin (AA) frees letters figures carriage pulley assembly (Y).

Step 25. Remove retaining ring (Y3), sleeve spacer (Y4), and spring clip (Y6).

Step 26. Pull letters figures pulley carriage (Y5) off letters figures pulley carriage rod (Y1) to free letter figures pulley (Y2b) and its bearing (Y2a).

Step 27. Remove screw (N) and print hammer release stop lever (M) from front frame.

Step 28. Remove self-locking nut (J), washers (K and L), print hammer release (H), and print hammer release shaft (G) from front frame.

Step 29. Remove screw (D) and print hammer actuator link guide bracket (E) from front frame.

(j) FUNCTION SELECTOR DISASSEMBLY.

Step 1. Remove seven function clutch release arm return helical springs (A11, figure 5-37, Appendix); remove bell actuator connecting rod (A32) from bell advance suppression arm (A33).

NOTE

While performing step 2, insure that none of the function sensing finger levers are lost as the function selector is removed from the front frame.

Step 2. Remove three screws (A48) and pull function selector assembly away from front frame.

Step 3. Remove print prevent rod actuator arm bias spring (A40) from function clutch release and backstop frame assembly (A49) and right-hand print prevent rod actuator arm (A41).

Step 4. Remove screws (A37), flat washers (A38), and print prevent rod assembly (A39).

Step 5. Remove print prevent adjustment screws (A39a) and print prevent rod lock strip (A39c) from print prevent rod (A39b).

Step 6. Remove print prevent rod actuator arm screws (A42) and slide right-hand and left-hand print prevent rod actuator arms (A41 and A46) off print prevent rod lever shaft assembly (A47).

Step 7. Remove retaining ring (A43) and slide print prevent rod lever shaft assembly (A47) to the left and out of function clutch release arm stop shaft (A44).

Step 8. Remove function sensing finger lever helical spring (A12) and off line letters sensing finger lever spring (A22).

Step 9. Remove clamp setscrew (A3) and clamp (A2) from advance prevent bail carriage return bar assembly (A9).

Step 10. Slide advance prevent bail carriage return bar shaft (A10) out of function clutch release shaft (A20) to free advance prevent bail carriage return bar assembly (A9).

Step 11. Remove function advance prevent adjustment screws (A9a) and nylon locking plate (A9b) from advance prevent bail carriage return bar (A9c).

Step 12. Remove retaining rings (A19) and slide blank advance suppression arm (A15), spacer (A16),

space arm (A17), and spacer (A18) off function clutch release shaft (A20).

Step 13. Slide function clutch release shaft (A20) to the left and out of function clutch release and backstop frame assembly (A49) to free spacers (A21), line feed and figures clutch release arms (A30 and A31), bell advance suppression arm (A33), letters clutch release arm (A34), and carriage return clutch release arm (A35).

Step 14. Remove retaining ring (A14) and slide blank sensing finger lever (A25) off blank advance suppression arm (A15).

Step 15. Remove retaining ring (A14) and slide function sensing finger lever (A13) off space arm (A17).

Step 16. Remove retaining ring (A29) and slide line feed sensing finger lever (A23) off line feed clutch release arm (A30).

Step 17. Remove retaining ring (A29) and slide line feed sensing finger lever (A24) off line feed clutch release arm (A30).

Step 18. Remove retaining ring (A29) and slide function sensing finger lever (A13) off figures clutch release arm (A31).

Step 19. Remove retaining ring (A29) and slide bell actuator sensing finger lever (A26) off bell advance suppression arm (A33).

Step 20. Remove retaining ring (A29) and slide function sensing finger lever (A13) off letters clutch release arm (A34).

Step 21. Remove retaining ring (A29) and slide off line letters sensing finger lever (A27) off letters clutch release arm (A34).

Step 22. Remove retaining ring (A29) and slide off line carriage return sensing finger lever (A28) off carriage return clutch release arm (A35).

Step 23. Remove retaining ring (A29) and slide carriage return sensing finger lever (A23) off carriage return clutch release arm (A35).

Step 24. Remove retaining ring (A7) and slide function backstop shaft (A8) out of function clutch release and backstop frame assembly (A49). Removal of function backstop shaft (A8) will free sleeve spacers, three function backstops, and (AN/TGC-14(V) only) the figures H code bar return stop.

Step 25. Remove clamp setscrews (A3) and slide clamps (A2) off function backstops (A5); press out function backstop eccentric bushings (A4).

Step 26. See insert on figure 5-37 (Appendix). Remove clamp setscrew (AN/TGC-14(V) only) and slide clamp off figures H code bar return stop.

Step 27. Remove retaining ring (A45) and slide function clutch release arm stop shaft (A44) out of function clutch release and backstop frame assembly (A49).

Step 28. Loosen nut (F4) and remove print prevent stop adjustment setscrew (F5) from off line function slide assembly (F6).

Step 29. Remove retaining ring (F3) and bell lever assembly (F2) from off line function slide assembly (F6).

Step 30. Remove off line function return helical springs (F1) from off line function slide assembly (F6).

Step 31. Remove retaining ring (B16) and slide pin (B15) out of lateral control chain (B20). Be careful not to lose spacers (B14) when removing pin (B15).

Step 32. Remove safety spring (B7) from lateral control strip (B23).

Step 33. Remove retaining ring (C1) from lateral control function slide (C6) and pull lateral control belt strip assembly (B) to front of machine.

Step 34. Remove retaining ring (B3), pin (B2), lateral control belt pulley (B1b), and lateral control belt pulley bearing (B1a) from fork (B4).

Step 35. Remove fork (B4) and slack takeup spring (B5) from slack takeup slide (B6) by turning fork counterclockwise.

Step 36. Remove retaining ring (B19) and pin (B22) to free link (B21).

Step 37. Remove screw (B12), lock washer (B13), lateral control chain takeup eccentric (B9), lateral control chain takeup lever (B10), and detent link (B11) from link (B21).

Step 38. Remove retaining ring (B19) and pin (B18) from link (B21) to free lateral control chain (B20). Be careful not to lose spacer (B17).

Step 39. Remove safety spring (D4) from rotary strip (D13).

Step 40. Remove retaining ring (C1) and pull rotary cable strip assembly (D) off rotary function slide (C10)

Step 41. Remove nut (D5) from rotary chain adjustment stud (D6).

Step 42. Remove retaining ring (D8) from pin (D7) and rotary chain adjustment stud (D6) from rotary chain (D10).

Step 43. Remove retaining ring (D12), pin (D11), and rotary chain (D10) from rotary strip (D13). Be careful not to lose spacer (D9).

Step 44. Remove retaining ring (D3), pin (D2), rotary cable pulley (D1b), and rotary cable pulley bearing (D1a) from rotary strip (D13).

Step 45. Remove three screws (C7) and spacers (C8) from support (C9); move the function slide assembly out of front frame.

Step 46. Remove screws (C3), lock washers (C4), clips (C2), and spacers (C5) from support (C9). Lateral control function slide (C6) and rotary function slide (C10) are now free.

(k) FRONT FRAME REAR SIDE DISASSEMBLY.

Step 1. Remove springs (CB and BU, figure 5-38, Appendix) and secondary number 3 cam follower spring (CN).

Step 2. Remove retaining ring (BL4) and slide pin (BL3) out of lateral transfer pulley chain (BL1).

Step 3. Remove automatic chain takeup ratchet (BY) from automatic chain takeup adjustment stud (BZ) by turning it clockwise.

Step 4. Remove retaining ring (BL4) and spacer (BL5); slide pin (BL2) out of lateral transfer pulley chain (BL1) and remove chain from frame.

Step 5. Remove retaining ring (BX) and automatic chain takeup feed pawl (BW) from automatic chain takeup actuator lever (CA).

Step 6. Remove retaining ring (BX) and automatic chain takeup pawl (BV) from the point at which they are mounted.

Step 7. Remove ring (BL7) and slide lateral transfer pulley assembly (BL6) out of front frame assembly (CK).

Step 8. Press out pins (BL6b) from lateral transfer pulleys (BL6a) and slide lateral transfer pulley (BL6a), lateral transfer pulley bearings (BL6c), and lateral transfer pulley bearing retainer (BL6e) off lateral transfer pulley shaft (BL6f).

Step 9. Remove screw (BK), printer keyboard idler gear stud (BH), printer keyboard idler gear assembly (BJ), standoff gear support (BJ3), and nut (CL) from front frame assembly (CK); press printer keyboard idler gear bearing (BJ1) out of printer keyboard idler gear (BJ2).

Step 10. Remove letters figures cam follower stroke adjustment screw (CJ) from front frame assembly (CK).

Step 11. Remove retaining ring (BA), straight pin (AZ), and line feed shift lever (AY) from front frame assembly (CK).

Step 12. Remove retaining ring (AX) and rotary cable adjustment screw (AW) from front frame assembly (CK), freeing rotary cable adjustment bracket (AU) and nylon lock block (AV).

Step 13. Remove screw (BQ), lock washer (BR), and chain adjustment slide bracket (BP) from front frame assembly (CK).

Step 14. Remove automatic chain takeup actuator adjustment setscrew (BM) and nut (BN) from chain adjustment slide bracket (BP).

Step 15. Remove number 5 lateral stroke adjustment screw (BG), nut (BT), and sleeve spacer (BS) from front frame assembly (CK).

Step 16. Remove remaining four stroke adjustment screws (BG) and nuts (BF) from front frame assembly (CK).

Step 17. Remove retaining ring (CD) and link (CC); pull shaft (CH) out of front frame assembly (CK), freeing spacer (CE), chain pulley bearing (CF1), chain pulley (CF2), and spacer (CG).

NOTE

Removal of number 1 through 5 carriage pins (BB, BC, and CM) allows carriage pulley assemblies (BE) to fall free.

Step 18. Compress carriage pin lock (BD) and remove number 2 carriage pin (BB) by turning it counterclockwise, freeing carriage pin lock (BD).

Step 19. See insert on figure 5-38 (Appendix). Remove retaining ring (AN/TGC-14(V) only), compression spring retainer, compression spring, and carriage pin number 2 stop from number 2 carriage pin (BB).

Step 20. Compress carriage pin locks (BD) and remove number 1, 3, and 5 carriage pin (BC) and number 4 carriage pin (CM) by turning them counterclockwise, freeing carriage pin locks (BD).

Step 21. Remove retaining ring (BE3), sleeve spacer (BE4), and carriage clip (BE6) from carriage pulley rod (BE1).

Step 22. Pull carriage (BE5) off carriage pulley rod (BE1), freeing carriage pulley bearing (BE2a) and carriage pulley (BE2b).

(4) RIBBON FEED TOP PLATE DISASSEMBLY.

Step 1. Remove retaining rings (2, 4, and 5, figure 5-39, Appendix).

Step 2. Loosen clamp setscrew (18); remove ribbon feed backstop eccentric (1) and brace plate (3).

Step 3. Remove ribbon feed backstop helical spring (6), sleeve spacer (16), and ribbon feed backstop (19).

Step 4. Slide clamp (17) off ribbon feed backstop (19) and remove clamp setscrew (18).

Step 5. Remove clutch stop helical spring (7), retaining ring (10), sleeve spacer (20), and left-hand and right-hand ribbon feed clutch stops (21 and 9).

Step 6. Remove reversing cam follower spring (8), sleeve spacers (11 and 22), and left-hand and right-hand reversing cam followers (23 and 12).

Step 7. Remove two retaining rings (30) and two ribbon spool drive gears (29).

Step 8. Remove spool clips (28) from ribbon spool drive gears (29).

Step 9. Remove tension control brake arm spring (26) from right-hand tension control brake arm (15) and then remove right-hand intermediate drive gear assembly (13), washer shim (14), and right-hand tension control brake arm (15) from post on ribbon feed mounting base plate (55). Do not press bearing (13a) out of right-hand intermediate drive gear (13b) unless bearing is worn or damaged and requires replacement.

Step 10. Remove left-hand intermediate drive gear assembly (24), washer (25), and left-hand tension control brake arm (27) with spring (26). Do not press bearing (24a) out of left-hand intermediate drive gear (24b) unless bearing is worn or damaged and requires replacement.

Step 11. Slide ribbon feed clutch (32), washer (33), and clutch shaft worm gear assembly (34) off ribbon feed mounting base plate (55).

Step 12. Remove four clutch rollers (31) out of ribbon feed clutch (32).

Step 13. Do not press sleeve bearing (34a) out of clutch shaft worm gear (34b) unless bearing is worn or damaged and requires replacement.

Step 14. Remove retaining rings (10) and slide left-hand and right-hand ribbon reversing sensing arms (42 and 54) off ribbon feed mounting base plate (55).

Step 15. Remove left-hand and right-hand wire links (41 and 53).

Step 16. Remove two screws (36), two washers (37), ribbon reversing sliding plate (35), and guide pin spacers (38) from ribbon feed mounting base plate (55).

Step 17. Remove four retaining rings (40) and ribbon roller assemblies (39) from ribbon feed mounting base plate (55).

Step 18. Do not remove ribbon roller bushings (39a) from ribbon rollers (39b) unless bushings are worn or damaged and require replacement.

Step 19. Remove retaining ring (43), ribbon feed idler gear assembly (45), and spacer (46) from ribbon feed mounting base plate (55).

Step 20. Do not press ribbon feed idler gear bearing (45a) out of ribbon feed idler gear (45b) unless bearing is worn or damaged and requires replacement.

NOTE

On models not equipped with ribbon feed slip clutch assembly (47), omit steps 21 through 23. Remove the ribbon feed drive gear by loosening the set screw on the gear and sliding the gear off ribbon feed worm shaft (50c).

Step 21. Remove retaining ring (47a), key washers (47b), washer spring (47c), ribbon feed slip clutch gear (47d), and key washer (47b) from ribbon feed slip clutch hub (47f).

Step 22. Loosen ribbon feed slip clutch hub socket screw (47e) and slide ribbon feed slip clutch assembly (47) off ribbon feed worm shaft (50c).

Step 23. Remove felt washers (56) from ribbon feed worm shaft (50c).

Step 24. Remove four screws (49) from left-hand and right-hand bearing block assemblies (48 and 52) and lift them and the ribbon feed worm shaft off ribbon feed mounting base plate (55).

Step 25. Slide left-hand and right-hand bearing block assemblies (48 and 52) and thrust washer (51) off ribbon feed worm shaft (50c).

Step 26. Do not remove bearings (48a and 52a) unless bearings are worn or damaged and require replacement.

Step 27. Press out roll pin (50b) and remove ribbon feed worm (50a) from ribbon feed worm shaft (50c); remove retaining ring (44).

Step 28. For AN/TGC-14A(V) only, remove two screws (58) and bounce prevent lever guide (57) from ribbon feed mounting base plate (55).

(f) KEYBOARD DISASSEMBLY.

Step 1. Remove screws (B and C, figure 5-40, Appendix) and lock washers (D); remove keyboard left-hand rail (A).

Step 2. Remove screw (F) and lock washer (G); remove keyboard right-hand rail (E).

Step 3. Remove keyboard lock bar helical spring (H) and then remove keyboard lock bar (J).

Step 4. Remove four screws (AH) and remove space bar safety guard cover (AG); remove four screws (AH) and remove keyboard cover (L3) and BREAK push button switch nut (T).

Step 5. Remove nuts (AK), lock washers (AL), and space bar control arms (AJ); slide out space bar shaft (AM).

Step 6. Remove screws (CM), lock washers (CN), and key retaining strip (CL).

Step 7. Remove space bar (AN) by pulling forward.

Step 8. Remove all keys by pulling them forward.

NOTE

A key assembly consists of a lever and keytop, but these will not be disassembled in this manual.

Step 9. Remove wear pad (AP).

Step 10. Remove four screws (AH), space bar safety guard cover (AG), and front key guide (AF) from front support (DP1).

Step 11. Remove screws (V) and lock washers (W); remove switch bracket (U), complete with switches and filter.

Step 12. Remove two screws (DM), two lock washers (DN), and slip connector contact (DL); then remove two screws (CH), two lock washers (CJ), two flat washers (CK), and code pulsing contact (CG) from left frame assembly (DP9). For AN/TGC-14(V), remove two screws (CH), lock washers (CJ), flat washers (CK), and slip connector contact assembly. See insert on figure 5-40, sheet 2 (Appendix).

Step 13. Remove screws (CE) and lock washers (CF); remove master pulsing contact assembly (CD), identified by a reddish-brown glyptol spot on end of mounting screw. For AN/TGC-14(V), remove screws (CE) and lock washers (CF); remove master pulsing

contact assembly. See insert on figure 5-40, sheet 2 (Appendix).

Step 14. Remove backstop spring (BU).

Step 15. Remove screws (DP9f) and lock washers (DP9g).

Step 16. Remove left top frame (DP9e).

Step 17. Remove screws (CA), lock washers (CB), and top left code bar guide (BZ).

Step 18. Lift keyboard cam shaft assembly (CC) out of left bottom frame (DP9l).

Step 19. Remove bearing (CC15), sleeve spacer (CC14), keyboard drive gear (CC13), and clutching rollers (CC10).

Step 20. Loosen clutch assembly setscrew (CC11); slide clutch assembly (CC12) off keyboard drive shaft assembly (CC9).

Step 21. Slide pulsing cam assembly (CC8) off start stop cam bushing (CC7).

Step 22. Remove bearing (CC1) and sleeve spacer (CC2); pull keyboard drive shaft assembly (CC9) out of start stop cam bushing (CC7).

Step 23. Remove bearings (CC3) from start stop cam bushing (CC7).

Step 24. Remove screws (CC5), master pulsing cam (CC4), and start pulse eccentric (CC6) from start stop cam bushing (CC7).

Step 25. Remove cam follower clutch release eccentric (BM) by removing nut (BP), flat washer (BN), and felt washer (CU).

Step 26. Remove clutch release helical spring (BK) and cam follower clutch release (BL).

Step 27. Remove repeat key actuator arm screw (DJ) and repeat key actuator arm nutplate (DK); remove repeat key actuator arm (DH).

Step 28. Remove clutch release finger (DG) and felt washer (DE) from repeat key shaft (DD).

Step 29. Remove screws (CQ) and lock washers (CR); remove right side cover (CP).

Step 30. Remove screw (CZ), flat washer (CK), clamp nutplate (DA), and screw (AR); slide repeat key lever clamp (CY) off repeat key shaft (DD).

Step 31. Remove repeat key lever helical spring (CX) and pull repeat key assembly (AQ) but of right frame.

Step 32. Remove grip rings (DB) and retaining ring (DC); pull repeat key shaft (DD) out of left bottom frame (DP9l) and right frame (DP8c).

NOTE

Repeat key shaft bushing (DF) should be removed from the left bottom frame after repeat key shaft (DD) has been removed.

Step 33. Loosen bail support shaft setscrew (BR); remove ring (BT) and slip clutch release bail (BS) out of bail support shaft (BQ) and straight pin (CV).

Step 34. Remove bail support shaft (BQ), ring (BT), and felt washer (CU) from left bottom frame (DP9l).

Step 35. Remove straight pin (CV) from right frame (DP8c) by removing retaining ring (CW) and felt washer (CU).

Step 36. Remove screws (DP2), lock washers (DP3), and rear support (DP6) from frames (DP9l) and (DP8c).

Step 37. Remove screws (DP2), lock washers (DP3), key lever leaf spring mounting strip (DP5), and key lever leaf spring (DP4) from rear support (DP6).

Step 38. Remove screws (DP2), lock washers (DP3), and front support (DP1) from frames (DP9l) and (DP8c).

Step 39. Remove screw (AA12a), lock washer (AA12b), and keyboard contact actuator (Z) from master pulsing cam follower (AA12c).

Step 40. Remove helical springs (X and Y).

Step 41. Remove screw (AD), lock washer (AE), shaft clamp (AB), and pulsing finger adjustment shim (AC) from left bottom frame (DP9l).

Step 42. Lift pulsing finger and prevent lever assembly (AA) from left bottom frame (DP9l).

Step 43. Disassemble pulsing finger and prevent lever assembly (AA) by removing retaining ring (AA14) and sliding all the parts off pulsing finger and prevent lever shaft (AA15).

Step 44. Remove screws (BF) and lock washers (BG); lift code bar guide (BE) and number 1 through 5 code bars (AW, AX, AY, AZ, and BA) out of frames (DP9l and DP8c).

Step 45. Remove numbers 1 through 5 code bars (AW, AX, AY, AZ, and BA) from code bar guide (BE).

Step 46. Remove screws (BC), lock washers (BD), and code bar and key lever assembly (BB) from code bar guide (BE).

Step 47. See insert on figure 5-40, sheet 2 (Appendix). Remove two screws (AN/TGC-14(V) only), lock washers, and spring bar from left bottom frame (DP9l).

Step 48. Loosen backstop eccentric shaft setscrew (BY) and remove retaining ring (BW).

Step 49. Slide backstop eccentric shaft (BX) from clutch backstop assembly (BV).

Step 50. Remove screws (CT), lock washers (BD), and top right code bar guide (CS) from right frame (DP8c).

NOTE

Do not remove threaded inserts (DP9h and DP8b).

(g) ELECTRICAL CHASSIS DISASSEMBLY.

Step 1. Refer to figure 5-41 (Appendix) and raise the two paper support and brake drum assembly lock levers; lift the paper supply roll and paper support and brake drum assembly (A) out of the electrical chassis.

Step 2. Grasp the knurled nuts on both ends of paper support and brake drum assembly (A) and turn them counterclockwise.

Step 3. Remove brake drum (A1) and slide paper support shaft assembly (A2) out of the paper supply roll; remove guide disc (A2a).

Step 4. Remove patch card assemblies (C, D, and E).

Step 5. Remove three lamps (F) by pressing in and turning counterclockwise.

Step 6. Disassemble the remaining parts of chassis assembly (G) using figure 5-41 (Appendix) as a guide. Do not remove nameplates (45 and 46), studs (47 and 49), or printer slide locks (48 and 50).

(h) LINE SENSOR DISASSEMBLY.

NOTE

Do not remove nameplates as removal will destroy the nameplates.

Step 1. Remove three screws (C, figure 5-42, Appendix) and cover (B2) from bracket (M).

Step 2. Remove selector cable clip (N) and holder clip (P) by removing two screws (Q).

Step 3. Remove three screws (C) and three flat washers (F), freeing board assembly (E); disconnect four wires and remove board assembly (E).

Step 4. Remove four screws (C) and four flat washers (F) freeing board assembly (L); disconnect twelve wires and remove board assembly (L).

Step 5. Remove screw (L2), lock washer (L3), and high-low range strip (L1) from board (L15).

Step 6. Disconnect six wires on transformer (G); remove four screws (C), four nuts (H), and transformer (G) from bracket (M).

Step 7. Remove selector receptacle (D) by removing two mounting nuts and disconnecting attached wires.

Step 8. Remove line sensor connector (J) by removing two screws (C) and two nuts (H); disconnect attached wires.

Step 9. Remove diode (K) from bracket (M) by removing mounting nut and associated parts; disconnect attached wires.

(i) SIGNAL LINE POWER SUPPLY DISASSEMBLY.

NOTE

Do not remove nameplate as removal will destroy the nameplate.

Step 1. Remove two screws (C, figure 5-43, Appendix) and cover (B) from bracket (J).

Step 2. Remove motor cable clip (K) and holder clip (L) by removing two screws (M).

Step 3. Remove three screws (C) and three washers (E), freeing board assembly (D); disconnect four wires and remove board assembly (D).

Step 4. Disconnect six wires on transformer (F); remove four screws (C), four nuts (G), and transformer (F) from bracket (J).

Step 5. Remove signal line power supply connector (H) from bracket (J) by removing two screws (C) and two nuts (G); disconnect attached wires.

(j) SERVICE CABLE DISASSEMBLY.

Step 1. Remove four screws (B, figure 5-44, Appendix), four lock washers (C), and cover (A) from junction box (P).

Step 2. Disconnect wires attached to the binding post lugs.

Step 3. Remove two red binding posts (F) and two black binding posts (G) from junction box (P).

Step 4. Remove white binding post (D) from junction box (P), freeing flat washer (E).

Step 5. Remove two splicers (L) from wires.

Step 6. Remove adapter (M) from cord (N); remove cord (N) from junction box (P).

Step 7. Remove service cable connector-plug (H), electric cable (K), and sleeve bushing (J) from junction box (P).

Step 8. Remove sleeve bushings (J) from electric cable (K) and cord (N).

k. CLEANING. - Adequate cleaning is an essential factor in all maintenance and repair procedures. It is impossible to perform accurate inspections or adjustments of parts that are dirty or covered with dirty lubricants. Mechanical components may be cleaned

by dipping and brushing them in petroleum solvent; Federal Specification P-S-661.

CAUTION

Never dip main shaft in solvent for cleaning purposes without first removing all clutches and then repacking clutches with grease MIL-G-3278A. Never dip presealed bearings in solvent or clean ultrasonically. Individual sub-assemblies may be cleaned ultrasonically or by dipping in solvents if they contain no sealed bearings or grease-packed clutches. Do not allow parts with placards to remain in cleaning solvent as the solvent will loosen the placards.

l. INSPECTION. - Inspection procedures for the parts of the teletypewriter sets consist primarily of visual inspections.

(1) MECHANICAL COMPONENTS. - Reject any part which shows excessive wear, rounded edges, or scores on contacting and bearing surfaces. Refer to table 5-3 (Appendix) through table 5-7 (Appendix) and table 5-9 (Appendix) for specific check points. When shafts appear to be excessively loose in their bushings, the bushings and/or shafts must be replaced. Distortion, cracking, and any other obvious defects are causes for rejection.

(2) ELECTRICAL COMPONENTS. - Check all electrical components for evidence of burning; check their mountings for security. Check all wiring connections for loose or cold-soldered joints.

m. LUBRICATION. - The teletypewriter sets are lubricated at the factory and normally will not require lubrication until 250 hours operation time has elapsed. The two lubricants to be used on the teletypewriter sets are Standard Oil Beacon Lubricant No. 325, Specification MIL-G-3278A and Pioneer Ball-Bearing Oil PD14926-51, Specification MIL-L-6085A. Frequency of lubrication and type of lubricant are indicated in table 5-9 (Appendix).

CAUTION

Do not use excess lubricant in any procedure.

n. ASSEMBLY PROCEDURES. - Perform the following assembly procedures in the exact sequence indicated. Use extreme care when reassembling the various parts to avoid damaging adjacent parts or disturbing any adjustments. Any required special cleaning, inspection, or lubrication instructions will be included as part of the assembly procedures. The figure and index numbers used in the procedures refer to parts location illustrations in other parts of this section or in the Appendix.

o. MARK AND SPACE CLUTCH RELEASE SELECTOR SHAFT, TIMING CAM SHAFT, AND BACK-STOP SHAFT ASSEMBLY.

(1) TIMING CAM SHAFT ASSEMBLY.

NOTE

It is important to install spring (AF8, figure 5-29, Appendix) between timing cams (AF7) as shown.

Step 1. Insert key (AF3) into correct keyway in timing cam shaft (AF14); install timing cams (AF7) on the key.

Step 2. Assemble remaining four timing cams (AF7) in the same manner as the first cam.

Step 3. Slide spacer (AF9) onto timing cam shaft (AF14).

Step 4. Insert key (AF3) into keyway and slide timing cam shaft gear (AF10) into position.

Step 5. Secure cam assembly by pressing rings (AF11 and AF6) into grooves on timing cam shaft (AF14).

Step 6. Press bearing (AF5) onto timing cam shaft (AF14); then slide spacer (AF4) onto timing cam shaft (AF14).

Step 7. Insert key (AF3) into timing cam shaft (AF14); slide function clutch release cam (AF2) into position over the key and secure it with bowed retaining ring (AF1).

Step 8. Press bearing (AF13) into bearing retainer (AF12) and press both onto timing cam shaft (AF14).

Step 9. Insert timing cam shaft assembly into rear frame (P, figure 5-30, Appendix) and secure it with three screws (N) and three lock washers (V).

(2) MARK AND SPACE CLUTCH RELEASE SELECTOR SHAFT ASSEMBLY.

NOTE

Perform the third reduction pinion assembly of paragraph 5-5p prior to performing this procedure.

Step 1. Slide mark clutch release finger (P5, figure 5-29, Appendix) over hub on mark clutch release arm assembly (P6); secure with retaining ring (P4).

Step 2. Attach safety spring (P3) between mark clutch release arm assembly (P6) and mark clutch release finger (P5).

Step 3. Install lock nut (P2) on clutch release finger adjustment screw (P1); install clutch release finger adjustment screw (P1) in mark clutch release arm assembly (P6).

Step 4. Assemble the remaining clutch release assemblies (P, S, and T) as described in steps 1 through 3.

NOTE

In the next step, do not insert the mark clutch release selector shaft all the way into the rear frame; insert the shaft in small increments from left to right as the mark clutch release assemblies and type positioning cam followers are installed on the shaft.

Step 5. Refer to figure 5-45 (Appendix) for hole location and insert mark clutch release selector shaft (U, figure 5-29, Appendix) partially into the left side of rear frame (P, figure 5-30, Appendix).

Step 6. Install two felt washers (R, figure 5-29, Appendix), start clutch release arm assembly (T), type positioning cam follower (Q), and felt washer (R) on mark clutch release selector shaft (U).

Step 7. Install mark number 3 clutch release assembly (S) on mark clutch release selector shaft (U).

Step 8. Install number 4 mark clutch release assembly (P) on mark clutch release selector shaft (U).

Step 9. Install type positioning cam follower (Q) and felt washer (R) on mark clutch release selector shaft (U).

Step 10. Install mark number 5 clutch release assembly (P) on mark clutch release selector shaft (U).

Step 11. Install mark number 2 clutch release assembly (P) on mark clutch release selector shaft (U).

Step 12. Install type positioning cam follower (Q) and felt washer (R) on mark clutch release selector shaft (U).

Step 13. Install mark number 1 clutch release assembly (P) and felt washer (N) on mark clutch release selector shaft (U).

NOTE

Mark clutch release selector shaft (U) should just pass through the center bearing of rear frame (P, figure 5-30, Appendix) after installation of the last mark clutch release assembly.

Step 14. Attach bell prevent lever (M1, figure 5-29, Appendix) to letters figures pulley carriage actuator and cam follower (M4) using screw (M2) and washer (M3); then slide letters figures pulley carriage actuator and cam follower (M4) onto mark clutch release selector shaft (U). Install screw (M5), washer (M6), and nut (M7) on letters figures pulley carriage actuator and cam follower (M4); then install screw (M8) and nut (M9).

Step 15. Slide felt washer (N) and line feed motion amplify link (K) onto mark clutch release selector shaft (U).

Step 16. Complete assembly of the mark clutch release assemblies by positioning all of the installed assemblies between their respective retaining ring grooves and secure them with eight retaining rings (H).

NOTE

In the next steps, do not insert the space clutch release selector shaft all the way into the rear frame; insert the shaft in small increments from left to right as the space clutch release assemblies and type positioning cam followers are installed on the shaft.

Step 17. Assemble clutch release assemblies (Z), (AA), (AB), and (AC) as described in steps 1 through 3. Refer to figure 5-45 (Appendix) for the hole location and insert space clutch release selector shaft (AE, figure 5-29, Appendix) partially into the left side of rear frame (P, figure 5-30, Appendix).

Step 18. Install secondary number 3 cam follower (AG, figure 5-29, Appendix) and space number 3 clutch release assembly (AC) on space clutch release selector shaft (AE).

Step 19. Install type positioning cam follower (Q) and felt washer (R) on space clutch release selector shaft (AE).

Step 20. Install space number 4 clutch release assembly (AB) on space clutch release selector shaft (AE).

Step 21. Install space number 5 clutch release assembly (AA) on space clutch release selector shaft (AE).

Step 22. Install two felt washers (W), type positioning cam follower (Q), and felt washer (R) on space clutch release selector shaft (AE).

Step 23. Install space number 2 clutch release assembly (AB) on space clutch release selector shaft (AE).

Step 24. Install space number 1 clutch release assembly (AA) on space clutch release selector shaft (AE).

NOTE

Space clutch release selector shaft (AE) should pass through the center bearing of rear frame (P, figure 5-30, Appendix) after the space number 1 clutch release assembly is installed.

Step 25. Install two felt washers (W, figure 5-29, Appendix), print and function clutch release assembly (Z), and felt washer (W) on space clutch release selector shaft (AE).

Step 26. Slide line feed cam follower arm (V1) onto line feed torque tube actuator (V3c).

Step 27. Install line feed cam follower arm clamping screw (V2) into line feed cam follower arm (V1) and tighten lightly; install line feed actuator assembly (V) onto space clutch release selector shaft (AE).

Step 28. Slide roller (V3a) onto line feed torque tube actuator (V3c) and secure with retaining ring (V3b).

Step 29. Slide all clutch release assemblies into their respective positions between the retaining ring grooves and secure them with six retaining rings (H).

Step 30. Fasten print and function clutch release arm spring (Y) between print and function clutch release assembly (Z) and the spring post on rear frame (P, figure 5-30, Appendix).

Step 31. Install five inter-arm springs (F, figure 5-29, Appendix), between the mark and space clutch release assemblies.

Step 32. Complete the assembly of the space clutch release assemblies by installing inter-arm spring (F) between start clutch release arm (T1) and the tab on rear frame (P, figure 5-30, Appendix).

NOTE

The last inter-arm spring (F, figure 5-29, Appendix) is stretched about 1/2 inch farther than the other inter-arm springs but is otherwise identical.

(3) BACKSTOP SHAFT ASSEMBLY.

Step 1. Install six clamp screws (B3, figure 5-29, Appendix) into six clamps (B2); slide six clamps (B2) onto clutch backstop levers (B4).

Step 2. Press clutch backstop eccentric bushings (B1) into clutch backstop levers (B4) and tighten clamp screws (B3).

Step 3. Refer to figure 5-45 (Appendix) for hole location and insert backstop shaft (D, figure 5-29, Appendix) partially into the left side of rear frame (P, figure 5-30, Appendix) just far enough to install the clutch backstops as was done with the mark and space clutch release selector shafts.

Step 4. Install and secure five clutch backstop assemblies (B, figure 5-29, Appendix) on backstop shaft

(D) in the following sequence (left to right): retaining ring (C); clutch backstop assembly (B); retaining ring (C); two felt washers (E); retaining ring (C); clutch backstop assembly (B); two retaining rings (C); clutch backstop assembly (B); retaining ring (C); four felt washers (E); retaining ring (C); clutch backstop assembly (B); two retaining rings (C); clutch backstop assembly (B); retaining ring (C); and two felt washers (E).

NOTE

Install each clutch backstop assembly just to the right of the mark clutch release fingers. Backstop shaft (D) should just pass through the center plate of rear frame (P, figure 5-30, Appendix) as the fifth clutch backstop assembly is installed.

Step 5. Install two felt washers (E, figure 5-29, Appendix) and sixth clutch backstop assembly (B) on backstop shaft (D) after the shaft passes through the center plate of rear frame (P, figure 5-30, Appendix); secure with retaining ring (C, figure 5-29, Appendix).

Step 6. Attach five clutch backstop springs (A) between clutch backstop levers (B4) and their respective attaching holes in rear frame (P, figure 5-30, Appendix); attach print and function clutch backstop spring (A, figure 5-29, Appendix) between its clutch backstop lever and backstop spring clip (G1, figure 5-30, Appendix).

Step 7. Attach backstop spring clip (G1) to rear frame (P) with screw (G2) and washer (G3).

Step 8. Snap timing cam wick (AD, figure 5-29, Appendix) on space clutch release selector shaft (AE) between the left and center plate of the rear frame, positioning the wick so that it contacts the timing cams; snap function timing cam wick (X) on space clutch release selector shaft (AE) under the function timing cam.

Step 9. Slide line feed pawl (L) onto line feed motion amplify link (K) and secure with retaining ring (J); connect line feed pawl spring (G) between the post on line feed pawl (L) and the hole in line feed motion amplify link (K).

p. THIRD REDUCTION PINION ASSEMBLY.

Step 1. Install ring (F4, figure 5-28, Appendix) in retainer on right-hand rear plate of frame (P, figure 5-30, Appendix).

Step 2. Slide idler gear arm assembly (H8, figure 5-28, Appendix) onto the rear frame and secure with ring (G).

Step 3. Press one bearing (F3) onto the shaft of second reduction gear (F6); slide spacer (F5) onto second reduction gear (F6).

Step 4. Slide second reduction gear (F6) through retainer and press second bearing (F3) onto second reduction gear (F6).

Step 5. Check third reduction pinion (F1) for pin hole; if required, drill the hole and then slide third reduction pinion (F1) onto second reduction gear (F6).

Step 6. Support the shaft on second reduction gear (F6); align the holes in second reduction gear (F6) and third reduction pinion (F1); press in pin (F2).

q. IDLER GEAR ASSEMBLY.

Step 1. Install ring (H5, figure 5-28, Appendix) into idler gear (H6).

Step 2. Press one idler gear bearing (H3) onto post of idler gear arm assembly (H8); slide idler gear (H6) onto idler gear bearing (H3).

Step 3. Slide spacer (H4) onto post of idler gear arm assembly (H8).

Step 4. Press one idler gear bearing (H3) into idler gear (H6); secure with ring (H2).

Step 5. Slide idler gear stud (H7) through the idler gear assembly and secure with idler gear lock nut (H1).

r. V LEVER AND LINKAGE ASSEMBLY.

Step 1. Install first character adjustment screw (J2, figure 5-28, Appendix) into V lever of V lever shaft (J4); secure with anti-turn nut (J3).

Step 2. Install and secure bail eccentric (Q1) on automatic carriage return and line feed bail actuator (Q3) using screw (Q2).

Step 3. Install anti-turn nuts (K2) and (L2) and screws (L1) and (L1) into lock lever actuator arm (K3) and automatic carriage return and line feed actuator arm (L3).

Step 4. Install carriage return lock lever eccentric bushing (P3) in carriage return lock lever (P2); secure with nut (P1).

Step 5. Install two felt washers (J5) on V lever shaft (J4) and slowly slide shaft into rear frame (P, figure 5-30, Appendix) while installing lock lever actuator arm (K3, figure 5-28, Appendix), carriage return lock lever (P2), automatic carriage return and line feed bail actuator (Q3), and automatic carriage return and line feed actuator arm (L3); secure with retaining rings (J1).

Step 6. Attach carriage return and line feed bail actuator helical spring (N) and lock lever actuator arm helical spring (M) to carriage return lock lever (P2); extend spring (N) and attach it to automatic carriage return and line feed bail actuator (Q3); attach spring (M) to lock lever actuator arm (K3).

s. REAR FRAME ASSEMBLY.

Step 1. Insert detent helical spring (D5, figure 5-30, Appendix), detent ball (D4), and lock arm (D2) into change gear post (D6); secure with pin (D3).

Step 2. Attach change gear post (D6) to rear frame (P) with screw (D1) and lock washer (D7); apply lock-tite compound to the mating surfaces.

Step 3. Attach start cam lubricating wick assembly (M1) to rear frame (P) with screw (M2) and lock washer (M3).

Step 4. Attach function helical spring (H) and print helical spring (J) to their respective brackets on rear frame (P).

Step 5. Attach print and function helical spring yoke link assemblies (K) to function helical spring (H) and print helical spring (J).

CAUTION

Align the spring yoke link assemblies parallel to the frame to avoid any twisting motion of the clevis pin.

Step 6. Attach frame clamp pads (L1 and Q1) to frame clamps (L3 and Q3) with frame clamp screws (L2 and Q2).

Step 7. Attach frame clamps (L3 and Q3) to rear frame (P) with frame clamp stud pivots (L4 and Q4) and retaining rings (L5 and Q5).

Step 8. Install the switch plate assembly (AN/TGC-14(V) only) comprised of all items in insert on figure 5-30 (Appendix).

Step 9. Install advance prevent stop spring (B) and secure with screws (C); install ribbon feed base spring clips (T) and (U) and secure with blocks (S) and screws (R).

t. MOTOR AND MOTOR MOUNT ASSEMBLY.

NOTE

For the 60-cycle motor, refer to figure 5-25 (Appendix); for the 400-cycle motor, refer to figure 5-24 (Appendix).

Step 1. Slide motor cover (400-cycle motor only) (D, figure 5-24, Appendix) over motor and gear head assembly (C).

Step 2. Slide motor fan (B) onto the motor shaft and secure with motor fan setscrews (A).

Step 3. Press bearing (A6, figure 5-28, Appendix) into motor mounting plate (A8).

Step 4. Press bearing (A6) onto first reduction gear (A7).

Step 5. Insert first reduction gear (A7) in motor mounting plate (A8).

Step 6. Install bearing cup (A2) over first reduction gear (A7); then secure the bearing cup to motor mounting plate (A8) using screws (A3) and lock washers (A4).

Step 7. Press pin (A5) into first reduction gear (A7) so that the pin protrudes the same distance from each side of the first reduction gear.

Step 8. Slide the motor into cooling housing (F, figure 5-23, Appendix) insuring that the cable is aligned with the cutout and that there is clearance between the motor fan and the rear of the cooling housing.

Step 9. Install two screws (A) into cooling housing (F) and tighten temporarily.

Step 10. Align motor mounting plate (A8, figure 5-28, Appendix) with bottom of air outlet of the cooling housing and attach the motor to the mounting plate using three screws (E, figure 5-24, Appendix) and lock washers (F) or three screws (D, figure 5-25, Appendix) and lock washers (E).

Step 11. Insert motor assembly into rear frame (figure 5-45, Appendix) and align the mounting holes.

Step 12. Secure the motor assembly to the rear frame with three screws (B, figure 5-28, Appendix), lock washers (C), and washers (D).

Step 13. Align the slot in speed change gear (E) with pin (A5) and slide the speed change gear onto shaft of first reduction gear (A7); secure the speed change gear with lock nut (A1). Adjust idler gear assembly (H) to mesh with speed change gear (E) by loosening idler gear lock nut (H1) and swinging the assembly until the gears mesh; tighten the lock nut when the gears are properly meshed.

u. SELECTOR ASSEMBLY, INSTALLATION, AND CHECK. - For selectors without (-2) stamped after the serial number, proceed as follows:

Step 1. Align pins (F, figure 5-26, Appendix) with holes in right-hand inner plate (AE2); press selector magnet assembly (E) against right-hand inner plate (AE2).

Step 2. Install screw (C) and lock washer (D) into right-hand inner plate (AE2), securing selector magnet assembly (E).

Step 3. Press armature shaft bearing (AE1) into right-hand inner plate (AE2).

Step 4. Insert lubricating wick non-metallic washer (L) and lubricating wick retainer (M) into armature shaft bearing (AE1).

Step 5. Slide two armature shaft spacers (N) onto armature (P).

Step 6. Slide one end of armature (P) into armature shaft bearing (AE1).

Step 7. Press armature shaft bearing (AG1) into right-hand outer frame plate (AG3).

Step 8. Insert lubricating wick non-metallic washer (L) and lubricating wick retainer (M) into armature shaft bearing (AG1).

Step 9. Align positioning pins (F) of selector magnet assembly (E) and armature (P) with their respective mounting holes and press right-hand outer frame plate (AG3) against selector magnet assembly (E).

Step 10. Secure right-hand outer frame plate (AG3) with screw (C) and lock washer (D).

Step 11. Attach left-hand inner plate stop bar (AB1) to left-hand inner plate (AB4b) using screws (AB2) and lock washers (AB3).

Step 12. Attach right-hand inner plate stop bar (AD1) to right-hand inner plate (AE2) using screws (AD2) and lock washers (AD3).

Step 13. Align the mounting holes in left-hand inner plate (AB4b) with the pins in selector magnet assembly (E) and press the left-hand inner plate against the selector magnet assembly; secure with screw (C) and lock washer (D).

Step 14. Press armature shaft bearing (AB4a) into left-hand inner plate (AB4b).

Step 15. Insert lubricating wick non-metallic washer (L) and lubricating wick retainer (M) into armature shaft bearing (AB4a).

Step 16. Slide two armature shaft spacers (N) onto armature (P).

Step 17. Slide one end of armature (P) into armature shaft bearing (AB4a).

Step 18. Press armature shaft bearing (H1) into left-hand outer frame plate (H3).

Step 19. Insert lubricating wick non-metallic washer (L) and lubricating wick retainer (M) into armature shaft bearing (H1).

Step 20. Align the left-hand outer frame pins of selector magnet assembly (E) and armature (P) with their respective mounting holes and press left-hand outer frame plate (H3) against selector magnet assembly (E).

Step 21. Secure with screw (D), lock washer (C), and cable strain relief bracket (B).

Step 22. Attach latches (R) to two selector mark shafts (Y) and two selector space shafts (Z) using screws (S) and lock washers (T).

Step 23. Attach selector shaft bias spring arms (U) to selector mark shafts (Y) and selector space shafts (Z) using screws (S) and lock washers (T).

Step 24. Press straight pins (X) into selector mark shafts (Y) and selector space shafts (Z).

Step 25. Attach two armature mark paddle latches (V) to two selector mark shafts (Y) and two armature space paddle latches (W) to two selector space shafts (Z) using screws (S) and lock washers (T).

Step 26. Press shaft bearings (AG2) into right-hand outer frame (AG3).

Step 27. Press shaft bearings (H2) into left-hand outer frame plate (H3).

Step 28. Insert one end of selector mark shafts (Y) into shaft bearings (AG2) in right-hand outer frame plate (AG3); insert one end of selector space shafts (Z) into shaft bearings (AG2) in right-hand outer frame plate (AG3).

Step 29. Align the bearing holes in left-hand outer frame plate (H3) with the other end of selector mark shaft (Y) and selector space shaft (Z); press left-hand outer frame plate (H3) toward right-hand outer frame plate (AG3).

CAUTION

In the next step, place the selector assembly on a flat surface prior to tightening the selector tie rod studs in order to prevent twisting while tightening.

Step 30. Slide selector tie rod studs (AF) through right-hand outer frame plate (AG3), outer frame plate spacers (K), right-hand inner frame plate (AE2), inner frame plate spacers (AC), left-hand inner frame plate (AB4b), outer frame plate spacers (K), and left-hand outer plate (H3); attach terminal plate assembly (G) and secure with nuts (J).

Step 31. Attach the electrical hardware as shown in figure 5-26 (Appendix).

Step 32. Attach selector shaft bias springs (Q).

NOTE

Check the operation of the selector as described in steps 33 through 35 prior to installing the selector assembly in the rear frame.

Step 33. Apply force at point A on figure 5-46 (Appendix) while applying force to the armature mark paddle latch (point B).

Step 34. Push the armature mark paddle latch under the armature and hold in position; then try to push the armature space paddle latch past the armature. If the armature space paddle latch bypasses the armature, the assembly must be repinned. Reverse this procedure to check the armature mark paddle latch clearances.

Step 35. Repeat steps 33 and 34 for the three remaining armature paddle latches.

Step 36. Install the selector assembly in the rear frame (figure 5-45, Appendix), insuring that the armature mark and space paddle latches (V and W, figure 5-26, Appendix) do not bind or catch on any of the clutch release arms.

NOTE

When installed, the grooves in outer frame plates (AG3 and H3) must be engaged with mark and space clutch release selector shafts (U and AE, figure 5-29, Appendix).

Step 37. Insert lock bar (AA3, figure 5-26, Appendix) into the left hole on the rear frame and then back out to the right to engage the outer side.

Step 38. Secure lock bar and selector assembly using two screws (AA1) and two lock washers (AA2).

For selectors with (-2) stamped after the serial number, proceed as follows:

Step 1. Insert one end of selector mark latch shafts (J, figure 5-27, Appendix) and selector space latch shafts (K) into bearings in right-hand magnet frame assembly (H).

Step 2. Align the bearing holes in left-hand magnet frame assembly (G) with the other end of selector mark latch shafts (J) and selector space latch shafts (K); press left-hand magnet frame assembly (G) toward right-hand magnet frame assembly (H).

Step 3. Attach cable strain relief bracket (B) using screw (C) and lock washer (D).

CAUTION

In the next step, place the selector assembly on a flat surface prior to tightening the selector tie rod studs in order to prevent twisting while tightening.

Step 4. Slide selector tie rod studs (N) through outer frame of right-hand magnet frame assembly (H), outer frame plate spacers (P), inner frame of right-hand magnet frame assembly (H), inner frame plate spacers (Q), inner plate of left-hand magnet frame assembly (G), outer frame plate spacers (P), and outer frame of left-hand magnet frame assembly (G); attach terminal plate assembly (E) and secure with nuts (F).

Step 5. Attach the electrical hardware as shown in figure 5-27 (Appendix).

Step 6. Attach selector shaft bias springs (L).

NOTE

Check the operation of the selector as described in preceding steps 33 through 35 prior to installing the selector assembly in the rear frame.

Step 7. Install the selector assembly in the rear frame (figure 5-45, Appendix), insuring that the armature mark and space paddle latch portions of the selector mark and space latch shafts (J and K, figure 5-27, Appendix) do not bind or catch on any of the clutch release arms.

NOTE

When installed, the grooves in outer frames of left-hand and right-hand magnet frame assemblies (G and H) must be engaged with mark and space clutch release selector shafts (U and AE, figure 5-29, Appendix).

Step 8. Insert lock bar (M3, figure 5-27, Appendix) into the left hold on the rear frame and then back out to the right to engage the other side.

Step 9. Secure the lock bar and selector assembly using screws (M1) and lock washers (M2).

v. BACK PLATE ASSEMBLY AND INSTALLATION.

Step 1. Insert rear lock screws (A1, figure 5-30, Appendix) into back plate (A3).

Step 2. Secure rear lock screws with retaining rings (A2).

Step 3. Position the back plate against rear frame (P); then slide it to the left to engage the tabs on the clamping plates with the slots in the rear frame.

Step 4. Tighten six screws to secure the back plate to rear frame (P).

Step 5. Align the holes in the fan outlet duct assembly with those in the back plate; install and tighten screws (B, figure 5-23, Appendix), lock washers (C), and washers (D).

w. TIME DELAY MOUNTING BASE PLATE ASSEMBLY AND INSTALLATION.

NOTE

This procedure applies to AN/TGC-14A(V) only.

Step 1. Attach post (Y, figure 5-20, Appendix) using lock washer (AA) and nut (Z).

Step 2. Press time delay secondary check pawl eccentric (U) into time delay secondary check pawl (T) using screw (V) and spacer (W); install this assembly on the post of time delay mounting base plate (X).

Step 3. Attach time delay secondary check pawl spring (S) to time delay secondary check pawl (T) and post on time delay mounting base plate assembly (X).

Step 4. Attach time delay switch (N), time delay switch actuator (L), and spacer (R) to time delay mounting base plate (X) using screws (P), washers (Q), and nut plate (AB).

Step 5. Install detent spring roller (K13a) into detent spring (K13d); secure with detent spring pin (K13b) and retaining ring (K13c).

Step 6. Attach detent spring assembly (K13) to time delay mounting base plate assembly (X) using retaining ring (K14).

Step 7. Insert return spiral spring (K5) into recess in advance ratchet (K6).

Step 8. Place the unthreaded portion of ratchet support shaft (K9) into the hole on the right side of time delay yoke (K8); as you feed the shaft into the yoke, install reduction ratchet (K7) and advance ratchet (K6) on the shaft; then push the shaft through the hole in the left side of the yoke.

Step 9. Install one shim (K4), time delay latch (K1), another shim (K4), sleeve (K3), and ring (K2) on ratchet support shaft (K9).

Step 10. Attach ratchet support shaft (K9) to time delay mounting base plate (X) using ratchet support shaft lock (K12), lock washer (K11), and lock nut (K10).

Step 11. Attach timing cam shaft extension (H) to timing cam shaft assembly (AF, figure 5-29, Appendix) using screw (J, figure 5-20, Appendix) and lock washer (E).

Step 12. Attach time delay mounting base plate (X) to left side frame of rear frame assembly (P, figure 5-30, Appendix) using four screws (D, figure 5-20, Appendix), lock washers (E), and sleeve spacers (F). Attach time delay feed and check pawl guide (G) prior to installing lower screw (D) and lock washer (E).

x. MAIN SHAFT ASSEMBLY AND INSTALLATION.

(1) SELECTOR MAIN SHAFT ASSEMBLY. (Refer to figure 5-21, Appendix.)

NOTE

When assembled, the clutch and cam assemblies on the selector main shaft will be positioned in cam alphabetical order as follows: A cam and start clutch assembly (G); B cam and lateral number 3 clutch (H); C cam and lateral number 4 clutch (J); D cam and lateral number 5 clutch (K); E cam and rotary number 2 clutch (L); and F cam and rotary number 1 clutch (M).

Step 1. Pack all clutch cavities and the inner cam race with Beacon Lubricant Number 325, Specification MIL-G-3278A prior to installing the clutches on the main shaft.

Step 2. Insert 28 rollers (R) into cam on A cam and start clutch assembly (G).

Step 3. Insert four rollers (N) into the four cavities of A cam and start clutch assembly (G).

Step 4. Install retaining ring (Q) on selector main shaft (T).

Step 5. Slide washer (P) onto selector main shaft (T).

Step 6. Slide A cam and start clutch assembly (G) onto selector main shaft (T), insuring that none of the 28 rollers (R) has moved out of position.

Step 7. Slide washer (P) onto selector main shaft (T) and secure A cam and start clutch assembly (G) by installing retaining ring (Q).

Step 8. Install clutches (H, J, K, L, and M) as described in steps 2 through 7; refer to the note preceding step 1 for the position of the clutches on the selector main shaft.

Step 9. Press left-hand bearing (E) into left-hand bearing retainer (F).

Step 10. Install start clutch release adjustment setscrew (D4d) into start clutch backstop lever (D4e) so that approximately 3/32 inch of the threads still protrudes.

Step 11. Install lock nut (D4c) on start clutch release adjustment setscrew (D4d).

Step 12. Install start clutch backstop eccentric bushing (D4f) into start clutch backstop lever (D4e).

Step 13. Slide clamp (D4a) onto start clutch backstop lever (D4e); temporarily secure with clamp screw (D4b).

Step 14. Slide start clutch backstop lever assembly (D4), felt washer (U), and start clutch release latch (D2) onto pin of range adjustment assembly (D5); secure with retaining ring (D3).

NOTE

On AN/TGC-14(V), range adjustment assembly (D5) and left-hand bearing retainer (F) are an inseparable assembly.

Step 15. Slide range adjustment assembly (D5) onto left-hand bearing retainer (F) and then onto selector main shaft (T).

Step 16. Attach start clutch backstop lever spring (D1) between range adjustment assembly (D5) and start clutch backstop lever assembly (D4).

Step 17. Install woodruff key (C) into keyway of selector main shaft (T).

Step 18. Slide printer helical gear (B) over woodruff key (C) on selector main shaft (T); secure with retaining ring (A).

Step 19. Slide spacer (S) onto selector main shaft (T).

(2) FUNCTION MAIN SHAFT ASSEMBLY. (Refer to figure 5-22, Appendix.)

NOTE

When assembled, the clutch and cam assemblies on the function main shaft will be positioned in cam alphabetical order (left to right) as follows: G and H cam and print function clutch (G); I cam and line feed clutch (J); J cam and letters figures clutch (K); K cam and carriage return clutch (M).

Step 1. Pack all clutch cavities and the cam inner race with Beacon Lubricant Number 325, Specification MIL-G-3278A prior to installing the clutches on the function main shaft.

NOTE

In the following steps, the sequence will be starting from the right and working left as parts are installed on function main shaft (S).

Step 2. Install retaining ring (D) in the first groove on the right side of function main shaft (S).

Step 3. Slide flat washer (E) onto function main shaft (S).

Step 4. Insert 28 rollers (F) into K cam and carriage return clutch (M).

Step 5. Insert four rollers (H) into K cam and carriage return clutch (M).

Step 6. Slide K cam and carriage return clutch (M) onto function main shaft (S), insuring that none of the rollers has moved out of place.

Step 7. Secure K cam and carriage return clutch (M) with flat washer (E) and retaining ring (D).

Step 8. Assemble clutches (K, J, and G) as described in steps 2 through 6; refer to note preceding step 1 for the position of the clutches on the function main shaft.

Step 9. Slide spacer (C) onto function main shaft (S); press center bearing (B) into center bearing retainer (A) and place them on function main shaft (S).

Step 10. Insert third reduction gear key (R) into keyway in function main shaft (S); install third reduction gear (Q), insuring that the slot in the third reduction gear is aligned with the third reduction gear key.

Step 11. Press right-hand bearing (P) into right-hand bearing retainer (N); place the assembly onto function main shaft (S).

(3) MAIN SHAFT INSTALLATION.

Step 1. Engage key of the selector main shaft with the keyway of the function main shaft.

Step 2. Carefully place the main shaft assembly in rear frame (P, figure 5-30, Appendix) insuring that none of the backstops or other linkage obstruct entry of the shaft.

Step 3. Insure that the backstops are resting on the correct clutches.

Step 4. Align timing marks on timing cam shaft gear and start clutch gear as shown on figure 5-7 (Appendix).

y. FEED MECHANISM AND MOTOR STOP ASSEMBLY AND INSTALLATION.

NOTE

This procedure applies to AN/TGC-14A(V) only.

Step 1. Attach time delay feed pawl assembly (C6, figure 5-20, Appendix), sleeve spacer (C5), and time delay check pawl assembly (C4) to main shaft drive adapter assembly (C7) using retaining ring (C3).

Step 2. Attach felt washer (C2) to main shaft drive adapter assembly (C7) using retaining ring (C1).

Step 3. Attach time delay check pawl helical spring (A) and time delay feed pawl helical spring (B) to their respective posts on time delay mounting baseplate (X).

Step 4. Attach feed mechanism and motor stop assembly (C) to printer helical gear (B, figure 5-21, Appendix) using two screws (AC, figure 5-20, Appendix) and two lock washers (E).

z. FRONT FRAME ASSEMBLY.

(1) REAR SIDE ASSEMBLY.

Step 1. Insert straight pin (AZ, figure 5-38, Appendix) into front frame assembly (CK); attach line feed shift lever (AY) to straight pin (AZ); secure with retaining ring (BA).

Step 2. Insert rotary cable adjustment screw (AW) through top bracket of front frame assembly (CK); then through top half of rotary cable adjustment bracket (AU), nylon lock block (AV), the bottom half of rotary cable adjustment bracket (AU), and the bottom half of the bracket on front frame assembly (CK).

Step 3. Secure rotary cable adjustment screw (AW) in rotary cable adjustment bracket (AU) with retaining ring (AX).

Step 4. Insert letters figures cam follower stroke adjustment screw (CJ) approximately halfway into bracket of front frame assembly (CK).

Step 5. Insert spacer (BL6d) into lateral transfer pulley bearing retainer (BL6e).

Step 6. Press one lateral transfer pulley bearing (BL6c) into lateral transfer pulley bearing retainer (BL6e).

Step 7. Press the other lateral transfer pulley bearing (BL6c) onto lateral transfer pulley shaft (BL6f); then feed the shaft through spacer (BL6d) and lateral transfer pulley bearing retainer (BL6e).

Step 8. Align the holes in lateral transfer pulley (BL6a) with holes in lateral transfer pulley shaft (BL6f); press the lateral transfer pulleys on the shaft.

Step 9. Press two pins (BL6b) into the holes in lateral transfer pulleys (BL6a) and lateral transfer pulley shaft (BL6f).

Step 10. Insert lateral transfer pulley assembly (BL6) into front frame assembly (CK) and secure with ring (BL7).

Step 11. Press chain pulley bearing (CF1) into chain pulley (CF2).

Step 12. Insert shaft (CH) through front frame assembly (CK); install spacer (CG), chain pulley assembly (CF), and spacer (CE) as shaft (CH) is advanced through the front frame.

Step 13. Pass shaft (CH) through the tab on front frame assembly (CK); install link (CC) and then secure shaft (CH) with retaining ring (CD).

Step 14. Install number 5 lateral stroke adjustment screw (BG), nut (BT), and sleeve spacer (BS) in square tab on front frame assembly (CK).

Step 15. Install remaining four rotary and lateral stroke adjustment screws (BG) and nuts (BF) on front frame assembly (CK).

Step 16. Install automatic chain takeup actuator adjustment setscrew (BM) and nut (BN) into chain adjustment slide bracket (BP).

Step 17. Attach chain adjustment slide bracket (BP) to front frame assembly (CK) using screw (BQ) and lock washer (BR).

Step 18. Press carriage pulley bearing (BE2a) into carriage pulley (BE2b).

Step 19. Press carriage pulley assembly (BE2) into carriage (BE5).

Step 20. Insert carriage pulley rod (BE1) through front frame assembly (CK); place carriage (BE5) over carriage pulley rod (BE1) and then secure with carriage clip (BE6), sleeve spacer (BE4), and retaining ring (BE3).

Step 21. Align holes in carriage pin locks (BD) with hole in carriage pulley rod (BE1) by compressing carriage pin lock (BD) around carriage pulley rod (BE1); then install number 1 carriage pin (BC) through carriage pin lock (BD) and carriage pulley rod (BE1).

Step 22. Repeat steps 18 through 21 for number 3 and 5 carriage pins (BC).

Step 23. Install number 2 and 4 carriage pins (BB and CM) as described in Steps 18 through 21.

Step 24. See insert on figure 5-38 (Appendix). Place carriage pin number 2 stop (AN/TGC-14(V) only), compression spring, and compression spring retainer on carriage pin number 2; secure with retaining ring.

Step 25. Press printer keyboard idler gear bearing (BJ1) into printer keyboard idler gear (BJ2); insert printer keyboard idler gear stud (BH) into printer keyboard idler gear bearing (BJ1).

Step 26. Insert screw (BK) through the printer keyboard idler gear and bearing assembly, standoff gear support (BJ3), and front frame assembly (CK); secure with nut (CL).

Step 27. Attach automatic chain takeup pawl (BV) to front frame assembly (CK); secure with retaining ring (BX).

Step 28. Attach lateral transfer pulley chain (BL1) to lateral transfer pulley (BL6a) using spacers (BL5), pin (BL2), and retaining ring (BL4).

Step 29. Feed lateral transfer pulley chain (BL1) through carriages (BE5) and attach to automatic chain takeup adjustment stud (BZ), using pin (BL3) and retaining ring (BL4).

Step 30. Attach automatic chain takeup feed pawl (BW) to automatic chain takeup actuator lever (CA) using retaining ring (BX).

Step 31. Insert automatic chain takeup adjustment stud (BZ) through its mounting hole in front frame assembly (CK); place automatic chain takeup actuator lever (CA) over automatic chain takeup adjustment stud (BZ); secure with left-hand threaded automatic chain takeup ratchet (BY).

Step 32. Attach spring (CB) to link (CC) and automatic chain takeup actuator lever (CA).

Step 33. Attach spring (BU) to automatic chain takeup pawl (BV) and automatic chain takeup feed pawl (BW).

(2) FRONT SIDE ASSEMBLY.

NOTE

The cable and belt pulley bearings are pressed into the pulleys at the factory and should not be disassembled unless replacement is necessary.

Step 1. Press three pulley bearings (A1, figure 5-31, Appendix) into three pulleys (A2).

Step 2. Slide three sleeve spacers (C), three pulley assemblies (A), and three sleeve spacers (C) on the posts on the front frame and pin (W); secure with three retaining rings (B).

Step 3. Insert pin (W) into the front frame and secure with nut (X).

Step 4. Press lateral control belt pulley bearing (AK1) into lateral control belt pulley (AK2).

Step 5. Slide two sleeve spacers (AM), two lateral control belt pulley assemblies (AK), and two sleeve spacers (AM) onto two pins on the front frame; secure with two retaining rings (AL).

Step 6. Press letters figures carriage pulley bearing (Y2a) into letters figures carriage pulley (Y2b); push letters figures carriage pulley assembly (Y2) into letters figures pulley carriage (Y5).

Step 7. Insert letters figures pulley carriage rod (Y1) through letters figures pulley carriage (Y5).

Step 8. Slide spring clip (Y6) and sleeve spacer (Y4) onto letters figures carriage pulley rod (Y1); secure the entire assembly with retaining ring (Y3).

Step 9. Insert the drilled head of letters figures pulley carriage rod (Y1) through the correct hole in the front frame; slide straight pin (AA) through the tabs of the riveted casting assembly mounted on the front frame and letters figures pulley carriage rod (Y1).

Step 10. Install two retaining rings (Z) on straight pin (AA).

Step 11. Press return cable pulley bearing (U1a) into return cable pulley (U1b).

Step 12. Slide sleeve spacer (U3), return cable pulley assembly (U1), and sleeve spacer (U3) onto pin of return cable pulley bracket (U4); secure the entire assembly with retaining ring (U2).

Step 13. Attach return cable pulley bracket assembly (U) or (on AN/TGC-14(V) only) pulley mounting bracket to front frame using screw (V).

Step 14. Attach two frame clamp pads (AC1) and two frame clamp screws (AC2) to two frame clamps (AC3).

Step 15. Attach two frame clamp assemblies (AC) to the front frame using two clamp pivots (AD) and two retaining rings (AE).

Step 16. Attach print hammer actuator link guide bracket (E) to the front frame using screw (D).

Step 17. Slide print hammer release (H) and washer (L) over print hammer release shaft (G).

Step 18. Insert print hammer release shaft (G) into front frame; secure with flat washer (K) and self-locking nut (J).

Step 19. Attach print hammer release stop lever (M) to the front frame using screw (N).

Step 20. Attach two printer electrical chassis locators (AR) to the front frame using lock nuts (AS).

NOTE

Step 21 through step 28 apply to AN/TGC-14(V) only. See insert on figure 5-31 (Appendix).

Step 21. Place figures H code bar on the code bar support, the riveted bracket located on left side of front frame, and the pulley mounting bracket.

Step 22. Slide code bar guide, compression spring, and compression spring retainer onto guide pin; secure with a retaining ring.

Step 23. Insert guide pin through figures H code bar and code bar support; screw the guide pin into the front frame.

Step 24. Attach washer and clamp plate to the front frame using screw.

Step 25. Attach actuator stud and lock washer to the front frame.

Step 26. Place actuator spring over actuator stud, engaging the end of the spring in the hole in the front frame.

Step 27. Engage the top end of actuator spring with the hole in figures H code bar actuator; place the figures H code bar actuator on actuator stud and secure with retaining ring.

Step 28. Attach code bar spring to figures H code bar and to tab on riveted bracket on left side of front frame.

Step 29. Align left-hand guide cover (R) with riveted bracket on front frame and right-hand guide cover (S) with return cable pulley bracket (U4) or (AN/TGC-14(V) only) pulley mounting bracket.

Step 30. Secure left-hand and right-hand guide covers (R and S) with two screws (T).

Step 31. Attach line feed shift (AG1) to line feed shift arm (AG3) with retaining ring (AG2).

Step 32. Attach line feed spacing shift bracket (AG7) to line feed shift arm (AG3); secure with washer (AG5) and ring (AG4).

Step 33. Install shift lever adjustment screw (AG6) in line feed spacing shift bracket (AG7).

Step 34. Secure line feed spacing arm assembly (AG) to the front frame using three screws (AH) and lock washers (AJ).

Step 35. Attach print lever and character advance lever shaft support bracket assembly (AN) to the front frame using lock washers (AQ) and screws (AP).
aa. FUNCTION SLIDE ASSEMBLY.

Step 1. Attach lateral control function slide (C6, figure 5-37, Appendix) to support (C9) using two spacers (C5), clips (C2), screws (C3), and lock washers (C4).

Step 2. Attach rotary function slide (C10) to support (C9) using two spacers (C5), clips (C2), lock washers (C4), and screws (C3).

CAUTION

Make certain that spacers (C8) are installed under the function slide assembly; otherwise the function slides will bind and the unit will not function properly.

Step 3. Position function slide assembly and three spacers (C8) on front frame; secure with three screws (C7) by passing them through the front frame from the rear to the front. Refer to (F, figure 5-45, Appendix) for relative location of parts.

Step 4. Install print lever and character advance lever shaft support bracket assembly (AN, figure 5-31, Appendix) on the front frame; secure with four screws (AP) and lock washer (AQ).

ab. STRIP ASSEMBLY.

(1) LATERAL CONTROL BELT STRIP ASSEMBLY.

Step 1. Press lateral control belt pulley bearing (B1a, figures 5-37, Appendix) into lateral control belt pulley (B1b).

Step 2. Install lateral control belt pulley assembly (B1 in fork (B4); secure with pin (B2) and retaining ring (B3).

Step 3. Insert slack takeup slide (B6) into lateral control strip (B23).

Step 4. Slide slack takeup spring (B5) onto shaft of fork (B4); then pass the shaft through lateral control strip (B23) and screw into slack takeup slide (B6).

Step 5. Engage the tab of lateral control chain take-up lever (B10) in the slot of link (B21).

Step 6. Insert screw (B12) through lock washer (B13), lateral control chain takeup eccentric (B9), lateral control chain takeup lever (B10), and link (B21); secure the entire assembly by threading screw (B12) into detent link (B11).

Step 7. Engage the tab on detent link (B11) with the fourth tooth from the right side of link (B21); turn lateral control chain takeup eccentric (B9) so that the heavy portion faces down (bottom).

Step 8. Attach lateral control chain takeup lever (B10) to lateral control strip (B23) using pin (B22) and retaining ring (B19).

Step 9. Attach lateral control chain (B20) to link (B21) by inserting pin (B18) through one side of lateral control chain (B20), spacer (B17), link (B21), spacer (B17), and other side of chain; then secure with retaining ring (B19).

Step 10. Attach the loose end of lateral control chain (B20) to lateral transfer pulley (BL6a, figure 5-38, Appendix) using pin (B15, figure 5-37, Appendix), spacers (B14), and retaining ring (B16).

Step 11. Position lateral control strip (B23) over post of lateral control function slide (C6); secure with retaining ring (C1).

Step 12. Attach safety spring (B7) to pin in lateral control strip (B23) and post of lateral control function slide (C6).

(2) ROTARY CABLE STRIP ASSEMBLY.

Step 1. Press rotary cable pulley bearing (D1a, figure 5-37, Appendix) into rotary cable pulley (D1b).

Step 2. Place rotary cable pulley assembly (D1) in rotary strip (D13); secure with pin (D2) and retaining ring (D3).

Step 3. Attach rotary chain (D10) to rotary strip (D13) using pin (D11), spacer (D9), and retaining ring (D12).

Step 4. Place rotary strip (D13) over center post of rotary function slide (C10); secure with retaining ring (C1).

Step 5. Attach safety spring (D4) to post of rotary strip (D13) and center post of rotary function slide (C10).

Step 6. Feed the rotary chain through number 1 and number 2 carriage pulleys as shown in figure 4-19 (Appendix).

Step 7. Attach rotary chain adjustment stud (D6, figure 5-37, Appendix) to rotary chain (D10) using pin (D7) and retaining ring (D8).

Step 8. Insert rotary chain adjustment stud (34, figure 5-5, Appendix) through the unthreaded hole in the upper tab of the casting on the front frame; secure the stud with nut (D5, figure 5-37, Appendix).

Step 9. Press spring bar (A50) onto the front frame.
ac. FUNCTION BACKSTOP ASSEMBLY.

Step 1. Place line feed sensing finger lever (A23, figure 5-37, Appendix) on the pin on left side of line feed clutch release arm (A30); secure with retaining ring (A29).

Step 2. Place off line linefeed sensing finger lever (A24) on the pin on right side of line feed clutch release arm (A30); secure with retaining ring (A29).

Step 3. Assemble remaining function clutch release arms (A31, A33, A34, A35, A15, and A17) as described in steps 1 and 2.

Step 4. Align the keyway of function clutch release shaft (A20) with the key of function clutch release and backstop frame assembly (A49) when installing function clutch release shaft (A20) in function clutch release and backstop frame assembly (A49); slide function clutch release shaft (A20) into left side of function clutch release and backstop frame assembly (A49), spacer (A21), line feed clutch release arm (A30), figures clutch release arm (A31), spacer (A21), bell advance suppression arm (A33), spacer (A21), letters clutch release arm (A34), carriage return clutch release arm (A35), spacer (A21), and then the right side of function clutch release and backstop frame assembly (A49).

Step 5. Install spacer (A18), space arm (A17), spacer (A16), and blank advance suppression arm (A15) on function clutch release shaft (A20).

Step 6. Install retaining rings (A19) in their respective grooves in function clutch release shaft (A20).

Step 7. Install five function advance prevent adjustment screws (A9a) in nylon locking plate (A9b) and advance prevent bail carriage return bar (A9c).

Step 8. Position advance prevent bail carriage return bar (A9c) so that its arms are in contact with the ends of function clutch release shaft (A20); insert advance prevent bail carriage return bar shaft (A10) through function clutch release shaft (A20).

Step 9. Secure advance prevent bail carriage return bar shaft (A10) by installing and tightening clamp (A2) and clamp setscrew (A3) on advance prevent bail carriage return bar (A9c); check that advance prevent bail carriage return bar shaft (A10) is flush with both ends of advance prevent bail carriage return bar (A9c).

Step 10. Insert function clutch release arm stop shaft (A44) into function clutch release and backstop frame assembly (A49); secure with retaining rings (A45).

Step 11. Slide print prevent rod lever shaft assembly (A47) through function clutch release arm stop shaft (A44); secure with retaining ring (A43).

Step 12. Slide left-hand print prevent rod actuator arm (A46) onto left side of print prevent rod lever shaft assembly (A47) and temporarily secure with print prevent rod actuator arm screw (A42).

Step 13. Slide right-hand print prevent rod actuator arm (A41) onto right side of print prevent rod lever shaft (A47) and temporarily secure with print prevent rod actuator arm screw (A42).

Step 14. Install seven print prevent adjustment screws (A39a) through print prevent rod (A39b) and lock strip (A39c).

Step 15. Attach print prevent rod (A39b) to left-hand and right-hand print prevent rod actuator arms (A46) and (A41) using screw (A37) and flat washer (A38).

Step 16. Slide clamp (A2) onto function backstop (A5); install function backstop eccentric bushing (A4) into function backstop (A5); install and tighten clamp setscrew (A3).

Step 17. Repeat step 16 for remaining function backstops (A5), making certain that the carriage return backstop eccentric bushing is installed exactly as shown in figure 5-37 (Appendix).

Step 18. See insert on figure 5-37 (Appendix). Install clamp setscrew (AN/TGC-14(V) only) in clamp; install clamp assembly on figures H code bar return stop.

Step 19. Install sleeve spacer (AN/TGC-14(V) only) in figures H code bar return stop; clamp in position by tightening clamp setscrew.

Step 20. Insert function backstop shaft (A8) through function clutch release and backstop frame assembly (A49), line feed backstop (A5), sleeve spacer (A6), letters figures backstop (A5), and carriage return backstop (A5); secure function backstop shaft (A8) by installing retaining ring (A7).

Step 21. Grasp entire function backstop assembly (A) and align the function sensing finger levers with their respective slots in function slide support (C9); position function clutch release and backstop frame assembly (A49) against the front frame and secure with three screws (A48).

Step 22. Attach three function backstop springs (A1) to function backstops (A5) and pins of function clutch release and backstop frame assembly (A49).

Step 23. Attach print prevent rod actuator arm bias spring (A40) to right-hand print prevent rod actuator arm (A41) and spring post on right side of function clutch release and backstop frame assembly (A49).

Step 24. Attach function clutch release arm return helical springs (A11) between blank advance suppression arm (A15) and space arm (A17) and their respective posts on spring bar (A50).

Step 25. Attach function clutch release arm return helical springs (A11) between clutch release arms (A30, A31, A33, A34, and A35) and their respective posts on spring bar (A50).

Step 26. Attach function sensing finger lever helical spring (A12) to blank sensing finger lever (A25) and blank advance suppression arm (A15).

Step 27. Attach function sensing finger lever helical spring (A12) to function sensing finger lever (A13) and space arm (A17).

Step 28. Attach function sensing finger lever helical spring (A12) to line feed sensing finger lever (A23) and line feed clutch release arm (A30).

Step 29. Attach function sensing finger lever helical spring (A12) to off line line feed sensing finger lever (A24) and line feed clutch release arm (A30).

Step 30. Attach function sensing finger lever helical spring (A12) to function sensing finger lever (A13) and figures clutch release arm (A31).

Step 31. Attach function sensing finger lever helical spring (A12) to bell actuator sensing finger lever (A26) and bell advance suppression arm (A33).

Step 32. Attach function sensing finger lever helical spring (A12) to function sensing finger lever (A13) and letters clutch release arm (A34).

Step 33. Attach off line letters sensing finger lever spring (A22) to off line letters sensing finger lever (A27) and letters clutch release arm (A34).

Step 34. Attach function sensing finger lever helical spring (A12) to off line carriage return sensing finger lever (A28) and carriage return clutch release arm (A35).

Step 35. Attach function sensing finger lever helical spring (A12) to carriage return sensing finger lever (A23) and carriage return clutch release arm (A35).

Step 36. Slide function sensing finger lever stop strip (E) between the springs and the function sensing finger levers, with the flat edge against the printer frame.

Step 37. Install nut (F4) on print prevent stop adjustment set screw (F5) and install setscrew in off line function slide assembly (F6).

Step 38. Install off line function return helical springs (F1) between off line function slide assembly (F6) and the tabs on four function levers.

Step 39. Attach bell lever assembly (F2) on off line function slide assembly (F6) and secure with retaining ring (F3); insert bell actuator connecting rod (A32) into bell advance suppression arm (A33) and bell lever assembly (F2); attach function clutch release arm return helical spring (A11) to end of bell actuator connecting rod (A32) and spring bar (A50).

Step 40. Position off line function slide assembly (F6) on the front frame; align the holes of the function sensing finger lever stop strip and the off line function slide with the front frame; secure the entire assembly with four screws (CP, figure 5-31, Appendix).

ad. ADVANCE DRUM ASSEMBLY AND INSTALLATION.

Step 1. Install internal retaining ring (D8, figure 5-36, Appendix) in advance drum (D7).

Step 2. Press ball bearing (D9) into rear of advance drum (D7).

Step 3. Install spacer (D3) and bearing (D2) in advance drum (D7).

Step 4. Slide advance drum assembly onto shaft on advance drum bracket (D10); secure with grip ring (D1).

Step 5. Press two dowel pins (A1) into rotary pulley shim (A5) so that they are flush with the right side of the rotary pulley shim.

Step 6. Slide spacer (A3) onto shaft of rotary pulley shim (A5).

Step 7. Press rotary cable pulley bearing (A4a) into rotary cable pulley (A4b); then slide one spacer (A3) and rotary cable pulley assembly (A4) onto shaft of rotary pulley shim (A5).

Step 8. Install another spacer (A3) and secure the entire assembly with grip ring (A2).

Step 9. Loosely install three cable clamps (D4) on advance drum (D7) using lock washers (D6) and cable clamp screws (D5).

Step 10. Align the mounting hole in check pawl guide bracket (E) with the pins of rotary cable pulley shim assembly (A) and advance drum bracket (D10); attach check pawl guide bracket (E), rotary cable pulley shim assembly (A), and advance drum assembly (D) to the holes in the front frame using screws (AB, figure 5-31, Appendix).

ae. FRONT FRAME AND MAIN SHAFT ASSEMBLY.

Step 1. Rest rear frame assembly (N, figure 5-45, Appendix) on its back plate, insuring that the main

shaft is still properly located in the three bearing cut-outs.

Step 2. Position front frame assembly (G) over the main shaft and rear frame so that the top of front frame engages the rear frame first.

CAUTION

In the next step, insure that the line feed pawl is properly aligned and engaged with its respective slot in the front frame and that the function sensing finger levers are behind the automatic carriage return and line feed bail actuator.

Step 3. Engage all the type positioning cam followers with their respective carriage pulleys; then slowly apply pressure toward the back plate and engage the bottom row of type positioning cam followers with their respective carriage pulleys.

CAUTION

In the next step, if for any reason front and rear frames do not fit together properly, check the following before proceeding:

(1) Range adjustment assembly (D5, figure 5-21, Appendix) must be between the two pins on front frame (CK, figure 5-38, Appendix).

(2) All type positioning cam followers and the letters figures carriage pulley arm must be engaged with their respective carriage pulleys.

(3) Line feed pawl must not be jammed under front frame.

(4) Function sensing finger levers must be behind the automatic carriage return and line feed bail actuator.

(5) Insure that there is no other interference between any of the parts on either frame.

Step 4. Press front and rear frames together, insuring that the corner of advance drum bracket (D10, figure 5-38, Appendix) does not engage first character adjustment screw (J2, figure 5-28, Appendix).

Step 5. Engage and tighten six frame clamps (three on bottom and three on top).

Step 6. For AN/TGC-14A(V), attach secondary number 3 cam follower spring (CN, figure 5-38, Appendix) between the post on rear of front frame assembly (CK) and the post on secondary number 3 cam follower (AG, figure 5-29, Appendix). For AN/TGC-14(V), attach the spring between the post on the cam follower and the hole in ribbon feed mounting base plate (55, figure 5-39, Appendix).

af. TAKEUP BRACKET ASSEMBLY AND INSTALLATION.

Step 1. Install ring (E5, figure 5-35, Appendix) in takeup drum (E1).

Step 2. Press inside bearing (E3) into takeup drum (E1).

Step 3. Install carriage return spiral spring (E6) in takeup drum (E1), engaging the hook of the carriage return spiral spring with the slot in the takeup drum as shown in figure 5-35 (Appendix); loosely install lateral control belt clamp (E37) using screw (E38) and lock washer (E39).

Step 4. Slide takeup drum shaft (E8) into the takeup drum assembly.

Step 5. Slide spacer (E4) into takeup drum (E1).

Step 6. Press outside bearing (E3) into takeup drum (E1) and secure shaft with retaining ring (E2).

Step 7. Engage carriage return spring mounting cup (E9) with carriage return spiral spring (E6); secure with carriage return spring holder (E7).

Step 8. Slide takeup drum shaft (E8) through the mounting hole in takeup drum bracket assembly (E36) and engage the two tabs of carriage return spring mounting cup (E9) with the appropriate holes in takeup drum bracket assembly (E36); apply light tension to the carriage return spiral spring to prevent it from disengaging the carriage return spring mounting cup by aligning the hole in the takeup drum with the hole in the bracket and securing it with a pin.

Step 9. Secure the takeup drum assembly with lock washer (E11) and nut (E10).

Step 10. Press belt pulley bearing (E28a) into belt pulley (E28a2).

Step 11. Slide spacer (E28d), belt pulley assembly (E28a), and spacer (E28c) onto left-hand pulley bracket (E28e); secure with ring (E28b).

Step 12. Press cable pulley bearing (E30a) into cable pulley (E30b).

Step 13. Install spacer (E32), cable pulley assembly (E30), and spacer (E32) onto takeup drum bracket assembly (E36); secure with ring (E31).

Step 14. Attach left-hand belt pulley bracket (E28e) to takeup drum bracket assembly (E36) using two screws (E29).

Step 15. Press belt pulley bearing (E15b) into belt pulley (E15a).

Step 16. Install belt pulley assembly (E15) on takeup arm (E18); secure with spacer (E17) and grip ring (E16).

Step 17. Attach takeup arm (E18) onto takeup drum bracket assembly (E36) using flat washer (E20) and ring (E19).

Step 18. Install lateral tension helical spring (E12) on post of takeup drum bracket assembly (E36) and pin of takeup arm (E18); secure with flat washers (E14) and retaining rings (E13).

NOTE

Steps 19 through 21 pertain to AN/TGC-14A(V) only; steps 22 and 23 pertain to AN/TGC-14(V) only.

Step 19. Insert range dial (E23) into takeup drum bracket assembly (E36), range finder lock helical spring (E26), and conical range finder slide lock (E25); install range finder knob (E27) into range dial (E23); press groove pin (E24) through conical range finder slide lock (E25) and into range finder knob (E27).

Step 20. Insert range finder lock lever shaft (E35a) through range finder lock lever bracket (E35e), range finder lock lever (E35c), and range finder lock lever spring (E35d); secure with retaining ring (E35b).

Step 21. Install range finder lock lever assembly (E35) on takeup drum bracket assembly (E36) with screw (E34) and flat washer (E33).

Step 22. See AN/TGC-14(V) insert on figure 5-35 (Appendix). Insert the range pinion into the range finder lock helical spring and takeup drum bracket assembly; install spacer and range pinion dial; press range pinion dial pin into range pinion.

Step 23. Install range pinion lock knob in clamp of takeup drum bracket assembly.

Step 24. Preload takeup drum by turning it counterclockwise two to three complete turns. Insert a screw or some similar object into the hole in the takeup drum and the front frame to prevent the takeup drum from unwinding.

ag. PRINT LEVER SHAFT INSTALLATION.

Step 1. Install bearing (D2a, figure 5-35, Appendix) into print lever shaft (D2b).

Step 2. Install two felt washers (D3) on print lever shaft assembly (D2) and slide them to the extreme left side of the print lever shaft assembly.

Step 3. Install print prevent arm clamping screw (A2) in print prevent arm (A1), print cam follower clamping screw (B2) in print cam follower (B1), and print spring arm clamping screw (C4) in print spring arm (C3).

NOTE

In the next step, slide print spring arm and clamping screw (C4 and C3), print cam follower assembly (B), and print prevent arm assembly (A) onto print lever shaft assembly (D2) as it is installed in front frame.

Step 4. Install print lever shaft assembly (D2) through hole in left side of front frame (CK, figure 5-38, Appendix).

Step 5. Attach print helical spring yoke link (K, figure 5-30, Appendix) to print spring arm (C3, figure 5-35, Appendix) using print spring yoke pivot stud (C1); secure with retaining ring (C2) or, on some equipment, nylon washer and cotter pin.

Step 6. Install retaining rings (D1) in their appropriate grooves on print lever shaft assembly (D2).

Step 7. Attach takeup drum and linkage assembly (E) to front frame (CK, figure 5-31, Appendix) using two screws (AT, figure 5-31, Appendix) and two screws (P).

ah. FUNCTION SHAFT AND RIGHT-HAND SECTION ASSEMBLY AND INSTALLATION.

Step 1. Press spacer (AA, figure 5-36, Appendix) into character advance lever shaft assembly (X4).

Step 2. Oil felt strip (X3) and then install it on character advance lever shaft assembly (X4).

Step 3. Partially install character advance lever shaft assembly (X4) through the hole in the right side of front frame (CK, figure 5-31, Appendix).

Step 4. Install code bar actuator clamp screw (AC2, figure 5-36, Appendix) into code bar actuator clamp (AC1).

Step 5. Install lifter arm clamping screw (AD2) into lifter arm (AD1).

Step 6. Press two sleeve bearings (AF6a) into function lever (AF6b).

Step 7. Install two compression springs (AF5) in the recess of function lever (AF6b); then place function bar (AF3) over the ends of compression springs (AF5) and engage the slots of function bar (AF3) with the tabs of function lever (AF6b).

CAUTION

In the next step, depress function bar (AF3) prior to turning special screws (AF4). If the screws are turned without first disengaging function bar (AF3), the locking feature will be destroyed.

Step 8. Install special screws (AF4) in function lever (AF6b) by compressing the function bar and compression springs and then turning the special screws clockwise until there is 1/4-inch clearance between the function bar and the function lever.

Step 9. Install function cam follower clamping screw (AG2) into function cam follower (AG1).

Step 10. Engage lifter arm spring (AE) with the holes in function lever (AF6b) and lifter arm assembly (AD).

Step 11. Install ring (Z), spacer (AB), code bar actuator clamp assembly (AC), lifter arm spring (AE), function lever (AF6b), and function cam follower (AG1) on character advance lever shaft assembly (X4) as it is installed in front frame assembly (CK, figure 5-31, Appendix).

Step 12. Install clamp setscrew (N2, figure 5-36, Appendix) in clamp (N1).

Step 13. Slide bounce prevent lever eccentric bushing (N3) into bounce prevent lever (N4); then install the clamp assembly on the bounce prevent lever and lightly clamp.

Step 14. Install carriage return cam follower clamping screw (P1) in carriage return cam follower (P2).

Step 15. Install retaining ring (K), shown to the right of bounce prevent lever (N4), on carriage return shaft assembly (L).

Step 16. Slide bounce prevent lever (N4) and felt washer (BG) onto carriage return shaft assembly (L); then slide shaft partially through front frame assembly (CK, figure 5-31, Appendix).

Step 17. Install carriage return cam follower assembly (P, figure 5-36, Appendix) on carriage return shaft assembly (L) as it is slid through front frame.

Step 18. Engage the left side of carriage return shaft assembly (L) with the hole in advance prevent bail carriage return bar shaft (A10, figure 5-37, Appendix); then engage the pin of carriage return cam follower (P2, figure 5-36, Appendix) with the hole in advance prevent bail carriage return bar (A9c, figure 5-37, Appendix).

Step 19. Install retaining ring (K, figure 5-36, Appendix) on carriage return shaft assembly (L).

Step 20. Attach bounce prevent lever spring (M) to bounce prevent lever (N4) and advance drum bracket (D10).

Step 21. Install felt strip (X6) and felt strip clip (X5) on lever of character advance lever shaft assembly (X4); then crimp felt strip clip (X5).

Step 22. Press rotary cable pulley bearing (BC3a) into rotary cable pulley (BC3b).

Step 23. Slide spacer (BC2), rotary cable pulley assembly (BC3), and spacer (BC2) onto pin of rotary cable pulley shaft assembly (BC3c); secure with grip ring (BC1).

Step 24. Press lateral control belt pulley bearing (BF3a) into lateral control belt pulley (BF3b).

Step 25. Slide spacer (BF4), lateral control belt pulley assembly (BF3), and spacer (BF2) onto pin of lateral control belt pulley bracket (BF5); secure with grip ring (BF1).

Step 26. Attach rotary cable pulley shaft assembly (BC3c), spacer bracket (BD), and lateral control belt pulley bracket (BF5) on the right side of front frame assembly (CK, figure 5-31, Appendix), using advance suppression latch mounting stud (BA, figure 5-36, Appendix) and screw (AF, figure 5-31, Appendix).

Step 27. Install felt washers (AZ, figure 5-36, Appendix), advance suppression latch (AY), and advance suppression latch eccentric bushing (AX) on advance suppression latch mounting stud (BA); secure with screw (AW).

Step 28. Install check pawl eccentric stud (AT1) on check pawl (AT4) using lock washer (AT2) and nut (AT3).

Step 29. Install felt washer (AV), spacer (AU), check pawl assembly (AT), and check pawl eccentric bushing (AS) on front frame assembly (CK, figure 5-38, Appendix); secure with screw (AR, figure 5-36, Appendix).

Step 30. Install nut (AN2) on rotary detent pawl adjustment screw (AN1); then install screw (AN1) in rotary detent pawl (AN3) so that the screw protrudes 1/16 inch.

Step 31. Install washer (AP), rotary detent pawl (AN3), felt washer (AL), rotary detent pawl actuator arm (AK2), and rotary detent pawl eccentric bushing (AJ) on front frame assembly (CK, figure 5-38, Appendix); secure with screw (AH, figure 5-36, Appendix).

Step 32. Install character advance pawl (T) and character advance pawl eccentric bushing (V) on lever of character advance lever shaft assembly (X4) using screw (U).

Step 33. Attach character advance pawl spring (S) to lever of character advance lever shaft assembly (X4) and character advance pawl (T).

Step 34. Attach rotary detent pawl spring (AM) to lever of character advance lever shaft assembly (X4) and rotary detent pawl (AN3).

Step 35. Install index link (W) on rotary detent pawl actuator arm (AK2) and lever of character advance lever shaft assembly (X4); secure with retaining rings (AK1 and X2).

Step 36. Install shim (R), advance prevent lever (Q), and ring (Y) on character advance lever shaft assembly (X4); secure with retaining ring (X1).

Step 37. Attach check pawl spring (AQ) to post on check pawl assembly (AT) and to advance suppression latch (AY).

Step 38. Attach advance prevent lever spring (H) to advance prevent lever (Q) and to lever of carriage return shaft assembly (L).

Step 39. Install spacer (G) and check pawl link (F) on lever of carriage return shaft assembly (L); secure with retaining ring (J) and check that check pawl link (F) is engaged with check pawl (AT4).

Step 40. Install lateral control belt (BE), return cable (B), and print hammer cable (C) in this sequence as instructed in paragraph 5-5c. The rotary cable will be installed later.

Step 41. Fasten function helical spring yoke link assembly (K, figure 5-30, Appendix) to function lever (AF6b, figure 5-36, Appendix) using function spring yoke pivot stud (AF1); secure with retaining ring (AF2) or, on some equipment, nylon washer and cotter pin.

ai. PAPER FEED ASSEMBLY AND INSTALLATION.

Step 1. For AN/TGC-14A(V) only, install paper feed tooth sprockets (AB, figure 5-34, Appendix) into paper feed rubber roll (AC).

Step 2. Install paper feed rubber roll (AC) into paper feed guide (AG); secure by installing two ball bearings (Y and AF) on the end shafts of paper feed rubber roll (AC).

Step 3. Install washer (AE) on the left side of paper feed rubber roll (AC) and secure with grip ring (AD).

Step 4. Install screw (AA) in paper feed rubber roll (AC).

Step 5. Install lock washer (X) and paper feed detent and ratchet (V) on the right side of paper feed rubber roll (AC); secure by pressing in ratchet roll pin (W).

Step 6. Install detent roller (T1) on paper feed detent arm (T3); secure with retaining ring (U).

Step 7. Slide paper feed detent arm (T3) and detent roller (T1) onto shaft of paper feed guide (AG); secure with retaining ring (U).

Step 8. Attach paper feed detent spring (S) to paper feed guide (AG) and paper feed detent arm (T3).

Step 9. Attach left-hand and right-hand pressure roll actuator arms (Q and R) to paper feed guide (AG) by inserting pressure roll pivot shaft (K) through left-hand and right-hand pressure roll actuator arms (Q and R) and then through the tabs on paper feed guide (AG).

Step 10. Secure pressure roll pivot shaft (K) with retaining rings (L).

Step 11. Slide pressure roll shaft (M) through the hole in left-hand pressure roll actuator arm (Q), through pressure roll (P), and through the hole in right-hand pressure roll actuator arm (R); secure with retaining rings (N).

NOTE

In the next step, install pad spring (D), paper pressure release lever pivot clamp (G3), pressure release cams (C2), and pad spring (D) on paper feed pressure release shaft (A) as it is slid through the tabs of pressure pad (E) and paper feed guide (AG). Insert paper feed stop arm (AJ) on left end of paper feed pressure release shaft (A) and anti-turn nut (AK) and screw (AH) in paper feed stop arm (AJ).

Step 12. Position pressure pad (E) against paper feed guide (AG); secure by sliding paper feed pressure release shaft (A) through the tabs of paper feed guide (AG) and pressure pad (E).

Step 13. Secure paper feed pressure release shaft (A) with four retaining rings (B).

Step 14. Install two pressure release cam setscrews (C1) into pressure release cams (C2); tighten pressure release cams (C2) on their respective flats of paper feed pressure release shaft (A).

Step 15. Install screw (G1) in paper pressure release lever pivot clamp (G3).

Step 16. Attach paper pressure release lever (H) to paper pressure release lever pivot clamp (G3); secure with retaining ring (G2).

Step 17. Attach paper pressure release lever spring (F) to paper feed pressure release shaft (A) and paper pressure release lever (H).

Step 18. Attach two pressure roll springs (J) to left-hand and right-hand pressure roll actuator arms (Q) and (R) and to posts of paper feed guide (AG).

Step 19. Place paper feed assembly in position on front frame assembly (CK, figure 5-38, Appendix) and secure with two screws (N, figure 5-31, Appendix) and paper guide retaining pins (Q).

Step 20. Install paper feed knob (Z, figure 5-34, Appendix) and secure with screw (AA).

aj. PRINT CYLINDER SHAFT ASSEMBLY AND INSTALLATION.

Step 1. Place print cylinder (B10, figure 5-33, Appendix) and washer (B22) on print cylinder shaft (B23).

Step 2. Press bearing (B6) into right-hand bearing retainer (B7).

Step 3. Slide bearing and right-hand bearing retainer assembly and sleeve spacer (B5) onto the right side of print cylinder shaft (B23).

Step 4. Place machine key (B4) into the keyway of print cylinder shaft (B23).

Step 5. Install index wheel (B3) over the key on print cylinder shaft (B23), insuring that the red dot (figure 5-14, Appendix) in the index wheel is aligned between the type strip containing the letter E and the type strip containing the letter L.

Step 6. Slide sleeve spacer (B2) onto print cylinder shaft (B23); secure with special nut (B1).

Step 7. Slide threading flange (B19), left-hand bearing retainer (B18), and bearing (B17) on print cylinder shaft (B23).

Step 8. Insert rotary motion spring housing nylon washer (B15) into rotary motion spring retainer (B16).

Step 9. Install rotary motion spring (B14) into rotary motion spring retainer (B16) by inserting outer end of the spring into the retainer slot and gradually winding the spring into the retainer. Refer to figure 5-12 (Appendix) for the correct method of installing rotary motion spring (B14, figure 5-33, Appendix).

Step 10. Slide retainer assembly onto print cylinder shaft (B23), insuring that the tab on rotary motion spring (B14) is engaged with the slot in print cylinder shaft (B23).

Step 11. Install rotary motion spring retaining washer (B12) and rotary motion spring retaining nylon washer (B13); secure with grip ring (B11).

Step 12. Place print cylinder shaft assembly (B) in position on front frame assembly (CK, figure 5-38, Appendix); secure with screw (B8, figure 5-33, Appendix) and lock washer (B9) on the right side and with screws (B20) and lock washers (B21) on the left side.

ak. PRINT CYLINDER YOKE SHAFT ASSEMBLY AND INSTALLATION.

Step 1. Attach nylon lockstrip (A5, figure 5-33, Appendix) to print cylinder yoke (A6b) using screw (A4).

Step 2. Install belt clamp (A3) and belt clamp wedge (A2) in print cylinder yoke (A6b); temporarily tighten with screw (A4).

Step 3. Position print cylinder yoke assembly (A6) over print cylinder (B10) and secure by sliding print cylinder yoke shaft (A7) through front frame assembly (CK, figure 5-31, Appendix), through the hole in the top of print cylinder yoke (A6b, figure 5-33, Appendix), and then through the other side of the front frame. Refer to figure 5-45 (Appendix) for relative location of parts.

Step 4. Secure print cylinder yoke shaft (A7, figure 5-33, Appendix) with two retaining rings (A1).

al. PRINT HAMMER SHAFT ASSEMBLY AND INSTALLATION.

Step 1. Place print hammer (C17, figure 5-33, Appendix) on print hammer shaft (C23); fit print hammer cap (C11) on print hammer (C17) using three screws (C12) and lock washers (C3).

NOTE

Insure that print hammer (C17) can be easily slid from one end of the print hammer shaft to the other without binding.

Step 2. Install print hammer face pad (C13) on print hammer (C17) using print hammer face pad clamp screw (C14); temporarily tighten screw (C14).

Step 3. Install print hammer cable clamp (C15) on print hammer (C17) using print hammer cable clamp screw (C16) and lock washer (C3).

Step 4. Install right-hand vibrator arm (C6), screw (C7), lock washer (C9), washer (C8), and lock nut (C10); temporarily tighten lock nut (C10).

Step 5. Install screw (C5b) in print hammer shaft stop (C5a); slide print hammer shaft stop (C5a) onto print hammer shaft (C23) and temporarily tighten screw (C5b).

Step 6. Install left-hand vibrator arm (C22) on print hammer shaft (C23) using screw (C7), lock washer (C9), washer (C8), and lock nut (C10); temporarily tighten lock nut (C10).

Step 7. Install screw (C21c) in print hammer actuator link lever (C21b); temporarily fasten print hammer actuator link lever (C21b) to print hammer shaft (C23).

Step 8. Attach print hammer actuator link (C20) to print hammer actuator link lever (C21b) and secure with retaining ring (C21a); attach felt washer (C21d) to print hammer actuator link lever (C21b) and secure with grip ring (C21e).

Step 9. Install one felt washer (C4) on each end of print hammer shaft (C23). Place left-hand and right-hand bearings (C18 and C1) on their respective ends of print hammer shaft (C23); position print hammer shaft assembly (C) in front frame assembly (CK, figure 5-31, Appendix) as shown in figure 5-45 (Appendix).

Step 10. Secure the print hammer shaft assembly in the front frame using four screws (C2, figure 5-33, Appendix) and lock washers (C3).

Step 11. Attach print hammer return spring (C4) to print hammer shaft stop (C5a) and spring post on front frame.

Step 12. Attach print hammer actuator link helical spring (C19) to print hammer actuator link (C20) and spring post on front frame.

am. FRONT PLATE ASSEMBLY AND INSTALLATION.

Step 1. Attach right-hand ribbon guide bracket (D10, figure 5-32, Appendix) to front plate assembly (D13) using screws (D4) and flat washers (D5).

Step 2. Install retaining ring (D2), ribbon guide roller (D1), and retaining ring (D2) on right-hand ribbon guide bracket (D10).

Step 3. Install left-hand ribbon guide bracket (D3) on front plate assembly (D13) using screws (D4) and flat washers (D5).

Step 4. Install retaining ring (D2), ribbon guide roller (D1), and retaining ring (D2) on left-hand ribbon guide bracket (D3).

Step 5. For AN/TGC-14(V), install right-hand ribbon vibrator guide assembly (D9) on front plate assembly (D13) using ribbon vibrator pivot shaft (D6), retaining rings (D7), and felt washers (D14). For AN/TGC-14A(V), install right-hand ribbon vibrator

guide assembly (D9) using spring clip. See insert on figure 5-32 (Appendix).

Step 6. For AN/TGC-14(V), install left-hand ribbon vibrator guide assembly (D8) on front plate assembly (D13) using ribbon vibrator pivot shaft (D6), retaining rings (D7), and felt washers (D14). For AN/TGC-14A(V), install left-hand ribbon vibrator guide assembly (D8) using spring clip. See insert on figure 5-32 (Appendix).

Step 7. Install torsion spring (D17c) into end of line bell lever (D17d); attach end of line bracket and shaft assembly (D17b) to end of line bell lever (D17d) using retaining ring (D17a).

Step 8. Install end of line bracket assembly (D17) on front plate assembly (D13); secure with two screws (D16).

Step 9. Connect wire link (D18) between end of line bell lever assembly (D19) and end of line bell lever (D17d); install end of line bell lever assembly (D19) onto post on front plate assembly (D13) and secure with retaining ring (D20).

Step 10. Install bell (D11) on post of front plate assembly (D13); secure with screw (D4) and lock washer (D12).

an. RIBBON FEED TOP PLATE ASSEMBLY.

Step 1. Install two guide pin spacers (38, figure 5-39, Appendix) on the appropriate posts of ribbon feed mounting base plate (55).

Step 2. Position ribbon reversing sliding plate (35) on post of ribbon feed mounting base plate (55); fasten with two washers (37) and two screws (36).

Step 3. Position clutch shaft worm gear assembly (34) on post of ribbon feed mounting base plate (55).

Step 4. Install washer (33) and ribbon feed clutch (32) on clutch shaft worm gear (34b).

Step 5. Install four clutch rollers (31) in ribbon feed clutch (32).

Step 6. Install left-hand tension control brake arm (27) over the appropriate post of ribbon feed mounting base plate (55).

Step 7. Press bearing (24a) into left-hand intermediate drive gear (24b).

Step 8. Install washer (25), left-hand intermediate drive gear assembly (24), left-hand reversing cam follower (23), sleeve spacer (22), left-hand ribbon feed clutch stop (21), and sleeve spacer (20).

Step 9. Install clamp setscrew (18) in clamp (17).

Step 10. Slide clamp (17) onto ribbon feed backstop (19).

Step 11. Install right-hand tension control brake arm (15), washer shim (14), right-hand intermediate drive gear assembly (13), right-hand reversing cam follower (12), sleeve spacer (11), and right-hand ribbon feed clutch stop (9); secure with retaining ring (10).

Step 12. Attach clutch stop helical spring (7) to left-hand and right-hand ribbon feed clutch stops (21 and 9).

Step 13. Install ribbon feed backstop (19), sleeve spacer (16), brace plate (3), and ribbon feed backstop eccentric (1); secure with retaining rings (2, 4, and 5).

Step 14. Attach ribbon feed backstop helical spring (6) to ribbon feed backstop (19) and brace plate (3).

Step 15. Attach reversing cam follower spring (8) to left- and right-hand reversing cam followers (23 and 12).

Step 16. Press ribbon feed idler gear bearing (45a) into ribbon feed idler gear (45b).

Step 17. Install ribbon feed idler gear assembly (45) and spacer (46); secure with retaining ring (43).

Step 18. Attach tension control brake arm spring (26) to left-hand and right-hand tension control brake arms (27 and 15).

Step 19. Insert one end of left-hand wire link (41) into left-hand ribbon feed clutch stop (21).

Step 20. Insert the other end of left-hand wire link (41) into left-hand ribbon reversing sensing arm (42); secure left-hand ribbon reversing sensing arm (42) to the post on ribbon feed mounting base plate (55) with retaining ring (10).

Step 21. Insert one end of right-hand wire link (53) into right-hand ribbon feed clutch stop (9).

Step 22. Insert the other end of right-hand wire link (53) into right-hand ribbon reversing sensing arm (54); secure right-hand ribbon reversing sensing arm (54) to the post on ribbon feed mounting base plate (55) with retaining ring (10).

Step 23. Press ribbon roller bushings (39a) into ribbon rollers (39b); repeat this step for total of four assemblies.

Step 24. Install four ribbon roller assemblies (39) on their respective posts of ribbon feed mounting base plate (55); secure with retaining rings (40).

Step 25. Install ribbon feed worm (50a) on ribbon feed worm shaft (50c); secure by pressing in roll pin (50b).

Step 26. Press bearing (52a) into right-hand bearing block (52b).

Step 27. Slide thrust washer (51) and right-hand bearing block assembly (52) onto ribbon feed worm shaft (50c); install retaining ring (44) on ribbon feed worm shaft (50c).

Step 28. Press bearing (48a) into left-hand bearing block (48b).

Step 29. Slide left-hand bearing block assembly (48) onto ribbon feed worm shaft (50c).

NOTE

On models not equipped with ribbon feed slip clutch assembly (47), omit steps 30 through 32. Install the setscrew in the ribbon feed drive gear, slide the gear onto ribbon feed worm shaft (50c), and tighten the setscrew.

Step 30. Install felt washers (56) on ribbon feed worm shaft (50c).

Step 31. Install key washer (47b), ribbon feed slip clutch gear (47d), key washer (47b), washer spring (47c), and key washer (47b) on ribbon feed slip clutch hub (47f); secure with retaining ring (47a).

Step 32. Install ribbon feed slip clutch assembly (47) on ribbon feed worm shaft (50c); secure with ribbon feed slip clutch hub socket screw (47e).

Step 33. Install the ribbon feed worm shaft assembly on ribbon feed mounting base plate (55); secure with four screws (49). Insure that the ribbon feed worm shaft rotates freely after the bearing blocks have been secured.

Step 34. Attach two spool clips (28) to ribbon spool drive gears (29); install ribbon spool drive gears (29) on posts on ribbon reversing sliding plate (35) and secure with retaining rings (30).

NOTE

Steps 35 and 36 pertain to AN/TGC-14A(V) only; proceed to step 37 for AN/TGC-14(V).

Step 35. Attach bounce prevent lever guide (57) to ribbon feed mounting base plate (55) using two screws (58).

Step 36. Attach ribbon feed top plate assembly to printer assembly by inserting rear of ribbon feed mounting base plate (55) into ribbon feed base spring clips (T and U, figure 5-30, Appendix) on rear frame and aligning slotted holes of ribbon feed mounting base plate (55, figure 5-39, Appendix) over two screws (T, figure 5-31, Appendix); secure ribbon feed top plate assembly (E, figure 5-32, Appendix) by moving lock clips to the left engaging screws (T, figure 5-31, Appendix).

Step 37. For AN/TGC-14(V), attach the ribbon feed top plate assembly to printer assembly with five screws and washers.

ao. KEYBOARD ASSEMBLY.

Step 1. Check for the presence of threaded insert (DP9h, figure 5-40, Appendix) in left bottom frame (DP9l) and threaded insert (DP8b) in right frame (DP8c).

Step 2. Position front support (DP1) against left bottom frame (DP9l); align spring pin (DP9k) and secure with screws (DP2) and lock washers (DP3).

Step 3. Align spring pins (DP8a) with their respective holes in front support (DP1) and right frame (DP8c); secure with screws (DP2) and lock washers (DP3).

Step 4. Assemble key lever leaf spring (DP4), key lever leaf spring mounting strip (DP5), and rear support (DP6); secure with screws (DP2) and lock washers (DP3).

Step 5. Attach rear support (DP6) to frames (DP8c and DP9l) using screws (DP2) and lock washers (DP3).

Step 6. See insert on figure 5-40, sheet 2 (Appendix). Attach spring bar (AN/TGC-14(V) only) to left bottom frame (DP9l) using screws and lock washers.

Step 7. Install code bar support rollers (BH), pins (BJ1), and discs (BJ2) into code bar guide (BE).

Step 8. Attach code bar and key lever guide assembly (BB) to code bar guide (BE) using four screws (BC) and lock washers (BD).

Step 9. Attach code bar guide (BE) to frames (DP9l and DP8c) using screws (BF) and lock washers (BG).

Step 10. Assemble pulsing finger and prevent lever assembly (AA) as shown on sheet 1 of figure 5-40 (Appendix).

Step 11. Attach pulsing finger and prevent lever assembly (AA) to left bottom frame (DP9l) using screw (AD), lock washer (AE), shaft clamp (AB), and pulsing finger adjustment shim (AC).

NOTE

Keyboard code bar prevent lever (AA3) passes through the opening in front support (DP1). Check freedom of motion by allowing the unit to move back and forth by its own weight.

Step 12. Attach helical springs (X and Y) between the fingers and spring bar portion of code pulsing contact assembly (CG). For AN/TGC-14(V), see insert

on figure 5-40, sheet 2 (Appendix) and attach helical springs (X and Y) between fingers and spring bar.

Step 13. Attach master pulsing contact assembly (CD) loosely to left bottom frame (DP9l) using two screws (CE) and lock washers (CF); center and tighten master pulsing contact assembly (CD) as described in paragraph 5-5c(5), steps 10 and 11.

Step 14. Insert straight pin (CV) into right frame (DP8c).

Step 15. Insert bail support shaft (BQ) into left bottom frame (DP9l).

Step 16. Install felt washer (CU) and ring (BT) on bail support shaft (BQ) from the inboard side of right frame (DP8c).

Step 17. Insert clutch release bail (BS) through left bottom frame (DP9l) and engage with straight pin (CV) and bail support shaft (BQ).

Step 18. Insert cam follower clutch release eccentric (BM) through felt washer (CU), cam follower clutch release (BL), and clutch release bail (BS); secure with flat washer (BN) and nut (BP).

Step 19. Attach clutch release helical spring (BK) to cam follower clutch release (BL) and clutch release finger (DG).

Step 20. Install ring (BT) on bail support shaft (BQ) from the outboard side of left bottom frame (DP9l). Secure cam follower clutch release (BL) over cam on clutch assembly (CC12); insure that clutch release bail (BS) is free to rotate.

Step 21. Insert repeat key shaft bushing (DF) into left bottom frame (DP9l).

Step 22. Insert repeat key shaft (DD) through frames (DP9l) and (DP8c); secure with grip rings (DB) and retaining ring (DC).

Step 23. Install clutch release finger (DG) and felt washer (DE) on repeat key shaft (DD).

Step 24. Install repeat key actuator arm (DH) on repeat key shaft (DD); secure with repeat key actuator arm screw (DJ) and repeat key actuator arm nutplate (DK).

Step 25. Assemble backstop eccentric shaft (BX), clutch backstop assembly (BV), and retaining ring (BW); then insert assembly through left top frame (DP9e).

Step 26. Secure with backstop eccentric shaft set-screw (BY).

Step 27. Attach backstop spring (BU) to clutch backstop assembly (BV) and retaining ring (AA1).

Step 28. Insert code bars (AW through BA) in their respective slots in code bar guide (BE).

Step 29. Install top right code bar guide (CS) against top right frame (DP8c).

Step 30. Align top right code bar guide (CS) with code bars; then secure with screws (CT) and lock washers (BD).

Step 31. Engage keyboard code bar prevent lever (AA3) with slots in code bars (AW through BA); insert repeat key assembly (AQ) through front support (DP1).

Step 32. Install flat washer (CK) and repeat key lever clamp (CY) onto repeat key shaft (DD).

Step 33. Secure repeat key lever (AQ2) to repeat key lever clamp (CY) using screws (AR).

Step 34. Secure repeat key lever clamp (CY) to repeat key shaft (DD) with screw (CZ) and clamp nut plate (DA).

Step 35. Attach repeat key lever helical spring (CX) to repeat key assembly (AQ) and to pin on right frame (DP8c).

Step 36. Check repeat key assembly (AQ) for freedom of motion.

Step 37. Install clutch assembly (CC12) on keyboard drive shaft assembly (CC9) and secure with clutch assembly setscrew (CC11); install clutching rollers (CC10) into clutch assembly (CC12).

Step 38. Install keyboard drive gear (CC13), sleeve spacer (CC14), and bearing (CC15) on keyboard drive shaft assembly (CC9).

Step 39. Attach master pulsing cam (CC4) to start stop cam bushing (CC7) using screws (CC5); insert start pulse eccentric (CC6) into master pulsing cam (CC4).

Step 40. Install bearings (CC3) into start stop cam bushing (CC7); slide pulsing cam assembly (CC8) onto start stop cam bushing (CC7).

Step 41. Slide start stop cam bushing (CC7), sleeve spacer (CC2), and bearing (CC1) onto keyboard drive shaft assembly (CC9).

Step 42. Place keyboard cam shaft assembly (CC) into left bottom frame (DP9l).

Step 43. Secure code pulsing contact assembly (CG) to left bottom frame (DP9l) using two screws (CH), lock washers (CJ), and flat washers (CK); then secure slip connector contact assembly (DL) to code pulsing contact assembly (CG) using two screws (DM) and lock washers (DN). For AN/TGC-14(V), refer to insert on figure 5-40, sheet 2 (Appendix) and secure slip connector contact assembly to left bottom frame (DP9l) using two screws (CH), lock washers (CJ), and flat washers (CK).

Step 44. Secure left top frame (DP9e) to left bottom frame (DP9l) using screws (DP9f) and lock washers (DP9g).

Step 45. Install keyboard cover pad (L2) in keyboard cover (L3); install keyboard lock bar (J) over frames (DP9l and DP8e).

Step 46. Install left-hand and right-hand keyboard rails (A and E); secure with screws (B, C, and F) and lock washers (D and G).

NOTE

Keyboard lock bar (J) is secured by rails (A and E).

Step 47. Install keyboard lock bar helical spring (H) by attaching to keyboard lock bar (J) and top left code bar guide (BZ).

Step 48. Install wear pad (AP) by inserting its arms through the outermost slots in rear support (DP6).

Step 49. Install key lever dust seals (AV) over each key lever to be installed.

Step 50. Press key tops on their appropriate key levers as shown on sheet 2 of figure 5-40 (Appendix).

Step 51. Install space bar (AN) through outermost slots in front support (DP1) and rear support (DP6).

NOTE

The arms of the space bar pass through the same slots used for the wear pad.

Step 52. Secure keys by installing key retaining strip (CL) using screws (CM) and lock washers (CN).

Step 53. Assemble items (N through T) on switch bracket (U); attach switch bracket (U) to frame assembly (DP) using screws (V) and lock washers (W).

Step 54. Refer to the keyboard wiring diagram (figure 5-90, Appendix) and solder all electrical connections.

Step 55. Install front key guide (AF) to front support (DP1) with two screws (AH).

Step 56. Install keyboard cover (L3) and secure to front support (DP1) with screws (L1).

Step 57. Attach space bar safety guard cover (AG) to front support (DP1) and keyboard cover (L3) using four screws (AH).

Step 58. Attach right side cover (CP) to right frame (DP8c) with screws (CQ) and lock washers (CR).

ap. ELECTRICAL CHASSIS ASSEMBLY.

Step 1. Replace three lamps (F, figure 5-41, Appendix) by pressing in and turning clockwise.

Step 2. Replace patch cord assemblies (C, D, and E).

Step 3. Insert paper support shaft assembly (A2) through paper supply roll (B); place brake drum (A1) on the end of paper support shaft assembly (A2) and turn clockwise until tight.

Step 4. Raise the two paper support and brake drum assembly lock levers and install paper supply roll (B) and paper support and brake drum assembly (A) in the electrical chassis; secure by pulling the two paper support and brake drum assembly lock levers down.

Step 5. Assemble the remaining parts of chassis assembly (G) using figure 5-41 (Appendix) as a guide.

aq. LINE SENSOR ASSEMBLY.

Step 1. Install diode (K, figure 5-42, Appendix) on bracket (M) using the mounting screw and associated parts; connect wiring according to the wiring diagram (figure 5-88, Appendix).

Step 2. Connect wiring to line sensor connector (J) according to the wiring diagram (figure 5-88, Appendix); install the connector on bracket (M, figure 5-42, Appendix) using two screws (C) and two nuts (H).

Step 3. Connect wiring to selector receptacle (D) according to the wiring diagram (figure 5-88, Appendix); install the receptacle on bracket (M, figure 5-42, Appendix) using its mounting hardware.

Step 4. Install transformer (G) on bracket (M) using four screws (C) and four nuts (H); connect wiring according to the wiring diagram (figure 5-88, Appendix).

Step 5. Install high-low range strip (L1) on board (L15) using screw (L2) and lock washer (L3).

Step 6. Connect wiring to board assembly (L) according to the wiring diagram (figure 5-88, Appendix); install the board assembly on bracket (M, figure 5-42, Appendix) using four screws (C) and four flat washers (F).

Step 7. Connect wiring to board assembly (E) according to the wiring diagram (figure 5-88, Appendix); install the board assembly on bracket (M, figure 5-42, Appendix) using three screws (C) and three flat washers (F).

Step 8. Install holder clip (P) and selector cable clip (N) on cover (B2) using two screws (Q).

Step 9. Install cover (B2) on bracket (M) using three screws (C).

ar. SIGNAL LINE POWER SUPPLY ASSEMBLY.

Step 1. Connect wiring to signal line power supply connector (H, figure 5-43, Appendix) according to the wiring diagram (figure 5-89, Appendix); install the connector on bracket (J, figure 5-43, Appendix) using two screws (C) and two nuts (G).

Step 2. Install transformer (F) on bracket (J) using four screws (C) and four nuts (G); connect wiring according to the wiring diagram (figure 5-89, Appendix).

Step 3. Connect wiring to board assembly (D) according to the wiring diagram (figure 5-89, Appendix); install the board assembly on bracket (J, figure 5-43, Appendix) using three screws (C) and three washers (E).

Step 4. Install holder clip (L) and motor cable clip (K) on cover (B) using two screws (M).

Step 5. Install cover (B) on bracket (J) using two screws (C).

as. SERVICE CABLE ASSEMBLY.

Step 1. Install sleeve bushing (J, figure 5-44, Appendix) on electric cable (K) and cord (N).

Step 2. Attach electric cable (K) and cord (N) to junction box (P) using sleeve bushings (J).

Step 3. Install adapter (M) on cord (N).

Step 4. Install white binding post (D) on junction box (P) using flat washer (E).

Step 5. Install two black binding posts (G) and two red binding posts (F) on junction box (P).

Step 6. Connect wiring and splicers (L) according to the wiring diagram (figure 5-91, Appendix).

Step 7. Install cover (A) on junction box (P) using four screws (B) and four lock washers (C).

at. ADJUSTMENT PROCEDURES. — Complete adjustment of the teletypewriter sets requires many interacting operations which must be performed in the exact sequence indicated. The following procedures are intended to completely adjust the printer and keyboard following overhaul procedures. However, it will be necessary to adjust only portions of the equipment following minor parts replacement. Observe caution when making these adjustments to insure that other adjustments have not been altered. Check any interacting adjustments prior to returning the teletypewriter sets for servicing. Refer to paragraph 5-5b for removal procedures to be used to gain access for adjustments.

au. PRINTER ADJUSTMENTS.

(1) STANDARD PROCEDURES. — The procedures described in the following paragraphs are used repeatedly in the ensuing maintenance instructions. These procedures minimize the number of tools required to service the teletypewriter sets and permit many of the maintenance operations to be performed without supplying primary power to the printer.

(a) TURNING THE MAINSHAFT BY HAND. — The main shaft may be turned by hand by rotating the speed change gear clockwise or the idler gear counterclockwise (9 and 10, figure 5-4, Appendix). This operation will turn any of the clutches which have been released and consequently coupled to the main shaft. With the start clutch released, turning the main shaft will also turn the timing cam shaft.

(b) RELEASING THE START CLUTCH. — The preferred method of releasing the start clutch is accomplished electrically as follows:

Step 1. Patch the equipment for off line local loop; remove the motor connector and apply primary power to the electrical chassis. Do not remove the selector connector.

Step 2. Depress the LTRS key to obtain mark condition or the blank key (lower right-hand corner of keyboard) to obtain space condition. Any character

on the keyboard may be selected to observe mechanical operation of the clutches and parts. If it is desired to observe the complete cycle, depress any key and turn the main shaft by hand while observing the mechanism as the cycle is performed.

An alternate method to electrically release the start clutch is to set the MOTOR switch to the ON position, momentarily open the signal loop, and listen for an audible click from the selector denoting that the start clutch has been released.

NOTE

The signal loop can be opened by depressing the BREAK button while the SEND•REC-REC switch is in the SEND•REC position; by deflecting the nylon button extending through the contact block on the underside of the electrical chassis; or by opening the signal loop at the service cable junction box.

Rotation of the main shaft at this time will rotate the start clutch and its geared timing cam shaft. This will then release the five type positioning cam follower clutches in sequence and position them in the mark position. If it is desired to position all of the type positioning cams in the space position, open the signal line, rotate the main shaft, and then close the signal line.

Manual release of the start clutch may be accomplished only when no power is supplied to the machine. Refer to figure 5-46 (Appendix) and gently press the selector armature into the space position, allowing the armature paddle latch to trip off the armature and release the start clutch release finger.

CAUTION

Do not force the armature into the space position while power is applied to the selector as this could damage the armature paddle latch by forcing it out of alignment.

(c) RELEASING OTHER CLUTCHES. — Clutches number 1 through number 5 and the print function clutch can most easily be released by pulling the clutch release fingers away from their respective clutches, using a spring hook or some other suitable tool. The line feed, letters-figures, and carriage return clutches are most easily released by operating their off line function button or off line function slide assembly (F6, figure 5-37, Appendix). In the case of letters, however, the print function clutch must also be released and the off line button held in while the main shaft is turned through slightly more than 180 degrees rotation, thus operating the function cam follower for one full cycle. If the print function clutch is in the stop position, the letters shift may be accomplished by pulling the end of the function clutch release arm away from the clutch toward the rear of the unit and turning the main shaft 180 degrees.

(d) PUSHING CLUTCHES INTO POSITION. — If it is inconvenient to turn clutches by rotating the main shaft because this may disturb the position of other clutches already properly located, the clutch to be moved can be pushed around into position by pushing against the backstop notch in the clutch with a screwdriver as shown in figure 5-47 (Appendix).

(e) ESTABLISHING LETTERS A AND PERIOD POSITIONS. - Letters A position places all of the type positioning cam followers in the high portions of their cams. It is performed by positioning the number 1 and number 2 clutches on the mark side (held by the top clutch release fingers) and the number 3, number 4, and number 5 clutches on the space side (held by the bottom clutch release fingers). In addition, the letters figures cam follower must be located on the high (letters) side of the cam. When the signal for letters A cannot be transmitted, this operation is best performed by first accomplishing the letters shift and then positioning clutches number 1 through number 5.

The converse of this operation (period position) would be to place all the type positioning cam followers on the low portion of their cams. The printer may be put in the period position by positioning clutches number 1 and number 2 on the space side (held by the bottom clutch release fingers) and clutches number 3, number 4, and number 5 on the mark side (held by the top clutch release fingers). The letters figures cam follower must be located on the low (figures) side of the cam. Perform this sequence prior to assembly or disassembly of the printer.

(f) LOCATING CLUTCH RELEASE ARMS ON HIGH SIDE OF TIMING CAMS. - This operation prevents the clutch release arms (clutches number 1 through number 5) from bearing on the selector latches and armature paddle latches and consequently facilitates removal or installation of the selector assembly. Turn the range dial counterclockwise to the end of travel. Turn the main shaft manually until the start clutch stop tab is against the start clutch release latch. Release the start clutch; turn the range dial to its clockwise limit of travel and then a small amount counterclockwise.

(2) CLUTCH BACKSTOP ADJUSTMENT. - The clutch backstop for all the clutches must be adjusted to obtain optimum operation of each clutch. The clutch backstop prevents the clutch from chattering when it is in the stop (disengaged) position and consequently prevents overloading of the motor. Proceed as follows:

Step 1. Loosen the clutch backstop clamp screw of clutch backstop clamp shown in figure 5-48 (Appendix).

Step 2. Turn the clutch backstop eccentric bushing until the clutch backstop lever falls into the notch in the clutch just as the clutch comes to the stop position.

Step 3. Check the action of all clutch backstops except the print function clutch backstop by releasing the appropriate clutch and turning the main shaft by hand. The print function clutch backstop action must be checked after first applying power to the equipment.

NOTE

The action of the line feed, letters-figures, and carriage return clutches can best be observed by standing the printer on its back plate and viewing from the bottom of the machine.

Step 4. Check that the clutch backstop lever engages the clutch so that slight additional forward motion of the engaged cage is possible when the clutch release finger is pulled away from the stop tab on the cage.

(3) SELECTION ADJUSTMENTS.

(a) START CLUTCH RELEASE ADJUSTMENT. - The start clutch release adjustment is intended to

insure that the start clutch will release quickly upon receipt of the start signal pulse and that it will come to rest in the same position for every stop signal pulse. This will insure the same angular relation to the timing cam during every stop pulse and will consequently afford maximum receiving range.

NOTE

Insure that the selector is securely clamped in the printer prior to starting these adjustments.

Step 1. Hold the start clutch release arm (figure 5-49, Appendix) against the clutch and manually turn the main shaft until the start clutch release latch comes in contact with one of the two stop tabs on the cage.

Step 2. Loosen the start clutch backstop lever clamp screw and turn the start clutch backstop lever eccentric bushing until the start clutch backstop lever is free to fall into the notch on the restoring cam.

Step 3. Tighten the start clutch backstop lever clamp screw when the desired position has been obtained.

Step 4. Turn the main shaft several revolutions and check that the start clutch backstop lever drops into the restoring cam notch as soon as possible after the start clutch release latch has come into contact with one of the stop tabs on the cage.

Step 5. Rotate the main shaft until the start clutch release latch is located approximately midway between the two stop tabs on the cage in order to insure that the start clutch backstop lever is riding on the high portion of the restoring cam.

Step 6. Press the start clutch release arm downward until the start clutch release latch is in contact with the outside diameter of the clutch.

Step 7. Adjust the start clutch backstop lever adjustment setscrew so that 0.010 ± 0.002-inch clearance exists between the end of the screw and the flat surface of the start clutch release latch pin.

Step 8. Set up the start clutch release finger by bringing the start clutch release latch pin in the start clutch release arm fork to the middle of the start clutch release arm fork while all clutch release fingers are set up on their high sides. Then, turn the main shaft manually until the stop tab on the cage is positioned directly below the start clutch release latch pin.

Step 9. Check for 0.008 to 0.010-inch clearance (figure 5-50, Appendix) between the start clutch release finger adjustment screw and the armature paddle latch. If this clearance is not correct, readjust the selector as instructed in the following paragraph.

(b) SELECTOR ADJUSTMENT. - The selector assembly proper requires no adjustment. However, an adjustment of the mechanical relationship between the selector assembly and the printer mechanism into which it is installed is required. Adjust the selector linkage as follows:

NOTE

Unplug the motor connector and turn the equipment on.

Step 1. Turn the range dial fully counterclockwise to bring the start clutch release latch pin to the top

(open end) of the start clutch release arm fork (figure 5-49, Appendix).

Step 2. Manually turn the main shaft until the start clutch stop tab engages the start clutch release latch.

Step 3. Momentarily break the signal line to actuate the start clutch release latch and turn the range dial clockwise until the start clutch release latch pin bottoms in the start clutch release arm fork.

Step 4. Turn the range dial counterclockwise until there is approximately 1/16-inch clearance between the bottom of the start clutch release arm fork and the start clutch release latch pin.

Step 5. Hold the start clutch release arm against the clutch by inserting an approximately 0.030-inch shim between the backstop shaft and the start clutch release arm.

Step 6. Adjust all clutch release fingers on the mark side, except the start clutch release arm, so that 0.008 to 0.010-inch clearance exists between the armature paddle latches or latches and the tip of the clutch release finger adjustment screws (figure 5-50, Appendix).

Step 7. Open the signal line and then adjust all the clutch release fingers on the space side of the selector.

Step 8. Remove the shim and close the signal line to place the teletypewriter set in a steady mark condition.

Step 9. Set the range dial in the center of its travel.

Step 10. Slowly turn the main shaft until the stop tab on the clutch cage is aligned with the start clutch release latch pin.

Step 11. Adjust the clearance between the start clutch release arm adjustment screw and the armature paddle latch to 0.008 to 0.010 inch.

NOTE

The clutch release arm contains an inter-arm spring which will permit the clutch release finger adjustment screw to be turned in against the opposing armature paddle latch or latch even though the desired gap no longer exists. The correct adjustment has been obtained when the clearance gage is easily moved while still in contact with the armature paddle latch or latch and the clutch release finger adjustment screw.

(4) PRELIMINARY POSITIONING OF RANGE DIAL. - For AN/TGC-14(V), identified by slotted range pinion dial and range pinion lock knob, proceed as follows:

Step 1. Loosen the range pinion lock knob (insert on figure 5-35, Appendix) and turn the range pinion dial to its clockwise limit.

Step 2. Pull the range pinion dial out until its gear is no longer meshed.

Step 3. Rotate the range pinion dial until the pointer is centered in the uncalibrated portion of the scale.

Step 4. Push the range pinion dial toward the printer, rotating slightly back and forth, until the gears mesh.

Step 5. Set the range pinion dial at 60 and tighten the range pinion lock knob. This adjustment calibrates the range pinion dial and does not constitute an adjustment to the incoming signal. The complete range pinion dial calibration procedure is provided in paragraph 2-8e(1).

For AN/TGC-14A(V), proceed as follows:

Step 1. Loosen the range dial (figure 5-2, Appendix) by pulling the range finder knob out; then turn the range finder knob to its clockwise limit.

Step 2. Pull range finder knob out until the range dial gear is no longer meshed.

Step 3. Rotate the range finder knob until the pointer is centered in the uncalibrated portion of the range dial scale.

Step 4. Release the range finder knob slowly, rotating slightly back and forth, until the gears mesh.

Step 5. Pull the range finder knob out until the lock is released, but gear remains meshed; set the range dial to 60 and release the range finder knob. This adjustment calibrates the range dial and does not constitute an adjustment to the incoming signal. The complete range dial calibration procedure is provided in paragraph 2-8e(2).

(5) CHAIN AND CABLE ADJUSTMENTS. - The following series of adjustments is intended to establish the correct relationship between the chains and cables used to position the print cylinder and the function slides. If a machine is being reassembled following overhaul, perform all chain and cable adjustments. If however, subassemblies are being reassembled, or if a machine has been operating satisfactorily and then goes out of adjustment, it may be necessary to perform only certain adjustments to return the machine to an operational condition.

(a) LATERAL CONTROL FUNCTION SLIDE ALIGNMENT.

Step 1. Set the printer in letters A position with the function clutch in the stop position (paragraph 5-5au(1)(e)).

Step 2. Shorten the chain by turning the left-hand threaded automatic chain takeup ratchet (figure 5-51, Appendix) counterclockwise if the index mark on the lateral control function slide is to the right of the index mark on the function selector frame; lengthen the chain by holding both automatic chain takeup pawl and automatic chain takeup feed pawl away from the automatic chain takeup ratchet and turning the automatic chain takeup ratchet clockwise if the index mark on the lateral control function slide is to the left of the function selector frame index mark.

Step 3. Check for 1/16-inch clearance between the takeup arm pin and the takeup drum bracket (figure 5-52, Appendix).

Step 4. If necessary, adjust this clearance to 1/16 inch by taking up or letting out the lateral control belt at the lateral control belt clamp on the takeup drum. Readjust the print cylinder and print hammer if this step is performed (paragraph 5-5au(7)(a)).

(b) ROTARY FUNCTION SLIDE ALIGNMENT.

NOTE

The rotary motion spring must be under tension prior to this adjustment.

Step 1. Set the printer in letters A position (paragraph 5-5au(1)(e)).

Step 2. Disengage the rotary detent pawl pin from index wheel (23 and 24, figure 5-4, Appendix) by lifting the rotary detent pawl pin up.

NOTE

In the next step, never turn the adjustment stud. Hold the stud with a suitable internal-hex wrench and turn the adjustment nut to adjust the position of the index mark.

Step 3. If the index mark on the rotary function slide (figure 5-51, Appendix) is on the right side of the mark on the function selector frame, shorten the chain by turning the rotary chain adjustment nut clockwise; if the index mark on the rotary function slide is on the left side of the mark on the function selector frame, lengthen the chain by turning the rotary chain adjustment nut counterclockwise.

(c) ROTARY DETENT PAWL ADJUSTMENT. - This adjustment insures the proper angular relation of the print cylinder shaft at the moment of maximum detenting action.

Step 1. Engage rotary detent pawl pin (23, figure 5-4, Appendix) into any of the notches in the index wheel and hold it down.

Step 2. Hold the print hammer against the print cylinder.

Step 3. While holding the rotary detent pawl pin against the index wheel, adjust rotary detent pawl eccentric bushing (18) so that the characters on the print cylinder will be flat against the edge of a piece of shim stock held against the character and the paper feed rubber roll. This position should be approximately 20 degrees off center.

Step 4. Make certain that rotary detent pawl eccentric bushing (18) is positioned with the high side up so as not to interfere with check pawl (17).

Step 5. Secure rotary detent pawl eccentric bushing (18).

(d) ROTARY CABLE ADJUSTMENT.

Step 1. Set the printer in the letters A position (paragraph 5-5au(1)(e)).

Step 2. Pull rotary detent pawl pin (23, figure 5-24, Appendix) away from index wheel (24).

NOTE

Step 3 is only a preliminary adjustment.

Step 3. Adjust the rotary cable adjustment screw (figure 5-13, Appendix) to obtain the best possible alignment of the rotary detent pin with the index mark on the index wheel. Apply power to the equipment and recheck the adjustment by sending letters A and adjusting for minimum movement of the index wheel.

(e) LATERAL CONTROL BELT ADJUSTMENTS.

Step 1. Position the printer on its back plate and set the printer in letters A position (paragraph 5-5au(1)(e)).

Step 2. Position the takeup drum as shown in figure 5-52 (Appendix).

Step 3. Place the print hammer at the center of its travel.

Step 4. Loosen print hammer cable clamp (7, figure 5-4, Appendix); pull the print hammer cable tight and then retighten the print hammer cable clamp.

Step 5. Loosen lateral control belt clamp (11) and adjust the tension in the lateral control belt so that there is 1/16-inch clearance between the takeup arm pin (figure 5-52, Appendix) and the slot in the takeup drum bracket; tighten the lateral control belt clamp.

Step 6. Loosen return cable clamp (6, figure 5-4, Appendix); pull the return cable tight and retighten the return cable clamp. When correctly adjusted, the return cable can be depressed to touch the range finder knob.

(6) FUNCTION SECTION ADJUSTMENTS.

(a) FUNCTION SHAFT ADJUSTMENT. - The purpose of this adjustment is to establish the correct angular relationship between the print shaft terminal lever and the function cam follower. Adjust the function shaft as follows:

Step 1. Loosen function cam follower clamping screw (14, figure 5-1, Appendix) and lifter arm clamping screw (13).

Step 2. Set advance suppression latch eccentric bushing (16, figure 5-4, Appendix) so that the heavy portion points toward the top of the machine.

Step 3. Position the heavy portion of character advance pawl eccentric bushing (3) so that it points toward the front of the machine.

Step 4. Position check pawl eccentric bushing (19) so that the heavy portion points down.

Step 5. Release the print function clutch and turn the main shaft until the function cam follower is located on the lowest portion of the cam. Hold the function cam follower against the cam manually by inserting an internal-hex wrench into the head of function cam follower clamping screw (14, figure 5-1, Appendix) and pulling wrench handle toward the front of the machine.

NOTE

Before proceeding, make certain that the advance prevent lever tab is engaged with advance suppression latch (13, figure 5-4, Appendix).

Step 6. Rotate print shaft terminal lever (1, figure 5-4, Appendix) until the pin mounted in character advance pawl (12) makes contact with the flat surface of advance suppression latch (13) and the advance prevent lever tab is engaged with advance suppression latch (13).

Step 7. Tighten function cam follower clamping screw (14, figure 5-1, Appendix) while maintaining the correct lateral position of the function cam follower along the shafts in relation to the cam.

Step 8. Loosen four mounting screws on the off line function slide (31, figure 5-6, Appendix). Disconnect bell actuator connecting rod (A32, figure 5-37, Appendix) from bell lever assembly (F2); do not loosen function clutch release arm return helical spring (A11).

Step 9. Remove off line function slide (31, figure 5-6, Appendix) and then back out print prevent stop adjustment setscrew (30) until it is flush with the inner side of the off line function slide.

Step 10. Adjust print prevent rod actuator arm screw (36) to provide 1/8-inch clearance between print prevent rod (5) and the function sensing finger lever.

Step 11. Remove function sensing finger lever stop strip (32) and use it as a gage in the following steps.

Step 12. Rotate the main shaft until the function cam follower is on the high portion of the function cam. On AN/TGC-14(V), remove figures H code bar actuator (insert on figure 5-31, Appendix) before proceeding.

Step 13. Insure that the lifter arm (figure 5-53, Appendix) is engaged in the slot in the function lever; pick up the lifter arm and insert the function sensing finger lever stop strip (0.030-inch thick) between the function bar and the function sensing finger levers without pushing the levers down.

Step 14. Tighten the lifter arm clamping screw (13, figure 5-1, Appendix) and check that the spring arm portion of the function lever clears the front frame, the function helical spring yoke link clears the shock pad, and the end of the function bar clears the adjacent print prevent arm and extends over the blank sensing finger lever.

Step 15. Turn the main shaft until the print function clutch comes to a stop.

Step 16. Adjust rotary detent pawl adjustment screw (21, figure 5-4, Appendix) so that rotary detent pawl pin (23) clears the outside diameter of index wheel (24) by at least 0.010 inch.

Step 17. Position the function cam in its low position and check for at least 0.010-inch overtravel between the rotary detent pawl actuator arm and its adjustment screw. If incorrect, repeat steps 5 through 7.

Step 18. For AN/TGC-14(V), replace figures H code bar actuator.

NOTE

If the function bar adjustments are to be performed or checked, do not replace the off line function slide.

(b) FUNCTION BAR ADJUSTMENTS.

NOTE

Perform these adjustments only when required.

Step 1. Put the printer in the figures position so that bell actuator sensing finger lever (A26, figure 5-37, Appendix) is not impeded.

Step 2. Move the type positioning clutches so that the printer is in figures A position (paragraph 5-5au(1) (e)).

Step 3. Release the print function clutch and turn the main shaft until the function cam follower falls to the low portion of the cam.

Step 4. Raise and lower the function lever by raising and lowering function spring yoke pivot stud and link (35, figure 5-6, Appendix).

Step 5. Compress the function bar and function lever assemblies (figure 5-54, Appendix).

Step 6. Turn the two special screws counterclockwise until the function bar depresses all but automatic carriage return and automatic line feed sensing finger levers (figure 5-55, Appendix). Be careful not to damage the corners of the special screws.

Step 7. Carefully turn the special screws clockwise until the function sensing finger levers are deflected by the function bar.

Step 8. Turn the special screws an additional 1-1/2 turns clockwise so that only those function sensing finger levers in aligned slots will be depressed as shown in figure 5-55 (Appendix). Insure that both the blank and carriage return sensing finger levers are cammed out the same distance when actuated by the function bar.

Step 9. Install and secure off line function slide (31, figure 5-6, Appendix) with four screws.

(c) CHARACTER ADVANCE ADJUSTMENT. - The character advance adjustment establishes the correct relationship between character advance pawl (12, figure 5-4, Appendix), check pawl (17), and the function cam follower (figure 5-53, Appendix). When the correct relationship has been established, each down stroke of the function cam follower will result in one tooth being fed on the advance ratchet except when advance is intentionally suppressed. Adjust the character advance as follows:

Step 1. Release the print function clutch and rotate the main shaft until the function cam follower falls to the low portion of the cam. Check that the heavy portion of character advance pawl eccentric bushing (3, figure 5-4, Appendix) points toward the front of the printer when the cam follower is on the low side of the cam.

Step 2. Engage the advance prevent lever tab in the advance suppression latch as shown in figure 5-56 (Appendix).

Step 3. Adjust advance suppression latch eccentric bushing (16, figure 5-4, Appendix) to provide 1/16 to 3/32-inch clearance between the tip of the character advance pawl (figure 5-56, Appendix) and the advance ratchet.

Step 4. Adjust character advance pawl eccentric bushing (3, figure 5-4, Appendix) so that the pin on the character advance pawl (figure 5-56, Appendix) contacts the flat surface of the advance suppression latch.

Step 5. Position check pawl eccentric bushing (19, figure 5-4, Appendix) so that the heavy portion points down.

Step 6. Disengage the advance suppression latch (figure 5-57, Appendix) and adjust the check pawl eccentric bushing so that 1/4-tooth clearance exists between the character advance pawl and the next tooth on the advance ratchet.

Step 7. Release the print function clutch and rotate the main shaft so that the cam follower is positioned on the high portion of the function cam (figure 5-53, Appendix). There should be a clearance of 1/4 tooth between the check pawl and the next tooth on the advance ratchet (figure 5-58, Appendix).

Step 8. Rotate the main shaft until the function cam follower falls to the low point of the function cam.

Step 9. The character advance pawl should be approximately 1/4 tooth from the next tooth of the advance ratchet. If it is not, readjust the character advance pawl and the check pawl (steps 6 and 7) to obtain the correct relationship.

(d) CARRIAGE RETURN ADJUSTMENTS. - The following series of adjustments is intended to put the carriage return lock lever (figure 5-59, Appendix) and the lock lever actuator arm in the proper relationship to one another and to the carriage return cam follower. This insures that the carriage return cam follower will be held out and away from the cam until full carriage return has taken place and that the carriage return cam follower will be released to fall into its cam as soon as carriage return has taken place. Adjust the carriage return as follows:

Step 1. Release the print function clutch and turn the main shaft until the function cam follower falls to the low portion of the function cam.

Step 2. Back out function advance prevent adjustment screws (40 through 44, figure 5-5, Appendix) so they do not project below the advance prevent bail carriage return bar.

Step 3. Insure that the carriage return cam follower is on the low portion of the carriage return cam (clutch in stop position).

Step 4. Loosen the carriage return cam follower clamping screw while holding the cam follower against the cam.

Step 5. Adjust the carriage return lever until 1/32-inch clearance exists between the character advance pawl and advance prevent lever tab (figure 5-60, Appendix).

Step 6. Tighten the carriage return cam follower clamping screw (figure 5-59, Appendix).

Step 7. Insure that the clutch is in the stop position.

Step 8. Turn the advance drum to center the print hammer.

Step 9. Align the holes in the takeup drum (figure 5-52, Appendix) and the takeup drum bracket assembly and insert a pin into the holes.

Step 10. Manually release the carriage return clutch so that the cam follower is on the high side of the cam and the carriage return lock lever latches in place (figure 5-61, Appendix).

Step 11. Adjust check pawl eccentric stud (14, figure 5-4, Appendix) so that the check pawl is 1/16 to 3/32 inch off the advance ratchet (figure 5-60, Appendix).

Step 12. Remove the pin from the takeup drum and turn the main shaft until the carriage return clutch is in the stop position.

(e) CARRIAGE RETURN LOCK LEVER ADJUSTMENT. - This adjustment is necessary to insure that the print cylinder and the print hammer have fully returned to the left-hand margin. Adjust the carriage return lock lever as follows:

NOTE

Make certain that advance suppression latch (13, figure 5-4, Appendix) is not engaged.

Step 1. Turn the advance drum counterclockwise until the print hammer is centered.

Step 2. Align the holes in the takeup drum (figure 5-52, Appendix) and the takeup drum bracket assembly and insert a pin into the holes.

Step 3. Release the carriage return clutch by operating the carriage return off line function lever (33, figure 5-6, Appendix) and rotate the main shaft until the carriage return cam follower is on the high side of the cam (figure 5-61, Appendix).

Step 4. Using special Mite wrenches (numbers 2241 and 2242), adjust the carriage return lock lever eccentric bushing (figure 5-61, Appendix) so that 0.010-inch clearance exists between the carriage return lock lever and the carriage return cam follower.

Step 5. Rotate the main shaft until the carriage return clutch is in the stop position (figure 5-61, view B, Appendix).

NOTE

Hold the cam follower away from the cam by using the carriage return lock lever.

Step 6. Adjust the first character adjustment screw in the V lever (figure 5-59, Appendix) so that it protrudes 1/8 inch.

Step 7. Remove the pin from the takeup drum and allow carriage return to take place.

Step 8. Check that the lock lever actuator arm (figure 5-59, Appendix) is adjusted so that the carriage return cam follower is free to drop into the cam when full carriage return has taken place.

Step 9. Adjust the lock lever actuator arm so that 1/32-inch clearance exists between the lock lever and the outer edge of the cam follower when the cam follower is pulled away from the cam (figure 5-61, view B, Appendix).

(f) AUTOMATIC CARRIAGE RETURN AND LINE FEED ADJUSTMENT.

Step 1. Operate carriage return off line function lever (figure 5-6, Appendix) and turn the main shaft, allowing the print cylinder and print hammer to return to the left side. Insure that the carriage return and print function clutches are returned to their stop positions.

Step 2. Turn the advance drum to the center of its travel.

Step 3. Check that both sides of the automatic carriage return and line feed bail actuator (figure 5-62, Appendix) strike the automatic carriage return and line feed sensing finger levers simultaneously. If they do not strike simultaneously, adjust the automatic carriage return actuator eccentric until they do.

Step 4. Adjust the automatic carriage return and line feed actuator arm (figure 5-62, Appendix) so that the sensing finger levers are midway between the function sensing finger lever stop strip (figure 5-63, Appendix) and the function bar (approximately 1/32 inch).

Step 5. Repeat step 1.

Step 6. Rotate the advance drum counterclockwise until the stop pin (figure 5-62, Appendix) comes in contact with the V lever. This will move the V lever to the end of line position.

Step 7. Release the print function clutch and rotate the main shaft until the function cam follower falls to the low portion of the cam.

Step 8. Manually cause the carriage to advance by lifting the rotary detent pawl actuator arm (AK2, figure 5-36, Appendix) with index finger. Observe that the line feed and automatic carriage return sensing finger levers (figure 5-62, Appendix) come in contact with the front edge of the function bar during the upstroke and fall beneath the function bar at least 1/16-inch when the function bar is fully up. This insures that sufficient engagement is provided for proper simultaneous release of both line feed and carriage return clutches. Insure that the sensing finger levers do not contact the function bar when the carriage is advanced to the position one step before the last character; otherwise, a premature release of either or both the automatic carriage return and line feed functions may occur, causing erratic operation. Check that none of the sensing finger levers contact any of the print prevent adjustment screws.

NOTE

If it is difficult to cause the carriage to advance manually, the alternate method would be to continue releasing the function clutch and

NOTE (Cont)

turning the main shaft by hand on the gear train. This would cause the carriage to advance as in normal operation. However, the five positioning clutches must be set up for a printed character.

Normally, the teletypewriter set is supplied with automatic carriage return after printing the seventy-second character. To adjust the equipment for automatic carriage return after printing the seventy-sixth character, proceed as follows:

Step 1. Remove grip ring (D1, figure 5-36, Appendix) and slide advance drum (D7) off advance drum bracket (D10).

Step 2. Remove the seventy-two character block from the V lever (figure 5-59, Appendix). Apply a small amount of liquid staking compound to the screw and attach the block to the hole provided on the advance drum bracket or the V lever. Refer to figure 5-59 (Appendix) for the alternate stowage positions.

Step 3. Install the advance drum and perform the automatic carriage return and line feed adjustment (steps 1 through 8) and the first character adjustment (paragraph 5-5au(7)(h)) to obtain seventy-six characters to the line.

In a similar manner, to adjust the equipment for seventy-two character automatic carriage return, remove the seventy-two character block from the stowage position, apply a small amount of liquid staking compound to the threads, and install the block on the V lever (figure 5-59, Appendix). Perform the automatic carriage return and line feed adjustment and the first character adjustment to obtain seventy-two characters to the line.

(g) BELL SENSING FINGER LEVER ADJUSTMENT.

Step 1. Release the print function clutch, operate the letters off line function lever, and turn the main shaft until the letters figures clutch comes to the stop position. The printer will now be in letters position.

Step 2. Adjust the bell prevent lever screw (figure 5-64, Appendix) so that the bell prevent lever will hold the bell sensing finger lever 1/32 inch away from the face of the function bar.

Step 3. Operate the figures off line function lever and turn the main shaft until the letters figures cam follower is in the figures position.

Step 4. Check to insure that the bell prevent lever tab (figure 5-64, Appendix) is clear of the bell sensing finger lever so that the bell sensing finger lever can fall into the slots in the function slides that would be aligned if the bell function were selected.

(h) LINE FEED ADJUSTMENT.

Step 1. Release the line feed clutch (figure 5-65, Appendix) by operating the line feed off line function slide lever and turning the main shaft until the line feed actuator cam follower arm is on the high portion of the cam.

Step 2. Loosen the line feed actuator cam follower arm screw; hold the line feed actuator cam follower arm against the cam.

Step 3. Adjust the torque tube and linkage until the pushing surface of the reference tooth is in contact with the pushed surface of the paper feed ratchet tooth

(figure 5-65, Appendix); tighten the line feed actuator cam follower arm screw securely.

NOTE

The remaining portion of this adjustment is normally performed at the factory and should not be made unless it is required after a complete disassembly and reassembly of the printer.

Step 4. Turn the line feed shift lever adjustment screw counterclockwise if the line feed pawl has failed to fully engage and clockwise if it had failed to fully disengage as evidenced by inability to reverse the manual paper feed when the cam follower is on the low side of the cam.

Step 5. Perform the final check by turning the main shaft until the line feed actuator cam follower arm is on the low portion of the cam. Move the line feed pawl manually up and down several times to insure that the paper feed ratchet and line feed pawl engage and properly clear.

(7) PRINT SECTION ADJUSTMENTS. - The following adjustments are intended to establish the correct mechanical relationships among all of the elements of the printer controlled by the action of the print cam or directly concerned with printing.

(a) PRINT CYLINDER CLAMP AND PRINT HAMMER ADJUSTMENT. - Prior to performing this adjustment, insure that the lateral control function slide is in perfect adjustment (paragraph 5-5au(5)(a)) and perform the bounce prevent lever adjustment (paragraph 5-5au(7)(i)) to establish the right margin. Proceed as follows:

Step 1. Set the printer in letters A position (paragraph 5-5au(1)(e)).

Step 2. Turn the advance drum counterclockwise to the limit of its travel.

NOTE

Make certain that automatic carriage return and line feed occur by the next rotation of the print function clutch.

Step 3. Attach print cylinder yoke clamp (22, figure 5-1, Appendix) to the lateral control belt so that the right edge of the print cylinder yoke is approximately 1/16 inch from the adjacent frame. This adjustment establishes the right-hand margin.

Step 4. Release the carriage return clutch by operating the carriage return off line function lever.

Step 5. Rotate the main shaft until the print cylinder has fully returned.

Step 6. Tighten the print hammer cable clamp screw (figure 5-17, Appendix) so that the print hammer face opposes the letter A, thus establishing the correct lateral relationship between the print cylinder and the print hammer.

(b) PRINT HAMMER RELEASE ADJUSTMENT. - This adjustment has the effect of positioning the print hammer shaft so that the positive drive of the print hammer is released just at the instant the print hammer strikes the paper. Adjust the print hammer release as follows:

Step 1. Loosen print prevent arm clamping screw (A2, figure 5-35, Appendix), print cam follower clamping screw (B2), print spring arm clamping screw (C4),

print hammer actuator link lever screw (C21c, figure 5-33, Appendix), the print hammer release stop screw (figure 5-66, Appendix), lock nuts (C10, figure 5-33, Appendix), and print hammer shaft stop screw (C5b).

Step 2. Tighten one of the lock nuts (C10).

NOTE

In the next step, position the print shaft terminal lever (figure 5-66, Appendix) so that it is approximately parallel with the print hammer shaft and then tighten the print spring arm clamping screw.

Step 3. Tighten print spring arm clamping screw (C4, figure 5-35, Appendix) temporarily so that the print spring arm can be used as a lever with which to rotate print lever shaft assembly (D).

Step 4. Using the vibrator arm (figure 5-66, Appendix) as a lever, rotate the print hammer shaft until the print hammer comes in contact with the print cylinder.

Step 5. Position the print hammer actuator link guide bracket and the print hammer actuator link lever screw so that the print hammer actuator link is in line with the print shaft terminal lever and at right angles to the print hammer shaft.

Step 6. Tighten the print hammer actuator link lever screw sufficiently for the lever to grip the print shaft but loose enough so that the clamp can be returned upon the print hammer shaft with slight pressure.

Step 7. Rotate the print hammer actuator link clockwise, viewing it from the left side of the printer, until the larger flat surface of the lever is approximately parallel to the front surface of the printer.

Step 8. Hold the print hammer against the print cylinder as described in step 3 and move the print spring arm up and down so that the end of the print shaft terminal lever (figure 5-66, Appendix) engages the tab on the print hammer actuator link.

Step 9. Repeat step 8 several times or until this engagement has the effect of rotating print hammer actuator link lever (C21b, figure 5-33, Appendix) on the print hammer shaft to the extent that there is no further contact between the end of the print shaft terminal lever (figure 5-66, Appendix) and the tab on the print hammer actuator link.

Step 10. Tighten the print hammer actuator link lever screw.

Step 11. Loosen the print spring arm clamping screw and lock nut (C10, figure 5-33, Appendix) which had been tightened temporarily in step 2.

(c) PRINT LEVER SHAFT ADJUSTMENTS.

Step 1. Adjust print hammer shaft stop assembly (C5, figure 5-33, Appendix) so that the front radius of the print hammer is approximately aligned with the inside surface of ribbon feed front plate assembly (figure 5-67, Appendix) and that 1/32-inch clearance exists between the print hammer shaft stop and print hammer shaft right-hand bearing (C1, figure 5-33, Appendix).

Step 2. Release the print function clutch and turn the main shaft until the print cam follower falls to the low portion of the cam (figure 5-68, Appendix).

NOTE

The action of the cam follower can be checked by inserting an internal-hex wrench into the print cam follower clamping screw head and gently pulling toward the front of the machine.

Step 3. Rotate the print shaft terminal lever until 1/32-inch clearance exists between the end of the terminal lever and the opposing edge of the print hammer actuator link (figure 5-68, Appendix).

Step 4. Tighten the print cam follower clamping screw, being careful to maintain the correct lateral relationship between the cam follower and the cam. This adjustment establishes the correct angular relationship between the print cam follower and the print shaft terminal lever.

Step 5. Hold the print cam follower against the low point of the cam and tighten the print hammer release stop screw so that no further rotation of the print hammer release is possible.

Step 6. Turn the main shaft slowly until the 1/32-inch clearance between the end of the print shaft terminal lever and the edge of the print hammer actuator link decreases to 0.010 inch.

Step 7. Tighten print spring arm clamping screw (C4, figure 5-35, Appendix) while the print helical spring yoke link bottoms on the shock pad. This adjustment establishes the correct angular relationship between the print spring arm and the print cam follower, insuring that the cam follower will not bottom on the cam but will in effect be stopped by the bottoming of the print helical spring yoke link on its shock pad.

Step 8. Lift up on print and function spring yoke pivot studs and links (27 and 35, figure 5-6, Appendix); turn the main shaft until the print cam follower is opposite the first small drop in the print cam (figure 5-69, Appendix); slowly release the spring yoke pivot studs and links and check that the print cam follower rests in the print cam drop.

Step 9. Position the print prevent rod lever by pulling outward on the print prevent rod and adjust the print prevent arm so that it tightly locks into the notch in the print prevent rod lever; tighten print prevent arm clamping screw (A2, figure 5-35, Appendix).

Step 10. Adjust left-hand and right-hand vibrator arms (C22 and C6, figure 5-33, Appendix) so that the vibrator arms are as close as possible to the ribbon feed front plate without interference; insure that the vibrator arms pivot freely in their mountings.

(d) TYPE POSITIONING CAM FOLLOWER STROKE ADJUSTMENT.

(1) ROTARY MOTION OF THE PRINT CYLINDER. - Refer to figure 5-70 (Appendix) for a plan view of the print cylinder. Adjust the rotary motion of the print cylinder as follows:

Step 1. Turn on the equipment and send the letter A; insure that the printer is in the letters A position (paragraph 5-5au(1)(e)).

Step 2. Transmit the letter A repeatedly and observe the motion of index wheel (24, figure 5-4, Appendix). During the transmission of letter A, rotary detent pawl pin (23) should bottom on the index wheel at the index mark.

Step 3. Adjust the rotary cable adjustment screw (figure 5-13, Appendix) until repeated transmission of the letter A results in minimum or no motion of the

index wheel. The rotary cable, which was roughly adjusted to its proper length previously, is now finely adjusted to its proper length.

Step 4. Transmit the letter E and observe the action of the index wheel. The rotary detent pawl pin should bottom in the index wheel one notch away (toward the bottom) from the index mark.

Step 5. Adjust number 2 rotary stroke adjustment screw (11, figure 5-5, Appendix) until repeated transmission of the letter E results in minimum or no motion of the index wheel. Tighten the stroke adjustment screw nut.

Step 6. Transmit the letter L repeatedly. Observe the action of the index wheel. The rotary detent pawl pin will bottom on the notch two positions toward the bottom from the index mark.

Step 7. Adjust number 1 rotary stroke adjustment screw (28, figure 5-6, Appendix) until the repeated transmission of the letter L results in minimum or no motion of the index wheel. Tighten the stroke adjustment screw nut.

Step 8. Check the adjustments by transmitting the letter T; this should result in the rotary detent pawl pin bottoming in the notch three positions (toward the bottom) from the index mark. Repeated transmission in this position is the aggregate of the strokes of the number 2 and number 1 cams and should result in minimum or no motion of the index wheel. If the index wheel moves during repeated transmission of the letter T, recheck the adjustments of the number 2 and number 1 rotary stroke adjustment screws and check the previous adjustments to insure that the rotary detent pawl pin is bottoming fully in the index wheel when the function cam follower is at the low point on the function cam. Also check that the rotary detent pawl pin is clear of the index wheel when the function cam follower is at the stop point on the function cam. Tighten all stroke adjustment screw nuts.

(2) LATERAL MOTION OF THE PRINT CYLINDER.

CAUTION

Do not perform the lateral stroke adjustment without first aligning the lateral control function slide (paragraph 5-5au(5)(a)). Always perform an adjustment of the automatic lateral control chain mechanism (paragraph 5-5au) following any adjustment to the lateral stroke. Remove the spring from the automatic chain takeup actuator lever in the lateral chain takeup prior to performing this adjustment.

Step 1. Transmit the letter A and check that the print hammer face is squarely aligned with the letter A on the print cylinder as shown in figure 5-66 (Appendix).

Step 2. If necessary, readjust the print cable clamp screw until the print hammer face is properly aligned with the letter A on the print cylinder.

Step 3. Transmit the letter Z and adjust number 5 lateral stroke adjustment screw (22, figure 5-6, Appendix) until the print hammer face opposes the letter Z on the print cylinder. Tighten the stroke adjustment screw nut.

Step 4. Transmit the letter D and adjust number 4 lateral stroke adjustment screw (16, figure 5-5, Appendix) until the print hammer opposes the letter D

on the print cylinder. Tighten the stroke adjustment screw nut.

Step 5. Transmit the letter S and adjust number 3 lateral stroke adjustment screw (20, figure 5-6, Appendix) until the print hammer opposes the letter S on the print cylinder; transmit letters A and check for 1/16-inch clearance between the takeup arm pin and the takeup drum bracket (figure 5-52, Appendix). Tighten the stroke adjustment screw nut.

NOTE

This completes the rough adjustments of the cam follower strokes for the number 3, 4, and 5 pulses. The final adjustment of these strokes is described in the following steps. Tighten all stroke adjustment screw nuts when adjustment is completed. Take care not to bend the stroke adjustment screws.

Step 6. Insert paper into the printer and print a complete line of A's. Strike the carriage return when the end of the line is reached. If the adjustment of the number 3, 4, and 5 pulses was too rough, functions such as carriage return may not yet be selected properly. In that case, effect carriage return by operating the carriage return off line function lever.

Step 7. Print a line of T's over A's.

Step 8. Adjust number 5 lateral stroke adjustment screw (22, figure 5-6, Appendix) until the T's appear to be perfectly superimposed over the A's. Do not be concerned with the spacing or the superimposition of the first two or three characters in the line since their adjustment will be described in subparagraph (h).

Step 9. When the T's appear perfectly superimposed over the A's, check the adjustment by printing M over N; B over D; and H over I.

Step 10. Adjust the number 4 type positioning cam follower stroke by printing a line of E's and then a line of D's over the E's. Turn number 4 lateral stroke adjustment screw (16, figure 5-5, Appendix) until the D's are perfectly superimposed over the E's.

Step 11. Check the adjustment by typing V over H, O over T, and N over I.

Step 12. Adjust the stroke of the number 3 type positioning cam follower by printing a line of V's and then superimposing O's. Turn number 3 lateral stroke adjustment screw (20, figure 5-6, Appendix) until the lines are perfectly superimposed.

Step 13. Check the adjustment further by printing F over D, Y over T, and I over A.

When these adjustments appear to have been satisfactorily made, check them in the aggregate by printing combinations such as T over O and A over M. It may be found that certain compromises have to be made in the individual stroke adjustments in order to achieve good spacing on some of the aggregate combinations. This compromise will not be discernible in normal printed copy.

With the spacing adjustment completed, the function slides should properly align so that functions can be selected by transmission. Check each of the functions in turn. If a function is not properly selected, check either the stroke adjustment or the particular adjustments relating to those functions. Up to this point, neither print prevention nor advance prevention has been properly adjusted so that both printing and

spacing will probably occur on some of the functions.

(e) LETTERS FIGURES CARRIAGE PULLEY STROKE ADJUSTMENT. - The last stroke adjustment to be made is that of the letters figures cam follower, which operates on the rotary cable.

Step 1. Operate the letters off line function lever and repeatedly transmit letters A.

Step 2. Loosen the lock nut on letters figures arm adjustment screw (43, figure 5-6, Appendix); using an internal-hex wrench, turn the adjustment screw inward until the letters figures arm clears carriage return shaft (50, figure 5-5, Appendix) by 1/32 to 1/16 inch.

Step 3. Check that the letter A type row on the print cylinder is aligned with the print hammer face; if not aligned, adjust the rotary cable adjustment screw (figure 5-13, Appendix) for proper alignment.

Step 4. Operate the figures off line function lever and repeatedly transmit figures A; that is, the symbol (-).

Step 5. Check that the figure A (-) type row on the print cylinder is aligned with the print hammer face; if not aligned, adjust letters figures cam follower stroke adjustment screw (41, figure 5-6, Appendix) for proper alignment.

Step 6. Observe the action of the index wheel and turn the letters figures cam follower stroke adjustment screw until repeated transmission of figures A results in minimum or no motion of the index wheel. This insures that the letters figures shift is resulting in exactly 180 degrees rotation of the print cylinder shaft.

(f) ADVANCE PREVENTION ADJUSTMENT.

NOTE

No character advance should take place after the transmission of blank, line feed, figures, bell, and letters.

Step 1. Back out all function advance prevent adjustment screws (40 through 44, figure 5-5, Appendix).

Step 2. Check that the character advance pawl clears the advance ratchet by 1/16-inch to 3/32-inch (paragraph 5-5au(6)(c), step 3).

Step 3. Repeatedly transmit the blank signal and adjust blank advance prevent adjustment screw (40, figure 5-5, Appendix) until spacing on blank ceases.

Step 4. Continue to turn the blank advance prevent adjustment screw in until backspacing on blank begins, insuring that the print cylinder is far enough along the line to permit backspacing.

Step 5. Observe the number of turns of the blank advance prevent adjustment screw required to go from the point at which spacing ceases until the point at which backspacing begins.

Step 6. Adjust the blank advance prevent adjustment screw to the midpoint between these two conditions.

Step 7. Transmit any printed character several times to insure that advance is not being suppressed for characters that should be printed.

Step 8. Repeat steps 3 through 7 for line feed, figures, letters, and bell, utilizing their function advance prevent adjustment screws (41, 42, 43, and 44, figure 5-5, Appendix). Check after each adjustment to insure that advancing is not being prevented on printed characters.

(g) PRINT PREVENT ADJUSTMENT. - Printing should be suppressed on blank, space, line feed, figures, bell, letters, and carriage return. The print prevent rod was set far out of adjustment during the print release adjustment in order to prevent it from interfering with other adjustments which had to be made previously. Perform the print prevent adjustment as follows:

Step 1. Turn function print prevent adjustment screws (46 through 52, figure 5-6, Appendix) counterclockwise until the screw heads are approximately two turns out from the inner surface of the print prevent rod.

NOTE

With the motor running and the printer in the steady mark position, the function cam follower will be in the stop position. This insures that all of the function sensing finger levers will be restrained from falling into slots that may have been aligned in the function slides.

Step 2. Loosen lock nut and back out print prevent stop adjustment setscrew (30).

Step 3. Repeatedly transmit letters A and turn in print prevent stop adjustment setscrew (30) until printing is suppressed.

Step 4. Back the screw out until printing of letters A appears, and then one-quarter turn beyond this point; tighten the lock nut.

Step 5. Adjust print prevent rod actuator arm screws (36, figure 5-6, Appendix) until the heads of the function print prevent adjustment screws are approximately 1/32 inch away from the function sensing finger levers.

NOTE

If the function print prevent adjustment screws are turned in too far in the following steps, the function sensing finger levers will not fall into the slides properly and the print prevent function will be selected but not performed. As a result, printing will take place.

Step 6. Transmit the blank signal and turn blank print prevent adjustment screw (46) until printing on blank is prevented.

Step 7. Turn the screw in one turn beyond the point at which printing stops.

Step 8. Check this adjustment by transmitting any printed character to insure that printing is not being prevented on all transmissions; further check this adjustment as described in the following steps.

Step 9. Turn off the equipment with the printer in letters A position.

Step 10. Release the print function clutch and turn the main shaft by hand until the function cam follower is on the high portion on the function cam. When the machine is in this condition, the blank sensing finger lever should not be in contact with the blank print prevent adjustment screw.

Step 11. Repeat the preceding steps for space, line feed, figures, bell, letters, and carriage return, utilizing their individual print prevent adjustment screws (47 through 52).

Step 12. Following adjustments, always check that printing is not being prevented for any printed characters. Also check that there is no contact between the print prevent adjustment screw and its function sensing finger lever when the printer is in letters A position and when the function cam follower is on the high portion of the function cam.

(h) **FIRST CHARACTER ADJUSTMENT.** - The spacing of the first two characters in a line is adjusted by first character adjustment screw (44, figure 5-6, Appendix).

Step 1. Transmit the following characters in the order given: Carriage Return (CAR RET); Line Feed (LINE FEED); M M M M.

Step 2. Note the spacing between the first two characters. If they are too close together, turn the first character adjustment screw counterclockwise until spacing is the same as between the last two M's; turn the screw clockwise when the first two M's are too far apart.

Step 3. When this screw has been adjusted for optimum spacing of the first two characters, recheck the automatic carriage return and line feed adjustment (paragraph 5-5au(6)(f)) and the bounce prevent adjustment (paragraph 5-5au(7)(i)).

NOTE

Always check the first character adjustment if there is no character advance at the beginning of a line following the receipt of a transmitted signal.

(i) **BOUNCE PREVENT ADJUSTMENT.**

Step 1. Position the print cylinder in the full carriage return position.

Step 2. Set bounce prevent lever eccentric bushing (49, figure 5-5, Appendix) so that the first motion of the advance drum will immediately cause bounce prevent lever (48) to ride on the stop pin mounted in the advance ratchet (figure 5-59, Appendix).

Step 3. Type five or six characters and allow the bounce prevent lever to engage the V lever. Check that the end tooth on the bounce prevent lever clears the stop pin tab on the V lever.

av. **AUTOMATIC LATERAL CONTROL CHAIN TAKEUP ADJUSTMENT.**

Step 1. Rotate the automatic chain takeup ratchet (figure 5-71, Appendix) manually and set the lateral control function slide alignment (figure 5-51, Appendix) so that index marks on the function selector frame and lateral control function slide are aligned when the letter A is transmitted.

Step 2. Check that the automatic chain takeup actuator adjustment setscrew on the stop bracket (figure 5-71, Appendix) extends approximately 1/8 inch out of the bracket toward the front of the machine; adjust setscrew so that 1/4-tooth clearance exists between the automatic chain takeup pawl and automatic chain takeup ratchet tooth when the character advance automatic chain takeup feed pawl is fully engaged in the ratchet tooth.

Step 3. Transmit letters M and set lateral control belt strip link (B21, figure 5-37, Appendix) by loosening screw (B12) far enough so that the lateral control belt strip link can be moved to the proper notch; then turn lateral control chain takeup eccentric (B9) for

fine adjustment. If adjustment cannot be obtained by turning the eccentric, move entire assembly into the next notch. Make this adjustment so that the automatic chain takeup feed pawl (figure 5-71, Appendix) is withdrawn on the automatic chain takeup ratchet to the point that it almost falls into the next tooth on the automatic chain takeup ratchet.

Step 4. Hold the automatic chain takeup pawl and feed pawl out of engagement and then turn the automatic chain takeup ratchet about 3/4-turn clockwise.

Step 5. Transmit a series of AM's and check that the automatic chain takeup ratchet advances; advancing should cease when the index mark on the lateral control function slide is in alignment with the mark on the function selector frame (figure 5-51, Appendix) when in letters A position.

Step 6. If the automatic lateral control chain takeup overfeeds, rotate lateral control chain takeup eccentric (B9, figure 5-37, Appendix) so that the tab at the end of lateral control chain takeup lever (B10), which contacts automatic chain takeup actuator lever (CA, figure 5-38, Appendix), moves to the left side of the machine.

Step 7. If the automatic lateral control chain takeup does not feed enough, rotate lateral control chain takeup eccentric (B9, figure 5-37, Appendix) so that the tab moves to the right side of the machine, tilting automatic chain takeup actuator lever (CA, figure 5-38, Appendix) more. Make certain that alignment marks on the function selector frame and lateral control function slide (figure 5-51, Appendix) maintain alignment within the width of one marker line.

aw. **FIGURES H MOTOR STOP ADJUSTMENT.**

NOTE

This procedure applies to the AN/TGC-14(V) only.

Step 1. Loosen the two screws on the figures H motor stop switch (figure 5-72, Appendix) and move the switch to the extreme left position.

Step 2. Place the machine in the figure J position. Verify this position by checking the individual clutches.

Step 3. Adjust carriage pins numbers 1, 3, 4, and 5 so that the top surface of each pin is even with the top surface of the code bar.

Step 4. Place the machine in figures H position and turn power off.

Step 5. Manually release the print function clutch and rotate the main shaft until the function cam follower is on the high portion of the cam. Check that the code bar return stop clears the code bar tabs when the machine is in the figures position.

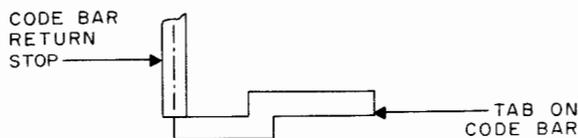
Step 6. Adjust the number 2 carriage pin so that the lower surface of the bottom bushing clears the top of the code bar by approximately 0.010 inch. Check that the code bar sensing tabs are halfway across carriage pins numbers 1, 3, 4, and 5.

Step 7. Adjust the code bar actuator clamp so that it just contacts the code bar actuator. Check that there is approximately 0.005-inch end clearance in the character advance lever shaft.

Step 8. Move the figures H motor stop switch to the right until it is just past the point at which it closes. This point is determined by an audible click; tighten the switch.

Step 9. Manually rotate the main shaft until the function cam follower falls to the low portion of the cam.

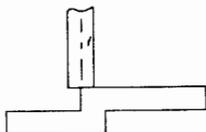
Step 10. Position the code bar return stop so that its centerline is aligned with the left face of the code bar tab as shown in the following sketch viewed from the front of the equipment. Insure that the code bar return stop cam follower still contacts the letters figures cam.



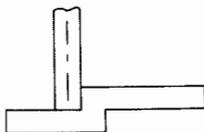
Check the operation of the code bar as follows:

Step 1. Set the MOTOR switch on the ON position.

Step 2. Depress the FIGS (figures) key and check that the centerline of the code bar return stop is aligned with the step on the code bar tab as shown in the following sketch viewed from the front of the equipment.



Step 3. Depress the LTRS (letters) key again and check that the code bar return stop is engaged with the step on the code bar as shown in the following sketch viewed from the front of the equipment.



Step 4. Depress the LTRS (letters) key again and check that the code bar return stop is engaged with the left face of the code bar tab as shown in the following sketch viewed from the front of the equipment.



NOTE

None of the figures H motor stop mechanism components should move as long as the machine is in letters position.

ax. AUTOMATIC TIME DELAY MOTOR STOP ADJUSTMENT.

NOTE

This procedure applies to the AN/TGC-14A(V) only. Before proceeding with this adjustment, check that time delay feed and check pawl helical springs (11 and 12, figure 5-73, Appendix) and time delay secondary check pawl stop spring (2) are correctly installed.

Step 1. Set all switches to the OFF position.

Step 2. With the start clutch in the stop position, check that the flat portion of timing cam shaft extension (9, figure 5-73, Appendix) is parallel with time delay check pawl (13). To adjust timing cam shaft extension (9), loosen the screw which secures it to the timing cam shaft and then turn the 3/8-inch hexagon until the flat portion is parallel to time delay check pawl (13); tighten the screw.

Step 3. Check that neither edge of the timing cam shaft extension contacts the pawls when the range dial is set to any of the previously determined extremes of range settings.

Step 4. Check that advance ratchet (5) returns to the correct start position by first turning the advance ratchet clockwise and then pulling time delay feed and check pawls (10 and 13) away from the advance ratchet. Insure that the button mounted on the advance ratchet returns to the stop tab on time delay yoke (18). Repeat this sequence at least three times to insure that detent spring (8) is properly seated. If the advance ratchet does not return to the start position, loosen lock nut (K10, figure 5-20, Appendix) and disengage ratchet support shaft lock (K12) from time delay mounting base plate assembly (X). Insert a screwdriver in the slot on time delay ratchet support shaft (16, figure 5-73, Appendix) and turn it counterclockwise until the button on the advance ratchet contacts the stop tab on the time delay yoke. Turn time delay ratchet support shaft (K9, figure 5-20, Appendix) enough to provide some tension on return spiral spring (K5); then engage ratchet support shaft lock (K12) with time delay mounting base plate assembly (X), over the flats of the hex on time delay ratchet support shaft (K9); secure with lock nut (K10).

Step 5. Slowly rotate the main shaft manually and observe that time delay feed pawl (10, figure 5-73, Appendix) engages a deep tooth in reduction ratchet (6), time delay check pawl (13) drops off to the next tooth, and time delay secondary check pawl (3) drops off to the next tooth on reduction ratchet (6). At this point, there should be 0.005 to 0.010-inch clearance between the edge of the tooth on advance ratchet (5) and time delay check pawl (13); if necessary, obtain this clearance by rotating time delay secondary check pawl eccentric (1). Check that the tip of time delay secondary check pawl (3) does not interfere with post (4).

Step 6. Advance reduction ratchet (6) until time delay secondary check pawl (3) falls into one of the shallow teeth of reduction ratchet (6). Turn post (4) until the tip of time delay secondary check pawl (3) bottoms on the shallow tooth of reduction ratchet (6) but does not restrict the return motion of advance ratchet (5) when time delay secondary check pawl (3) is engaged in the deep tooth of reduction ratchet (6).

Step 7. Manually advance advance ratchet (5) clockwise until button (17) touches the tab of time delay yoke (18). Slowly rotate the main shaft until the point of time delay latch (15) snaps to the right side of dent spring roller (7). Maintain this main shaft position so that time delay latch (15) is held in the clockwise position.

Step 8. Loosen two screws (22) and move time delay switch (21) so that time delay switch actuator roller (19) comes in contact with the center of the small end tab of time delay latch (15). Continue to move time delay switch (21) until a click is heard; tighten two screws (22). Depress time delay switch actuator (20) to insure that some additional clearance exists.

Step 9. Continue to rotate the main shaft until time delay feed pawl (10) withdraws, allowing advance ratchet (5) to return to the start position. The impact of advance ratchet (5) must return time delay yoke (18) to the counterclockwise starting position as shown.

Step 10. Check the operation of the automatic time delay motor stop by running the printer and then supplying a steady mark signal. The motor should shut off in approximately 60 seconds at 75 baud and in approximately 90 seconds at 45.45 baud.

NOTE

Shims are provided to absorb manufacturing tolerances of the time-delay yoke and associated parts. The time delay latch must be loose enough to fall from one side to the other by its own weight. If it is too tight, remove shims; if too loose, add shims.

Step 11. Rotate time delay feed and check pawl guide (14) clockwise until it stops against the screw. Check that time delay feed pawl (10) and time delay check pawl (13) move freely through the guide.

ay. PAPER BRAKE ADJUSTMENT.

CAUTION

Never lift the equipment by means of the dancer roll tube as this will result in permanent damage to the dancer roll tube mechanism.

Step 1. Adjust two paper brake link eccentrics (figure 5-74, Appendix) so that the spring end of the paper brake link is located midway ($\pm 25\%$ of its total travel) between the two stop tabs when the rubber part of the brake mechanism touches the flared edge of the brake drum under normal spring tension.

NOTE

The adjustment of step 2 takes precedence over step 1.

Step 2. While performing step 1, the paper brake link eccentrics must also be adjusted to keep the dancer roll tube parallel with the paper supply roll.

Step 3. Attach an 8-ounce spring scale to the center of the dancer roll tube; check that the pressure required to move the dancer roll tube away from the paper supply roll is 1-1/2 to 2 ounces. Move the scale to both ends and check that the pressure required to move the dancer roll tube is 1/2 to 1 ounce.

ORIGINAL

Step 4. If the above requirements are not met, or if the mechanism is binding, check for distortion or damage to the dancer roll tube, the brake drums, or the two upright supporting members on the electrical chassis.

az. RIBBON FEED ADJUSTMENTS. - The ribbon feed mechanism requires only ribbon feed backstop adjustments. Adjust the backstop in the same manner as the clutch backstops described in paragraph 5-5au (2).

ba. KEYBOARD ADJUSTMENTS.

(1) OVERALL ADJUSTMENTS.

(a) CLUTCH RELEASE CAM FOLLOWER ECCENTRIC. - Adjust the clutch release cam follower eccentric (figure 5-75, Appendix) so that the clutch release cam follower disengages the clutch release finger from the clutch when any single key is depressed, but cannot be made to disengage the clutch release finger from the clutch when two keys, other than the REP (repeat) and a second key, are depressed simultaneously. Adjust the clutch release cam follower eccentric for a minimum of 0.010-inch clearance between the stop tab and the clutch release finger while depressing the key which provides the least clearance.

(b) CLUTCH STOP. - Position the clutch release finger so that the stop tab on the clutch release finger is aligned with the center of the clutch cage by loosening grip ring (DB, figure 5-40, Appendix) and repositioning repeat key shaft bushing (DF) on repeat key shaft (DD).

(c) REPEAT KEY ACTUATOR ARM. - Adjust repeat key actuator arm (DH, figure 5-40, Appendix) by loosening the repeat key actuator arm screw (figure 5-76, Appendix) and adjusting the repeat key actuator arm so that the clutch release finger will clear the stop tab on the clutch when the REP (repeat) key is fully depressed and will clear the outside diameter of the clutch by 0.005 to 0.010 inch when the REP (repeat) key is not depressed.

(d) LATERAL POSITION AND CLEARANCE OF BACKSTOP.

Step 1. Loosen backstop eccentric shaft setscrew (BY, figure 5-40, Appendix) and slide backstop eccentric shaft (BX) until clutch backstop assembly (BV) rests on the center of the clutch housing.

Step 2. Tighten the backstop eccentric shaft setscrew just enough to prevent any lateral movement of the backstop eccentric shaft; then rotate the backstop eccentric shaft until the clutch backstop fully engages the front edge of the backstop notch (figure 5-77, Appendix) when the clutch is turned manually. Check that the clutch housing is advanced slightly forward as the clutch backstop slides to the bottom of the notch. This insures that the clutching rollers are fully disengaged from the keyboard drive shaft.

(e) KEYBOARD RAIL SPACING. - If the keyboard rails are loosened or removed, adjust the spacing between the rails as follows:

Step 1. Loosen screws (F, figure 5-40, Appendix) on right-hand keyboard rail (E).

Step 2. Loosen and remove screws (CM) on key retaining strip (CL) and remove the key retaining strip.

Step 3. Position the key retaining strip between the left-hand and right-hand keyboard rails as a clearance gage so that the key retaining strip is against left-hand keyboard rail (A).

Step 4. Move right-hand keyboard rail (E) so that it just contacts the key retaining strip at both the front and rear of the rails; secure the rails in this position and reinstall the key retaining strip in its correct position.

(f) CODE BAR AND PULSING FINGER CLEARANCE. - The shaft clamps (figure 5-78, Appendix, detail A) used to secure the pulsing fingers are spaced with pulsing finger adjustment shims which are 0.002-inch thick. Removal of the shims increases the clearance between the code bars and the pulsing fingers. It may be necessary to remove more shims from one side to keep the pulsing finger and prevent lever shaft parallel to the code pulsing cam assembly. If the pulsing finger and prevent lever shaft is removed, secure the shaft clamps and shims to their original position with the attaching screws.

Adjust the final thickness of the pulsing finger adjustment shims so that the clearance between the code bars and the pulsing fingers is 0.005 to 0.010 inch (figure 5-78, Appendix, detail B).

(g) CODE PULSING CONTACT CLEARANCE.

NOTE

An alternate method of establishing code pulsing contact clearance is given under paragraph 5-5ba(3)(a).

Step 1. Position the keyboard as shown in detail A, figure 5-78 (Appendix) and note the location of the code pulsing contacts.

Step 2. Depress the blank key and manually rotate the keyboard drive gear until the clutch is in the stop position (stop tab of cage against the clutch release finger).

Step 3. Place a 0.031-inch shim (one end bent approximately 45 degrees for 3/16-inch length) under the start pulsing finger. (This finger is operated by the steel cam next to the master pulsing cam.) Make certain that the shim does not climb up on the angled surface of the cam. This step establishes the midway point of travel of the start pulsing finger.

Step 4. Connect an ohmmeter across the start pulsing finger contacts; using a thin screwdriver as a contact bender, bend the lower contact leaf or bottom leaf stiffener as equipment dictates so that the contacts just close or open. This adjustment allows the contacts to make or break on the midway point of travel of the start pulsing finger.

Step 5. Depress the LTRS (letters) key and manually rotate the keyboard drive gear until the number 1 pulsing finger rests in the center of the low position of the nylon cam.

Step 6. Repeat steps 3 and 4.

Step 7. Repeat steps 5 and 6 for the number 2 through number 5 pulsing fingers; perform a total of six adjustments in this manner.

Step 8. Manually rotate the keyboard drive gear until the clutch is in the stop position. Depress the letters key and check for clearance of 0.005 to 0.010 inch between the code bars and pulsing finger tips (figure 5-78, detail B, Appendix). If the clearance is incorrect, repeat steps 1 through 7.

(h) CODE PULSING CONTACT TENSION. - Check that the pressure required to open a closed set of code pulsing contacts (figure 5-78, Appendix, detail D) is 3 to 4 ounces.

(2) OSCILLOSCOPE ADJUSTMENT OF KEYBOARD.

NOTE

Insure that the master pulsing contact assembly has been centered (paragraph 5-5c(5), steps 11 and 12) prior to performing this adjustment.

Step 1. Remove the electrical chassis from the case (paragraph 5-5b(3)) and extend the keyboard to the operating position.

Step 2. Refer to figure 2-12 and patch in Mode 1 (line battery supplied internally).

Step 3. Insert a 280-ohm, 8-watt resistor (FSN 5905-100-4802) in series in the signal loop.

Step 4. Connect Oscilloscope AN/USM-105, or equivalent, across the 280-ohm, 8-watt resistor.

Step 5. Turn on the equipment and adjust the LINE ADJUST control for approximately 30 milliamperes of signal line current as described in paragraph 2-8e(4).

Step 6. Locate the lower spring leaf adjusting screw (figure 5-78, Appendix, detail E) directly under the upper spring leaf adjusting screw; insert the insulated 1/16-inch internal-hex wrench (supplied in Tool Kit TK-122/U) through the split rubber cover into the lower spring leaf adjusting screw; transmit the letter Y using the REP (repeat) key and turn the lower spring leaf adjusting screw counterclockwise until the letter Y is no longer transmitted.

Step 7. Open the upper spring leaf adjusting screw access plate (figure 5-78, Appendix, detail E); insert the special wrench between the ribbon roller and the printer front plate into the upper spring leaf adjusting screw and turn the screw counterclockwise until the printer runs open.

Step 8. Transmit a series of letters R using the REP (repeat) key: Turn the upper spring leaf adjusting screw clockwise until the waveform on the oscilloscope shows a marking pulse on pulses 2, 4, and stop and spacing pulses on start, 1, 3, and 5 as shown in waveform A, figure 5-79 (Appendix). As the screw first comes in contact with the pulsing finger, waveform B will appear. Further clockwise rotation of the screw will produce waveform A; if the screw is turned too far in, waveform C will appear.

Step 9. Transmit a series of letters Y using the REP (repeat) key. Turn the lower spring leaf adjusting screw clockwise until the waveform shows marking pulses on 1, 3, 5, and stop and spacing pulses on start, 2, and 4 as shown in waveform A, figure 5-80 (Appendix). Waveform B shows the lower spring leaf adjusting screw too far out; waveform C shows the lower spring leaf adjusting screw approaching the proper adjustment; and waveform D shows the lower spring leaf adjusting screw too far in.

Step 10. Transmit LTRS (letters) using the REP (repeat) key. The oscilloscope waveform should appear as shown in waveform A, figure 5-81 (Appendix). Readjust the upper and lower adjusting screws slightly for minimum width of the pips. Transmit letters R; if the lower screw is properly adjusted and the upper screw is in too far, waveform B will appear. Transmit letters Y; if the upper spring leaf adjusting screw is properly adjusted and the lower spring leaf adjusting screw is in too far, waveform C will appear.

Step 11. Before proceeding with step 12, check the speed change gear which is installed in the equipment. Refer to paragraph 2-10 for speed change gear replacement and install the 100-word per minute (white) gear. Refer to figure 5-82 (Appendix) for the proper length of the start pulse of the speed change gear installed.

Step 12. Using a convenient time base on the oscilloscope, note the length of the start pulse (first spacing pulse); this start pulse should appear as shown in figure 5-82 (Appendix). For the AN/TGC-14(V) operating on 7.42-unit code and 100 words per minute, the pulse length should be 13.49 milliseconds (or 22 milliseconds at 60 words per minute). For the AN/TGC-14A(V) operating on 7.0-unit code, the pulse length should be 13.33 milliseconds at 75 baud and 22 milliseconds at 45.45 baud. If the pulse lengths are incorrect, adjust the pulse length as described in the following steps.

NOTE

There are two alternate methods for checking the start pulse length. The first method is to compare the lengths of the start pulse and the number 1 pulse during letters condition; the end of the number 1 pulse appears as a small pip in figure 5-82 (Appendix). The second method is to transmit letters X (marking on 1, 3, 4, and 5) and observe that the start pulse is the same length as the number 1 (marking) and number 2 (spacing) pulses.

Step 13. Locate the start pulse eccentric (CC6, figure 5-40, Appendix) in the master pulsing cam and rotate the pulsing cam assembly until this start pulse eccentric is aligned with the top adjustment hole in the keyboard frame (figure 5-83, Appendix); check that a screw is aligned with the bottom hole.

NOTE

Do not loosen or move either the eccentric or the screw as yet.

Step 14. Rotate the pulsing cam assembly until the second screw appears in one of the adjustment holes; loosen this screw by inserting an internal-hex wrench through the hole in the frame. Rotate the cam assembly until the third screw appears in one of the adjustment holes; loosen the screw.

Step 15. Rotate the pulsing cam assembly until the start pulse eccentric again appears in the top adjustment hole and the first screw again appears in the bottom hole. Insert a screwdriver through the top hole and into the start pulse eccentric; insert an internal-hex wrench through the bottom hole and loosen the third screw.

Step 16. If the start pulse must be lengthened, turn the start pulse eccentric in a manner that will retard the master pulsing cam in relation to the start stop cam. These cams move clockwise when viewed from the left side of the keyboard. If the start pulse must be shortened, advance the relative position of the master pulsing cam with the start stop cam.

Step 17. Upon completion of the adjustment, tighten the first screw and then the remaining two screws;

close the upper spring leaf adjusting screw access plate (figure 5-78, Appendix, detail E).

(3) FIELD ADJUSTMENT OF KEYBOARD.

(a) CODE PULSING CONTACT CLEARANCE.
NOTE

Insure that the master pulsing contact assembly has been centered (paragraph 5-5c(5), steps 11 and 12) prior to performing this adjustment.

Step 1. Position the keyboard as shown in detail A, figure 5-78 (Appendix) and note the location of the code pulsing contacts.

Step 2. Depress the blank key and manually rotate the keyboard drive gear until the first contact (start stop) opens and its pulsing finger is on the high side of the cam.

Step 3. Using a contact bender, adjust the contacts by carefully bending the bottom contact leaf or the bottom contact leaf stiffener for a clearance of 0.020 to 0.025 inch.

Step 4. Continue rotating the keyboard drive gear until the low side of the cam is opposite the number 1 pulsing finger; adjust the contact clearance for 0.015 to 0.020 inch (figure 5-78, Appendix, detail C); repeat this procedure for the number 2 through number 5 pulsing fingers.

Step 5. Depress the letters key and manually rotate the keyboard drive gear until the number 1 pulsing finger drops off the high side of the cam (figure 5-78, Appendix, detail D); check for a clearance between the pulsing finger pusher and the top contact leaf of 0.010 inch (minimum); repeat this procedure for the number 2 through number 5 pulsing fingers. If clearance is incorrect, check the condition of the cam, pulsing fingers, code bars, and associated mechanism.

(b) MASTER PULSING CONTACTS. - The following procedures will place the keyboard contacts in nearly perfect alignment. For further refinement of adjustment, perform the oscilloscope adjustment procedure of paragraph 5-5ba(2).

Step 1. Loosen three screws (CC5, figure 5-40, Appendix) and rotate start pulse eccentric (CC6) to the mid-position (slot toward center of shaft); tighten screws (CC5).

Step 2. Depress the blank key and manually rotate keyboard drive gear (CC13) until master pulsing cam follower (AA12c) rests on the first low part of master pulsing cam (CC4). Check that the number 1 pulsing finger contacts are closed.

NOTE

If the master pulsing contact assembly has been dismantled, proceed with steps 3 through 8. If the master pulsing contact assembly has not been dismantled from the keyboard frame, proceed with steps 9 through 24.

Step 3. Loosen master pulsing cam follower screw (AA12a) and rotate keyboard contact actuator (Z) aside.

Step 4. Using the special internal-hex 1/16-inch wrench (supplied in Tool Kit TK-122/U), back out upper and lower spring leaf adjusting screws (CD18) so that the screws are still engaged in their threads. This provides maximum clearance between the contacts.

Step 5. Using two screws (CE) and two lock washers (CF), mount the master pulsing contact assembly to left bottom frame (DP91); tighten the screws slightly. Make certain that the bends of upper and lower leaf contact assemblies (CD12 and CD13) are equal and the tips are approximately in the center of insulators (CD7).

Step 6. Spread the upper and lower leaf contacts apart just enough to insert keyboard contact actuator (Z) between the leaf contacts; tighten master pulsing cam follower screw (AA12a).

Step 7. Place a shim (0.010 inch for six-leaf master pulsing contact assembly (CD) or 0.005 inch for two-leaf master pulsing contact assembly (CD)) between the tip of master pulsing cam follower (AA12c) and its cam, while on the low. This establishes the midway point of travel of the master pulsing cam follower.

Step 8. Loosen two screws (CE) and move the entire master pulsing contact assembly into position so that keyboard contact actuator (Z) is pointing at the center insulator and upper and lower leaf contact assemblies (CD12) and (CD13) are parallel to keyboard contact actuator Z; tighten two screws (CE) and remove the shim.

Step 9. Connect an ohmmeter (Multimeter AN/PSM-4, or equivalent) across the keyboard slip connector contacts (figure 5-9, Appendix).

Step 10. Rotate the keyboard drive gear toward the front until the shaft rotates freely; the clutch will then be in the stop position.

Step 11. Depress letter A and turn the keyboard over with the space bar toward you.

Step 12. Observing the pulsing fingers (figure 5-8, Appendix) from right to left, note that the first one is the master pulsing cam follower and the second one is the start stop pulsing finger which is now resting on the low side of its cam.

Step 13. Slowly rotate the keyboard drive gear away from you until the master pulsing cam follower is riding in the center of the first low part of its cam.

Step 14. Turn the lower spring leaf adjusting screw (figure 5-78, Appendix) counterclockwise until no reading (meter pointer at infinity end) is observed on the ohmmeter; then turn the screw clockwise until the meter first reads. Continue turning the screw one-eighth turn past this point.

Step 15. Very carefully turn the keyboard drive gear away from you until the master pulsing cam follower is riding on the center of the high point of its cam.

Step 16. Turn the keyboard over and turn the upper leaf adjusting screw (figure 5-78, Appendix) counterclockwise until no reading is observed on the ohmmeter; then turn the screw clockwise until the reading is first observed and continue turning the screw one-eighth turn past this point.

Step 17. Remove the ohmmeter and reinsert the keyboard in the printer.

Step 18. Turn the machine on and type a series of letters R, using the REP (repeat) key.

Step 19. Adjust the printer range as instructed in paragraph 2-8e(1) until the low end of the range is found.

NOTE

If letter V prints, the upper spring leaf adjusting screw is in too far.

Step 20. Move the range dial up ten points from the low end.

Step 21. Type a series of letters Y, using the REP (repeat) key; turn the lower spring leaf adjusting screw clockwise until the letters Y print correctly.

NOTE

If letters function is selected, the lower spring leaf adjusting screw is in too far.

Step 22. Move the range dial back to the low end and type a series of letters R, using the REP (repeat) key; if letters V print, the upper spring leaf adjusting screw is too far in; if the machine runs open, the upper spring leaf adjusting screw is too far out. Make the indicated adjustment and verify that letters R are printing correctly.

Step 23. Type a series of letters Y, using the REP (repeat) key; if letters V print, the upper spring leaf adjusting screw is too far in; if the machine runs open, the upper spring leaf adjusting screw is too far out. Make the indicated adjustment and verify that letters Y are printing correctly.

NOTE

When both letters R and Y are printing correctly at the low end of the printer range, the keyboard is correctly adjusted.

Step 24. Reset the printer to the middle of its range according to paragraph 2-8e(1).

bb. SPROCKET-FEED PAPER ADJUSTMENT.

NOTE

This procedure applies to AN/TGC-14A(V) only.

Step 1. Install the 72 character block in the 72 character position on the carriage return V lever as shown in figure 5-59 (Appendix).

Step 2. Turn the advance drum counterclockwise until the stop pin on the advance ratchet comes in contact with the 72 character block. Release the print function clutch, rotate the main shaft manually until the next downstroke of the function bar releases the automatic carriage return and line feed sensing finger levers.

Step 3. Set the printer in letters A position by positioning the number 1 and number 2 clutches on the mark side (held by the top clutch release fingers) and the number 3, 4, and 5 clutches on the space side (held by the bottom clutch release fingers). Insure that the index marks on the lateral control function slide are in proper alignment with the index marks on the function selector frame.

Step 4. Loosen the lateral control belt clamp (figure 5-52, Appendix) on the takeup drum and allow 3/8 inch of the lateral control belt to be released; then tighten the clamp.

Step 5. Loosen the lateral control belt clamp (figure 5-3, Appendix) and tighten the 3/8 inch slack of the lateral control belt released from the takeup drum and then tighten the clamp; check for a clearance of approximately 1/8 inch between the right edge of

print cylinder yoke assembly (A6, figure 5-33, Appendix) and the adjacent frame (right wall of the rear frame).

NOTE

In the following step, if the amount of lateral control belt excess on the takeup drum is not sufficient, remove the lateral control belt from print cylinder yoke clamp (22, figure 5-1, Appendix), establish the 1/8-inch clearance between the right edge of the print cylinder yoke assembly and the adjacent frame, and reclamp the lateral control belt in the print cylinder yoke clamp.

Step 6. Place the printer in letters M position; refer to figure 5-52 (Appendix) and check for 1/16-inch clearance between the takeup arm pin and the rear of the slot in the takeup drum bracket.

Step 7. Place the printer in letters A position and advance the print cylinder half way across the page.

Step 8. Loosen the print hammer cable clamp screw (figure 5-17, Appendix) and reposition the hammer so that when actuated it will strike the letter A squarely, thus establishing the correct lateral position between the print cylinder and print hammer; tighten the print hammer cable clamp screw.

5-6. REFERENCE DATA.

a. SEATING TORQUE VALUES. - Refer to the following list for the recommended seating torque for stainless steel cap screws.

Screw Size	Torque (Inch-Pounds)
2-56	3.8
3-48	5.7
4-40	8.0
5-40	12.0
6-32	15.0
8-32	28.0
10-32	45.0
1/4-20	95.0

To prevent permanent damage to the screws, do not exceed the above values. When the screws are installed into lightly threaded holes, individual judgment is necessary to determine the exact amount of force to use so as not to strip the threads.

b. TENSION VALUES. - Refer to table 5-10 (Appendix) for the tension values of the springs in the equipment.

5-7. OVERALL SCHEMATIC AND WIRING DIAGRAMS.

Refer to Appendix figure 5-84 for the overall schematic diagram and to Appendix figures 5-86 and 5-88 through 5-92 for the wiring diagrams for Teletypewriter Set AN/TGC-14(V). For Teletypewriter Set AN/TGC-14A(V), refer to Appendix figure 5-85 for the overall schematic diagram and to Appendix figures 5-87 and 5-88 through 5-92 for the wiring diagrams.



TABLE 4-1. TEST EQUIPMENT AND SPECIAL TOOLS

NAME	DESIGNATION	ALTERNATE	REQUIRED USE
Oscilloscope	AN/USM-105	Oscilloscope AN/USM-50	Observe waveforms.
Multimeter	AN/PSM-4	Electronic Multimeter TS-505/U	Perform resistance, current, and voltage measurements.
Teletypewriter Tool Kit TK-122/U*			Perform minor adjustments.

*This tool kit contains all special tools and gages required to maintain the teletypewriter sets.

TABLE 4-2. PRELIMINARY CHECKS FOR EQUIPMENT ALREADY IN USE

STEP NO.	ACTION	PROCEDURE OR REFERENCE
1.	Check for presence of primary power.	Remove service cable from primary power source; using Multimeter AN/PSM-4, check power source for correct primary power.
2.	Check for presence of correct fuses; using Multimeter AN/PSM-4, check for continuity.	Refer to figure 2-1; replace defective fuses.
3.	Check that option patch cords are secure; check option patching arrangement for operating mode in use.	Refer to paragraph 2-9.
4.	Check motor and selector cable connectors for security in their receptacles; check all service cable junction box connections for security.	Tighten or repair loose or damaged connections.
5.	Check keyboard and electrical chassis slip contacts for continuity and correct operation. Check service cable for signs of deterioration; connect service cable to primary power source. Check cable connector for security with electrical chassis receptacle.	Tighten loose connections.
6.	Check signal line current.	Using Multimeter AN/PSM-4, check incoming signal line current: High Range - 20 to 80 ma Low Range - 1 to 5 ma
7.	Check signal line distortion.	Check for maximum of 35-percent distortion on incoming signal. Refer to paragraph 4-11 for a description of the types of distortion which may be encountered.
8.	Proceed to table 4-4 (Appendix) for troubleshooting procedures.	

TABLE 4-3. PRELIMINARY CHECKS FOR EQUIPMENT OF UNKNOWN CONDITION

STEP NO.	ACTION	PROCEDURE OR REFERENCE
1.	Perform thorough visual inspection; check for missing or damaged components and security of all connectors and patch cords. Check belt and cables for wear and proper threading.	Refer to Section 1 for general overall illustrations of the complete equipment. Refer to Section 5 for belt and cable threading instructions.
2.	Determine the type of primary power required and connect the teletypewriter set to the applicable primary power source.	Refer to paragraph 2-5.
3.	Perform all checks of table 4-2 (Appendix).	

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	NOTE	
	Prior to using this chart, perform the test setup of paragraph 4-5b.	
1. Both motor and copy lights inoperative.	Defective main fuse 1A1F1.	Replace fuse.
	Defective MOTOR switch	Replace switch.
	Open or shorted wire.	Perform continuity check using figure 4-6 (Appendix) and Multimeter AN/PSM-4. Replace or solder broken or shorted wire.
2. Motor inoperative (copy lights operative).	Broken or bent connector pin.	Replace connector assembly.
	Defective motor fuse 1A1F2.	Replace fuse.
Motor inoperative; slight movement of gears when MOTOR switch is turned on.	Faulty motor.	Perform continuity check between power leads and chassis. See figure 4-6 (Appendix). Replace or solder broken or shorted wire.
	Faulty starting capacitor 1A1C1 (one side open or shorted).	Test for shorted or open condition. Replace if defective.
	Motor stop relay 1A1K1 continuously energized due to defective or mis-adjusted relay, line sensor, or switch 1A2A1S1.	Repair or replace defective parts; refer to table 4-6 (Appendix) for line sensor troubleshooting procedures.
3. Copy lights inoperative.	Defective motor stop circuit in line sensor.	Refer to table 4-6 (Appendix).
	Faulty LAMP switch 1A1S2.	Replace switch.
	Faulty bulbs.	Replace bulbs.
	Open wire or connection.	Perform continuity checks.
	Transformer 1A3T1 defective.	Replace transformer.

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>4. Motor will not stop with figures H function (AN/TGC-14(V)). Motor stop relay 1A1K1 will not energize.</p> <p>Motor will not stop after 60 to 90 seconds inactivity (no mark-to-space) transition (AN/TGC-14A(V)).</p>	<p>Figures H linkage improperly adjusted.</p> <p>Defective figures H motor stop switch 1A2A1S1.</p> <p>Motor stop relay 1A1K1 coil open.</p> <p>Open wire or connection.</p> <p>Defective line sensor.</p> <p>Code bar binding; code bar not closing figures H motor stop switch.</p> <p>Time delay motor stop mechanism improperly adjusted.</p> <p>Defective time delay switch 1A2A1S1.</p> <p>Defective motor stop relay 1A1K1.</p> <p>Defective line sensor.</p> <p>Open wire or connection.</p>	<p>Perform figures H motor stop linkage adjustment (paragraph 5-5aw).</p> <p>Replace switch (figure 5-72, Appendix).</p> <p>Replace relay (figure 4-37, Appendix).</p> <p>Perform continuity checks in motor stop circuit.</p> <p>Refer to table 4-6 (Appendix).</p> <p>Correct the cause of binding; repair or replace code bar spring.</p> <p>Adjust according to paragraph 5-5ax.</p> <p>Replace switch (figure 5-73, Appendix).</p> <p>Replace relay (figure 4-37, Appendix).</p> <p>Refer to table 4-6 (Appendix).</p> <p>Perform continuity checks in motor stop circuit.</p>
<p>5. Motor speed fluctuates.</p>	<p>Input power (voltage or frequency) variations.</p> <p>Binding component in printer.</p> <p>Erratic operation of motor stop switch 1A2A1S1 (AN/TGC-14(V)).</p>	<p>Check primary power.</p> <p>Check clutches, gears, cams, and linkages for free movement; if necessary, lubricate parts according to table 5-9 (Appendix).</p> <p>Adjust figures H motor stop linkage (paragraph 5-5aw).</p>
<p>6. Heater inoperative.</p>	<p>Thermostat 1A1S3 inoperative.</p> <p>Defective heating element.</p> <p>Defective fuse 1A1F1 (AN/TGC-14(V)) or 1A1F1 or 1A1F4 (AN/TGC-14A(V)).</p>	<p>Replace thermostat.</p> <p>Perform continuity check of heating element: 66.5 ohms $\pm 10\%$.</p> <p>Replace fuse.</p>
<p>7. Printer runs open; meter shows signal line current.</p> <p>Printer runs open.</p>	<p>Defective line sensor.</p> <p>Faulty start clutch or clutch release finger adjustment.</p> <p>No mark signal being transmitted.</p> <p>Signal line fuse 1A1F4 (AN/TGC-14(V)) or 1A1F5 (AN/TGC-14A(V)).</p> <p>Signal loop open.</p>	<p>Refer to table 4-6 (Appendix).</p> <p>Adjust according to paragraph 5-5au(3)(a).</p> <p>Check signal line and/or remote operator.</p> <p>Replace fuse.</p> <p>Patching not proper for operating mode. Patch correctly as instructed in paragraph 2-9.</p>

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Printer runs open (Cont.)	Faulty contact on contact block 1A1S4 (AN/TGC-14(V)) or 1A1E8 (AN/TGC-14A(V)). Signal line power supply inoperative. Defective line sensor. Open wire. Open signal line in service cable.	Replace contact block. Refer to table 4-9 (Appendix). Refer to table 4-6 (Appendix). Perform continuity check on signal line. Perform continuity checks on service cable.
8. Printer runs closed but does not print.	Printer improperly patched. Poor solder connections on patch cords. Defective line sensor. Start clutch not releasing. Selector improperly adjusted or faulty.	Refer to patching instructions in paragraph 2-9. Resolder patch cords. Refer to table 4-6 (Appendix). Adjust start clutch as instructed in paragraph 5-5au(3)(a). Adjust selector as instructed in paragraph 5-5au(3)(b) or replace selector.
9. Teletypewriter set prints garbled message.	Range dial out of adjustment. Incorrect speed gear installed. Line current at improper value or distorted. Selector improperly adjusted. Defective line sensor. Start clutch improperly adjusted. Signal line power supply output high or low. Loose selector bar (AA1, figure 5-26, Appendix). Figures H motor stop linkage out of adjustment (AN/TGC-14(V)). Defective clutch.	Adjust as instructed in paragraph 2-8e(1). Check for broken setscrew (AN/TGC-14(V) only) on range dial; replace if broken. Install correct speed gear as instructed in paragraph 2-10. Readjust; trace source of distortion. Adjust selector as instructed in paragraph 5-5au(3)(b). Refer to table 4-6 (Appendix). Adjust as instructed in paragraph 5-5au(3)(a). Refer to table 4-9 (Appendix). Tighten selector bar screws. Adjust as instructed in paragraph 5-5aw. Check all clutches for operation by sending RYRY (all clutches should release). Replace defective clutch.

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>Teletypewriter set prints garbled message (Cont.)</p> <p>10. Depressing any key does not produce output signal.</p>	<p>Timing marks on timing cam shaft gear and start clutch gear (figure 5-7, Appendix) not aligned.</p> <p>Dirty print cylinder shaft.</p> <p>Function slides out of adjustment and random functions are selected.</p> <p>Rotary spring broken.</p> <p>SEND•REC-REC switch in REC position.</p> <p>Printer not seated correctly on electrical chassis.</p> <p>Master pulsing contacts out of adjustment.</p> <p>Keyboard slip connector contact 1A9E1 defective.</p> <p>Keyboard not in correct operating position.</p> <p>Incorrect patching.</p> <p>Keyboard clutch release finger (figure 4-7, Appendix) does not clear tab.</p> <p>Keyboard drive gear stripped (figure 4-7, Appendix).</p> <p>Defective keyboard.</p>	<p>Align three dots on start clutch gear with two dots on timing cam shaft gear (∴).</p> <p>Clean print cylinder shaft.</p> <p>Perform function slide and stroke adjustments (paragraph 5-5au(5)(a).</p> <p>Replace spring (figure 5-12, Appendix).</p> <p>Place switch in SEND•REC position.</p> <p>Position printer correctly.</p> <p>Readjust on local mode (paragraph 5-5ba or 5-5bb).</p> <p>Repair or replace contact.</p> <p>Pull keyboard out to correct position.</p> <p>Patch correctly (paragraph 2-9).</p> <p>Adjust according to paragraph 5-5ba(1)(a).</p> <p>Replace gear.</p> <p>Refer to table 4-5 (Appendix).</p>
<p>11. Printer prints copy received from remote station but not from local keyboard.</p>	<p>SEND•REC-REC switch 1A9S3 defective or in REC position.</p> <p>Keyboard filter 1A9FL1 open or shorted.</p> <p>Incorrect patching.</p> <p>Open wire or connection.</p> <p>Contact block 1A1S4 (AN/TGC-14(V) or 1A1E8 (AN/TGC-14A(V)) defective.</p> <p>Keyboard clutch not engaged.</p> <p>Master pulsing contacts out of adjustment.</p>	<p>Replace switch or set to SEND•REC position.</p> <p>Replace filter.</p> <p>Patch correctly (paragraph 2-9).</p> <p>Perform continuity checks.</p> <p>Replace contact block.</p> <p>Engage clutch.</p> <p>Readjust contacts (paragraphs 5-5ba and 5-5bb).</p>
<p>12. No printing; selection taking place.</p>	<p>Print and function clutch (figure 4-24, Appendix) not operating correctly.</p> <p>Print prevent adjustment incorrect.</p>	<p>Check clutch for correct operation; repair or replace if necessary.</p> <p>Adjust according to paragraph 5-5au(7)(g).</p>

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>No printing; selection taking place (Cont.)</p>	<p>Print hammer actuating adjustment incorrect.</p> <p>Defective print hammer actuator link helical spring (C19, figure 5-33, Appendix).</p> <p>Defective print helical spring (J, figure 5-30, Appendix).</p> <p>Defective print cam follower (B, figure 5-35, Appendix).</p>	<p>Adjust according to paragraph 5-5au(7)(a).</p> <p>Replace spring.</p> <p>Replace spring.</p> <p>Adjust, repair, or replace.</p>
<p>13. No function selection; printing taking place.</p>	<p>Broken function lever lifter arm screw or function cam follower screw (AD2 and AG2, figure 5-36, Appendix).</p> <p>Function bar is not set high enough to clear sensing finger levers on high side of function cam.</p>	<p>Drill out broken portion and replace with stainless-steel screws.</p> <p>Adjust function lever lifter arm or entire function section (paragraph 5-5au(6)).</p>
<p>14. Printing on functions.</p>	<p>Print prevent adjustment screws (A39a, figure 5-37, Appendix) improperly adjusted.</p> <p>Print shaft terminal lever (D, figure 5-35, Appendix) worn.</p> <p>Print prevent arm (A, figure 5-35, Appendix) worn or out of adjustment.</p> <p>Defective print prevent rod actuator arm bias spring (A40, figure 5-37, Appendix).</p> <p>Incorrect stroke adjustment.</p>	<p>Adjust according to paragraph 5-5au(7)(g).</p> <p>Replace with stellite-tipped part.</p> <p>Adjust arm (paragraph 5-5au(7)(c) or replace if defective).</p> <p>Replace spring.</p> <p>Adjust according to paragraph 5-5au(7).</p>
<p>15. Printing on space.</p>	<p>Function slides (figure 5-51, Appendix) out of adjustment.</p> <p>Function bar (AF3, figure 5-36, Appendix) out of adjustment.</p> <p>Broken function backstop clutch release arm return helical spring (figure 4-25, Appendix).</p> <p>Space print prevent adjustment screw (51, figure 5-6, Appendix) in too far.</p>	<p>Adjust according to paragraph 5-5au(5).</p> <p>Adjust according to paragraph 5-5au(6)(a) or (b).</p> <p>Replace spring.</p> <p>Adjust according to paragraph 5-5au(7)(g).</p>
<p>16. Functions during printing.</p>	<p>Function bar adjustment incorrect.</p> <p>Function slides (figure 5-51, Appendix) out of adjustment.</p>	<p>Adjust according to paragraph 5-5au(6)(a) or (b).</p> <p>Adjust according to paragraph 5-5au(5).</p>
<p>17. Occasional misprint.</p>	<p>Range dial out of adjustment.</p> <p>Signal line distortion.</p>	<p>Adjust according to paragraph 2-8e(1) or (2).</p> <p>Check for maximum of 35-percent distortion.</p>

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>21. Printing only top or bottom of characters. (Refer to figure 4-19, Appendix)</p>	<p>Rotary function slide out of adjustment.</p> <p>Rotary adjustment incorrect.</p> <p>Clearance between rotary detent pawl pin and index wheel (24, figure 5-4, Appendix) incorrect.</p> <p>Broken rotary detent pawl spring on detent arm (AM, figure 5-36, Appendix).</p> <p>Print cylinder shaft binding.</p> <p>Defective print hammer face pad.</p>	<p>Adjust according to paragraph 5-5au(5)(b).</p> <p>Perform all rotary adjustments in paragraph 5-5au(5).</p> <p>Adjust according to paragraph 5-5au(5)(c).</p> <p>Replace spring.</p> <p>Check and remove cause of binding.</p> <p>Replace pad.</p>
<p>22. No carriage advance.</p>	<p>Character advance pawl and check pawl eccentric bushings (3 and 19, figure 5-4, Appendix) out of adjustment.</p> <p>Carriage return lock lever (figure 5-59, Appendix) not dropping out of carriage return cam follower.</p> <p>First character adjustment screw (figure 5-59, Appendix) loose.</p> <p>Random advance prevention function selected.</p> <p>Broken or damaged character advance pawl or check pawl springs (S and AQ, figure 5-36, Appendix).</p> <p>Character advance pawl, check pawl, or advance ratchet worn (figure 5-59, Appendix).</p>	<p>Adjust according to paragraph 5-5au(6)(c).</p> <p>Adjust according to paragraph 5-5au(6)(e).</p> <p>Tighten and adjust according to paragraph 5-5au(7)(h).</p> <p>Adjust function slides according to paragraph 5-5au(5)(a) or (b).</p> <p>Check springs and replace defective units.</p> <p>Check for wear and replace if necessary.</p>
<p>23. No line feed.</p>	<p>Refer to first three entries of Symptom 15.</p> <p>Line feed actuator cam follower arm (figure 5-65, Appendix) out of adjustment.</p> <p>Pressure release lever in RELEASE position.</p> <p>Paper supply roll not rotating freely on electrical chassis.</p> <p>Function lever lifter arm out of adjustment.</p> <p>Pressure roll (P, figure 5-34, Appendix) not clamping paper.</p>	<p>Refer to Symptom 15.</p> <p>Readjust according to paragraph 5-5au(6)(h).</p> <p>Move lever to LOCK position.</p> <p>Check installation of paper supply roll and tension on dancer roll tube.</p> <p>Adjust according to paragraph 5-5au(6)(a).</p> <p>Check for damaged pressure roll springs or binding pressure roll shaft.</p>

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
No line feed (Cont.)	Paper feed binding (Tactical Case CY-2976/PG).	Check that pressure release lever is set correctly. Check that the front of the case is not sagging. If case has not been modified, install Modification Kit Part No. 30561 (table 1-3).
	Dirty paper feed rubber roll.	Clean roll.
	Line feed clutch (figure 5-62, Appendix) not operating.	Check for defect and repair or replace.
24. No carriage return.	Refer to first three entries of Symptom 15.	Refer to Symptom 15.
	Check pawl (figure 5-59, Appendix) does not clear advance ratchet.	Adjust according to paragraph 5-5au(6)(c).
	Carriage return spiral spring (E6, figure 5-35, Appendix) broken or disengaged.	Replace or engage spring.
25. No blank function.	Refer to Symptom 15, except check blank print prevent adjustment screw (52, figure 5-6, Appendix).	Refer to Symptom 15.
26. No space function.	Same as no carriage advance (Symptom 22).	Refer to Symptom 22.
	Refer to first three entries of Symptom 15.	Refer to Symptom 15.
27. No letters function.	Letters sensing finger lever (figure 4-28, Appendix) stuck in function slide.	Release lever.
	Letters figures clutch (figure 4-28, Appendix) not operating.	Check clutch for proper operation.
	Incorrect stroke adjustment.	Adjust according to paragraph 5-5au(7).
	Rotary spring (figure 5-12, Appendix) broken.	Replace spring.
28. No figures function.	Same as no letters function (Symptom 27).	Refer to Symptom 27.
29. No bell function.	Refer to first three entries of Symptom 15 and Symptom 27.	Refer to Symptom 15 and Symptom 27.
	Bell function linkage (figure 5-64, Appendix) does not fully return.	Inspect for fault and correct.
30. No lateral movement. (Refer to figure 4-19, Appendix.)	Jammed function slides.	Release function slides.
	Defective lateral tension helical spring.	Replace spring.
	Cables or belt not functioning.	Inspect for fault and correct.

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
31. No rotary movement.	Defective rotary spring (figure 5-12, Appendix). Defective rotary cable (figure 4-19, Appendix). Rotary detent pawl (22, figure 5-4, Appendix) adjustment incorrect. Defective clutch.	Replace rotary spring. Replace rotary cable. Adjust according to paragraph 5-5au(5)(c). Check clutches for correct operation.
32. No automatic carriage return and line feed.	Incorrect adjustment.	Adjust according to paragraph 5-5au(6)(f).
33. Automatic carriage return but no line feed.	Incorrect alignment of automatic carriage return and line feed sensing finger levers (figure 5-62, Appendix).	Adjust automatic carriage return actuator eccentric and actuator arm according to paragraph 5-5au(6)(f).
34. Carriage return after 4 or 5 characters from left side margin.	Incorrect automatic carriage return adjustment. Bounce prevent lever (N, figure 5-36, Appendix) not seating in teeth of V lever assembly (J, figure 5-19, Appendix).	Adjust according to paragraph 5-5au(6)(f). Adjust bounce prevent lever (paragraph 5-5au(7)(i)) or first character adjustment screw (paragraph 5-5au(7)(h)).
35. Slow carriage return. (Refer to figure 4-19, Appendix.)	Dirty print cylinder shaft. Print hammer binding. Cables may be tight or damaged. Number of turns on takeup drum insufficient; carriage return spiral spring eyelet (E6, figure 5-35, Appendix) not engaging tab on carriage return spring mounting cup (E9).	Clean shaft. Check and remove cause of binding. Loosen or replace cables. Detach cables and lateral control belt; turn takeup drum counterclockwise two turns; install cables and belt; bend end of spiral spring to insure that eyelet engages tab of cup.
36. Advancing on advance prevent functions. (Refer to figure 4-31, Appendix.)	Incorrect stroke adjustment. Function advance prevent adjustment screws on advance prevent bail carriage return bar out of adjustment.	Adjust according to paragraph 5-5au(7). Adjust according to paragraph 5-5au(7)(f).
37. Double line feed every time.	Shift linkage on line feed (figure 5-65, Appendix) not functioning. Carriage return too slow. Line feed adjustment incorrect. Cable adjustments incorrect. Incorrect number of turns on carriage return spiral spring.	Locate and correct malfunction. Check for dirt on shafts. Adjust according to paragraph 5-5au(6)(h); make certain that the reference tooth (not the first tooth) on the line feed pawl (figure 5-65, Appendix) is used when making this adjustment. Adjust according to paragraph 5-5au(5). Refer to paragraph 5-5af.

TABLE 4-4. SYSTEM TROUBLE-SHOOTING CHART (Cont.)

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
38. No ribbon reversal.	No eyelets in ribbon.	Replace ribbon.
	Ribbon improperly threaded.	Install ribbon according to paragraph 3-3c(2).
	Ribbon feed clutch does not release.	Locate and correct malfunction.
39. Unusual noise.	Clutch backstops out of adjustment.	Adjust backstops according to paragraph 5-5au(2).
	Interference between motor fan and outlet duct assembly (figure 5-23, Appendix).	Reposition motor to eliminate interference.
	Binding component.	Locate and correct.
	Incorrect idler gear adjustment.	Refer to paragraph 2-10.
	Defective clutch backstop spring.	Replace spring.
	Gears require lubrication.	Refer to table 5-9 (Appendix).
	Defective gear.	Check all gears for damage; replace defective gears.
	Defective bearings on gears.	Check and replace defective bearings.

TABLE 4-5. KEYBOARD 1A9, TROUBLE-SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>Ⓐ</p> <p>Ⓐ₁</p> <p>Ⓐ₂</p> <p>Ⓐ₃</p> <p>Figure 4-9 (Appendix)</p>	1. Teletypewriter set runs open with keyboard in operating position.	<p>Keyboard slip connector contact or contact block not making correct contact.</p> <p>Defective filter FL1; defective code pulsing contacts; defective master pulsing contacts; or defective BREAK switch.</p>	<p>Check for defective contacts; repair or replace defective contacts.</p> <p>Remove keyboard; connect multimeter across ●A; if reading is not 5 ohms, connect multimeter across ●A₁ and then across ●A₂. If either reading is not 2.5 ohms, replace filter FL1. If readings at ●A₁ and ●A₂ are both 2.5 ohms, connect multimeter across ●A₃. If no continuity, replace BREAK switch. If continuity is obtained across ●A₃, adjust or repair code pulsing or master pulsing contacts for reading of 5 ohms across ●A.</p>

TABLE 4-5. KEYBOARD 1A9, TROUBLE-SHOOTING CHART (Cont.)

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
	2. Teletypewriter set runs closed with keyboard in operating position.	SEND●REC-REC switch in wrong position or defective. Master pulsing contacts or code pulsing contacts defective or out of adjustment (figure 4-7, Appendix). Defective pulsing finger (figure 4-7, Appendix). Defective filter FL1.	Set switch in correct position or replace switch. Adjust according to paragraph 5-5ba or replace contacts. Replace pulsing finger. Refer to Symptom 1 for procedure.
	3. Incorrectly transmitted character.	Incorrect range adjustment. Master pulsing contacts defective or out of adjustment.	Adjust according to paragraph 2-8e(1). Adjust according to paragraph 5-5ba or replace contacts.
	4. Depressing BREAK switch does not open signal line.	Defective BREAK switch.	Refer to Symptom 1 for procedure.

TABLE 4-6. LINE SENSOR 1A3, TROUBLE-SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
 Figure 4-13 (Appendix)	1. Printer runs open.	No signal input at ★2.	Connect multimeter (d-c volts) across ★2 (equipment energized; polarity of voltage determined by input signal line polarity) and check for 9 vdc with 60-ma signal and steady mark. If reading is correct, check resistor A2R1, diodes A2CR1 through A2CR5, or output of power supply as described below.
    Figure 4-13 (Appendix)		Incorrect power supply output.	Connect multimeter (a-c volts) across ★3 and check for 115 vac. If reading is incorrect, refer to table 4-10 (Appendix). Connect multimeter across ●D. If 33 vac is not obtained, check for defective transformer T1 or diodes A1CR1 through A1CR4. Connect multimeter (d-c volts) across ●E (negative) and ●F (positive). If 26 vdc is not obtained, check for defective diodes A1CR1 through A1CR4, capacitors A1C1 and A1C2, or resistors A1R1 and A1R2.

TABLE 4-6. LINE SENSOR 1A3, TROUBLE-SHOOTING CHART (Cont.)

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
(G) (H) Figure 4-13 (Appendix)	1. Printer runs open (Cont.).	Defective transistor circuit.	Connect multimeter (d-c volts) between ●F (positive) and ●G (negative). Check for -0.94 vdc during mark and -6.20 vdc during space (with BREAK switch depressed); then connect multimeter between ●F (positive) and ●H (negative) and check for -6.70 vdc during mark and -0.94 vdc during space. If readings are incorrect, check selector coils, transistors A2Q1 through A2Q3, and associated circuits. Refer to table 4-11 (Appendix) for complete voltage and current readings.
	2. Printer runs closed but does not print.	Same as Symptom 1.	Same as Symptom 1.
	3. Equipment prints garbled message or occasional misprint.	Same as Symptom 1.	Same as Symptom 1.
	4. Motor stop relay 1A1K1 continuously energized or will not energize.	Same as Symptom 1.	Same as Symptom 1.

TABLE 4-7. FUNCTION AND PULSE DATA

FUNCTION	MARKING PULSES					RESULTS
	1	2	3	4	5	
Blank						Suppresses printing and character advance.
Space			X			Suppresses printing only.
Line Feed		X				Suppresses printing and character advance. Releases line feed clutch on function main shaft.
Figures	X	X		X	X	Suppresses printing and character advance. Rotates letters figures clutch on function main shaft to figures position if it was previously held in letters position.
Bell	X		X			Suppresses printing and character advance. Moves bell clapper. Operates only during figures shift.
Letters	X	X	X	X	X	Suppresses printing and character advance. Rotates letters figures clutch on function main shaft to letters position if it was previously held in figures position.
Carriage Return				X		Suppresses printing and character advance. Releases carriage return clutch on function main shaft.

TABLE 4-8. PRINTER 1A2, TROUBLE-SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>① Figure 4-34 (Appendix)</p> <p>Ⓑ Figure 4-34 (Appendix)</p> <p>Ⓒ Figure 4-34 (Appendix)</p> <p>Ⓒ Figure 4-34 (Appendix)</p>	1. Motor does not operate.	Absence of input power.	Turn equipment off. Gain access to motor. Remove connector from jack 1AJ11 (test point ★1) and turn equipment on. Connect a-c multimeter between 1AJ11-A and 1AJ11-B and read 115 vac. If reading is incorrect, refer to table 4-10 (Appendix). If readings are correct, continue with Symptom 2.
	2. Motor does not operate; input power present.	Defective motor or faulty connections.	Turn equipment off. For the 60-cps motor, connect multimeter (ohms) between A2P1-B and A2P1-A (47 ohms) and between A2P1-B and A2P1-D (140 ohms). For the 400-cps motor, check for 8.5 ohms between A2P1-A and A2P1-B and 19 ohms between A2P1-A and A2P1-D. If readings are incorrect, check for faulty connections or replace defective motor.
	3. Printer runs open.	Magnetic selector not plugged in or defective.	Make certain that magnetic selector connector is secure in jack 1A3J1. If trouble persists, turn equipment off, remove connector, and connect multimeter (ohms) between A1P1-B and A1P1-D; meter should read 65 ohms ±10%. Check between A1P1-C and A1P1-D for same reading. If either reading is incorrect, check for broken connection or replace magnetic selector.
	4. Printer runs closed.	Same as Symptom 3.	Same as Symptom 3.
	5. Motor will not stop with figures H or time delay motor stop function.	Defective stop switch 1A2S1.	Turn off equipment. Connect multimeter (ohms) between 1A2P1-F and 1A2P1-H; actuate stop switch and check for continuity reading. If no continuity, replace stop switch.
	6. Refer to table 4-4 (Appendix) for other symptoms of trouble in printer.	Refer to table 4-4 (Appendix).	Refer to table 4-4 (Appendix).

TABLE 4-9. SIGNAL LINE POWER SUPPLY 1A4, TROUBLE-SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>③ Ⓓ Ⓔ Ⓕ Figure 4-36 (Appendix)</p>	1. Printer runs open.	Incorrect signal line power supply output.	Refer to Symptom 1 of table 4-6 (Appendix).
	2. Equipment prints garbled message.	Incorrect or fluctuating output of signal line power supply.	Perform checks of Symptom 1 above; carefully check all components for signs of intermittent operation. Replace any suspect part with a good unit.

TABLE 4-10. ELECTRICAL CHASSIS 1A1, TROUBLE-SHOOTING CHART

TEST POINT	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<p>4</p> <p>through</p> <p>7</p> <p>Figure 4-37 (Appendix)</p>	<p>1. Printer motor, line sensor, or signal line power supply inoperative due to loss of input primary power.</p>	<p>Defective parts in primary power circuit.</p>	<p>Connect multimeter across ★4 (pins J9-1 and J9-2) and then across ★5 (pins J10-1 and J10-2); check for 115 vac at both test points. Check fuses F1 and F3 and MOTOR switch S1 if readings are incorrect. If components are not defective, check power inputs at ★6, ★7, and service cable connections.</p>
<p>I</p> <p>Figure 4-37 (Appendix)</p>	<p>2. Motor will not stop with figures H function, or time delay motor stop function.</p>	<p>Defective coil on motor stop relay K1.</p>	<p>With power off, connect multimeter (ohms) across ●I; if meter reads very high resistance (1 megohm or above), replace relay.</p>
<p>J</p> <p>K</p> <p>L</p> <p>Figure 4-37 (Appendix)</p>	<p>3. Printer motor inoperative.</p>	<p>Defective capacitor C1.</p>	<p>With power off, connect multimeter between ●J and ●K and then between ●K and ●L; meter should read very high (1 megohm or above) or infinite resistance. If not, replace C1. To check for an open capacitor C1, replace with a known good capacitor.</p>
<p>M</p> <p>Figure 4-37 (Appendix)</p>	<p>4. Heating element inoperative.</p>	<p>Defective fuse F2.</p> <p>Defective fuse F1 (AN/TGC-14(V) or fuse F1 or F4 (AN/TGC-14A(V)).</p> <p>Defective element or thermostat.</p>	<p>Replace fuse.</p> <p>Replace fuse.</p> <p>With power off, connect multimeter (ohms) across ●M (E1 to E2). Meter should read 66.5 ohms ±10%. Check that thermostat S3 opens at approximately +16°C (+60°F) and closes at approximately +5°C (+40°F). Replace defective heater or thermostat.</p>
<p>8</p> <p>Figure 4-37 (Appendix)</p>	<p>5. No output on send line.</p>	<p>Defective fuse F5 (AN/TGC-14A(V)) or F4 (AN/TGC-14(V)), defective keyboard, or incorrect option patching.</p>	<p>With power off, check fuse with multimeter (ohms); replace defective fuse. Refer to table 4-5 (Appendix) for keyboard troubleshooting. Check for correct option patching (paragraph 2-9).</p>
<p>9</p> <p>Figure 4-37 (Appendix)</p>	<p>6. Line sensor inoperative.</p>	<p>Loss of input signal.</p>	<p>Check for presence of input signal at ★9. If signal is missing, check service cable and junction box for defect or check for correct option patching (paragraph 2-9).</p>

TABLE 4-11. VOLTAGE AND CURRENT MEASUREMENTS

TEST CONDITIONS (Connect negative lead of meter to electrical chassis, unless otherwise indicated.)	TRAN- SISTOR	BASE		EMITTER		COLLECTOR	
		D-C VOLTS	D-C MA	D-C VOLTS	D-C MA	D-C VOLTS	D-C MA
LINE SENSOR 1A3							
1. Connect strap (figure 4-13, Appendix) across A2E2 and A2E3; apply primary power at 115 vac, 60 cps; use Multimeter AN/PSM-4, or equivalent; apply mark signal at 60 ma; check for -5.5 vdc at A2E14.	A2Q1	-1.70	1.90	-1.42	11.0	-1.46	8.80
	A2Q2	-1.40	6.90	-0.84	94.0	-0.94	87.0
	A2Q3	-0.47	0	-0.84	0	-6.70	0
2. Same as condition 1 except mark signal at 20 ma and -1.85 vdc at A2E14. Check for 29.1 vdc between A2E6 and A2E13 and 33 vac rms between TI-3 and TI-4.	A2Q1	-1.55	0.15	-1.35	8.60	-1.47	8.40
	A2Q2	-1.35	4.80	-0.83	88.0	-0.93	86.0
	A2Q3	-0.48	0	-0.84	0	-6.80	0
3. Same as condition 2 except apply space signal at 0 ma.	A2Q1	0	0	-0.41	0	-16.50	0
	A2Q2	-0.41	0	-0.82	0	6.20	0
	A2Q3	-0.49	0	-0.88	93.0	-0.94	89.0
4. Connect strap (figure 4-13, Appendix) across A2E1 and A2E2; apply primary power at 115 vac, 60 cps; use Multimeter AN/PSM-4, or equivalent; apply mark signal at 5 ma; check for -11.3 vdc at A2E14.	A2Q1	-1.75	4.80	-1.55	13.60	-1.90	8.80
	A2Q2	-1.55	9.70	-0.88	97.0	-0.97	88.0
	A2Q3	-0.49	0	-0.88	0	-7.0	0
5. Same as condition 4 except apply mark signal at 1 ma.	A2Q1	-1.65	0.98	-1.40	10.0	-1.44	9.0
	A2Q2	-1.40	6.40	-0.86	95.0	-0.95	89.0
	A2Q3	-0.47	0	-0.86	0	-7.0	0
6. Same as condition 4 except apply space signal at 0 ma; also check for -5.95 vdc at A2E10 and 0.45 vdc across resistor A2R9.	A2Q1	-0.59		-0.52		-16.80	
	A2Q2	-0.52		-0.86		-6.60	
	A2Q3	-1.20		-0.85		-0.96	

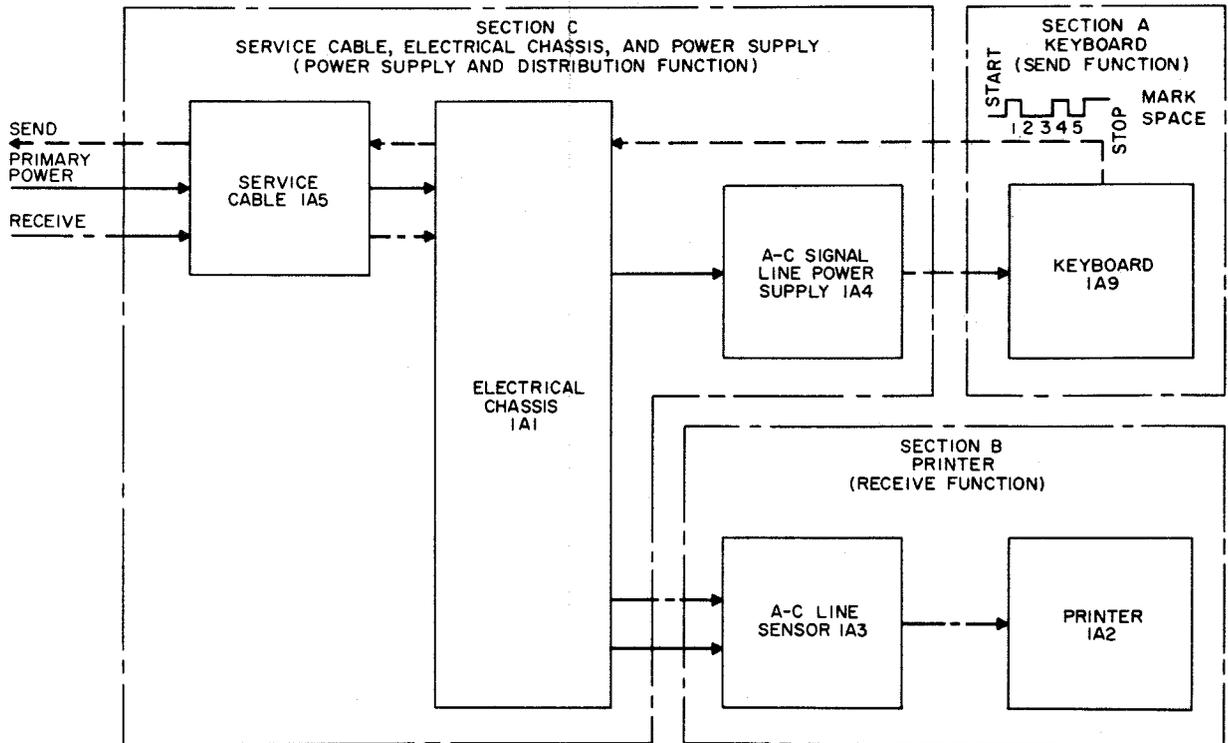


Figure 4-1. Functional Sections

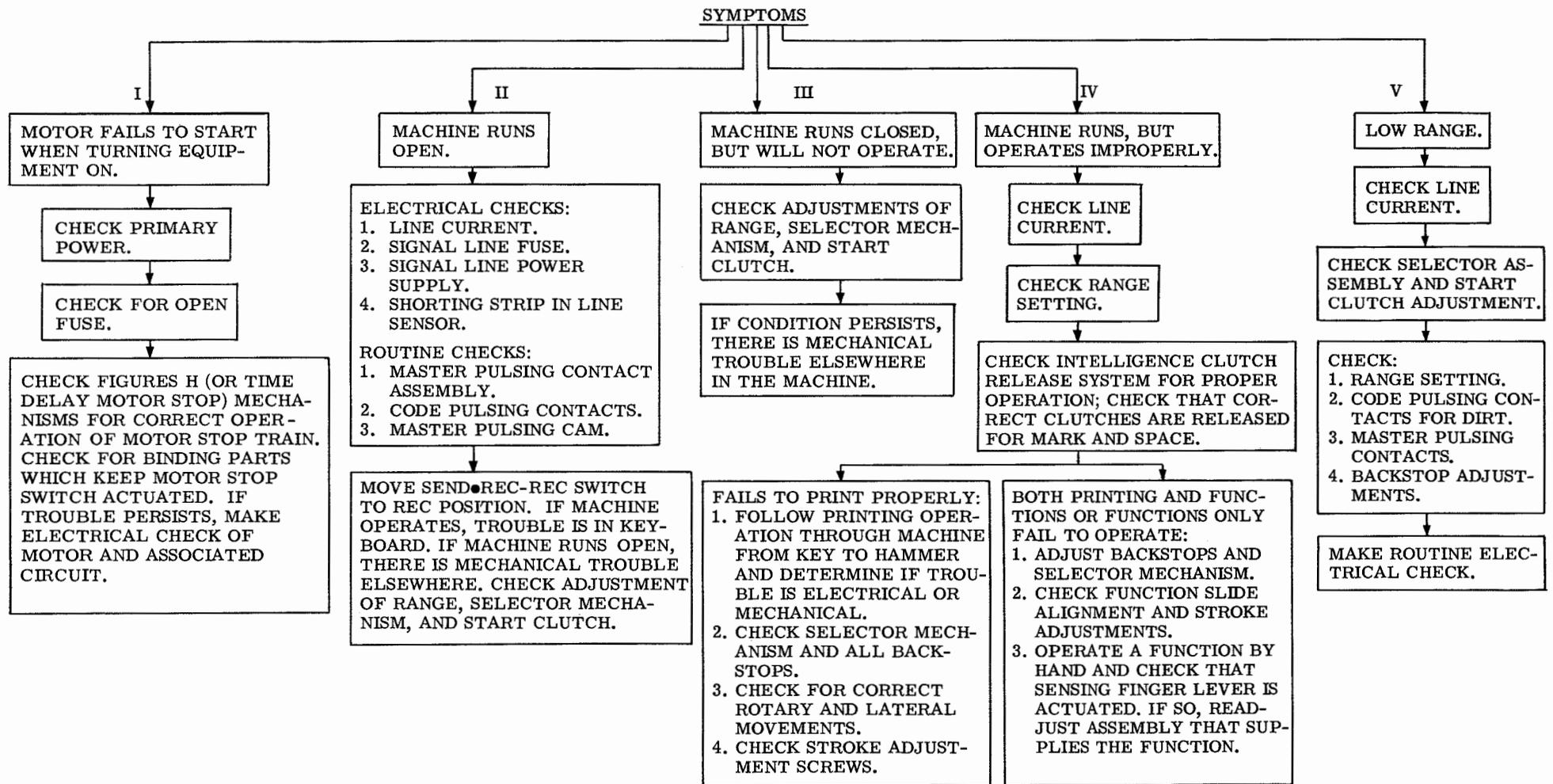


Figure 4-5. Trouble-Shooting Flow Chart

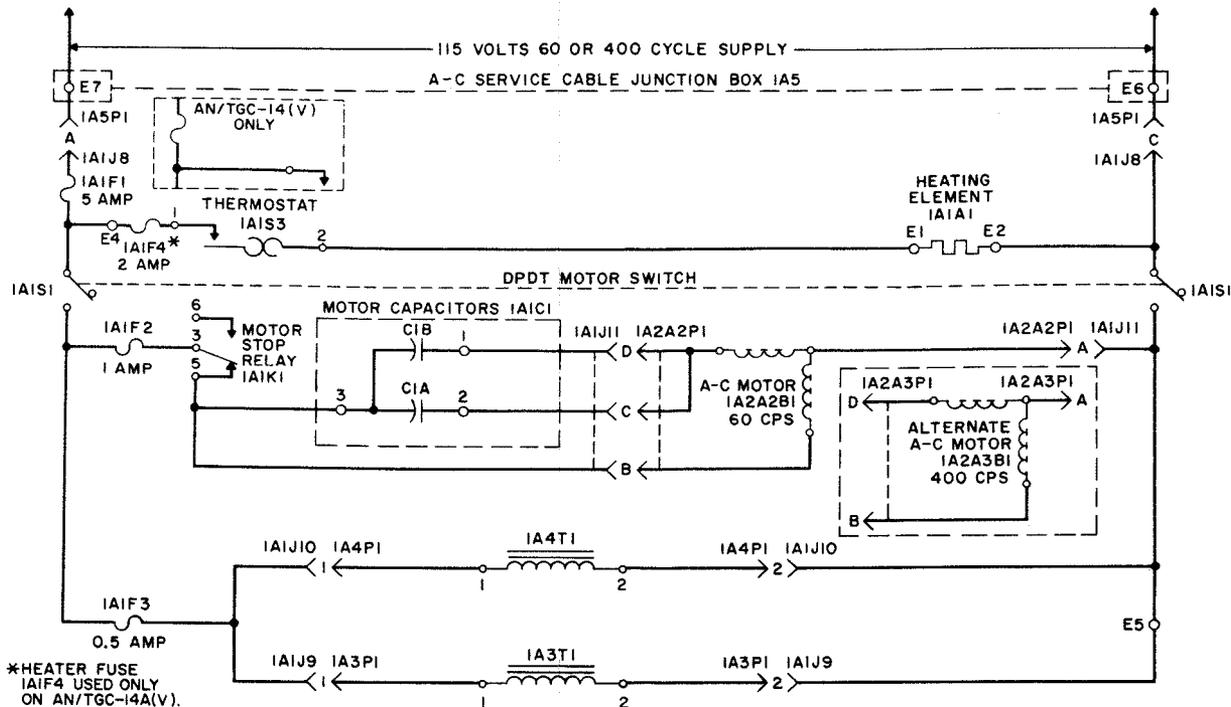


Figure 4-6. Alternating Current Primary Power Distribution, Simplified Schematic Diagram

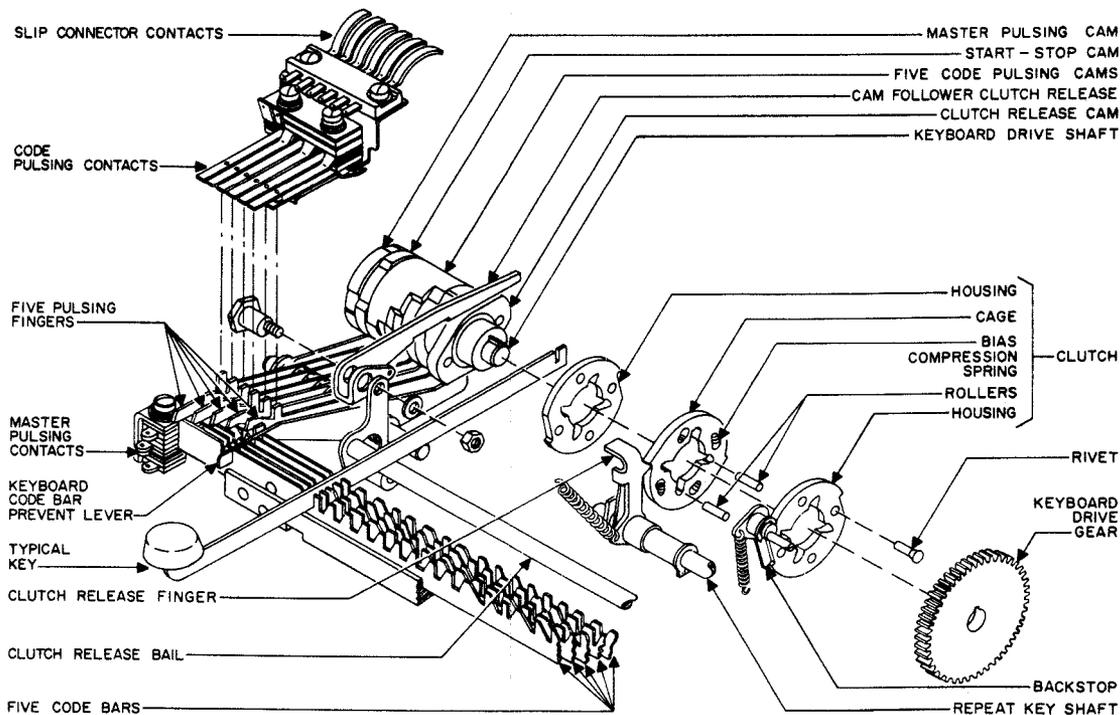


Figure 4-7. Keyboard IA9, Mechanical Diagram

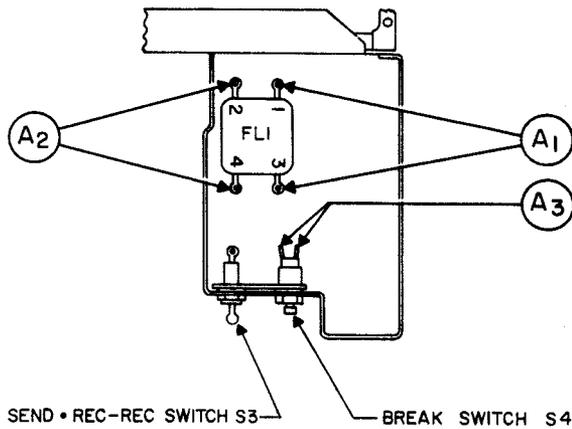
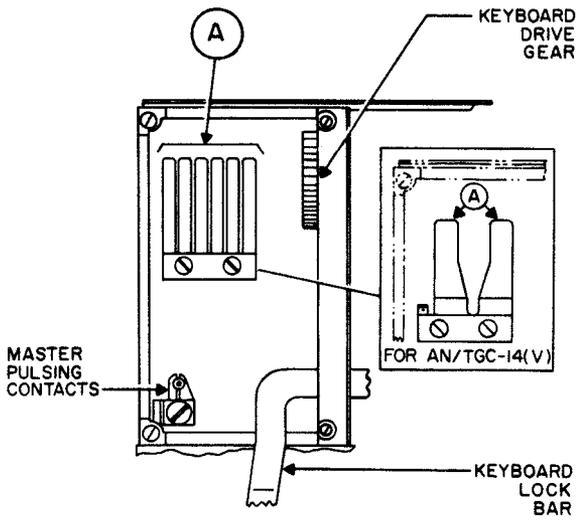


Figure 4-9. Keyboard 1A9, Location of Test Points

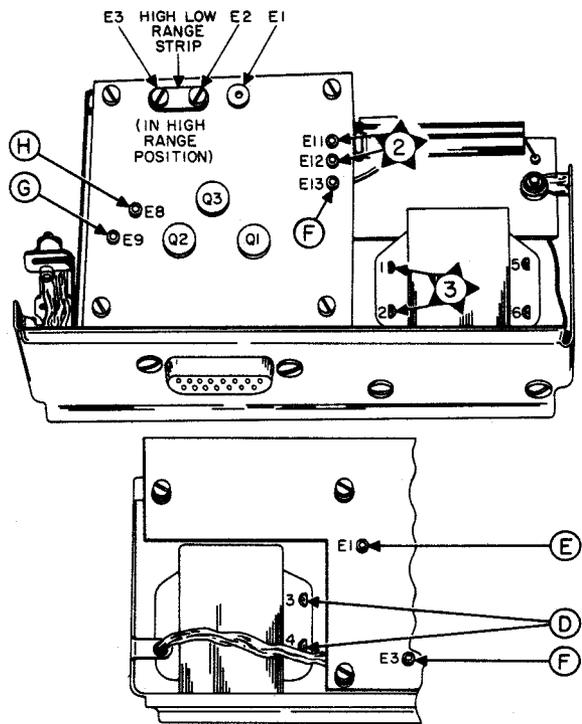


Figure 4-13. Line Sensor 1A3,
Location of Test Points

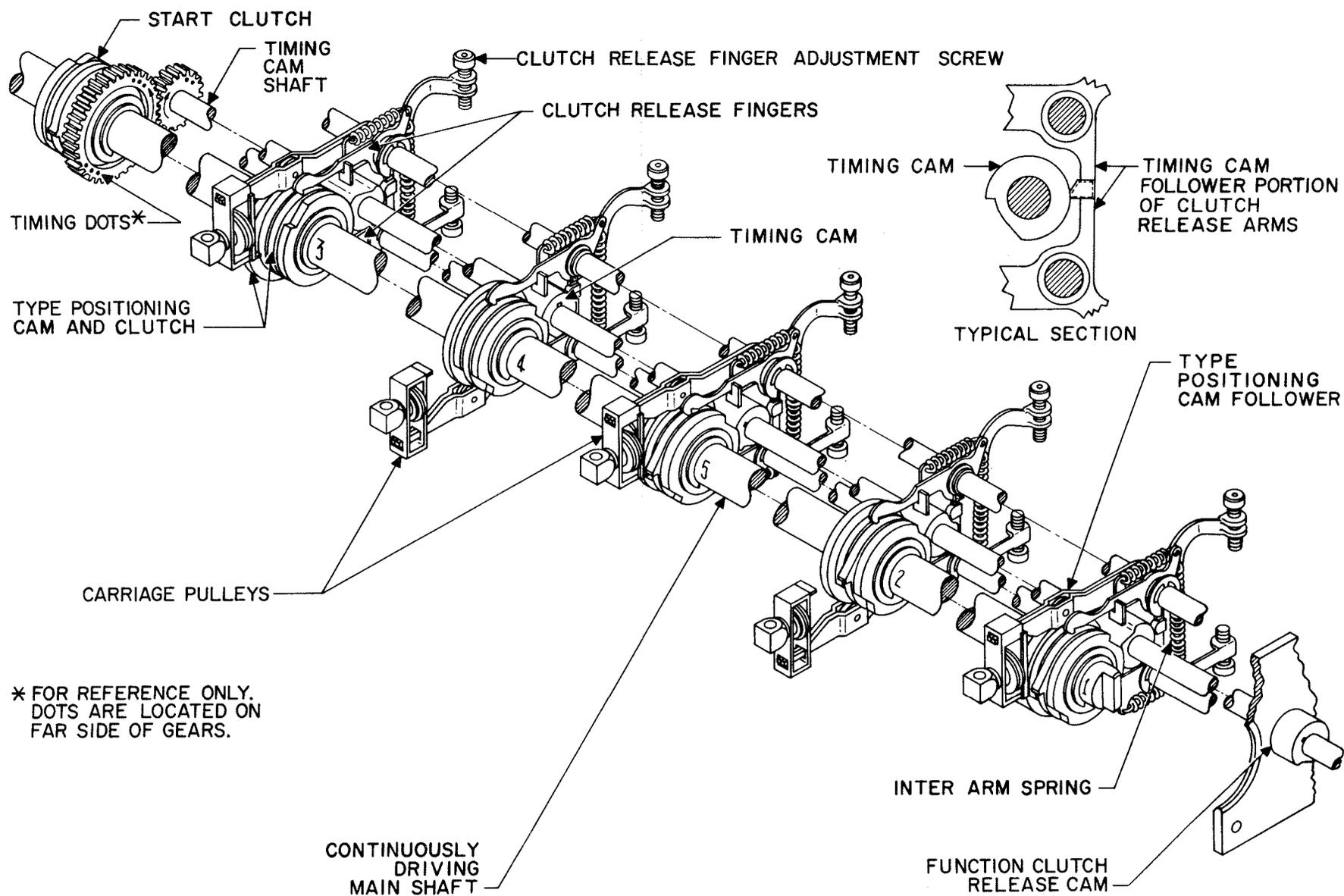


Figure 4-22. Print Cylinder Positioning Clutch Release System

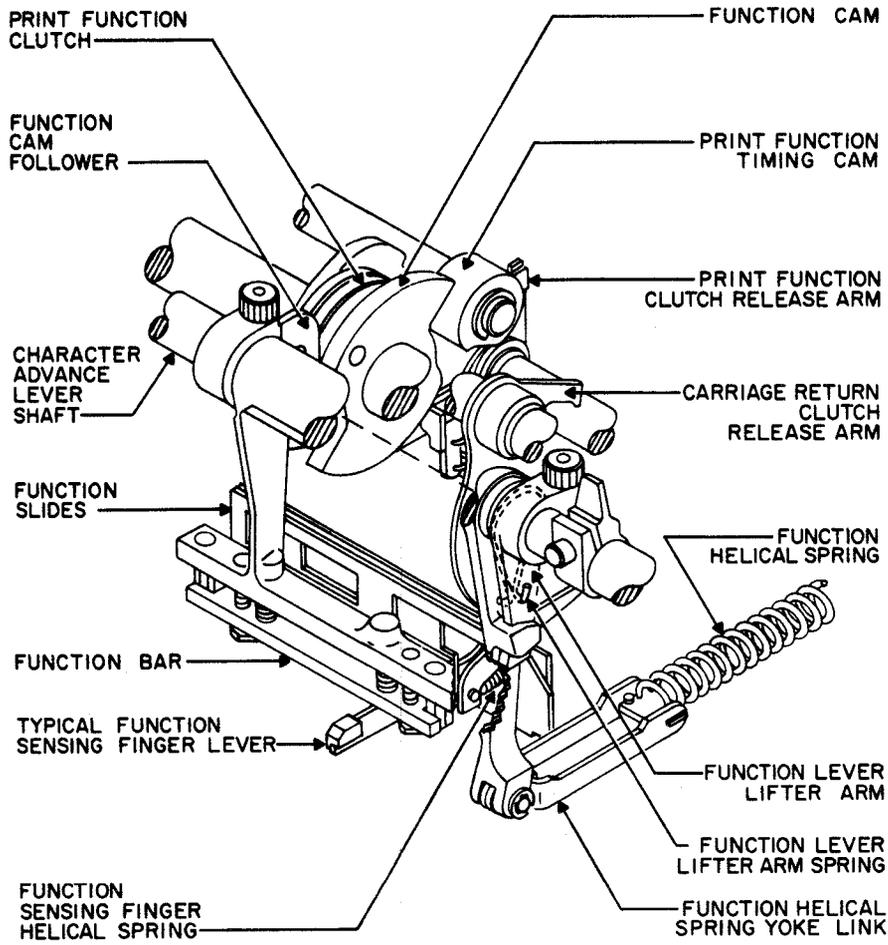


Figure 4-24. Function Selector, Start of Function Cycle

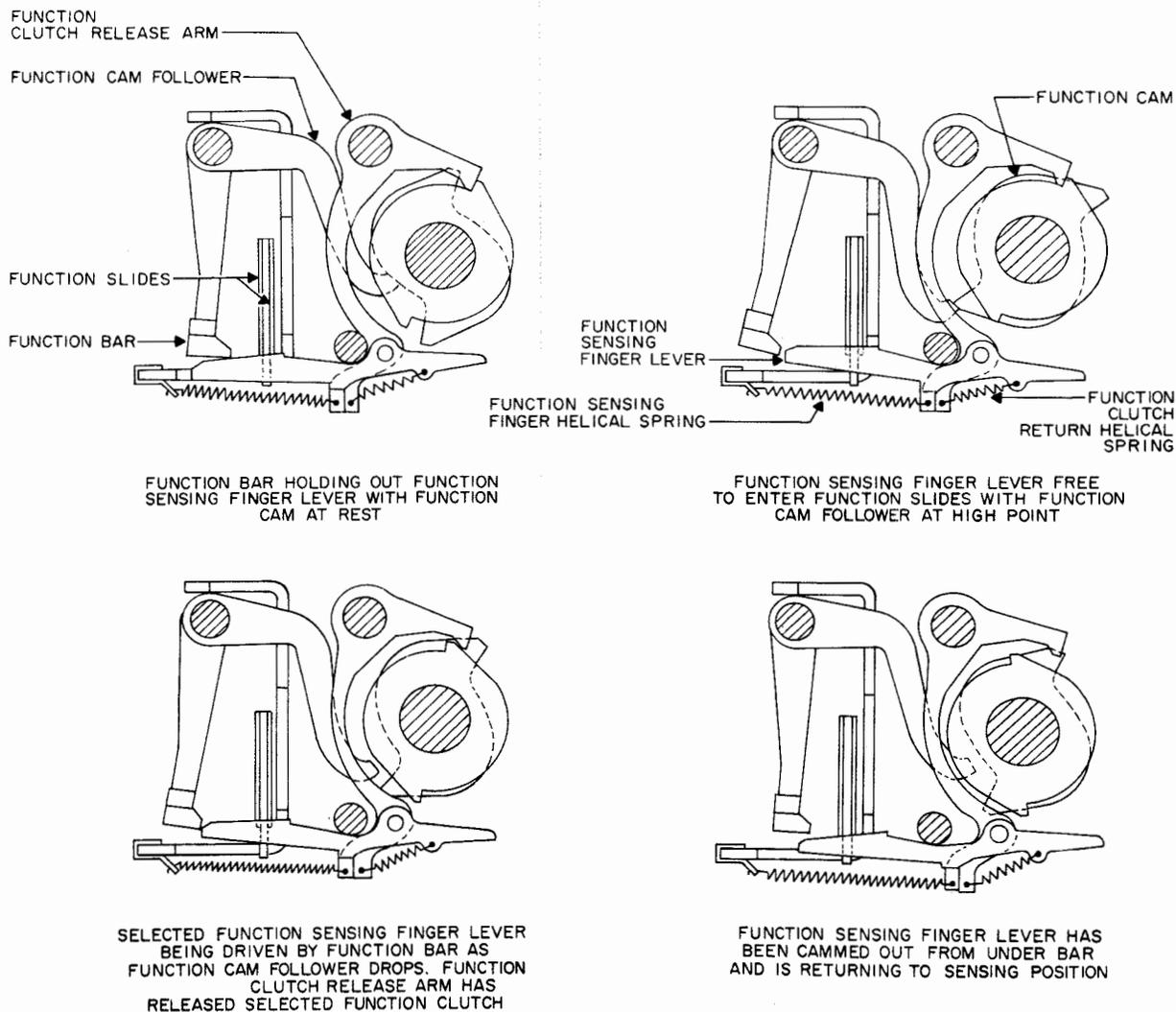


Figure 4-25. Function Selector, Operating Cycle

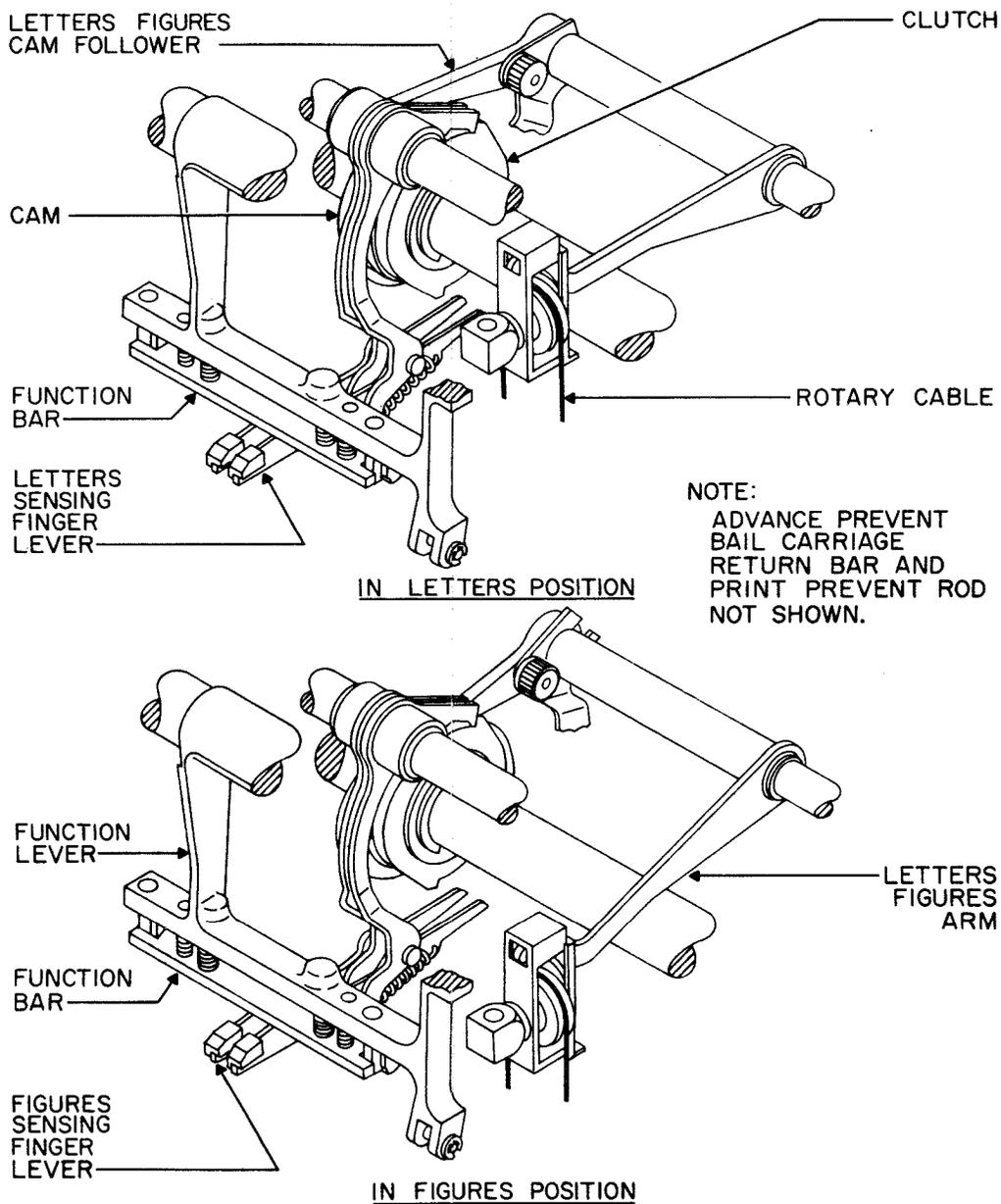


Figure 4-28. Function Selector, Letters Figures Linkage

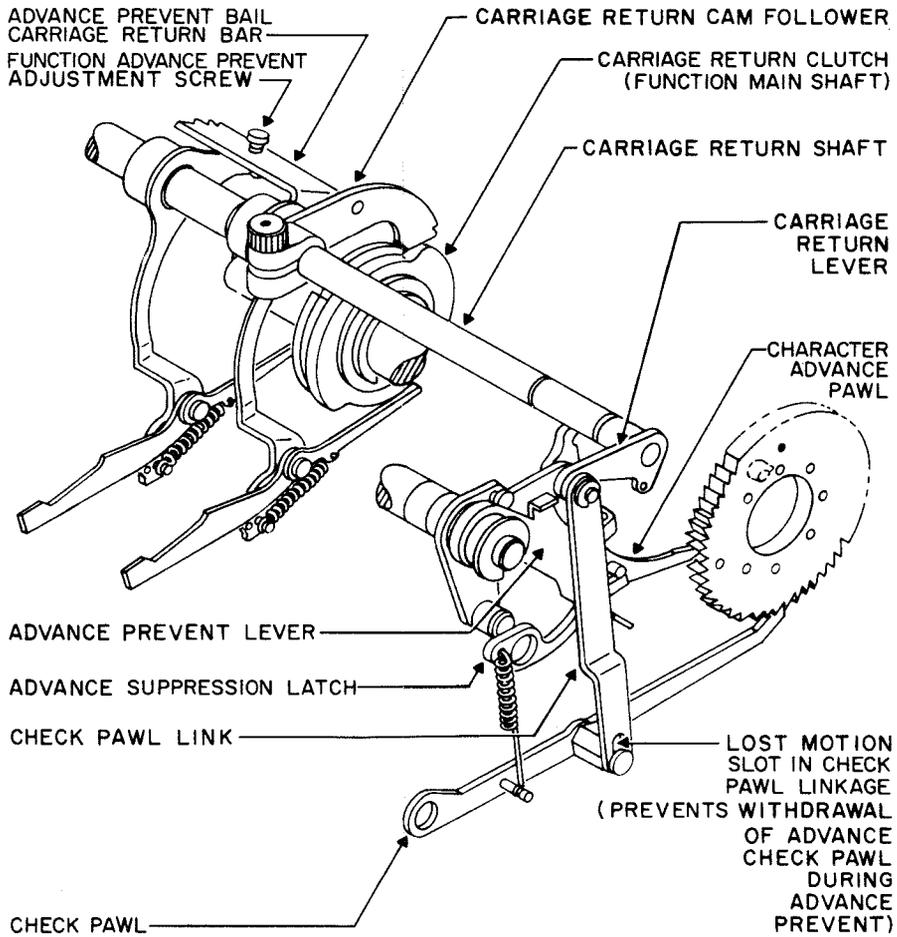


Figure 4-31. Function Selector, Character Advance Prevent Linkage

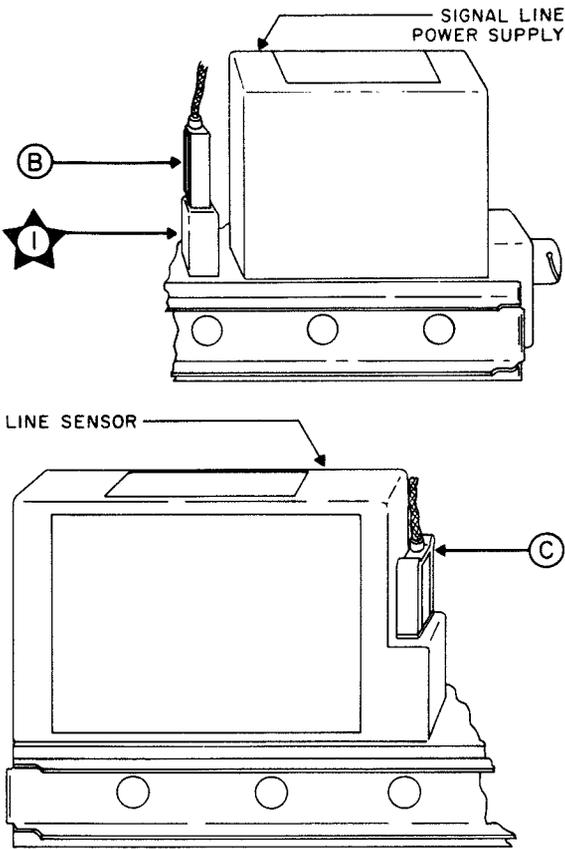


Figure 4-34. Printer 1A2,
Location of Test Points

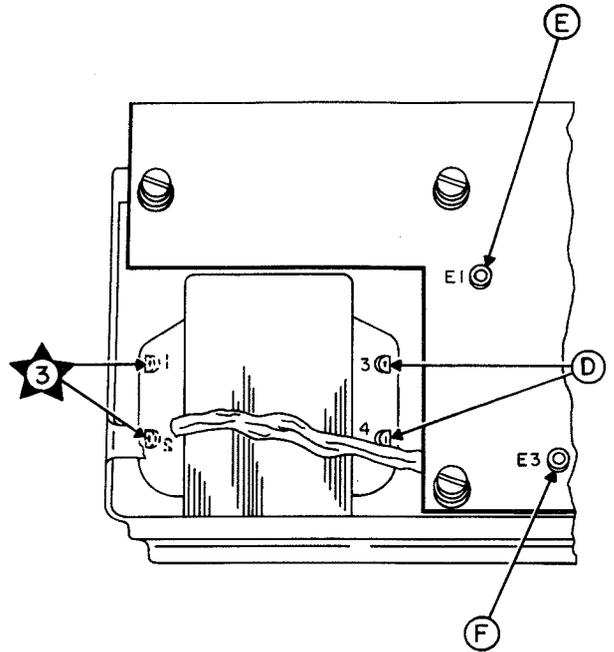


Figure 4-36. Signal Line Power Supply 1A4,
Location of Test Points

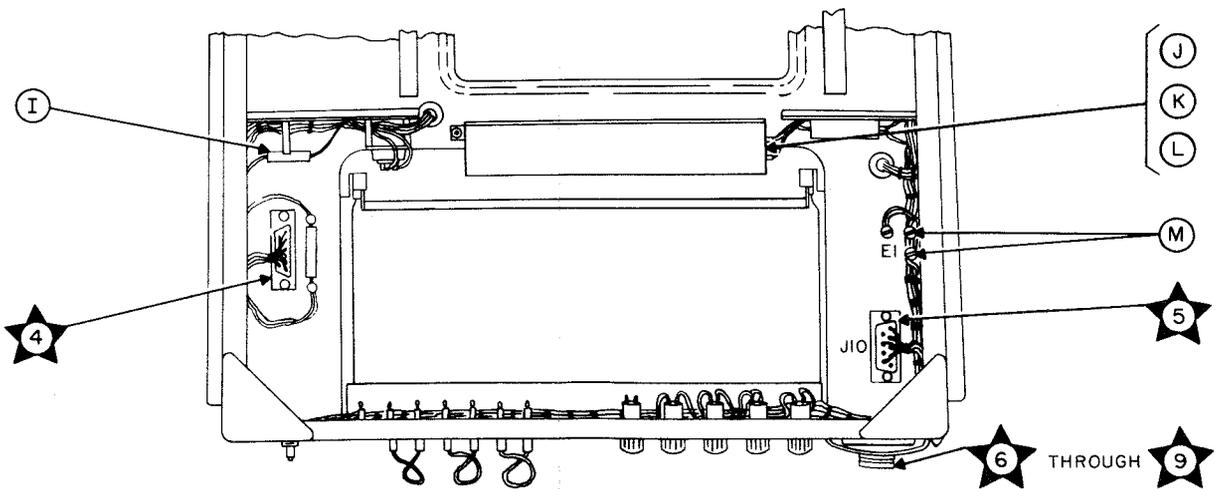


Figure 4-37. Electrical Chassis 1A1, Location of Test Points

TABLE 5-1. TEST EQUIPMENT AND TOOLS REQUIRED

TEST EQUIPMENT AND TOOLS	PREVENTIVE MAINTENANCE	MAINTENANCE STANDARDS	REPAIR
Multimeter AN/PSM-4	X	X	
Electronic Multimeter TS-505/U			X
Oscilloscope AN/USM-24 or AN/USM-105			X
*Teletypewriter Tool Kit TK-122/U			X
Materials Pioneer Ball Bearing Oil, PD14926-51, MIL-L-6085A, FSN 9150-223-4129, 1-quart can Standard Oil Beacon Lubricant No. 325, MIL-G-3278A, FSN 9150-261-8297, 8-ounce tube			
*This tool kit contains all required special tools and gages.			

TABLE 5-2. OPERATOR'S DAILY CHECKOFF LIST

STEP NO.	ACTION REQUIRED	PROCEDURE
Operating conditions and control settings: MOTOR and LAMP switches: ON SEND•REC-REC switch: SEND•REC Equipment patched for off-line local mode (paragraph 2-9). Refer to Section 3 for operating instructions.		
1.	Test overall operation of teletypewriter set with keyboard in operating position.	A. Depress LTRS key and type out test message. Observe that machine prints clearly with no garbles. B. On AN/TGC-14(V), depress FIGS key and then depress STOP key; observe that motor stops. On AN/TGC-14A(V), observe that motor stops after 60 to 90 seconds (75 baud and 45.45 baud respectively) of inactivity with time delay MOTOR STOP switch in ENABLE position. C. Depress BREAK button. Observe that motor starts. D. Type out a complete row of characters and observe that automatic carriage return and line feed take place after 72 or 76 characters have been printed. E. Test all off line function buttons on the printer front cover for proper operation. F. Operate all other controls and check for binding or improper operation. G. Set SEND•REC-REC switch to REC position. Arrange to have test sentence sent from a remote station. Operate local keyboard and observe that received message is clear and correct. This indicates that the SEND•REC-REC switch is operating correctly.

TABLE 5-3. OPERATOR'S WEEKLY CHECKOFF LIST

Operating conditions and control settings:
Primary power removed.
Teletypewriter set removed from case (paragraph 5-5b(3)).

STEP NO.	ACTION REQUIRED	PROCEDURE
1.	Inspect components.	Inspect cables and lateral control belt for wear. Inspect ribbon for dryness.
2.	Clean mechanical parts.	Using a small brush, clean print hammer shaft and print cylinder shaft.
3.	Clean and oil air filter.	Take out case air filter and dip in cleaning fluid, Federal Specification P-S-661. Blow dry using clean dry air or allow to air dry. Immerse in light machine oil and blow excess off while rotating filter.
4.	Inspect all mechanical parts for security.	Remove paper guide; inspect ribbon feed mechanism and all other mechanical parts for binding or damage.
5.	Inspect electrical cables.	Inspect service cable wiring and binding posts for damage.
6.	Inspect electrical chassis rear panel.	Inspect option patch connections for security. Inspect fuse posts for security and damage.

TABLE 5-4. PREVENTIVE MAINTENANCE WEEKLY CHECKOFF

Operating conditions and control settings:
Primary power connected.
Teletypewriter set removed from case (paragraph 5-5b(3)).
Equipment patched for Mode 1 (paragraph 2-9).

STEP NO.	ACTION REQUIRED	PROCEDURE
1.	Measure signal line current.	Set Multimeter AN/PSM-4 on scale to measure 0 to 100 milliamperes. Connect leads to terminals E1 and E2 on service cable junction box. (Polarity of signal line determines location of test leads.) Multimeter should indicate approximately 60 ma dc.
2.	Measure primary power source.	Set Multimeter AN/PSM-4 to measure a-c voltage of 0 to 250 volts; connect leads across primary power source and check for correct primary power.

TABLE 5-5. PREVENTIVE MAINTENANCE SEMIMONTHLY CHECKOFF

Operating conditions and control settings: Primary power disconnected. Teletypewriter set removed from case (paragraph 5-5b(3)). Paper guide plate and copy paper removed (paragraph 5-5b(4)).		
STEP NO.	ACTION REQUIRED	PROCEDURE
CAUTION		
Do not overlubricate. Apply one or two drops of oil using the oiler supplied in Tool Kit TK-122/U. Lubricate all felt washers in the equipment with two drops of oil from the oiler. Apply lubricants to gears and cams with a brush and to other moving parts with the oiler, one drop at a time. After applying lubricant, spread it evenly and immediately remove any excess. Do not lubricate the print cylinder shaft; the print cylinder must run dry. Lubricants pick-up dirt and other abrasives, resulting in excessive wear to the print cylinder end plugs.		
(1) (figure 5-1, Appendix)	Inspect and lubricate ribbon vibrator guides with MIL-L-6085A Oil.	Apply two drops of oil to ribbon vibrator guides, spring arm clips, and ribbon vibrator pivot shafts.
(2) (figure 5-1, Appendix)	Inspect and lubricate ribbon feed mechanism with MIL-G-3278A grease.	Apply grease to ribbon feed worm and ribbon feed slip clutch gear teeth.
(3) (figure 5-1, Appendix)	Inspect lateral control belt, return cable, and pulleys.	Inspect lateral control belt, return cable, and pulleys for signs of wear or fraying. Replace if defective (paragraph 5-5c).
(4) (figure 5-1, Appendix)	Inspect figures H code bar actuator clamp (AN/TGC-14(V) only) and lubricate with MIL-L-6085A oil.	Observe that actuator clamp moves freely. Apply one drop of oil to the stud.
(5) (figure 5-1, Appendix)	Lubricate felt washers with MIL-L-6085A oil.	Lubricate all felt washers in equipment (typical felt washer shown in figure 5-1, Appendix) with two drops of oil.
(6) (figure 5-2, Appendix)	Inspect lateral tension helical spring.	Inspect for tension and security. Observe that pulley is free and does not bind, Set up machine for letters A and check for 1/16-inch clearance between takeup arm pin and rear of frame (figure 5-52, Appendix).
(7) (figure 5-2, Appendix)	Move paper feed knob.	Observe that paper feed knob turns freely in both directions with paper in the paper feed mechanism.
(8) (figure 5-2, Appendix)	Inspect and lubricate print hammer shaft linkage with MIL-G-3278A grease. Check mechanical clearance.	Observe that a minimum perceptible clearance exists between the print shaft terminal lever and the print hammer actuator link. For adjustment, refer to paragraph 5-5ay(7)(c). Lubricate terminal lever at point of intersection with print hammer release.
(9) (figures 5-2 and 5-3, Appendix)	Inspect print hammer cable and pulleys.	Observe that print hammer cable is not frayed and pulleys turn freely. Replace defective cable (paragraph 5-5c(3)).
(10) (figure 5-3, Appendix)	Inspect cable and belt clamps.	Inspect all cable and belt clamps on advance drum for security.

TABLE 5-5. PREVENTIVE MAINTENANCE SEMIMONTHLY CHECKOFF (Cont)

STEP NO.	ACTION REQUIRED	PROCEDURE
(11) (figure 5-4, Appendix)	Inspect and lubricate advance linkage.	Inspect rotary detent pawl adjustment screw and observe that nut is secure. Inspect all other linkages and eccentric bushings for security. Lubricate tip of adjustment screw and index wheel with MIL-G-3278A grease. Lubricate the following parts with MIL-L-6085A oil: rotary detent pawl eccentric bushing; bushings and pivots between rotary detent pawl and character advance terminal lever; check pawl eccentric bushing; advance suppression latch eccentric bushing; character advance pawl eccentric bushing; and character advance lever shaft.
(12) (figure 5-4, Appendix)	Inspect and lubricate figures H code bar (AN/TGC-14(V) only) with MIL-G-3278A grease.	Move figures H code bar and observe that it moves freely. Apply grease sparingly to friction points.
(13) (figures 5-4 and 5-5, Appendix)	Lubricate gears with MIL-G-3278A grease.	Lubricate first, second, and third reduction gears, motor pinion, idler gear, and speed change gear.
(14) (figure 5-6, Appendix)	Lubricate spring yoke studs with MIL-L-6085A oil.	Lubricate print spring yoke stud and function spring yoke stud.
(15) (figure 5-7, Appendix)	Lubricate parts with MIL-L-6085A and MIL-G-3278A lubricants.	Lubricate the following points with oil: felt washer for the start cam surface; start clutch backstop lever eccentric bushing; and backstops where they ride clutches. Lubricate start clutch release latch pin (where it intersects fork in start clutch release arm) with grease.
(16) (figures 5-8 and 5-9, Appendix)	Lubricate keyboard clutch and distributor with MIL-G-3278A grease.	Lubricate the clutch backstop surface and key lever leaf springs with grease. Lubricate the keyboard code bar prevent lever cam; clutch release cam follower eccentric; clutch backstop bushing; and all pulsing finger bushings with oil.
(17) (figure 5-9, Appendix)	Lubricate wick with MIL-L-6085A oil.	Lubricate keyboard cam wick with two drops of oil.

TABLE 5-6. PREVENTIVE MAINTENANCE MONTHLY CHECKOFF

Operating conditions and control settings: Primary power disconnected. Teletypewriter set removed from case (paragraph 5-5b(3)). Paper guide plate and copy paper removed (paragraph 5-5b(4)).		
STEP NO.	ACTION REQUIRED	PROCEDURE
NOTE		
Use the oiler supplied in Tool Kit TK-122/U to apply MIL-L-6085A oil.		
(1) (figure 5-1, Appendix)	Lubricate ribbon feed mechanism with MIL-G-3278A grease and MIL-L-6085A oil.	Lubricate intermediate drive gears with grease. Apply one drop of oil to the pivot and link of ribbon reversing sensing arms.
(2) (figure 5-1, Appendix)	Lubricate spring with MIL-L-6085A oil.	Lubricate rotary motion spring retainer grip ring with oil.
(3) (figure 5-3, Appendix)	Lubricate bearings with MIL-L-6085A oil.	Lubricate print hammer shaft bearings.
(4) (figure 5-4, Appendix)	Lubricate parts with MIL-G-3278A grease.	Lubricate advance prevent lever tab and rotary detent pawl pin.
(5) (figure 5-5, Appendix)	Lubricate parts with MIL-G-3278A grease.	Lubricate intersection of carriage return lock lever and cam follower.
(6) (figure 5-6, Appendix)	Inspect and lubricate parts with MIL-G-3278A grease and MIL-G-6085A oil.	Lubricate line feed pawl surface and paper feed detent and ratchet with grease. Inspect paper feed rubber roll for wear. Lubricate paper pressure release lever and linkage with oil.
(7) (figure 5-6, Appendix)	Lubricate advance ratchet with MIL-G-3278A grease.	Lubricate advance ratchet on advance drum.
(8) (figure 5-6, Appendix)	Lubricate parts with MIL-G-3278A grease.	Lubricate the line feed cam surface, letters figures cam surface, carriage return cam surface, and function sensing finger levers where they touch function bar.
(9) (figure 5-6, Appendix)	Inspect and lubricate function selector components with MIL-G-3278A grease.	Inspect off line function slide levers for positive operation. Inspect all springs for security and action. Inspect screws on print prevent rod. Apply grease to off line function slide levers where they slide under bracket at front.
(10) (figure 5-8, Appendix)	Lubricate keyboard with MIL-G-3278A grease and MIL-L-6085A oil.	Lubricate clutch release cam with grease. Apply one drop of oil to point of contact of all key lever leaf springs with their respective key levers.
(11) (figure 5-10, Appendix)	Lubricate selector with MIL-L-6085A oil.	Lubricate twelve bearings.

TABLE 5-7. PREVENTIVE MAINTENANCE BIMONTHLY CHECKOFF

Operating conditions and control settings:
Primary power disconnected.
Printer removed from chassis (paragraph 5-5b (5)).

STEP NO.	ACTION REQUIRED	PROCEDURE
NOTE Use the oiler supplied in Tool Kit TK-122/U to apply MIL-L-6085A oil.		
(1) (figures 5-5 and 5-6, Appendix)	Inspect for wear and lubricate with MIL-G-3278A grease and MIL-L-6085A oil.	Inspect and lubricate with grease the first character adjustment screw, tab on carriage return lock lever, and surface of the V lever tab that intersects the stop pin in the advance drum. Inspect and lubricate with oil the carriage return lock lever eccentric bushing. Inspect V lever shaft bushings for wear.
(2) (figures 5-5 and 5-6, Appendix)	Inspect for wear and lubricate with MIL-G-3278A grease and MIL-L-6085A oil.	Lubricate with grease the automatic carriage return and line feed bail actuator eccentric. Inspect all eccentric bushings and shafts which support clutch release fingers and cam followers for wear and then lubricate with oil.
(3)	Inspect for wear and lubricate with MIL-G-3278A grease.	Apply lubricant to all main shaft clutch stop tabs.
(4) (figure 5-5, Appendix)	Inspect for wear and lubricate with MIL-G-3278A grease.	Apply lubricant to type positioning cam followers and to carriage pulley surfaces.
(5) (figures 5-8 and 5-9, Appendix)	Inspect for wear and lubricate with MIL-L-6085A oil.	Inspect keyboard code pulsing cams for wear, positive action, and inspect for security and end play. Apply a small amount of oil to the pulsing finger bushings and several drops of oil to the cam wicks.
(6) (figures 5-8 and 5-9, Appendix)	Inspect and lubricate with MIL-L-6085A oil.	Inspect and apply one drop of oil to point of contact of all key lever leaf springs with their respective key levers.
(7) (figure 5-8, Appendix)	Lubricate with MIL-L-6085A oil.	Inspect repeat key shaft for end play and wear. Apply lubricant to shaft bearings or bushings.
(8) (figure 5-9, Appendix)	Lubricate with MIL-G-3278A grease.	Lubricate keyboard clutch stop tabs and clutch release linkage.

NOTE

If motors fail to operate or have a tendency to decrease speed, check starting capacitor, motor stop switch, fuses, and motor connections. Do not attempt to repair motors. Replace defective motors with equivalent replacement parts.

TABLE 5-8. LIST OF MAINTENANCE STANDARDS PROCEDURES

SECTION	STEP	ACTION REQUIRED	REFERENCE STANDARD	*PERIOD	PARA-GRAPH	STEP	TABLE
A SEND FUNCTION	1.	Type test sentence.	**60 ma	Daily	5-3b	1 to 7	4-6
	2.	Check signal line current.		Daily			
B RECEIVE FUNCTION	1.	Check test sentences from remote station.	**60 ma	Daily	2-8e(1)	1 to 8	
	2.	Check range.		Daily			
	3.	Check line sensor 1A3.		Monthly			
	4.	Check signal line current.		Daily			
C POWER AND DISTRIBUTION FUNCTION	1.	Check supply voltage.	**60 ma	Weekly	5-3b	1 to 7	
	2.	Check output of signal line power supply 1A4.		Monthly			

*Based on equipment in continuous operation.

**May be less; depends upon number of teletypewriter sets on the signal line.

TABLE 5-9. LUBRICATION INSTRUCTIONS

KEY

G - Standard Oil Beacon Lubricant No. 325, MIL-G-3278A.

0 - Pioneer Ball Bearing Oil PD14926-51, MIL-L-6085A.

W- Inspect these points for wear and/or proper clearances.

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
PRINTER ASSEMBLY						
5-4(24)	Index wheel.	G	G			
5-6(45)	Advance ratchet.	G		G		
5-4 (13 and 12)	Advance suppression latch where character advance pawl contacts.	G	G		G	
5-4 (16)	Advance suppression latch eccentric bushing.	0	0			
5-4 (5 and 12)	Advance prevent lever tab where character advance pawl contacts.	G		G		

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
5-4 (4 and 5)	Carriage return lever and advance prevent lever tab meeting point.	G		G		
5-4 (18)	Rotary detent pawl eccentric bushing.	0	0			W
5-4 (20 and 1)	Bushings and pivots on link between rotary detent pawl and print shaft terminal lever.	0	0			W
5-4 (21)	Rotary detent pawl adjustment screw tip.	G	G			
5-4 (19)	Check pawl eccentric bushing.	0	0			W
5-4 (3)	Character advance pawl eccentric bushing.	0	0			W
5-5 (46)	V lever tab which meets pin in advance drum.	G			G	
5-6 (9)	Bushings at both ends of V lever shaft.	0			0	
5-4 (23)	Rotary detent pawl pin.					W
5-6 (44)	First character adjustment screw (contact point).	G		G		
5-6 (4)	Carriage return lock lever eccentric bushing.	0			0	
5-59	Carriage return lock lever and carriage return cam follower at meeting point.	G		G		
5-36 (E) and 5-6 (42)	Check pawl guide bracket holding check pawl against advance drum.	G			G	
5-4 (15 and 14)	Check pawl link at check pawl eccentric stud and opposite end.	0		0		
5-59	Tab on carriage return lock lever where it meets pin in lock lever actuator arm.	G				G
5-6 (3)	Automatic carriage return and line feed bail actuator eccentric.	G			G	
5-6 (46)	Print prevent adjustment screw heads.	G			G	
5-6 (40)	Line feed pawl guide bracket.	G				G

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
5-6 (40)	Line feed pawl pivot.	G	0			
5-6 (38)	Paper feed detent and ratchet.	G		G		
5-34 (T1 and T3)	Paper feed detent roller and pivot on paper feed detent arm.	G		0		
5-34 (M)	Pressure roll shaft.	0		0		
5-37 (B1)	Lateral control belt pulley assembly.	0			0	
5-37 (C6 and C10)	Lateral control and rotary function slides.	0			0	
5-10	Shaft bearings (12).	0		0		
5-10	Armature paddle latches where armatures are engaged.	G		G		W
5-5 (30 through 33, 36, 37)	Armature paddle latches and latches where clutch release finger adjustment screws are engaged.	G			G	W
5-7	Start clutch backstop lever eccentric bushing.	0	0			W
5-7	Start clutch release latch pin where it meets the fork in start clutch release arm.	G	G			W
5-49 (Typical)	Stop tab on all clutches.	G			G	
5-21 (N) (Typical)	Clutch and cam rollers.	G				G
5-48 (Typical)	Clutch backstop lever surfaces where they meet clutches.	G	G			
5-48 (Typical)	Clutch backstop eccentric bushings.	0			0	
5-29 (M, V,U,AE P,AA,and Q)	All bushings, letters figures cam follower assembly, and line feed actuator assembly mounted on mark and space clutch release selector shafts running length of printer on which are mounted the mark and space clutch release assemblies and type positioning cam followers.	0			0	

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
5-5 (9 and 8)	Type positioning cam followers where they meet the carriage pulley surfaces and type positioning cams.	G			G	
5-65	Line feed cam surface.	G		G		
5-6 (6)	Letters figures cam surface.	G		G		
5-59	Carriage return cam surface.	G		G		
5-6 (34)	Function sensing finger levers where they meet function bar.	G		G		W
5-6 (32)	Function sensing finger lever stop strip.	G				G
5-6 (35 and 27)	Function and print spring yoke pivot studs and links	G	G			W
5-69	Print prevent arm where print prevent rod lever engages.	G		G		
5-5 (51)	Character advance lever shaft bushings.	0	0			
5-5 (50)	Carriage return shaft bushing between lever and carriage return cam follower on opposite end.	0			0	
5-6 (20, typical)	Type positioning cam follower stroke adjustment screw ends (6).	G				G
5-37 (B20 and D10)	Lateral control and rotary chains.	0		0		W
5-62 (Typical)	Function sensing finger lever pivots.	0		0		W
5-33 (C1 and C18)	Right-hand and left-hand bearings.	0		0		
5-12	Rotary motion spring retainer grip ring.	0		0		
5-7	Range adjustment gear segment (on start clutch assembly).	G				G
5-31(E)	Print hammer actuator link guide bracket.	G				G
5-33 (C21b)	Print hammer actuator link lever pivot.	G	0			
5-2	Print shaft terminal lever where it meets print hammer actuator link and print hammer release.	G	0			

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
5-2	Print hammer release bushing.	G		0		
5-2	Takeup arm bushing.	0	0			
5-62 (Typical)	Function clutch release arm bushings.	0		0		
	All gears in equipment.	G	G		W	
	All spring loops in equipment.	0				0
	Check all cables and belts for wear.	W	W			
5-35 (E6)	Carriage return spiral spring.	G			G	
5-33 (B14)	Rotary motion spring.	G			G	
5-5 (52)	Advance prevent stop spring where it engages bail.	G			G	
5-6 (33)	Off line function slide levers.	0				0
5-35 (B1)	Print cam follower tip.	G				W
5-36 (AG1)	Function cam follower tip.	G				W
5-5 (7, typical)	Clutch release finger cam follower surfaces.	G				W
TIME DELAY MOTOR STOP MECHANISM (AN/TGC-14A(V) only)						
5-20 (C4)	Time delay check pawl assembly.	0			0	W
5-20 (C2)	Felt washer.	0		0		
5-20 (C6)	Time delay feed pawl assembly.	0			0	W
5-20 (G)	Time delay feed and check pawl guide.	0			0	
5-20 (H)	Timing cam shaft extension.	G		G		W
5-20 (K5)	Return spiral spring. (Do not disassemble ratchets; apply drop of oil between ratchets.)	0			0	
5-20 (K6)	Advance ratchet.	0			0	W
5-20 (K7)	Reduction ratchet.	0			0	W
5-20 (K13a)	Roller.	0			0	
5-20 (K13d)	Detent spring.	0			0	
5-20 (L)	Time delay switch actuator.	0			0	
5-20 (T)	Time delay secondary check pawl.	0			0	W

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
5-20 (K3)	Sleeve. All spring hooks (both ends).	0 0			0	0
KEYBOARD						
5-9	Keyboard cam wick.	0		0		W
5-40 (CC10)	Clutching rollers.	G				G
5-9	Clutch backstop surface.	G	G			
5-8	Keyboard code bar prevent lever cam.	G	G			
5-8	Clutch release cam.	G		G		
5-9	Clutch release cam follower eccentric.	0	0			
5-9	Clutch backstop bushing.	0	0			
5-8	Pulsing finger bushings.	0	0			
5-8	Key lever leaf springs where they contact key levers.	0			0	
5-8	Clutch release bail bearings.	0		0		
5-8	Repeat key shaft ends.	G			0	
5-9	Clutch stop tabs.	G			G	
RIBBON FEED MECHANISM						
5-1 (25)	Clutch shaft worm gear assembly.	G			G	
5-1 (17)	Ribbon feed worm.	G		G		
5-1 (24)	Ribbon feed slip clutch gear shaft bearings.	0			0	
5-1 (28)	Ribbon spool drive gears.	G			G	
5-1 (24)	Ribbon feed slip clutch gear (teeth only).	G		G		
5-1 (26 and 6)	Left-hand and right-hand ribbon reversing sensing arm pivot points.	0			0	
5-1 (3)	Ribbon rollers.	0			0	
5-1 (29)	Ribbon feed backstop (where it rides clutch).	G		G		
5-1 (5)	Ribbon reversing sliding plate assembly (slot's).	0			0	

TABLE 5-9. LUBRICATION INSTRUCTIONS (Cont)

FIGURE AND INDEX NO. (APPENDIX)	LUBRICATION OR CHECK POINT	SPECIAL INTERVAL	PERIODIC INTERVALS			
		ANY REASSEMBLY	EVERY 250 HOURS	EVERY 500 HOURS	EVERY 1000 HOURS	EVERY 3000 HOURS
5-1 (2)	Ribbon feed clutch stop (stop tab contact point).	G			G	
5-1 (7)	Reversing cam followers (point of contact).	G			G	
5-1 (29, 7, and 2)	Pivot points on ribbon feed backstop, reversing cam follower, and ribbon feed clutch stop.	G			0	
5-1 (28)	Ribbon spool drive gear bearings.	0			0	
5-39 (56)	All felt washers.	0			0	
5-39 (47c)	Washer spring.	0			0	
5-1	All spring loops.	0				0
5-39 (27 and 15)	Left-hand and right-hand tension control brake arms (pivot points).	0			0	
ELECTRICAL CHASSIS						
5-41 (G10)	Dancer roll tube bearings.	0				0
5-41 (G9)	Paper brake link pivots.	0				0

TABLE 5-10. TENSION VALUES

FIGURE AND INDEX (APPENDIX)	ITEM	LOAD LENGTH (INCHES)	LOAD (OUNCES)
5-20 (B)	Time Delay Feed Pawl Helical Spring	1.000 ±0.0312	2.5
5-20 (K5)	Return Spiral Spring		1.5 ±0.15 in.-oz at 1/2 turn; 2.6 ±0.26 in.-oz at 1-1/2 turns.
5-20 (K13d)	Detent Spring		5 oz (To move from detent.)
5-20 (S)	Time Delay Secondary Check Pawl Spring	0.6250 ±0.0312	1.5
5-21 (D1)	Backstop Lever Spring	0.8750	32-36
5-26 (Q); 5-27 (L)	Selector Shaft Bias Spring	1.1406 ±0.0156	5.6432
5-28 (M)	Lock Lever Actuator Arm Helical Spring	1.0625	3
5-28 (N)	Automatic Carriage Return and Line Feed Bail Actuator Helical Spring	1.3125	7.5
5-29 (A)	Clutch Backstop Spring	1.125	28

TABLE 5-10. TENSION VALUES (Cont)

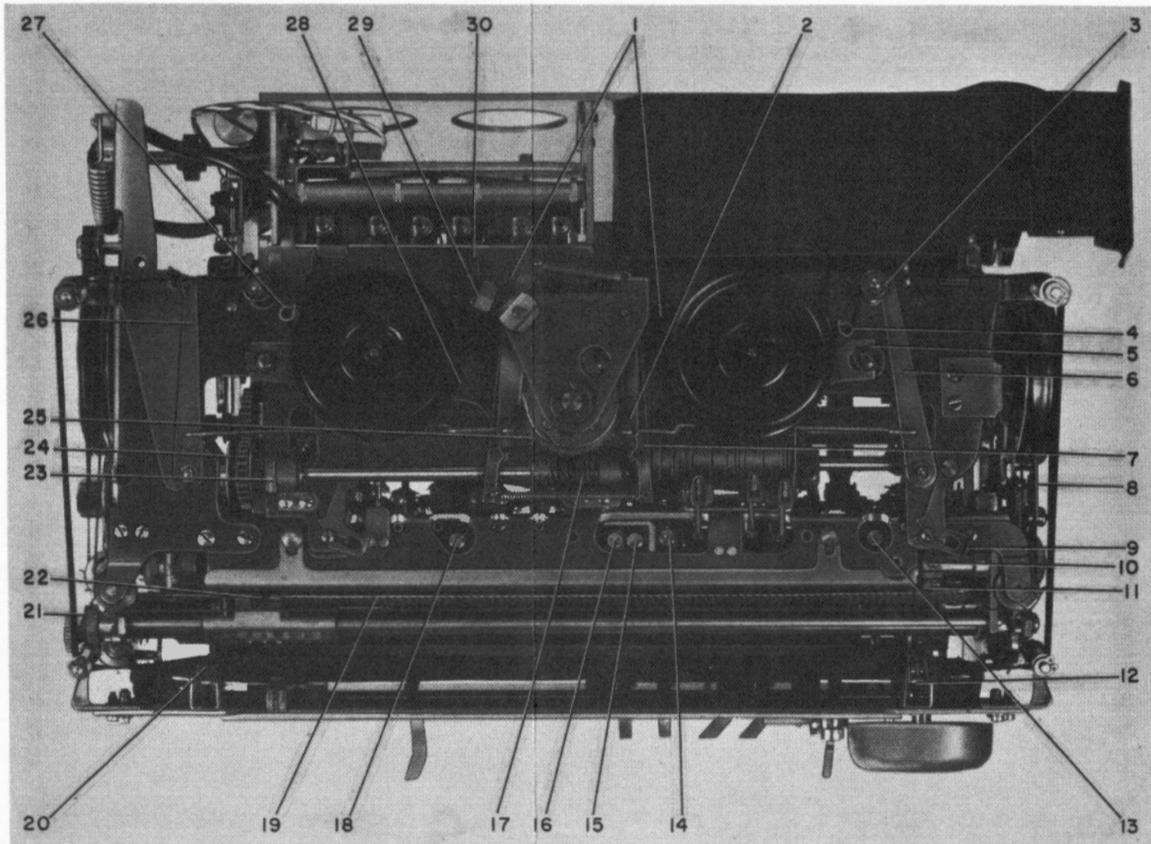
FIGURE AND INDEX (APPENDIX)	ITEM	LOAD LENGTH (INCHES)	LOAD (OUNCES)
5-29 (F)	Inter-arm Spring	1.312	32-34
5-29 (G)	Line Feed Pawl Spring	1.375	3
5-29 (P3)	Safety Spring	0.6875	60±5
5-29 (Y)	Print and Function Clutch Release Arm Spring	1.0625- 1.125	16-18
5-29 (AF8)	Timing Cam Shaft Spring (Compression)	0.250	16-25
5-30 (D5)	Detent Helical Spring (Compression)	0.375	6
5-30 (H)	Function Helical Spring	2.375 2.750	32±3.2 42±4.2
5-30 (J)	Print Helical Spring	2.375 2.750	16±1.6 20±2.0
5-31 (Insert)	Actuator Spring (AN/TGC-14 (V) only)	90 degrees	0.28216-0.52905
5-31 (Insert)	Code Bar Spring (AN/TGC-15(V) only)	0.9375 1.1094	9±1 12±1
5-31 (Insert)	Compression Spring (AN/TGC-14(V) only)	0.2812	4±0.5
5-33 (B14)	Rotary Motion Spring		2.7 in.-oz at 4 turns.
5-33 (C4)	Print Hammer Return Spring	1.1875	9-11
5-33 (C6 and C22)	Vibrator Arm (Ribbon)		2.5 (to open)
5-34 (D)	Pad Spring	84 degrees	6-8
5-34 (F)	Paper Pressure Release Lever Spring	1.000	2 (min.)
5-34 (J)	Pressue Roll Spring	0.480	32-36
5-34 (S)	Paper Feed Detent Spring	0.8437 0.9062	24 32
5-35 (E6)	Carriage Return Spiral Spring		16 in.-oz at 1 turn; 19-22 in.-oz at 4 turns
5-35 (E12)	Lateral Tension Helical Spring	0.640 (max. deflection)	30±1
5-35 (E26)	Range Finder Lock Helical Spring (Compression)	0.500	15
5-36 (H)	Advance Prevent Lever Spring	1.125	5
5-36 (M)	Bounce Prevent Lever Spring	1.6250 1.750	30 40
5-36 (S)	Character Advance Pawl Spring	0.5937 0.5312	9 7
5-36 (AE); Figure 5-55	Lifter Arm Spring	0.049	18
5-36 (AF5); Figure 5-54	Function Lever Compression Spring	0.375	32
5-36 (AM)	Rotary Detent Pawl Spring	1.125 1.1875	29 36
5-36 (AQ); Figure 5-60	Check Pawl Spring	0.875	4
5-37 (Insert)	Return Stop Spring	180 degrees	2-3
5-37 (A1)	Function Backstop Spring	1.000 1.0625	23 25
5-37 (A11)	Function Clutch Release Arm Return Helical Spring	1.250 1.5625	5 8

TABLE 5-10. TENSION VALUES (Cont)

FIGURE AND INDEX (APPENDIX)	ITEM	LOAD LENGTH (INCHES)	LOAD (OUNCES)
5-37 (A12)	Function Sensing Finger Lever Helical Spring	0.625±0.0312	8
5-37 (A22)	Off Line Letters Sensing Finger Lever Spring	0.500±0.0312	4
5-37 (A40)	Print Prevent Rod Actuator Arm Bias Spring	1.9375	1.5
5-37 (B5)	Slack Takeup Spring (Compression)	1.000 0.437	3 8-10
5-37 (B7 and D4)	Lateral Control Belt Strip and Rotary Cable Strip Safety Spring	1.125	4
5-37 (F1)	Off Line Function Return Helical Spring	0.875 1.093	6 9
5-38 (Insert)	Compression Spring (AN/TGC-14(V) only)	0.234±0.010	2±0.5
5-38 (BU)	Spring	0.4687	2±0.5
5-38 (CB)	Spring	1.125	8±0.5
5-38 (CN)	Secondary No. 3 Cam Follower Spring	1.750 1.9375	28±3 40±4
5-39 (6)	Ribbon Feed Backstop Helical Spring	1.2187±0.0312	28-32
5-39 (7)	Clutch Stop Helical Spring	1.0937 1.1562	8 10
5-39 (8)	Reversing Cam Follower Spring	1.500	20±1
5-39 (26)	Tension Control Brake Arm Spring	1.250	10±1
5-40 (H)	Keyboard Lock Bar Helical Spring	1.312	10±1
5-40 (X)	Helical Spring	1.0312	15±2
5-40 (Y)	Helical Spring	1.000	24±2
5-40 (BK)	Clutch Release Helical Spring	1.0625	3
5-40 (BU)	Backstop Spring	0.750	22±2
5-40 (CX)	Repeat Key Lever Helical Spring	1.000	35±2
5-40 (DQ)	Spring	0.4062 0.6562	6 12
5-41 (G1)	Paper Brake Link Spring	1.000 1.1875	2.5 3
5-41 (G40**)	Contact Block (Breaker)		1.5 (to open)
4-7	Clutch Bias Compression Spring	0.156	3
4-32	Off Line Function Button Spring	0.6562 0.8594	5±2 14±2
3-1 (4*)	Helical Compression Spring	0.2187	6-8

*Part of copy window release mechanism.

**Part of contact block.



KEY	ITEM	KEY	ITEM
1	Intermediate Drive Gears (table 5-6, step 1, Appendix)	17	Ribbon Feed Worm (table 5-5, step 2, Appendix)
2	Ribbon Feed Clutch Stop	18	Print Spring Arm Clamping Screw
3	Ribbon Roller	19	Lateral Control Belt (table 5-5, step 3, Appendix)
4	Right-Hand Tension Control Brake Arm	20	Left-Hand Ribbon Vibrator Guide (table 5-5, step 1, Appendix)
5	Ribbon Reversing Sliding Plate	21	Rotary Motion Spring Retainer (table 5-6, step 2, Appendix)
6	Right-Hand Ribbon Reversing Sensing Arm (table 5-6, step 1, Appendix)	22	Print Cylinder Yoke Clamp
7	Reversing Cam Follower	23	Felt Washer (table 5-5, step 5, Appendix)
8	Return Cable (table 5-5, step 3, Appendix)	24	Ribbon Feed Slip Clutch Gear (table 5-5, step 2, Appendix)
9	Lock Clips	25	Clutch Shaft Worm Gear
10	Code Bar Actuator Clamp (table 5-5, step 4, Appendix)	26	Left-Hand Ribbon Reversing Sensing Arm (table 5-6, step 1, Appendix)
11	Code Bar Actuator Clamp Screw	27	Left-Hand Tension Control Brake Arm
12	Right-Hand Ribbon Vibrator Guide (table 5-5, step 1, Appendix)	28	Ribbon Spool Drive Gear
13	Lifter Arm Clamping Screw	29	Ribbon Feed Backstop
14	Function Cam Follower Clamping Screw	30	Ribbon Feed Top Plate Assembly
15	Print Prevent Arm Clamping Screw		
16	Print Cam Follower Clamping Screw		

Figure 5-1. Printer Assembly, Top View

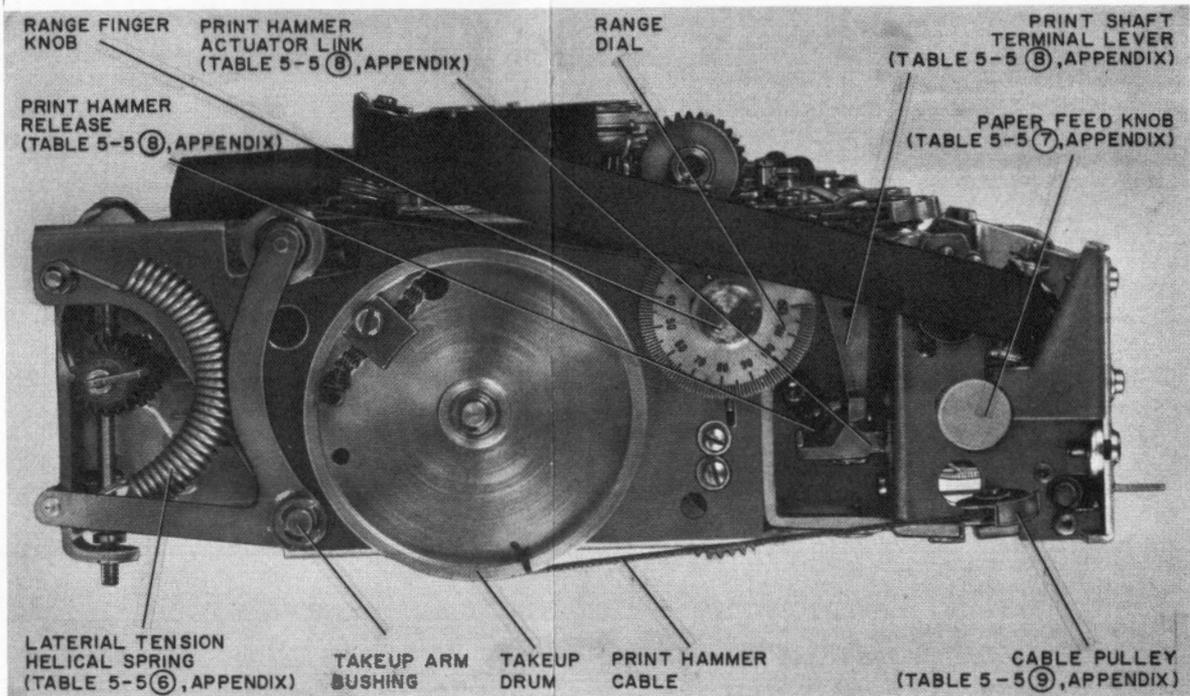


Figure 5-2. Printer Assembly, Left-Side View

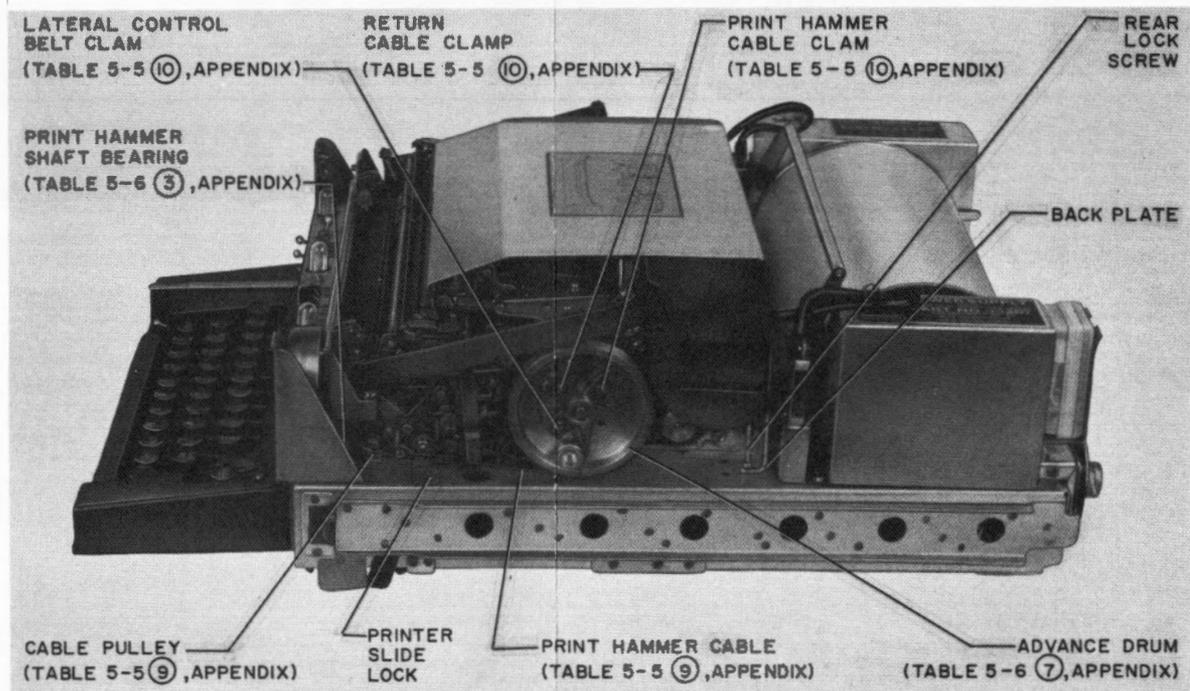
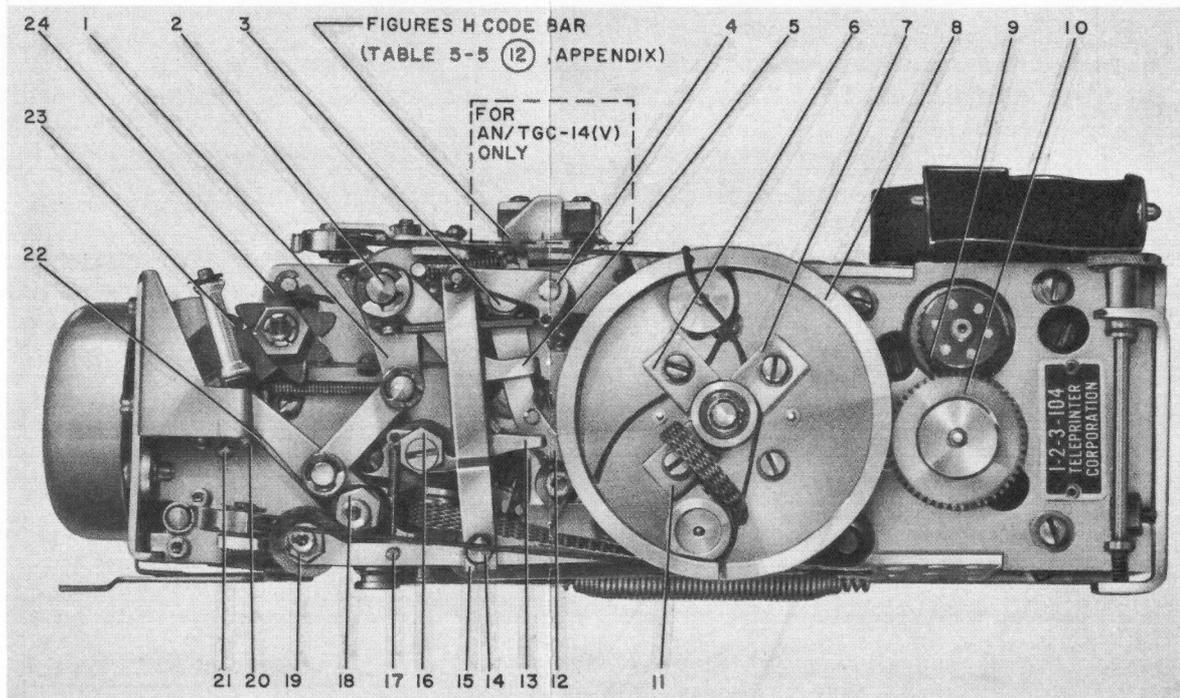


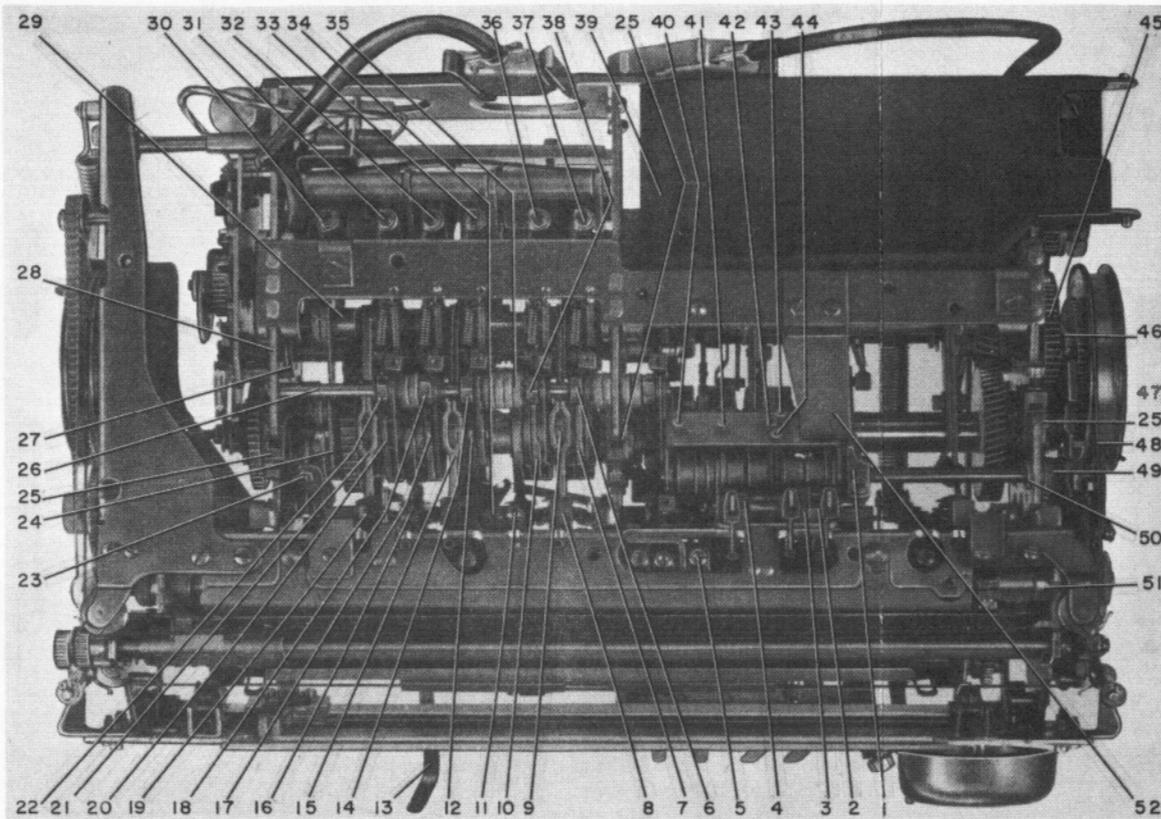
Figure 5-3. Teleprinter Assembly, Right-Side View



KEY	ITEM
1	Print Shaft Terminal Lever (table 5-5, step 11, Appendix)
2	Character Advance Lever Shaft (table 5-5, step 11, Appendix)
3	Character Advance Pawl Eccentric Bushing (table 5-5, step 11, Appendix)
4	Carriage Return Lever
5	Advance Prevent Lever Tab (table 5-6, step 4, Appendix)
6	Return Cable Clamp
7	Print Hammer Cable Clamp
8	Advance Drum
9	Speed Change Gear (table 5-5, step 13, Appendix)
10	Idler Gear (table 5-5, step 13, Appendix)
11	Lateral Control Belt Clamp
12	Character Advance Pawl

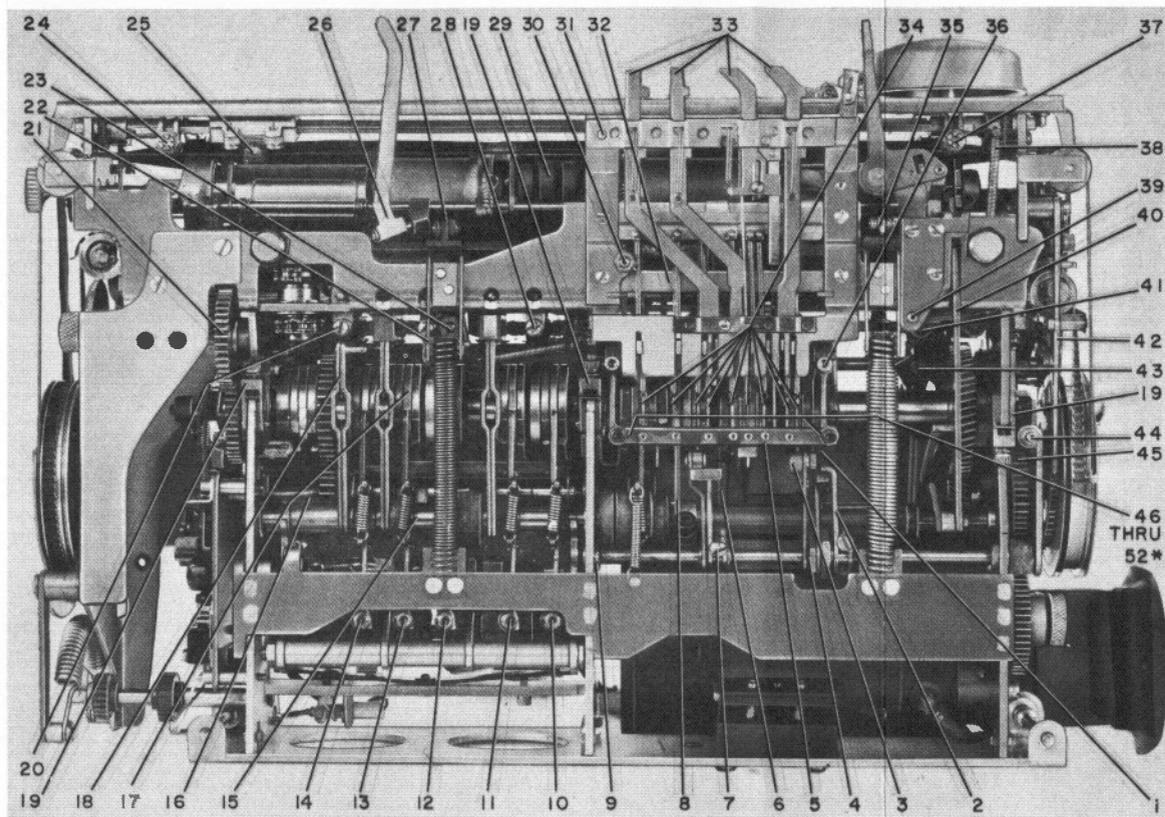
KEY	ITEM
13	Advance Suppression Latch
14	Check Pawl Eccentric Stud
15	Check Pawl Link
16	Advance Suppression Latch Eccentric Bushing (table 5-5, step 11, Appendix)
17	Check Pawl
18	Rotary Detent Pawl Eccentric Bushing (table 5-5, step 11, Appendix)
19	Check Pawl Eccentric Bushing (table 5-5, step 11, Appendix)
20	Rotary Detent Pawl Tab
21	Rotary Detent Pawl Adjustment Screw (table 5-5, step 11, Appendix)
22	Rotary Detent Pawl
23	Rotary Detent Pawl Pin (table 5-6, step 4, Appendix)
24	Index Wheel (table 5-5, step 9, Appendix)

Figure 5-4. Printer Assembly, Right-Side View



KEY	ITEM
1	Carriage Return Cam Follower (table 5-6, step 5, Appendix)
2	Carriage Return Backstop Eccentric Bushing
3	Letters Figures Backstop Eccentric Bushing
4	Line Feed Backstop Eccentric Bushing
5	Function Cam Follower Screw
6	No. 1 Clutch Backstop Eccentric Bushing
7	No. 1 Mark Clutch Release Finger (table 5-7, step 2, Appendix, typical)
8	No. 1 Carriage Pulley (table 5-7, step 4, Appendix, typical)
9	No. 1 Type Positioning Cam Follower (table 5-7, step 4, Appendix, typical)
10	No. 2 Mark Clutch Release Finger
11	No. 2 Rotary Stroke Adjustment Screw
12	No. 5 Mark Clutch Release Finger
13	Paper Pressure Release Lever
14	No. 5 Clutch Backstop Eccentric Bushing
15	No. 5 Type Positioning Cam Follower
16	No. 4 Lateral Stroke Adjustment Screw
17	No. 4 Mark Clutch Release Finger
18	No. 4 Clutch Backstop Eccentric Bushing
19	No. 3 Carriage Pulley
20	No. 3 Mark Clutch Release Finger
21	No. 3 Type Positioning Cam Follower
22	No. 3 Clutch Backstop Eccentric Bushing
23	Start Clutch Backstop
24	Start Clutch Release Latch Pin
25	Frame Clamps
26	Backstop Shaft
27	Timing Cam Shaft
28	Start Clutch Release Arm
29	Mark Selector Shaft
30	Start Clutch Release Arm Adjustment Screw
31	No. 3 Clutch Release Finger Adjustment Screw
32	No. 4 Clutch Release Finger Adjustment Screw
33	No. 5 Clutch Release Finger Adjustment Screw
34	Rotary Chain Adjustment Stud
35	Felt Washer
36	No. 2 Clutch Release Finger Adjustment Screw
37	No. 1 Clutch Release Finger Adjustment Screw
38	No. 2 Clutch Backstop Eccentric Bushing
39	Fan Outlet Duct Assembly
40	Blank Advance Prevent Adjustment Screw
41	Line Feed Advance Prevent Adjustment Screw
42	Figures Advance Prevent Adjustment Screw
43	Letters Advance Prevent Adjustment Screw
44	Bell Advance Prevent Adjustment Screw
45	Second Reduction Gear (table 5-5, step 13, Appendix)
46	V Lever Tab (table 5-7, step 1, Appendix)
47	Third Reduction Gear (table 5-5, step 13, Appendix)
48	Bounce Prevent Lever
49	Bounce Prevent Lever Eccentric Bushing
50	Carriage Return Shaft Bushing
51	Character Advance Lever Shaft Bushing
52	Advance Prevent Stop Spring

Figure 5-5. Printer Assembly, Top View (Ribbon Feed Top Plate Assembly Removed)



KEY

ITEM

- | | |
|----|---|
| 1 | Carriage Return Cam (table 5-6, step 8, Appendix) |
| 2 | Lock Lever Actuator Arm |
| 3 | Automatic Carriage Return and Line Feed Bail Actuator Eccentric (table 5-7, step 2, Appendix) |
| 4 | Carriage Return Lock Lever Eccentric Bushing (table 5-7, step 1, Appendix) |
| 5 | Print Prevent Rod (table 5-6, step 9, Appendix) |
| 6 | Letters Figures Cam Follower (table 5-6, step 8, Appendix) |
| 7 | Automatic Carriage Return and Line Feed Actuator Arm Screw |
| 8 | Line Feed Cam Follower (table 5-6, step 8, Appendix) |
| 9 | V Lever Shaft Bushing (table 5-7, step 1, Appendix) |
| 10 | No. 1 Space Clutch Release Finger Adjustment Screw |
| 11 | No. 2 Space Clutch Release Finger Adjustment Screw |
| 12 | No. 5 Space Clutch Release Finger Adjustment Screw |
| 13 | No. 4 Space Clutch Release Finger Adjustment Screw |

- | | |
|----|---|
| 14 | No. 3 Space Clutch Release Finger Adjustment Screw |
| 15 | Space Selector Shaft |
| 16 | Timing Cam Shaft |
| 17 | No. 4 Clutch Cage |
| 18 | Secondary No. 3 Cam Follower |
| 19 | Frame Clamps |
| 20 | No. 3 Lateral Stroke Adjustment Screw |
| 21 | Keyboard Drive Gear |
| 22 | No. 5 Lateral Stroke Adjustment Screw |
| 23 | Automatic Chain Takeup Ratchet |
| 24 | Left-Hand Vibrator Arm Lock Nut |
| 25 | Print Hammer Cable Clamp Screw |
| 26 | Paper Pressure Release Lever (table 5-6, step 6, Appendix) |
| 27 | Print Spring Yoke Pivot Stud and Link (table 5-5, step 14, Appendix) |
| 28 | No. 1 Rotary Stroke Adjustment Screw |
| 29 | Pressure Roll |
| 30 | Print Prevent Stop Adjustment Setscrew |
| 31 | Off Line Function Slide (table 5-6, step 9, Appendix) |
| 32 | Function Sensing Finger Lever Stop Strip |
| 33 | Off Line Function Slide Levers (table 5-6, step 9, Appendix) |
| 34 | Function Sensing Finger Levers (table 5-6, step 8, Appendix) |
| 35 | Function Spring Yoke Pivot Stud and Link (table 5-5, step 14, Appendix) |
| 36 | Print Prevent Rod Actuator Arm Screw |
| 37 | Right-Hand Vibrator Arm Lock Nut |
| 38 | Paper Feed Detent and Ratchet (table 5-6, step 6, Appendix) |
| 39 | Shift Lever Adjustment Screw |
| 40 | Line Feed Pawl (table 5-6, step 6, Appendix) |
| 41 | Letters Figures Cam Follower Stroke Adjustment Screw |
| 42 | Check Pawl |
| 43 | Letter Figures Arm Adjustment Screw |
| 44 | First Character Adjustment Screw (table 5-7, step 1, Appendix) |
| 45 | Advance Ratchet (table 5-6, step 7, Appendix) |
| 46 | Blank Print Prevent Adjustment Screw |
| 47 | Space Print Prevent Adjustment Screw |
| 48 | Line Feed Print Prevent Adjustment Screw |
| 49 | Figures Print Prevent Adjustment Screw |
| 50 | Bell Print Prevent Adjustment Screw |
| 51 | Letters Print Prevent Adjustment Screw |
| 52 | Carriage Return Print Prevent Adjustment Screw |

For location of items 46 through 52 on print prevent rod read from left to right.

Figure 5-6. Printer Assembly, Bottom View

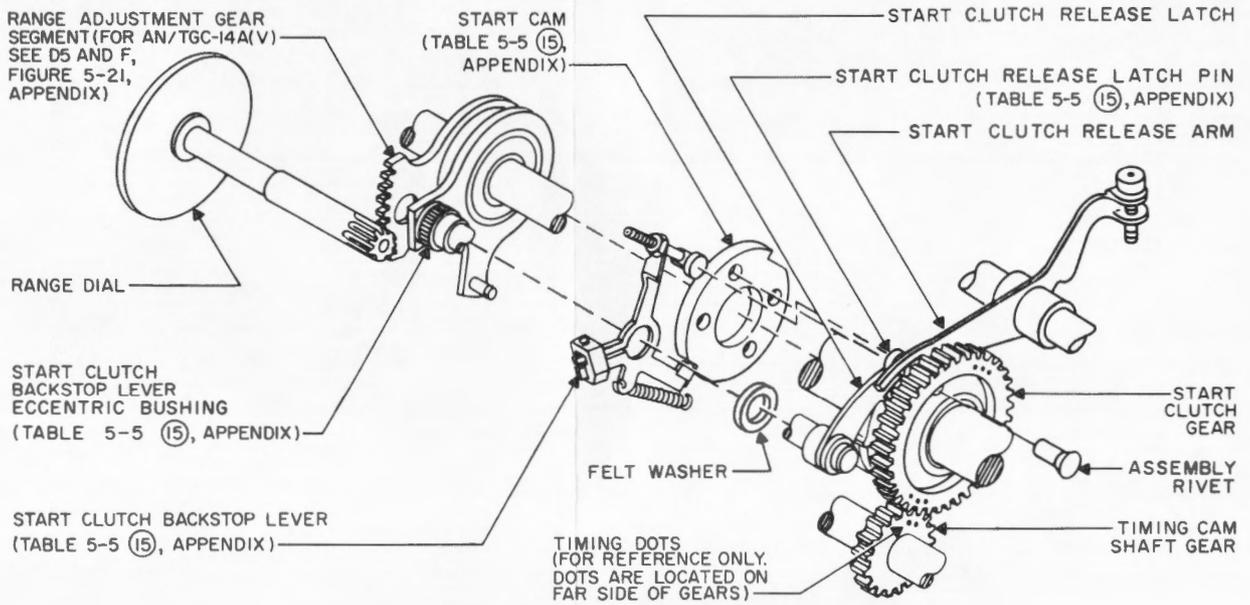


Figure 5-7. Start Clutch Release Mechanism, Exploded View

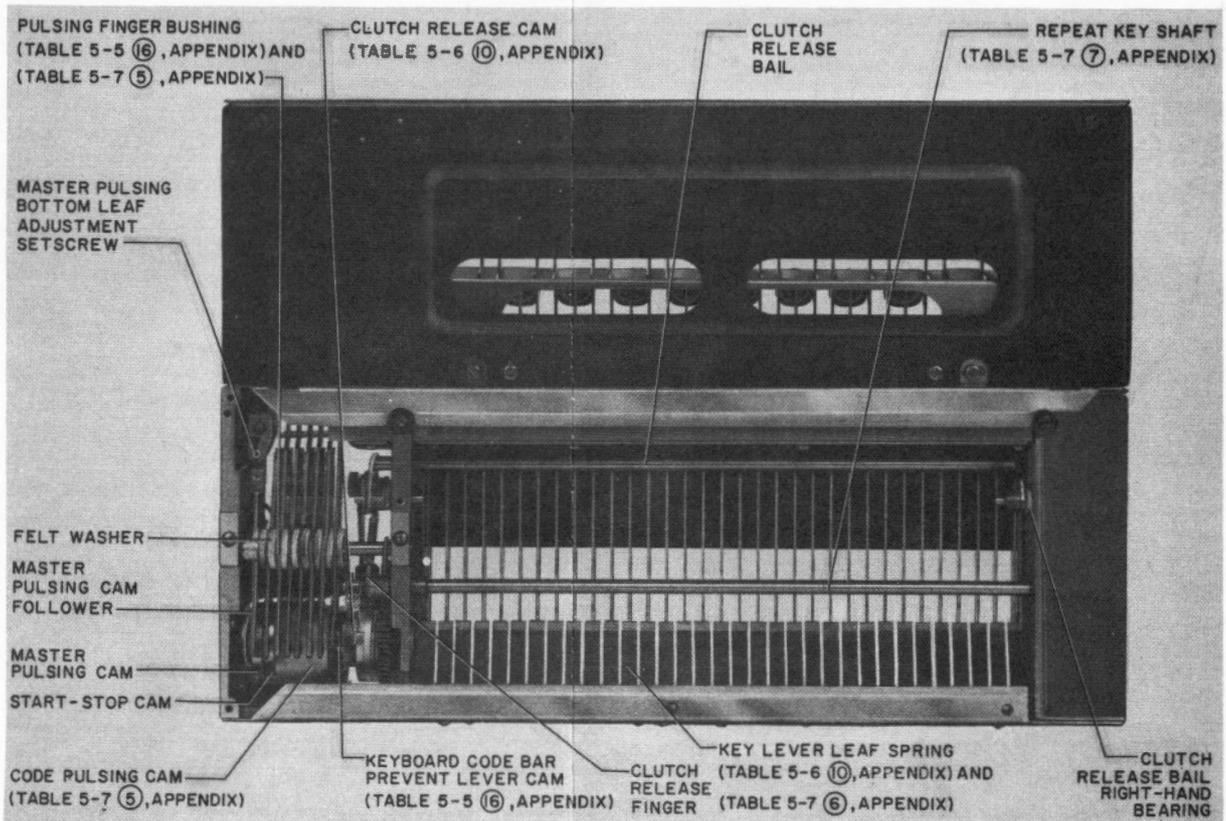


Figure 5-8. Keyboard Assembly, Bottom View

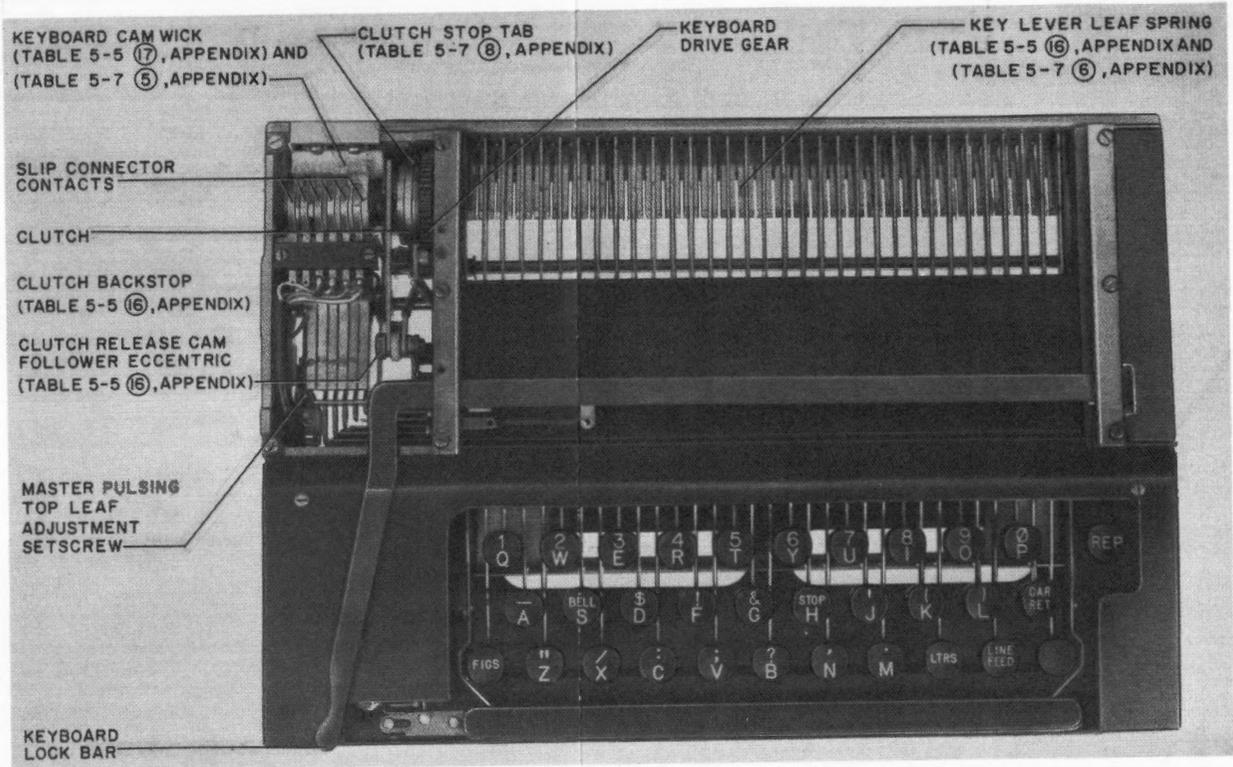


Figure 5-9. Keyboard Assembly, Top View

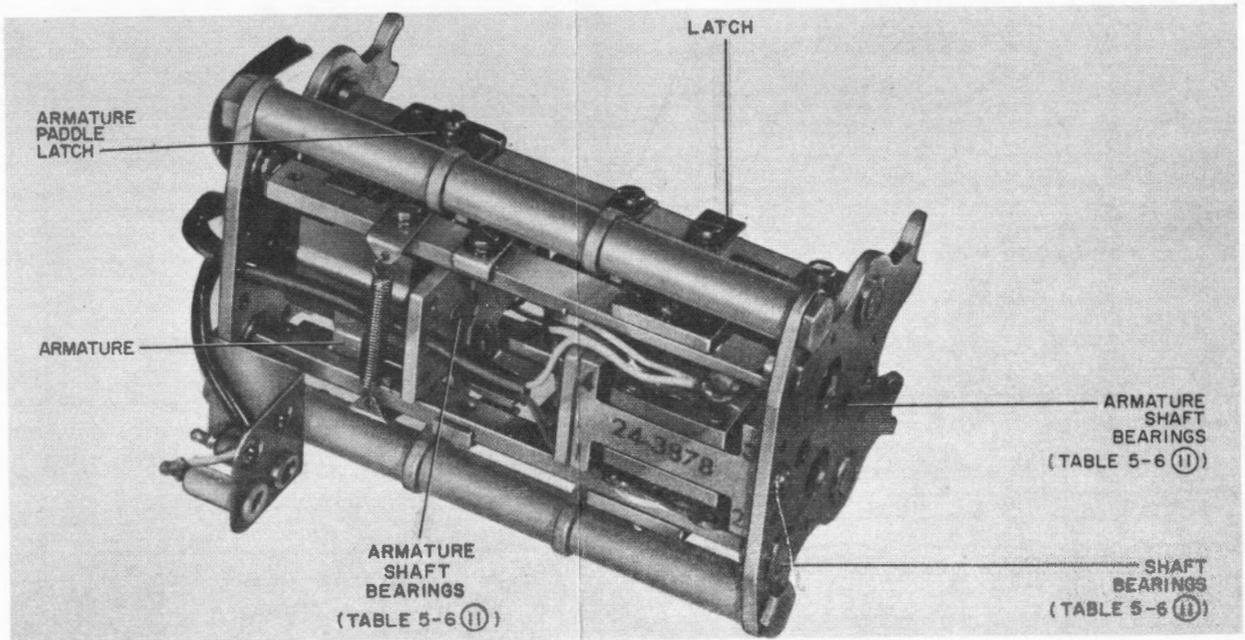


Figure 5-10. Selector Assembly, Lubrication Points

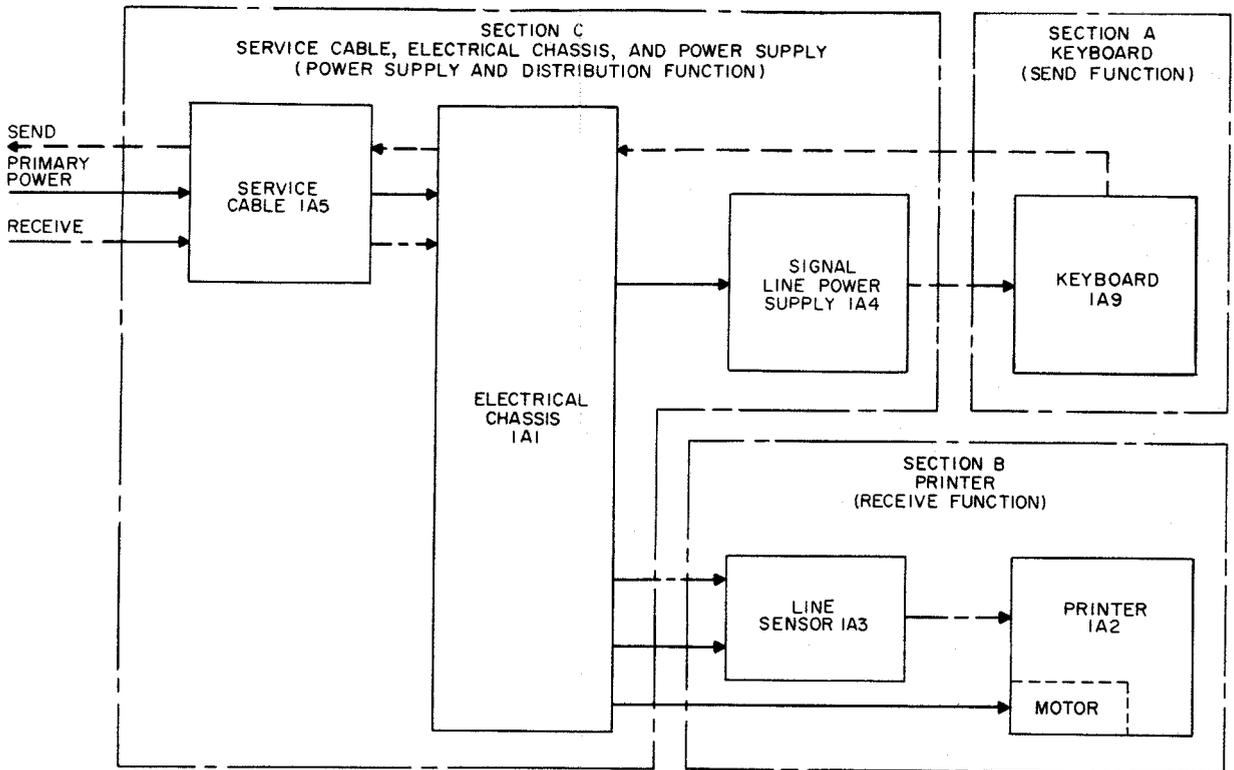


Figure 5-11. Functional Section Block Diagram

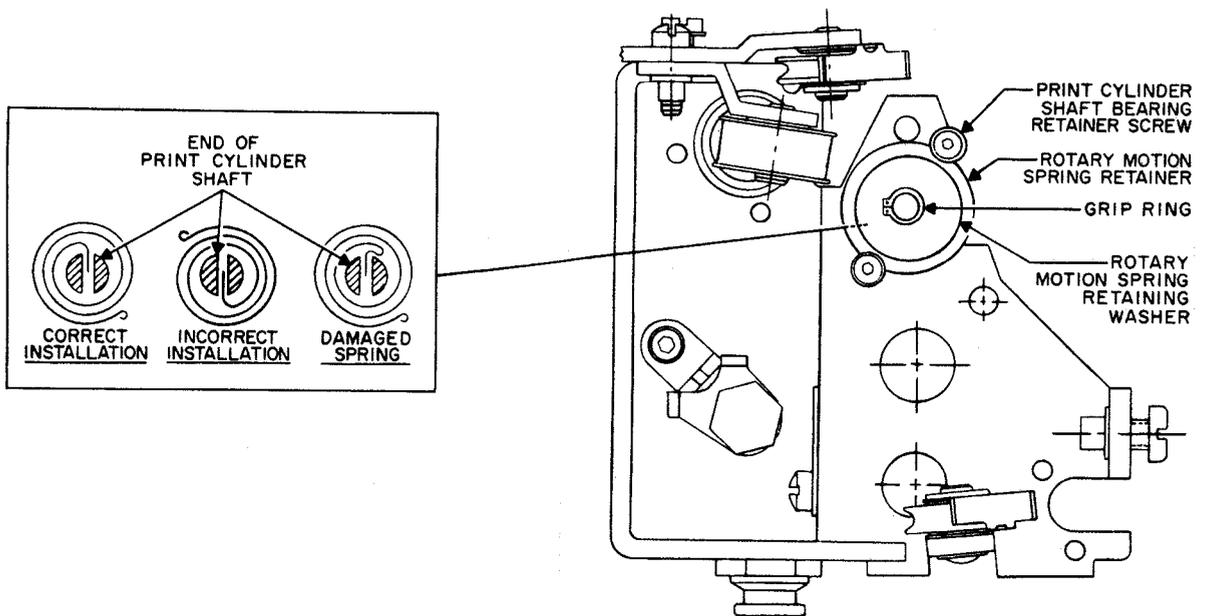


Figure 5-12. Rotary Cable Installation, Left-Side View

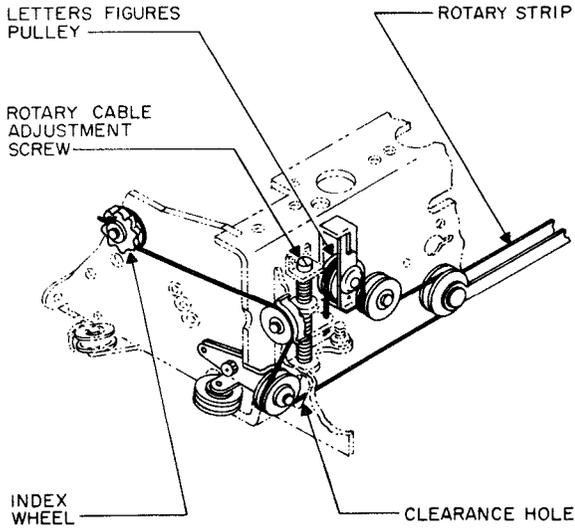


Figure 5-13. Rotary Cable Installation, Cable Threading Diagram

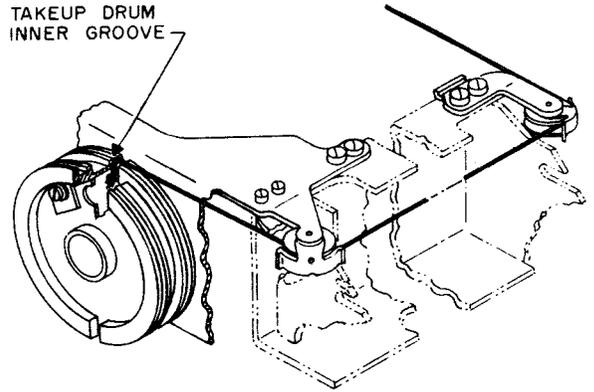


Figure 5-15. Return Cable Installation, Cable Threading Diagram

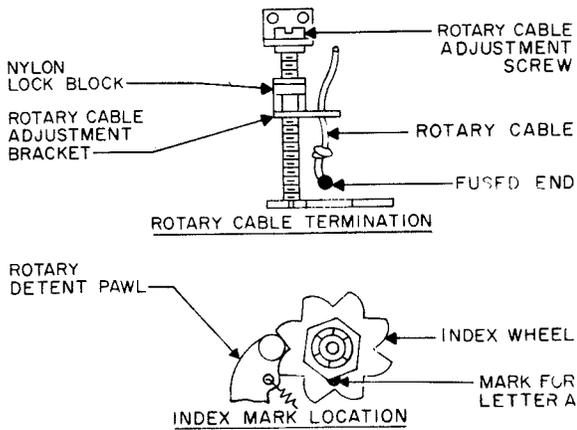


Figure 5-14. Rotary Cable Installation, Detail Views

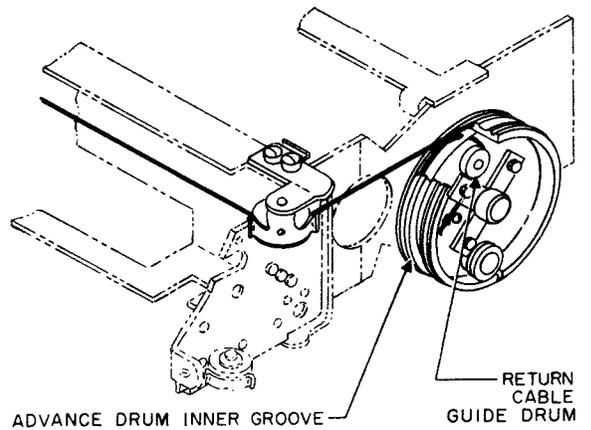


Figure 5-16. Return Cable Installation, Securing Cable to Advance Drum

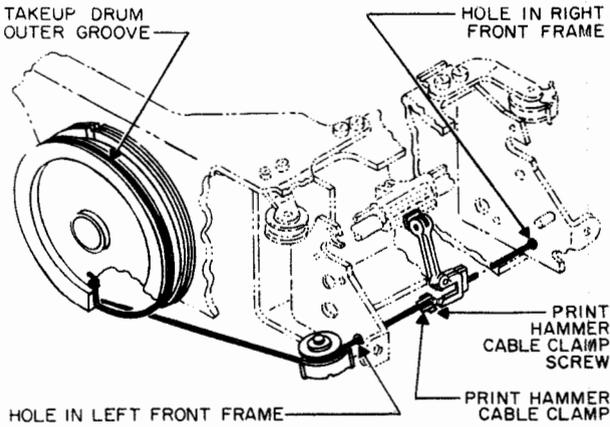


Figure 5-17. Print Hammer Cable Installation, Cable Threading Diagram

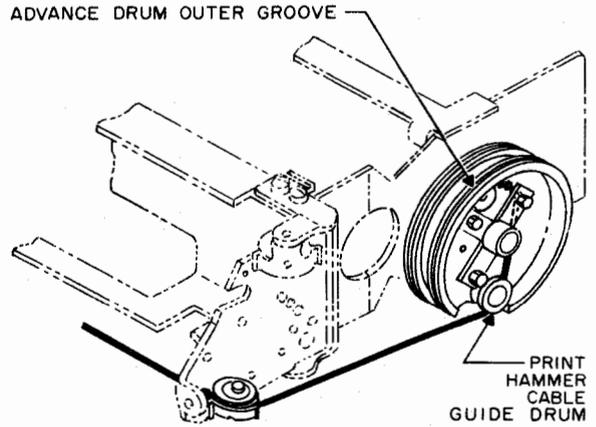


Figure 5-18. Print Hammer Cable Installation, Securing Cable to Advance Drum

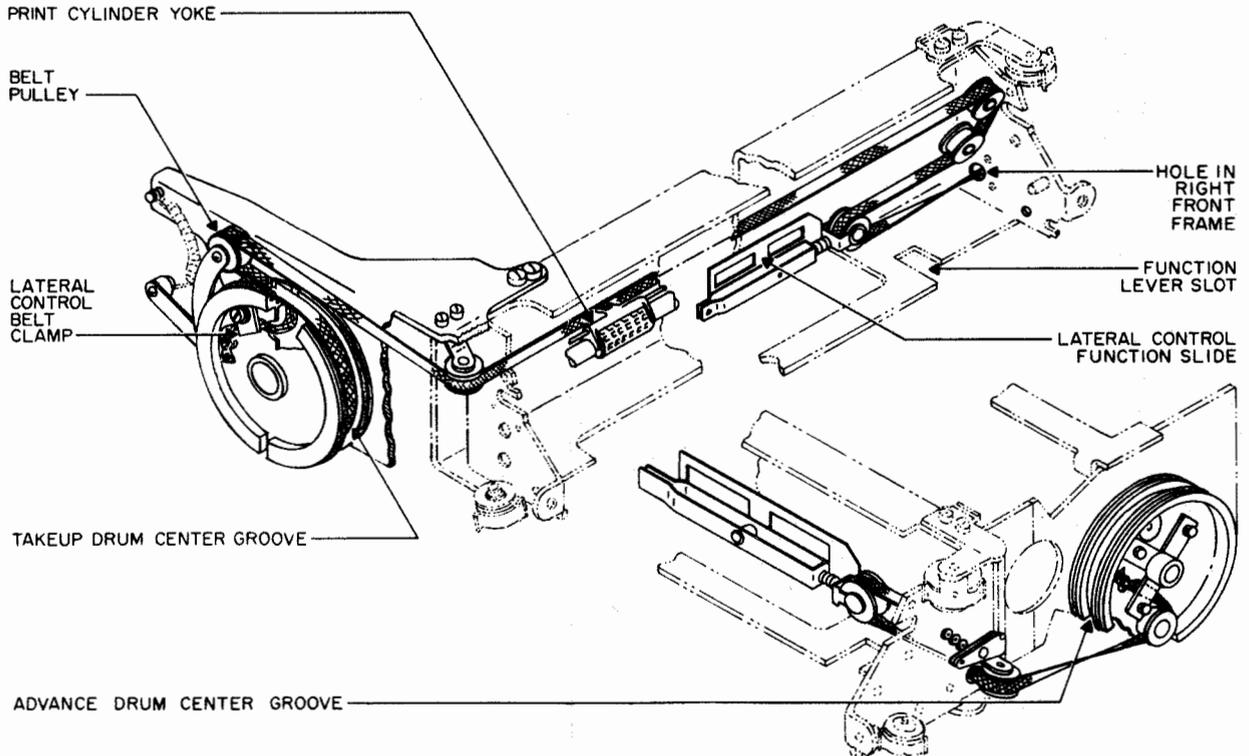
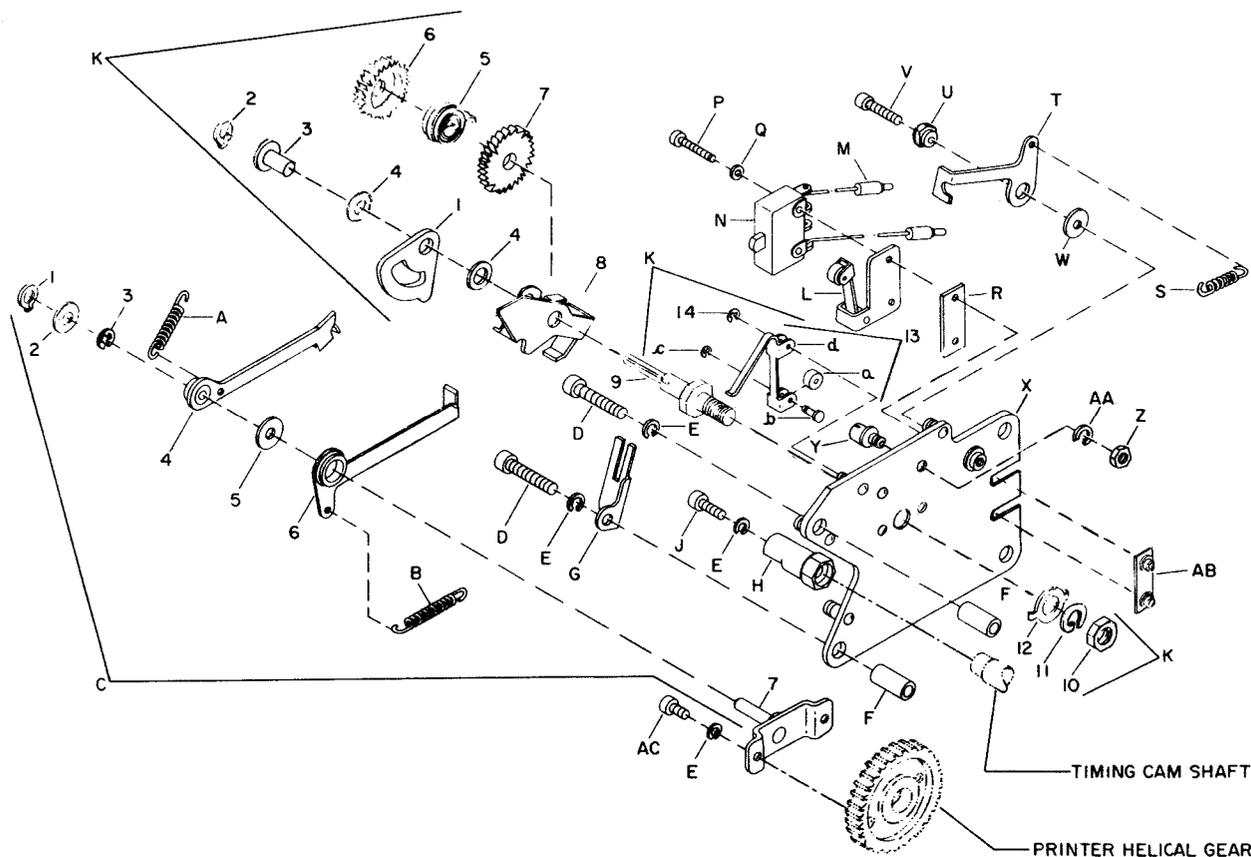
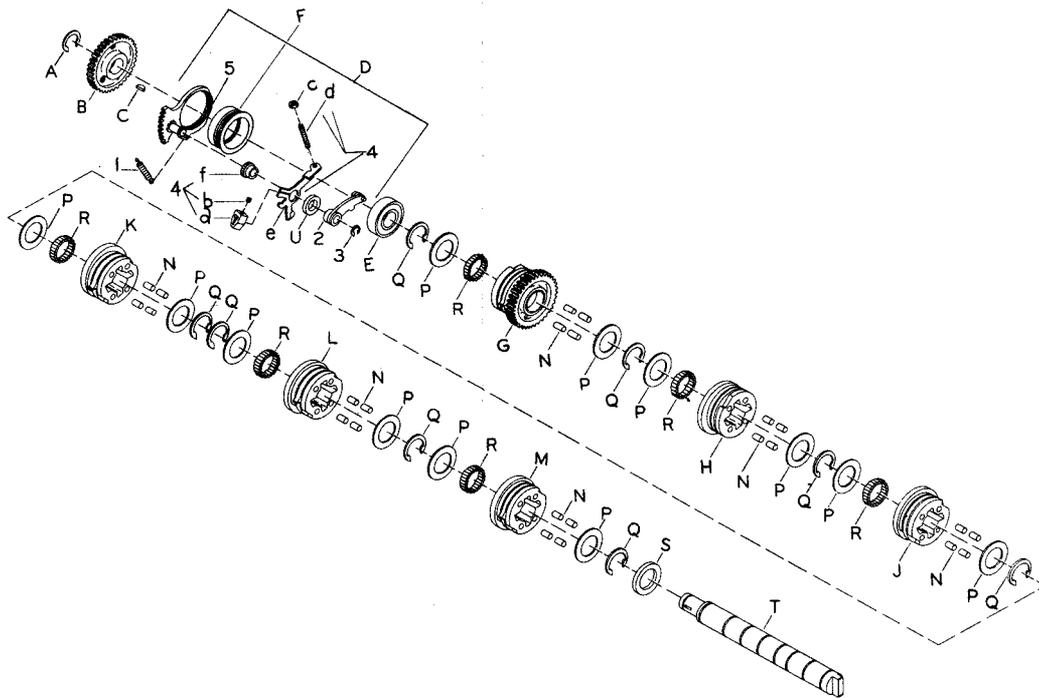


Figure 5-19. Lateral Control Belt Installation, Belt Threading Diagram



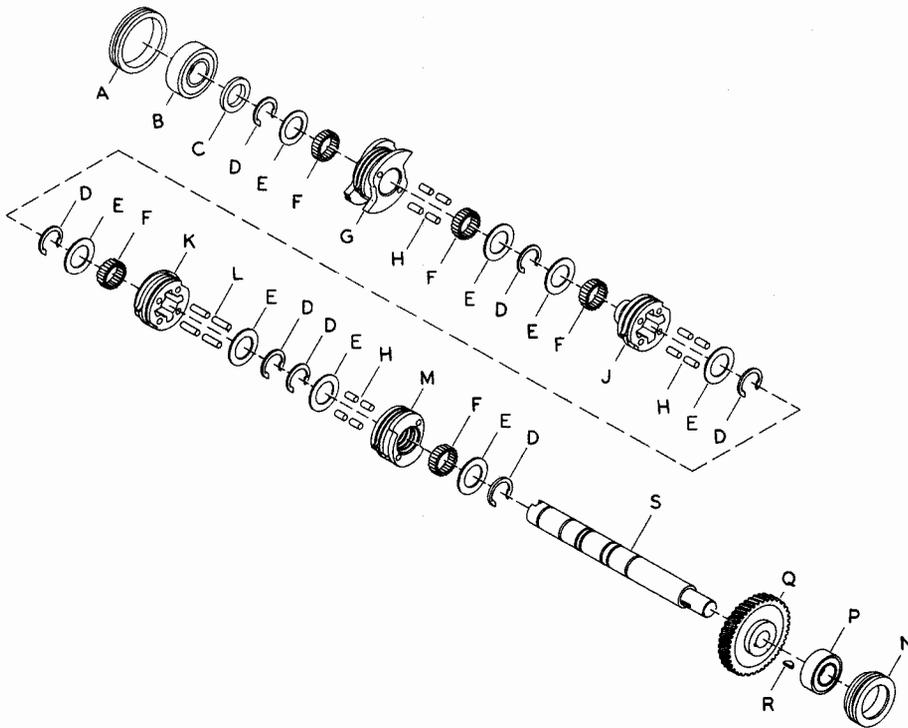
KEY	ITEM	ITEM NO.		
A	Spring, Time Delay Check Pawl Helical	001102	3	Sleeve
B	Spring, Time Delay Feed Pawl Helical	001103	4	Shim
C	Motor Stop Assembly, Feed Mechanism and	001104	5	Spring, Return Spiral
1	Ring, Retaining	001105	6	Ratchet, Advance
2	Washer, Felt	001106	7	Ratchet, Reduction
3	Ring, Retaining	001107	8	Yoke
4	Pawl Assembly, Time Delay Check	001108	9	Shaft, Ratchet Support
5	Spacer, Sleeve	001109	10	Nut, Lock
6	Pawl Assembly, Time Delay Feed	001110	11	Washer, Lock
7	Adapter Assembly, Main Shaft Drive	001111	12	Lock, Ratchet Support Shaft
D	Screw	001112	13	Spring Assembly, Detent
E	Washer, Lock	001113	a	Roller
F	Spacer, Sleeve	001114	b	Pin
G	Guide, Time Delay Feed and Check Pawl	001115	c	Ring, Retaining
H	Extension, Timing Cam Shaft	001118	d	Spring
J	Screw	001119	14	Ring, Retaining
K	Plate Assembly, Time Delay	001124	L	Actuator, Time Delay Switch
1	Latch	001125	M	Probe, Time Delay Switch
2	Ring	001126	N	Switch, Time Delay
			P	Screw
			Q	Washer
			R	Spacer
			S	Spring, Time Delay Secondary Check Pawl
			T	Pawl, Time Delay Secondary Check
			U	Eccentric, Time Delay Secondary Check Pawl
			V	Screw
			W	Spacer
			X	Plate Assembly, Time Delay Mounting Base
			Y	Post
			Z	Nut, Plain Hex
			AA	Washer, Lock
			AB	Plate, Nut
			AC	Screw

Figure 5-20 Automatic Time Delay Motor Stop Assembly
SL-4-03315 Figure 20



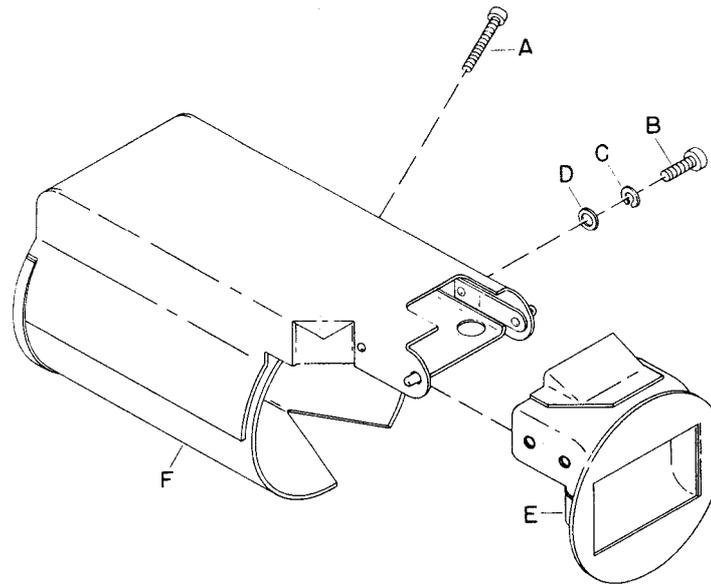
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Ring, Retaining	001559	F	Retainer, Left-Hand Bearing	001576
B	Gear, Printer Helical	001560	G	Clutch Assembly, A Cam and Start	001580
C	Key, Woodruff	001561	H	Clutch, B Cam and Lateral No. 3	001586
D	Retainer Assembly, Start Clutch Release	001562	J	Clutch, C Cam and Lateral No. 4	001592
1	Spring, Backstop Lever	001563	K	Clutch, D Cam and Lateral No. 5	001598
2	Latch	001564	L	Clutch, E Cam and Rotary No. 2	001604
3	Ring, Retaining	001565	M	Clutch, F Cam and Rotary No. 1	001610
4	Lever Assembly, Backstop	001566	N	Roller	001611
a	Clamp	001567	P	Washer	001612
b	Screw, Clamp	001568	Q	Ring, Retaining	001595
c	Nut, Lock	001569	R	Roller, Needle Bearing	001597
d	Setscrew, Start Clutch Release Adjustment	001570	S	Spacer	001614
e	Lever, Start Clutch Backstop	001571	T	Shaft, Selector Main	001615
f	Bushing, Start Clutch Backstop Eccentric	001572	U	Washer, Felt	
5	Adjustment Assembly, Range	001573			
E	Bearing, Left-Hand	001575			

Figure 5-21 Selector Main Shaft Assembly
SL-4-03315 Figure 28



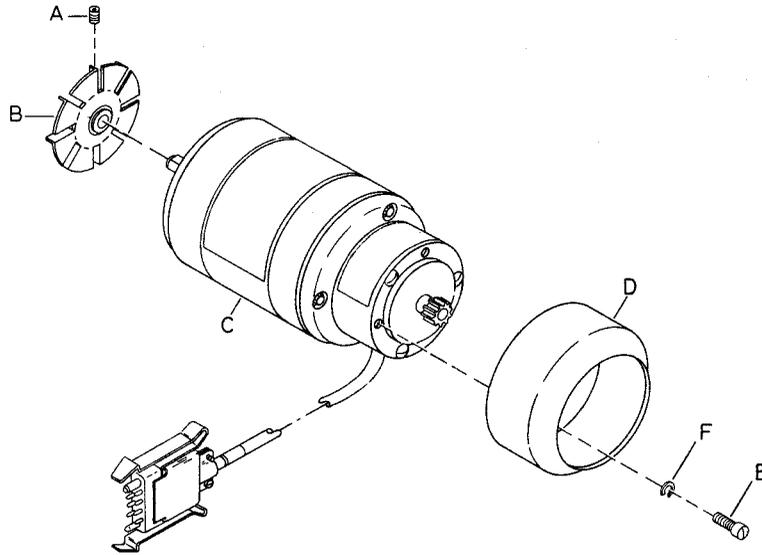
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Retainer, Center Bearing	001523	K	Clutch, J Cam, Letters and Figures	001542
B	Bearing, Center	001524	L	Roller	001543
C	Spacer	001525	M	Clutch, K Cam, Carriage Return	001548
D	Ring, Retaining	001526	N	Retainer, Right-Hand Bearing	001552
E	Washer, Flat	001527	P	Bearing, Right-Hand	001553
F	Roller, Needle Bearing	001528	Q	Gear, Third Reduction	001554
G	Clutch, G and H Cam, Print Function	001529	R	Key, Third Reduction Gear	001556
H	Roller	001530	S	Shaft, Function Main	001557
J	Clutch, I Cam, Line Feed	001536			

Figure 5-22 Function Main Shaft Assembly
SL-4-03315 Figure 27



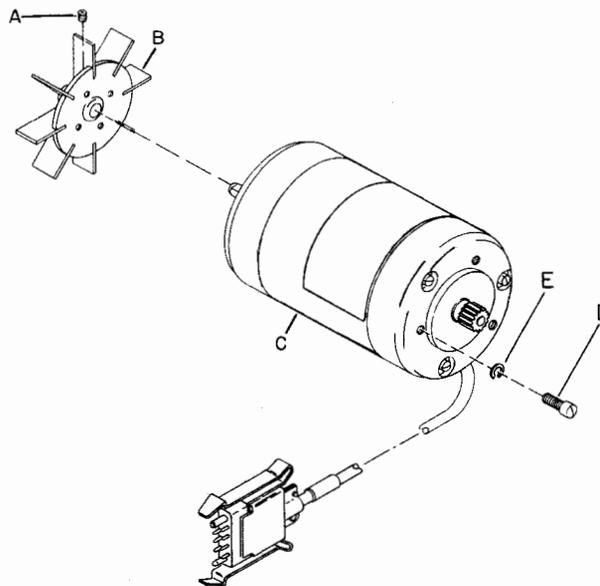
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Screw, Machine (Clamping)	001160	D	Washer	001163
B	Screw, Machine (Mounting)	001161	E	Outlet, Cooling	001164
C	Washer, Lock	001162	F	Housing, Cooling	001165

Figure 5-23 Fan Outlet Duct Assembly
SL-4-03315 Figure 21



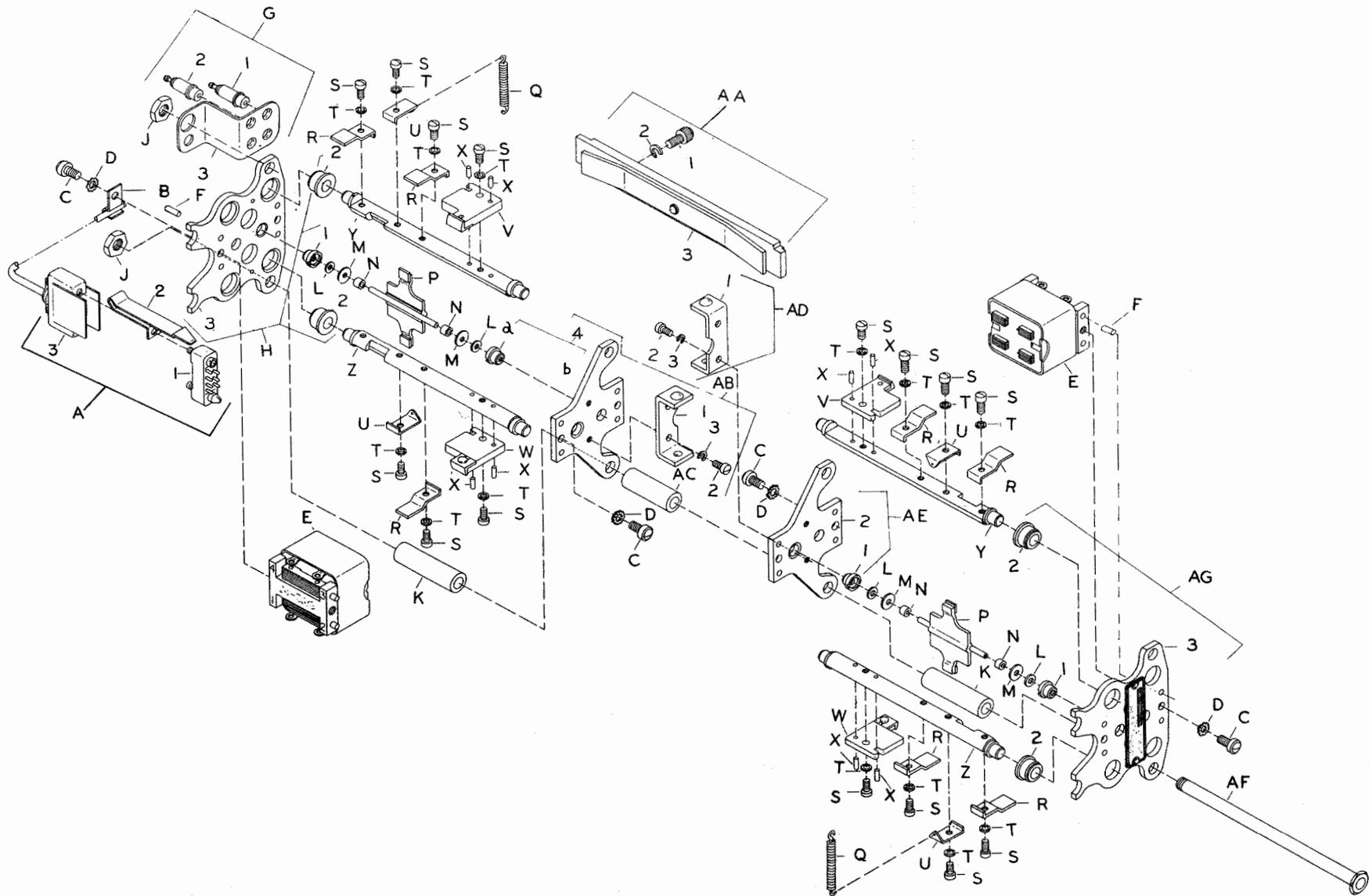
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Setscrew, Motor Fan	001769	D	Cover, Motor	001772
B	Fan, Motor	001770	E	Screw	
C	Gear Head Assembly, Motor and	001771	F	Washer, Lock	

Figure 5-24 Motor (400-Cycle) And Gearhead Assembly
SL-4-03315 Figure 34



KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Setscrew, Motor Fan	001774	D	Screw	
B	Fan, Motor	001775	E	Washer, Lock	
C	Assembly, Motor and Connector	001776			

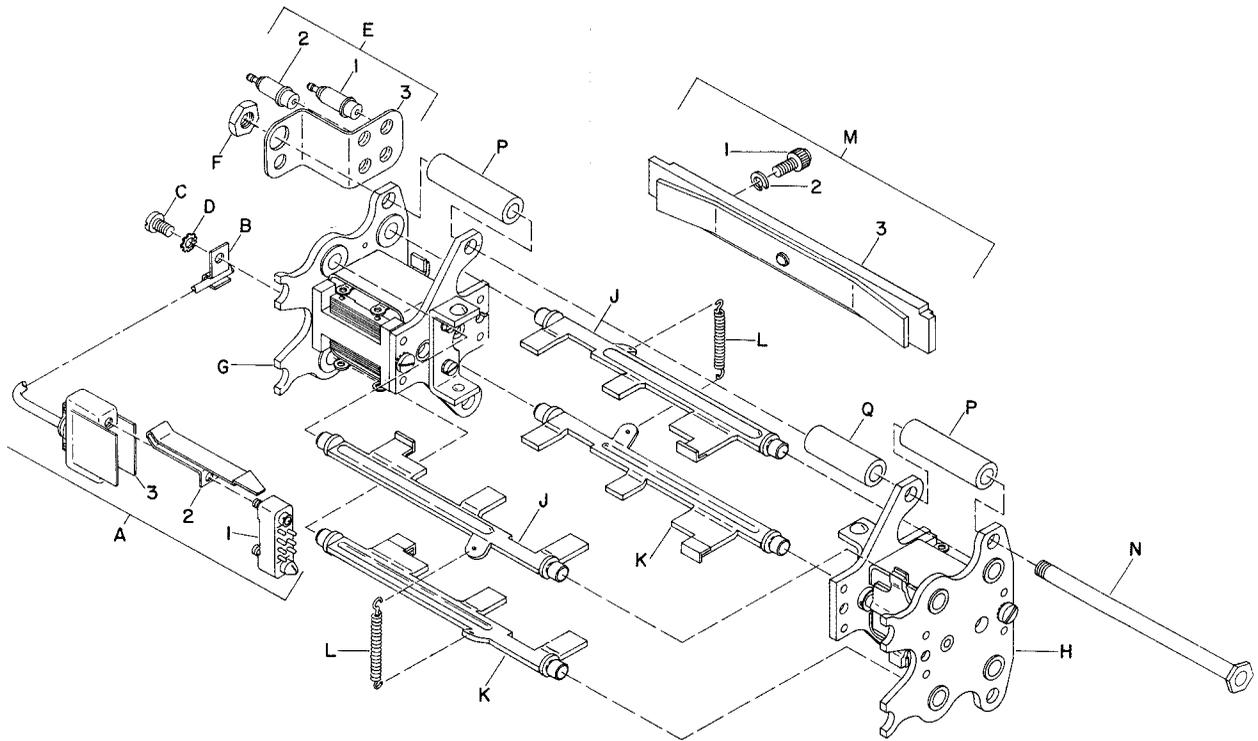
Figure 5-25 Motor (60-Cycle) Assembly
SL-4-03315 Figure 35



1	Bearing, Armature Shaft	001183
2	Bearing, Shaft	001184
3	Plate	001185
J	Nut	001182
K	Spacer, Outer Frame Plate	001186
L	Washer, Lubricating Wick Non-Metallic	001187
M	Retainer, Lubricating Wick	001188
N	Spacer, Armature Shaft	001189
P	Armature	001190
Q	Spring, Selector Shaft Bias	001191
R	Latch	001196
S	Screw, Machine	001197
T	Washer, Lock	001198
U	Arm, Selector Shaft Bias	001199
	Spring	
V	Latch, Armature Mark Paddle	001193
W	Latch, Armature Space Paddle	001195
X	Pin, Straight	001200
Y	Shaft, Selector Mark	001192
Z	Shaft, Selector Space	001194
AA	Lock Assembly	001201
1	Screw, Machine	001202
2	Washer, Lock	001203
3	Bar	001204
AB	Plate Assembly, Left-Hand Inner	001205
1	Bar, Stop	001206
2	Screw	001207
3	Washer, Lock	001208
4	Bearing Assembly	001209
a	Bearing, Armature Shaft	001210
b	Plate	001211
AC	Spacer, Inner Frame Plate	001212
AD	Plate Assembly, Right-Hand Inner	001213
1	Bar, Stop	001217
2	Screw	001218
3	Washer, Lock	001219
AE	Bearing Assembly, Right-Hand Inner Plate	001220
1	Bearing, Armature Shaft	001221
2	Plate	001222
AF	Stud, Selector Tie Rod	001228
AG	Bearing Assembly, Right-Hand Outer Frame Plate	001236
1	Bearing, Armature Shaft	001237
2	Bearing, Shaft	001239
3	Plate	001238

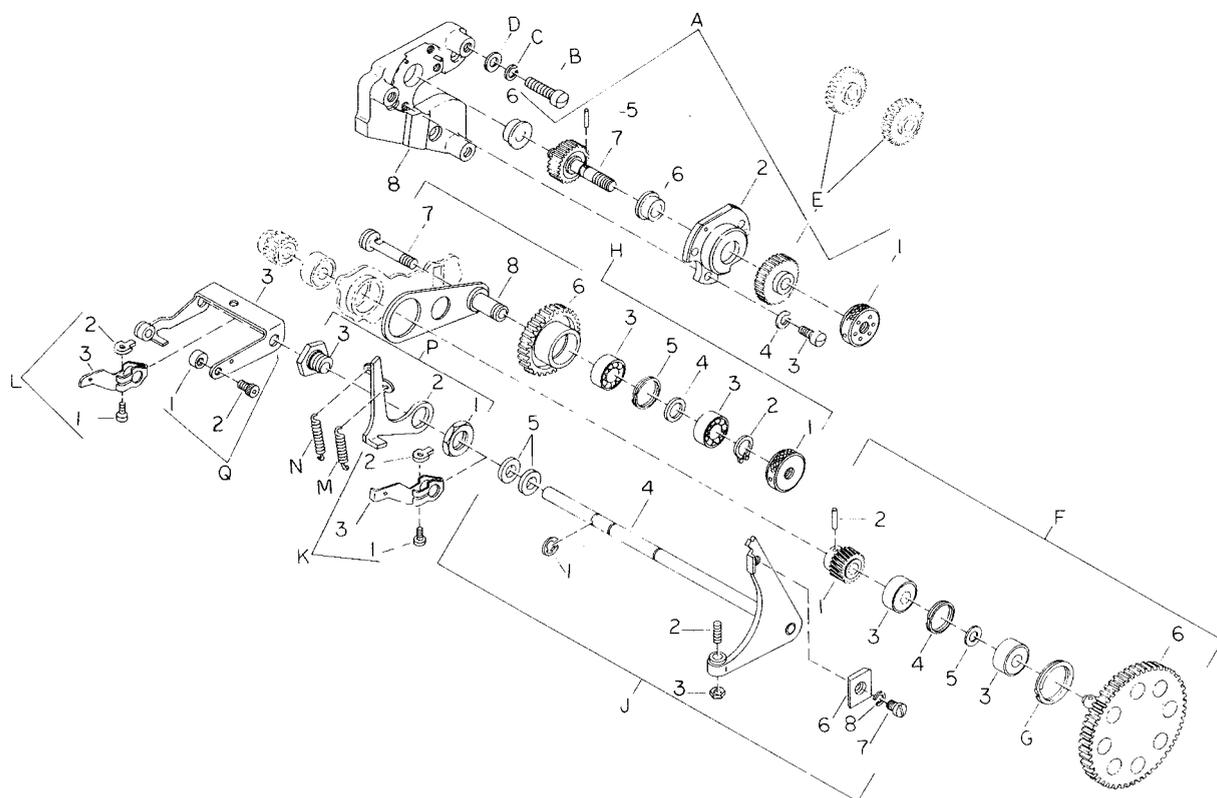
KEY	ITEM	ITEM NO.
A	Connector Assembly, Cable	001167
1	Connector	001168
2	Lock	001169
3	Hood	001170
B	Bracket, Cable Strain Relief	001171
C	Screw	001172
D	Washer, Lock	001173
E	Magnet Assembly, Selector	001174
F	Pin	001175
G	Plate Assembly, Terminal	001177
1	Terminal	001178
2	Terminal	001180
3	Plate	001179
H	Bearing Assembly, Left-Hand Outer Frame Plate	001181

Figure 5-26 Selector Assembly (AN/TGC-14(V) Only)
SL-4-03315 Figure 22



KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Connector Assembly, Cable	001241	H	Frame Assembly, Right-Hand	
1	Connector	001242		Magnet	001254
2	Lock	001243	J	Shaft, Selector Mark	
3	Hood	001244		Latch	001256
B	Bracket, Cable Strain Relief	001245	K	Shaft, Selector Space	
C	Screw	001246		Latch	001255
D	Washer, Lock	001247	L	Spring, Selector Shaft Bias	
E	Plate Assembly, Terminal	001248	M	Lock Assembly	001258
1	Terminal	001250	1	Screw	001259
2	Terminal	001251	2	Washer	001260
3	Plate	001249	3	Bar	001261
F	Nut	001252	N	Stud, Selector Tie Rod	001262
G	Frame Assembly, Left-Hand		P	Spacer, Outer Frame Plate	001263
	Magnet	001253	Q	Spacer, Inner Frame Plate	001264

Figure 5-27 Selector Assembly (AN/TGC-14A(V) Only)
SL-4-03315 Figure 23



KEY	ITEM	ITEM NO.			
A	Mount Assembly, Motor	001266			
1	Nut, Lock	001270			
2	Cup, Bearing	001271			
3	Screw	001272			
4	Washer, Lock	001273			
5	Pin	001274			
6	Bearing	001277			
7	Gear, First Reduction	001276			
8	Plate, Motor Mounting	001270			
B	Screw	001267			
C	Washer, Lock	001268			
D	Washer	001269			
E	Gear, Speed Change	001278			
F	Pinion Assembly, Third Reduction				
1	Pinion, Third Reduction	001281			
2	Pin	001283			
3	Bearing	001284			
4	Ring	001285			
5	Spacer	001286			
6	Gear, Second Reduction	001287			
G	Ring	001288			
H	Ring	001290			
H	Gear Assembly, Idler	001291			
1	Nut, Lock	001292			
2	Ring	001293			
3	Bearing	001294			
4	Spacer	001295			
5	Ring	001296			
6	Gear, Idler	001298			
7	Stud	001299			
8	Arm Assembly, Idler Gear	001300			
J	V Lever Assembly	001301			
1	Ring, Retaining (4)	001302			
2	Screw, First Character Adjustment	001303			
3	Nut, Anti-Turn	001304			
4	Shaft	001305			
5	Washer, Felt	001306			
6	Stop, 72 Character	001307			
7	Screw	001308			
8	Washer, Lock				
K	Arm Assembly, Lock Lever Actuator	001309			
1	Screw	001310			
2	Nut, Anti-Turn	001311			
3	Arm, Lock Lever Actuator				
L	Arm Assembly, Automatic Carriage Return and Line Feed Actuator	001312			
1	Screw	001315			
2	Nut, Anti-Turn	001316			
3	Arm, Automatic Carriage Return and Line Feed Actuator	001317			
M	Spring, Lock Lever Actuator Arm Helical	001318			
N	Spring, Automatic Carriage Return and Line Feed Bail Actuator Helical	000256			
P	Lock Lever Assembly, Carriage Return	001322			
1	Nut, Plain Hex	001323			
2	Lock Lever	001324			
3	Bushing, Eccentric	001325			
Q	Actuator Assembly, Automatic Carriage Return and Line Feed Bail Eccentric, Bail (Carriage Return)	001326			
1	Screw	001327			
2	Screw	001328			
3	Actuator	001329			
		001330			

Figure 5-28 Gear Train, Automatic Carriage Return,
And Line Feed Assembly

SL-4-03315 Figure 24

ORIGINAL

A-123/A-124

KEY	ITEM	ITEM NO.			
			3	Arm Assembly, Torque Tube	001388
			a	Roller	001389
			b	Ring, Retaining	001390
			c	Actuator, Line Feed Torque Tube	001391
			W	Washer, Felt	001392
			X	Wick, Function Timing Cam	001393
			Y	Spring, Print and Function Clutch Release Arm	001394
			Z	Release Assembly, Print and Function Clutch	001395
A	Spring, Clutch Backstop	001332	1	Spring, Safety	001397
B	Backstop Assembly, Clutch	001333	2	Ring, Retaining	001398
1	Bushing, Eccentric	001335	3	Finger, Space Clutch Release	001399
2	Clamp	001336	4	Arm, Print Function Clutch Release	001400
3	Screw, Clamp	001337	AA	Release Assembly, Space No. 1 and 5 Clutch	001402
4	Lever	001338	1	Spring, Safety	001403
C	Ring, Retaining	001334	2	Screw, Clutch Release Finger Adjustment	001404
D	Shaft, Backstop	001339	3	Nut, Lock	001405
E	Washer, Felt	001340	4	Ring, Retaining	001406
F	Spring, Inter-Arm	001341	5	Finger	001407
G	Spring, Line Feed Pawl	001342	6	Arm, No. 1 and 5 Space Clutch Release	001408
H	Ring, Retaining	001343	AB	Release Assembly, Space No. 2 and 4 Clutch	001409
J	Ring, Retaining	001344	1	Spring, Safety	001410
K	Link, Line Feed Motion Amplify	001345	2	Screw, Clutch Release Finger Adjustment	001411
L	Pawl, Line Feed	001346	3	Nut, Lock	001412
M	Follower Assembly, Letters Figures Cam	001347	4	Ring, Retaining	001413
1	Lever, Bell Prevent	001349	5	Finger	001414
2	Screw	001351	6	Arm, No. 2 and 4 Space Clutch Release	001415
3	Washer	001352	AC	Release Assembly, Space No. 3 Clutch	001433
4	Follower, Letter Figures Pulley Carriage Actuator and Cam	001353	1	Spring, Safety	001434
5	Screw	001355	2	Screw, Clutch Release Finger Adjustment	001435
6	Washer	001356	3	Nut, Lock	001436
7	Nut	001357	4	Ring, Retaining	001437
8	Screw, Letters Figures Arm Adjustment	001358	5	Finger	001438
9	Nut	001359	6	Arm, No. 3 Space Clutch Release	001439
N	Washer, Felt		AD	Wick, Timing Cam	001441
P	Release Assemblies, Mark No. 1, 2, 4 and 5 Clutch	001362	AE	Shaft, Space Clutch Release Selector	001443
1	Screw, Clutch Release Finger Adjustment	001363	AF	Shaft Assembly, Timing Cam	001444
2	Nut, Lock	001364	1	Ring, Bowed Retaining	001445
3	Spring, Safety	001365	2	Cam, Function Clutch Release	001446
4	Ring, Retaining	001366	3	Key	001447
5	Finger, Mark Clutch Release	001367	4	Spacer	001448
6	Arm Assembly, Mark Clutch Release	001368	5	Bearing	001449
Q	Follower, Type Positioning Cam	001369	6	Ring	001450
R	Washer, Felt	001370	7	Cam, Timing	001451
S	Release Assembly, Mark No.3 Clutch	001371	8	Spring	001453
1	Screw, Clutch Release Finger Adjustment	001372	9	Spacer	001454
2	Nut, Lock	001373	10	Gear, Timing Cam Shaft	001455
3	Spring, Safety	001374	11	Ring, Retaining	001457
4	Ring, Retaining	001375	12	Retainer, Bearing	001458
5	Finger, Mark Clutch Release	001376	13	Bearing	001459
6	Arm Assembly, Mark Clutch Release	001377	14	Shaft, Timing Cam	001460
T	Arm Assembly, Start Clutch Release	001378	AG	Secondary No. 3 Cam Follower	001461
1	Screw, Start Clutch Release Arm Adjustment	001379			
2	Nut, Lock	001380			
3	Arm, Start Clutch Release	001381			
U	Shaft, Mark Clutch Release Selector	001383			
V	Actuator Assembly, Line Feed	001384			
1	Arm, Line Feed Cam Follower	001386			
2	Screw, Clamping	001387			

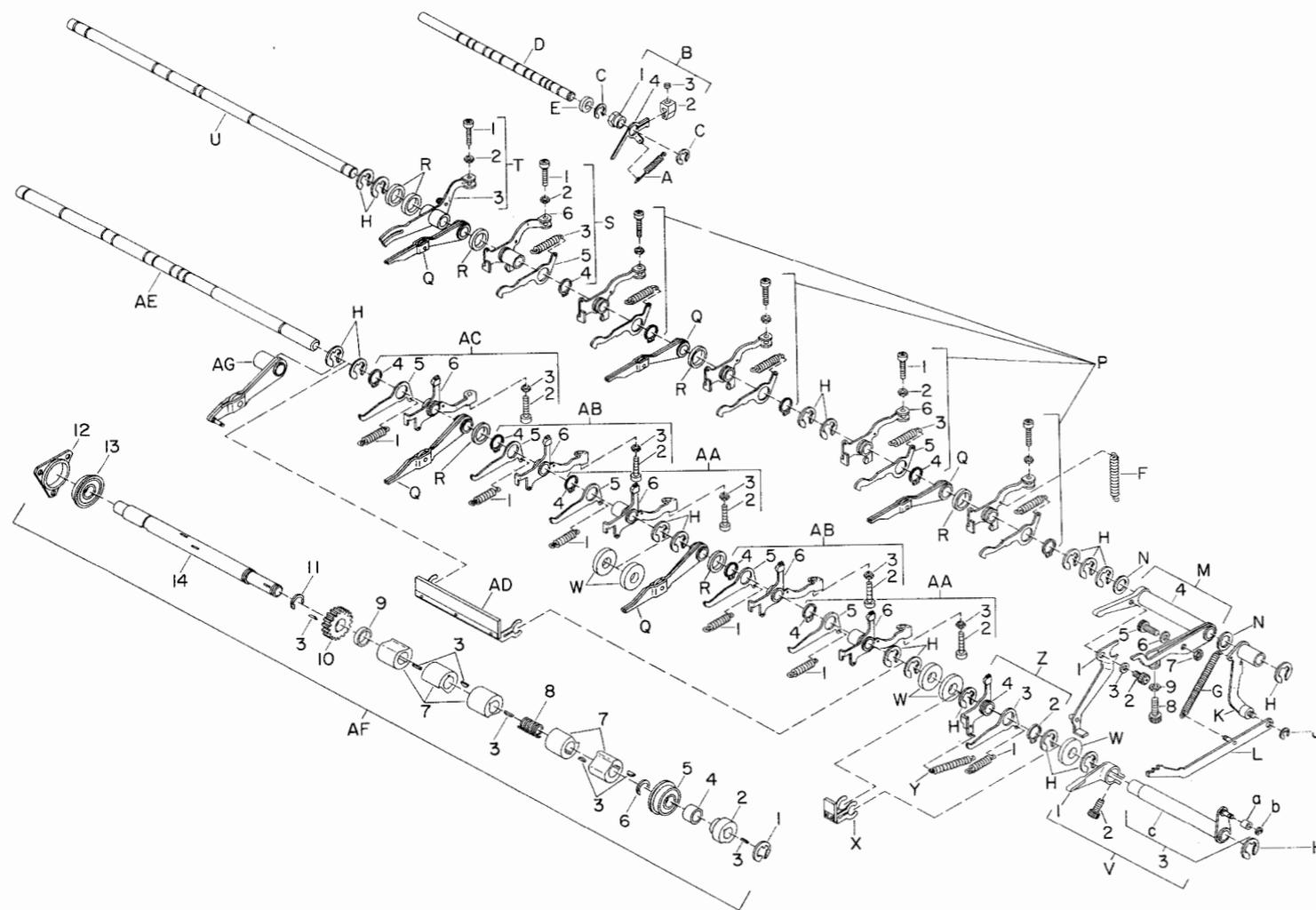
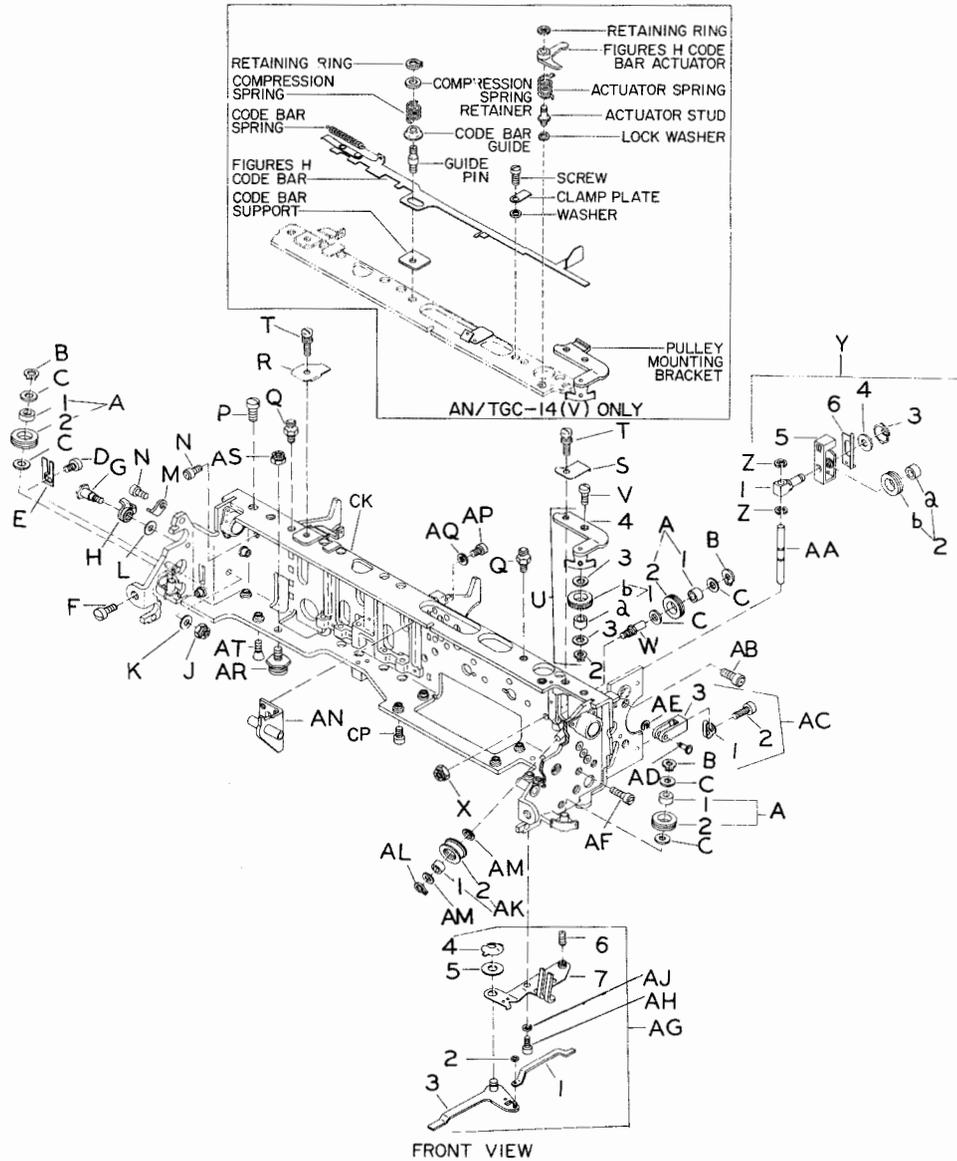
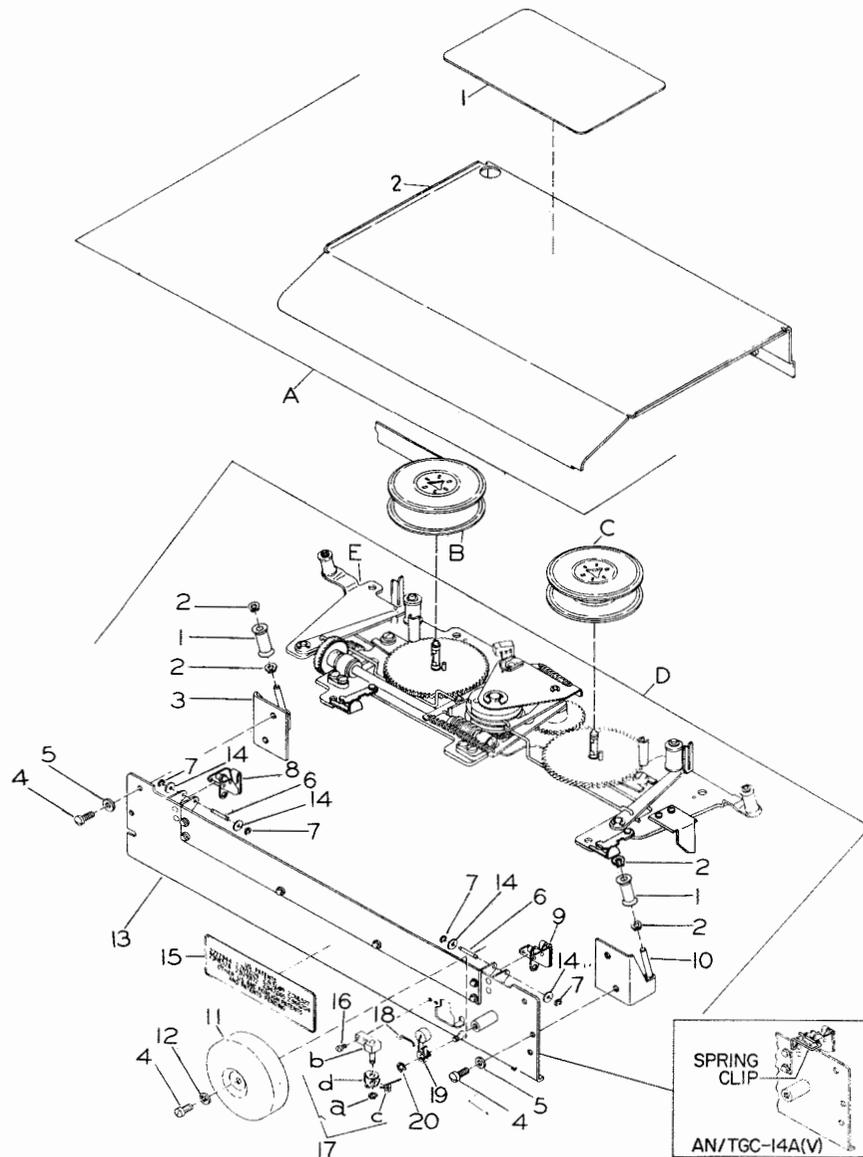


Figure 5-29 Mark and Space Clutch Release Shaft, Timing Cam Shaft, And Backstop Shaft Assembly



KEY	ITEM	ITEM NO.		
A	Pulley Assembly	000937		
1	Bearing	000939		
2	Pulley	000940		
B	Ring, Retaining	000938		
C	Spacer, Sleeve	000941		
D	Screw, Machine	000942		
E	Bracket, Print Hammer Actuator			
	Link Guide	000943		
F	Screw, Machine	000944		
G	Shaft, Print Hammer Release	000945		
H	Release, Print Hammer	000946		
J	Nut, Self-Locking	000947		
K	Washer, Flat	000948		
L	Washer	000949		
M	Lever, Print Hammer Release			
	Stop	000950		
N	Screw	000951		
P	Screw, Machine	000952		
Q	Pin, Paper Guide Retaining	000953		
R	Cover, Left-Hand Guide	000954		
S	Cover, Right-Hand Guide	000955		
T	Screw	000956		
U	Bracket Assembly, Return Cable			
	Pulley	000977		
1	Pulley Assembly	000978		
a	Bearing	000981		
b	Pulley	000982		
2	Ring, Retaining	000980		
3	Spacer, Sleeve	000983		
4	Bracket	000984		
V	Screw	000978		
W	Pin	000985		
X	Nut	000986		
Y	Pulley Assembly, Letters			
	Figures Carriage	000987		
1	Rod	000989		
2	Pulley Assembly	000990		
a	Bearing	000991		
b	Pulley	000992		
3	Ring, Retaining	000993		
4	Spacer, Sleeve	000994		
5	Carriage, Pulley	000995		
6	Clip, Spring	000996		
Z	Ring, Retaining	000988		
AA	Pin, Straight	000997		
AB	Screw	000998		
AC	Clamp Assembly, Frame			
	(Bottom)	000999		
1	Pad	001002		
2	Screw	001003		
3	Clamp, Frame	001004		
AD	Pivot, Clamp	001000		
AE	Ring, Retaining	001001		
AF	Screw	001005		
AG	Arm Assembly, Line Feed			
	Spacing	001006		
1	Shift, Line Feed	001009		
2	Ring, Retaining	001010		
3	Arm, Line Feed			
	Shift	001011		
4	Ring	001012		
5	Washer	001013		
6	Screw, Shift Lever			
	Adjustment	001014		
7	Bracket, Shift	001015		
AH	Screw	001007		
AJ	Washer, Lock	001008		
AK	Pulley Assembly, Lateral			
	Control Belt	001016		
1	Bearing	001018		
2	Pulley	001019		
AL	Ring, Retaining	001017		
AM	Spacer, Sleeve	001020		
AN	Bracket Assembly, Print Lever			
	and Character Advance Lever			
	Shaft Support	001021		
AP	Screw, Machine	001022		
AQ	Washer, Lock	001023		
AR	Locator, Printer Electrical			
	Chassis	001024		
AS	Nut, Lock	001025		
AT	Screw, Machine	001026		
CK	Frame Assembly, Front			
	(For Reference Only)	001097		
CP	Screw			

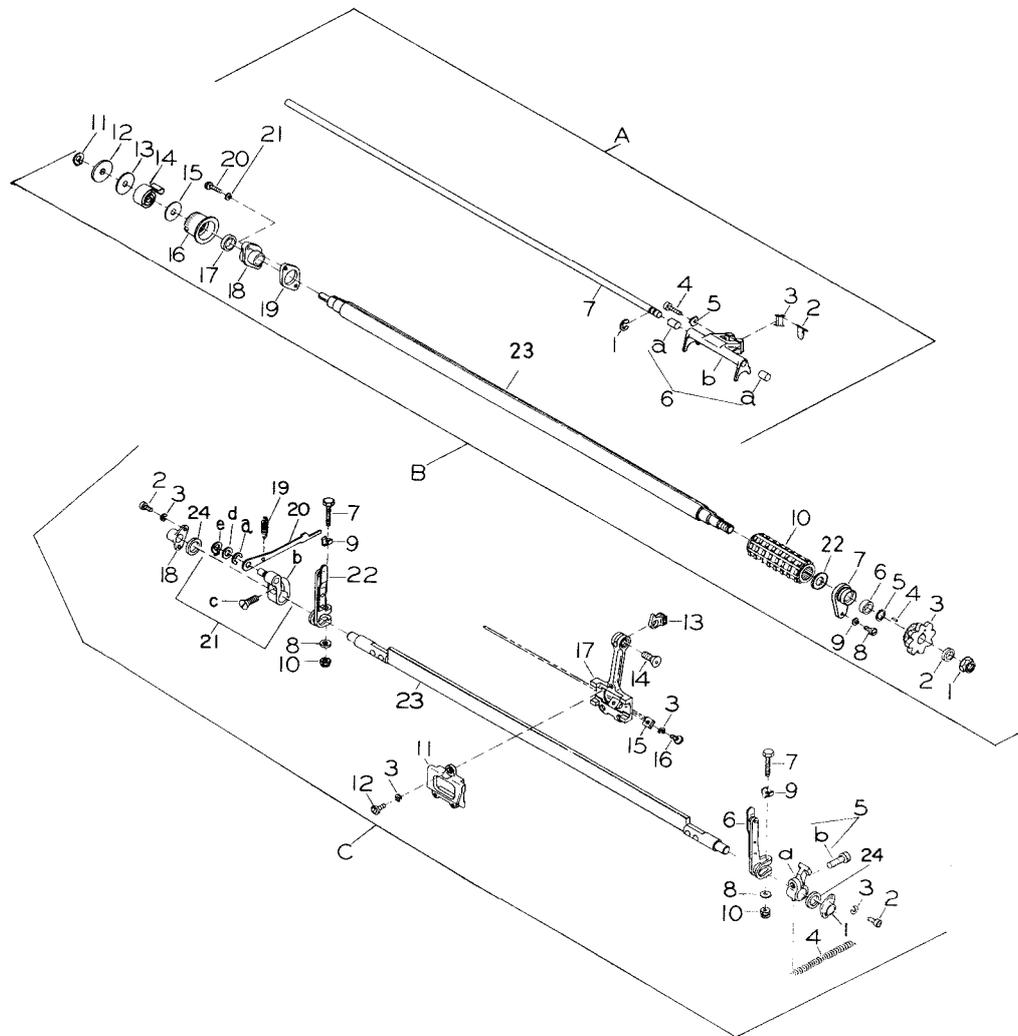
Figure 5-31 Front Frame Assembly (Front View)
SL-4-03315 Figure 18



KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Guide Assembly, Paper	000377	11	Bell	000399
1	Diagram, Ribbon Threading	000378	12	Washer, Lock	000400
2	Guide	000379	13	Plate Assembly, Front	000401
B	Ribbon and Spool	000380	*14	Washer, Felt	000391
C	Spool, Ribbon	000381	15	Plate, Patent	000402
D	Plate Assembly, Ribbon Feed Front	000383	16	Screw, Machine	000407
1	Roller, Ribbon Guide	000384	17	Bracket Assembly, End of Line Bell	000406
2	Ring, Retaining	000385	a	Ring, Retaining	000408
3	Bracket, Left-Hand Ribbon Guide	000386	b	Bracket and Shaft Assembly	000411
4	Screw, Machine	000387	c	Spring, Torsion	000410
5	Washer, Flat	000388	d	Lever	000409
*6	Shaft, Ribbon Vibrator Pivot	000389	18	Link, Wire	000405
*7	Ring, Retaining	000390	19	Lever Assembly, End of Line Bell	000403
8	Guide Assembly, Left-Hand Ribbon Vibrator	000393	20	Ring, Retaining	000404
9	Guide Assembly, Right-Hand Ribbon Vibrator	000394	E	Plate Assembly, Ribbon Feed Top (See Figure 5-39, Appendix for Breakdown.)	
10	Bracket, Right-Hand Ribbon Guide	000396			

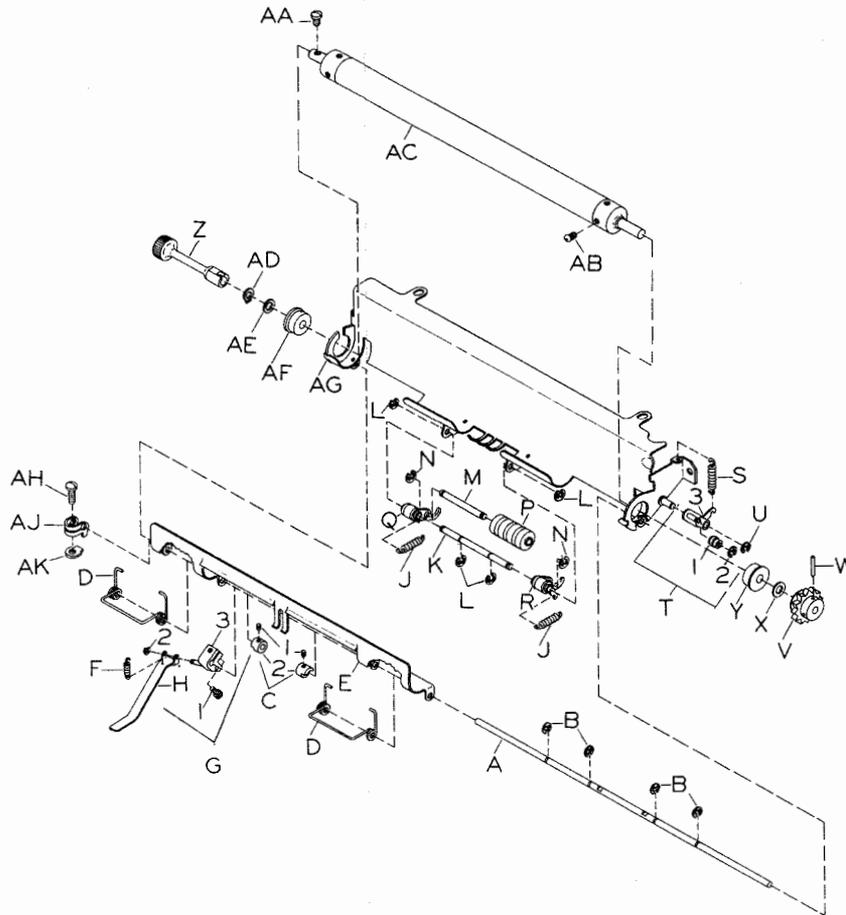
*Items 6, 7, and 14 are replaced by the new style clamp.
Refer to AN/TGC-14A(V) insert.

Figure 5-32 Ribbon Feed and Front Plate Assemblies
SL-4-03315 Figure 11



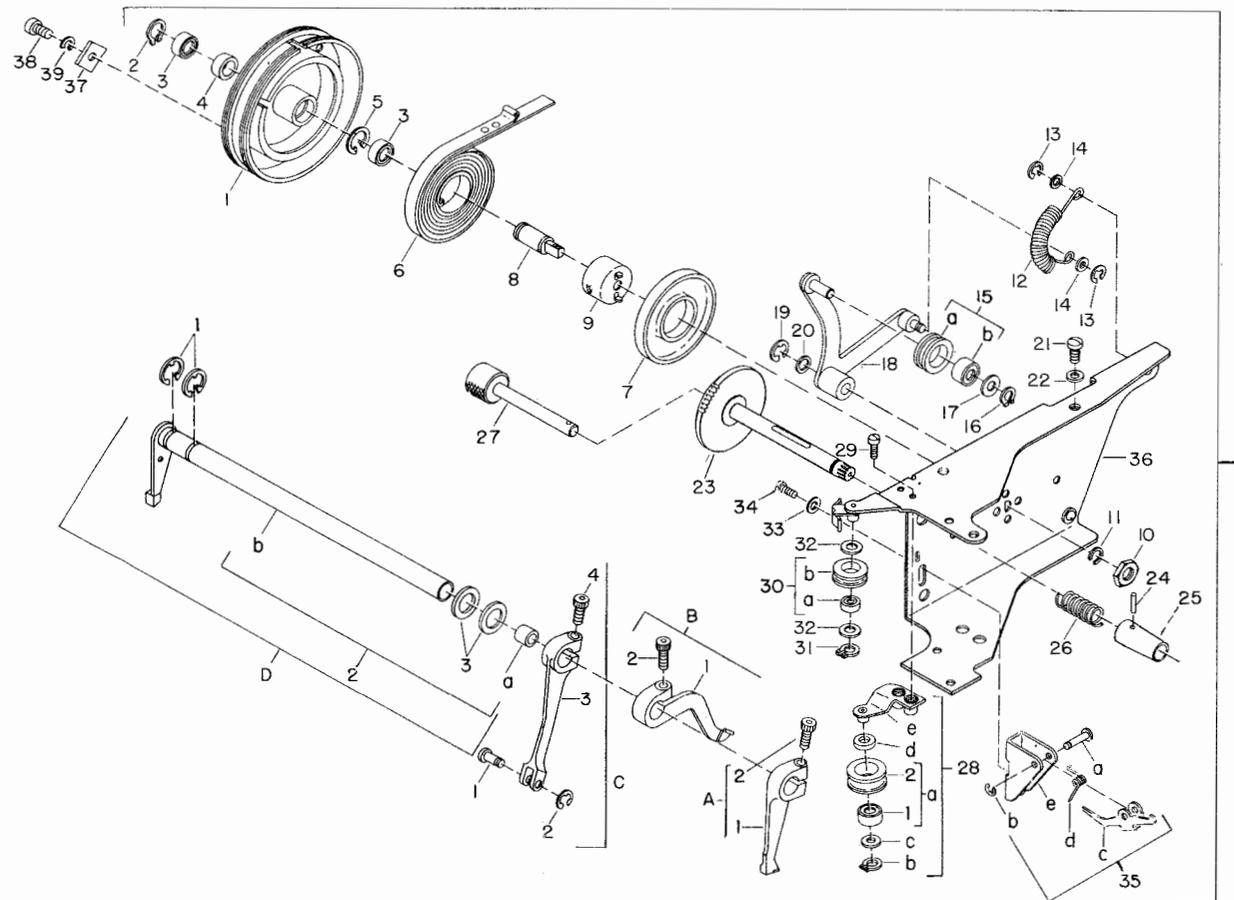
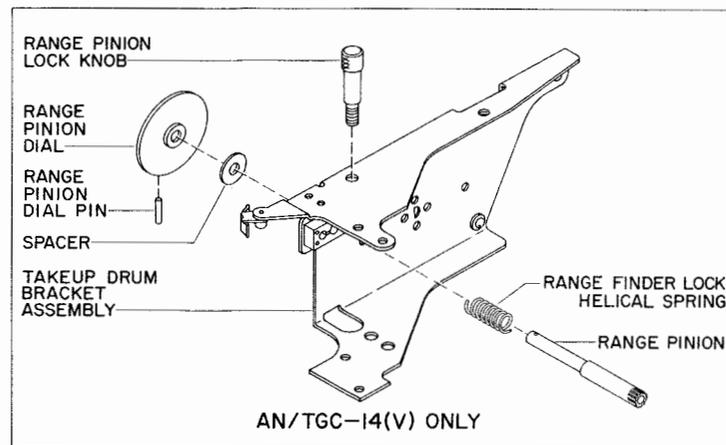
KEY	ITEM	ITEM NO.
A	Shaft Assembly, Print Cylinder Yoke	000498
1	Ring, Retaining	000499
2	Wedge, Belt Clamp	000500
3	Clamp, Belt	000501
4	Screw, Machine	000502
5	Lockstrip, Nylon	000503
6	Yoke Assembly, Print Cylinder	000504
a	Bushing	000505
b	Yoke	000506
7	Shaft, Print Cylinder Yoke	000507
B	Shaft Assembly, Print Cylinder	000508
1	Nut, Special	000509
2	Spacer, Sleeve	000510
3	Wheel, Index	000511
4	Key, Machine	000512
5	Spacer, Sleeve	000513
6	Bearing	000514
7	Retainer, Right-Hand Bearing	000515
8	Screw	000516
9	Washer, Lock	000517
10	Cylinder, Print	000519
11	Ring, Grip	000521
12	Washer, Rotary Motion Retaining	000522
13	Washer, Rotary Motion Spring Retaining Nylon	000523
14	Spring, Rotary Motion	000524
15	Washer, Rotary Motion Spring Housing Nylon	000525
16	Retainer, Rotary Motion Spring	000526
17	Bearing	000527
18	Retainer, Left-Hand Bearing	000528
19	Flange, Threading	000529
20	Screw	000530
21	Washer, Lock	000531
22	Washer	000532
23	Shaft, Print Cylinder	000520
C	Shaft Assembly, Print Hammer	000533
1	Bearing, Right-Hand	000534
2	Screw	000535
3	Washer, Lock	000536
4	Spring, Print Hammer Return	000537
5	Stop Assembly, Print Hammer Shaft	000538
a	Stop	000539
b	Screw	000540
6	Arm, Right-Hand Vibrator (Ribbon)	000541
7	Screw, Machine	000542
8	Washer	000543
9	Washer, Lock	000544
10	Nut, Lock	000545
11	Cap, Print Hammer	000546
12	Screw, Machine	000547
13	Pad, Print Hammer Face	000549
14	Screw, Print Hammer Face Pad Clamp	000550
15	Clamp, Print Hammer Cable	000551
16	Screw, Print Hammer Cable Clamp	000552
17	Hammer, Print	000554
18	Bearing, Left-Hand	000555
19	Spring, Print Hammer Actuator Link Helical	000558
20	Link, Print Hammer Actuator	000559
21	Lever Assembly, Print Hammer Actuator Link	000560
a	Ring, Retaining	000561
b	Lever	000562
c	Screw	000563
d	Washer, Felt	
e	Ring, Grip	
22	Arm, Left-Hand Vibrator (Ribbon)	000564
23	Shaft, Print Hammer	000569
24	Washer, Felt	

Figure 5-33 Print Hammer, Print Cylinder, And Print Cylinder Yoke Assembly
SL-4-03315 Figure 13



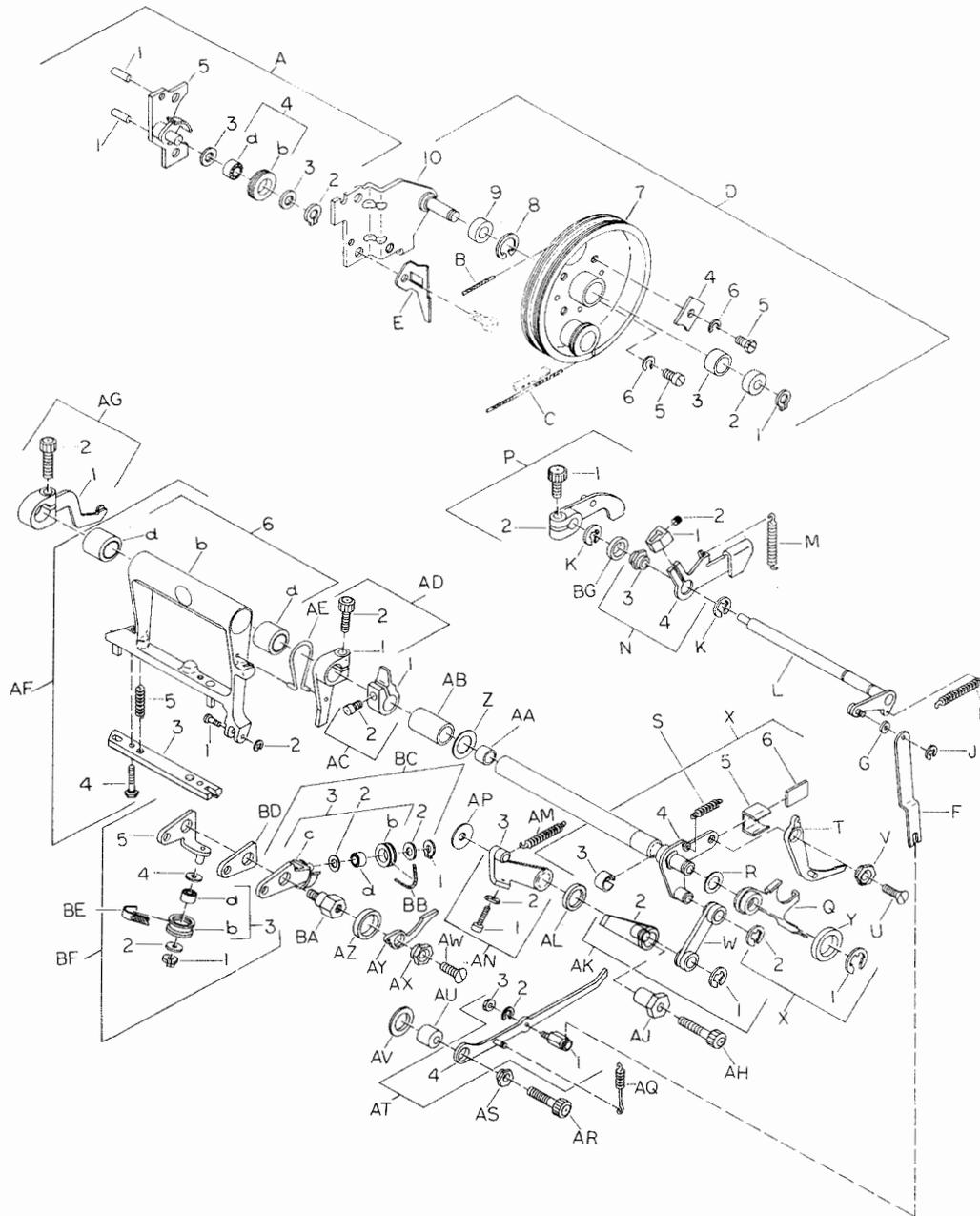
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Shaft, Paper Feed Pressure Release	000571	R	Arm, Right-Hand Pressure Roll Actuator	000591
B	Ring, Retaining	000572	S	Spring, Paper Feed Detent	000592
C	Cam Assembly, Pressure Release	000573	T	Backstop Assembly, Paper Feed Detent	000593
1	Setscrew, Pressure Release Cam	000574	1	Roller, Detent	000595
2	Cam, Pressure Release	000575	2	Ring, Retaining	000596
D	Spring, Pad	000576	3	Arm, Paper Feed Detent	000597
E	Pad, Pressure	000577	U	Ring, Retaining	000594
F	Spring, Paper Pressure Release Lever	000578	V	Ratchet, Paper Feed Detent and	000598
G	Clamp Assembly, Paper Pressure Release Lever Pivot	000579	W	Pin, Ratchet Roll	000599
1	Screw	000580	X	Washer, Lock	000600
2	Ring, Retaining	000581	Y	Bearing, Ball	000601
3	Clamp	000582	Z	Knob, Paper Feed	000602
H	Lever, Paper Pressure Release	000583	AA	Screw, Machine	000603
J	Spring, Pressure Roll	000584	AB	Sprocket, Paper Feed Tooth	000604
K	Shaft, Pressure Roll Pivot	000585	AC	Roll, Paper Feed Rubber	000605
L	Ring, Retaining	000586	AD	Ring, Grip	000606
M	Shaft, Pressure Roll	000587	AE	Washer	000607
N	Ring, Retaining	000588	AF	Bearing, Ball	000608
P	Roll, Pressure	000589	AG	Guide, Paper Feed	000609
Q	Arm, Left-Hand Pressure Roll Actuator	000590	AH	Screw, Machine	000610
			AJ	Arm, Paper Feed Stop	000611
			AK	Nut, Anti-Turn	000612

Figure 5-34 Paper Feed Assembly
SL-4-03315 Figure 14



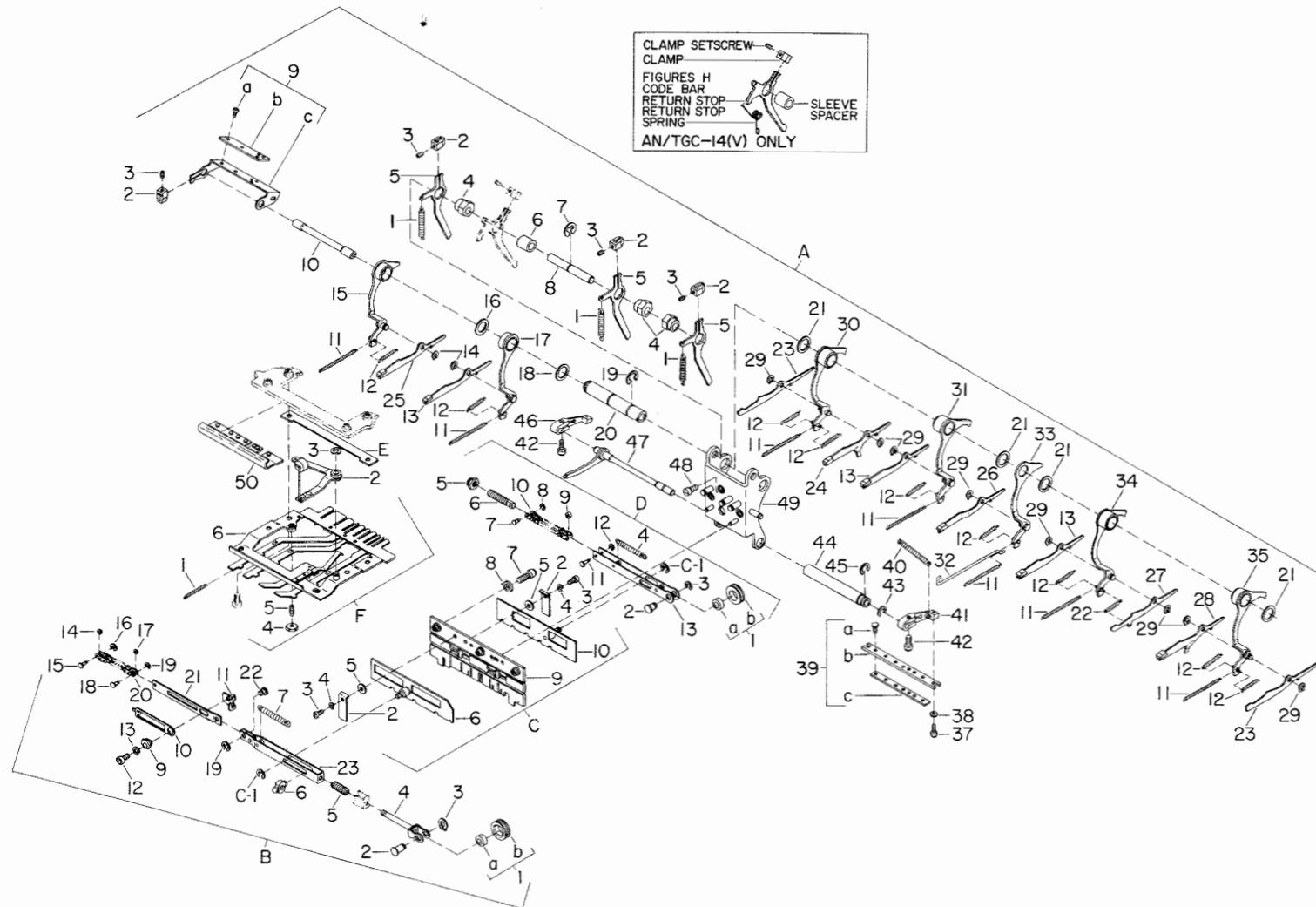
KEY	ITEM	ITEM NO.	ITEM	ITEM NO.
			7	Holder, Carriage Return Spring
			8	Shaft, Takeup Drum
			9	Cup, Carriage Return Spring Mounting
			10	Nut, Plain Hex
			11	Washer, Lock
			12	Spring, Lateral Tension Helical
			13	Ring, Retaining
			14	Washer, Flat
			15	Pulley Assembly, Belt
			a	Pulley
			b	Bearing
			16	Ring, Grip
			17	Spacer
			18	Arm, Takeup (Lateral Belt)
			19	Ring
			20	Washer, Flat
			21	Screw, Machine
			22	Washer
			23	Dial, Range
			24	Pin, Groove
			25	Lock, Conical Range Finder Slide
			26	Spring, Range Finder Lock Helical
			27	Knob, Range Finder
			28	Bracket Assembly, Left-Hand Belt Pulley
			a	Pulley Assembly, Belt
			1	Bearing
			2	Pulley
			b	Ring
			c	Spacer
			d	Spacer
			e	Bracket, Left-Hand Belt Pulley
			29	Screw, Machine
			30	Pulley Assembly, Cable
			a	Bearing
			b	Pulley
			31	Ring
			32	Spacer
			33	Washer, Flat
			34	Screw, Machine
			35	Lever Assembly, Range Finder Lock
			a	Shaft
			b	Ring, Retaining
			c	Lever
			d	Spring
			e	Bracket
			36	Bracket Assembly, Takeup Drum
			37	Clamp, Lateral Control Belt
			38	Screw
			39	Washer, Lock
A	Arm Assembly, Print Prevent	000614		
1	Arm	000615		
2	Screw, Clamping	000616		
B	Follower Assembly, Print Cam	000617		
1	Follower, Cam	000618		
2	Screw, Clamp	000619		
C	Arm Assembly, Print Spring	000620		
1	Stud, Print Spring Yoke	000621		
	Pivot	000622		
2	Ring, Retaining	000623		
3	Arm	000624		
4	Screw, Clamping	000625		
D	Shaft Assembly, Print Lever	000626		
1	Ring, Retaining	000627		
2	Shaft Assembly	000628		
a	Bearing	000629		
b	Shaft	000630		
3	Washer, Felt	000631		
E	Drum Assembly, Takeup	000632		
1	Drum	000633		
2	Ring, Retaining	000634		
3	Bearing	000635		
4	Spacer	000636		
5	Ring	000637		
6	Spring, Carriage Return Spiral			

Figure 5-35 Takeup Drum And Linkage Assembly
SL-4-03315 Figure 15



KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Shim Assembly, Rotary Cable Pulley	000690	2	Screw, Clamping	000748
1	Pin, Dowel	000691	AE	Spring, Lifter Arm	000749
2	Ring, Grip	000692	AF	Lever Assembly, Function	000750
3	Spacer	000693	1	Stud, Function Spring Yoke Pivot	000751
4	Pulley Assembly	000694	2	Ring, Retaining	000752
a	Bearing	000695	3	Bar, Function	000753
b	Pulley	000696	4	Screw, Special	000754
5	Shim, Rotary Pulley	000697	5	Spring, Compression	000755
B	Cable, Return	000698	6	Lever Assembly, Function	000756
C	Cable, Print Hammer	000699	a	Bearing, Sleeve	000757
D	Drum Assembly, Advance	000700	b	Lever	000758
1	Ring, Grip	000701	AG	Follower Assembly, Function Cam	000759
2	Bearing	000702	1	Follower, Cam	000760
3	Spacer	000703	2	Screw, Clamping	000761
4	Clamp, Cable	000704	AH	Screw	000762
5	Screw, Cable Clamp	000705	AJ	Bushing, Rotary Detent Pawl Eccentric	000763
6	Washer, Lock	000706	AK	Arm Assembly, Rotary Detent Pawl Actuator	
7	Drum, Advance	000707	1	Ring, Retaining	000765
8	Ring, Internal Retaining	000708	2	Arm	000764
9	Bearing, Ball	000709	AL	Washer, Felt	000806
10	Bracket, Advance Drum	000710	AM	Spring, Rotary Detent Pawl	000766
E	Bracket, Check Pawl Guide	000711	AN	Pawl Assembly, Rotary Detent	000767
F	Link, Check Pawl	000712	1	Screw, Rotary Detent Pawl Adjustment	000768
G	Spacer	000713	2	Nut, Plain Hex	000769
H	Spring, Advance Prevent Lever	000714	3	Pawl	000770
J	Ring, Retaining	000715	AP	Washer	000771
K	Ring, Retaining	000716	AQ	Spring, Check Pawl	000772
L	Shaft Assembly, Carriage Return	000717	AR	Screw	000773
M	Spring, Bounce Prevent Lever	000718	AS	Bushing, Check Pawl Eccentric	000774
N	Lever Assembly, Bounce Prevent	000719	AT	Pawl Assembly, Check	000775
1	Clamp	000720	1	Stud, Eccentric	000776
2	Setscrew	000721	2	Washer, Lock	000777
3	Bushing, Eccentric	000722	3	Nut, Plain Hex	000778
4	Lever	000723	4	Pawl	000779
P	Follower Assembly, Carriage Return Cam	000724	AU	Spacer	000780
1	Screw, Clamping	000725	AV	Washer, Felt	000806
2	Follower, Carriage Return Cam	000726	AW	Screw, Machine	000781
Q	Lever, Advance Prevent	000727	AX	Bushing, Advance Suppression Latch Eccentric	000782
R	Shim	000728	AY	Latch, Advance Suppression	000783
S	Spring, Character Advance Pawl	000729	AZ	Washer, Felt	000804
T	Pawl, Character Advance	000730	BA	Stud, Advance Suppression Latch Mounting	000784
U	Screw	000731	BB	Cable, Rotary	000785
V	Bushing, Character Advance Pawl Eccentric	000732	BC	Pulley Assembly, Rotary Cable	000786
W	Link, Index	000733	1	Ring, Grip	000787
X	Shaft Assembly, Character Advance Lever	000734	2	Spacer	000788
1	Ring, Retaining	000735	3	Pulley Assembly	000789
2	Ring, Retaining	000736	a	Bearing	000790
3	Strip, Felt	000737	b	Pulley	000791
4	Shaft Assembly, Character Advance Lever	000740	c	Shaft Assembly	000792
5	Clip, Felt Strip	000739	BD	Bracket, Spacer	000793
6	Strip, Felt	000738	BE	Belt, Lateral Control	000794
Y	Ring	000807	BF	Pulley Assembly, Lateral Control Belt	000795
Z	Ring	000808	1	Ring, Grip	000796
AA	Spacer	000741	2	Spacer	000797
AB	Spacer	000742	3	Pulley Assembly	000798
AC	Clamp Assembly, Code Bar Actuator	000743	a	Bearing	000799
1	Clamp	000744	b	Pulley	000800
2	Screw	000745	4	Spacer	000801
AD	Arm Assembly, Lifter	000746	5	Bracket, Lateral Control Belt Pulley	000802
1	Arm	000747	BG	Washer, Felt	000803

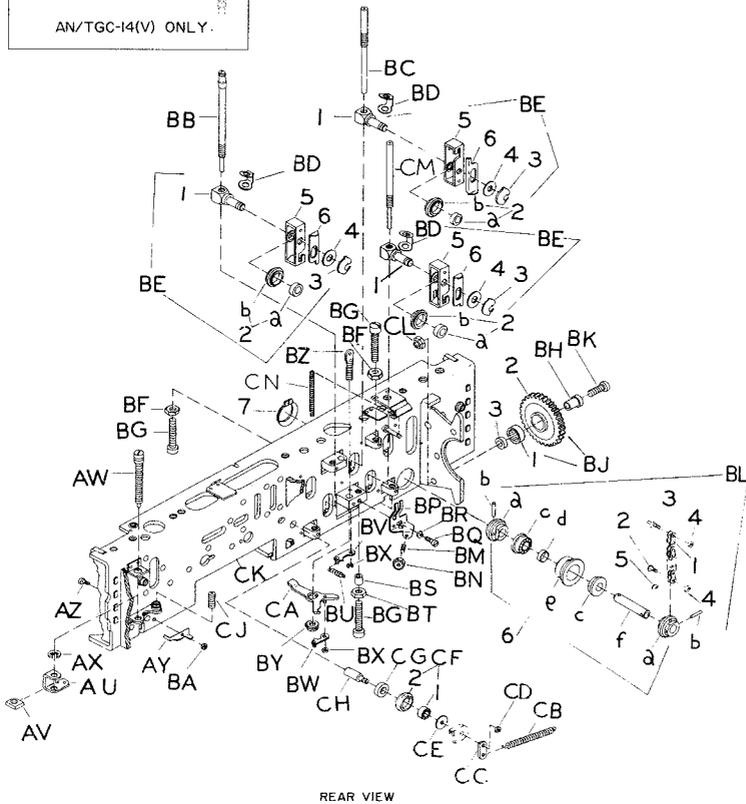
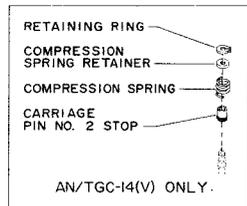
Figure 5-36 Advance Drum and Linkage Assembly
SL-4-03315 Figure 16



KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
15	Arm, Blank Advance Suppression	000834	6	Slide, Slack Takeup	000882
16	Spacer	000835	7	Spring, Safety	000883
17	Arm, Space	000836	9	Eccentric, Lateral Control	
18	Spacer	000837		Chain Takeup	000884
19	Ring, Retaining	000838	10	Lever, Lateral Control Chain	
20	Shaft, Function Clutch Release	000839		Takeup	000885
21	Spacer	000840	11	Link, Detent	000886
22	Spring, Off Line Letters		12	Screw	000887
	Sensing Finger Lever	000843	13	Washer, Lock,	000888
23	Lever, Carriage Return and Line		14	Spacer	000889
	Feed Sensing Finger	000844	15	Pin	000890
24	Lever, Off Line Line Feed		16	Ring, Retaining	000891
	Sensing Finger	000845	17	Spacer	000892
25	Lever, Blank Sensing Finger	000846	18	Pin	000893
26	Lever, Bell Actuator		19	Ring, Retaining	000894
	Sensing Finger	000847	20	Chain, Lateral Control	000895
27	Lever, Off Line Letters		21	Link	000896
	Sensing Finger	000848	22	Pin	000897
28	Lever, Off Line Carriage		23	Strip, Lateral Control	000898
	Return Sensing Finger	000849	C	Slide Assembly, Function	000899
29	Ring, Retaining	000850	1	Ring, Retaining	000900
30	Arm, Line Feed Clutch Release	000851	2	Clip	000901
31	Arm, Figures Clutch Release	000852	3	Screw	000902
32	Rod, Bell Actuator Connecting	000853	4	Washer, Lock	000903
33	Arm, Bell Advance Suppression	000854	5	Spacer	000904
34	Arm, Letters Clutch Release	000855	6	Slide, Lateral Control	
35	Arm, Carriage Return			Function	000905
	Clutch Release	000856	7	Screw	000906
37	Screw	000858	8	Spacer	000907
38	Washer, Flat	000859	9	Support	000908
39	Rod Assembly, Print Prevent	000857	10	Slide, Rotary Function	000910
	Screw, Print Prevent Adjustment	000860	D	Strip Assembly, Rotary	
a	Rod	000861		Cable	000911
b	Strip, Lock	000862	1	Pulley Assembly, Rotary	
	Cable			Cable	000913
40	Spring, Print Prevent Rod		a	Bearing	000916
	Actuator Arm Bias	000863	b	Pulley	000917
41	Arm, Right-Hand Print Prevent		2	Pin	000914
	Rod Actuator	000864	3	Ring, Retaining	000915
42	Screw, Print Prevent Rod		4	Spring, Safety	000918
	Actuator Arm	000865	5	Nut	000912
43	Ring, Retaining	000866	6	Stud, Rotary Chain	
44	Shaft, Function Clutch			Adjustment	000920
	Release Arm Stop	000867	7	Pin	000921
45	Ring, Retaining	000868	8	Ring, Retaining	000922
46	Arm, Left-Hand Print Prevent		9	Spacer	000923
	Rod Actuator	000869	10	Chain, Rotary	000924
47	Shaft Assembly, Print		11	Pin	000925
	Prevent Rod Lever	000870	12	Ring, Retaining	000926
48	Screw	000871	13	Strip, Rotary	000927
49	Frame Assembly, Function Clutch		E	Strip, Function Sensing Finger	
	Release and Backstop	000872		Lever Stop	000928
50	Bar, Spring	000873	F	Slide Assembly, Off	
B	Strip Assembly, Lateral			Line Function	000929
	Control Belt	000874	1	Spring, Off-Line Function	
1	Pulley Assembly, Lateral			Return Helical	000930
	Control Belt	000875	2	Lever Assembly, Bell	000931
a	Bearing	000878	3	Ring, Retaining	000932
b	Pulley	000879	4	Nut, Plain Hex	000933
2	Pin	000876	5	Setscrew, Print Prevent	
3	Ring, Retaining	000877		Stop Adjustment	000934
4	Fork	000880	6	Slide Assembly	000935
5	Spring, Slack Takeup	000881			

KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Backstop Assembly, Function	000810	a	Screw, Function Advance	
1	Spring, Function Backstop	000811		Prevent Adjustment	000827
2	Clamp	000812	b	Plate, Nylon Locking	000826
3	Setscrew, Clamp	000813	c	Bar	000828
4	Bushing, Function Backstop		10	Shaft, Advance Prevent Bail	
	Eccentric	000814		Carriage Return Bar	000829
5	Backstop, Function	000815	11	Spring, Function Clutch Release	
6	Spacer, Sleeve	000820		Arm Return Helical	000830
7	Ring, Retaining	000821	12	Spring, Function Sensing	
8	Shaft, Function Backstop	000822		Finger Lever Helical	000831
9	Bar Assembly, Advance Prevent		13	Lever, Function Sensing Finger	000832
	Bail Carriage Return	000825	14	Ring, Retaining	000833

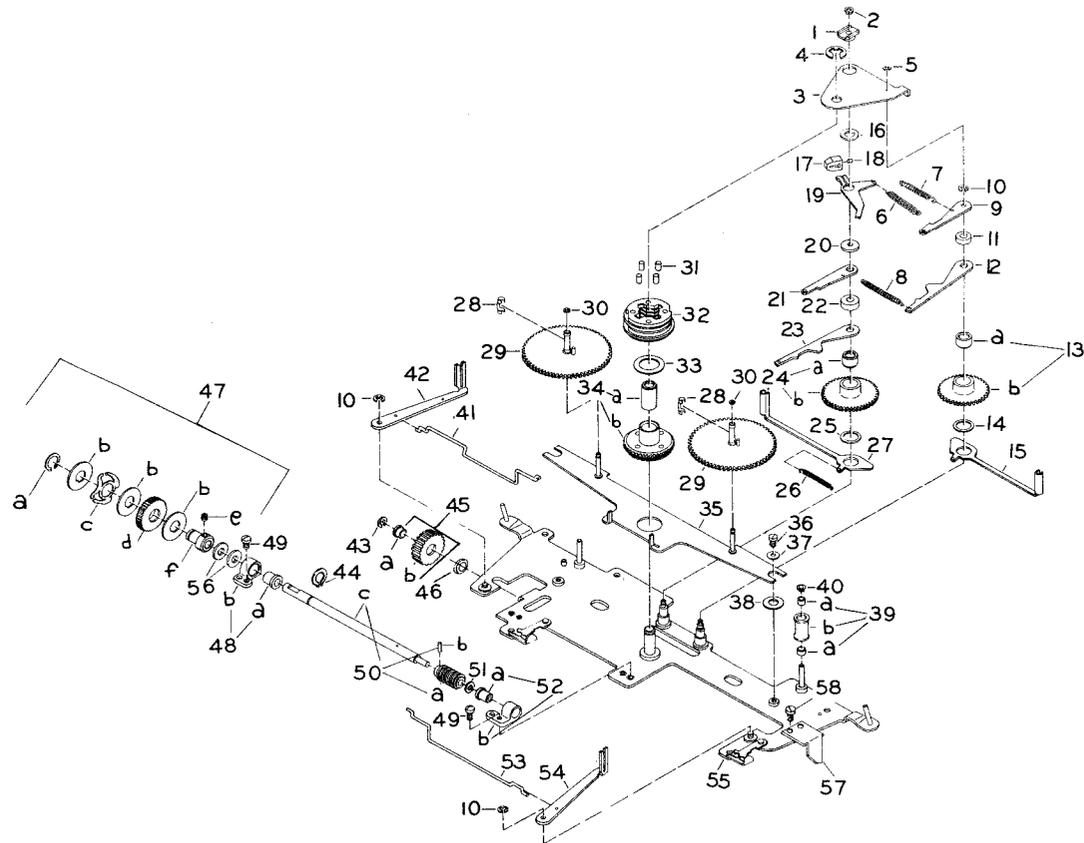
Figure 5-37 Function Selector Assembly
SL-4-03315 Figure 17



KEY	ITEM	ITEM NO.
AU	Bracket, Rotary Cable Adjustment	001027
AV	Block, Nylon Lock	001028
AW	Screw, Rotary Cable Adjustment	001029
AX	Ring, Retaining	001030
AY	Lever, Line Feed Shift	001031
AZ	Pin, Straight	001032
BA	Ring, Retaining	001033
BB	Pin, No. 2 Carriage	001034
BC	Pin, No. 1, 3 and 5 Carriage	001039
BD	Lock, Carriage Pin	001040
BE	Pulley Assembly, Carriage	001042
1	Rod	001043
2	Pulley Assembly	001044
a	Bearing	001045
b	Pulley	001046
3	Ring, Retaining	001047
4	Spacer, Sleeve	001048
5	Carriage	001049
6	Clip, Carriage	001050
BF	Nut, Plain Hex	001051
BG	Screw, No. 1 Thru 5 Stroke Adjustment (No. 1 and 2 Rotary and No. 3, 4 and 5 Lateral)	001052
BH	Stud, Printer Keyboard Idler Gear	001053

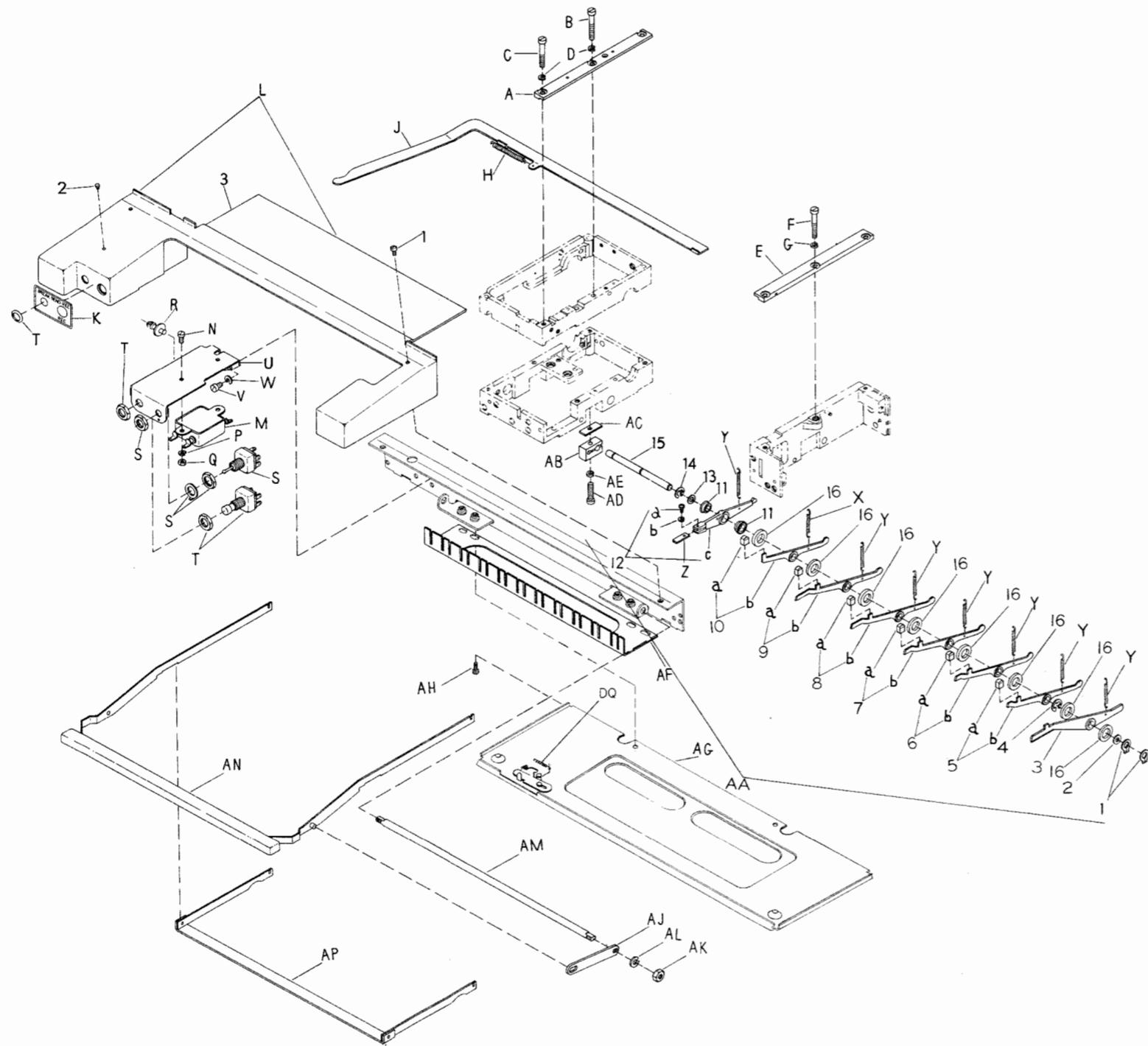
BJ	Gear Assembly, Printer Keyboard Idler	001054
1	Bearing	001056
2	Gear	001057
3	Support, Standoff Gear	001058
BK	Screw	001055
BL	Pulley Assembly, Lateral Transfer	001059
1	Chain, Lateral Transfer Pulley	001060
2	Pin	001061
3	Pin	001062
4	Ring, Retaining	001063
5	Spacer	001064
6	Pulley Assembly, Transfer	001065
a	Pulley	001067
b	Pin	001068
c	Bearing	001069
d	Spacer	001070
e	Retainer	001071
f	Shaft	001072
7	Ring	001066
BM	Setscrew, Automatic Chain Takeup Actuator Adjustment	001073
BN	Nut	001074
BP	Bracket, Chain Adjustment Slide	001075
BQ	Screw, Machine	001076
BR	Washer, Lock	001077
BS	Spacer, Sleeve	001078
BT	Nut, Plain Hex	001079
BU	Spring	001080
BV	Pawl, Automatic Chain Takeup	001081
BW	Pawl, Automatic Chain Takeup Feed	001082
BX	Ring, Retaining	001083
BY	Ratchet, Automatic Chain Takeup	001084
BZ	Stud, Automatic Chain Takeup Adjustment	001085
CA	Lever, Automatic Chain Takeup Actuator	001086
CB	Spring	001087
CC	Link	001088
CD	Ring, Retaining	001089
CE	Spacer	001090
CF	Pulley Assembly, Chain	001091
1	Bearing	001092
2	Pulley	001093
CG	Spacer	001094
CH	Shaft	001095
CJ	Screw, Letters Figures Cam Follower Stroke Adjustment	001096
CK	Frame Assembly, Front	001097
CL	Nut, Plain Hex	001098
CM	Pin, No.4 Carriage	001041
CN	Spring, Secondary No. 3 Cam Follower	001099

Figure 5-38 Front Frame Assembly (Rear View)
SL-4-03315 Figure 19



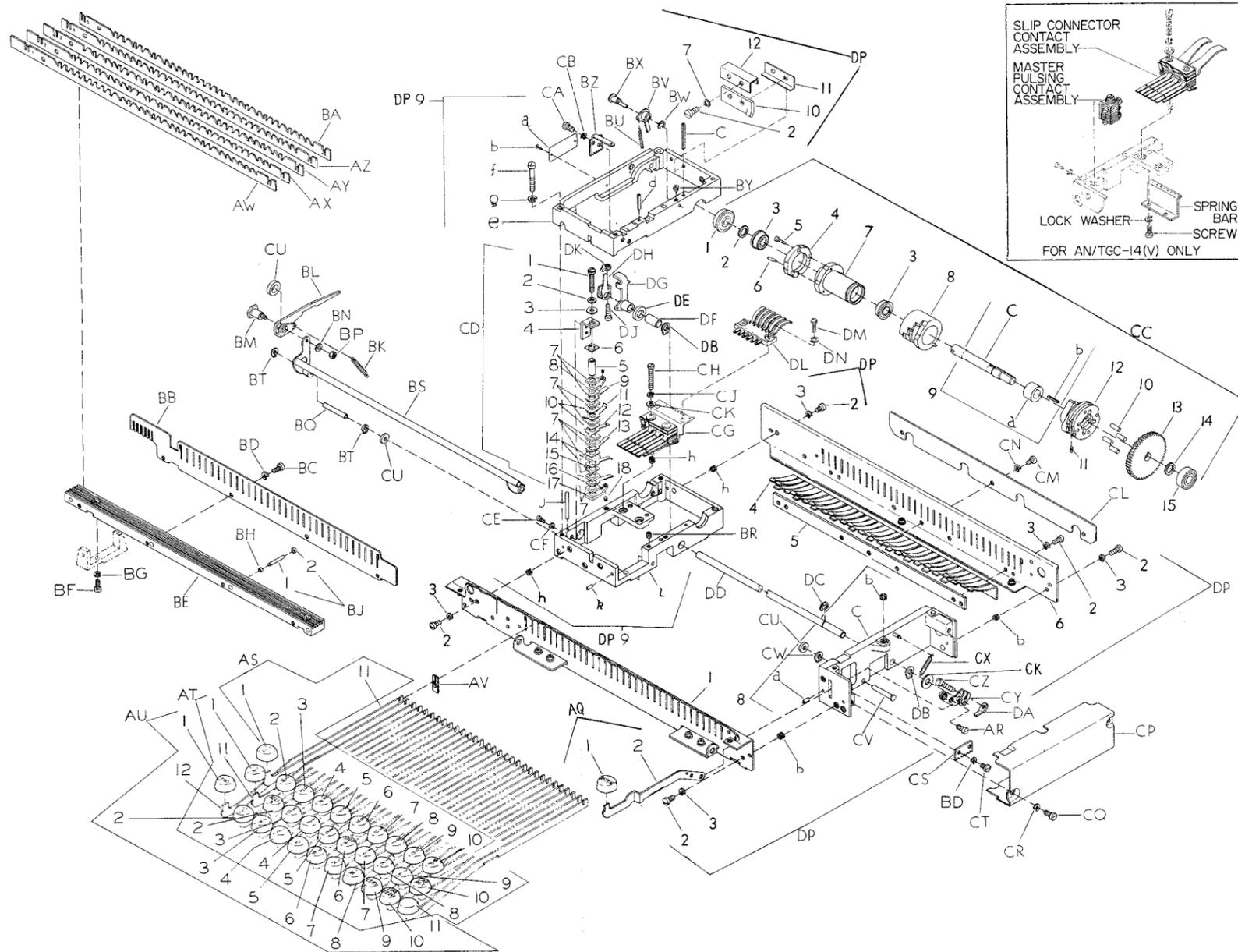
KEY	ITEM	ITEM NO.	ITEM NO.	ITEM NO.	
1	Eccentric, Ribbon Feed Backstop	000413	44	Ring, Retaining	000465
2	Ring, Retaining	000414	45	Gear Assembly, Ribbon Feed Idler	000464
3	Plate, Brace	000415	a	Bearing	000466
4	Ring, Retaining	000416	b	Gear, Idler	000467
5	Ring, Retaining	000417	46	Spacer	000468
6	Spring, Ribbon Feed Backstop Helical	000418	47	Clutch Assembly, Ribbon Feed Slip	000469
7	Spring, Clutch Stop Helical	000419	a	Ring, Retaining	000470
8	Spring, Reversing Cam Follower	000420	b	Washer, Key	000471
9	Stop, Right-Hand Ribbon Feed Clutch	000421	c	Spring, Washer	000472
10	Ring, Retaining	000422	d	Gear, Slip Clutch	000473
11	Spacer, Sleeve	000423	e	Screw, Hub Socket	000474
12	Follower, Right-Hand Reversing Cam	000424	f	Hub	000475
13	Gear Assembly, Right-Hand Intermediate Drive	000425	48	Block Assembly, Left-Hand Bearing	000476
a	Bearing	000426	a	Bearing	000478
b	Gear	000427	b	Block	000479
14	Shim, Washer	000428	49	Screw	000477
15	Arm, Right-Hand Tension Control Brake	000429	50	Shaft Assembly, Ribbon Feed Worm	000480
16	Spacer, Sleeve	000430	a	Worm, Ribbon Feed	000482
17	Clamp	000431	b	Pin, Roll	000483
18	Setscrew, Clamp	000432	c	Shaft	000484
19	Backstop, Ribbon Feed	000433	51	Washer, Thrust	000485
20	Spacer, Sleeve	000434	52	Block Assembly, Right-Hand Bearing	000486
21	Stop, Left-Hand Ribbon Feed Clutch	000435	a	Bearing	000488
22	Spacer, Sleeve	000436	b	Block	000489
23	Follower, Left-Hand Reversing Cam	000437	53	Link, Right-Hand Wire	000490
24	Gear Assembly, Left-Hand Intermediate Drive	000438	54	Arm, Right-Hand Ribbon Reversing Sensing	000491
a	Bearing	000439	55	Plate, Ribbon Feed Mounting Base	000492
b	Gear	000440	56	Washer, Felt	000494
25	Washer	000441	57	Guide, Bounce Prevent Lever	000497
26	Spring, Tension Control Brake Arm	000442	58	Screw, Machine	000496
27	Arm, Left-Hand Tension Control Brake	000443			
28	Clip, Spool	000444			
29	Gear, Ribbon Spool Drive	000445			
30	Ring, Retaining	000446			
31	Roller, Clutch	000447			
32	Clutch, Ribbon Feed	000448			
33	Washer	000449			
34	Gear Assembly, Clutch Shaft Worm	000450			
a	Bearing, Sleeve	000451			
b	Gear, Worm	000452			
35	Plate, Ribbon Reversing Sliding	000453			
36	Screw, Machine	000454			
37	Washer	000455			
38	Spacer, Guide Pin	000456			
39	Roller Assembly, Ribbon	000457			
a	Bushing	000459			
b	Roller	000460			
40	Ring, Retaining	000458			
41	Link, Left-Hand Wire	000461			
42	Arm, Left-Hand Ribbon Reversing Sensing	000462			
43	Ring, Retaining	000463			

Figure 5-39 Ribbon Feed Top Plate Assembly
SL-4-03315 Figure 12



KEY	ITEM	ITEM NO.			
			a	Screw, Machine	000179
			b	Washer, Lock	000180
			c	Follower, Cam	000181
			13	Spacer, Sleeve	000182
			14	Ring, Retaining	000183
			15	Shaft, Pulsing Finger and Prevent Lever	000185
			16	Washer, Felt	000184
			AB	Clamp, Shaft	000186
			AC	Shim, Pulsing Finger Adjustment	000187
			AD	Screw, Machine	000188
			AE	Washer, Lock	000189
			AF	Guide, Front Key	000190
			AG	Cover, Space Bar Safety Guard	000196
			AH	Screw, Machine	000197
			AJ	Arm, Space Bar Control	000191
			AK	Nut, Plain Hex	000192
			AL	Washer, Lock	000193
			AM	Shaft, Space Bar	000194
			AN	Bar, Space	000195
			AP	Pad, Wear	000198
			AQ	Key Assembly, Repeat	000199
			1	Top	000201
			2	Lever	000202
			AR	Screw	000200
			AS	Key Assembly, Top Row	000203
			1	Top, Q	000204
			2	Top, W	000205
			3	Top, E	000206
			4	Top, R	000207
			5	Top, T	000208
			6	Top, Y	000209
			7	Top, U	000210
			8	Top, I	000211
			9	Top, O	000212
			10	Top, P	000213
			11	Lever, Top Row Key	000214
			AT	Key Assembly, Center Row	000215
			1	Top, A	000216
			2	Top, S	000217
			3	Top, D	000218
			4	Top, F	000219
			5	Top, G	000220
			6	Top, H	000221
			7	Top, J	000222
			8	Top, K	000223
			9	Top, L	000224
			10	Top, CAR RET	000225
			11	Lever, Center Row Key	000226
			AU	Key Assembly, Bottom Row	000227
			1	Top, FIGS	000228
			2	Top, Z	000229
			3	Top, X	000230
			4	Top, C	000231
			5	Top, V	000232
			6	Top, B	000233
			7	Top, N	000234
			8	Top, M	000235
			9	Top, LTRS	000236
			10	Top, LINE FEED	000237
			11	Top, Blank	000238
			12	Lever, Bottom Row Key	000239
			AV	Seal, Key Lever Dust	000240
			AW	Bar, No. 1 Code	000241
A	Rail, Keyboard Left-Hand	000126			
B	Screw, Machine	000127			
C	Screw, Machine	000128			
D	Washer, Lock	000129			
E	Rail, Keyboard Right-Hand	000130			
F	Screw, Machine	000131			
G	Washer, Lock	000132			
H	Spring, Keyboard Lock Bar Helical	000133			
J	Bar, Keyboard Lock	000134			
K	Plate, Designation	000135			
L	Cover Assembly	000136			
1	Screw, Machine	000138			
2	Pad, Keyboard Cover	000137			
3	Cover, Keyboard	000139			
M	Filter, Keyboard	000140			
N	Screw, Machine	000141			
P	Washer, Lock	000142			
Q	Nut, Plain Hex	000143			
R	Terminal	000153			
S	Switch, Send-Rec-Rec Toggle	000144			
T	Switch, Break Push Button	000146			
U	Bracket, Switch	000147			
V	Screw, Machine	000148			
W	Washer, Lock	000149			
X	Spring, Helical	000150			
Y	Spring, Helical	000151			
Z	Actuator, Keyboard Contact	000152			
AA	Lever Assembly, Pulsing Finger and Prevent	000154			
1	Ring, Retaining	000155			
2	Spacer, Sleeve	000156			
3	Lever, Keyboard Code Bar Prevent	000157			
4	Ring, Retaining	000158			
5	Finger Assembly, No. 5 Pulsing	000159			
a	Pusher	000160			
b	Finger	000161			
6	Finger Assembly, No. 4 Pulsing	000162			
a	Pusher	000163			
b	Finger	000164			
7	Finger Assembly, No. 3 Pulsing	000165			
a	Pusher	000166			
b	Finger	000167			
8	Finger Assembly, No. 2 Pulsing	000168			
a	Pusher	000169			
b	Finger	000170			
9	Finger Assembly, No. 1 Pulsing	000171			
a	Pusher	000172			
b	Finger	000173			
10	Finger Assembly, Start Pulsing	000174			
a	Pusher	000175			
b	Finger	000176			
11	Bearing, Master Pulsing Cam Follower	000177			
12	Follower Assembly, Master Pulsing Cam	000178			

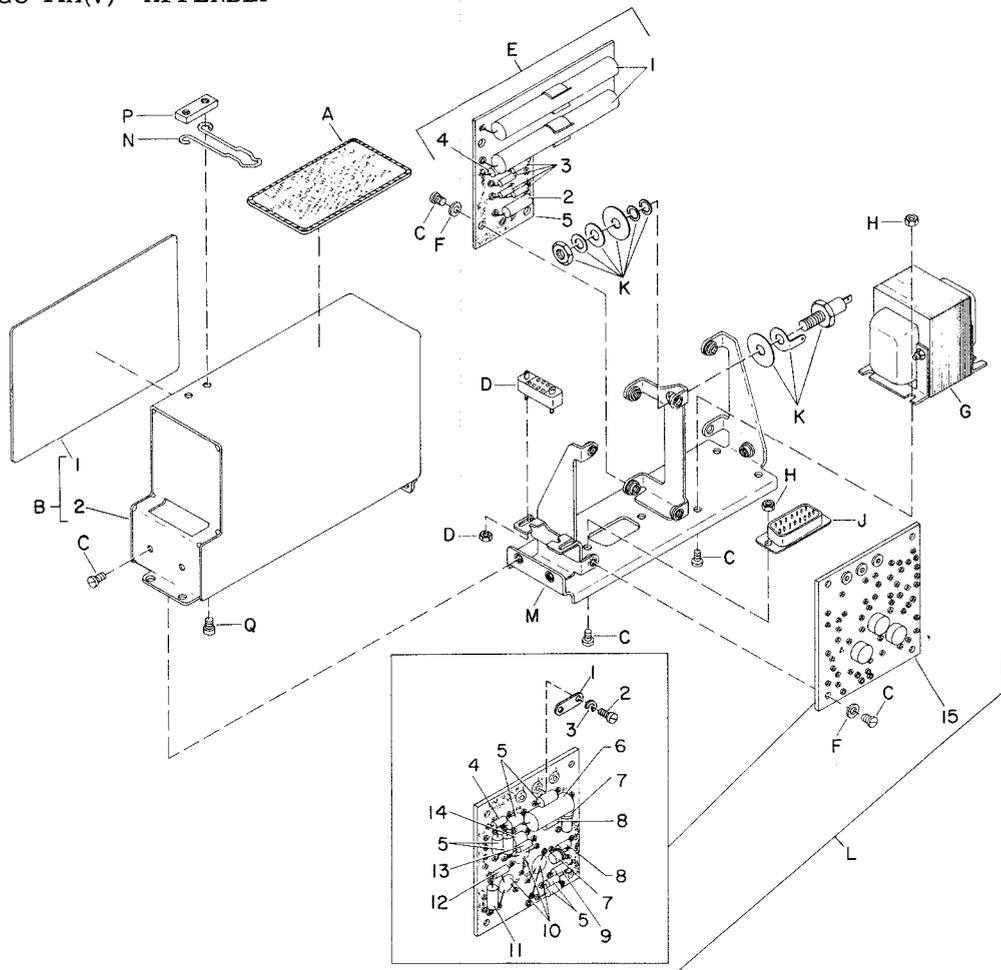
Figure 5-40 Keyboard Assembly (Sheet 1 of 2)
SL-4-03315 Figure 7



KEY	ITEM	ITEM NO.
AX	Bar, No. 2 Code	000242
AY	Bar, No. 3 Code	000243
AZ	Bar, No. 4 Code	000244
BA	Bar, No. 5 Code	000245
BB	Guide Assembly, Code Bar and Key Lever	000246
1	Guide, Key Lever	
BC	Screw	000247
BD	Washer, Lock	000248
BE	Guide, Code Bar	000249
BF	Screw	000250
BG	Washer, Lock	000251
BH	Roller, Code Bar Support	000252
BJ	Pin Assembly, Code Bar Roller	000253
1	Disc	000254
2	Pin	000255
BK	Spring, Clutch Release Helical	000256
BL	Release, Cam Follower Clutch	000257
BM	Eccentric, Cam Follower Clutch Release	000258
BN	Washer, Flat	000259
BP	Nut	
BQ	Shaft, Bail Support	000260
BR	Setscrew, Bail Support Shaft	000261
BS	Bail, Clutch Release	000262
BT	Ring	000263
BU	Spring, Backstop	000264
BV	Backstop Assembly, Clutch	000265
BW	Ring, Retaining	000268
BX	Shaft, Backstop Eccentric	000269
BY	Setscrew, Backstop Eccentric Shaft	000267
BZ	Guide, Top Left Code Bar	000266
CA	Screw, Machine	000270
CB	Washer, Lock	000271
CC	Cam Shaft Assembly, Keyboard	000272
1	Bearing	000273
2	Spacer, Sleeve	000274
3	Bearing	000275
4	Cam, Master Pulsing	000279
5	Screw	000276
6	Eccentric, Start Pulse	000277
7	Bushing, Start Stop Cam	000278
8	Cam Assembly, Pulsing	000280
9	Shaft Assembly, Keyboard Drive	000281
a	Bushing, Sleeve	000282
DP	Key	000283
c	Shaft	000284
10	Roller, Clutching	000285
11	Setscrew, Clutch Assembly	000286
12	Clutch Assembly	000287
13	Gear, Keyboard Drive	000288
14	Spacer, Sleeve	000289
15	Bearing	000290
CD	Contact Assembly, Master Pulsing	000291
1	Screw, Machine	000294
2	Washer, Flat	000295
3	Insulator	000297
4	Bracket, Contact Mounting	000298
5	Spacer, Insulator Sleeve	000299
6	Insulator	000296

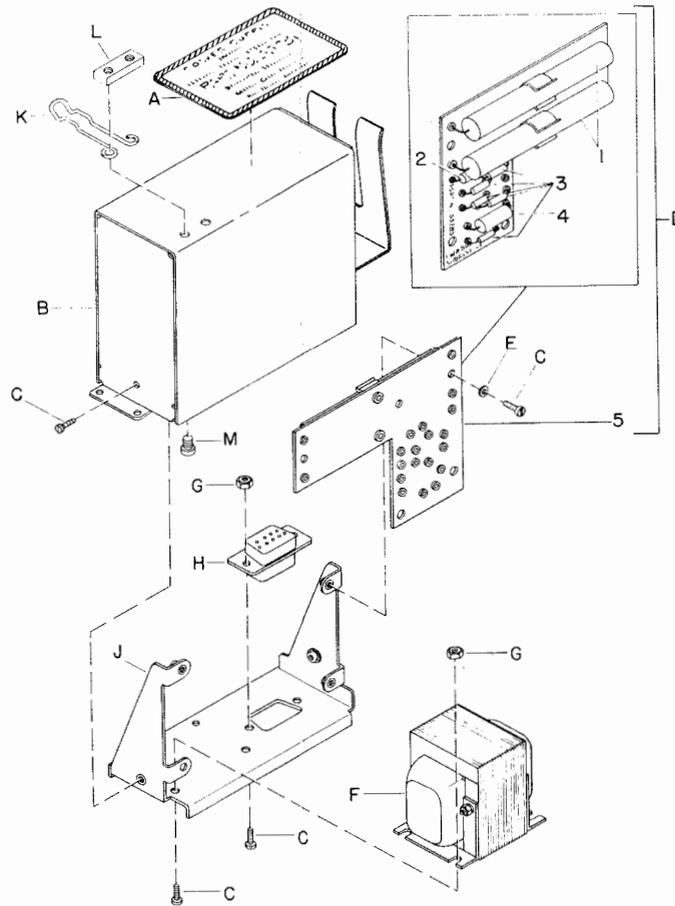
KEY	ITEM	ITEM NO.
7	Insulator	000300
8	Bracket, Adjusting Screw	000305
9	Leaf, Top Spring	000304
10	Support, Upper Leaf	000307
11	Contact Assembly, Upper	000306
12	Contact Assembly, Upper Leaf	000308
13	Contact Assembly, Lower Leaf	000309
14	Support, Lower Leaf	000310
15	Contact Assembly, Lower	000311
16	Leaf, Lower Spring	000303
17	Bracket, Adjusting Screw	000302
18	Screw, Upper and Lower Spring Leaf Adjusting	000301
CE	Screw, Machine	000292
CF	Washer, Lock	000293
CG	Contact Assembly, Code Pulsing	000318
CH	Screw, Machine	000319
CJ	Washer, Lock	000313
CK	Washer, Flat	000312
CL	Strip, Key Retaining	000314
CM	Screw, Machine	000315
CN	Washer, Lock	000316
CP	Cover, Right Side	000317
CQ	Screw, Machine	000320
CR	Washer, Lock	000321
CS	Guide, Top Right Code Bar	000322
CT	Screw, Machine	000323
CU	Washer, Felt	000326
CV	Pin, Straight	000327
CW	Ring, Retaining	000325
CX	Spring, Repeat Key Lever Helical	000328
CY	Clamp, Repeat Key Lever	000329
CZ	Screw, Machine	000330
DA	Nutplate, Clamp	000331
DB	Ring, Grip	000332
DC	Ring, Retaining	000333
DD	Shaft, Repeat Key	000334
DE	Washer, Felt	000335
DF	Bushing, Repeat Key Shaft	000337
DG	Finger, Clutch Release	000338
DH	Arm, Repeat Key Actuator	000339
DJ	Screw, Repeat Key Actuator Arm	000340
DK	Nutplate, Repeat Key Actuator Arm	000341
DL	Contact Assembly, Slip Connector	000342
DM	Screw, Machine	000343
DN	Washer, Lock	000344
DP	Frame Assembly	000345
1	Support, Front	000346
2	Screw, Machine	000347
3	Washer, Lock	000348
4	Spring, Key Lever Leaf	000349
5	Strip, Key Lever Leaf Spring	
6	Support, Rear	000350
7	Washer, Lock	000353
8	Frame Assembly, Right	000354
a	Pin, Spring	000355
b	Insert, Threaded	000356
c	Frame	000357
9	Frame Assembly, Left	000358
a	Plate, Identification	000359
b	Screw, Drive	000360

KEY	ITEM	ITEM NO.
c	Pin, Spring	000361
d	Pin, Spring	000363
e	Frame, Top	000364
f	Screw, Machine	000365
g	Washer, Lock	000366
h	Insert, Threaded	000367
j	Pin, Spring	000368
k	Pin, Spring	000369
l	Frame, Bottom	000370
10	Wick, Keyboard Cam	000371
11	Bracket, Keyboard Cam Wick Mounting	000372
12	Plate, Keyboard Cam Wick	000373
DQ	Spring	



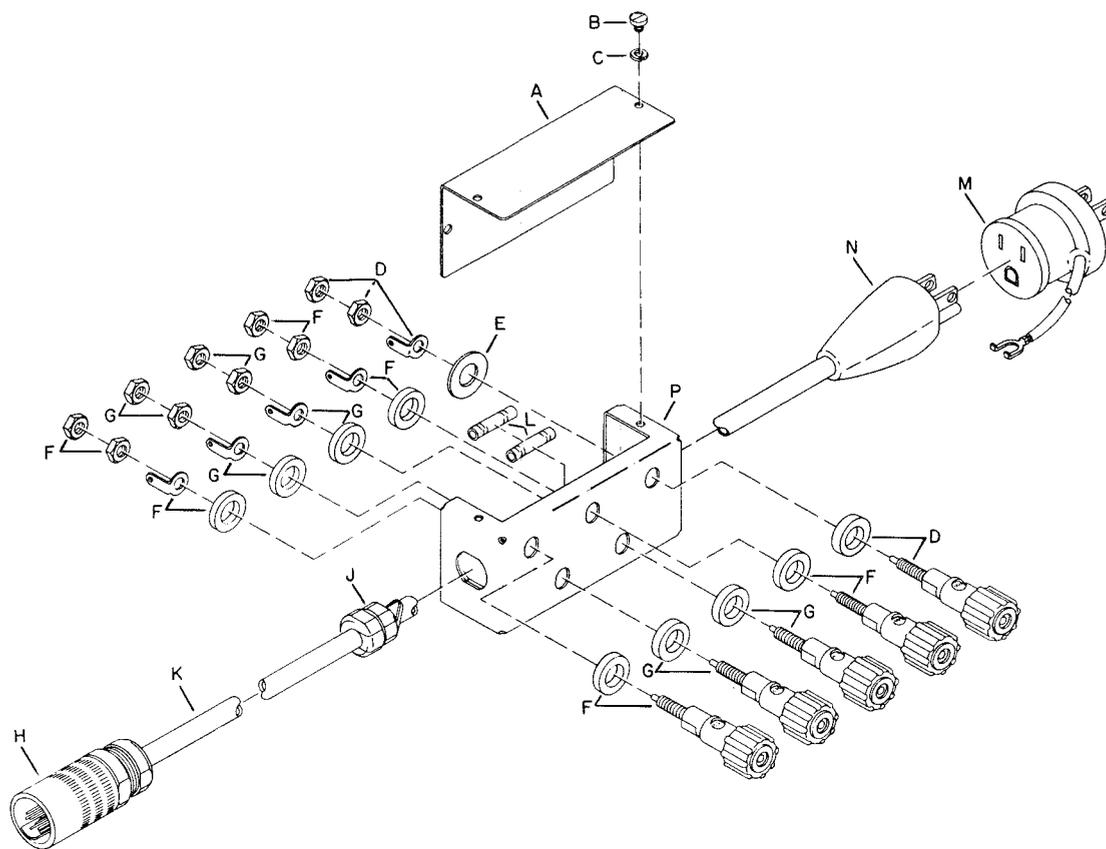
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Nameplate	001687	2	Screw	001712
B	Cover Assembly	001688	3	Washer, Lock	001713
1	Nameplate	001690	4	Resistor	001714
2	Cover	001691	5	Rectifier	001715
C	Screw	001689	6	Resistor	001716
D	Receptacle, Selector	001692	7	Diode	001717
E	Board Assembly	001693	8	Resistor	001718
1	Capacitor	001696	9	Resistor	001719
2	Resistor	001697	10	Transistor	001720
3	Rectifier	001698	11	Resistor	001721
4	Resistor	001699	12	Resistor	001722
5	Board	001700	13	Resistor	001723
F	Washer, Flat	001695	14	Resistor	001724
G	Transformer	001701	15	Board	001725
H	Nut	001703	M	Bracket	001726
J	Connector, Line Sensor	001704	N	Clip, Selector Cable	001727
K	Diode	001707	P	Clip, Holder	001728
L	Board Assembly	001708	Q	Screw	001729
1	Strip, High-Low Range	001711			

Figure 5-42 Line Sensor
SL-4-03315 Figure 31



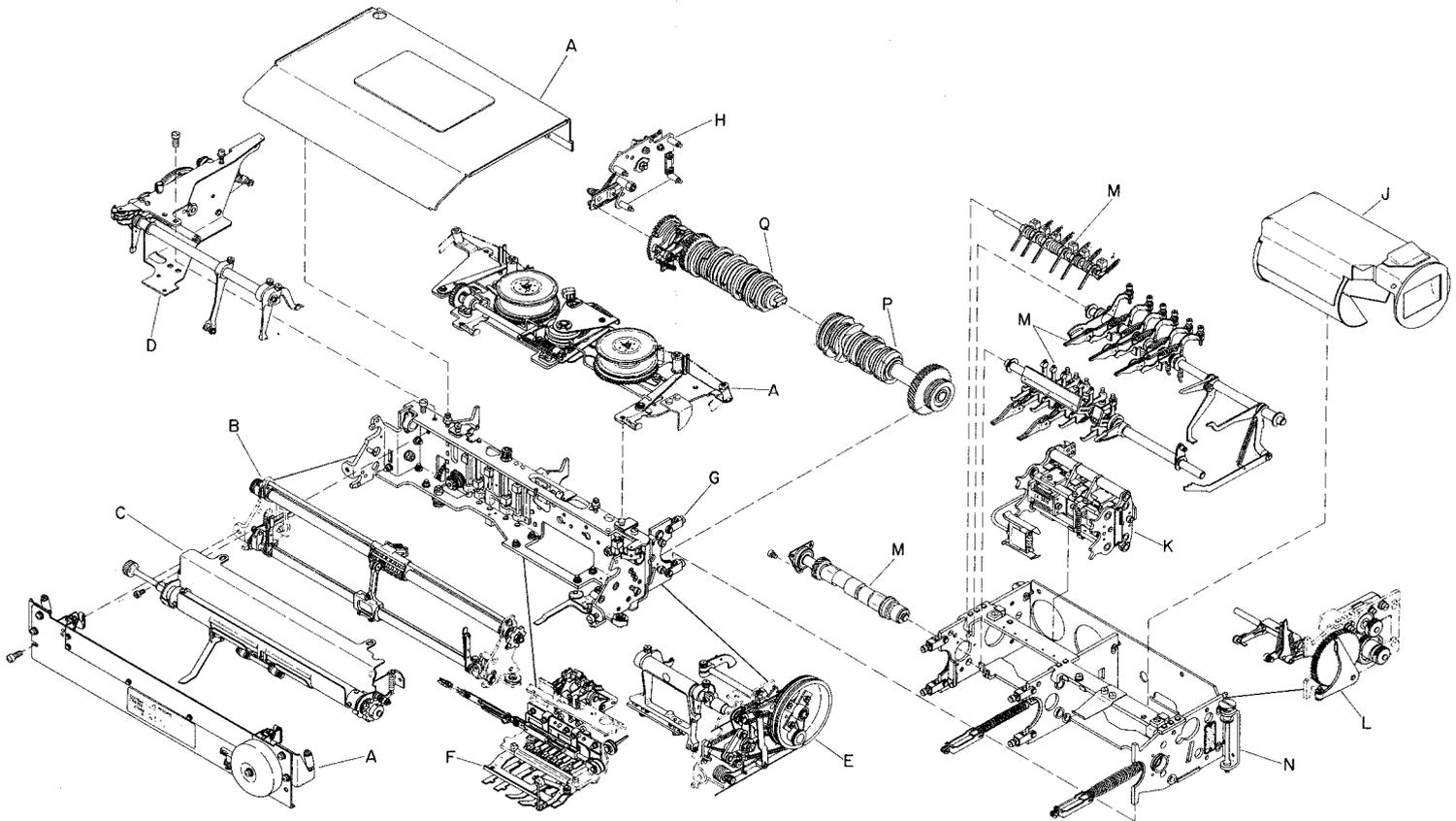
KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Nameplate	001731	E	Washer	001736
B	Cover	001732	F	Transformer	001742
C	Screw	001733	G	Nut	001744
D	Board Assembly	001734	H	Connector, Signal Line Power Supply	001745
1	Capacitor	001737	J	Bracket	001748
2	Resistor	001738	K	Clip, Motor Cable	001749
3	Rectifier	001739	L	Clip, Holder	001750
4	Resistor	001740	M	Screw	001751
5	Board	001741			

Figure 5-43 Signal Line Power Supply
SL-4-03315 Figure 32



KEY	ITEM	ITEM NO.	KEY	ITEM	ITEM NO.
A	Cover	001755	H	Connector-Plug, Service Cable	001758
B	Screw, Machine	001756	J	Bushing, Sleeve	001762
C	Washer, Lock	001766	K	Cable, Electric	001757
D	Post, Binding	001761	L	Splice	001764
E	Washer, Flat	001765	M	Adapter	001763
F	Post, Binding	001759	N	Cord	001754
G	Post, Binding	001760	P	Junction Box	001753

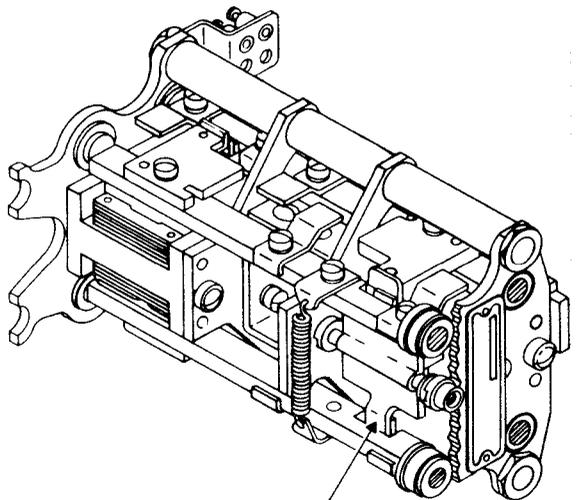
Figure 5-44 Service Cable
SL-4-03315 Figure 33



KEY	ITEM
A	Assemblies, Ribbon Feed, Front Plate, and Paper Guide (See figure 5-32, Appendix for breakdown.)
B	Shaft Assembly, Print Hammer, Print Cylinder, and Print Cylinder Yoke (See figure 5-33, Appendix for breakdown.)
C	Feed Assembly, Paper (See figure 5-34, Appendix for breakdown.)
D	Assemblies, Takeup Drum, Bracket, and Print Shaft (See figure 5-35, Appendix for breakdown.)
E	Linkage Assembly, Advance Drum and (See figure 5-36, Appendix for breakdown.)
F	Selector Assembly, Function (See figure 5-37, Appendix for breakdown.)
G	Frame Assembly, Front (See figures 5-31 and 5-38, Appendix for breakdown.)

KEY	ITEM
H	Time Delay Assembly, Automatic Motor Stop (See figure 5-20, Appendix for breakdown.)
J	Duct Assembly, Fan Outlet (See figure 5-23, Appendix for breakdown.)
K	Selector Assembly (See figures 5-26 or 5-27, Appendix for breakdown.)
L	Feed Assembly, Gear Train and Automatic Carriage Return Line (See figure 5-28, Appendix for breakdown.)
M	Shaft Assembly, Mark and Space Clutch Release Shaft, Timing Cam Shaft, And Backstop (See figure 5-20, Appendix for breakdown.)
N	Frame Assembly, Rear (See figure 5-30, Appendix for breakdown.)
P	Shaft Assembly, Function Main (See figure 5-22, Appendix for breakdown.)
Q	Shaft Assembly, Selector Main (See figure 5-21, Appendix for breakdown.)

Figure 5-45 Printer Assembly
SL-4-03315 Figure 10



PUSH IN AT THIS POINT
TO RELEASE START
CLUTCH. (ACCESS FROM
BOTTOM OF PRINTER)

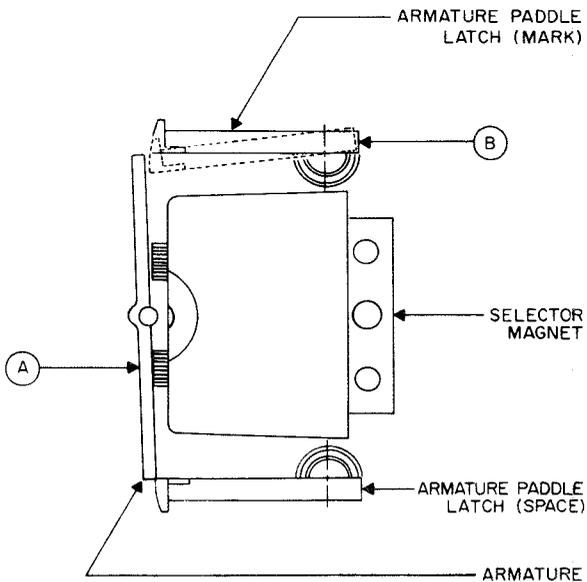


Figure 5-46. Selector Assembly

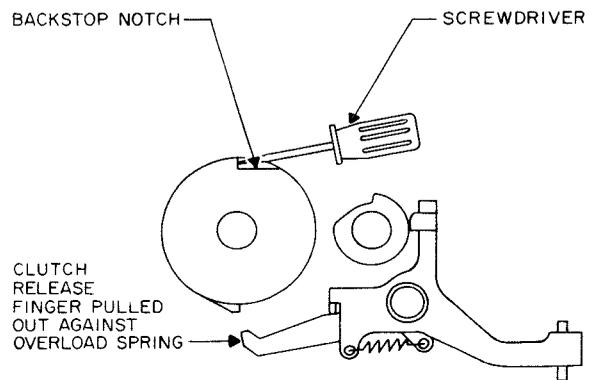
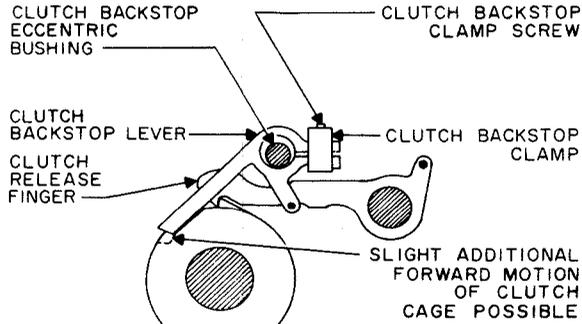
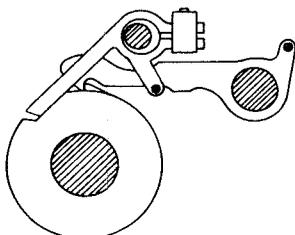


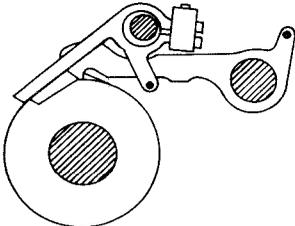
Figure 5-47. Advancing Clutches Manually



CLUTCH BACKSTOP CORRECTLY ADJUSTED



CLUTCH BACKSTOP EFFECTIVELY TOO SHORT



CLUTCH BACKSTOP EFFECTIVELY TOO LONG

Figure 5-48. Clutch Backstop Adjustment

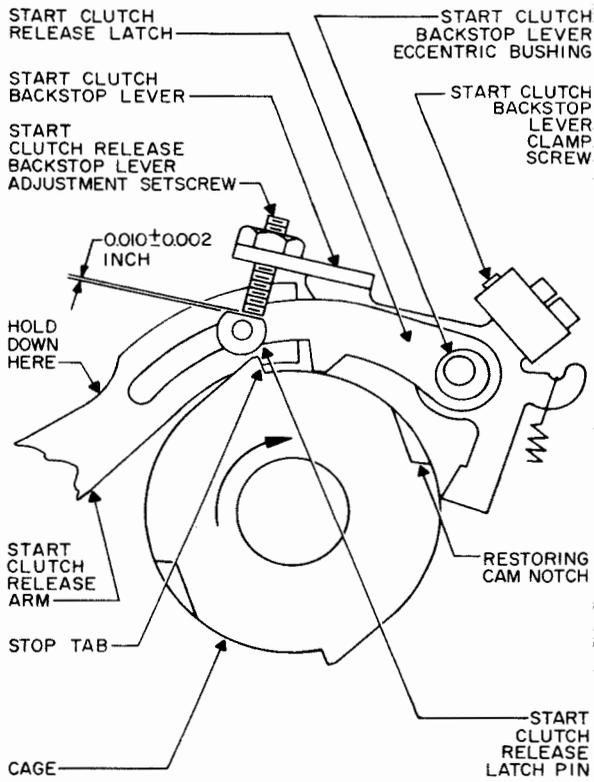


Figure 5-49. Start Clutch Release Adjustment

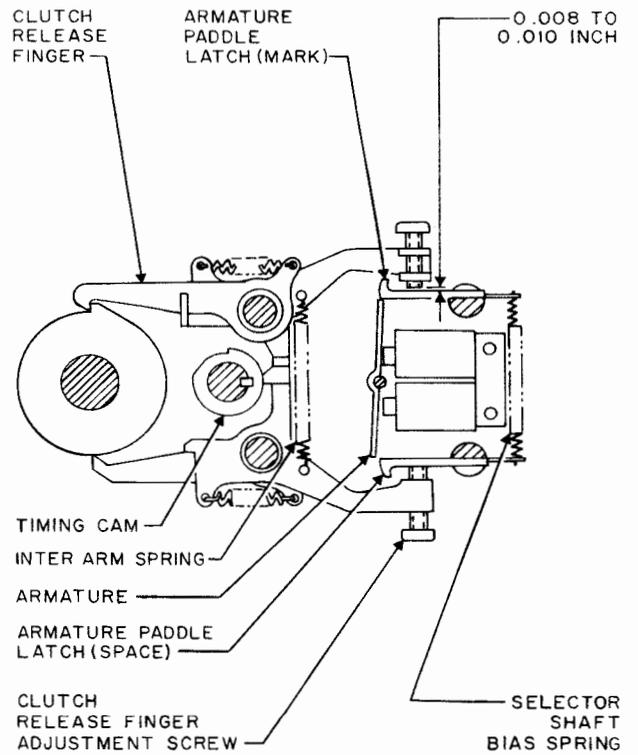


Figure 5-50. Selector Linkage Adjustment

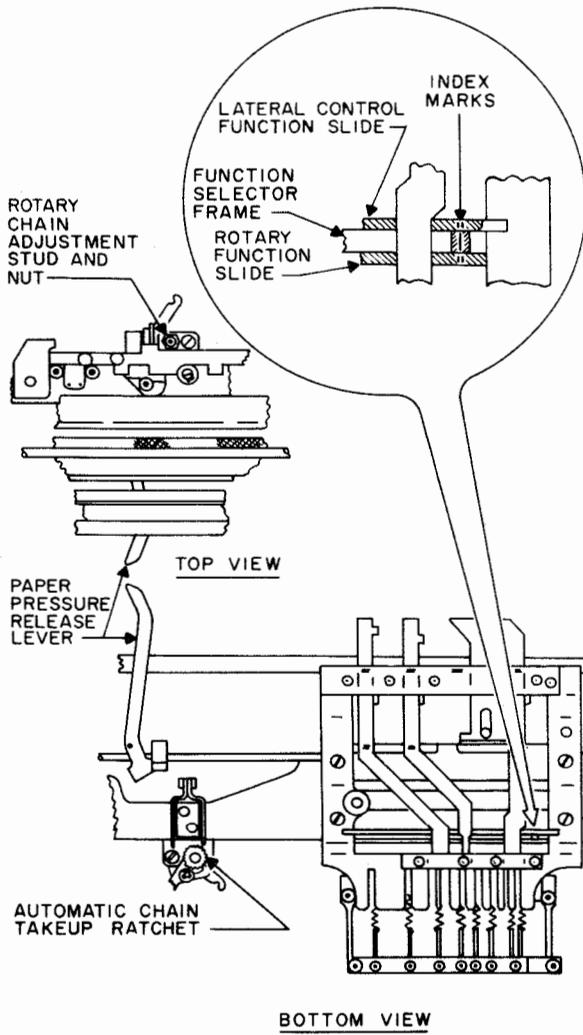


Figure 5-51. Function Slide Alignment

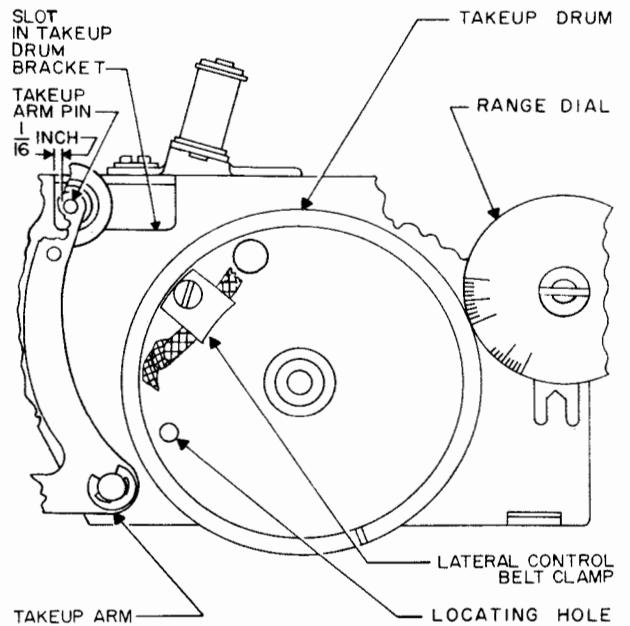


Figure 5-52. Lateral Control Belt Adjustment, Clearance Requirements

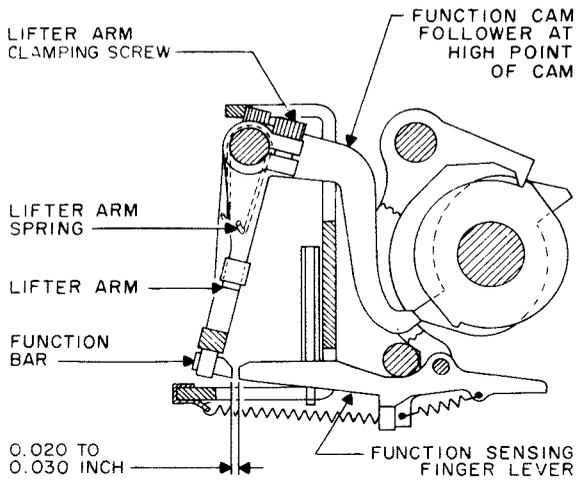
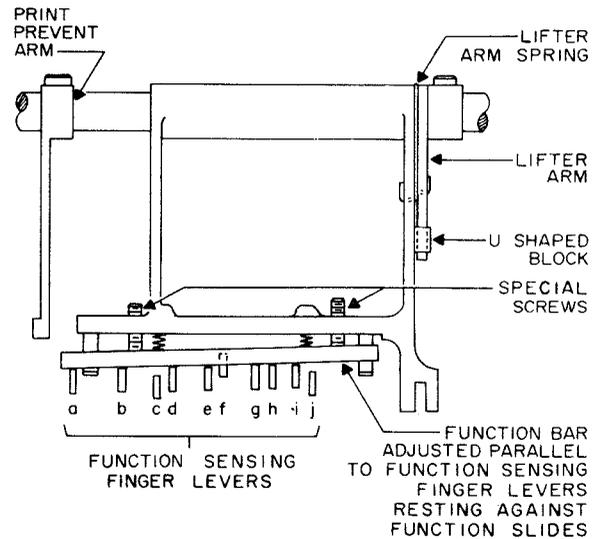


Figure 5-53. Function Shaft Adjustment



LEGEND

- | | |
|------------------------|------------------------------|
| a. BLANK | f. BELL |
| b. SPACE | g. LETTERS |
| c. AUTOMATIC LINE FEED | h. OFF LINE LETTERS |
| d. LINE FEED | i. CARRIAGE RETURN |
| e. FIGURES | j. AUTOMATIC CARRIAGE RETURN |

Figure 5-55. Function Bar and Function Sensing Finger Lever Alignment

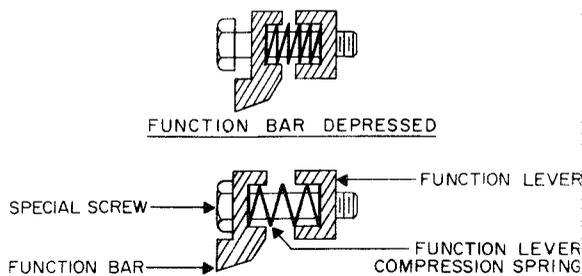


Figure 5-54. Function Bar Adjustment, Screw Position

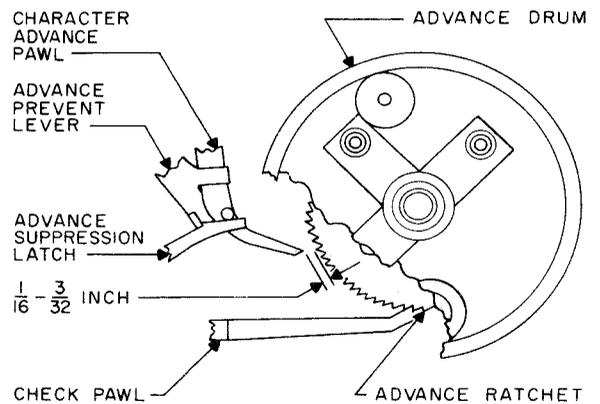


Figure 5-56. Advance Prevent Lever Engaged With Advance Suppression Latch

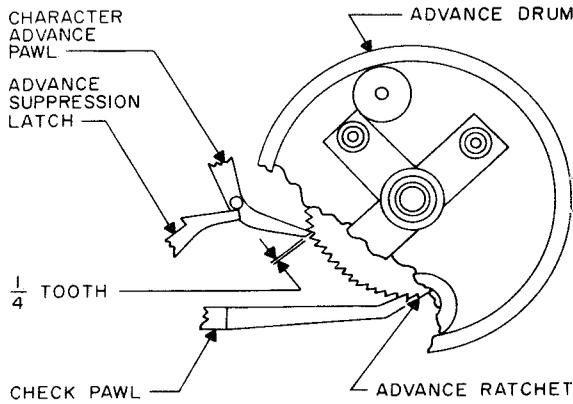


Figure 5-57. Character Advance Pawl And Advance Ratchet Tooth Clearance

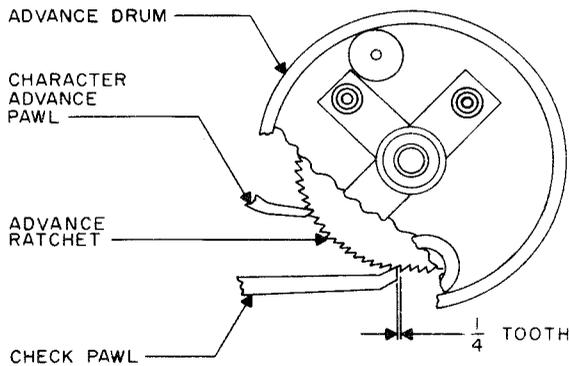


Figure 5-58. Check Pawl and Advance Ratchet Tooth Clearance

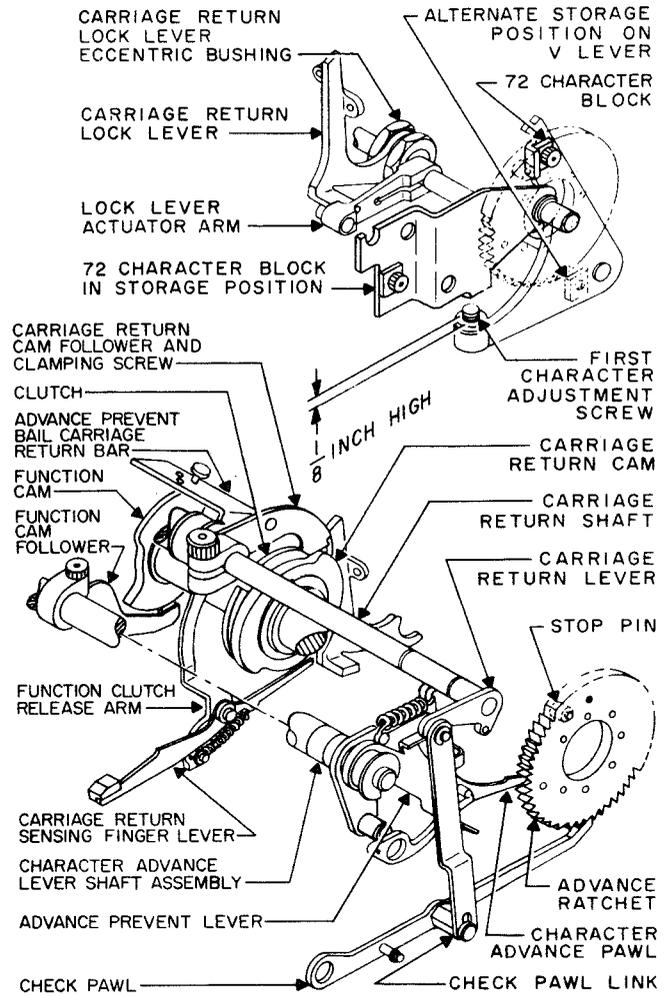


Figure 5-59. Carriage Return Linkage

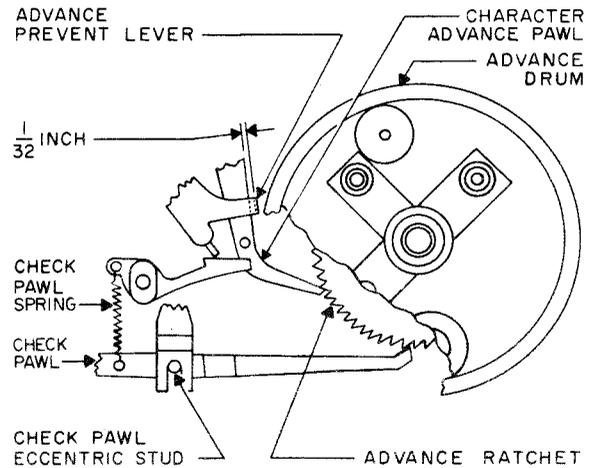


Figure 5-60. Carriage Return Lever Adjustment

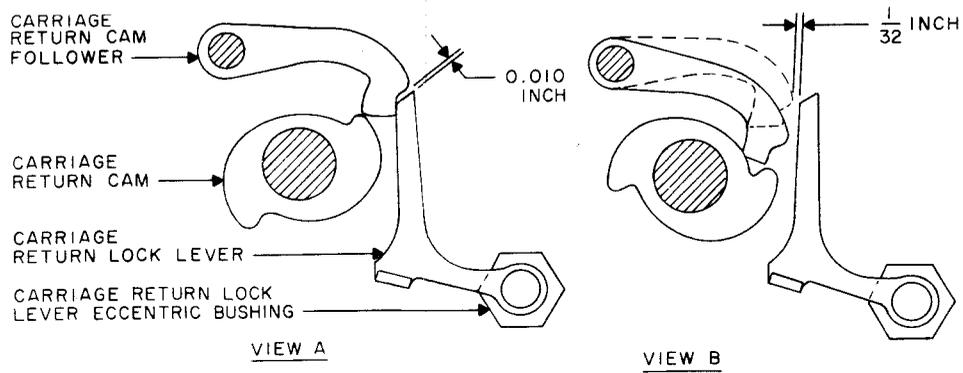


Figure 5-61. Carriage Return Lock Lever Eccentric Bushing Adjustment

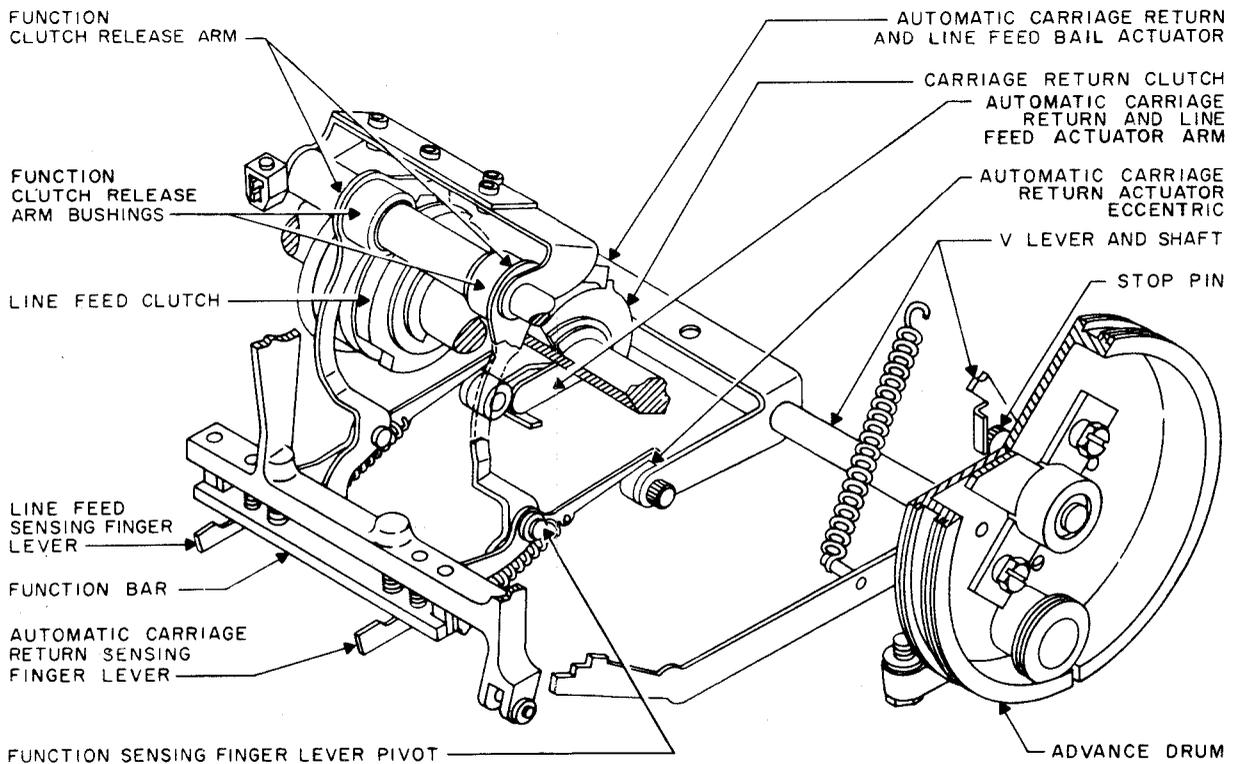


Figure 5-62. Automatic Carriage Return and Line Feed Linkage

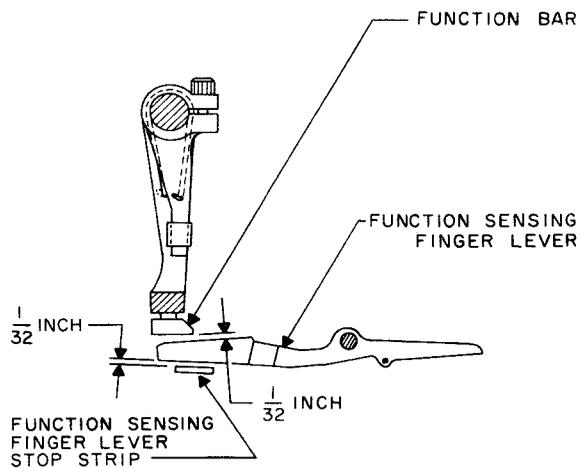


Figure 5-63. Function Bar and Function Sensing Finger Lever Clearance Adjustment

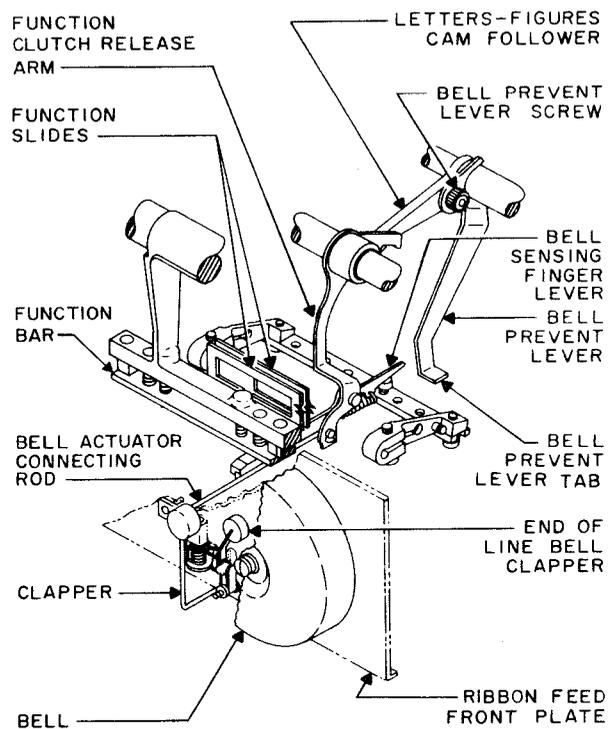


Figure 5-64. Bell Function Linkage

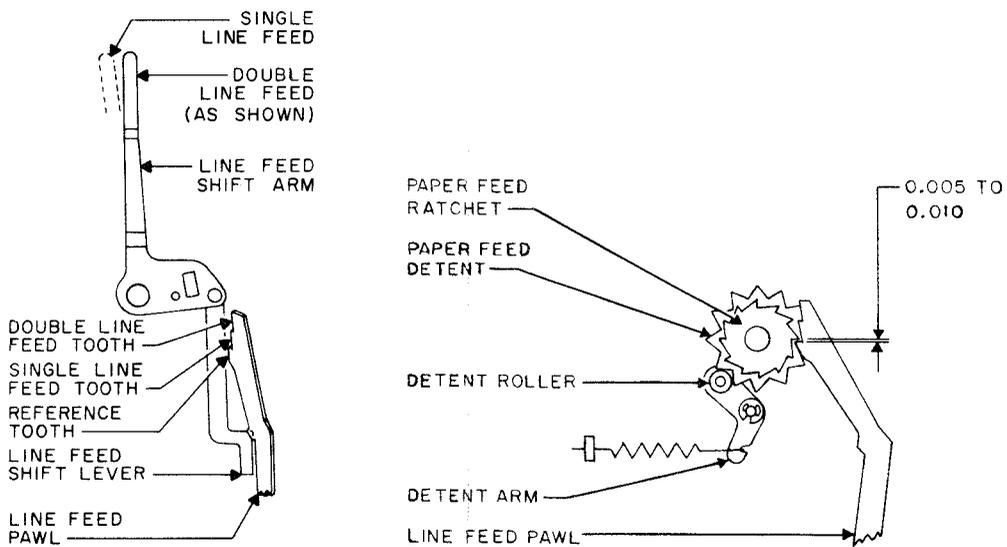
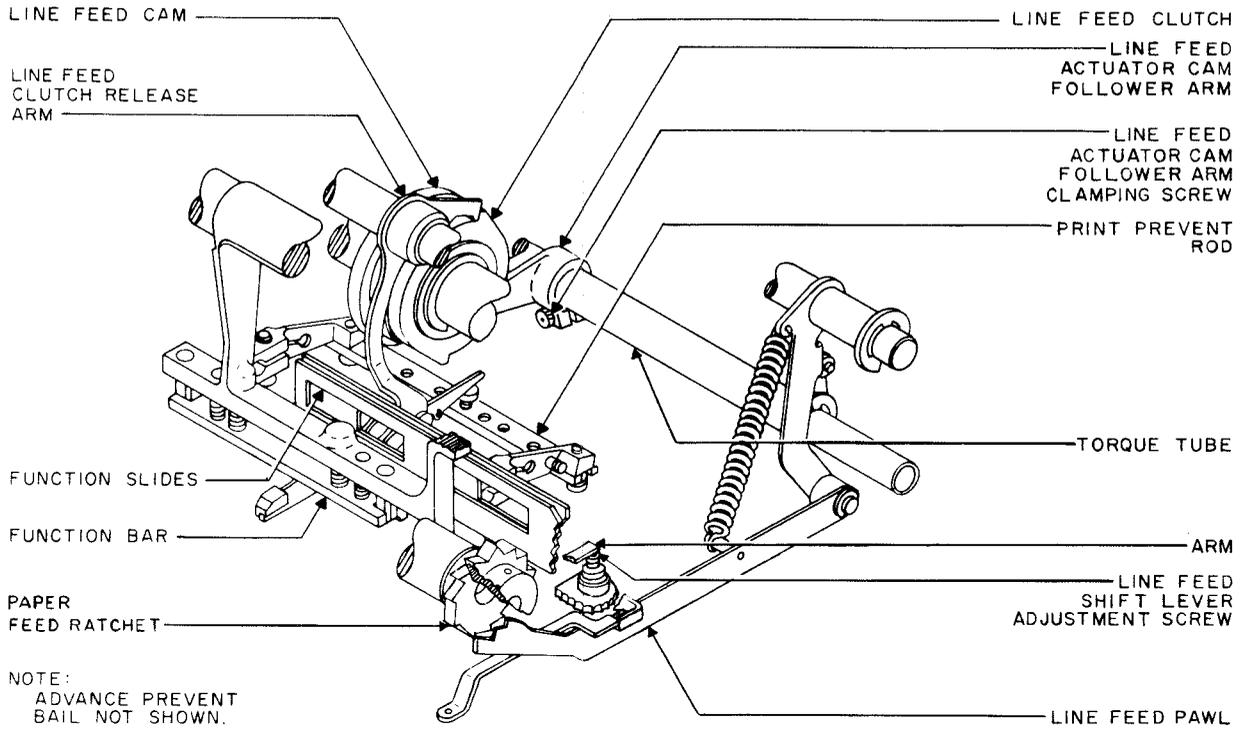


Figure 5-65. Line Feed Linkage

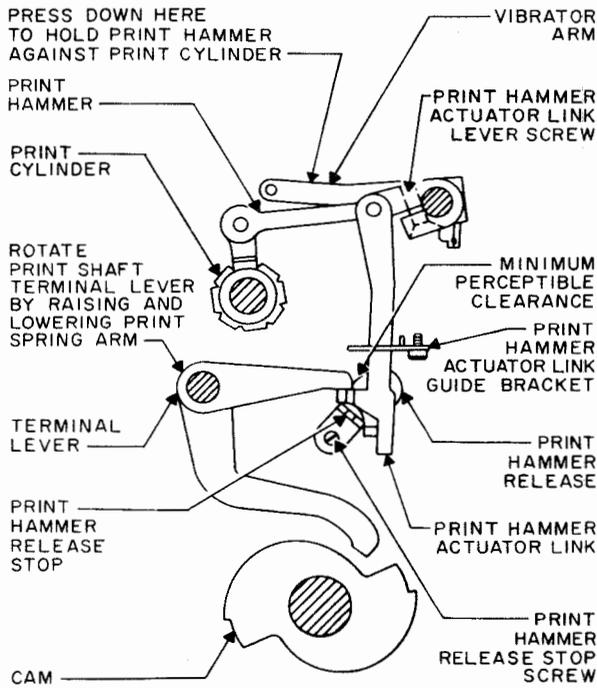


Figure 5-66. Print Hammer Release Adjustment

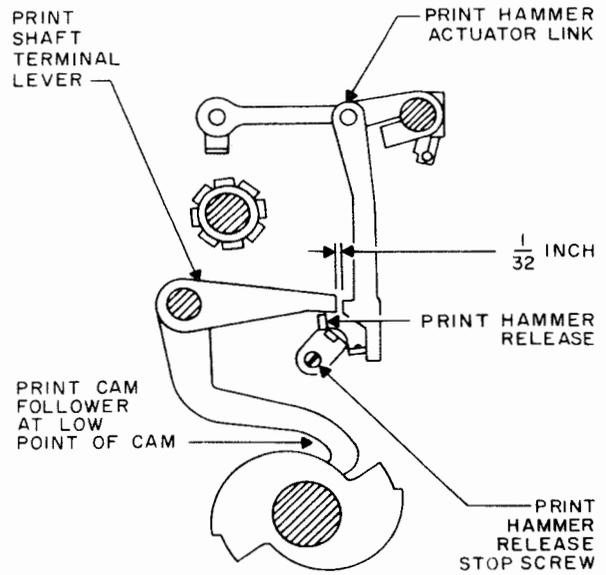


Figure 5-68. Print Linkage Adjustment

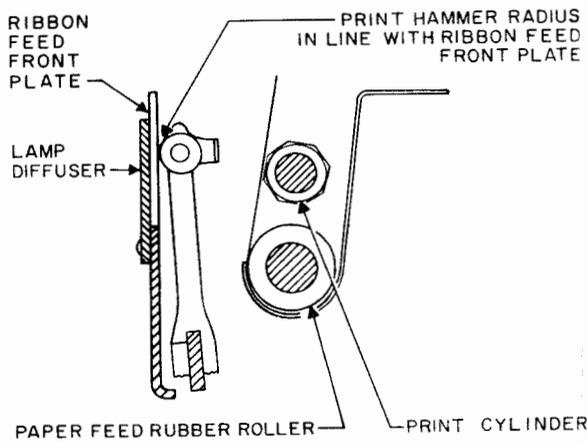


Figure 5-67. Print Hammer Backstroke Adjustment

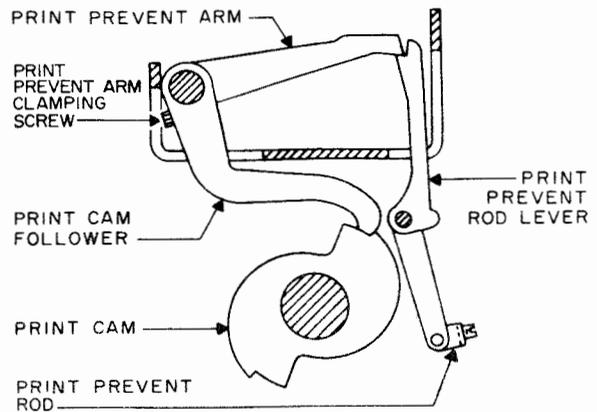


Figure 5-69. Print Prevent Arm Engaged With Print Prevent Rod Lever

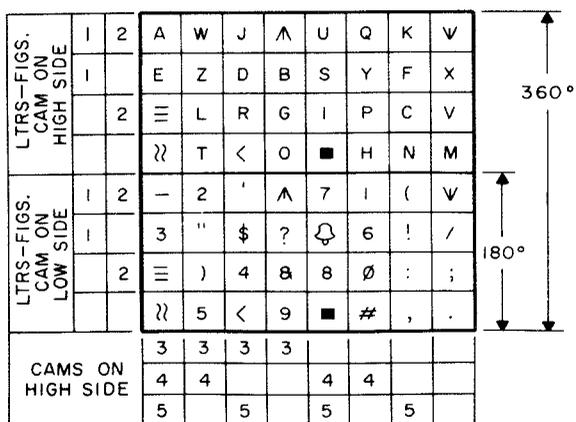


Figure 5-70. Plan View Of Print Cylinder

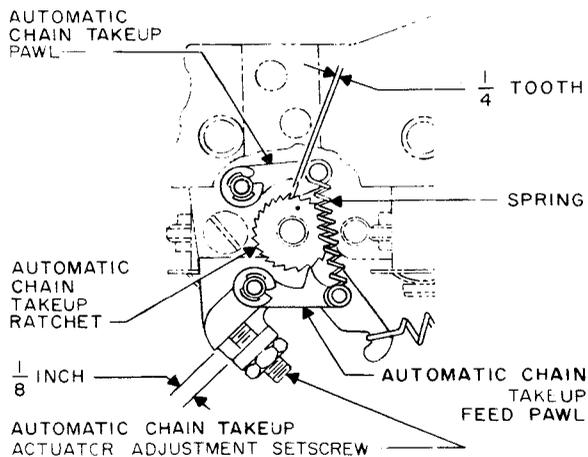


Figure 5-71. Automatic Lateral Control Chain Takeup Adjustment

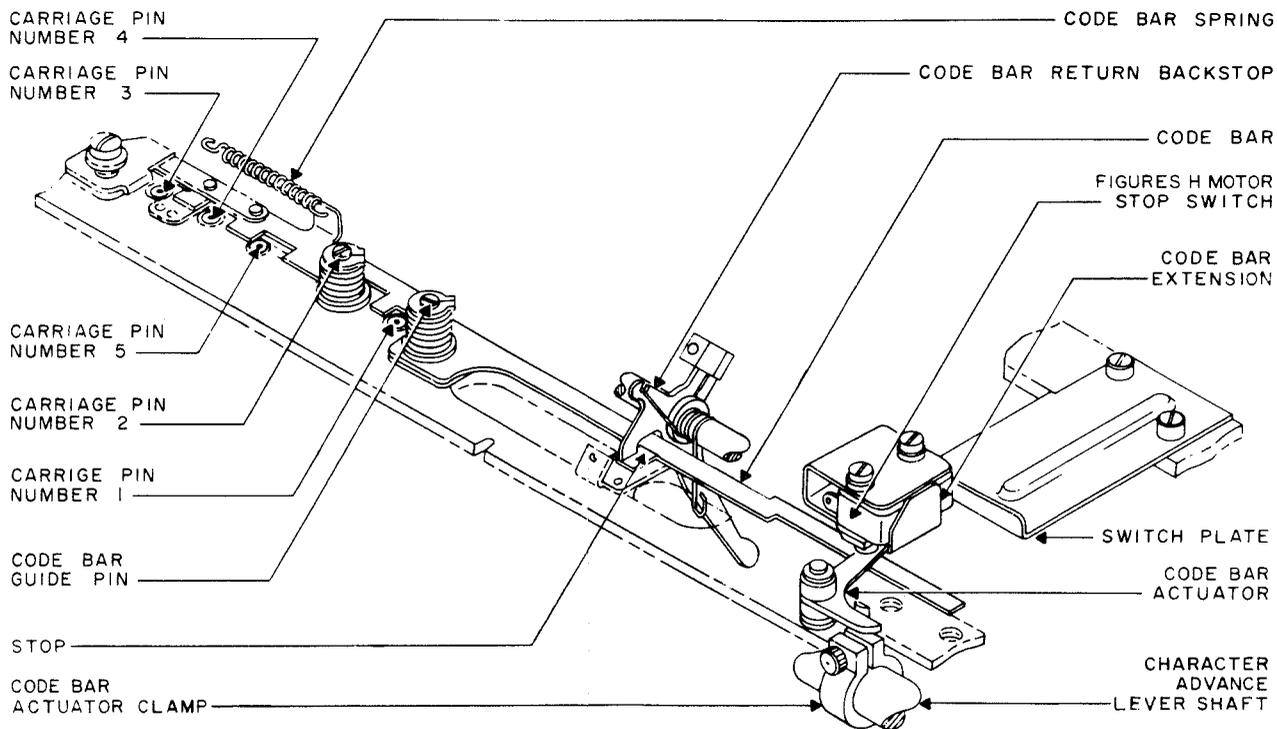
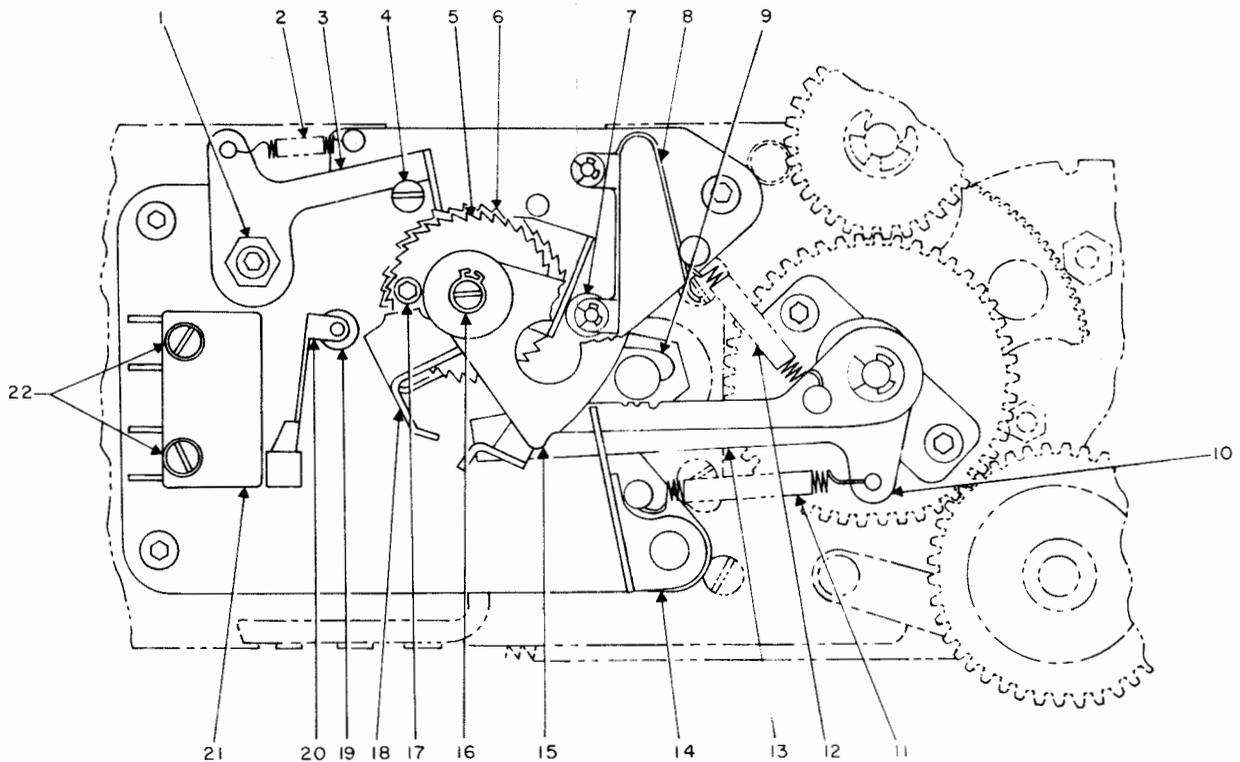
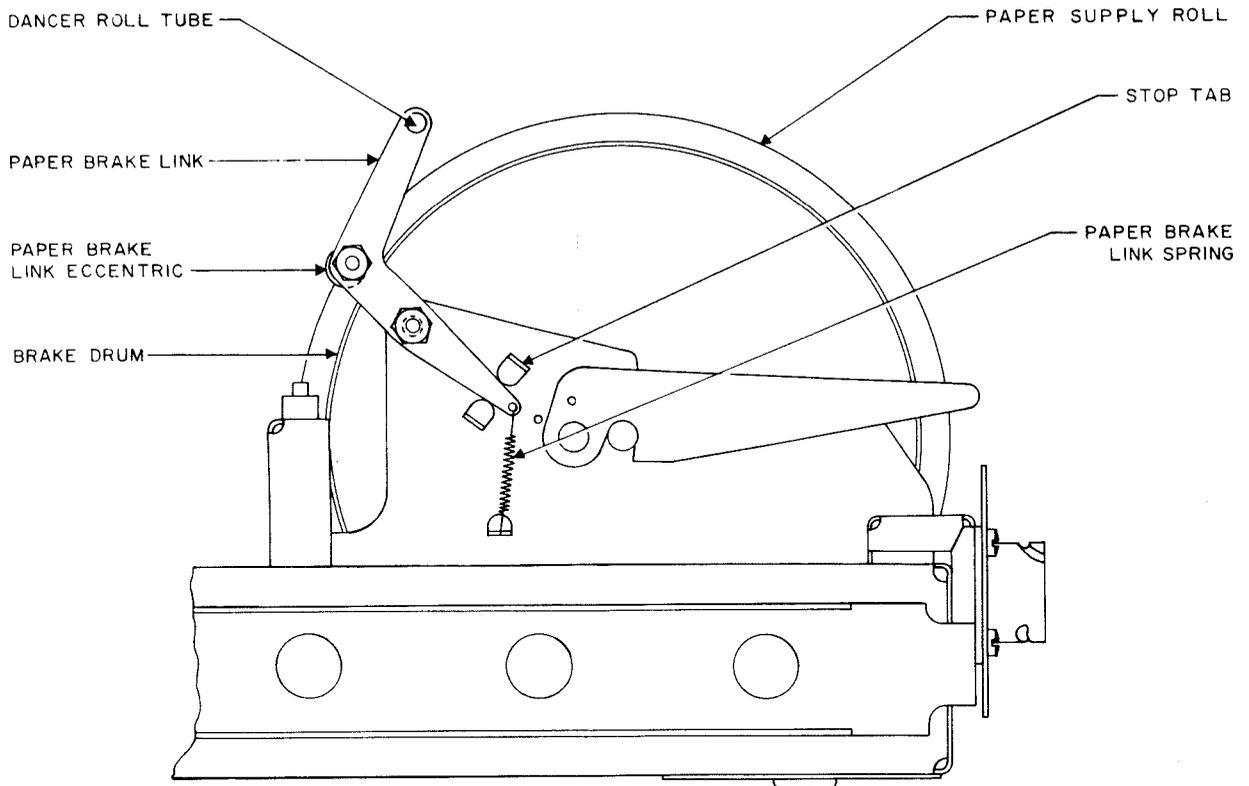


Figure 5-72. Figures H Motor Stop Adjustment



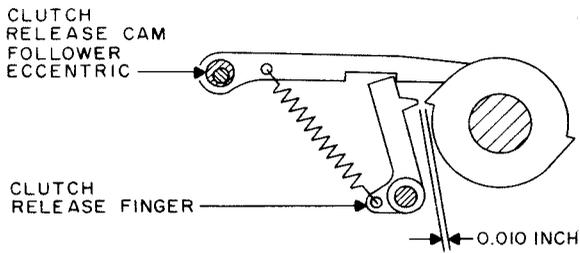
KEY	INDEX	KEY	INDEX
1	Time Delay Secondary Check Pawl Eccentric	12	Time Delay Check Pawl Helical Spring
2	Time Delay Secondary Check Pawl Stop Spring	13	Time Delay Check Pawl
3	Time Delay Secondary Check Pawl	14	Time Delay Feed and Check Pawl Guide
4	Post	15	Time Delay Latch
5	Advance Ratchet	16	Time Delay Ratchet Support Shaft
6	Reduction Ratchet	17	Button
7	Detent Spring Roller	18	Time Delay Yoke
8	Detent Spring	19	Time Delay Switch Actuator Roller
9	Timing Cam Shaft Extension	20	Time Delay Switch Actuator
10	Time Delay Feed Pawl	21	Time Delay Switch
11	Time Delay Feed Pawl Helical Spring	22	Screws

Figure 5-73. Time Delay Motor Stop Mechanism

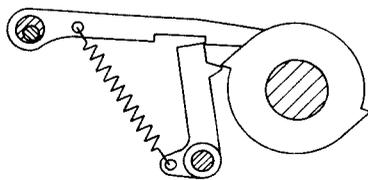


RIGHT SIDE VIEW OF
ELECTRICAL CHASSIS

Figure 5-74. Paper Brake Adjustment, Parts Location



ONE KEY DEPRESSED



TWO KEYS DEPRESSED

Figure 5-75. Clutch Release Cam Follower
Eccentric Adjustment

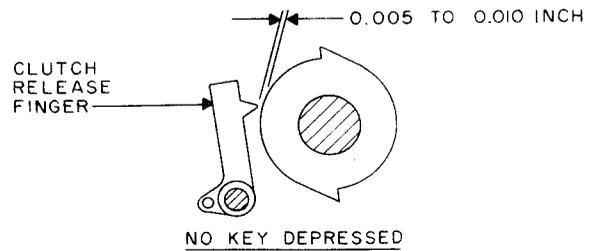
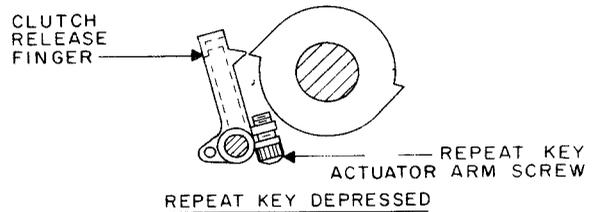


Figure 5-76. Repeat Key Actuator
Arm Adjustment

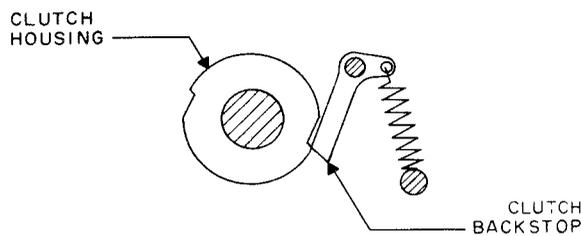


Figure 5-77. Backstop Eccentric Adjustment

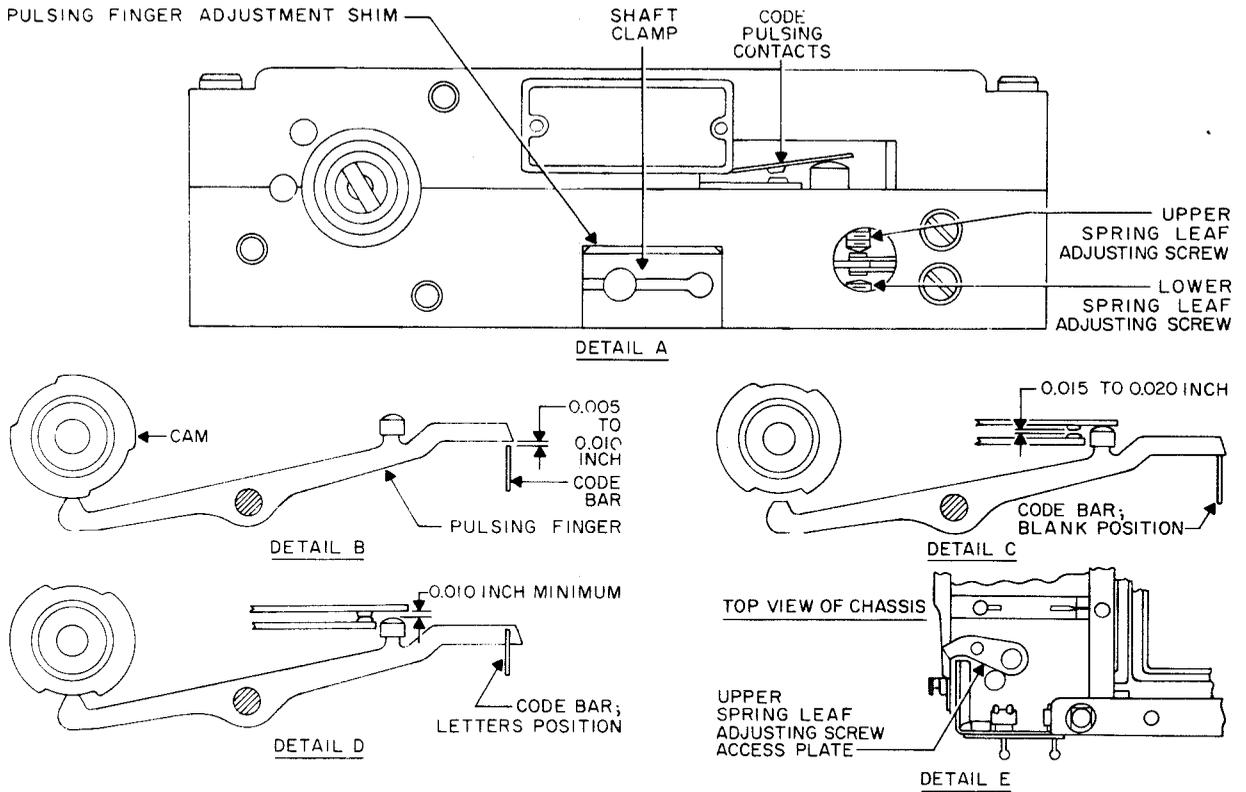


Figure 5-78. Keyboard Adjustment, Parts Location

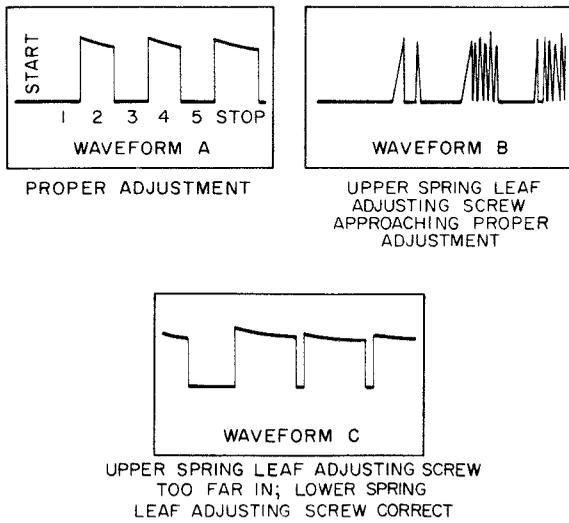


Figure 5-79. Waveforms For Transmitting Letters R

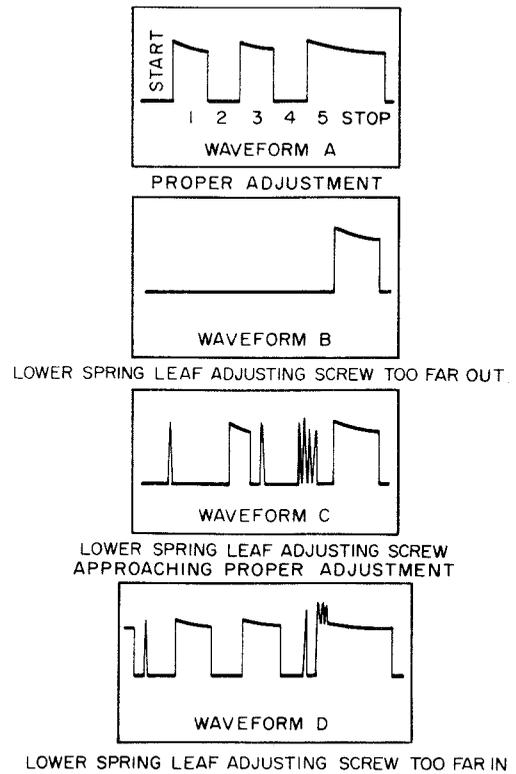
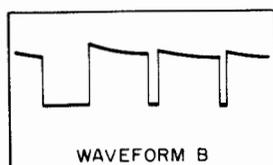
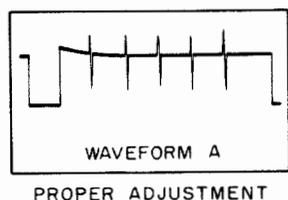
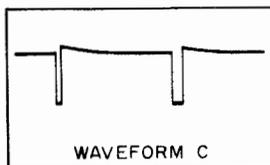


Figure 5-80. Waveforms For Transmitting Letters Y



UPPER SPRING LEAF
ADJUSTING SCREW TOO FAR IN
LOWER SPRING LEAF
ADJUSTING SCREW
CORRECT



LOWER SPRING LEAF
ADJUSTING SCREW TOO FAR IN
UPPER SPRING LEAF
ADJUSTING SCREW
CORRECT

Figure 5-81. Waveforms For Transmitting
Letters (LTRS)

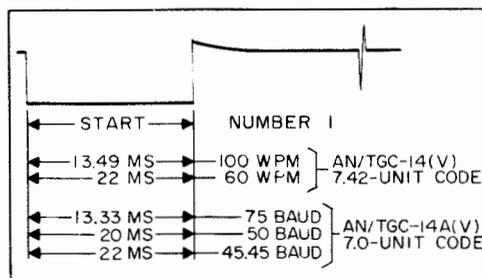


Figure 5-82. Waveform For Timing
Adjustment

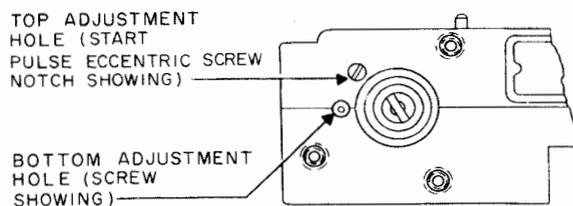


Figure 5-83. Keyboard Timing Adjustment

NOTES

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH THE UNIT NUMBER, OR ASSEMBLY DESIGNATION, OR BOTH.
2. ALL RESISTORS ARE 1/2 WATT ±5% AND VALUES ARE IN OHMS UNLESS OTHERWISE INDICATED.
3. ALL CAPACITORS ARE ±10% AND VALUES ARE IN MICROFARADS (UF) UNLESS OTHERWISE INDICATED.
4. ALL MEASUREMENTS OBTAINED WITH 20,000-OHMS-PER-VOLT METER. UNLESS OTHERWISE INDICATED, VALUES AT SIGNIFICANT TEST POINTS ARE TO COMMON GROUND, WITH ALL UNITS INTERCONNECTED, BUT WITH THE EQUIPMENT DEENERGIZED. SEE SECTION 4 FOR COMPLETE VOLTAGE READINGS.
5. PATCHED FOR SIMPLEX INTERNAL BATTERY OPERATION. FOR PATCHING OPTIONS SEE PARAGRAPH 2-9.
6. ALL DIODES ARE TYPE AFIN645 UNLESS OTHERWISE INDICATED.
7. THE SYMBOL  DENOTES A ZENER DIODE.

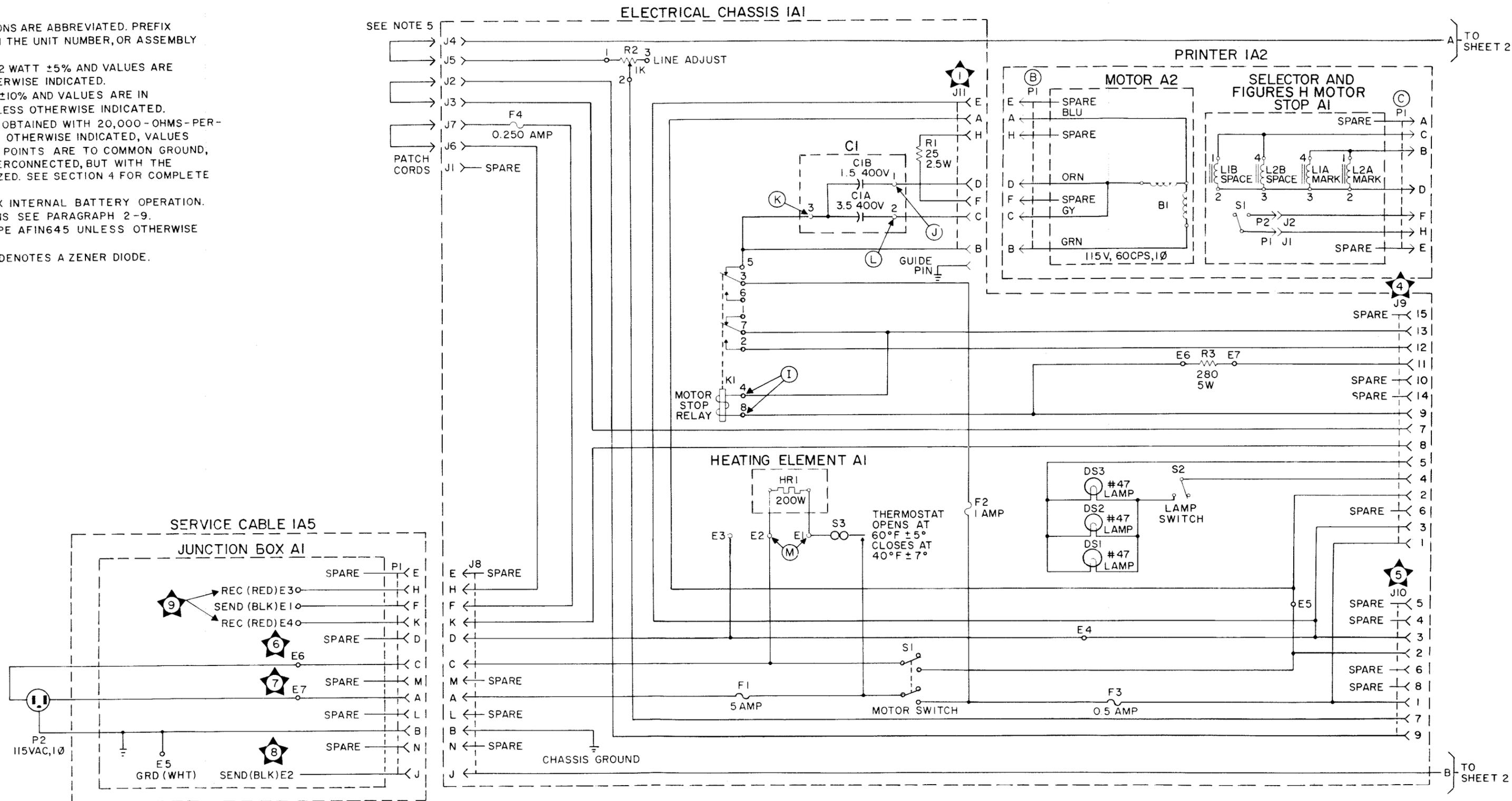


Figure 5-84. Teletypewriter Set AN/TGC-14(V), Schematic Diagram (Sheet 1 of 2)

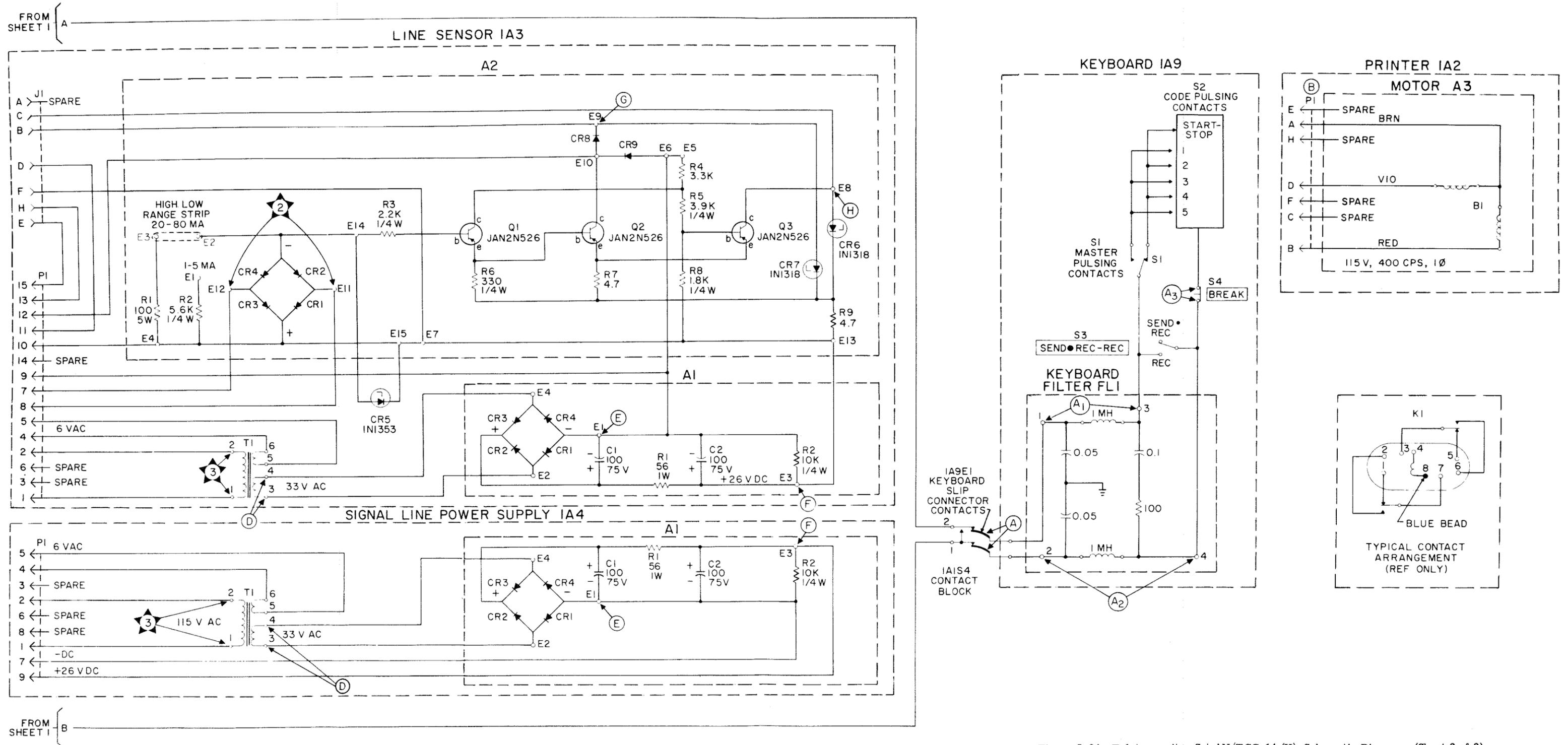


Figure 5-84. Teletypewriter Set AN/TGC-14 (V), Schematic Diagram (Sheet 2 of 2)

NOTES

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH THE UNIT NUMBER, OR ASSEMBLY DESIGNATION, OR BOTH.
2. ALL RESISTORS ARE 1/2 WATT $\pm 5\%$ AND VALUES ARE IN OHMS UNLESS OTHERWISE INDICATED.
3. ALL CAPACITORS ARE $\pm 10\%$ AND VALUES ARE IN MICROFARADS (UF) UNLESS OTHERWISE INDICATED.
4. ALL MEASUREMENTS OBTAINED WITH 20,000-OHMS-PER-VOLT METER. UNLESS OTHERWISE INDICATED, VALUES AT SIGNIFICANT TEST POINTS ARE TO COMMON GROUND, WITH ALL UNITS INTERCONNECTED, BUT WITH THE EQUIPMENT DEENERGIZED. SEE SECTION 4 FOR COMPLETE VOLTAGE READINGS.
5. PATCHED FOR SIMPLEX INTERNAL BATTERY OPERATION. FOR PATCHING OPTIONS SEE PARAGRAPH 2-9.
6. ALL DIODES ARE TYPE AFIN645 UNLESS OTHERWISE INDICATED.
7. THE SYMBOL  DENOTES A ZENER DIODE.

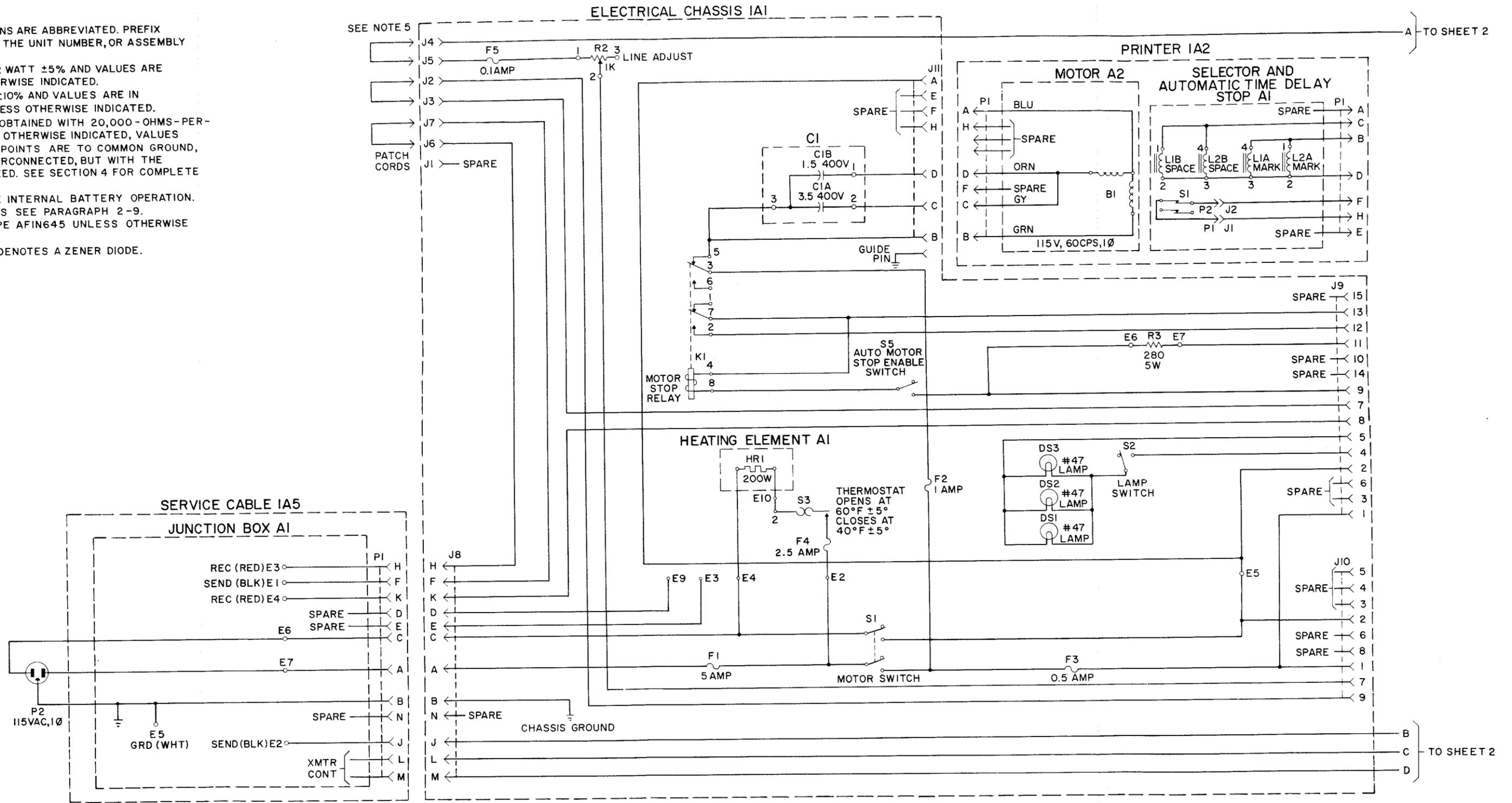


Figure 5-85. Teletypewriter Set AN/TGC-14A(V), Schematic Diagram (Sheet 1 of 2)

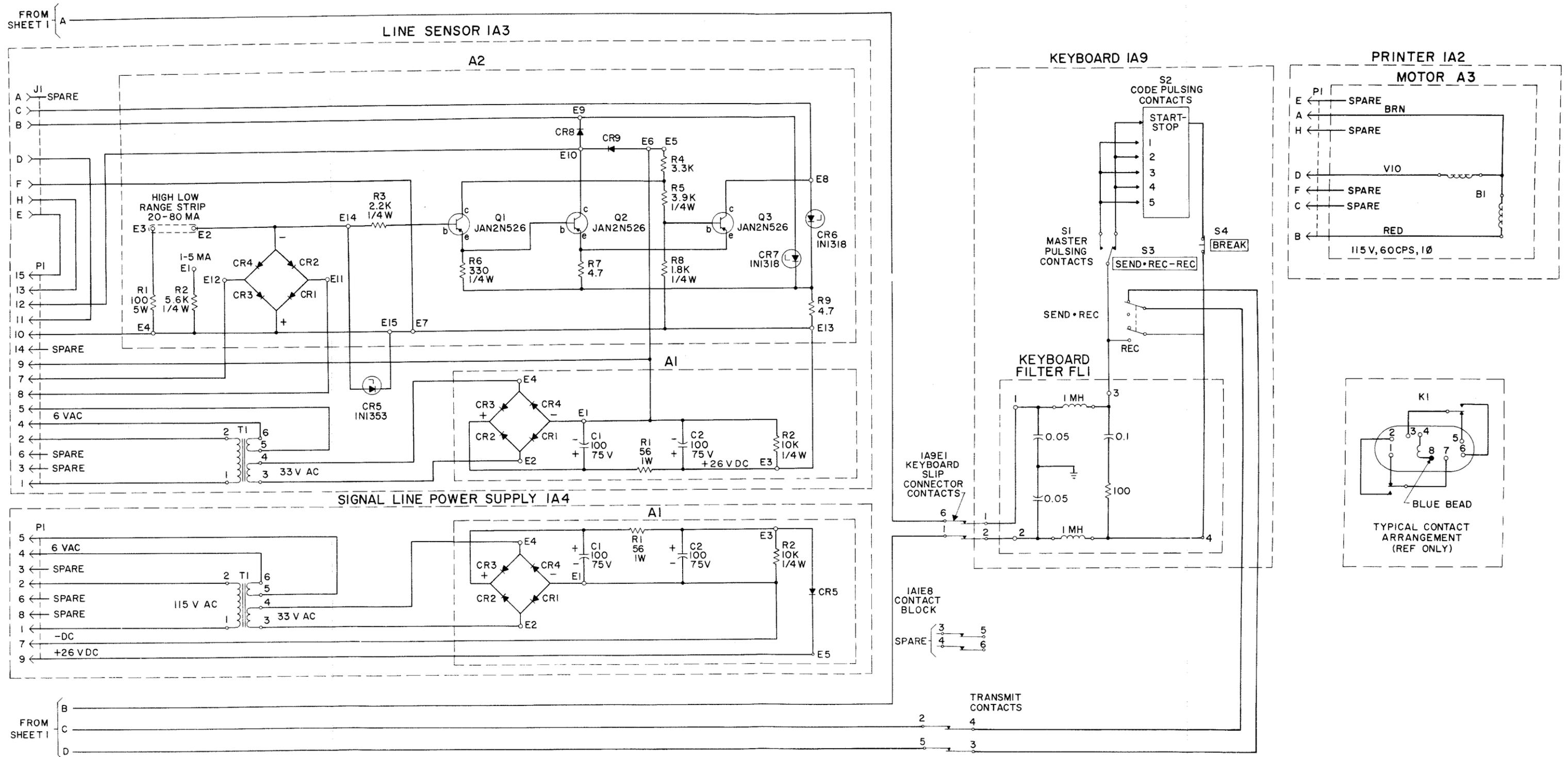


Figure 5-85. Teletypewriter Set AN/TGC-14A(V), Schematic Diagram (Sheet 2 of 2)

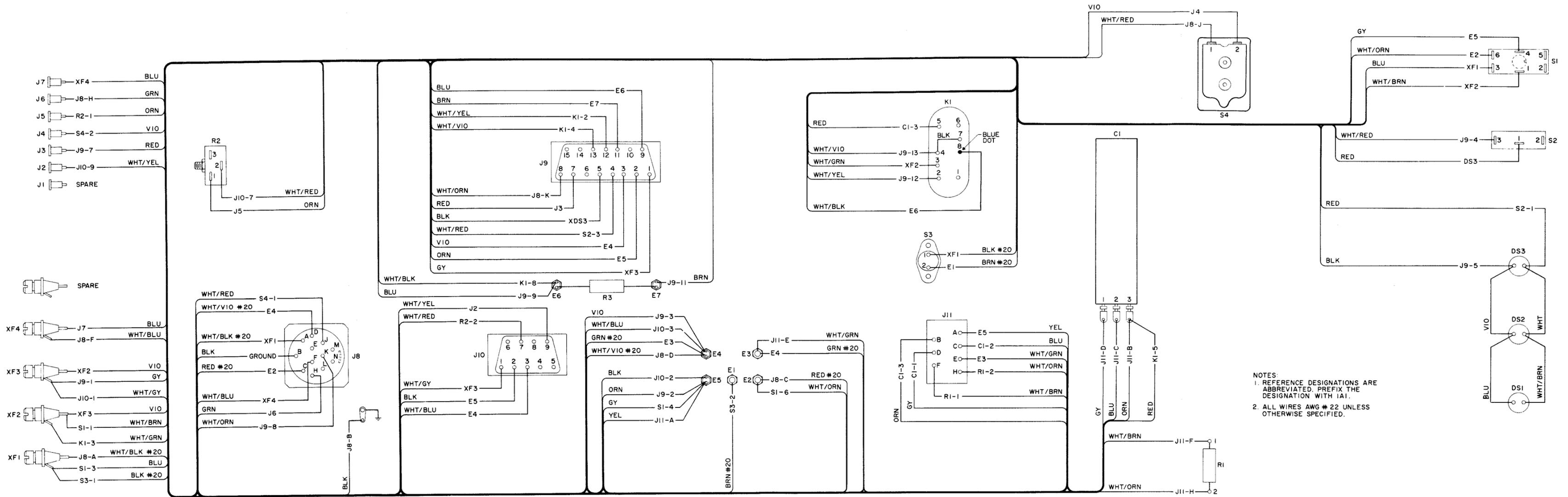


Figure 5-86. Teletypewriter Set AN/TGC-14(V), Wiring Diagram

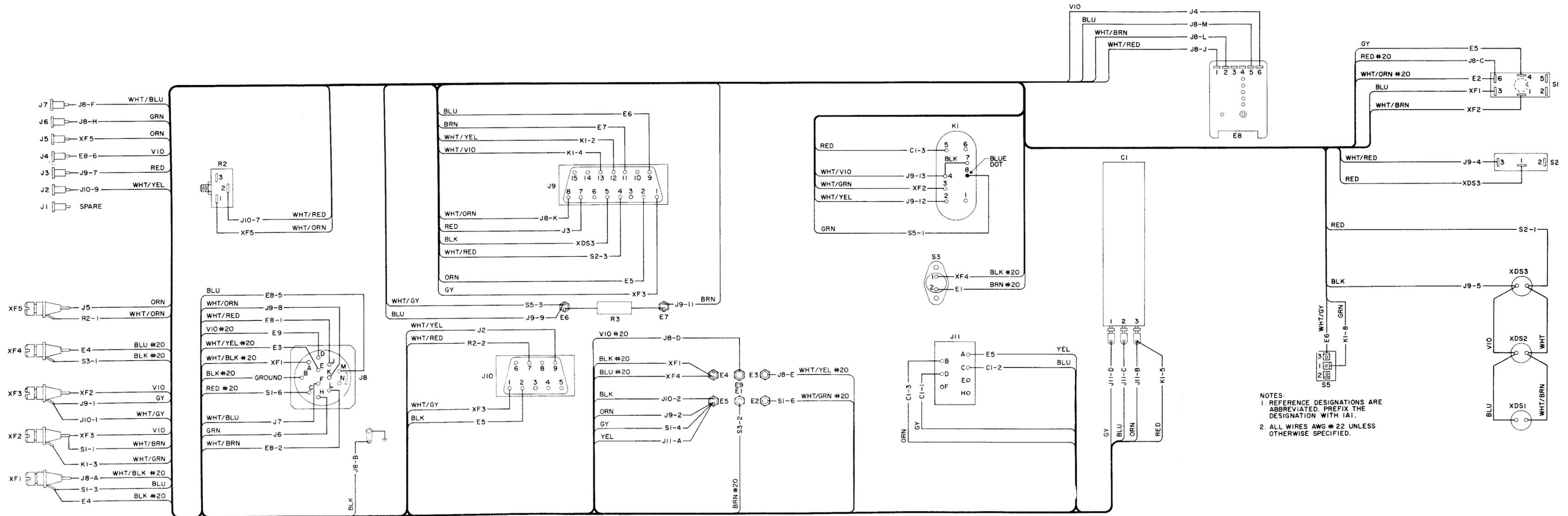
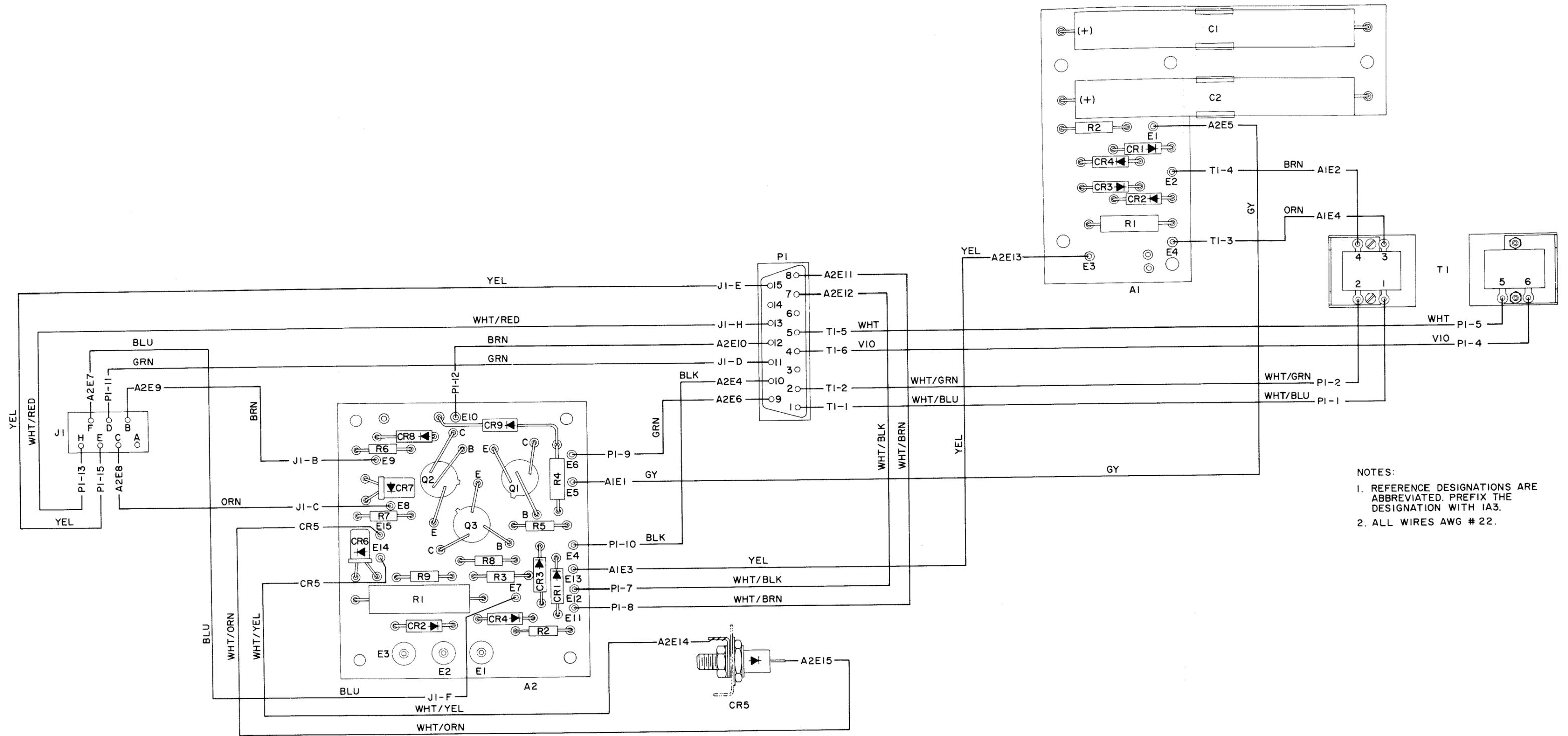


Figure 5-87. Teletypewriter Set AN/TGC-14A(V), Wiring Diagram

ORIGINAL

A-205/A-206



- NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH IA3.
 2. ALL WIRES AWG # 22.

Figure 5-88. Line Sensor, Wiring Diagram

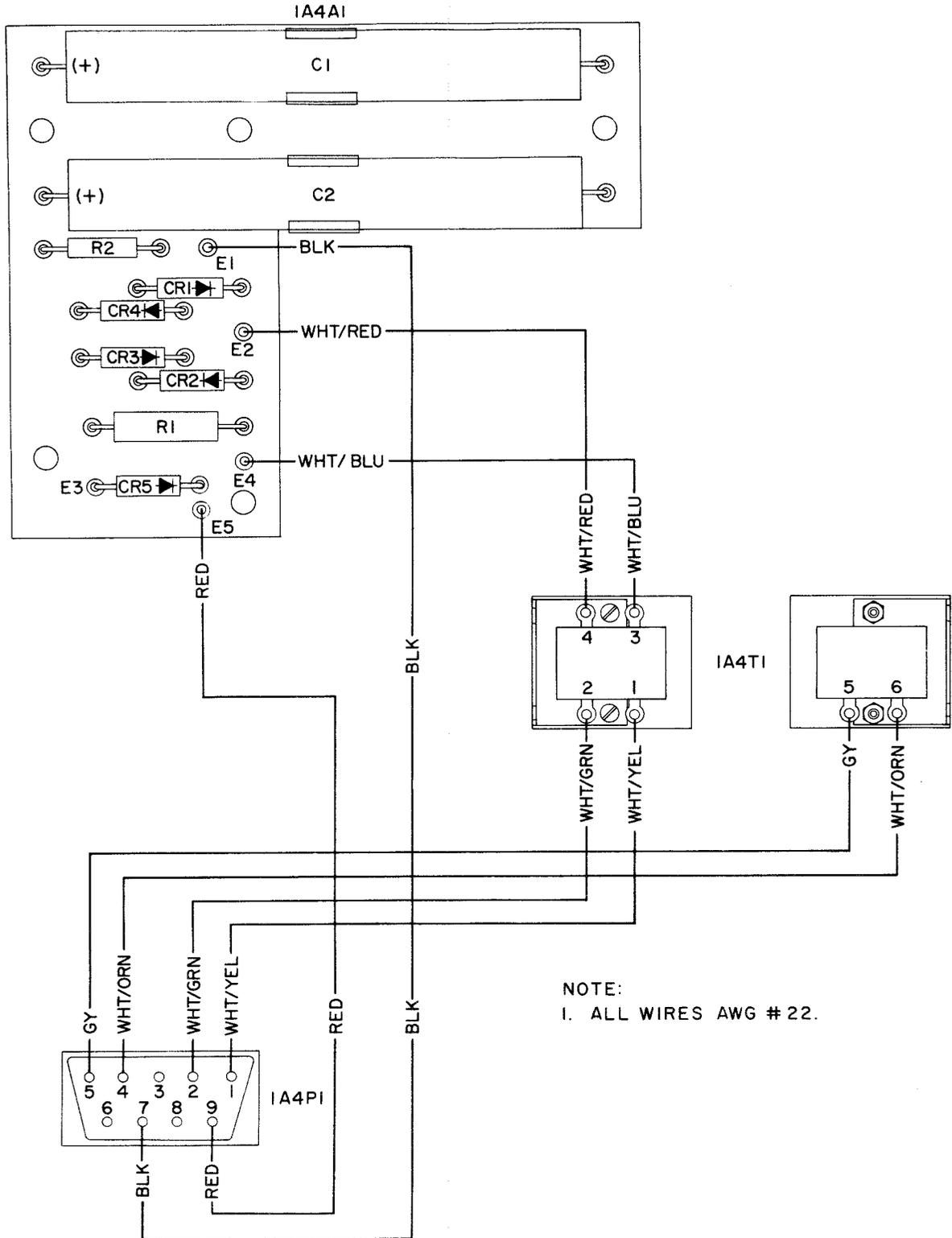


Figure 5-89. Signal Line Power Supply, Wiring Diagram

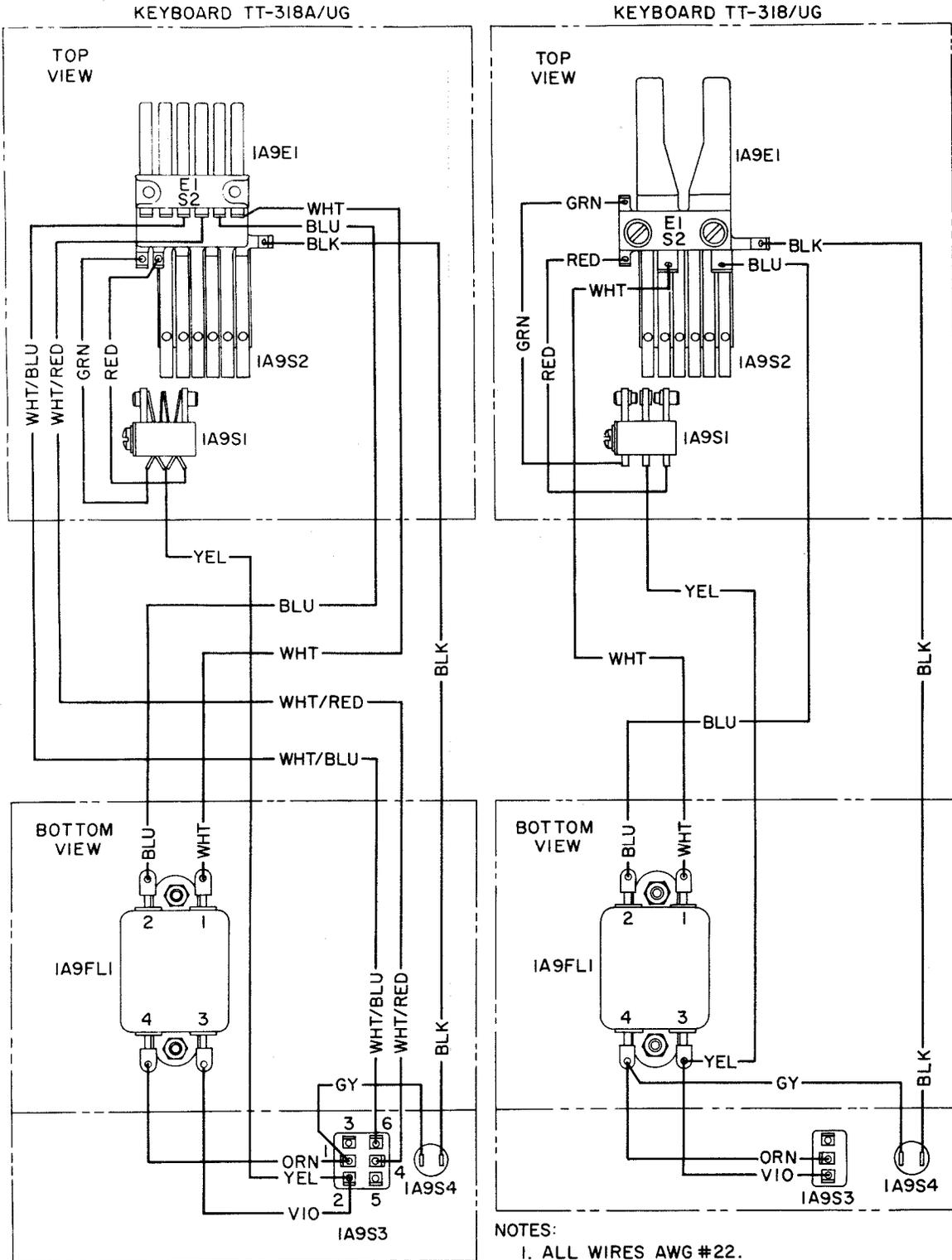


Figure 5-90. Keyboard TT-318/UG and TT-318A/UG, Wiring Diagram

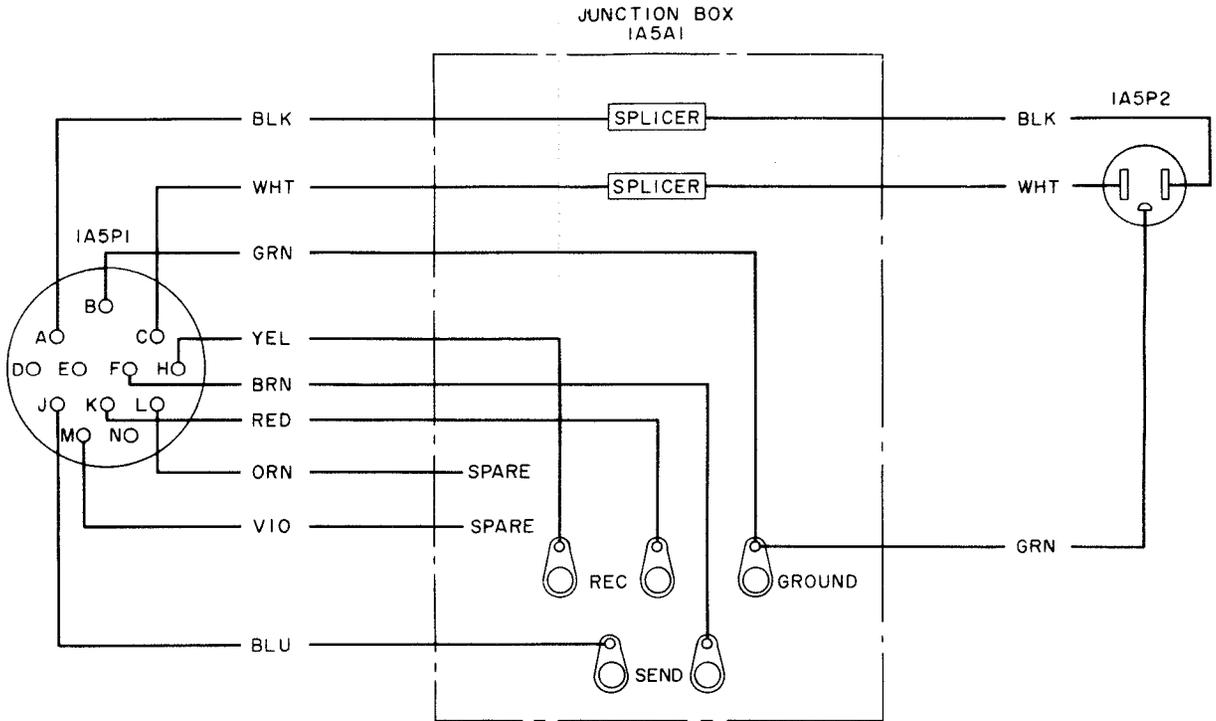


Figure 5-91. Service Cable, Wiring Diagram

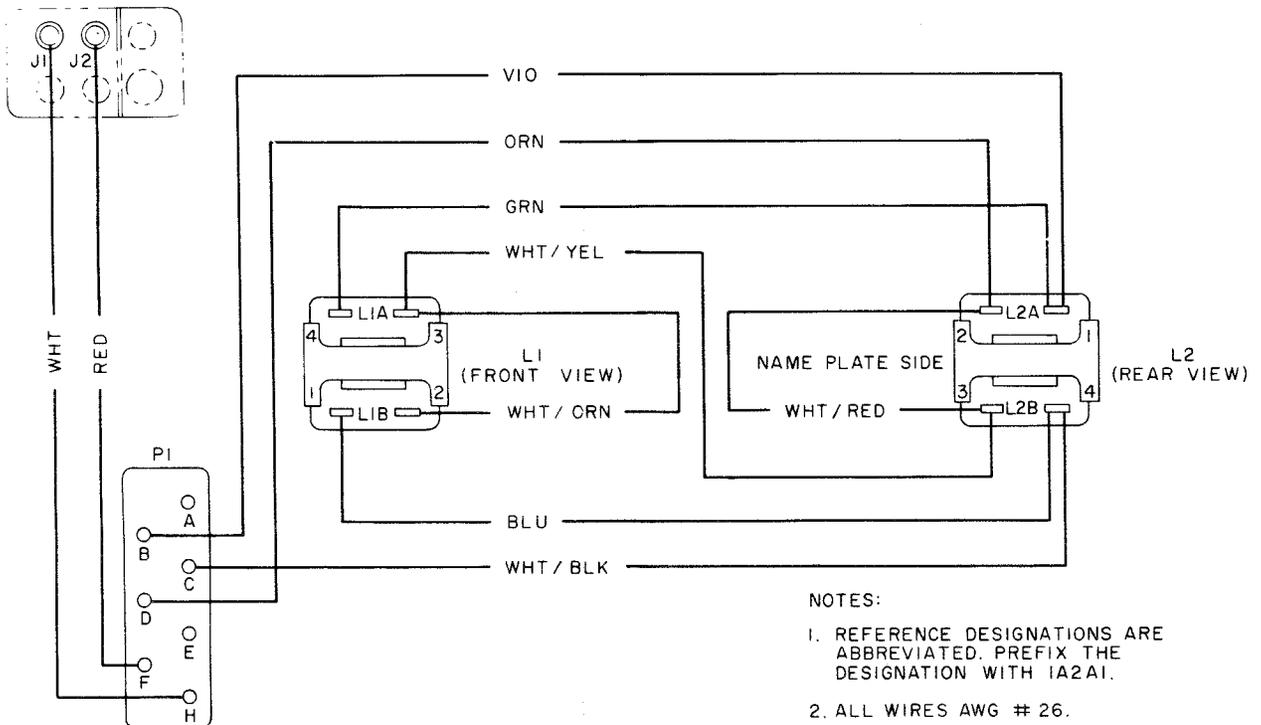


Figure 5-92. Selector, Wiring Diagram

SECTION 6
PARTS LIST

6-1 INTRODUCTION

6-1.1 This parts list and illustrated Parts Breakdown lists, describes and illustrates the parts for the Teletypewriter TT-299A/UG, Part Number A0009, TT-298A/UG, Part Number 30600-5, TT-299B/UG, Part Number 30600-2 and TT-298B, Part Number 30600-4 all manufactured by the MITE Corporation, New Haven, Conn. The difference between these machines is indicated by a code in the usable on code column. This column is explained in Section 6-2.8. This breakdown will be used for requisitioning, storing, issuing and identifying parts. This parts list consists of three (3) Sections as follows:

6-2 Group Assy Parts List

6-3 Numerical index

6-4 Maintenance Parts List
(Reference Designation Index in detail)

6-2 GROUP ASSEMBLY PARTS LIST

6-2.1 GENERAL. Section I Group Assembly Parts List, consists of a breakdown of the complete unit into sub-assemblies and detailed parts. Each assembly is listed in its order of disassembly and is followed immediately by its component parts properly indented below it, to show their relationship to the assembly. Attaching parts are listed immediately following the parts which they attach. Items which are made from raw stock, such as cut lengths of wire, insulating materials, and seal wire are not included in the Group Assembly Parts List.

6-2.2 FIGURE AND INDEX NUMBER COLUMN. In this column, the digits preceding the hyphen refer to the figure in the Parts Breakdown on which a part or assembly is illustrated. The digits following the hyphen are the index numbers of procurable and non-procurable parts and assemblies. The index numbers are numerically arranged in the Group Assembly Parts List and are used mainly to assist in locating a part in the Group Assembly Parts List after it has been found in the Numerical Index. An assembly is given no index number when its component parts are listed immediately after the assembly.

6-2.3 PART NUMBER COLUMN. In this column are listed either the MITE part numbers, AN(Air Force-Navy), JAN (Joint Army-Navy), MS (Military Standard) part numbers, or part numbers of vendors other than MITE.

6-2.4 DESCRIPTION COLUMN. In this column is listed each assembly, its attaching parts, and components of the assembly. The indenture of the listings indicates the relationship of component parts to their assembly.

6-2.5 MANUFACTURER'S CODE. At the end of the description is given the manufacturer's code, as assigned by Cataloging Handbook H4-1, Federal Supply Code for Manufacturers. When no code is given the Manufacturer is the MITE Corporation

6-2.6 MANUFACTURER'S CODE SYMBOLS. The code symbols used in this Illustrated Parts Breakdown together with the name and address of the manufacturer, are as follows:

MANUFACTURER'S CODE

CODE	NAME AND ADDRESS
02660	American Phenolic Corp. Chicago, Ill.
03544	Belling and Lee, Ltd. Enfield, Middlesex, England
04426	Licon Division Illinois Tool Works Chicago, Ill.
09083	MITE Corporation Engineering Labs formerly of Paramus, N.J.
26344	MITE Corporation New Haven, Connecticut
24446	General Electric Co. Schenectady, N.Y.
56878	Standard Pressed Steel Co. Jenkintown, Pa.
70309	Allied Control Co., Inc. New York, N.Y.
71286	Camloc Fastener Corp. New York, N.Y.
73957	Groov Pin Corp. Union City, N.J.
76385	Minor Rubber Co., Inc. Newark, N.J.
78189	Shakeproof, Inc., Division of Illinois Tool Works Chicago, Ill.
79136	Waldes Koh-I-Noor, Inc. Long Island City, N.Y.
80035	Winchester Electronics Co. New York, N.Y.
80120	Schnitzer Alloy Products Co. Elizabeth, N.J.
80756	Ramsey Corp. St. Louis, Mo.
81312	Winchester Electronics Co. Glenbrook, Conn.
81349	Military Specifications
83086	New Hampshire Ball Bearing Inc. Peterborough, N.H.
88044	Aeronautical Standards Group Departments of Air Force & Navy Washington, D.C.
91629	Continental Rubber Works Boston, Mass.
96906	Military Standards
97481	Joint Army-Navy Air Forces Standards

MANUFACTURER'S CODE

PARTS LIST

6-2.7 UNITS PER ASSEMBLY COLUMN. This column lists the quantity of assemblies or parts required in the immediately preceding assembly of which the given part or assembly is a component. "Ref" refers to an assembly which is completely assembled on a preceding illustration, and is now exploded on the illustration on which it is referenced.

6-2.8 USABLE ON CODE COLUMN. Part variations within the groups of equipment are indicated by a letter symbol immediately following the units per assembly, in the "Usable on Code" column. To determine applicability of the codes used, the following cross reference is given:

Code	Applicability
A	TT-299A/UG Serial #A1-A74
A	TT-298A/UG Serial # (None)
B	TT-299B/UG Serial #A1-A553
C	Applicable to all machines
D	TT-299B/UG Serial #B001-B522
D	TT-298B/UG Serial #A001-A302

The primary difference between the Teletypewriter TT-299 series and the Teleprinter TT-298 series is that the Teleprinter TT-298 series is a receive only machine and therefore has no Keyboard, TT-318()/UG. Further, the TT-299A/UG machines utilize the 7.0 Baudot code system whereas the TT-298B/UG and the TT-299B/UG machines utilize the 7.42 Baudot Code.

6-3 NUMERICAL INDEX

6-3.1 GENERAL. Section II Numerical Index, is a complete listing of all part numbers that appear in the Group Assembly Parts List. The listing also includes Stock Number, Figure and Index Number, Source Code and Material Accountability Recoverability Code.

6-3.2 PART NUMBER COLUMN. In this column are listed part numbers for procurable and non-procurable parts and assemblies in the Group Assembly Parts List.

6-3.3 STOCK NUMBER COLUMN. In this column of the Numerical Index, Section II, are listed the Federal Stock Numbers as assigned by the various Procuring Departments. The Stock Number consists of a class code prefix followed by a serial number of the part number. When a serial number has been assigned, the class code and serial number form the stock number; when a serial number has not been assigned, the class code and part number form the stock number. In the event a Federal Stock Number has not been assigned to an item appearing in the Illustrated Parts Breakdown, reference should then be made to the Master Cross Reference Index Publication Number S-00-1-1 or Allowance Parts List (APL) issued by the Electronic Supply Office (ESO). (Not applicable to this list)

6-3.4 FIGURE AND INDEX NUMBER COLUMN. In this column which appears in all sections, the digits preceding the dash refer to the figure in the Parts Breakdown on which the parts or assemblies are illustrated. The digits following the dash are the index numbers of procurable or non-procurable parts or assemblies. For Government or contractor standard parts, the figure and index number shown in the Numerical Index is the figure and index for the first occurrence only of such parts in the Group Assembly Parts List.

6-3.5. SOURCE CODE COLUMN. SMR codes may not appear in this publication. The inclusion of this materiel depends upon the date this document is completely revised. SMR codes are to be used in determining the source maintenance echelon and recoverability of each item.

I. The following is the established format for SMR Codes:

<u>Source</u>	<u>Maintenance</u>		<u>Recoverability</u>
(1)	(2)	(3)	(4)
(1) Consumer Source Information			
(2) Lowest maintenance echelon capable of installing part			
(3) Lowest maintenance echelon capable of manufacturing, assembling or testing a part prior to installation			
(4) Recoverability Status			

II. DEFINITION AND APPLICATION OF CODE: The following definitions and applications are applicable for each code:

SOURCE CODES

PART PROCURED - SUPPLY SYSTEM STOCK:

- a. "A" Series-Assemble; Assembly not purchased.
 - (1) CODE "AF" is applied to assemblies which are not purchased but which are to be assembled within activities prior to installation.
 - (2) CODE "AO" is applied to assemblies which are not purchased but which are to be assembled within overhaul/rework activities prior to installation.
 - (3) CODE "AOA" is applied to items to be assembled by the prime overhaul/rework point when required.
- b. "M" Series-Manufactured items which are not purchased or stock numbered.
 - (1) CODE "MF" is applied to items which are capable of being manufactured within Fleet activities. Items coded "MF" have no anticipated usage, or possess restrictive installation or storage factors. With respect to support equipment, the naval manufacturing activity may alter the design of Source Code "MF" material and/or processes provided that fit, function, use and safety are not impaired.
 - (2) CODE "MO" is applied to items which are capable of being manufactured within overhaul/ rework activities. Items coded "MO" have no anticipated or relatively low usage, or possess restrictive installation or storage factors or are manufactured more economically by the Government. With respect to support equipment the naval manufacturing activity may alter the design of Source Code "MO" material and/or processes provided that fit, function, use and safety are not impaired.
 - (3) CODE "MOA" is applied to items to be manufactured by the prime overhaul/rework point when required.
- c. "N" Series-Not stocked normally; Will be purchased on demand.
 - (1) CODE "N" is applied to items which do not meet established criteria for stocking and which are readily available from commercial sources.

6-3.5 (continued)

- (2) CODE "N1" is applied to Bureau of Yards and Docks Supply Office ("Y") cognizance items under fraction code "A" which are: (1) commercially available to all continental United States activities, (2) authorized for local stocking at the retail level, (3) replenished by local purchase within the continental United States, (4) carried in wholesale stock only for overseas and fleet activities, and (5) stock numbered and published in the Navy Stock List of the Yards and Docks Supply Office.

d. "P" Series-Purchased items.

- (1) CODE "P" is applied to items which are purchased in view of known or anticipated high usage and which are relatively simple to manufacture within the Navy if necessary "P" means in system.
- (2) CODE "P1" is applied to items which are purchased in view of known or anticipated usage and which are difficult, impractical, or uneconomical to manufacture within the Navy.
- (3) CODE "P2" is applied to items for which little usage is anticipated, but which are purchased in limited quantity for insurance purposes. Items coded "P2" are difficult to manufacture, require special tooling or stock not normally available within the Naval Establishment or require long production lead time.
- (4) CODE "P3" is applied to repair parts items which are purchased in limited quantity in accordance with life expectancy. Items coded "P3" are normally deteriorative in nature and may require special storage conditions.
- (5) CODE "P4" is applied to items which are procured only for initial outfitting or for special control and not carried in system stock for replenishment purposes.

e. CODE "U" is applied when not of supply or maintenance stocking significance.

f. "X" Series-Not procured; Normally impractical for stocking, maintenance or manufacture.

- (1) CODE "X" is applied to items which, if damaged, would require uneconomical repair. The need for an item or items coded "X" will normally result in recommendation for retirement of equipment from service.
- (2) CODE "X1" is applied to items for which purchase of the next larger assembly Source Coded in the "P" series is justified.
- (3) CODE "X2" is applied to items which are not purchased for stock, but may be acquired for use through salvage or one time purchase. Activities requiring such items will attempt to obtain them from salvage; if not obtainable from salvage or readily manufactured, such items shall be requisitioned through normal supply channels with supporting justification.

III MAINTENANCE CODES

Code	Maintenance Echelon (Navy Material);
O	Overhaul Activities
T	Tender or repair ships
F	Activity to which equipment is assigned (e.g., Vessel, FASRON or self-supported squadron).
E	Specialized repair facilities
B	Specific maintenance requirements not applicable (optional)
Code	Maintenance Echelon (Marine Corps Material Only);
O	Organizational Maintenance (1st and 2nd echelon).
F	Field Maintenance (3rd echelon).
H	Field Maintenance (4th echelon).
D	Depot Maintenance (5th echelon).

Note: Navy Material includes all material under the cognizance of inventory managers of the Department of the Navy other than the Commandant of the Marine Corps.

III. RECOVERABILITY CODES

Code	Definition and Application of Code
R	REPAIRABLE-Parts which are economical and practical to repair. Replacements are obtained from the supply system or an exchange basis, if and when practicable, i.e., a part may be lost or damaged beyond recognition or the inventory manager may not require such exchange.
S	SALVAGEABLE-Parts which are economical and practical to salvage and which may be placed in "Ready for Issue" condition by cleaning, replating, ancoizing, adjusting, replacement of bearing or bushings. "S" coded parts may contain parts or materials which are usable, valuable, or critical, and which may be placed in the supply system for issue.
C	CONSUMABLE (Expendable)-Parts that are neither repairable nor salvageable(optional)

6-3.6 MATERIAL ACCOUNTABILITY, RECOVERABILITY CODE COLUMN. In this column is listed the recoverability coding as and when supplied by the Procuring Department. (see Par. 6-3.5, III Recoverability Codes Above)

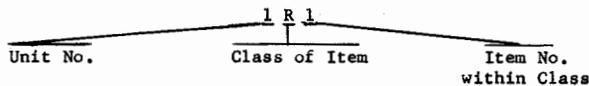
6-4 REFERENCE DESIGNATION INDEX

6-4.1 GENERAL. The Reference Designation Index, Section III lists reference designation symbols which have been established for any parts of the equipment covered. The listing also includes Figure and Index Number and Part Number.

6-4.2 REFERENCE DESIGNATION COLUMN. In this column are listed the assigned reference designation symbols, arranged in alphabetical-numerical sequence. The column contains all reference designation symbols shown on schematic diagrams contained in Section A-4 and A-5 of NAVSHIPS 95898 pertaining to the equipment covered by the Illustrated Parts Breakdown. Further, the below Examples will assist the reader in complete comprehension of this Reference Designation Column.

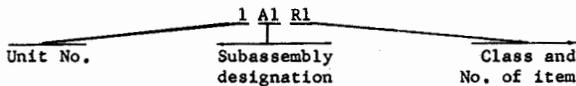
a. REFERENCE DESIGNATIONS - The unit numbering method of assigning reference designations has been used to identify units, assemblies, subassemblies, and parts. This method has been expanded as much as necessary to adequately cover the various degrees of subdivision of the equipment. Examples of this unit numbering method and typical expansions of the same are illustrated by the following:

Example 1:



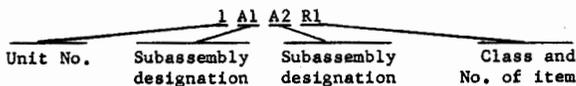
Read as: First (1) resistor (R) of first unit(1).

Example 2:



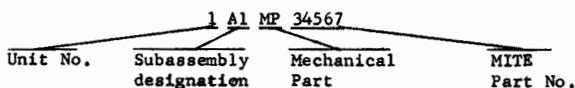
Read as: First (1) resistor (R) of first (1) sub-assembly (A) of first (1) unit.

Example 3:



Read as: First (1) resistor (R) of second (2) sub-assembly (A) of first (1) subassembly (A) of third (1) unit.

Example 4:



Read as: Part No. (34567) a mechanical part (MP) of (1) subassembly (A) of (1) unit.

b. REF DESIG PREFIX - Partial reference designations are used on the equipment and illustrations. The partial reference designations consist of the class letter(s) and the identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are proved on illustrations following the notation "REF DESIG PREFIX".

6-4.3 PART NUMBER COLUMN. In this column are listed the part numbers of those parts which have been assigned reference designation symbols.

6-5. LOCATION OF PARTS IN PARTS BREAKDOWN

6-5.1 The location of a part when the part number is known may be accomplished if the following steps are observed.

- a. Locate the part number in the Numerical Index
- b. Note the figure and index number shown opposite the part number.
- c. Locate the figure and index number in the Group Assembly Parts List.

6-5.2 The location of a part when the part number is not known may be accomplished if the following steps are observed.

- a. Refer to the applicable assembly breakdown.
- b. Compare the part with the illustration until the part is located.
- c. Note the index number
- d. Locate the index number in the corresponding Group Assembly Parts List

e. Opposite the index number is shown the part number and name.

6-5.3 The location of a part when the reference designation is known may be accomplished if the following steps are observed.

- a. Locate the reference designation in the Reference Designation Index.
- b. Note the figure and index number opposite it.
- c. Locate the figure and index number in the Group Assembly Parts List.
- d. Opposite the index number is shown the part number and name.

TT-299()/UG & TT-298()/UG

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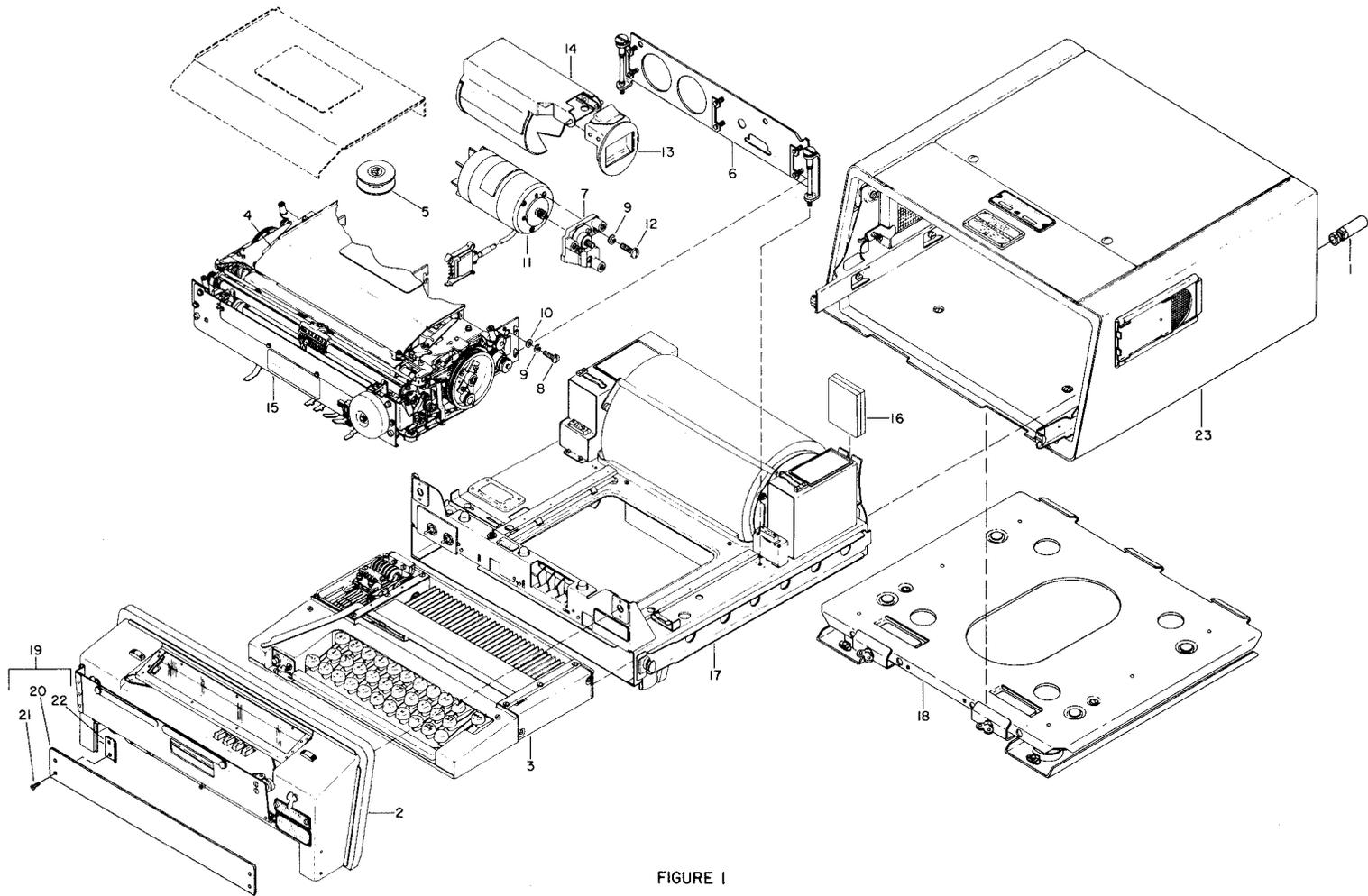


FIGURE 1

SECTION I
GROUP ASSEMBLY PARTS LIST

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
01 -000	30600-0002	..TT-299B/UG		B
01 -000	A0009	..TELETYPEWRITER		A
01 -001	03407	..PLUG	1	C
01 -002	06260-0006	..COVER ASSY	1	B
01 -002	626-1041	..COVER ASSEMBLY	1	A
01 -019	22214-0001	...COVER PLATE	1	D
01 -020	22200-0001	...PLATE	1	D
01 -021	05019-0006	...SCREW	2	D
01 -022	22201	...CLAMP	2	D
01 -003	30610	..KEYBD ASSY	1	B
01 -003	413-1041	..KEYBOARD ASSY	1	A
01 -004	03049	..PAPER GDE ASSY	1	C
01 -005	05048-0001	..RIBBON	REF	
01 -006	01965	..PLATE ASSY	1	C
01 -007	02538-0003	..MTRMGTPLATEASSY	1	B
01 -007	29127	..MOUNT ASSE	1	A
01 -008	05007-0080	..SCREW	3	C
		- - - * - - -		
01 -009	AN935-6L	..LOCKWASHER	05006-0006	88044
01 -010	05032-0009	..WASHER	3	C
01 -011	02485	..MOTOR ASSY	1	C
		- - - * - - -		
01 -012	03755	..SCREW	3	C
01 -009	AN935-6L	..LOCKWASHER	05006-0006	88044
		- - - * - - -		
01 -013	03417	..HOUSING ASSY	1	C
01 -014	33025-0001	..AIR DUCTS ASSY	1	B
01 -015	30450-0008	..PRINTER ASSY	1	B
01 -015	1-2-3-1041	..PRINTER ASSY	1	A
01 -016	30470-0002	..RUNNING SPARES	1	B
01 -016	744-104	..KIT RUN SPARES	1	A
01 -017	30605	..CHASSIS ASSY	1	B
01 -017	516-104	..CHASSIS ASSY	1	A
01 -018	30489	..SHOCK MOUNT	1	B
01 -018	5060-3	..SHOCK MOUNT	1	A
01 -023	06182-0004	..CASE ASSY	1	B
01 -023	6182-1041	..CASE ASSEMBLY	1	A
		FRONT COVER ASSEMBLY		
02 -000	06260-0006	..COVER ASSY	REF	B
02 -000	626-1041	..COVER ASSY	REF	A
02 -001	03386-0003	...HOLDER ASSY	1	B
02 -001	3386	...HOLDERASSEMBLY	1	A
02 -002	AG-1704	....BUMPER	05068-0002	91629
02 -003	03383-0003	....CLIP BAR	1	B
02 -003	3383	....BAR	1	A
02 -004	03376-0003	....BRACKET	1	B
02 -004	3376	....BRACKET	1	A
02 -005	03382	....LEAF SPRING	1	C
		- - - * - - -		
02 -006	05007-0006	....SCREW	2	C
02 -007	03384-0003	....RIVET ASSY	1	B
		- - - * - - -		

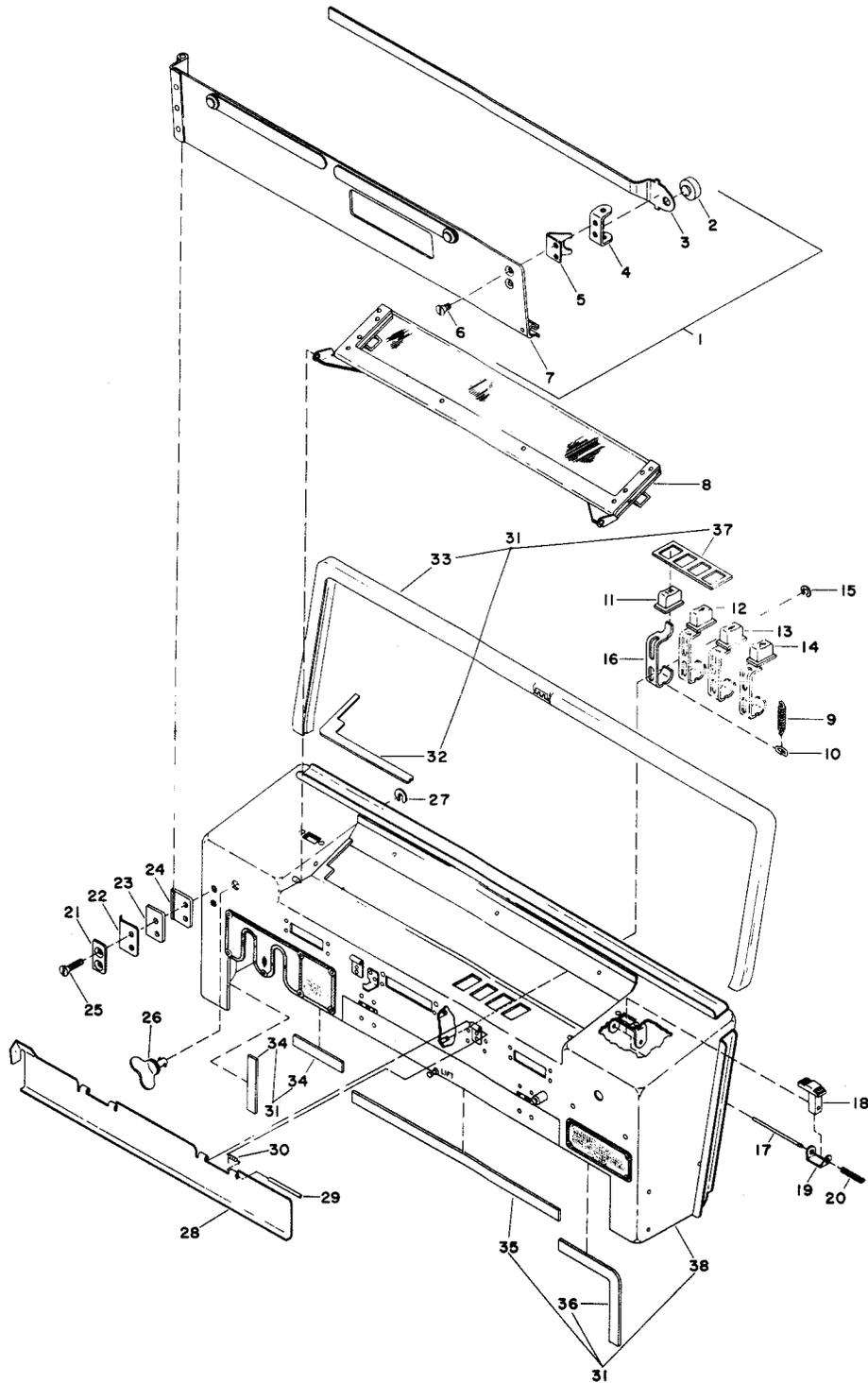


FIGURE 2

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
02 -007	3384	...HOLDER	1	A
02 -008	03356-0001	...WINDOW ASSY	1	A
02 -009	03345	...SPRING BUTTON	4	A
		- - - * - - -		
02 -010	03444	...SPRING CLIP	4	A
		- - - * - - -		
02 -011	03361	...BUTTON FEED	1	A
02 -012	03364	...BUTTON RET	1	A
02 -013	03363	...BUTTON LETTERS	1	A
02 -014	03362	...BUTTON FIGURES	1	A
02 -015	03346	...PLUNGER	4	A
		- - - * - - -		
02 -016	5144-9C	...E RING 05004-0045 79136	8	A
		- - - * - - -		
02 -017	03359	...RELEASE ROD	2	A
02 -018	03369	...RELEASE BUTTON	2	A
02 -019	04563	...RELEASE PIN	2	A
02 -020	03387	...COMP SPRING	2	A
02 -021	03373	...CLIP BRACE	1	A
02 -022	03372	...CLIP	1	A
02 -023	03371	...SHIM	1	A
02 -024	03370	...CLIP	1	C
		- - - * - - -		
02 -025	05007-0087	...SCREW	2	C
		- - - * - - -		
02 -026	FS28-8	...STUD 05082-0001 71286	2	C
		- - - * - - -		
02 -027	04149	...WASHER	2	C
		- - - * - - -		
02 -028	03625-0001	...REFLECTOR	1	B
		- - - * - - -		
02 -028	3625	..REFLECTOR	1	A
02 -029	03628	...HINGE PIN	2	C
		- - - * - - -		
02 -030	03629	...SPRING	2	C
02 -031	03648-0003	...FT COVER BND AS	1	B
02 -031	3648	...COVER ASSEMBLY	1	A
02 -032	03357	...GASKET	1	C
02 -033	03395	...DUST SEAL	1	C
02 -034	03399	...DUST SEAL	2	C
02 -035	03401	...DUST SEAL CTR	1	C
02 -036	03400	...DUST SEAL R H	1	C
02 -037	03447	...BUTTON	1	C
02 -038	03649-0003	...NAMEPLATE ASSY	1	B
02 -038	3649	...COVER ASSEMBLY	1	A
		- - - * - - -		
		KEYBOARD ASSEMBLY		
		- - - * - - -		
03 -000	30610	..KEYBD ASSY	REF	B
03 -000	413-1041	..KEY BD ASSY	REF	A
03 -001	00942	...RAIL LH	1	C
		- - - * - - -		
03 -002	05007-0013	...PAN HD SCREW	2	C
03 -003	05007-0017	...PAN HD SCREW	1	C
03 -004	AN935-4L	...LOCKWASHER 05006-0004 88044	3	C
		- - - * - - -		
03 -005	00943	...RAIL RH	1	C
		- - - * - - -		
03 -006	05007-0017	...PAN HD SCREW	3	C
03 -007	AN935-4L	...LOCKWASHER 05006-0004 88044	3	C
		- - - * - - -		

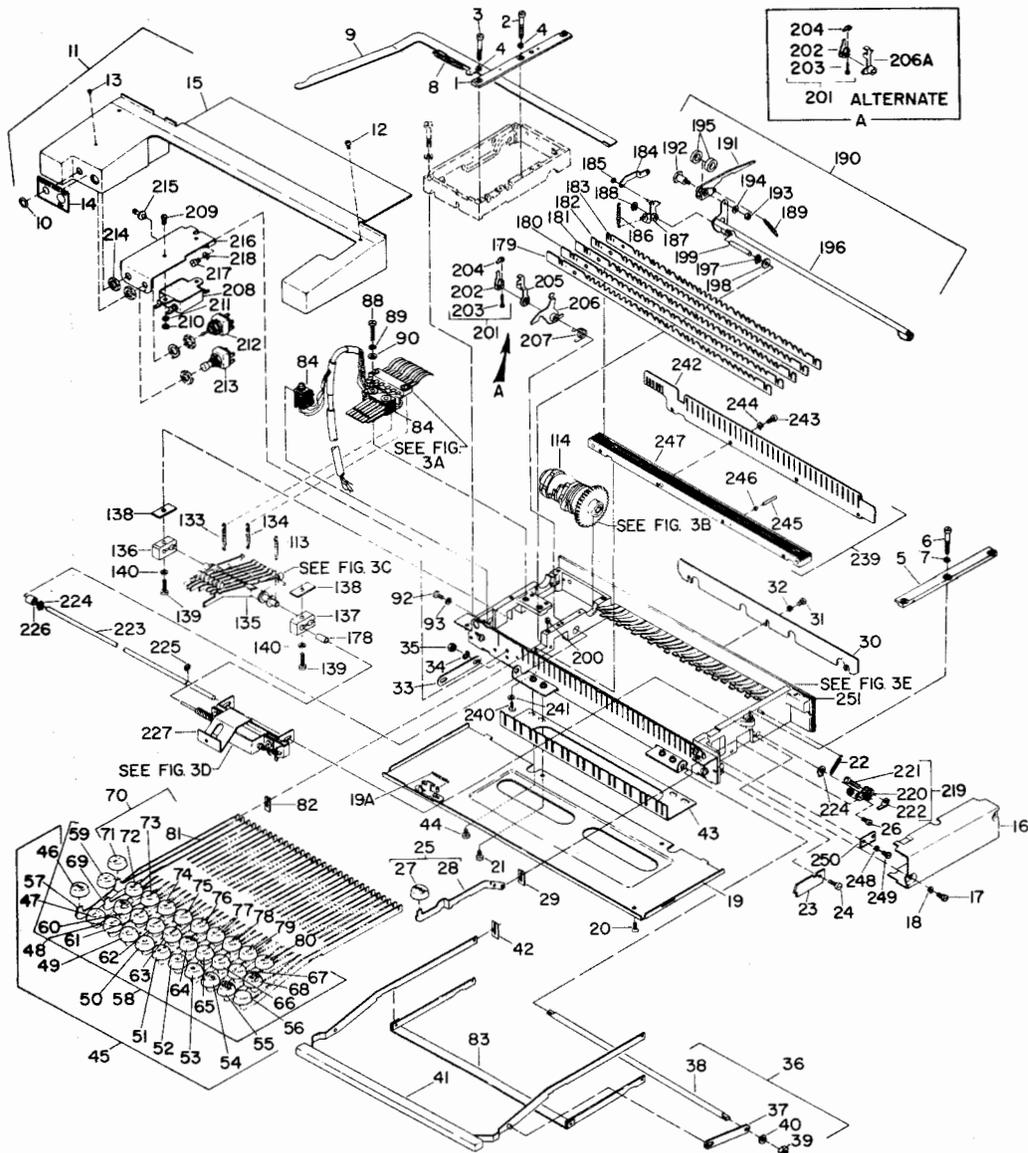
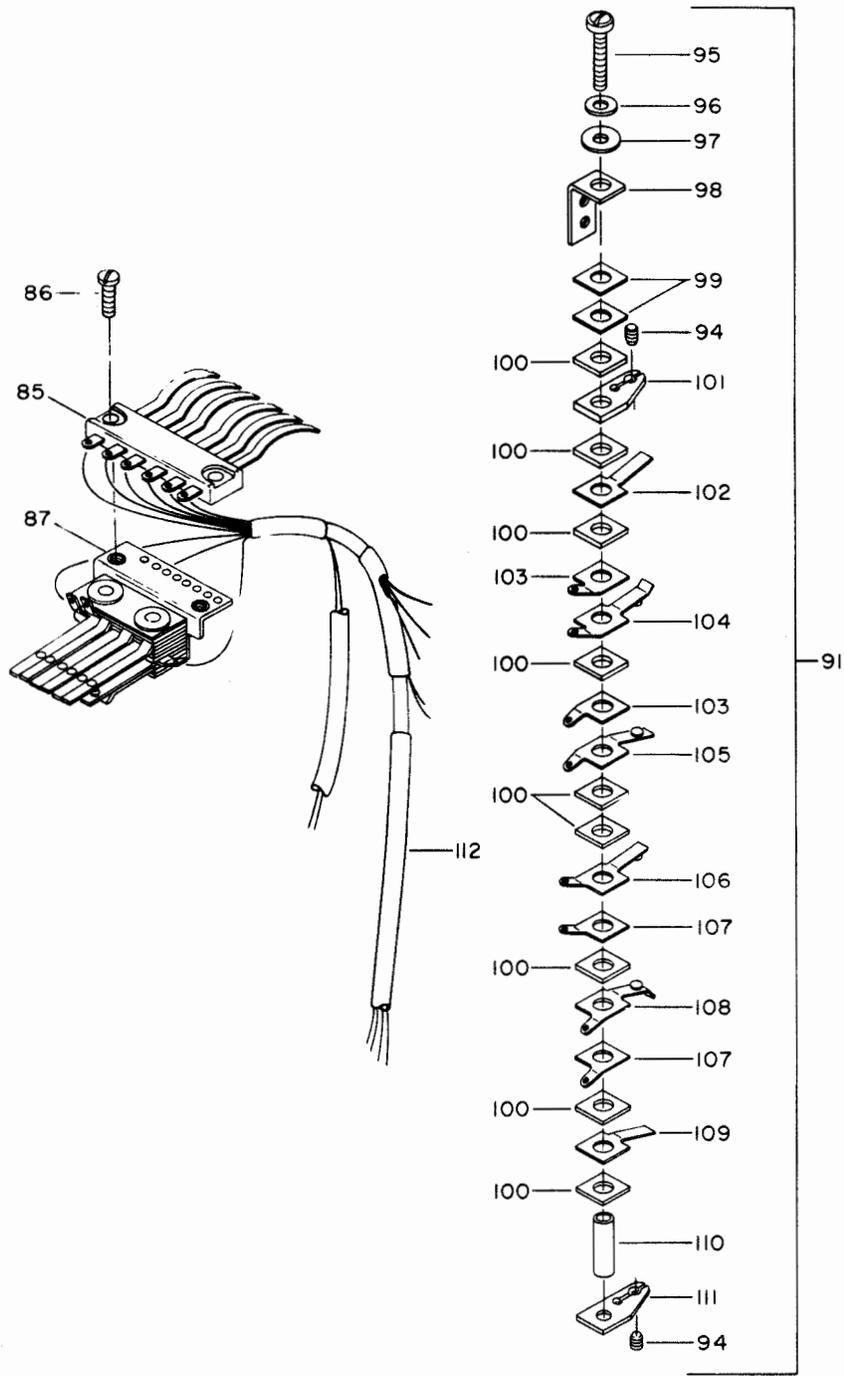


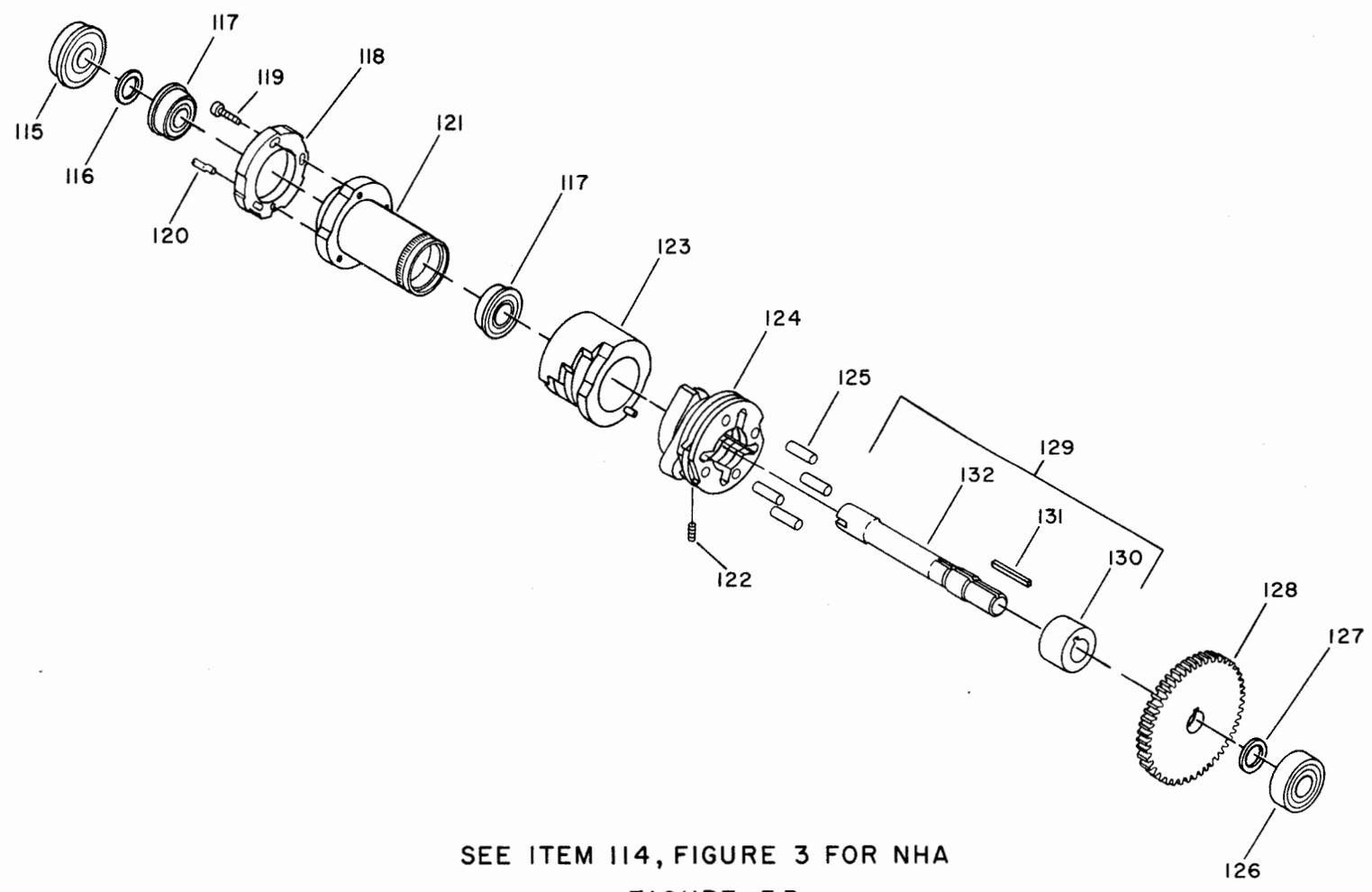
FIGURE 3

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
03 -008	00736	...SPRING LOCKBAR	1	C
03 -009	00746	...LOCK BAR	1	C
03 -010	05152-0001	...NUT	1	B
03 -011	04177-0010	...BRKT ASSY	1	B
03 -011	4177	...COVER ASSEMBLY	1	A
03 -012	05007-0024	...PAN HD SCREW	2	C
03 -013	00960	...WEAR PAD	1	C
03 -014	00769	...NAME PLATE	1	C
03 -015	04176-0010	...RIVET ASSY	1	B
03 -016	00946	...COVER	1	C
03 -017	05007-0024	...PAN HD SCREW	2	C
03 -018	AN935-4L	...LOCKWASHER 05006-0004 88044	2	C
03 -019	04661-0001	...LEVER ASSY	1	C
03 -019A	04606	...SPRING	1	B
03 -020	05007-0006	...FLAT HD SCR	2	C
03 -021	05007-0024	...PAN HD SCREW	2	C
03 -022	00731	...SPRING	1	C
03 -023	30671	...REPEATKEYSTOP	1	B
03 -024	05007-0024	...PAN HD SCREW	1	C
03 -024	NO NUMBER	...KEYBD ASSY	REF	
03 -025	00835	...KEY ASSY	1	C
03 -026	05007-0024	...PAN HD SCREW	1	C
03 -027	00891	...REPEAT KEY	1	C
03 -028	00649	...KEY LEVER	1	C
03 -029	00937	...DUST SEAL	1	C
03 -030	00711	...KEY STRIP	1	C
03 -031	05007-0024	...PAN HD SCREW	3	C
03 -032	AN935-4L	...LOCKWASHER 05006-0004 88044	3	C
03 -033	00726	...SPACE BAR	2	C
03 -034	05030-0006	...HEX NUT	2	C
03 -035	AN935-10L	...LOCKWASHER 05006-0012 88044	2	C
03 -036	00202	...SHAFT ASSY	1	B
03 -037	00726	...SPACE BAR	1	C
03 -038	00727	...SHAFT	1	C
03 -039	05030-0006	...HEX NUT	1	C
03 -040	AN935-10L	...LOCKWASHER 05006-0012 88044	1	C
03 -041	00674	...SPACE BAR ASSY	1	C
03 -042	00937	...DUST SEAL	2	C
03 -043	00941	...KEY GUIDE	1	C
03 -044	05007-0024	...PAN HD SCREW	2	C
03 -045	00894	...KEY ASSY	1	C
03 -046	00880	...KEY TOP FIGS	1	C
03 -047	00881	...KEY TOP Z	1	C
03 -048	00882	...KEYTOP	1	C
03 -049	00883	...C KEY TOP	1	C
03 -050	00884	...KEYTOP	1	C
03 -051	00885	...KEYTOP B	1	C
03 -052	00886	...KEYTOP N	1	C
03 -053	00887	...KEYTOP	1	C
03 -054	00888	...KEYTOP LTRS	1	C
03 -055	00889	...KEYTOP	1	C
03 -056	00890	...KEYTOP BLANK	1	C
03 -057	00854	...KEY LEVER	11	C



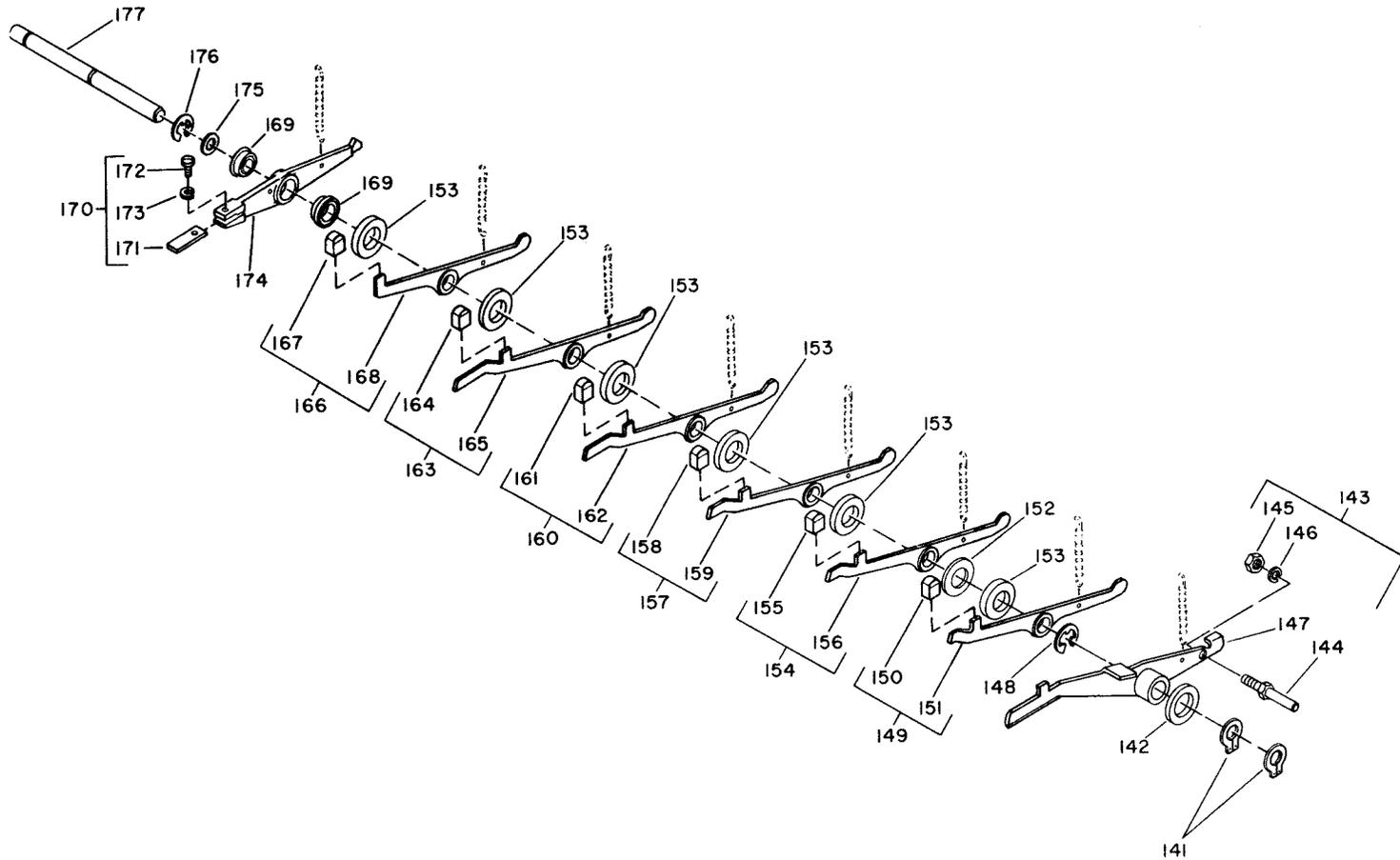
SEE ITEM 84, FIGURE 3 FOR NHA
FIGURE 3A

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
03 -058	00893	...KEY ASSY	1	C
03 -059	00870	....KEYTOP A	1	C
03 -060	00871	....KEYTOP BELL S	1	C
03 -061	00872	....KEYTOP D	1	C
03 -062	00873	....KEYTOP F	1	C
03 -063	00874	....KEYTOP G	1	C
03 -064	00875	....KEYTOP H	1	C
03 -065	00876	....KEYTOP J	1	C
03 -066	00877	....KEYTOP K	1	C
03 -067	00878	....KEYTOP L	1	C
03 -068	00879	....KEYTOP CAR RET	1	C
03 -069	00853	....KEY LEVER	10	C
03 -070	00892	...KEY ASSY	1	C
03 -071	00860	....KEYTOP 1 Q	1	C
03 -072	00861	....KEYTOP 2 W	1	C
03 -073	00862	....KEYTOP 3 E	1	C
03 -074	00863	....KEYTOP 4 R	1	C
03 -075	00864	....KEYTOP 5 T	1	C
03 -076	00865	....KEYTOP 6 Y	1	C
03 -077	00866	....KEYTOP 7 U	1	C
03 -078	00867	....KEYTOP 8 I	1	C
03 -079	00868	....KEYTOP 9 O	1	C
03 -080	00869	....KEYTOP P	1	C
03 -081	00852	....KEY LEVER	10	C
03 -082	00937	...DUST SEAL	31	C
03 -083	00831	...PAD ASSY	1	C
03A-084	30726	...COMP ASSY	1	B
03A-084	00225	...COMP ASSY	1	A
03A-085	00990	....CONTACT ASSY	1	B
03A-085	0964	....CONTACT	1	A
03A-086	05007-0079	...PAN HD SCR	2	B
		-----*		
03A-087	00996	....CONTACT ASSY	1	B
		-----*		
03A-087	0964	....CONTACT	1	A
03 -088	05007-0001	...PAN HD SCREW	2	B
03 -089	05006-0009	...LOCKWASHER	2	B
03 -090	05032-0007	...WASHER	2	B
		-----*		
03A-091	00971	....CONTACT ASSY	1	C
		-----*		
03 -092	05007-0002	...PAN HD SCR	2	C
03 -093	AN935-3L	...LOCKWASHER	2	C
		-----*		
03A-094	05009-0044	.....SET SCR HD	2	C
03A-095	05007-0158	.....SCR BINDING	1	B
03A-095	5007-82	.....SCREW	1	A
03A-096	05032-0005	.....FLAT WASHER	1	C
03A-097	00706	.....INSULATOR	1	C
03A-098	00704	.....BRACKET	1	C
03A-099	04143	.....SHIM INSUL	1	C
03A-100	04610	.....INSULATOR	9	B
03A-100	0846	.....INSULATOR	1	A
03A-101	00977	.....CONTACT BRACKT	1	C
03A-102	00994	.....LEAF SPRING	1	C
03A-103	29241	.....SUPPORT LEAF	2	B
03A-104	00974	.....CONTACT ASSY	1	C
03A-105	00972	.....CONTACT ASSY	1	C
03A-106	00973	.....CONTACT ASSY	1	C
03A-107	29242	.....SUPPORT LEAF	2	B
03A-108	00975	.....CONTACT ASSY	1	C
03A-109	00976	.....LEAF SPRING	1	C
03A-110	04662	.....SPACER	1	B
03A-110	0844	.....SPACER	1	A
03A-111	00978	.....CONTACT BRCKT	1	C
03A-112	30725	.....WIRE ASSY	1	B
03A-112	208	.....WIRE ASSY	1	A
03 -113	00731	...SPRING	1	C
03B-114	30617	...CAM ASSY	1	B



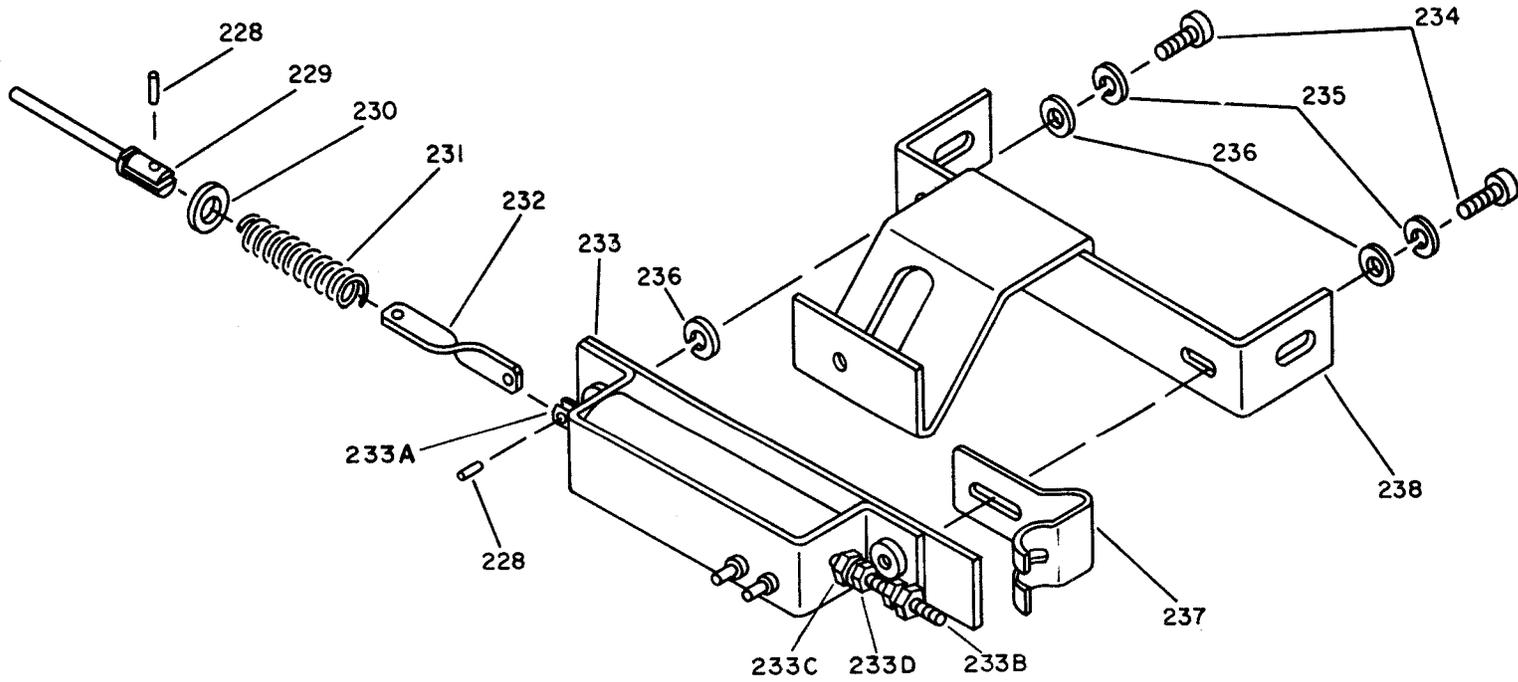
SEE ITEM 114, FIGURE 3 FOR NHA
FIGURE 3 B

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
03B-114	29117	...KEY-CAMASSY	1	A
03B-115	05012-0001	....BEARING	1	C
03B-116	00660	....SPACER	1	C
03B-117	05012-0015	....BEARING	2	C
03B-118	30611	....PULSING CAM	1	B
		- - - * - - -		
03B-118	26804	....CAM-PULSING	1	A
03B-119	05072-0003	....SOC HD SCREW	3	C
03B-120	00677	....ECCENTRIC	1	C
		- - - * - - -		
03B-121	00655	....CAM BUSHING	1	B
		- - - * - - -		
03B-121	26839	....CAM	1	A
03B-122	05079-0001	....SET SCREW	2	C
		- - - * - - -		
03B-123	00855	....CAM ASSY	1	B
03B-123	29116	....CAM	1	A
03B-124	00656	....CLUTCH ASSY	1	C
03B-125	01205-0001	....ROLLER	4	C
03B-126	05012-0029	....BEARING	1	C
03B-127	00660	....SPACER	1	C
03B-128	00648	....GEAR	1	B
03B-128	26816	....GEAR	1	A
03B-129	00625	....SHAFT ASSY	1	C
03B-130	00816	....BUSHING	1	C
03B-131	00678	....KEY	1	C
03B-132	00817	....SHAFT	1	C
03 -133	30286	...SPRING	1	B
03 -133	0733	...SPRING	2	A
03 -134	00734	...SPRING	7	C
03 -135	30612	...LEVER ASSY	1	B
		- - - * - - -		
03 -135	0721	...LEVER ASSEMBLY	1	A
03 -136	00776	...CLAMP SHAFT	1	C
03 -137	30506	...CLAMP SHAFT	1	B
03 -137	0776	...CLAMP	1	A
03 -138	00951	...SHIM CLAMP	2	C
03 -139	05007-0085	...FILL HD SCRW	2	C
03 -140	AN935-4L	...LOCKWASHER	2	C
		- - - * - - -		
03C-141	5555-18	....RET RING	2	C
03C-142	00724	....SPACER	1	C
03C-143	30517	....LEVER ASSY	1	C
03C-143	0618	....LEVER	1	A
03C-145	30504	....ECCENTRIC PIN	1	B
		- - - * - - -		
03C-146	05030-0002	....HEX NUT	1	B
03C-147	30897	....PREVENTLEVERASY	1	B
		- - - * - - -		
03C-148	5133-18	....RET RING	1	C
03C-149	00810	....PULSEFINGERASSY	1	C
03C-150	00610	....PUSHER	1	C
03C-151	04837	....SPIN ASSY	1	C
03C-152	04512	....SHIM	1	C
03C-153	03657	....FELT WASHER	7	C
03C-154	00809	....ASSY	1	C
03C-155	00610	....PUSHER	1	C
03C-156	04838	....SPIN ASSY	1	C
03C-157	00808	....ASSY	1	C
03C-158	00610	....PUSHER	1	C
03C-159	04839	....SPIN ASSY	1	C
03C-160	00807	....ASSY	1	C
03C-161	00610	....PUSHER	1	C
03C-162	04840	....SPIN ASSY	1	C
03C-163	00806	....ASSY	1	C
03C-164	00610	....PUSHER	1	C
03C-165	04841	....SPIN ASSY	1	C
03C-166	00805	....FINGER ASSY	1	C
03C-167	00610	....PUSHER	1	C
03C-168	04842	....SPIN ASSY	1	C
03C-169	05012-0014	....BEARING	2	B
03C-169	SFR156PPK58	....BEARING	2	A
		5012-14 83086		



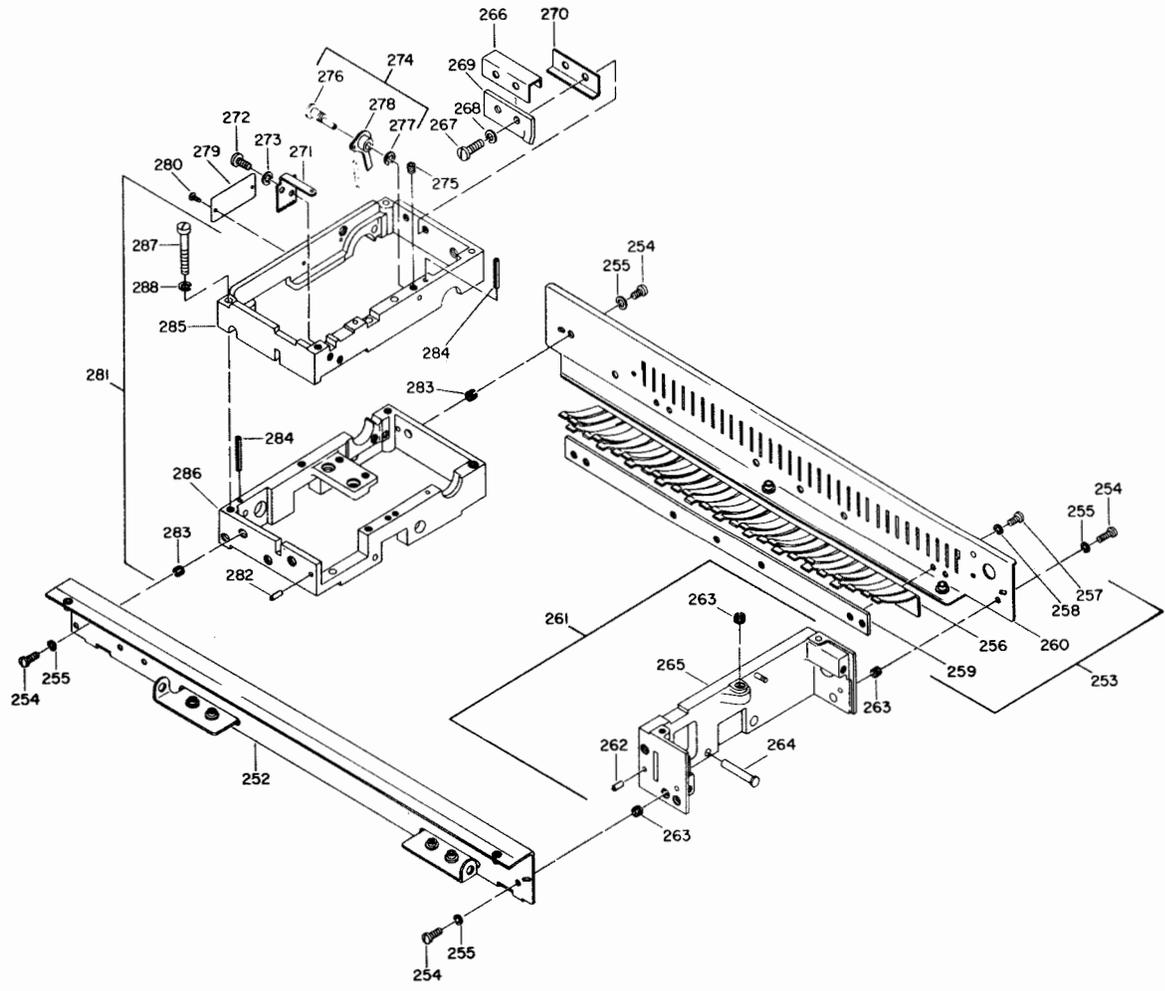
SEE ITEM 135, FIGURE 3 FOR NHA
FIGURE 3C

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
03C-170	00201	....SUB ASSY	1	B
03C-170	0959	....FOLLOWER ASSY	1	A
03C-171	00738	....ACTUATOR	1	C
		- - - * - - -		
03C-172	05007-0042	....SCREW FILL HD	1	C
03C-173	AN935-2L	....LOCKWASHER 5006-0002 88044	1	C
		- - - * - - -		
03C-174	00811	....CAM FOLLOWER	1	C
03C-175	00815	....SPACER	1	C
03C-176	5133-18	....RET RING 79136	1	C
03C-177	00722	....SHAFT	1	C
03 -178	30507	...BUSHING	1	B
03 -179	00929	...CODE BAR	1	C
03 -180	00930	...CODE BAR	1	C
03 -181	00931	...CODE BAR	1	C
03 -182	00932	...CODE BAR	1	C
03 -183	00933	...CODE BAR	1	C
03 -184	30509	...LINK LEVER	1	B
		- - - * - - -		
03 -185	5133-9	...RET RING 05004-0011 79136	2	C
		- - - * - - -		
03 -186	30523	...SPRING	1	B
03 -187	30513	...LEVER ASSY	1	B
		- - - * - - -		
03 -188	5555-12	...RET RING 05004-0003 79136	1	C
		- - - * - - -		
03 -189	30502	...SPRING	1	B
03 -189	1960	...SPRING	1	A
03 -190	00205	...REL ASSY	1	B
03 -191	00616	....CAM FOLLOWER	1	C
		- - - * - - -		
03 -192	00899	....ECCENTRIC	1	C
03 -193	50 FA 440	....HEX NUT 05016-0002 56878	1	C
03 -194	05032-0007	....FLAT WASHER	1	C
		- - - * - - -		
03 -195	03660	....FELT WASHER	1	C
03 -196	00632	....ASSY CLUTCH	1	C
03 -197	5555-12	...RET RING 05004-0003 79136	1	C
03 -198	03662	...FELT WASHER	2	C
03 -199	30515	...SHAFT	1	B
		- - - * - - -		
03 -199	0834	...SHAFT	1	A
03 -200	05009-0006	...SET SCREW	1	C
		- - - * - - -		
03 -201	30520	...ARM ASSY	1	B
03 -202	30519	....ACTUATE ARM	1	B
		- - - * - - -		
03 -202	0651	....ARM	1	A
03 -203	05007-0089	....SCREW	1	C
03 -204	00824	....ANTI TURN NUT	1	C
		- - - * - - -		
03 -205	30514	...LEVER ASSY	1	B
03 -205	0821	...FINGER	1	A
03 -206	30516	...LEVER ASSY	1	B
03 -206A	00821	...CLUTCH REL ASSY	1	A
03 -207	30508	...SPRING	1	B
03 -208	00961	...FILTER	1	C
		- - - * - - -		
03 -209	05007-0024	...PAN HD SCREW	2	C
03 -210	05030-0003	...HEX NUT	2	C
03 -211	1204-00	....LOCKWASHER 05006-0009 78189	2	B
		- - - * - - -		
03 -212	05577-0004	...SWITCH	1	C
03 -213	05581-0001	...SUB MIN SWITCH	1	C
		- - - * - - -		
03 -214	00962	...HEX NUT	1	C
		- - - * - - -		
03 -215	05514-0006	...TERMINAL	2	B
03 -216	00940	...BRACKET	1	C
		- - - * - - -		



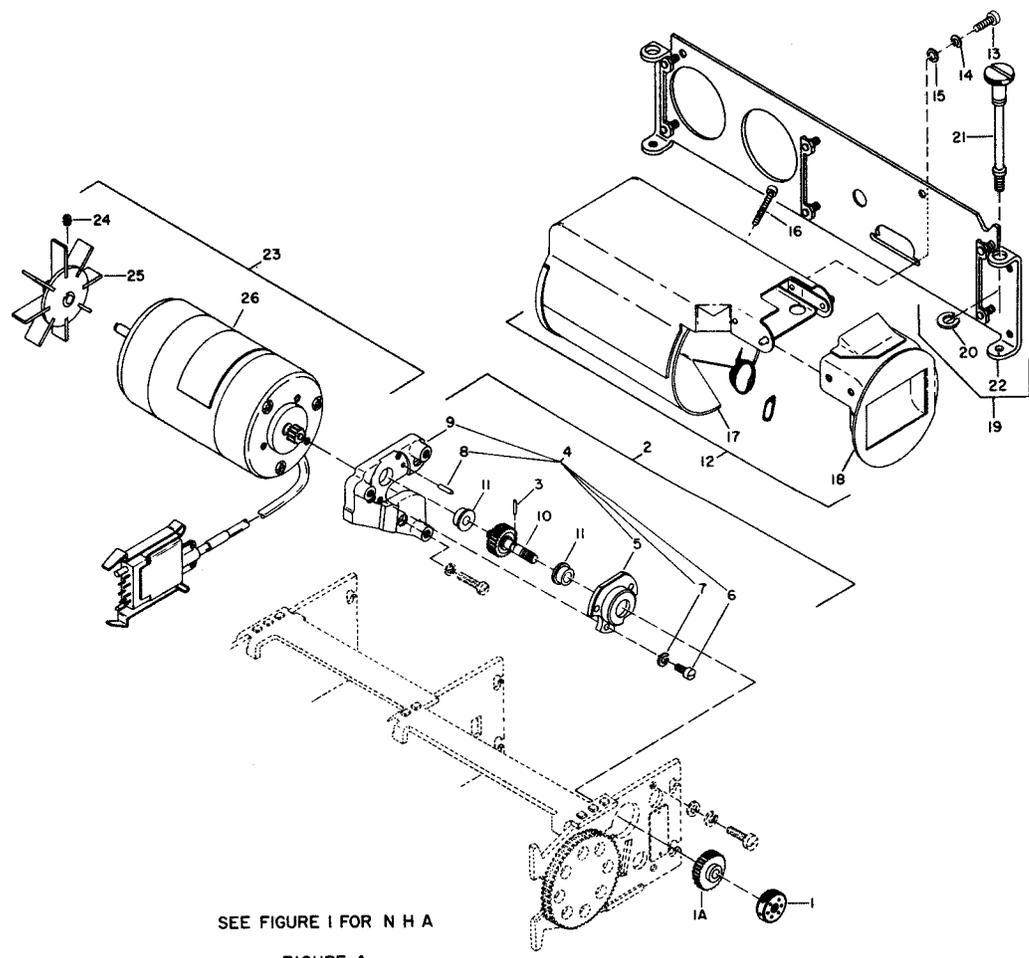
SEE ITEM 227, FIGURE 3 FOR NHA
FIGURE 3D

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
03 -217	05007-0024	...PAN HD SCREW	2	B
03 -217	MS35233-13	...SCREW 5007-24 96906	2	A
03 -218	1204-00	...LOCKWASHER 05006-0009 78189	2	B
		- - - * - - -		
03 -218	AN935-4L	...WASHER LOCK 5006-4 88044	2	A
03 -219	00204	...CLAMP NUT ASSY	1	B
03 -220	00956	....CLAMP REP ASSY	1	C
		- - - * - - -		
03 -221	05007-0032	....FILL HD SCR	1	C
03 -222	00958	....ANTI-TURN NUT	1	C
		- - - * - - -		
03 -223	00833	...SHAFT LEVER	1	C
		- - - * - - -		
03 -224	5555D-18	...RET RING 05004-0044 79136	2	C
03 -225	5133-18	...E RING 05004-0022 79136	1	C
		- - - * - - -		
03 -226	00936	...BUSHING	1	C
03 -227	30615	...SOLENOID&BRKT	1	B
03D-228	05007-0004	....PIN SPIROL	2	B
03D-229	30592	....PIN RELEASE	1	B
03D-230	05032-0020	....WASHER	1	B
03D-231	30595	....SPRING	1	B
03D-232	30590	....LINK	1	B
03D-233	30613	....SOLENOID See Pg. 6-74 for breakdown	1	B
		- - - * - - -		
03D-234	05007-0024	....SCREW MACHINE	2	C
03D-235	AN935-4L	....WASHER LOCK 05006-0004 88044	2	C
03D-236	05032-0004	....WASHER FLAT	2	B
		- - - * - - -		
03D-237	30594	....SPRING LEAF	1	B
03D-238	30593	....BRACKET MTG	1	B
03 -239	04574	...CODE BAR	1	C
		- - - * - - -		
03 -240	00944	...CODE MTG SCR	2	C
03 -241	1204-00	...LOCKWASHER 05006-0009 78189	2	B
		- - - * - - -		
03 -242	00713	....KEY GUIDE	1	C
		- - - * - - -		
03 -243	05007-0024	....SCREW PAN HD	4	C
03 -244	1204-00	....LOCKWASHER 05006-0009 78189	4	B
		- - - * - - -		
03 -245	03618	....PIN ASSY	4	C
03 -246	03619	....ROLLER	20	C
03 -247	00895	....CODE BAR ASSY	1	C
03 -248	00847	...CODE BAR RH	1	C
		- - - * - - -		
03 -249	05007-0024	...PAN HD SCREW	2	C
03 -250	1204-00	...LOCKWASHER 05006-0009 78189	2	B
		- - - * - - -		
03E-251	30623	...FRAME ASSY	1	B
03E-251	4157	...FRAME ASSEMBLY	1	A
03E-252	00750	....FRAME ASSY	1	C
03E-253	00203	....SUB ASSY	1	B
		- - - * - - -		
03E-254	05007-0024	...PAN HD SCREW	7	C
03E-255	1204-00	...LOCKWASHER 05006-0009 78189	7	B
		- - - * - - -		
03E-256	00630	.....LEAF SPRING	1	C
		- - - * - - -		
03E-257	05007-0024	....PAN HD SCR	4	C
03E-258	AN935-4L	....LOCKWASHER 05006-0004 88044	4	C
03E-259	00710	....MOUNTING STRIP	1	C
		- - - * - - -		
03E-260	00963	....ASSY REAR	1	C
03E-261	00775	....FRAME ASSY	1	C
03E-262	05080-0003	....ROLL PIN	4	A
03E-263	S11240-50	....TAPLOCK INSERT 05055-0002 73957	6	C
03E-264	00856	....PIN	1	C
03E-265	04844	....FRAME PIN ASSY	1	C
03E-266	03804	....CAMWICKHOLDER	1	B



SEE ITEM 251, FIGURE 3 FOR NHA
FIGURE 3 E

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
03E-267	05007-0024	....PAN HD SCREW	2	C
03E-268	1204-00	....LOCKWASHER	2	B
03E-269	03805	....CAM WICK	1	B
03E-270	03806	....CAMWICKBRKT	1	B
03E-271	00791	....CODE BAR LH	1	C
03E-272	05007-0016	....PAN HD SCREW	2	C
03E-273	1204-00	....LOCKWASHER	2	B
03E-274	00983	....SHAFT ASSY	1	C
03E-275	05009-0006	....SET SCREW	1	C
03E-276	00725	....SHAFT	1	C
03E-277	5133-15	....RET RING	1	C
03E-278	00819	....BACKSTOP ASSY	1	C
03E-279	30624	....NAME PLATE	1	B
03E-279	30457	....NAMEPLATE	1	A
03E-280	05020-0001	....DRIVE SCREW	2	C
03E-281	00774	....FRAME ASSY	1	C
03E-282	05080-0003	....ROLL PIN	4	C
03E-283	S11240-50	....TAP LOCK	13	C
03E-284	05080-0001	....ROLL PIN	4	C
03E-285	00770	....FRAME TOP	1	C
03E-286	00771	....FRAME	1	C
03E-287	05007-0013	....SCREW PAN HD	2	C
03E-288	AN935-4L	....LOCKWASHER	2	C
		MOTOR, GEARS & COMPONENTS		
04 -000	NO NUMBER	..MOTOR-COMP-INST	REF	C
04 -001	26786	..NUT	1	C
04 -001A	2533	...GEAR 100 WPM	1	C
04 -002	02538-0003	..PLATE ASSY	REF	B
04 -002	29127	..MOUNT ASSY	1	A
04 -003	05070-0001	...PIN GROOVED	1	C
04 -004	04723	...PLATE ASSY MTG	1	C
04 -005	02626	....CUP BRG	NS2	
04 -006	05007-0061	....SCREW MACHINE	3	C
04 -007	AN935-4L	....WASHER LOCK	3	C
04 -008	05003-0002	....PIN DOWELL	2	B
04 -009	30359	....PLATE MTG	NSS	B
04 -009	1322	....PLATE	1	A
04 -010	01175	...GEAR REDUCTION	1	C
04 -011	05012-0028	...BEARING	2	C
04 -012	33025-0001	..AIR DUCTS ASSY	REF	B
04 -012	25-104	..DUCTS ASSEMBLY	REF	A
04 -013	05007-0081	...PAN HD SCR	2	C
04 -014	05032-0003	...FLAT WASHER	2	C
04 -015	AN935-5L	...LOCKWASHER	2	C
04 -016	05007-0072	...FILL HD SCR	2	C
04 -017	03056	...RIVET ASSY	1	C
04 -018	03417	..HOUSING ASSY	1	C
04 -019	01965	..PLATE ASSY	1	C
04 -020	5103-25	...RING RETAINING	2	C
04 -021	01969	...SCREW	2	C
04 -022	04811	...PLATE	1	C



SEE FIGURE I FOR N H A
FIGURE 4

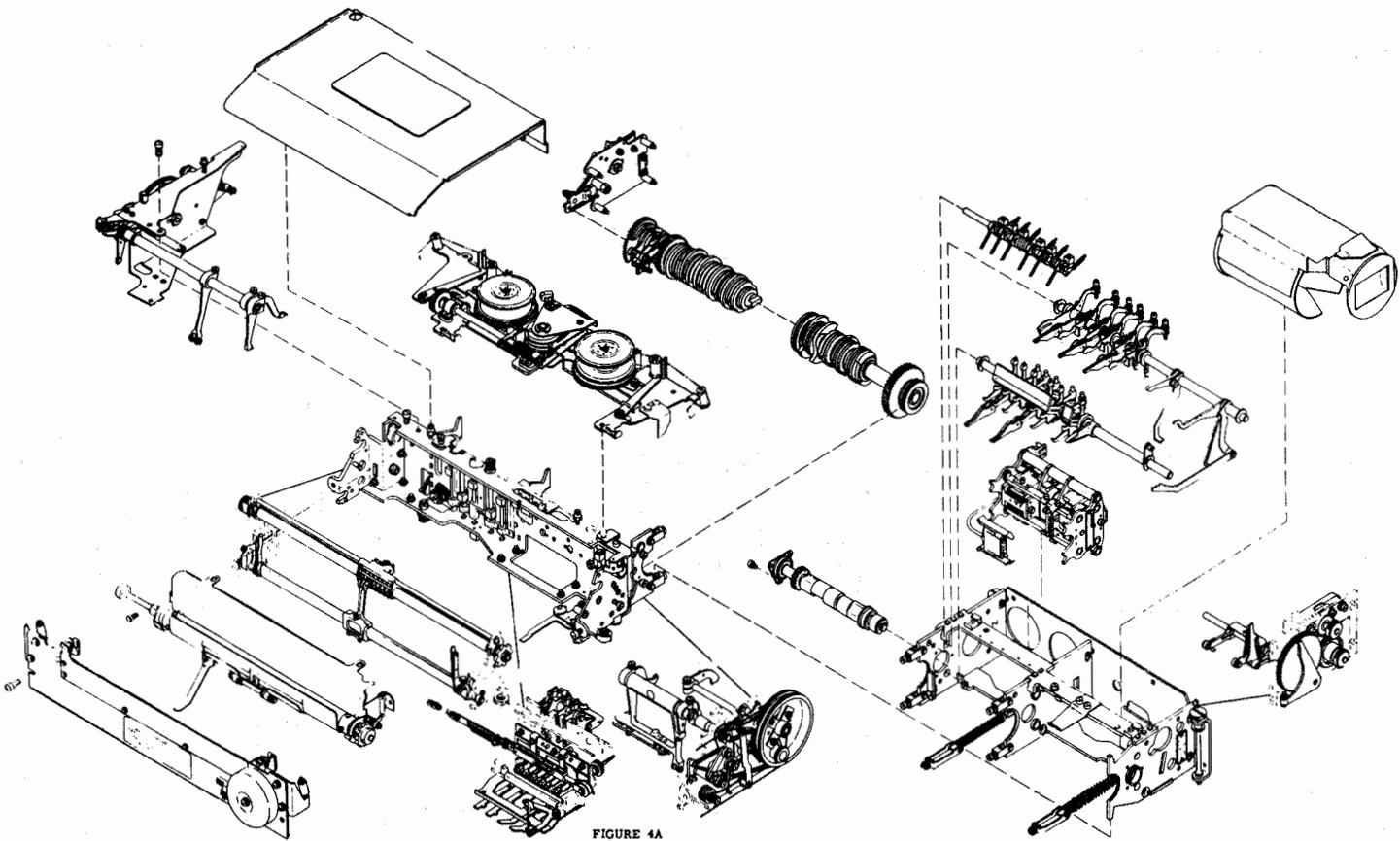


FIGURE 4A

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
04 -023	02485	...MOTOR ASSY	REF	C
04 -024	05009-0006	...SCREW	1	C
04 -025	02993	...FAN ASSY	1	C
04 -026	03416	...MOT & CONN ASSY	1	C
PRINTER ASSEMBLY				
04A-000	30450-0008	..PRINTER ASSY SEE FIG 01 -015	REF	B
04A-000	1-2-3-1041	..PRINTER ASSY SEE FIG 01 -015	REF	A
RIBBON FEED ASSEMBLY				
05 -000	29134-0002	...FEED ASSY	1	B
05 -000	17-1041	...FEED ASSY	REF	A
05 -001	02935	....BACKSTOP ECC	1	C
05 -002	03121	....PLATE BRACE	1	C
05 -003	03064	....SPRING	1	C
05 -004	03065	....CAMFOLLOWERSPG	1	C
05 -005	5133-9	....RET RING 05004-0011 79136	2	C
05 -006	05004-0027	....RET RING 05004-0027 79136	1	C
05 -007	5100-12	....RET RING 05004-0012 79136	1	C
05 -008	03066	....STOP SPRING	1	C
05 -009	02936	....CLUTCH STOP RH	1	C
05 -010	5133-12	....RET RING 05004-0019 79136	1	C
05 -011	03059	....SPACER STOP RH	1	C
05 -012	02938	....CAM FOLLOWER	1	C
05 -013	03033	....GEAR ASSY	1	C
05 -014	03103	....SHIM WASHER	1	C
05 -015	03094	....BREAK ARM RH	1	C
05 -016	03278	....PLATE SPACER	1	C
05 -017	00221	....CLAMP ASSY	1	B
05 -018	01673	....CLAMP	1	C
05 -019	05009-0001	....SCR SOC SET	1	C
05 -020	03039	....BACKSTOP	1	C
05 -021	02950	....SPACER	1	C
05 -022	02937	....CLUTCH STOP LH	1	C
05 -023	03023	....CLUTCHSTOPSPR	1	C
05 -024	02938	....CAM FOLLOWER	1	C
05 -025	03032	....GEAR ASSY	1	C
05 -026	03103	....SHIM WASHER	1	C
05 -027	03093	....BREAK SPRING	1	C
05 -028	03095	....BREAK ARM L H	1	C
05 -029	02864	....CLUTCH ASSY	1	C
05 -030	01205-0001	....ROLLER CLUTCH	4	C
05 -031	03867	....WASHER	1	C
05 -032	03031	....GEAR ASSY	1	C
05 -033	03037	....DRIVE ASSY	2	C
05 -034	03261	....SPOOL CLIP	2	C
05 -035	5133-6	....RET RING 05004-0023 79136	2	C
05 -036	03045	....PLATE ASSY	1	C
05 -037	05007-0016	....PAN HD SCR	4	C

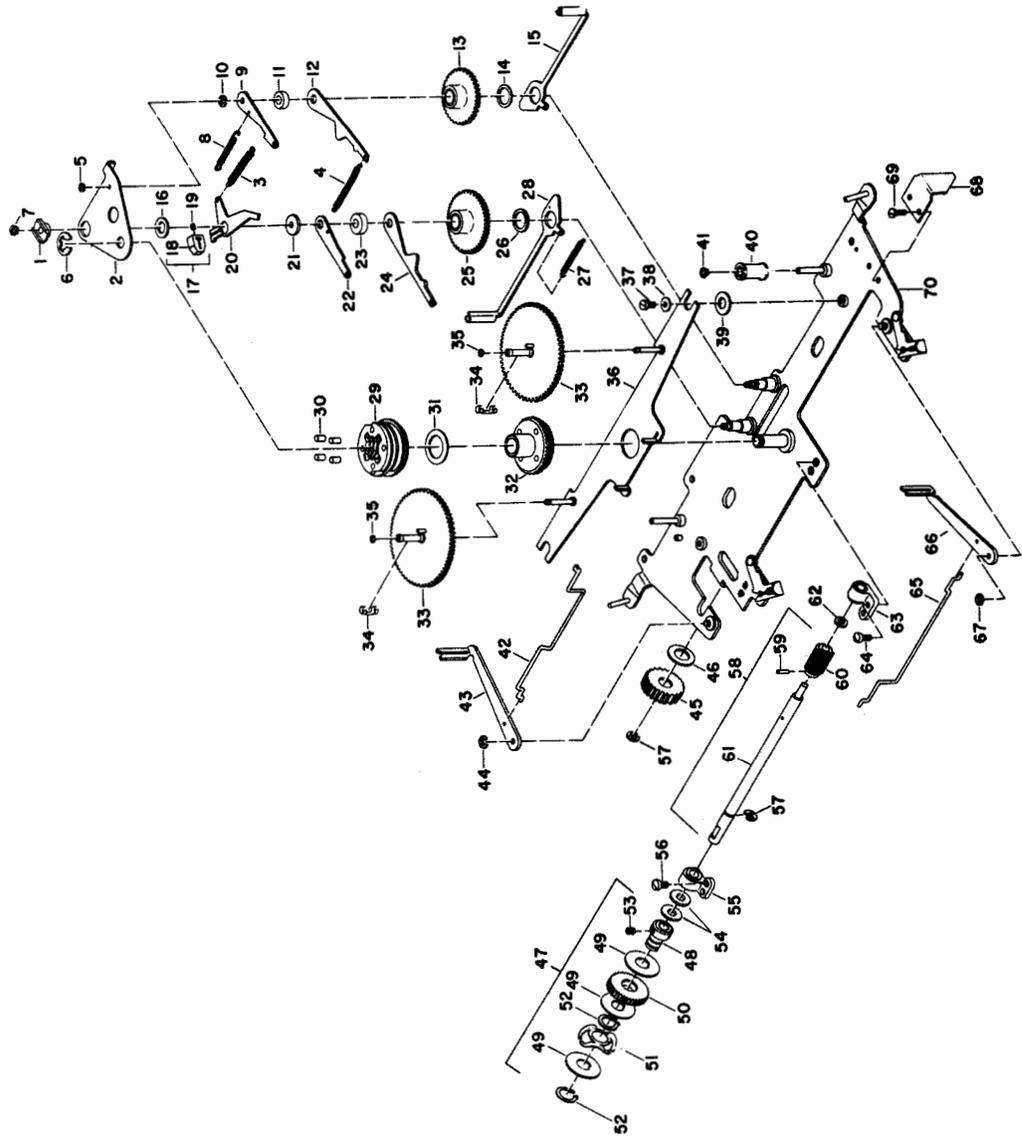


FIGURE 5

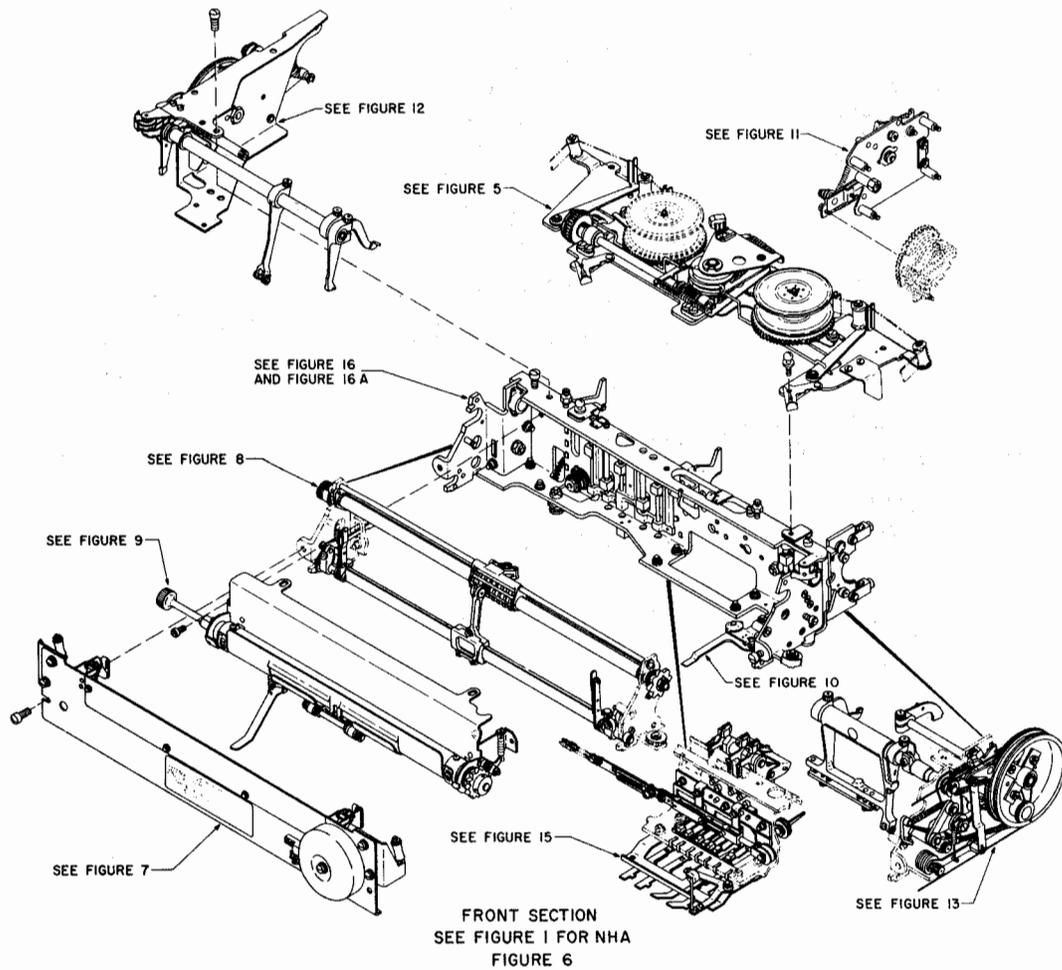


FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
05 -038	05032-0004	....WASHER	2	B
05 -039	03012	....SPACER GUIDE	2	C
05 -040	03110	....ROLLER ASSY	4	C
05 -041	5555-12	....RET RING 05004-0003 79136	4	C
05 -042	02969	....CLUTCH ARM LH	1	C
05 -043	02965	....ARM L H	1	C
05 -044	5133-12	....RET RING 05004-0019 79136	1	C
05 -045	03016	.....OPEN	1	C
05 -046	03013	....GEAR ASSY	1	C
05 -047	03869	....SPACER GEAR	1	C
05 -048	03873	....SLIPCLUTCHASSY	1	C
05 -049	03871	....HUB	1	C
05 -050	04553	....WASHER KEYED	3	C
05 -051	05077-0002	....GEAR	1	C
05 -052	5100-31	....SPRING WASHER 05004-0028 79136	1	C
		....RET RING	2	B
05 -053	05009-0006	....SCR SOC SET	1	C
05 -054	03656	....FELT WASHER	2	C
05 -055	03028	....BEARING ASSY	1	C
05 -056	05007-0033	....FILL HD SCR	2	C
05 -057	5133-18	....RET RING 05004-0022 79136	2	C
05 -058	03061	....SHAFT ASSY	1	C
05 -059	05080-0005	.....ROLL PIN	1	C
05 -060	03266	....WORM DOUBLE	1	C
05 -061	02973	....WORM SHAFT	1	C
05 -062	03123	....THRUST WASHER	1	C
05 -063	03030	....BLOCK ASSY	1	C
05 -064	05007-0033	....FILL HD SCR	2	C
05 -065	02968	....CLUTCH ARM RH	1	C
05 -066	02964	....SENSING ARM RH	1	C
05 -067	5133-12	....RET RING 05004-0019 79136	1	C
05 -068	30279	....GUIDE	1	B
05 -069	05007-0016	....PAN HD SCR	2	C
05 -070	29124-0002	....PLATE ASSY	1	B
05 -070	29124	....PLATE	1	A
FRONT SECTION INSTALLATION				
06 -000	NO NUMBER	.....FRONT SECT INST	REF	B
FRONT PLATE ASSEMBLY				
07 -000	03120	...PLATE ASSY	1	C

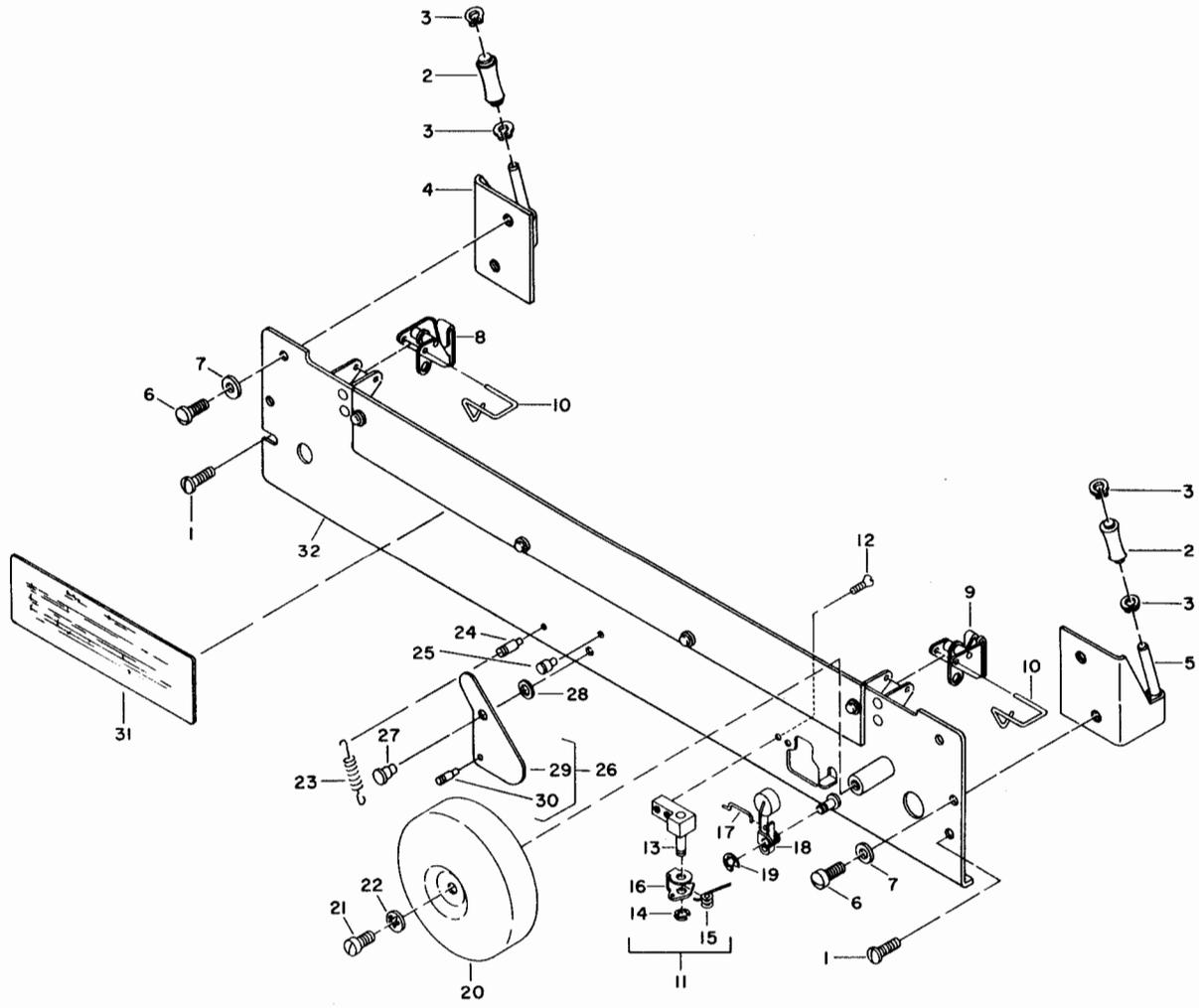


FIGURE 7

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
07 -001	05007-0005	...SCREW	2	C
07 -002	03091	....GUIDE ROLLER	2	C
07 -003	5555-12	....RET RING 05004-0003 79136	4	C
07 -004	03087	....BRKT ASSY LH	1	C
07 -005	03088	....BRKT ASSY RH	1	C
07 -006	05007-0038	....SC FILL HD	4	C
07 -007	05032-0007	....WASHER	4	B
07 -008	02079	....GUIDE ASSY LH	1	C
07 -009	02080	....GUIDE ASSY RH	1	C
07 -010	30565	....GUIDE RET	2	B
	2084	....SHAFT USE P/N 30565	1	A
	5133-6	....RING APPL. N/A 79136	2	A
07 -011	03759	....BRKT ASSY	1	C
07 -012	05007-0119	....SCR FLAT HD	2	B
07 -013	03758	....SHAFT ASSY	1	C
07 -014	5133-9	....E RING 05004-011 79136	1	C
07 -015	03637	....TORSION SPRING	1	C
07 -016	03634	....LEVER	1	C
07 -017	03632	....WIRE LINK	1	C
07 -018	03757	....LEVER ASSY	1	C
07 -019	5133-9	....RET RING 05004-0011 79136	1	C
07 -020	03038	....BELL	1	C
07 -021	05007-0038	....SC FILL HD	1	C
07 -022	1204-00	....LOCKWASHER 05006-0009 78189	1	B
07 -022	5032-13	....WASHER	2	A
07 -024	28625	....POST	1	D
07 -025	33944	....STOP	1	D
07 -026	33947	....SUPPRT ASSY	1	D
07 -027	33945	....SHOULDER STUD	1	D
07 -028	33946	....WASHER	1	D
07 -029	33948	....FOOT	1	D
07 -030	28626	....RIVET	1	D
07 -031	03803	....PATENT PLATE	1	C
07 -032	03086	....RIVET ASSY	1	C
		HAMMER-CYLINDER SHAFT ASSY		
08 -001	01753-0002	...YOKE ASSY	1	B
08 -001	1753	...SHAFT ASSEMBLY	1	A
08 -002	04141	....LOCK STRIP	1	C
08 -003	05007-0093	....SCREW FILL HD	1	C
08 -004	01565	....WEDGE CLAMP	1	C
08 -005	03564	....WEDGE CLAMP	1	C
08 -006	02165	....YOKE ASSY	1	C
08 -007	01288	...SHAFT	1	C

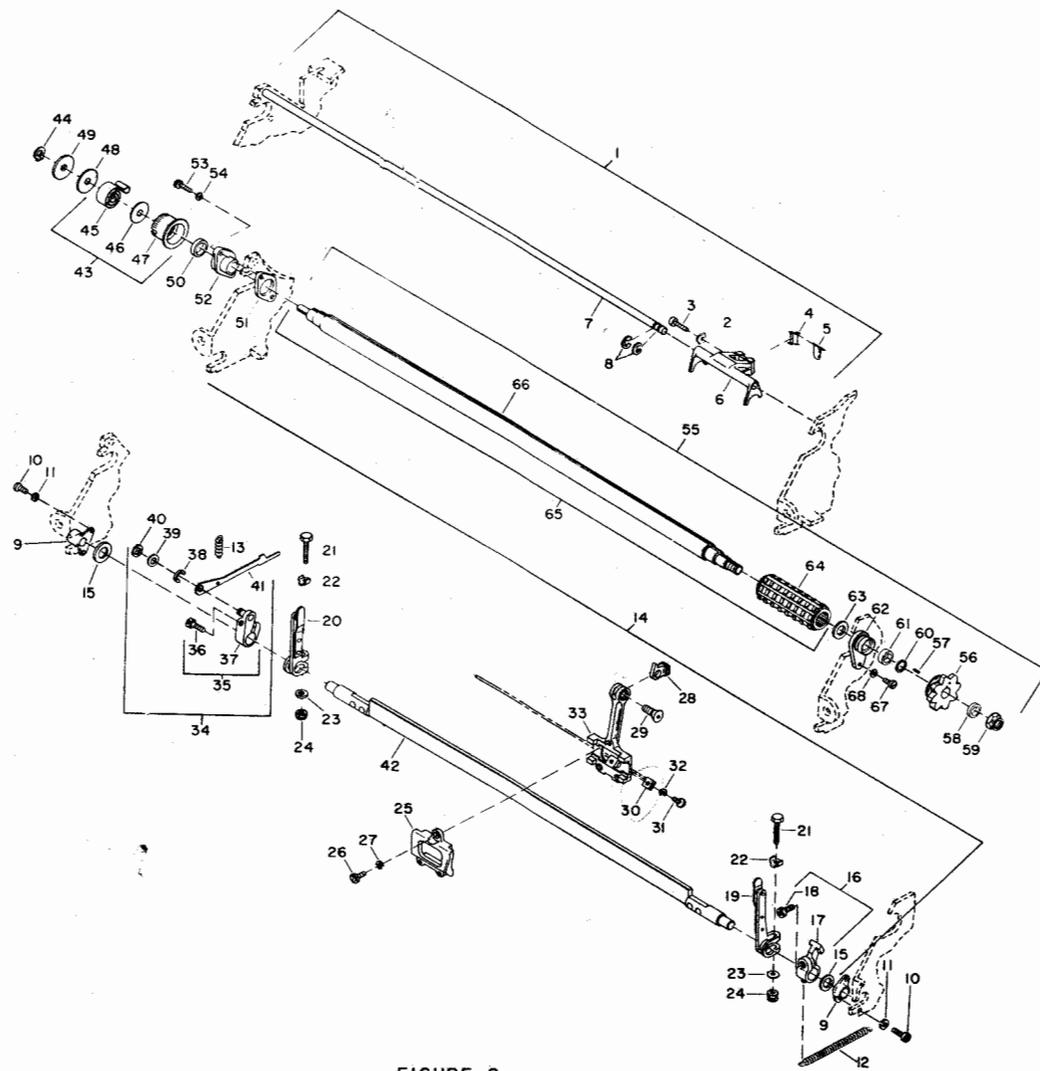


FIGURE 8

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
08 -008	5133-12	...RET RING 05004-0019 79136	2	C
08 -009	01343	...BEARINGS	2	C
08 -010	05008-0029	...SCREW	4	C
08 -011	AN935-3L	...LOCKWASHER 05006-0003 88044	4	C
08 -012	01802	...HAMMER SPRING	1	C
08 -013	01800	...SPRING	1	C
08 -014	01440-0001	...SHAFT ASSY	1	C
08 -015	03654	...FELT WASHER	1	C
08 -016	01799	...STOP ASSY	1	C
08 -017	04809	...STOP ASSY	1	C
08 -018	05008-0007	...SOC HD CAP SCR	1	C
08 -019	01502-0002	...VIBRATOR ASSY	1	C
08 -020	01502-0001	...VIBRATOR ASSY	1	C
08 -021	05007-0019	...HEX HD BOLT	2	C
08 -022	02009	...LOCK WASHER	2	C
08 -023	05032-0007	...FLATWASHER	2	B
08 -024	50 FA 440	...LOCKNUT 5016-0002 56878	2	C
08 -025	02723/26244	...PRINTHAMMERCAP 5815-00-889-6549	1	C
08 -026	05007-0046	...BINDING HD SCR 5815-00-2539	3	C
08 -027	AN935-3L	...SPRING 5310-00-5006-0003 261-88044	3	C
08 -028	01253	...PAD ASSY 5815-00-653-7042 7973	1	C
08 -029	05019-0005	...FL HD SOC SCRS 5305-00-045-1593	1	C
08 -030	01566 ML	...CLAMP	1	B
08 -030	3145	...CLAMP 5815-00-369-5725	1	A
08 -031	05007-0046	...BINDING HD SCR 261-7973	1	C
08 -032	AN935-3L	...SPRING 5310-00-5006-0003 88044	1	C
08 -033	01245	...PRINT HAMMER 5815-00-889-6549	1	C
08 -034	00219	...SUB ASSY	1	B
08 -035	01258	...LEVER ASSY	1	C
08 -036	05019-0003	...FLAT HD SOC	1	C
08 -037	04808	...LEVER ASSY	1	C
08 -038	5144-12	...RET RING 05004-0029 79136	1	C
08 -039	04560	...FELT WASHERS	1	C
08 -040	5555-12	...RET RING 05004-0003 79136	1	C
08 -041	01262	...ACTUATOR LINK	1	C
08 -042	02721	...SHAFT ASSY	1	C
08 -043	00224	...RET SUB ASSY	1	B
08 -044	05004-0003	...RET RING	1	C
08 -045	01261	...SPIRAL SPRING	1	C
08 -046	02005	...WASHER	1	C
08 -047	01346	...SPRING RET	1	C
08 -048	01402	...WASHER	1	C
08 -049	02783	...WASHER	1	C
08 -050	05012-0005	...BEARING	1	C
08 -051	02006	...THREAD FLANGE	1	C
08 -052	01345	...BEARING RET	1	C
08 -053	05008-0052	...SCREW	2	B
08 -053	5008-5	...SCREW	2	A
08 -054	1202-00	...LOCKWASHER 05006-0007 78189	2	C
08 -055	01379-0001	...SHAFT ASSY	1	B
08 -055	1379	...SHAFT ASSEMBLY	1	A
08 -056	01319	...INDEX WHEEL	1	C

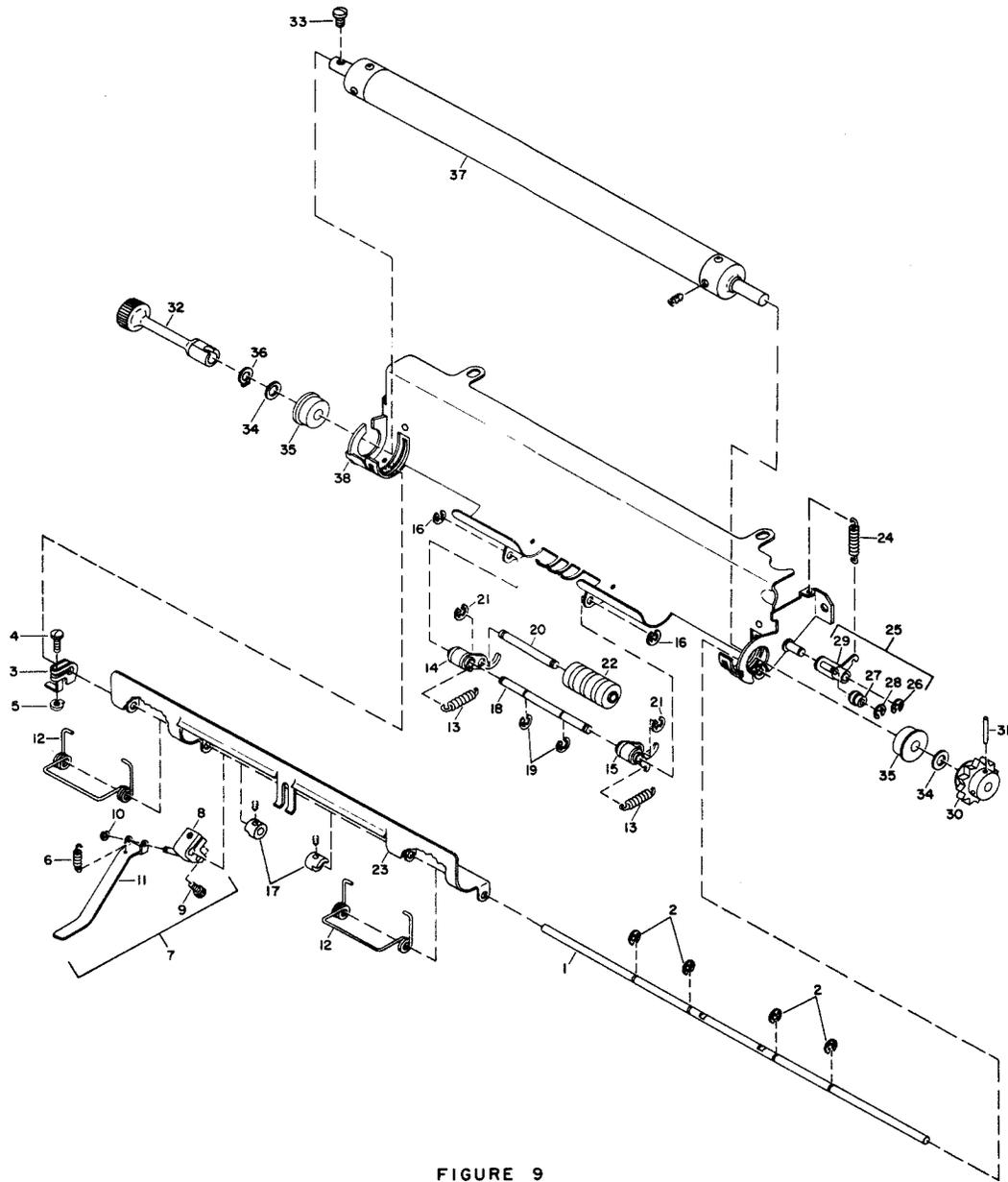


FIGURE 9

FIG.& INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
08 -057	01733	....KEY	1	C
08 -058	02007	....SPACER	1	C
08 -059	02929	....FLEXLOC NUT	1	C
08 -060	02526	....SPACER	1	C
08 -061	05012-0016	....BEARING	1	C
08 -062	01344	....BEARING RET	1	C
08 -063	04146	....WASHER	1	C
08 -064	01755	....CYLINDER ASSY SEE A536Q	NSS	C
08 -065	10117	.....CYL SHAFT ASSY	1	B
08 -065	1379	....SHAFT ASSY	1	A
08 -066	01287	....CYLINDER SHAFT SEE A536Q	NSS	C
08 -067	05007-0002	...SCREW	1	C
08 -068	1203-00	...WASHER 05006-0008 78189	1	C
PAPER FEED ASSEMBLY				
09 -000	33015-0002	...FEED ASSY	1	B
09 -000	15-104	...FEED ASSY	REF	A
09 -001	02158	....RELEASE CAM	1	C
09 -002	5133-12	....RET RING 05004-0019 79136	4	C
09 -003	04510	....STOP LEVER	1	C
09 -004	05007-0089	....SCR PAN LID	1	C
09 -005	00824	....ANTI TURN NUT	1	C
09 -006	02735	....LEVER SPRING	1	C
09 -007	00220	....CLAMP ASSY	1	B
09 -007	2228	....CLAMP ASSEMBLY	1	A
09 -008	04800	....CLAMP ASSY	1	C
09 -009	05008-0008	.....SOC HD SCREW	1	C
09 -010	5144-9C	.....TRUARC RING 05004-0045 79136	1	C
09 -011	02229	....RELEASE LEVER	1	C
09 -012	02407	....SPRING PAD	2	C
09 -013	01380	....SPRING ROLL	2	C
09 -014	02219	....SPRING ASSY	1	C
09 -015	02151	....SPRING ASSY RH	1	C
09 -016	5133-12	....RET RING 05004-0019 79136	2	C
09 -017	02102	....CAM ASSY	1	C
09 -018	02156	....ARM PIVOT	2	C
09 -019	5133-12	....RET RING 05004-0019 79136	2	C
09 -020	02157	....SHAFT ROLL	1	C
09 -021	5555-18	....RET RING 05004-0025 79136	2	C
09 -022	01247	....ASSY	1	C
09 -023	02214	....PRESS PAD	1	C
09 -024	01728	....SPRING DETENT	1	C
09 -025	01313	....BACKSTOP ASSY	1	C
09 -026	5133-9	....RETAINING RING 05004-0011 79136	1	C
09 -027	01737	.....ROLLER	1	C
09 -028	5133-9	.....RET RING 05004-0011 79136	1	C
09 -029	01973	.....ARM ASSY	1	C
09 -030	01968	....RATCHET	1	C
09 -031	05080-0006	....ROLL PIN	1	C
09 -032	01255	....FEED KNOB	1	C

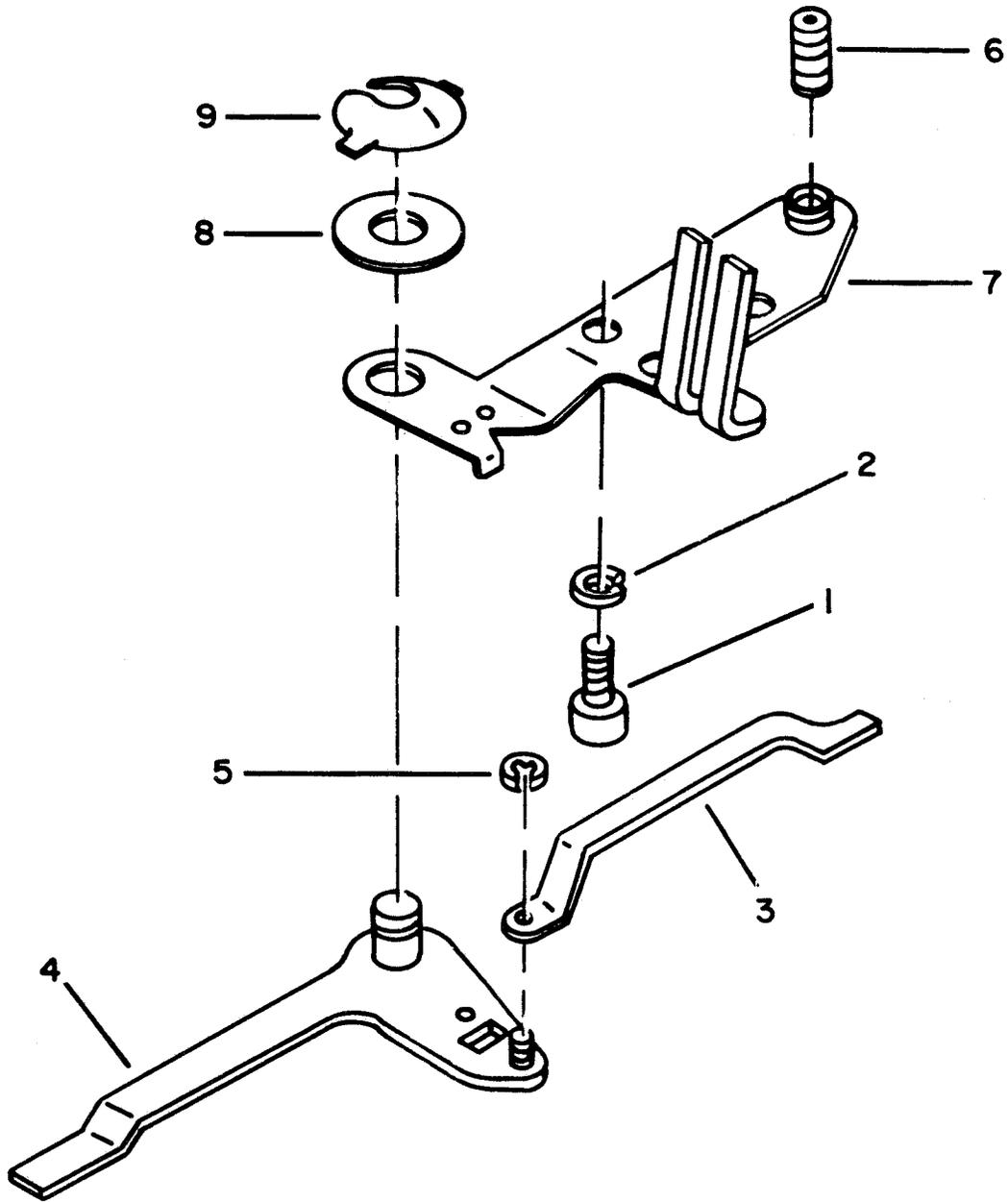


FIGURE 10

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
1234567890				
09 -033	05007-0018	....SCR BIND LID	1	C
09 -034	05032-0016	....SPACER	2	C
09 -035	05012-0004	....BEARING	1	B
09 -035	SFR3PP	....BEARING	1	A
09 -036	5555-18	....RET RING 05004-0025	83086 79136	1 C
09 -037	01200	....RUBBER ASSY	NSS	C
09 -037	10125	....ROLL ASSY SER	1	C
09 -038	01241-0002	....BRAZE ASSY	1	B
09 -038	1241	....GUIDE	1	A
LINE FEED SHIFT ASSEMBLY				
10 -000	02569	...FEED ASSY	1	C
10 -001	05007-0033	...SCREW	3	C
10 -002	AN935-4L	...WASHER 05006-0004	88044	3 C
10 -003	02244	....FEED SHIFT	1	C
10 -004	02264	....ARM ASSY	1	C
10 -005	5133-9	....E RING 05004-0011	79136	1 C
10 -006	05009-0005	....SOC HD SET	1	C
10 -007	04807	....PLATE ASSY	1	C
10 -008	05032-0012	....WASHER	1	B
10 -008	AN960C10L	....WASHER	88044	1 A
10 -009	5139-18	....E RING 05004-0036	79136	1 C
AUTOMATIC MOTOR STOP ASSY				
11 -000	33026	...STOP ASSY	1	B
11 -000	26-104	...TIME DELAY ASSY	REF	A
11 -001	03795	....SPRING	1	C
11 -002	03790	....SPRING	1	C
11 -003	00222	....SUB ASSY	1	B
11 -004	05008-0021	....SCR SOC HD	2	C
11 -005	AN935-4L	....WASHER SPRING 05006-0004	88044	2 C
11 -006	5555-12	....RET RING 05004-0003	79136	1 C
11 -007	03662	....FELT WASHER	3	C
11 -008	5133-12	....RET RING 05004-0019	79136	1 C
11 -009	03791	....PAWL ASSY	1	C
11 -010	03796	....SPACER	2	C
11 -011	04851	....PAWL ASSY	1	B
11 -011	3787	....PAWL ASSEMBLY	1	A
11 -012	03797	....ADAPTOR ASSY	1	C
11 -013	03786	....GUIDE	1	C
11 -014	05008-0015	....SCR SOC HD	4	C
11 -015	AN935-4L	....WASHER SPRING 05006-0004	88044	4 C
11 -016	03801	....SPACER	4	C
11 -017	03800	....CAM SHAFT	1	C
11 -019	05008-0008	....SCR SOC HD	1	C
11 -018	AN935-4L	....WASHER SPRING 05006-0004	88044	1 C

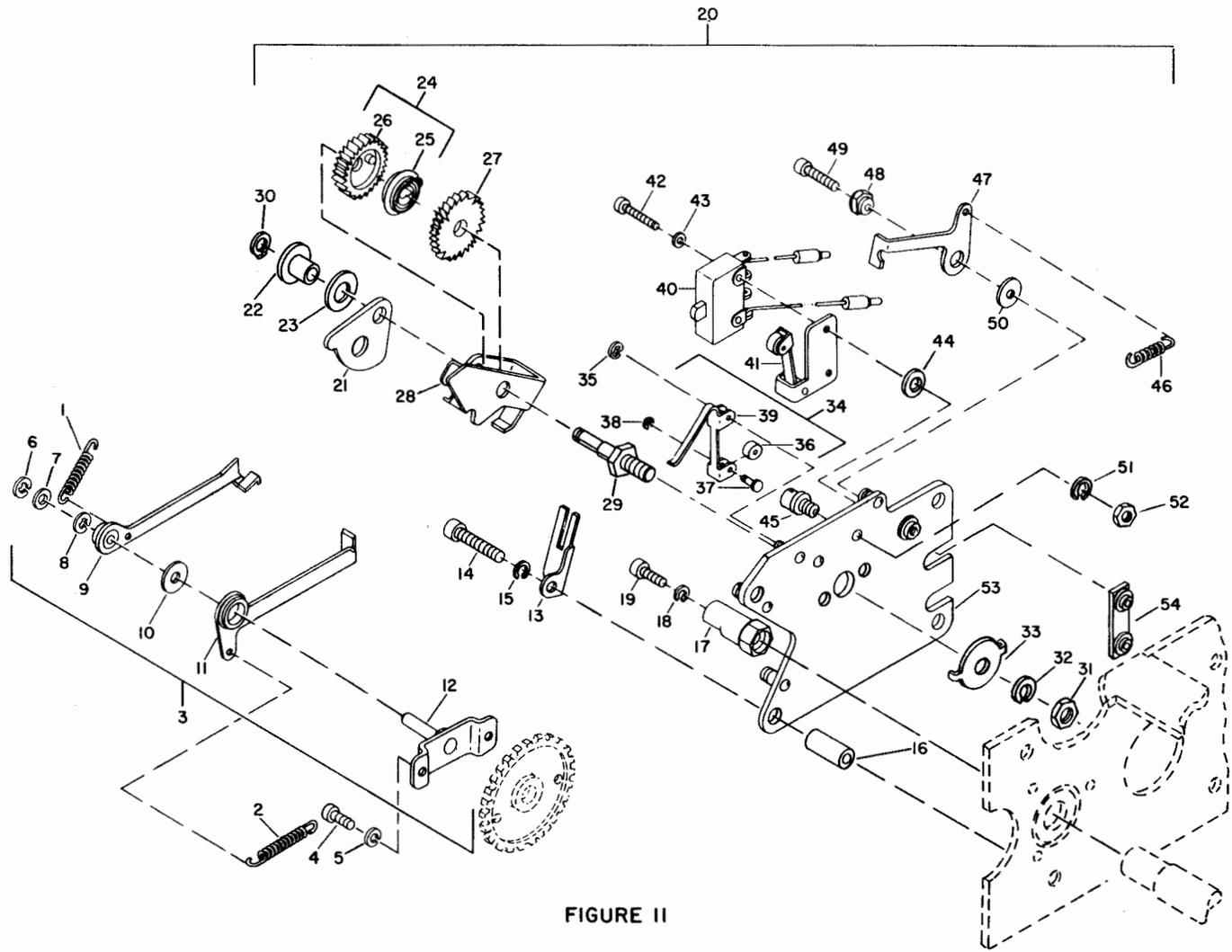


FIGURE II

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
11 -020	03761	....PLATE ASSY	1	C
11 -014	05008-0021	....SCR SOC HD	REF	C
11 -021	03779	.....LATCH	1	C
11 -022	04227	.....SLEEVE	1	C
11 -023	04512	.....SHIM	4	C
11 -024	04511	.....SPRING ASSY	1	C
11 -025	03781	.....SPRING	1	C
11 -026	03775	.....STUD ASSY	1	C
11 -027	03774	.....RATCHET	1	C
11 -028	03780	.....YOKE	1	C
11 -029	03765	.....SHAFT RATCHET	1	C
11 -030	5100-12	.....RET RING	05004-0012	79136
11 -031	05030-0006	.....HEX NUT		
11 -032	AN935-10L	.....SPRING	05006-0012	88044
11 -033	04133	.....LDCK		
11 -034	03770	.....SPRING ASSY		
11 -035	5133-6	.....RET RING	05004-0016	79136
11 -036	03772	.....ROLLER		
11 -037	03773	.....PIN		
11 -038	5133-6	.....RET RING	05004-0016	79136
11 -039	03771	.....SPRING DETENT		
11 -040	00223	.....SWITCH ASSY		
11 -041	70-120	.....ACTUATOR	05598-0001	04426
11 -042	05007-0124	....SCR PAN HD		
11 -043	05032-0014	.....WASHER		
11 -044	04135	.....SPACER		
11 -045	04137	.....POST STOP		
11 -046	03783	.....SPRING		
11 -047	03782	.....PAWL ADV		
11 -048	03784	.....CHECK PAWL		
11 -049	05008-0010	....SCR SOC HD		
11 -050	03785	.....SPACER		
11 -051	AN935-4L	.....SPRING	05006-0004	88044
11 -052	05030-0003	.....NUT HEX		
11 -053	03762	....PLATE ASSY		
11 -054	03319	....PLATE ASSY		
		FRONT SECTION ASSEMBLY		
12 -000	30597	...FRONT SEC ASSY	1	B
		TAKE-UP DRUM & FRAME ASSY		
12 -001	33611	...PIN	2	B
12 -001	2095	...STUD	1	A

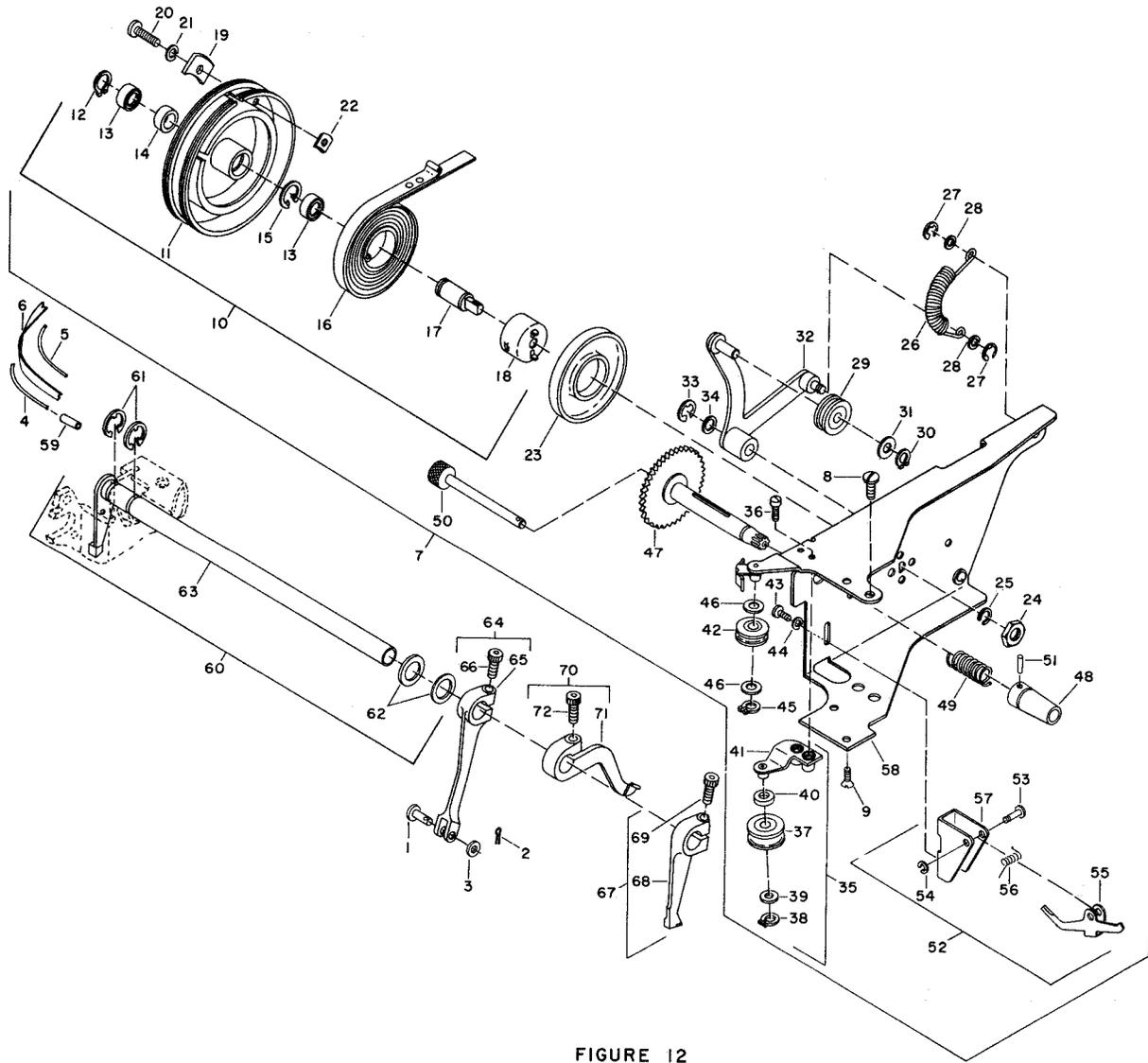


FIGURE 12

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE		
					1234567890	
12 -002	05180-0001	...PIN COTTER	2	B		
12 -003	33612	...NYLON WASHER	2	B		
12 -004	02622	....CABLE	1	C		
12 -005	02624	....CABLE	1	C		
12 -006	02621	....BELT	1	C		
12 -007	29133	....DRUM ASSY	1	C		
12 -008	05007-0030	....SCREW	2	C		
12 -009	05007-0048	....SCREW	2	C		
12 -010	00215	....DRUM ASSY	1	B		
12 -011	01314	.....DRUM	1	C		
12 -012	5100-18	.....RET RING	05004-0009	79136	1	C
12 -013	05012-0003	.....BEARING			1	C
12 -014	03250	.....SPACER L H			1	C
12 -015	5000-37	.....RET RING	05004-0010	79136	1	C
12 -016	01332	.....SPRING			1	C
12 -017	01746	.....SHAFT			1	C
12 -018	01745	.....CUP			1	C
12 -019	30017	.....CLAMP			1	B
12 -020	05007-0017	.....SCREW			1	C
12 -021	AN935-4L	.....LOCKWASHER	05006-0004	88044	1	C
12 -022	30018	.....CLAMP NUT			1	B
12 -023	03173	.....GUARD			1	C
12 -024	05030-0001	.....HEX NUT			1	C
12 -025	AN935-10L	.....LOCKWASHER	05006-0012	88044	1	C
12 -026	01756	.....SPRING			1	C
12 -027	5133-12	.....RET RING	05004-0019	79136	2	C
12 -028	05032-0029	.....WASHER			2	B
12 -028	5032-5	.....WASHER			2	A
12 -029	03143	.....PULLEY ASSY			1	C
12 -029	05044-0003	.....BEARING NEEDLE			NSS	C
12 -030	5555-15	.....RET RING	05004-0041	79136	1	C
12 -031	03159	.....SPACER			1	C
12 -032	01407	.....ARM ASSY			1	C
12 -033	5133-18	.....RET RING	05004-0022	79136	1	C
12 -034	05032-0016	.....WASHER			1	C
12 -035	01703	.....BRKT ASSY			1	C
12 -036	05007-0038	.....SCREW			2	C
12 -037	03143	.....PULLEY ASSY			1	C
12 -037	05044-0003	.....BEARING NEEDLE			NSS	C
12 -038	5555-15	.....RING	05004-0041	79136	1	C
12 -039	03159	.....SPACER			1	C
12 -040	03161	.....SPACER			1	C
12 -041	04829	.....BRKT ASSY			1	C
12 -042	03160	.....PULLEY ASSY			1	C
12 -042	05044-0003	.....BEARING NEEDLE			NSS	C
12 -043	05007-0033	.....SCREW			2	C
12 -044	05032-0029	.....WASHER			2	B
12 -044	5032-5	.....WASHER			2	A
12 -045	5133-18	.....RET RING	05004-0022	79136	1	C
12 -046	03159	.....SPACER			2	C

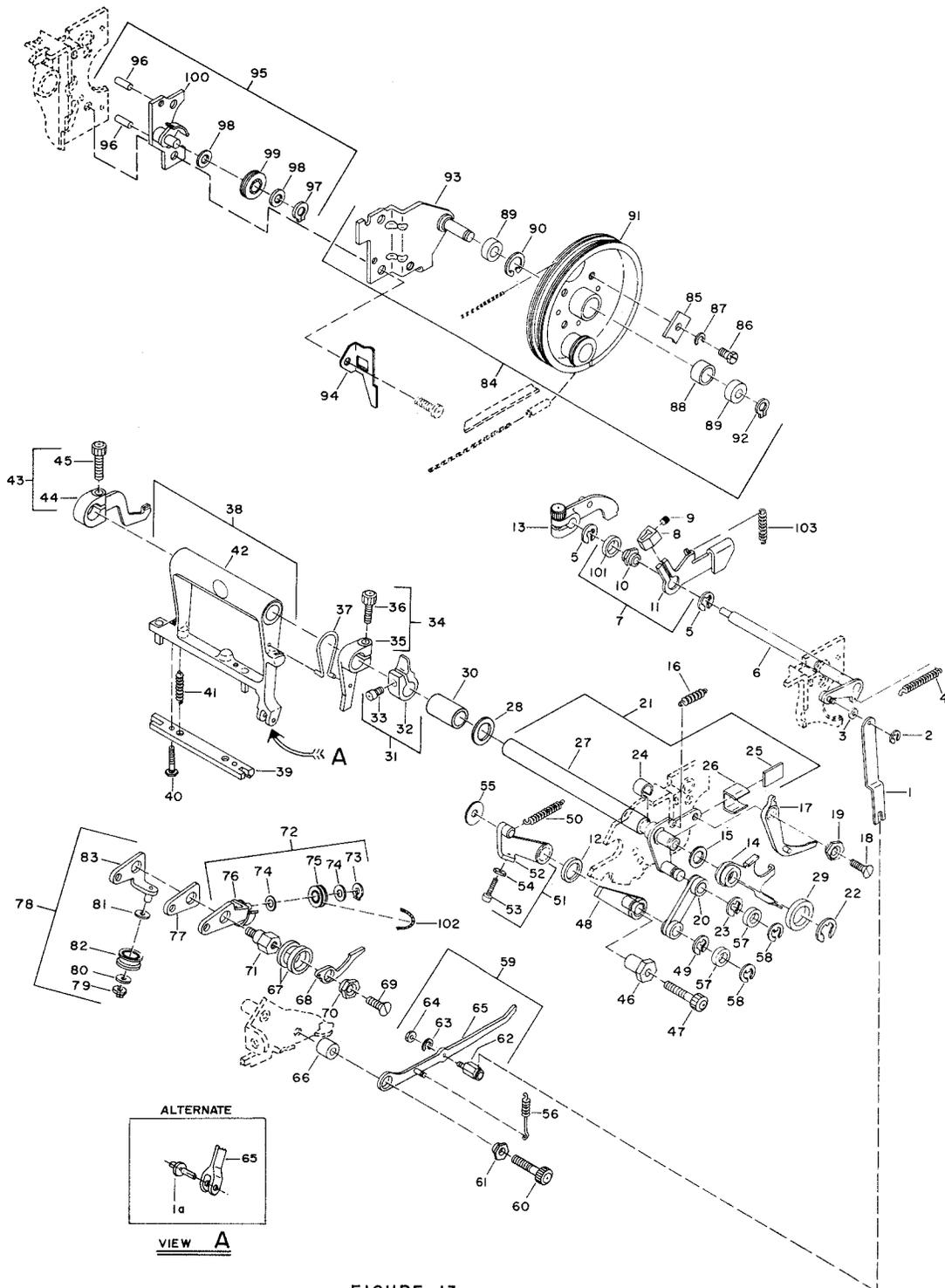


FIGURE 13

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
12 -047	29138	.....DIAL ASSY	1	C
12 -048	04294	.....LOCK SLIDE	1	C
12 -049	29144	.....SPRING	1	C
12 -050	29141	.....KNOB	1	C
12 -051	05070-0001	.....PIN	1	C
12 -052	30472	.....LEVER ASSY	1	B
12 -053	04297	.....LEVER	1	C
12 -054	5133-9	.....E RING 05004-0011 79136	1	C
12 -055	04295	.....LEVER	1	C
12 -056	04298	.....LEVER	1	C
12 -057	04532	.....LEVER ASSY	1	C
12 -058	29136	.....RIVET ASSY	1	C
12 -059	05572-0003	.....SLEEVE	1	B
12 -060	03577-0001	.....PRINTLEVRINGASY	1	B
		- - - * - - -		
12 -060	3577	.....LEVER ASSY	1	A
12 -061	5133-31	.....RET RING 05004-0017 79136	1	C
		- - - * - - -		
12 -062	03657	.....WASHER 03657	2	C
12 -061	5133-31	.....RET RING 05004-0017 79136	REF	C
12 -063	04846	.....LEVER ASSY	1	C
12 -064	01928-0001	.....ARM ASSY	1	B
12 -064	1928	.....ARM ASSY	1	A
12 -065	01615	.....ARM	1	C
12 -066	05008-0053	.....SCREW	1	B
12 -066	5008-38	.....SCREW	1	A
12 -067	02695	.....ARM ASSY	1	C
12 -068	04828	.....ARM ASSY	1	C
12 -069	05008-0053	.....SCREW	1	B
12 -069	5008-38	.....SCREW	1	A
12 -070	01663	.....PRINT ASSY	1	C
12 -071	04827	.....CAM ASSY	1	C
12 -072	05008-0054	.....SCREW	1	B
12 -072	5008-41	.....SCREW	1	A
		LINKAGE ASSEMBLY		
13 -000	30602	.....LINKAGE ASSY	1	B
13 -000	13-104	.....LINKAGE ASSEMBL	1	A
13 -001	01368	.....PAWL LINK	1	C
		- - - * - - -		
13 -002	5133-9	.....RET RING 05004-0011 79136	1	C
		- - - * - - -		
13 -003	02408	.....SPACER	1	C
13 -004	01750	.....SPRING	1	C
		- - - * - - -		
13 -005	5133-18	.....E RING TRUARC 05004-0028 79136	2	C
		- - - * - - -		
13 -006	04815	.....SHAFT ASSY	1	C
13 -007	03212	.....LEVER ASSY	1	C
13 -008	01673	.....CLAMP	1	C
13 -009	05009-0001	.....SCREW	1	C
13 -010	03208	.....ECCENTRIC	1	C
13 -011	03209	.....LEVER	1	C
13 -012	02662	.....FELT WASHER	1	C
13 -013	01160	.....CAM ASSY	1	C
13 -014	01393	.....LEVER ASSY	1	C
13 -015	02381	.....LEVER	1	C
13 -016	01730	.....SPRING	1	C
13 -017	01780	.....PAWL ASSY	1	C
		- - - * - - -		
13 -018	05007-0053	.....SCREW	1	C
13 -019	02560	.....PAWL	1	C
		- - - * - - -		

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
13 -020	02379	.....LINK ASSY	1	C
13 -021	01284-0001	.....LEVER ASSY	1	C
		-----*		
13 -021	1284	.....LEVER ASSEMBLY	1	A
13 -022	5133-21	.....E RING TRUARC 05004-0030 79136	1	C
13 -023	5133-18	.....E RING TRUARC 05004-0022 79136	1	C
		-----*		
13 -024	02385	.....STRIP	1	C
13 -025	03651	.....STRIP	1	C
13 -026	03652	.....CLIP	1	C
13 -027	04817-0001	.....SHAFT ASSY	1	B
13 -027	4817	.....LEVER	1	A
13 -028	03181	.....SPACER	1	C
13 -029	03667	.....FELT WASHER	1	C
13 -030	03178	.....SPACER	1	C
13 -031	03553	.....CLAMP ASSY	1	C
13 -032	03229	.....ACTUATOR	1	C
13 -033	05008-0047	.....SCREW	1	B
13 -033	5008-28	.....SCREW	1	A
13 -034	02728	.....ARM ASSY	1	C
13 -035	02726	.....ARM	1	C
		-----*		
13 -036	05008-0053	.....SCREW	1	B
		-----*		
13 -036	5008-38	.....SCREW	1	A
13 -037	02842	.....SPRING	1	C
13 -038	2073-0002	.....LEVER ASSY	1	B
13 -038	2073	.....LEVER ASSEMBLY	1	A
13 -039	02015	.....BAR	1	C
13 -040	02744	.....SCREW	1	C
13 -041	02016	.....SPRING	1	C
13 -042	01154	.....LEVER ASSY	1	C
13 -043	01664	.....CAM ASSY	1	C
13 -044	04818	.....ARM ASSY	1	C
13 -045	05008-0054	.....SCREW	1	C
13 -046	02105	.....INDEX PAWL	1	C
		-----*		
13 -047	05008-0031	.....SCREW	1	C
		-----*		
13 -048	04819	.....ARM ASSY	1	A
13 -049	5133-18	.....E RING TRUARC 05004-0022 79136	1	C
13 -050	01731	.....SPRING	1	C
13 -051	01399	.....PAWL ASSY	1	C
13 -052	04820	.....PAWL ASSY	1	C
13 -053	05008-0046	.....SCREW	1	B
13 -054	05030-0007	.....HEX NUT	1	C
13 -055	02106	.....WASHER	1	C
13 -056	01777	.....SPRING	1	C
13 -057	03658	.....FELT WASHER	2	C
13 -058	5555-18	.....GRIP RING 05004-0025 79136	2	C
13 -059	01776	.....PAWL ASSY	1	C
		-----*		
13 -060	05008-0015	.....SCREW	1	C
13 -061	01408	.....CHECK PAWL	1	C
		-----*		
13 -062	01539	.....STUD	1	C
13 -063	1202-00	.....LOCKWASHER 05006-0007 78189	1	C
13 -064	05030-0002	.....NUT	1	B
13 -065	04821	.....PAWL ASSY	1	C
13 -066	01434	.....SPACER	1	C
13 -067	03653	.....FELT WASHER	2	C
13 -068	01163	.....LATCH	1	C
		-----*		
13 -069	05007-0057	.....SCREW	1	C
13 -070	02559	.....LATCH	1	C
		-----*		
13 -071	02312	.....STUD	1	C
13 -072	02310	.....BRKT ASSY	1	C
13 -073	5555-15	.....RET RING 05004-0041 79136	1	C
13 -074	03159	.....SPACER	1	C

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
13 -075	03160	.....PULLEY ASSY	1	C
13 -075	05044-0003	.....BEARING NEEDLE	NSS	C
13 -076	04822	.....SHAFT ASSY	1	C
13 -077	02307	.....SPACER	1	C
13 -078	02309	.....BRKT ASSY	1	C
13 -079	5555-15	.....RING	1	C
		05004-0041 79136		
13 -080	03159	.....SPACER	1	C
13 -081	03161	.....SPACER	1	C
13 -082	03141	.....PULLEY	1	C
13 -083	04823	.....SHAFT ASSY	1	C
13 -084	01338	.....DRUM ASSY	1	C
13 -085	01425	.....CLAMP	1	C
13 -086	03219	.....CLAMP	3	C
13 -087	1204-00	.....LOCKWASHER	3	B
13 -088	03165	.....SHAFT	1	C
13 -089	05012-0003	.....BEARING	1	C
13 -090	5000-37	.....RET RING	1	C
13 -091	33222	.....DRUM ASSY	1	B
13 -091	4814	.....DRUM	1	A
13 -092	5100-18	.....RET RING	1	C
		05004-0009 79136		
13 -093	02527	.....BRKT ASSY	1	C
13 -094	01397	.....PAWL GUIDE	1	C
13 -095	03132	.....SHIM ASSY	1	C
13 -096	05003-0001	.....PIN	1	C
13 -097	5555-15	.....RING	1	C
		05004-0041 79136		
13 -098	03159	.....SPACER	1	C
13 -099	03160	.....PULLEY ASSY	1	C
13 -099	05044-0003	.....BEARING NEEDLE	NSS	C
13 -100	04813	.....SHAFT ASSY	1	C
13 -101	03660	.....FELT WASHER	1	C
13 -102	02623	.....CABLE	1	C
13 -103	03214	.....SPRING	1	C
13 -004	33864	...PIN	1	D
SELECTOR ASSEMBLY				
15 -000	30601	.....SELECTOR ASSY	1	B
15 -000	12-104	.....SELECTOR ASSEMB	1	A
15 -001	33361	.....FUNCTION ASSY	1	B
		- - - * - - -		
15 -002	05007-0033	.....SCREW	4	C
		- - - * - - -		
15 -002A	33863	.....PLATE ASSY	1	D
15 -002B	05007-0140	.....SCREW	1	D
15 -003	30675	.....LATCH SPRING	1	B
15 -004	03004	.....LEVER ASSY	1	C
15 -005	5133-12	.....RET RING	1	C
		05004-0019 79136		
15 -006	30677	.....LEVER ASSY	1	B
15 -007	5144-9C	.....RET RING	1	C
		05004-0045 79136		
15 -008	01718	.....SPRING	5	C
15 -009	33377	.....RET LEVER	1	B
15 -010	5133-12	.....RET RING	1	C
15 -011	5144-9C	.....RET RING	1	C
		05004-0045 79136		
15 -012	33366	.....FEED ASSY	1	B
15 -013	5144-9C	.....RET RING	2	C
		05004-0045 79136		
15 -014	33372	.....LATCH ASSY	1	B
15 -015	30673	.....ADS SLIDE	1	B
15 -016	05030-0002	.....HEX NUT	1	B
15 -017	05032-0015	.....FLAT WASHER	1	B
15 -018	AN935-2L	.....LOCKWASHER	1	C
		05006-0002 88044		
15 -019	30577	.....ECCENTRIC	1	B
15 -020	05008-0004	.....SCREW	1	B
15 -021	33383	.....FUNCTION ASSY	1	B
15 -021	1514	.....SLIDE	1	A
		1514		
15 -022	05009-0005	.....SET SCREW	1	C
15 -023	05030-0003	.....HEX NUT	1	C

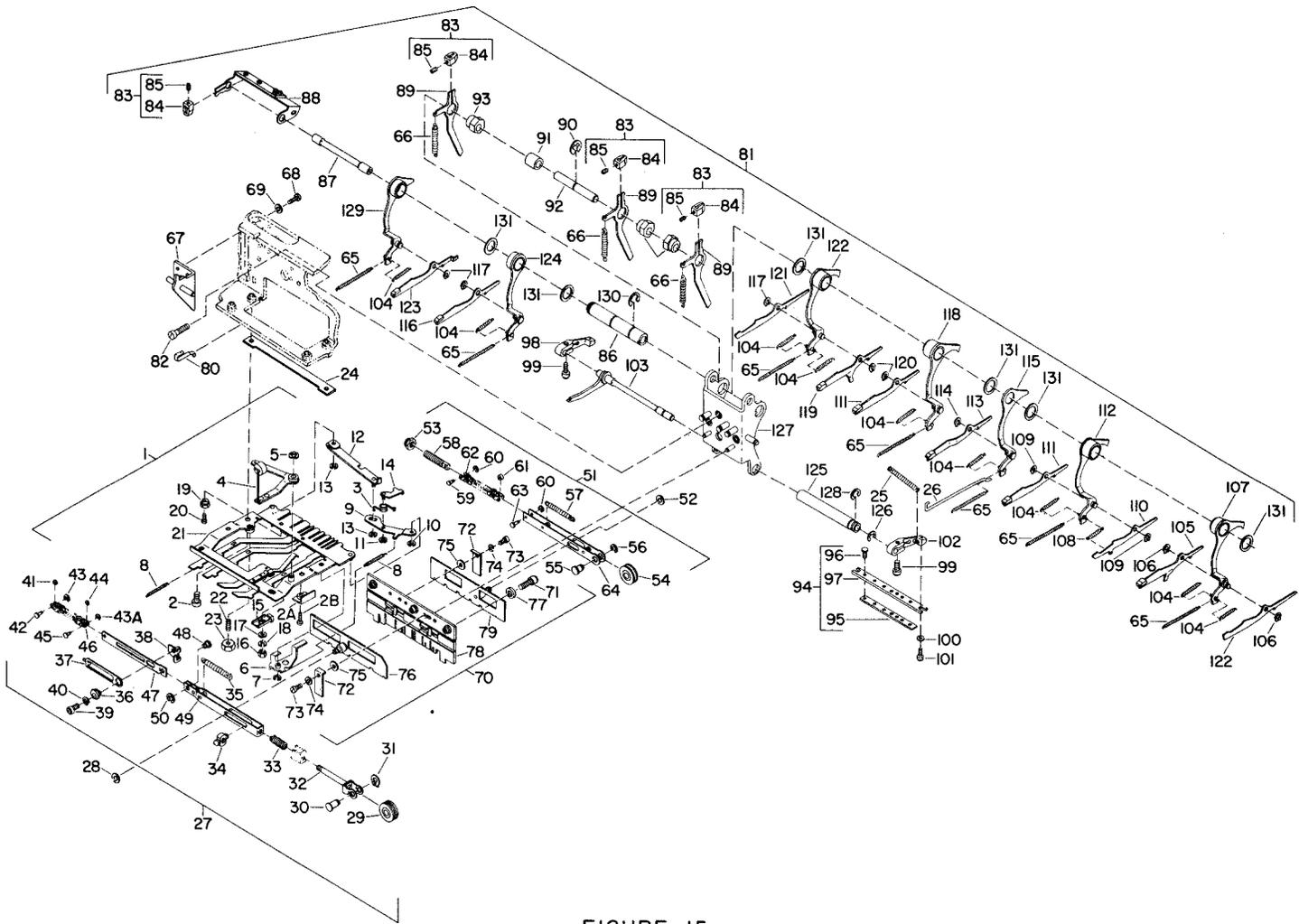


FIGURE 15

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
15 -024	01917	.....STOP STRIP	1	C
15 -025	01744	.....SPRING	1	C
15 -026	03007	.....CONN ROD	1	C
15 -027	02466	.....STRIP ASSY	1	C
15 -028	5133-12	.....RET RING 5004-0019 79136	1	C
15 -029	03141	.....BELT ASSY	1	C
15 -030	01741	.....BEARING	1	C
15 -031	5100-15	.....RET RING 05004-0033 79136	2	C
15 -032	01920	.....PULLEY ASSY	1	C
15 -033	01922	.....SPRING	1	C
15 -034	01921	.....SLIDE PIECE	1	C
15 -035	01607	.....SPRING	1	C
15 -036	03248	.....ECCENTRIC	1	C
15 -037	03290	.....ACTUATOR	1	C
15 -038	03487	.....LINK	1	C
15 -039	05008Q0029	.....SCREW	1	C
15 -040	AN935-3L	.....LOCKWASHER 05006-0003 88044	1	C
15 -041	03198	.....SPACERS	2	C
15 -042	02780	.....CHAIN PIN	1	C
15 -043	5133-6	.....RET RING 05004-0023 79136	1	C
15 -044	02469	.....SPACER	2	C
15 -045	02472	.....PIN	1	C
15 -043A	5133-6	.....E RING 05004-0016 79136	REF	C
15 -046	02462	.....CHAIN	1	C
15 -047	01747	.....LINK	1	C
15 -048	02836	.....PIN	1	C
15 -049	02835	.....U STRIP ASSY	1	C
15 -050	5133-12	.....RET RING 5004-0019 79136	1	C
15 -051	02467	.....STRIP ASSY	1	C
15 -052	5133-12	.....RET RING 05004-0019 79136	1	C
15 -053	05030-0013	.....HEX NUT	1	C
15 -054	03160	.....PULLEY ASSY	1	C
15 -054	05044-0003	.....BEARING NEEDLE	NSS	C
15 -055	03146	.....PIN	1	C
15 -056	5133-15	.....RET RING 05004-0018 79136	2	C
15 -057	01607	.....SPRING	1	C
15 -058	30401	.....STUD	1	B
15 -058	1320	.....STUD	1	A
15 -059	02780	.....CHAIN PIN	1	C
15 -060	5133-6	.....RET RING 5004-0023 79136	1	C
15 -061	02272	.....SPACER	1	C
15 -062	02461	.....CHAIN	1	C
15 -063	02471	.....CHAIN PIN	1	C
15 -060	5133-6	.....RET RING 5004-0023 79136	REF	C
15 -064	04802	.....STRIP ASSY	1	C
15 -065	01688	.....SPRING	7	C
15 -066	01701	.....SPRING	3	C
15 -067	01676	.....BRKT ASSY	1	C
15 -068	05007-0016	.....SCREW	4	C
15 -069	1204-03	.....LOCKWASHER 05006-0021 78189	4	C
15 -070	01630-0001	.....SLIDE ASSY	1	C
15 -071	05008-0010	.....SCREW	3	C
15 -072	01606	.....CLIP	4	C
15 -073	05007-0002	.....SCREW	4	C
15 -074	AN935-3L	.....LOCKWASHER 05006-0003 88044	4	C
15 -075	01601	.....SPACER	4	C
15 -076	01125	.....SLIDE ASSY	1	C
15 -077	01600	.....SPACER	3	C
15 -078	04830	.....SLIDE ASSY	1	C
15 -079	01124	.....SLIDE ASSY	1	C
	01600	.....SPACERS SEE ITEM A905	REF	C
15 -080	33621	.....CLIP SPRING	7	B
15 -081	33384	.....CLUTCH ASSY	1	B
15 -082	05007-0038	.....SCREW	3	C

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
15 -083	00221	.....CLAMP	4	B
15 -084	01673	.....CLAMP	1	C
15 -085	05009-0001	.....SCREW SOC	1	C
15 -086	01311	.....SHAFT	1	C
15 -087	01668	.....SHAFT	1	C
15 -088	02508	.....BAR ASSY	1	C
15 -089	01698	.....BACKSTOP	1	C
15 -090	5133-18	.....RET RING	1	C
15 -091	03258	.....SPACER	1	C
15 -092	01700	.....SHAFT	1	C
15 -093	01699	.....BACKSTOP	1	C
15 -094	02090	.....ROD ASSY	1	C
15 -095	02136	.....LOCK STRIP	1	C
15 -096	02030	.....SCREW ADJ	3	C
15 -097	01686	.....ROD	1	C
15 -098	30660	.....ACTUATE ASSY	1	B
		- - - * - - -		
15 -098	2188	.....ARM-ACTUATE	1	A
15 -099	05008-0008	.....SCREW	1	C
15 -100	05032-0010	.....WASHER	1	C
15 -101	05072-0002	.....SCREW	3	C
		- - - * - - -		
15 -102	30661	.....ARM ACTUATOR	1	B
		- - - * - - -		
15 -102	3218	.....ACTUATE ARM	1	A
15 -099	05008-0008	.....SCREW	1	C
15 -100	05032-0010	.....WASHER	1	C
		- - - * - - -		
15 -101	05072-0002	.....SCREW	1	C
15 -103	01624	.....LEVER ASSY	3	C
15 -104	01689	.....SPRING	2	C
15 -105	02018	.....LEVER ASSY	1	C
		- - - * - - -		
15 -106	5100-12	.....RET RING	2	C
		- - - * - - -		
15 -107	33381	.....ARM ASSY	1	B
15 -107	1683	.....ARM ASSY	1	A
15 -108	01656	.....SPRING	1	C
		- - - * - - -		
15 -109	5100-12	.....RET RING	2	C
		- - - * - - -		
15 -110	01692	.....LEVER	1	C
15 -111	02020	.....LEVER ASSY	1	C
15 -112	01682	.....ARM ASSY	1	C
15 -113	02021	.....LEVER ASSY	1	C
15 -114	5100-12	.....RET RING	1	C
15 -104	01689	.....SPRING	1	C
15 -115	01681	.....ARM ASSY	1	C
15 -116	02020	.....LEVER ASSY	1	C
		- - - * - - -		
15 -117	5100-12	.....RET RING	2	C
		- - - * - - -		
15 -104	01689	.....SPRING	2	C
15 -118	01680	.....ARM ASSY	1	C
15 -119	02019	.....LEVER ASSY	1	C
		- - - * - - -		
15 -120	5100-12	.....RET RING	2	C
		- - - * - - -		
15 -104	01689	.....SPRING	1	C
15 -121	01684	.....LEVER	1	C
15 -122	33379	.....ARM ASSY	1	B
15 -122	2020	.....ARM ASSY	2	A
15 -123	33225	.....LEVER ASSY	1	B
		- - - * - - -		
15 -123	2020	.....LEVER	2	A
15 -117	5100-12	.....RET RING	1	C
		- - - * - - -		
15 -104	01689	.....SPRING	1	C
15 -124	01678	.....ARM ASSY	1	C
15 -125	01612	.....SHAFT	1	C

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
15 -126	5133-15	.....RET RING 05004-0018 79136	1	C
15 -127	01685	.....FRAME ASSY	1	C
15 -128	5103-25	.....RET RING 05004-0015 79136	2	C
15 -129	01677	.....ARM ASSY	1	C
15 -130	5103-31	.....RET RING 05004-0014 79136	3	C
15 -131	01666	.....SPACER	6	C
FRAME ASSEMBLY				
16 -000	30452-0003	.....FRAME ASSY	1	B
16 -000	11-1041	.....FRAME ASSEMBLY	1	A
16 -001	03160	.....PULLEY ASSY	3	C
16 -001	05044-0003	.....BEARING NEEDLE	NSS	C
16 -002	5555-15	.....RET RING TRUARC 05004-0041 79136	3	C
16 -003	03159	.....SPACER	2	C
16 -004	01376	.....PULLEY SHAFT	1	C
16 -005	01748	.....BACKUP & GUIDE	1	C
16 -006	05007-0038	.....SCREW	1	C
16 -007	01223	.....HAMMER SHAFT	1	C
16 -008	01246	.....HAMMER ASSY	1	C
16 -009	05016-0003	.....NUT	1	C
16 -010	05032-0003	.....FLATWASHER	1	C
16 -011	01866	.....HAMMER WASHER	1	C
16 -012	01887	.....HAMMER STOP	1	C
16 -013	05008-0008	.....SCREW	3	C
16 -014	03239	.....GUIDE COVER LH	1	C
16 -015	03265	.....GUIDE COVER RH	1	C
16 -016	04569	.....SCREW	2	B
16 -016	5007-51	.....SCREW	1	A
16 -017	05032-0005	.....WASHER FLAT	2	C
16 -018	03024	.....PIN	2	C
16 -019	03182	.....BRACKET	1	C
16 -020	05007-0033	.....SCREW	1	C
16 -021	03160	.....PULLEY ASSY	1	C
16 -021	05044-0003	.....BEARING NEEDLE	NSS	C
16 -022	5555-15	.....RET RING 05004-0041 79136	1	C
16 -023	03159	.....SPACER	2	C
16 -024	04806	.....BRKT ASSY	1	C
16 -025	01131	.....PULLEY ASSY	1	C
16 -026	03251	.....ROD	1	C
16 -027	5139-15	.....RET RING 05004-0042 79136	1	C
16 -028	03160	.....PULLEY ASSY	1	C
16 -028	05044-0003	.....BEARING NEEDLE	NSS	C
16 -029	02841	.....SPACER	1	C
16 -030	03280	.....SPRING CLIP	1	C
16 -031	01126	.....CARRIAGE	1	C

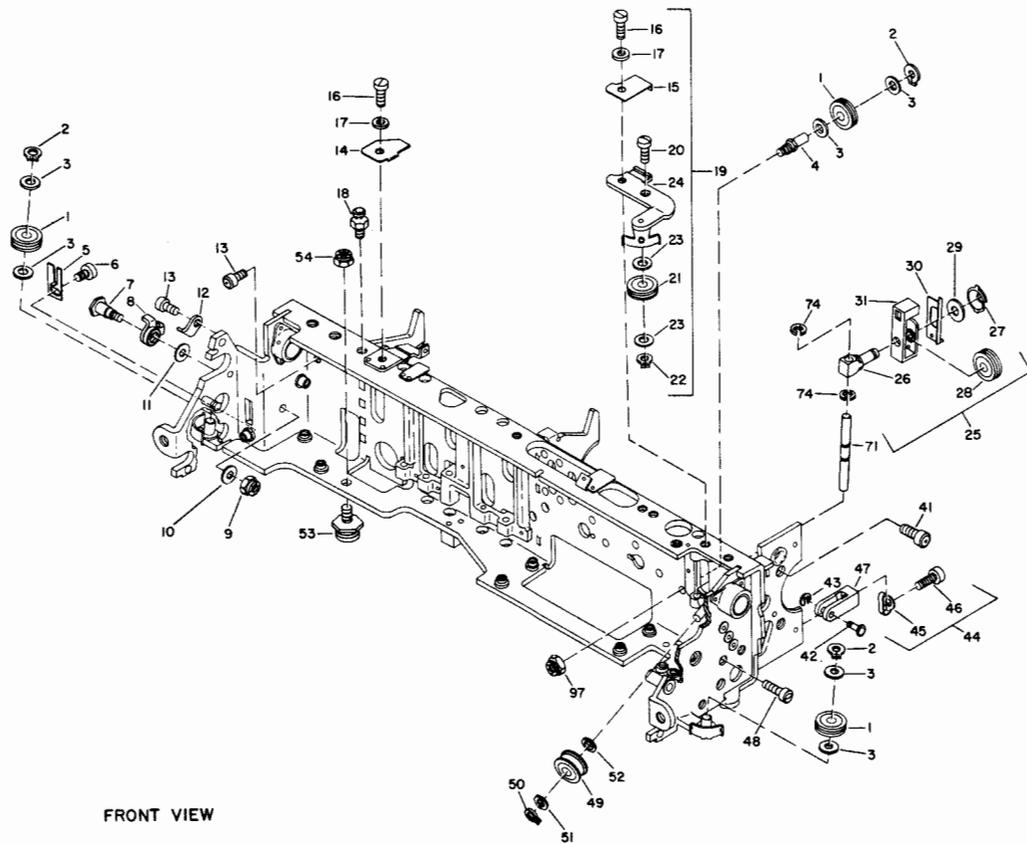
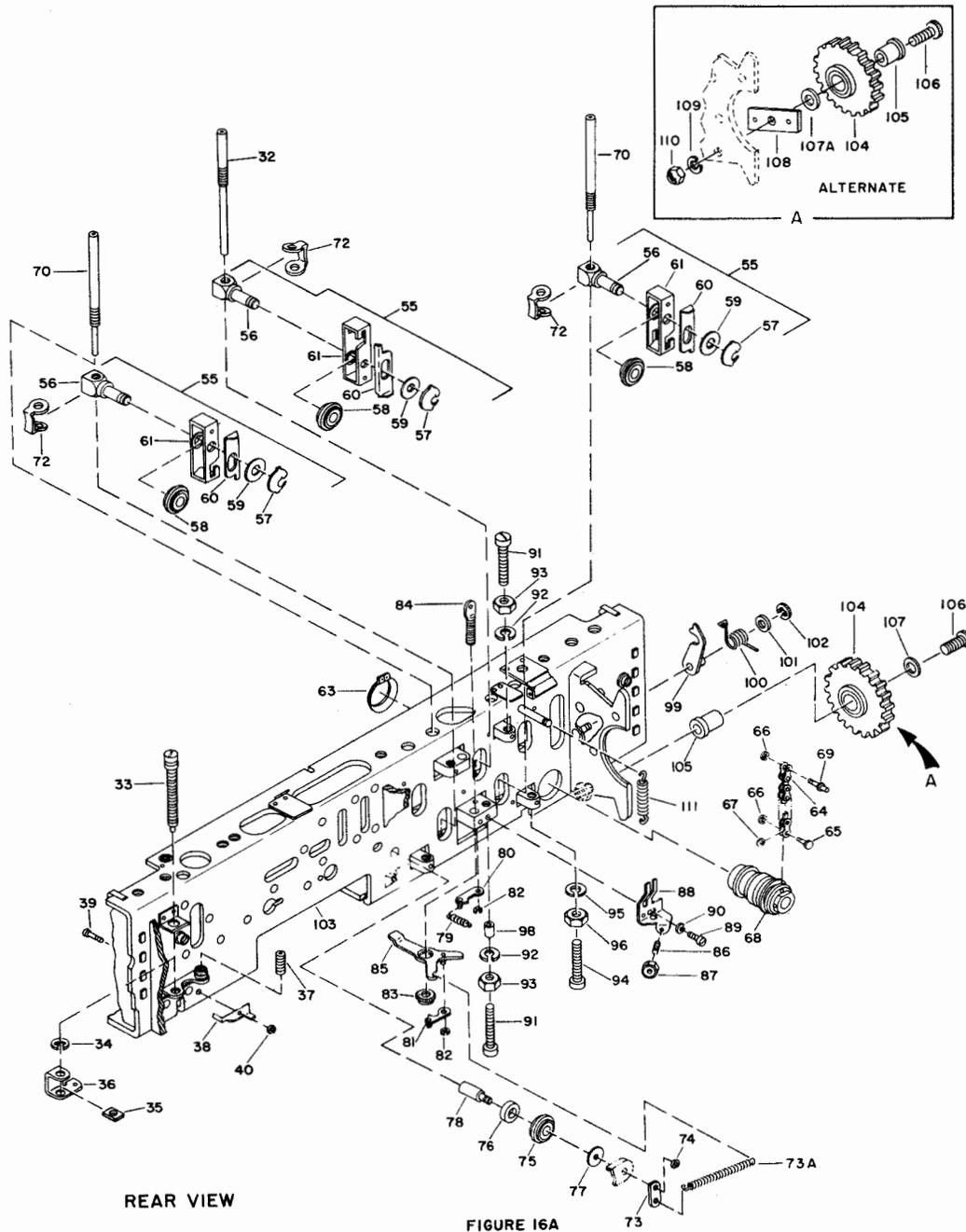
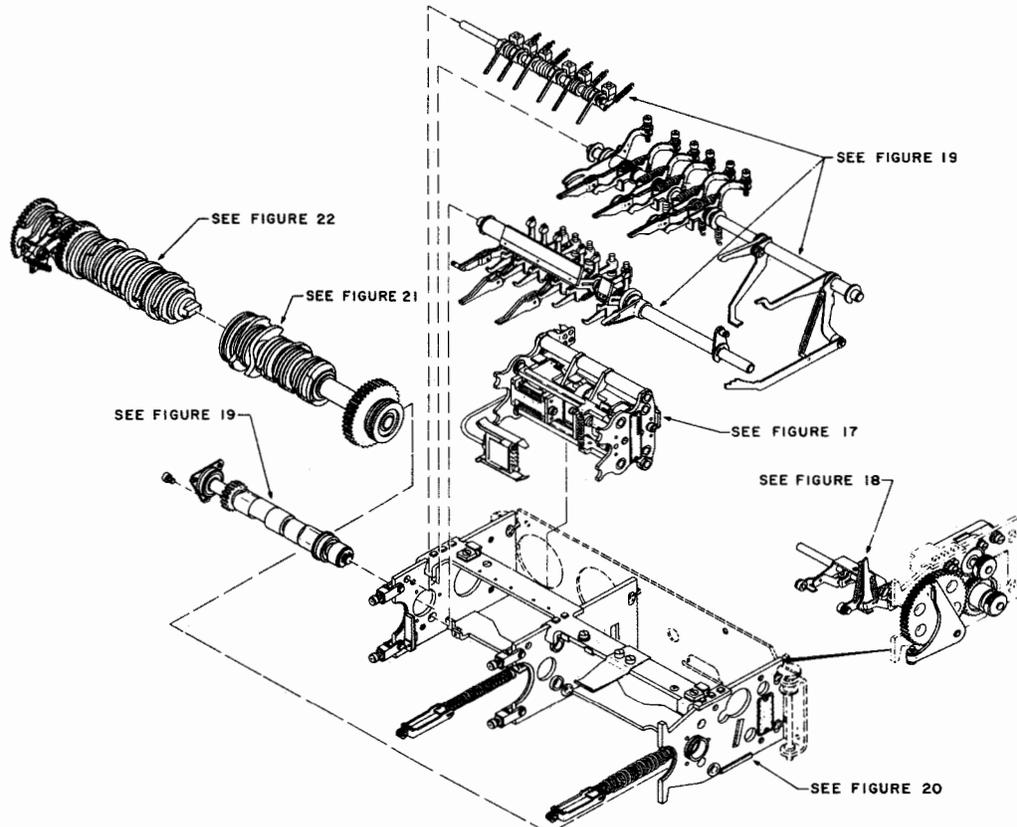


FIGURE 16

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
16A-032	03232	.....PIN	3	C
16A-033	01854	.....SCREW	1	C
16A-034	5133-14	.....RET RING TRUARC 05004-0043	1	C
16A-035	02439	.....CABLE BLOCK	1	C
16A-036	01856	.....BRACKET	1	C
16A-037	05009-0012	.....SCREW	1	C
16A-038	03163	.....LEVER	1	C
16A-039	03147	.....LEVER	1	C
16A-040	5133-6	.....RET RING TRUARC 05004-0023	3	C
16 -041	05008-0003	.....SCREW	2	C
16 -042	02095	.....PIVOT	2	C
16 -043	5133-9	.....RET RING TRUARC 05004-0011	2	C
16 -044	02509-0001	.....CLAMP ASSY	2	B
16A-044	2509	.....CLAMP ASSEMBLY	2	A
16 -045	01363	.....CLAMP PAD	1	C
16 -046	05008-0028	.....SCREW	1	C
16 -047	01362	.....CLAMP	1	C
16 -048	05007-0029	.....SCREW	1	C
16 -049	03143	.....PULLEY ASSY	2	C
16 -049	05044-0003	.....BEARING NEEDLE	NSS	C
16 -050	5133-6	.....RET RING TRUARC 05004-0023	2	C
16 -051	03159	.....SPACER	2	C
16 -052	03161	.....SPACER	2	C
16 -053	01916	.....LOCATOR	1	C
16 -054	50 FK 632	.....LOCKNUT	2	C
16A-055	01127	.....PULLEY ASSY	5	C
16A-056	01133	.....ROD	1	B
16A-056	3257	.....ROD	1	A
16A-057	5139-15	.....RET RING 05004-0042	1	C
16A-058	01130	.....PULLEY ASSY	1	C
16A-059	02841	.....SPACER	1	C
16A-060	03280	.....SPRING CLIP	1	C
16A-061	01126	.....CARRIAGE	1	C
16A-062	01137-0001	.....SPROCKET ASSY	1	B
16A-062	1137	.....PULLEY ASSEMBLY	1	A
16A-063	5101-50	.....RET RING 05004-0013	1	C
16A-064	01391	.....CHAIN	1	C
16A-065	02780	.....PIN	1	C
16A-066	5133-6	.....RET RING 05004-0023	2	C
16A-067	03198	.....SPACER	2	C
16A-068	03213	.....PULLEY ASSY	1	C
16A-069	03136	.....PIN	1	C
16A-070	03234	.....PIN	2	C
16A-071	03252	.....PIN	1	C
16A-072	04251	.....LOCKS	5	C
16A-073	03244	.....SPRING LINK	1	C
16A-073A	01960	.....SPRING	1	B
16 -074	5103-12	.....RET RING TRUARC 05004-0004	1	B
16 -074	5133-9	.....RING	1	A
16A-075	01130	.....PULLEY ASSY	1	C
16A-076	01385	.....SPACER	1	C
16A-077	03149	.....PULLEY	1	C
16A-078	01384	.....SPROCKET SHAFT	1	C
16A-079	03249	.....PAWL SPRING	1	C
16A-080	03247	.....PAWL ASSY	1	C
16A-081	03246	.....PAWL ASSY	1	C
16A-082	5133-6	.....RET RING TRUARC 05004-0023	2	C
16A-083	03138	.....RATCHET	1	C
16A-084	03137	.....STUD	1	C





REAR SECTION
SEE FIGURE I FOR NHA
FIGURE 14

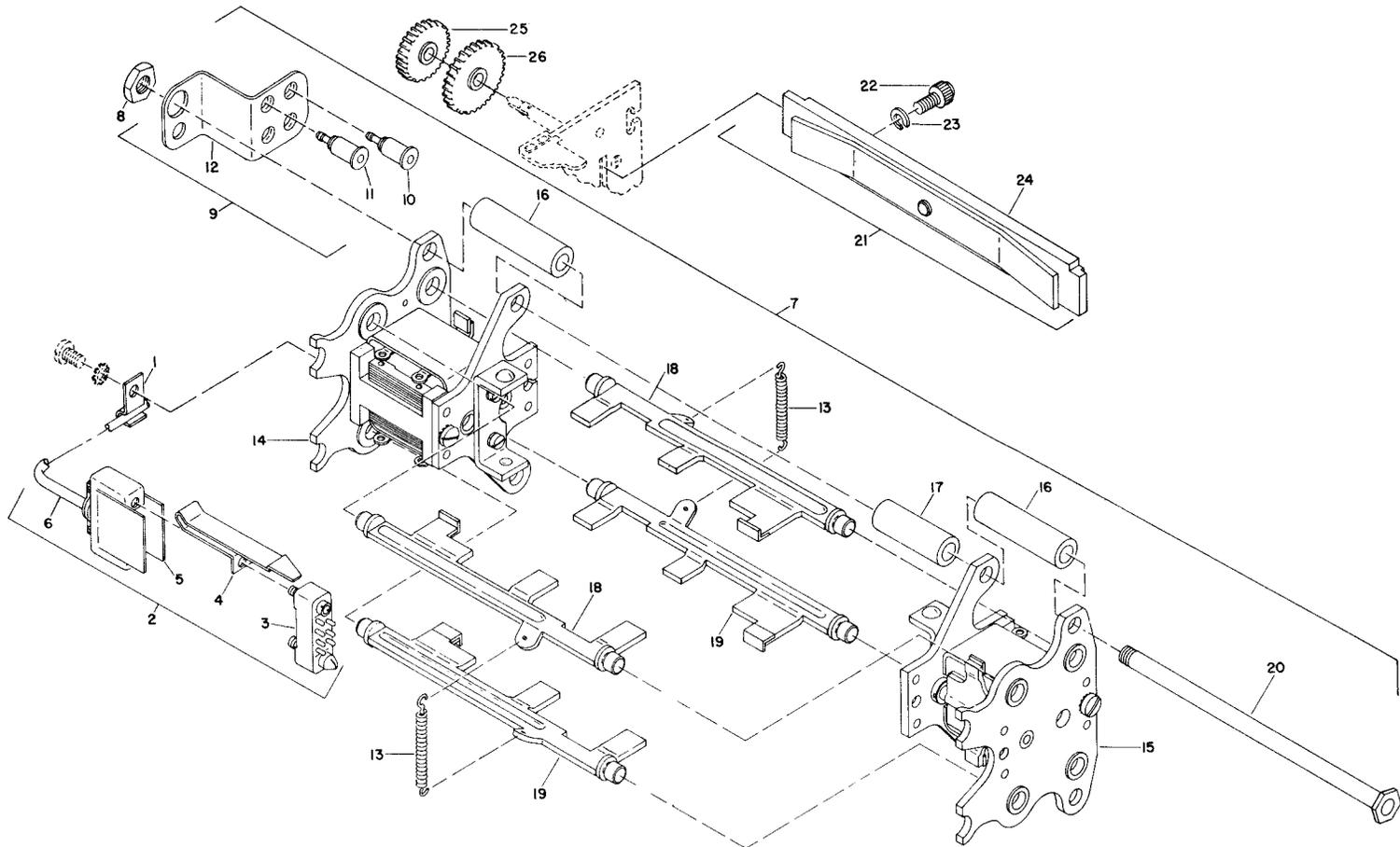


FIGURE 17

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
1234567890				
16A-085	03128	.....LEVER ASSY	1	C
16A-086	05009-0020	.....SCREW	1	C
16A-087	50 FA 440	.....NUT	1	C
16A-088	03133	.....SLIDE FORK	1	C
- - - * - - -				
16A-089	05007-0042	.....SCREW	1	C
16A-090	AN935-2L	.....LOCKWASHER	1	C
- - - * - - -				
16A-091	04147	.....SCREW	4	C
16A-092	AN935-4L	.....LOCKWASHER	4	C
16A-093	05030-0010	.....NUT	4	C
16A-094	04145	.....SCREW	1	C
16A-095	AN935-4L	.....LOCKWASHER	1	C
16A-096	05030-0010	.....NUT	1	C
16 -097	05030-0002	.....NUT	1	B
16A-098	03640	.....SPACER	1	C
16A-099	30361	.....LEVER ASSY	1	B
16A-100	30294	.....SPRING	1	B
16A-101	30305	.....SPACER	1	B
16A-102	5133-9	.....RET RING TRUARC	2	C
16A-103	29132-0002	.....RIVET ASSY	1	B
16A-104	1501	...GEAR ASSY	1	C
16A-105	1504	...GEAR SUPPORT	1	C
16A-106	05008-0014	...SCREW	1	C
16A-104		...ROLLER BEARING	NSS	B
16A-104	01324	...IDLER GEAR	NSS	B
16A-107	05032-0006	...WASHER	1	C
16A-107A	33813	...WASHER	1	D
16A-108	33810	...PLATE	1	D
16A-109	05006-0009	...WASHER	1	D
16A-110	05030-0010	...NUT	1	D
16A-111	4260	...SPRING	1	C
16A-104	29118	...GEAR ASSEMBLY	1	A
16A-103	29132	.....FRAME	1	A
REAR SECTION ASSEMBLY				
14 -000	30449-0005	...REAR SEC ASSY	1	B
SELECTOR ASSEMBLY				
17 -000	33024-0002	....SELECTOR ASSY	1	B
17 -000	24-104	....SELECTOR	1	A
17 -001	01592	....CABLE CLAMP	1	C
17 -002	03947	....CONNCTR ASSY	1	C
17 -003	05539-0001	.....HOOD	1	C
17 -004	02843	.....BRCKT CONNCTR	1	C
17 -005	05511-0018	.....CONNECTOR	1	C
17 -006	30277	.....HARNESS ASSY	1	B
17 -007	03919-0002	....SELECTOR ASSY	1	B
17 -007	3878	....SELECTOR	1	A
17 -008	05030-0006	.....HEX NUT	2	C
17 -009	03323	.....TERMINAL ASSY	1	C
17 -010	05511-0024	.....TERMINAL WHITE	1	C
17 -011	05511-0037	.....TERMINAL RED	1	C
12 -012	03322	.....TERMINAL PLATE	1	C
17 -013	01589	.....SPRING	2	C
17 -014	04547	.....FRAME ASSY	1	C

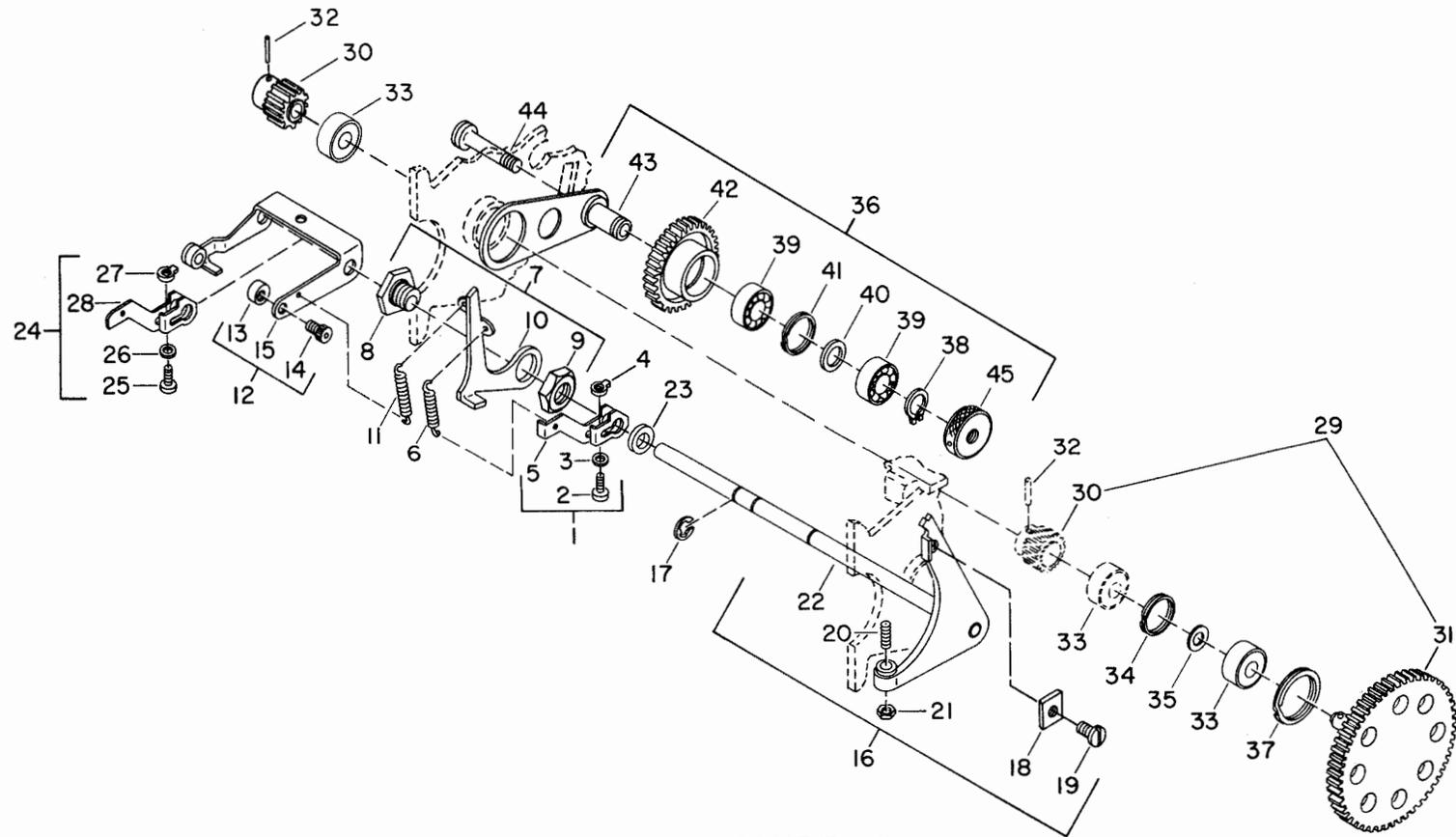


FIGURE 18

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
1234567890				
17 -015	04546	.....FRAME ASSY	1	C
17 -016	02546	.....SPACER	4	C
17 -017	02547	.....SPACER	2	C
17 -018	30081	.....SHAFT ASSY	2	B
17 -018	X30081	.....SHAFT	1	A
17 -019	30080	.....SHAFT ASSY	2	B
17 -019	X30080	.....SHAFT	1	A
17 -020	01578	.....STUD ASSY	2	C
17 -021	01597	.....LOCK ASSY	1	C
17 -022	05008-0008	.....SOC HD CAP SCR	2	C
17 -023	AN935-4L	.....LOCKWASHERS 05006-0004 88044	2	C
17 -024	04804	.....RIVETED ASSY	1	C
17 -025	02530	....60 WPM GEAR	1	B
17 -025	26809	....GEAR	1	A
17 -026	02531	....66 WPM GEAR	1	B
17 -026	26808	....GEAR	1	A
GEAR AND LINE FEED ASSY				
18 -001	30456	....ARM ASSY	1	B
18 -002	05007-0051	.....PAN HD SCRW	1	C
18 -003	05032-0005	.....WASHER	1	C
18 -004	00824	.....ANTI TURN NUT	1	C
18 -005	30261	.....ARM ACTUATE	1	B
18 -005	1807	.....ARM	1	A
18 -006	01960	.....SPRING	1	C
18 -007	02542	.....CAM LOCK ASSY	1	C
18 -008	01950	.....BUSHING	1	C
18 -009	05030-0009	.....HEX NUT	1	C
18 -010	01955	.....CAM FOLLOWER	1	C
18 -011	01949	....SPRING	1	C
18 -012	01954	.....FEED ASSY	1	C
18 -013	01952	.....AUTO CARR RET	1	C
18 -014	05008-0021	.....SCREW	1	C
18 -015	04825	.....ACTUATOR ASSY	1	C
18 -016	30392-0002	.....RELEASE	1	B
- - - * - - -				
18 -016	1690	.....FINGER ASSY	1	A
18 -017	5133-18	.....RET RING 05004-0022 79136	4	C
- - - * - - -				
18 -018	30182	.....FINGER ADJ BLC	1	B
18 -018	4551	.....STOP	1	A
18 -019	30183	.....ADJ BLCK SCRW	1	B
18 -019	4552	.....SCREW	1	A
18 -020	05009-0012	.....SOC SET SCR	1	C
18 -021	05030-0010	.....HEX NUT	1	C
18 -022	30393	.....SHAFT ASSY	1	B
18 -022	4826	.....SHAFT	1	A
18 -023	03658	.....WASHER	2	C
18 -024	30458	.....ARM	1	B
18 -025	05007-0051	.....PAN HD SCRW	1	C
18 -026	05032-0005	.....WASHER	1	C
18 -027	00824	.....ANTI TURN NUT	1	C
18 -028	30262	.....ACTUATE ARM	1	B
18 -028	2159	.....ARM	1	A
18 -029	01280-0001	.....3RD PINION ASSY	1	B
18 -029	29122	.....PINION ASSEMBLY	1	A
18 -030	01199	.....PINION	1	B
18 -030	26801	.....PINION	1	A
18 -031	01178	.....GEAR ASSY	1	B
18 -031	26810	.....GEAR	1	A
18 -032	05070-0005	.....PIN	1	C
18 -033	05013-0003	.....BEARING	2	C

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
18 -034	RR-50	....SPIROLOX RING 05005-0001 80756	1	C
18 -035	01166	....SPACER	1	C
18 -036	01278-0001	....GEAR ASSY	1	B
		- - - * - - -		
18 -035	29121	....GEAR ASSEMBLY	1	A
18 -037	RS-62	....RET RING 05005-0002 80756	1	C
		- - - * - - -		
18 -038	5100-25	....RETAINING RING 05004-0008 79136	1	C
18 -039	05012-0002	....BEARING	2	C
18 -040	01281	....SPACER	1	C
18 -041	RR-50	....RETAINING RING 05005-0001 80756	1	C
18 -042	01174	....IDLER GEAR	1	B
18 -042	26811	....GEAR	1	A
18 -043	01183	....ARM ASSY	1	B
18 -043	26805	....ARM ASSEMBLY	1	A
18 -044	01179	....STUD	1	C
18 -045	03520	....GEAR LOCK ASSY	1	C
		CAMSHAFT & RELEASE ASSY		
19 -001	02086	....SPRING	1	C
19 -003		....RET RING 05004-0019 79136	1	C
19 -002	02249	....PAWL ASSY	1	C
19 -000	30448-0005	....CLUTCH ASSY REL	1	B
		- - - * - - -		
19 -000	22-104	....SHAFT ASSEMBLY	REF	A
	RR-50	....SPIROLOX RING SEE ITEM B139 80756	1	C
		- - - * - - -		
19 -004	01850	....SPRING	6	C
19 -005	01510	....SHAFT	1	C
19 -006	5133-18	....RET RING 05004-0022 79136	14	C
19 -007	03658	....WASHER	10	C
19 -008	01114	....BACKSTOP ASSY	6	C
19 -009	01104	....BACKSTOP BUSH	1	C
19 -010	01673	....CLAMP	1	C
19 -011	05009-0001	....SET SCR	1	C
19 -012	01103	....BACKSTOP LEVER	1	C
19 -013	01120	....SPRING	6	C
19 -014	02189	....WICK ASSY	1	C
19 -015	05007-0002	....SCREW	3	C
19 -016	AN935-3L	....LOCKWASHER 05006-0003 88044	3	C
19 -017	03012	....SPACER	1	C
19 -018	02194	....WICK ASSY	1	C
19 -019	01265	....SHAFT ASSY	1	B
19 -019	29120	....SHAFT ASSEMBLY	1	A
19 -020	5131-25	....RING 05004-0031 79136	1	C
19 -021	01269	....FUNCTION CAM	1	C
19 -022	201	....WOODRUFF KEY 05015-0001 80120	7	C
19 -023	03134	....SPACER	1	C
19 -024	05012-0001	....BEARING	2	C
19 -025	5103-31	....RETAINING RING 05004-0014 79136	2	C
19 -026	01254	....CLUTCH CAM	5	B
19 -026	1269	....CAM	1	A
19 -027	02922	....COMP SPRING	1	C
19 -028	02921	....SPACER	1	C
19 -029	01268	....GEAR	1	C
19 -030	01349	....BEARING RET	1	C
19 -031	01266	....SHAFT	1	B
19 -031	26819	....SHAFT	1	A
19 -032	01852	....SPRING	1	C
19 -033	02612	....ARM ASSY	1	C
19 -034	01153	....LINE ARM	1	C
19 -035	05008-0007	....SOC HD SCR	1	C

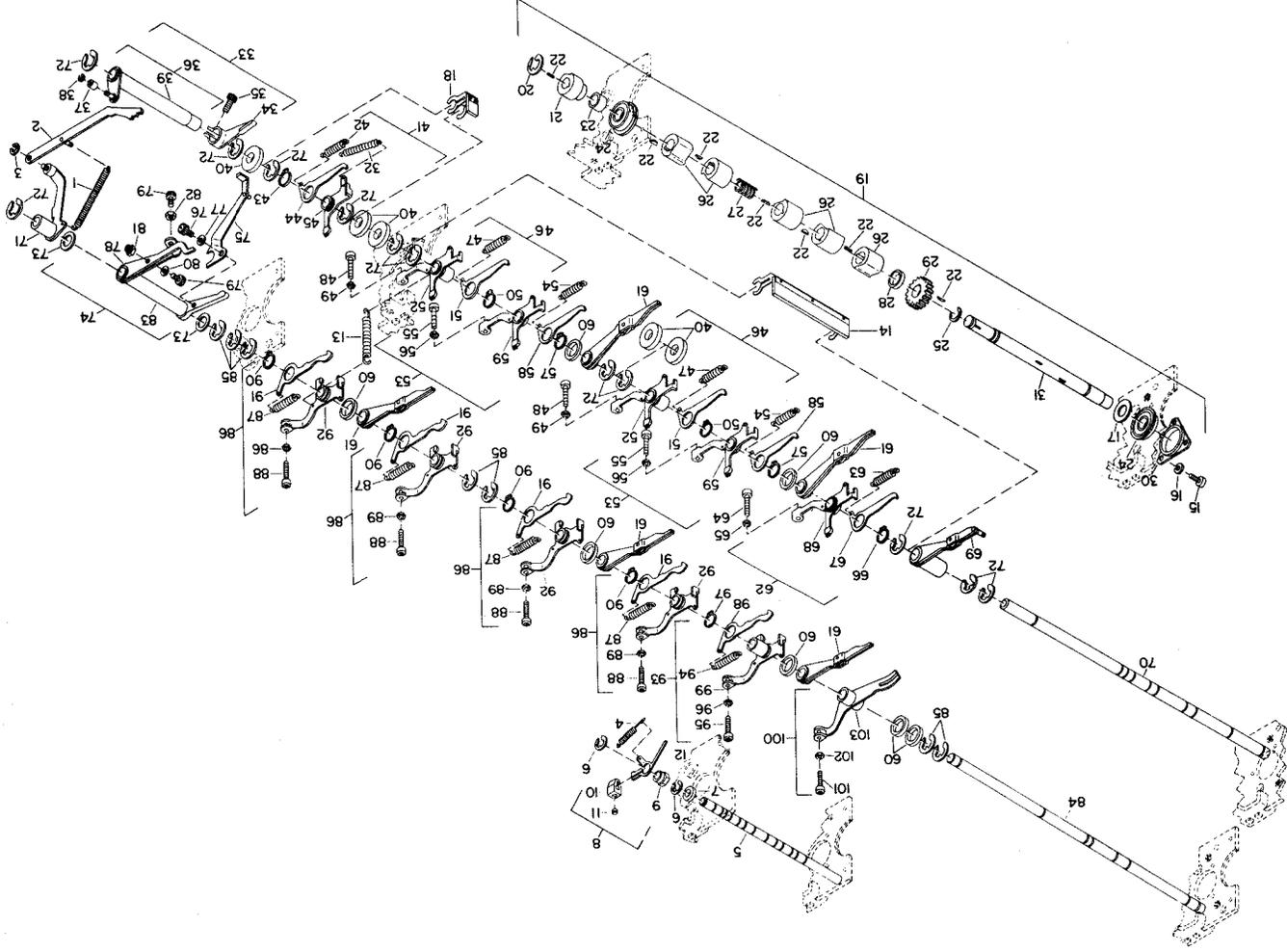


FIGURE 19

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
19 -036	01189	.....ARM ASSY	1	C
19 -037	03162	.....ROLLER	1	C
19 -038	5133-6	.....RETAINING RING 05004-0023 79136	1	C
19 -039	03253	.....ASSY	1	C
19 -040	03668	.....WASHER	6	C
19 -041	01123	.....RELEASE ASSY	1	C
19 -042	01116	.....SPRING	1	C
19 -043	5100-34	.....RETAINING RING 05004-0002 79136	1	C
19 -044	01106	.....CLUTCH FINGER	1	C
19 -045	02374	.....ARM SPIN ASSY	1	C
19 -046	02602	.....RELEASE ASSY	2	C
19 -047	01116	.....SPRING	1	C
19 -048	03186	.....SOC HD SCR	1	C
19 -049	05030-0007	.....HEX NUT	1	C
19 -050	5100-34	.....RETAINING RING 05004-0002 79136	1	C
19 -051	01106	.....FINGER	1	C
19 -052	02605	.....ARM ASSY	1	C
19 -053	02575	.....RELEASE ASSY	2	C
19 -054	01116	.....SPRING	1	C
19 -055	03186	.....SOC HD SCR	1	C
19 -056	05030-0007	.....HEX NUT	1	C
19 -057	5100-34	.....RETAINING RING 05004-0002 79136	1	C
19 -058	01106	.....FINGER	1	C
19 -059	02572	.....ARM ASSY	1	C
19 -060	03653	.....WASHER	7	C
19 -061	02613	.....CAM ASSY	5	C
19 -062	02590	.....RELEASE ASSY	1	C
19 -063	01116	.....SPRING	1	C
19 -064	03186	.....SOC HD SCR	1	C
19 -065	05030-0007	.....HEX NUT	1	C
19 -066	5100-34	.....RETAINING RING 05004-0002 79136	1	C
19 -067	01106	.....FINGER	1	C
19 -068	02589	.....RELEASE ASSY	1	C
19 -069	04258	.....CAM ASSY	1	C
19 -070	02610	.....SHAFT	1	C
19 -071	04801	.....LINK ASSY	1	C
19 -072	5133-25	.....RET RING 05004-0027 79136	8	C
19 -073	03657	.....WASHER	1	C
19 -074	30394	.....CAM FOLLOWER	1	B
19 -074	4581	.....PREVENT ASSY	1	A
19 -075	04665	.....ASSY BELL	1	B
19 -075	1809	.....LEVER 09083	1	A
19 -076	05008-0021	.....SOC HD SCR	1	C
19 -077	05032-0005	.....FLAT WASHER	1	C
19 -078	04580	.....FOLLOWER	1	C
19 -079	05008-0013	.....SOC HD SCR	2	C
19 -080	05032-0006	.....FLAT WASHER	1	C
19 -081	50 FA 440	.....LOCKNUT 05016-0002 56878	1	C
19 -082	05030-0010	.....HEX NUT	1	C
19 -083	04582	.....CAM ASSY	1	C
19 -084	02611	.....SHAFT	1	C
19 -085	5133-25	.....RET RING 05004-0027 79136	11	C
19 -086	02599	.....RELEASE ASSY	4	C
19 -087	01116	.....SPRING	1	C
19 -088	03186	.....SOC HD SCR	1	C
19 -089	05030-0007	.....HEX NUT	1	C
19 -090	5100-34	.....RETAINING RING 05004-0002 79136	1	C
19 -091	01108	.....CLUTCH FINGER	1	C
19 -092	02600	.....ARM SPIN ASSY	1	C
19 -093	02591	.....RELEASE ASSY	1	C
19 -094	01116	.....SPRING	1	C
19 -095	03186	.....SOC HD SCR	1	C
19 -096	05030-0007	.....HEX NUT	1	C
19 -097	5100-34	.....RETAINING RING 05004-0002 79136	1	C
19 -098	01108	.....CLUTCH FINGER	1	C
19 -099	02592	.....ARM SPIN ASSY	1	C
19 -100	01117	.....LATCH ASSY	1	C
19 -101	03186	.....SOC HD SCR	1	C
19 -102	05030-0007	.....HEX NUT	1	C
19 -103	04803	.....ARM ASSY	1	C

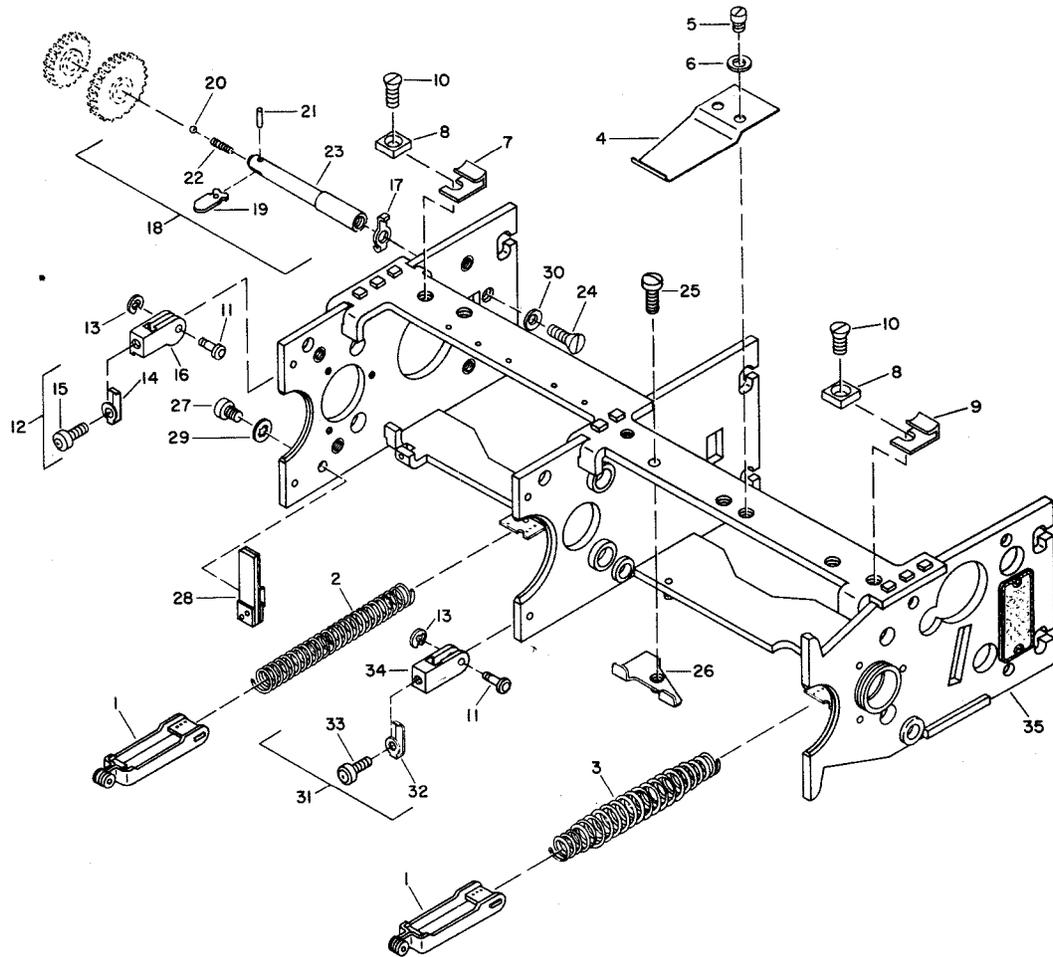


FIGURE 20

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
		REAR FRAME ASSEMBLY		
20 -000	30451-0005	.....FRAME ASSY	1	B
20 -000	21-1041	.....FRAME ASSEMBLY	REF	A
20 -001	02093	.....SPRING ASSY	1	C
20 -002	01628	.....SPRING	1	C
20 -003	01614	.....SPRING	1	C
20 -004	02137	.....SPRING ADV STOP	1	C
20 -005	05007-0024	.....SCR PAN HD	2	C
20 -006	05032-0013	.....WASHER	1	C
20 -007	04573	.....SPRING PLATE	1	C
20 -008	04571	.....BLOCK FEED PLAT	2	C
20 -009	04572	.....SPRING PLATE	1	C
20 -010	05007-0009	.....SCREW	2	B
20 -011	02095	.....PIVOT	4	C
20 -012	04531	.....FRAME ASSY	1	C
20 -013	5133-9	.....RET RING	4	C
20 -014	01363	.....CLAMP PAD	1	C
20 -015	05008-0028	.....SOC HD SCR	1	C
20 -016	04525	.....CLAMP	1	C
20 -017	04515	.....POSTION CLIP	1	C
20 -018	02510-0001	.....POST ASSY	1	B
20 -018	2510	.....POST ASSEMBLY	1	A
20 -019	02414	.....LOCK ARM	1	C
20 -020	05056-0001	.....BALL	1	C
20 -021	05080-0004	.....RDLIPIN	1	B
20 -021	5017-11	.....PIN	1	A
20 -022	02415	.....SPRING	1	C
20 -023	02413	.....CHG GEAR POST	1	C
20 -024	05007-0048	.....FLAT HD SCR	1	C
20 -025	05007-0016	.....SCR PAN HD	1	C
20 -026	04810	.....CLIP ASSY	1	C
20 -027	05007-0062	.....FILL HD SCR	1	C
20 -028	04812	.....BRKT ASSY	1	C
20 -029	1504-00	.....WASHER	1	C
20 -030	1204-00	.....LOCKWASHER	1	B
20 -031	02509-0001	.....CLAMP ASSY	3	B
20 -032	01363	.....CLAMPPAD	1	C
20 -033	05008-0028	.....SOC HD SCR	1	C
20 -034	01362	.....CLAMP	1	C
20 -035	29139-0003	.....RIVET ASSY	1	B
20 -035	2490	.....FRAME	1	A
		SELECTOR & FUNCTION SHAFT		
14 -000	30331	...SHAFT ASSY	1	B
		SELECTOR MAINSHAFT ASSY		
21 -000	33131-0002	....SELECTOR MAINSH	1	B
21 -000	31-1041	...SHAFT ASSEMBLY	1	A

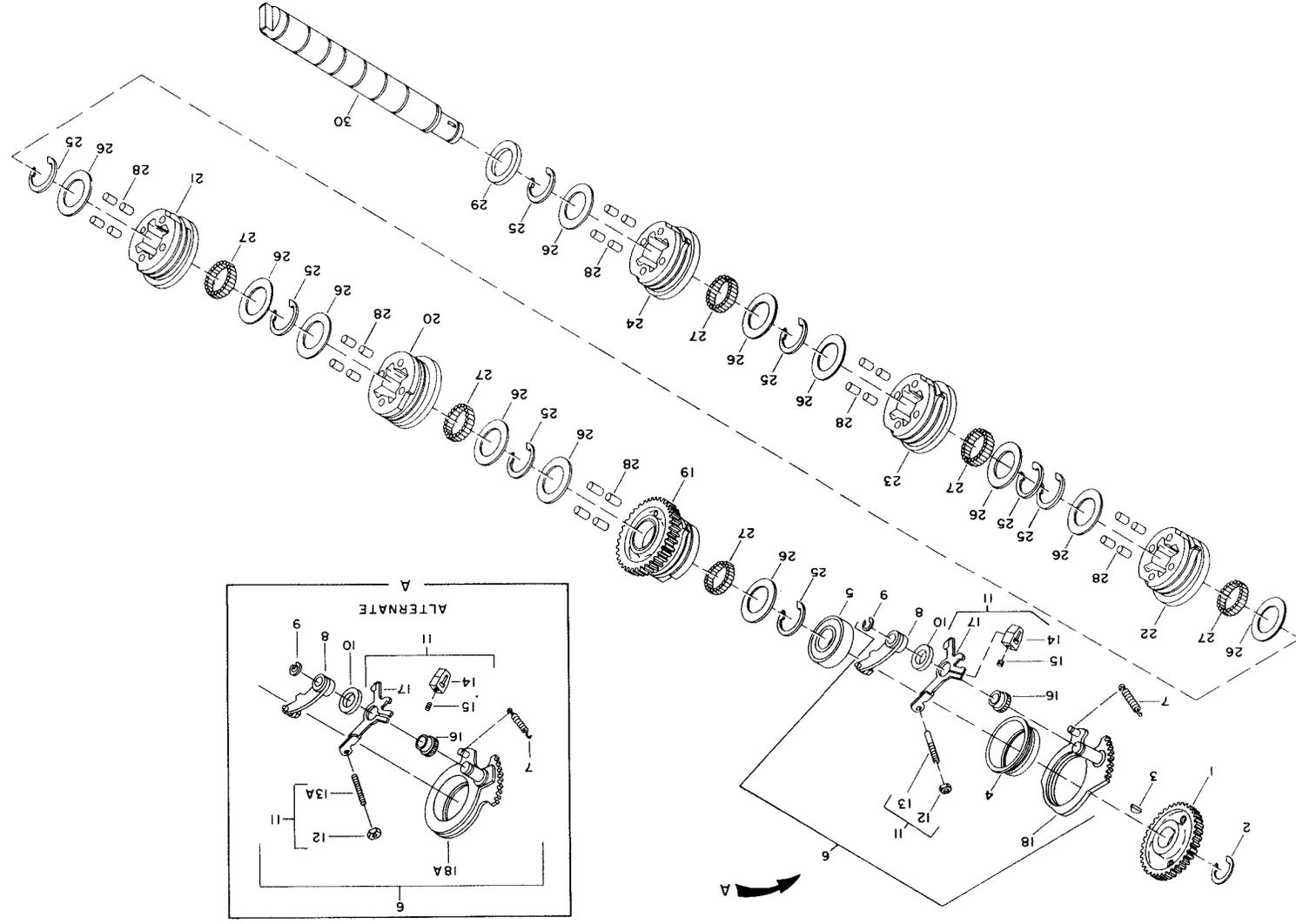


FIGURE 21

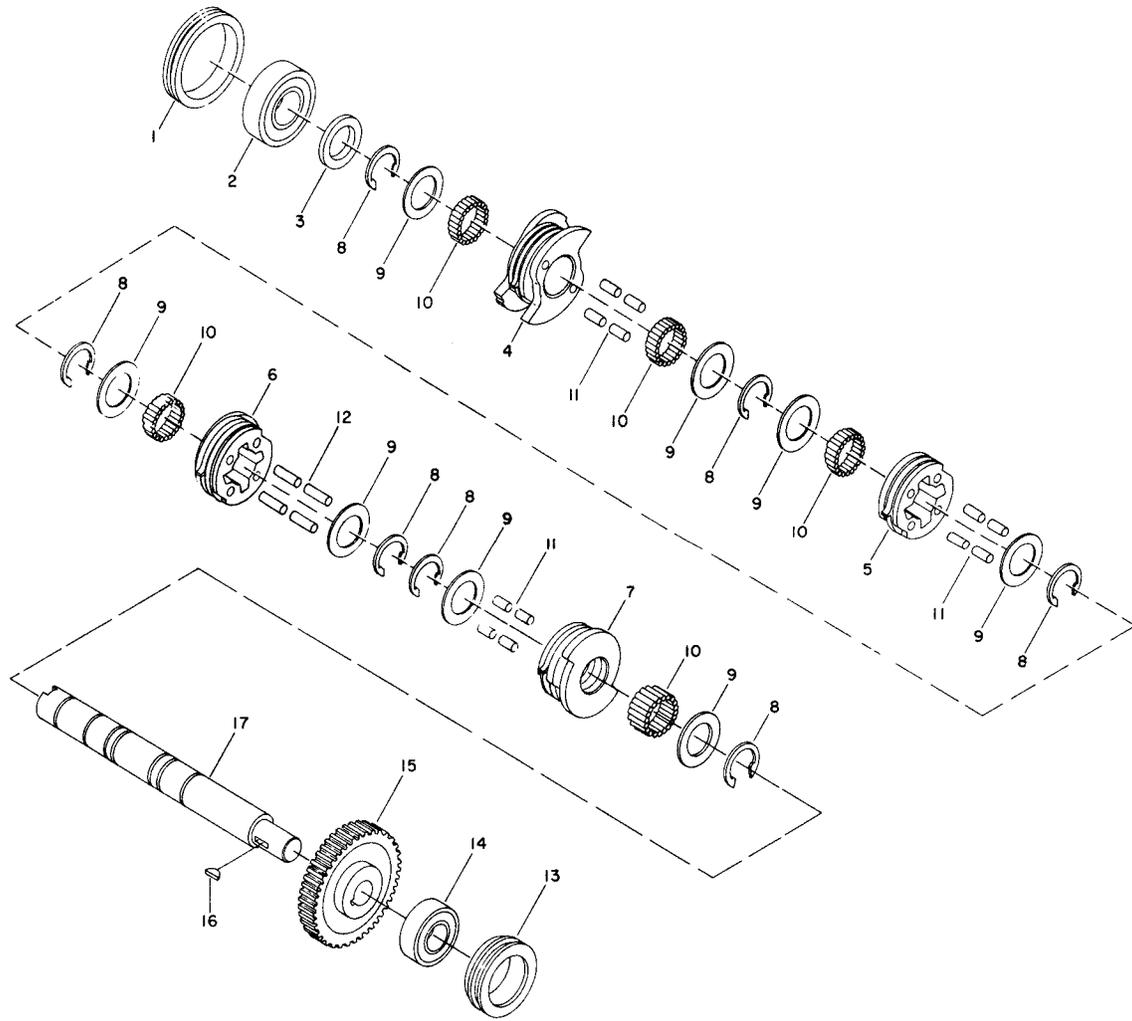


FIGURE 22

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
21 -001	01323	.....PRINTER GEAR	1	B
		- - - * - - -		
21 -001	26810	.....GEAR	1	A
21 -002	5103-37	.....RET RING	1	C
21 -003	02523	.....WOODRUFF KEY	1	C
		- - - * - - -		
21 -004	04529	.....BEARING RET LH	1	C
21 -005	05013-0001	.....BEARING	1	B
21 -005	MS115-00619-203	.....BEARING	1	A
21 -006	29145	.....RET ASSY	1	B
21 -006	1389	.....RETAINER ASSY	1	A
21 -007	01526	.....SPRING RANGE	1	C
21 -008	01122	.....LATCH ASSY	1	C
		- - - * - - -		
21 -009	5103-18	.....RETAINING RING	1	C
		- - - * - - -		
21 -010	03655	.....FELT WASHER	1	B
21 -011	02028	.....ASSY	1	C
21 -012	05030-0007	.....NUT	1	C
21 -013	05009-0031	.....SCREW OVAL	1	B
21 -013	4249	.....PIN	1	A
21 -014	01673	.....CLAMP	1	C
		- - - * - - -		
21 -015	05009-0001	.....SET SCREW	1	C
		- - - * - - -		
21 -016	02029	.....BUSHING	1	C
21 -017	03068	.....SOLDER ASSY	1	C
21 -018	04530	.....RANGE ASSY	1	B
21 -018A	01507	.....RETAINER	1	A
21 -019	01210	.....CLUTCH ASSY	1	C
21 -020	01211	.....CLUTCH ASSY	1	C
21 -021	01212	.....CLUTCH ASSY	1	C
21 -022	01213	.....CLUTCH ASSY	1	C
21 -023	01214	.....CLUTCH ASSY	1	C
21 -024	01215	.....CLUTCH ASSY	1	C
		- - - * - - -		
21 -025	5103-50	.....RET RING	8	C
		- - - * - - -		
21 -026	03866	.....WASHER	12	C
21 -027	01426	.....NEEDLE ROLLER	168	C
21 -028	01205-0001	.....CLUTCH ROLLER	24	C
21 -029	01235	.....SPACER	1	C
21 -030	01221	.....MAINSHAFT	1	C
		- - - * - - -		
		FUNCTION MAINSHAFT ASSY		
22 -000	33032	.....FUNCTION M ASSY	1	B
22 -000	32-1041	.....MAINSHAFT ASSY	REF	A
22 -001	01347	.....BEARING RET	1	C
22 -002	05013-0002	.....BEARING	1	C
22 -003	01235	.....SPACER	2	C
22 -004	01216	.....CLUTCH ASSY	1	C
22 -005	01217	.....CLUTCH ASSY	1	C
22 -006	01218	.....CLUTCH ASSY	1	C
22 -007	01219	.....CLUTCH ASSY	1	C
		- - - * - - -		
22 -008	03661	.....CRESENT RING	7	C
		- - - * - - -		
22 -009	03866	.....WASHER	8	C
22 -010	01426	.....NEEDLE ROLLER	140	C

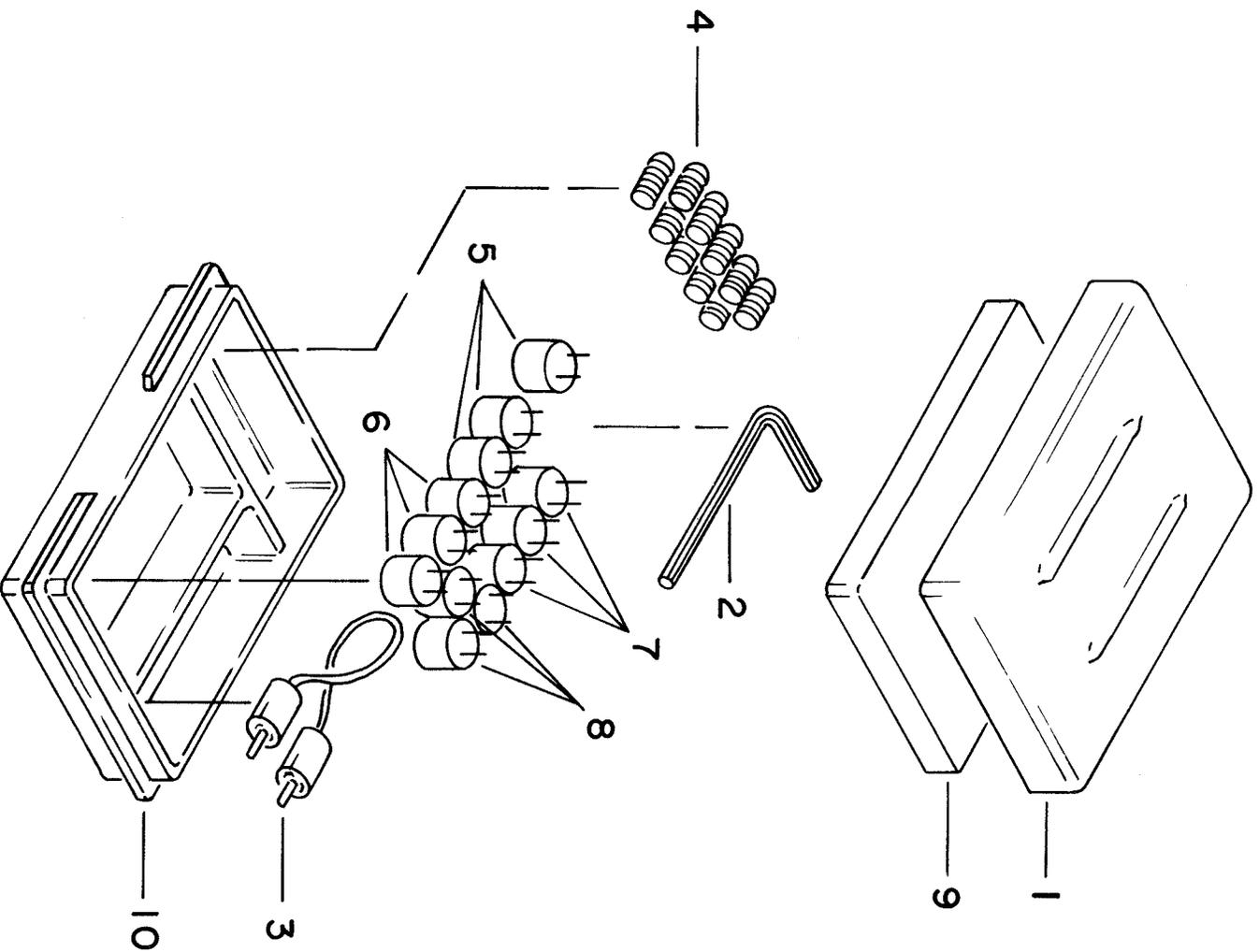


FIGURE 23

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
22 -011	01205-0001	.....CLUTCH ROLLER	12	C
22 -012	01205-0002	.....CLUTCH ROLLER	4	C
22 -013	01237	.....BEARING RET RH	1	C
22 -014	05013-0001	.....BEARING	1	C
22 -015	01270	.....GEAR ASSY	1	B
		- - - * - - - -		
22 -015	2524	.....GEAR	1	A
22 -016	02523	.....WOODRUFF KEY	1	C
		- - - * - - - -		
22 -017	01222	.....MAINSHAFT	1	C
		RUNNING SPARES KIT		
23 -000	30470-0002	..RUNNING SPARES	REF	B
04 -001	744-104	..KIT RUN SPARES	REF	A
23 -001	30273	...BOX TOP	1	B
23 -002	05028-0002	...WRENCHHEXO.050	1	B
23 -003	03576	...CORD ASSY	1	C
23 -004	02225	...SPROCKET TEETH	10	C
23 -005	05611-0002	...FUSE 0.100 AMP	3	B
23 -005		...FUSE 5522-4 03544	3	A
23 -006	05611-0006	...FUSE 0.500 AMP	3	B
23 -006		...FUSE-500MA 5522-6 03544	3	A
23 -007	05611-0007	...FUSE 1.0 AMP	3	B
23 -007	L562/1	...FUSE 5522-7 03544	3	A
23 -008	05611-0010	...FUSE 5.0 AMP	3	B
23 -008		...FUSE 5522-12 03544	3	A
23 -009	30274	...PAD PLASTIC	1	B
23 -009	3592	...PAD	2	A
23 -010	30272	...BOX BOTTOM	1	B
		CHASSIS ASSEMBLY		
24 -000	30605	..CHASSIS ASSY	REF	B
24 -000	516-104	..CHSSIS ASSY	REF	A
24 -001	03605	...DRUM ASSY	1	C
24 -002	03614	...DISC	1	C
24 -003	04852	...SHAFT ASSY	1	C
24 -004	03528	...CORD ASSY	1	C
24 -005	03529	...CORD ASSY	1	C
24 -006	02516	...CORD ASSY	1	C
24 -007	NO 47	...LAMPS 05530 -0001 24446	3	C
24 -008	33296	...LINE SENSOR	1	B
24 -008	543-104	...LINE SENSOR	REF	A
		- - - * - - - -		
24 -009	05007-0016	...SCREW	4	C
		- - - * - - - -		
24 -010	33287	...POWER SUPPLY	1	B
24 -010	533-104	...POWERSUPPLY	REF	A
		- - - * - - - -		
24 -011	05007-0016	...SCREW	4	C
		- - - * - - - -		
24 -012	03303	...SPRING	2	C
24 -013	03311	...BRAKE ASSY	2	C
24 -013	3477	...BRAKE ASSEMBLY	1	A
		- - - * - - - -		

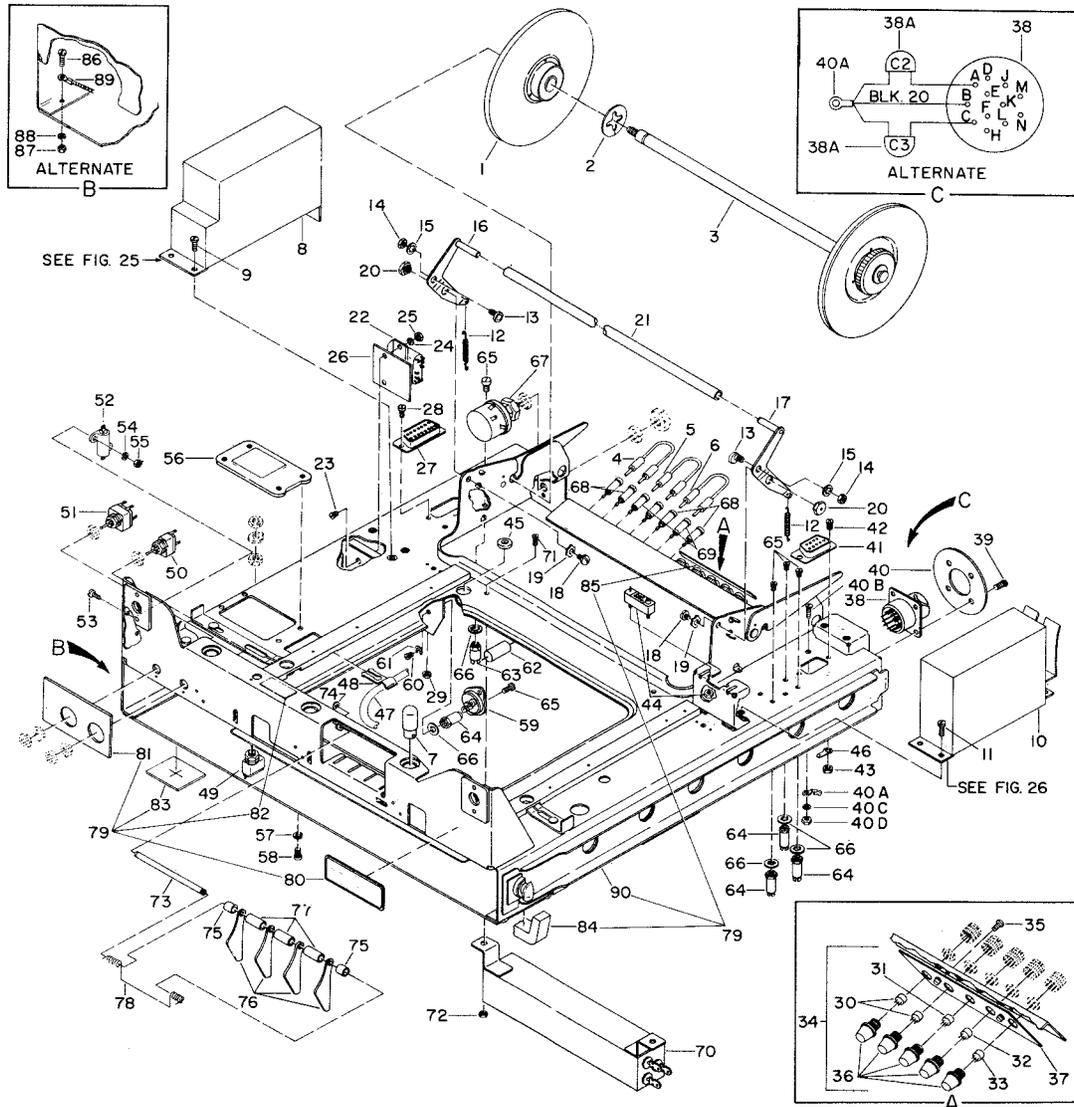
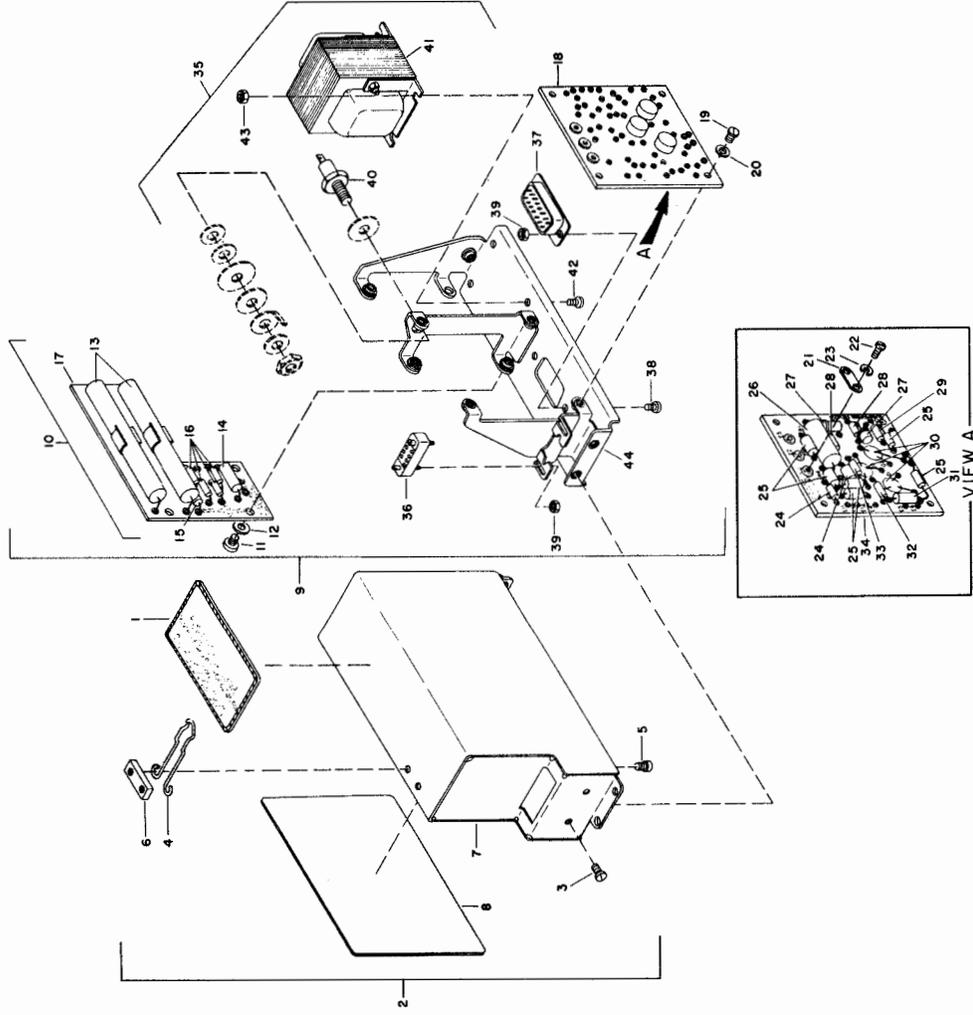


FIGURE 24

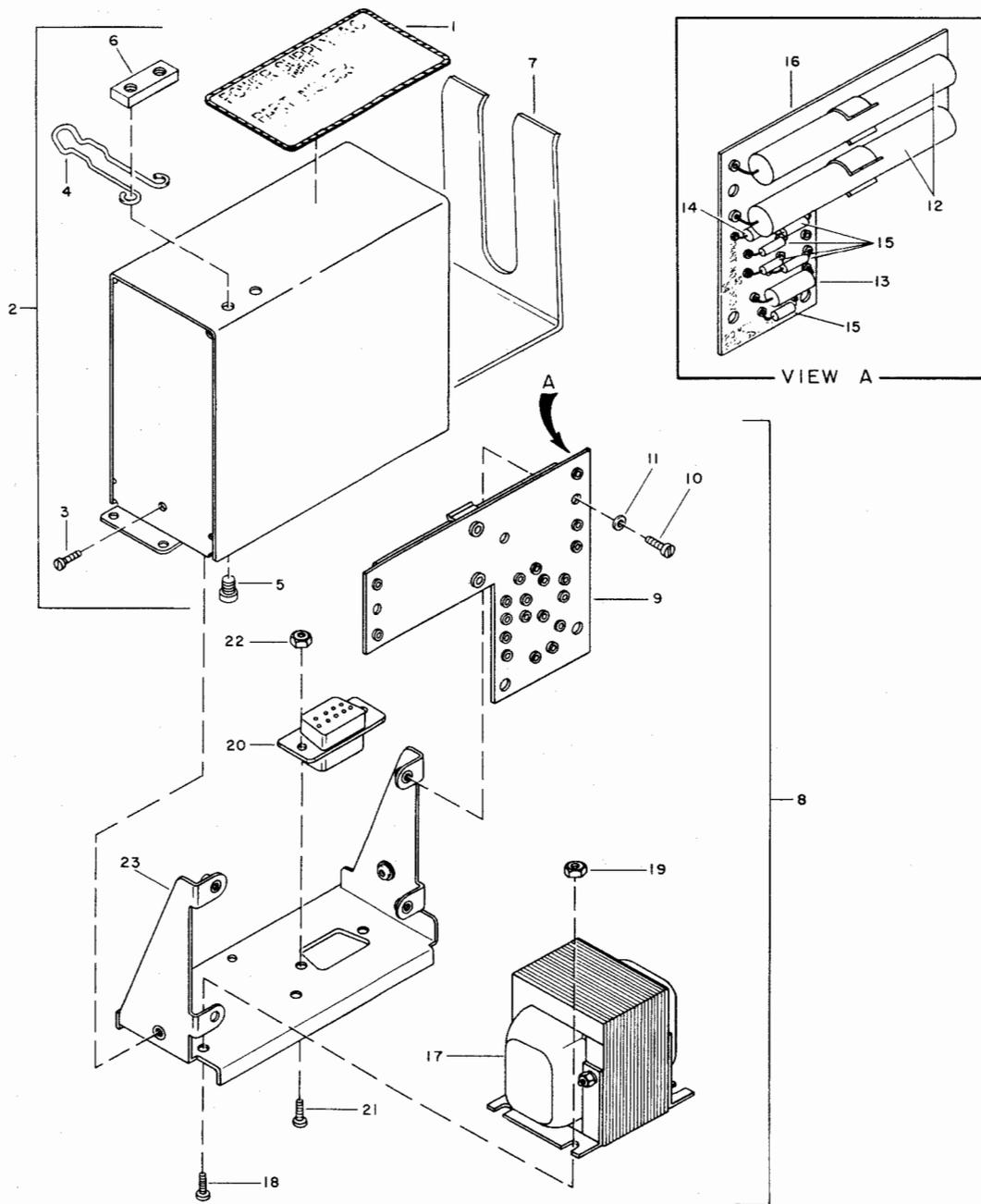
FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
24 -014	05030-0003	...NUT	2	C
24 -015	1204-00	...LOCKWASHER	2	C
		-----*		
24 -016	03526	...LH LINK ASSY	1	C
24 -017	03527	...RH LINK ASSY	1	C
		-----*		
24 -018	05007-0040	...SCREW	2	C
24 -019	1104-00	...LOCKWASHER	2	B
24 -019	1400-00	...WASHER LOCK	2	A
24 -020	03308	...PIVOT	2	C
		-----*		
24 -021	03309	...TUBE	1	C
24 -022	04593	...SUBMINATURE REL	1	B
24 -022	KHYX245	...RELAY	1	A
		-----*		
24 -023	05045-0003	...SCREW	2	C
24 -024	1204-00	...LOCKWASHER	2	B
24 -025	05030-0003	...NUT	4	C
		-----*		
24 -026	04205	...INSULATING PL	1	B
24 -027	05511-0135	...CONNECTOR	1	B
24 -027	DA15S	...RECEPTACLE	1	A
		-----*		
24 -028	05007-0024	...SCREW	1	C
24 -029	50FA440	...NUT	2	C
		-----*		
24 -030	05611-0002	...FUSE 0.100 AMP	1	B
24 -031	05611-0006	...FUSE 0.500AMP	1	B
24 -032	05611-0007	...FUSE 1.0 AMP	1	B
24 -033	05611-0010	...FUSE 5.0 AMP	1	B
24 -034	30896	...PLATE ASSY FUSE	1	B
		-----*		
24 -035	05007-0055	...SCREW MACHINE	2	B
		-----*		
24 -036	42W	... FUSEHOLDER	4	B
24 -036	5519-1	... FUSEHOLDER	5	A
24 -037	30872	...PLATE HOLDER	1	B
24 -038	165-11	...RECEPTACLE	1	C
		-----*		
24 -039	05007-0024	...SCREW	4	C
		-----*		
24 -038A	33058	...CAPACITOR	2	D
24 -040A	05516-0016	...GROUND LUG	1	D
		-----*		
24 -040B	05007-0024	...SCREW	1	D
24 -040C	05006-0004	...WASHER	1	D
24 -040D	05030-0004	...NUT	1	D
		-----*		
24 -040	03445	...PLATE CHASSIS	1	C
24 -041	05511-0133	...CONNECTOR	1	B
24 -041	5511-23	...TERMINAL-LUG	3	A
		-----*		
24 -042	05007-0024	...SCREW	2	C
24 -043	50FA440	...NUT	2	C
		-----*		
24 -044	05511-0026	...CONNECTOR	1	C
24 -045	2-4028	...GROMMET	1	C
24 -046	05516-0008	...TERMINAL	3	B
24 -047	33345	...HARNESS ASSY	1	B
24 -047	4263	...HARNESS	1	A
24 -048	30524	...CABLE CLAMPS	3	B
24 -048	2318	...CLAMP	3	A
24 -049	05577-0005	...SWITCH TOGGLE	1	C
24 -050	05577-0010	...TOGGLE SWITCH	1	C
24 -051	05577-0004	...SWITCH TOGGLE	1	C

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
24 -052	05618-10R0	...RESISTOR	1	B
24 -053	05007-0068	...PAN HD SCREW	1	B
24 -054	AN935-2L	...LOCKWASHER	2	C
24 -055	05030-0002	...NUT	2	B
24 -056	04244	...SWITCH ASSY	1	C
24 -057	05007-0016	...SCREW	4	C
24 -058	1204-00	...LOCKWASHER	4	B
24 -058	AN935-4L	...WASHER LOCK	4	A
24 -059	03408	...THERMOSTAT	1	C
24 -060	05007-0024	...SCREW	2	C
24 -061	1204-00	...LOCKWASHER	2	B
24 -062	05554-0005	...RESISTOR	1	C
24 -063	05514-0005	...TERMINALS	3	C
24 -064	853	...STAND OFFS	4	C
24 -065	05007-0024	...SCREW	7	C
24 -066	1204-00	...WASHER LOCK	7	B
24 -066	AN936A4C	...WASHER LOCK	4	A
24 -067	05525-0004	...RESISTOR VRBLE	1	C
24 -068	05511-0024	...RECEPTACLE	5	C
24 -069	05511-0037	...RECEPTACLE	2	C
24 -070	02222	...CAPACITOR	1	C
24 -071	05007-0024	...SCREW	2	C
24 -072	50 FA 440	...NUT LOCK	2	C
24 -073	03392	...SHAFT	1	C
24 -074	5133-12	...RET RING	2	C
24 -075	03389	...SPACER LEVER	2	C
24 -076	03286	...LEVER FUNCTION	4	C
24 -077	03388	...SPACER LEVER	3	C
24 -078	04202	...SPRING	1	C
24 -079	33354	...MTG ASSY	1	B
24 -080	33353	...ID PLATE	1	B
24 -080	3881	...DECAL	1	A
24 -081	03639	...SEAL CHASSIS	1	C
24 -082	04518	...NAME PLATE	1	C
24 -083	04144	...DUST SEAL	1	C
24 -084	03486	...SEAL CHASSIS	1	C
24 -085	30628	...DESIGN PLATE	1	B
24 -086	05007-0116	...SCREW	1	D
24 -087	05030-0004	...NUT	1	D
24 -088	05006-0019	...WASHER	1	D
24 -089	33589	...GROUND WIRE ASY	1	D
24 -090	04245	...CHASSIS ASSY	1	C
	33346	...HARNESS ASSY	1	B
24 -091	4262	...HARNESS ASSY SERVICE	1	A



SEE ITEM 8, FIGURE 24 FOR NHA
FIGURE 25

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED DN CODE		
		1234567890				
		LINE SENSOR ASSEMBLY				
25 -000	33296	...LINE SENSOR	REF	B		
25 -000	543-104	....LINE SENSOR	REF	A		
25 -001	33295	....NAMEPLATE	1	B		
25 -001	3524	....NAMEPLATE	1	A		
25 -002	03495	....COVER ASSY	1	C		
		- - - * - - -				
25 -003	05007-0016	....SCREW PAN HD	3	C		
		- - - * - - -				
25 -004	04067	....CLIP	1	C		
		- - - * - - -				
25 -005	05007-0016	....SCREW PAN HD	2	C		
25 -006	04068	....CLIP HOLDER	1	C		
		- - - * - - -				
25 -007	04854	....COVER ASSY	1	C		
25 -008	03568	....NAMEPLATE	1	C		
25 -009	30633	....WIRING ASSY	1	B		
25 -010	3507	....BOARD ASSEMBLY	1	A		
25 -010	33283-0002	....WIRE ASSY	1	B		
25 -011	05007-0024	....SCREW	3	C		
25 -012	05032-0005	....WASHER	3	C		
		- - - * - - -				
25 -013	CL2SBL101VPS	.....CAPACITOR	05586-0001	81349	2	C
25 -014	RC32GF560J	.....RESISTOR	05503-560J	81349	1	C
25 -015	RC07GF103J	.....RESISTOR	05501-103J	81349	1	C
25 -016	AF IN 645	.....DIODE	05546-0005	81349	4	B
25 -017	33275	.....WIRE ASSY			1	B
25 -017	3508	.....BOARD			1	A
25 -018	3517	.....BOARD ASSEMBLY			1	A
25 -018	33352	.....ASSY			1	B
		- - - * - - -				
25 -019	05007-0024	.....SCREW			4	C
25 -020	05032-0005	.....WASHER			4	C
		- - - * - - -				
25 -021	03516	.....SHORT STRIP			1	C
		- - - * - - -				
25 -022	05007-0055	.....SCREW			2	B
25 -023	AN935-2L	.....WASHERLOCK	5006-0002	88044	1	C
		- - - * - - -				
25 -024	RC07GF222J	.....RESISTOR	05501-222J	81349	2	C
25 -025	05546-0005	.....DIODE			6	B
25 -025	1N645	.....RECTIFIER	5546-5	97481	4	A
25 -026	05554-0007	.....RESISTOR			1	C
25 -027	05561-0015	.....DIODE			2	B
25 -027	1N1318	.....DIODE	5561-1	97481	2	A
25 -028	05502-4R7J	.....RESISTOR			2	C
25 -029	RC0GF331J	.....RESISTOR	05501-331J	81349	1	C
25 -030	USN 2N526	.....TRANSISTOR	05508-0008	81349	3	B
25 -030	2N526	.....TRANSISTOR	5508-8	97481	3	A
25 -031	RC20GF332J	.....RESISTOR	05502-332J	81349	1	C
25 -032	RC0GF332J	.....RESISTOR	05501-392J	81349	1	C
25 -033	RC07GF182J	.....RESISTOR	05501-182J	81349	1	C
25 -034	30745	.....WIRE BOARD ASSY			1	B
25 -035	30473-0002	.....MOUNTING BRCKT			1	B
25 -036	05511-0026	.....CONNECTOR			1	A
25 -037	DA15P	.....CONNECTOR	5511-11	91146	1	A
25 -037	05511-0136	.....CONNECTOR			1	B
		- - - * - - -				



SEE ITEM 10, FIGURE 24 FOR NHA
FIGURE 26

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE		
		1234567890				
25 -038	05007-0024	.....SCREW	2	C	
25 -039	50 FA 440	.....LOCKNUT	2	C	
		- - - * - - -				
25 -040	05561-0016	.....DIODE	1	B	
25 -041	03292	.....TRANSFORMER	1	C	
		- - - * - - -				
25 -042	05007-0024	.....SCREW	4	C	
25 -043	50 FA 440	.....LOCKNUT	4	C	
		- - - * - - -				
25 -044	03505	.....MOUNTING ASSY	1	C	
REF DNLY	30475	.....CONNECTOR ASSY	1	B	
		POWER SUPPLY ASSEMBLY				
26 -000	33287	...POWER SUPPLY	REF	B		
26 -000	533-104	...POWER SUPPLY	REF	A		
26 -001	33285	...NAMEPLATE	1	B		
26 -001	5322	...NAMEPLATE	1	A		
26 -002	03489	.....COVER ASSY	1	C	
		- - - * - - -				
26 -003	05007-0024	....SCREW PAN HD	2	C	
		- - - * - - -				
26 -004	04067	.....CLIP	1	C	
		- - - * - - -				
26 -005	05007-0016	.....SCREW PAN HD	2	C	
26 -006	04068	.....CLIP HOLDER	1	C	
		- - - * - - -				
26 -007	30275	.....RETAINER	NSS	B	
26 -008	30443	.....BRACKET ASSY	1	B	
26 -009	33283-0001	.....COMP ASSY	1	B	
		- - - * - - -				
26 -010	05007-0024	.....SCREWS	3	C	
26 -011	05032-0005	.....WASHERS	3	C	
		- - - * - - -				
26 -012	CL2SBL101VP3CAPACITOR	05586-0001	81349	2	C
26 -013	RC32GF560JRESISTOR	05503-560J	81349	1	C
26 -014	RC07GF103JRESISTOR	05501-103J	81349	1	C
26 -015	05546-0005DIODE		81349	5	B
26 -015	1N645RECTIFIER	5546-5	97481	4	A
26 -016	33275ASSY			1	B
26 -016	3507BOARD ASSEMBLY			1	A
26 -017	03292-TRANSFORMER			1	C
		- - - * - - -				
26 -018	05007-0024	.....SCREWS	4	C	
26 -019	50 FA 440LOCKNUT	05016-0002	56878	4	C
		- - - * - - -				
26 -020	DE9PCONNECTOR	5511-4	91146	1	A
26 -020	30442CONNECTOR			1	B
		- - - * - - -				
26 -021	05007-0024	.....SCREWS	2	C	
26 -022	50 FA 440LOCKNUT	05016-0002	56878	2	C
		- - - * - - -				
26 -023	03493BRACKET ASSY			1	C

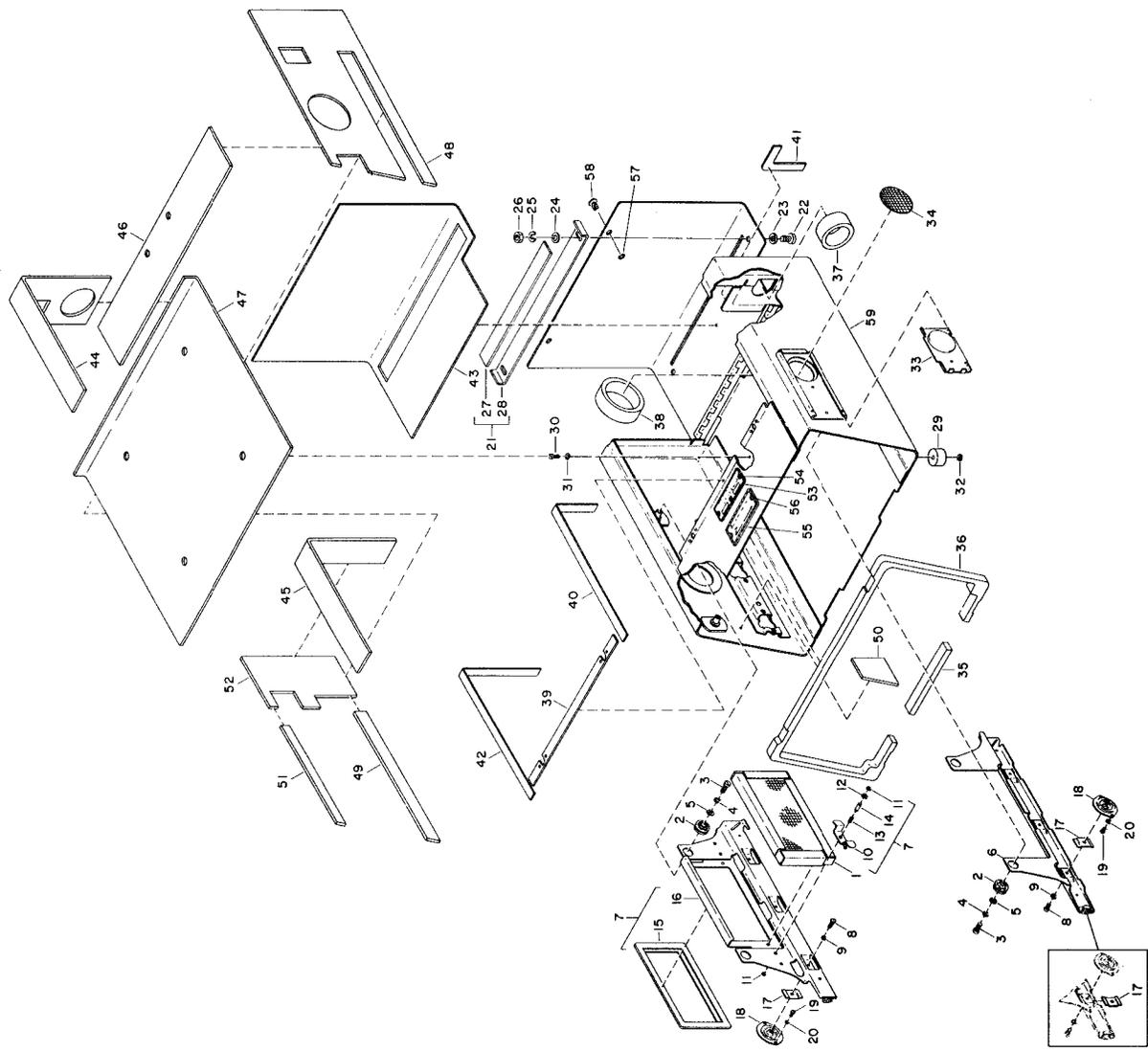


FIGURE 27

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
		CASE ASSEMBLY		
27 -000	06182-0004	..CASE ASSY	REF	B
27 -000	6182-1041	..CASE ASSY	REF	A
27 -001	03665	...AIR FILTER	1	C
27 -002	05534-0008	...RUBBER GROMMET	4	C
		- - - * - - -		
27 -003	05007-0024	...SCREW	4	C
27 -004	AN935-4L	...LOCKWASHER 05006-0004 88044	4	C
27 -005	30498	...FLAT WASHER	4	B
		- - - * - - -		
27 -005	4279	...WASHER	2	A
27 -006	04224	...MOUNT ASSY R H	1	C
27 -007	04210	...MOUNT ASSY L H	1	C
		- - - * - - -		
27 -008	05007-0134	...SCREW	6	C
27 -009	AN935-8L	...LOCKWASHER 05006-0017 88044	6	C
		- - - * - - -		
27 -010	03642	....BRACKET	2	C
		- - - * - - -		
27 -011	5133-15	....RET RING 05004-0018 79136	4	C
27 -012	05032-0009	....WASHER	2	C
		- - - * - - -		
27 -013	03604	....SPRING	2	C
27 -014	04172	....PIVOT POST	2	C
27 -015	03716	....BRACKET	1	C
27 -016	04195	....BRACKET	1	C
27 -017	04505	...SNUBBER	6	C
27 -018	04199	...VIBRATION INS	6	C
		- - - * - - -		
27 -019	05007-0133	...SCREW	12	C
27 -020	AN935-5L	...LOCKWASHER 05006-0005 88044	12	C
		- - - * - - -		
27 -021	00226	...SUB ASSY	1	B
		- - - * - - -		
27 -022	05007-0151	...SCREW	2	C
27 -023	04558	...WASHER	2	C
27 -024	05032-0039	...FLAT WASHER	2	C
27 -025	AN935-86	...LOCKWASHER 05006-0034 88044	2	C
27 -026	05123-0001	...NUT	2	C
		- - - * - - -		
27 -027	04594	....LINER	1	C
27 -028	04557	....COVER	1	C
27 -029	05068-0005	...BUMPERS	4	C
		- - - * - - -		
27 -030	05007-0134	...SCREW	4	C
27 -031	AN935-8L	...LOCKWASHER 05006-0017 88044	4	C
27 -032	05030-0015	...HEX NUT	4	C
		- - - * - - -		
27 -033	04527	...INSULATION ASSY	1	C
27 -034	03721	...SCREEN	2	C
27 -035	04523	...STRIP	1	C
27 -036	04289	...DUST SEAL	1	C
27 -037	04288	...DUST SEAL	1	C
27 -038	03724	...AIR SEALER	1	C
27 -039	04215	...COVER SEAL	1	C
27 -040	04214	...R H COVER SEAL	1	C
27 -041	04213	...R H COVER SEAL	1	C
27 -042	04212	...L H COVER SEAL	1	C

FIG.& INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USED ON CODE
		1234567890		
27 -043	04586	...LINER	1	C
27 -044	04223	...LINER	1	C
27 -045	04218	...LINER	1	C
27 -046	04216	...LINER	1	C
27 -047	30493	...LINER	1	B
27 -047	4217	...LINER	1	A
27 -048	04219	...LINER	1	C
27 -049	04291	...LINER	1	C
27 -050	04221	...LINER	1	C
27 -051	04290	...LINER	1	C
27 -052	04220	...LINER	1	C
27 -053	03810-0008	...NAME PLATE	1	B
27 -053	4585	...NAMEPLATE	1	A
		- - - * - - -		
27 -054	05002-0065	...RIVET	4	B
		- - - * - - -		
27 -055	30670	...NAME PLATE	1	B
		- - - * - - -		
27 -055	4724	...NAMEPLATE	1	A
27 -056	05002-0066	...RIVET	2	B
		- - - * - - -		
27 -058	05090-0003	...STUD	2	B
27 -057	05099-0001	...RET RING	2	C
27 -057	05009-0004	...RET RING	2	A
27 -059	04589-0002	...SPOT WELD ASSY	1	B
27 -059	4589	...CASE	1	A
		- - - * - - -		
03D-233A	30783	....PLUNGER	1	B
03D-233B	30784	....ADJUSTMENT ROD	1	B
03D-233C	05016-0018	....NUT	2	B
03D-233D	05030-0002	....NUT	2	B
		- - - * - - -		

SECTION II NUMERICAL INDEX

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
AF IN 645	25 -016	PIFFC
AG-1704	02 -002	
AN935-10L	03 -035	PIFFC
AN935-10L	03 -040	PIFFC
AN935-10L	11 -032	PIFFC
AN935-10L	12 -025	PIFFC
AN935-2L	03C-173	PIFFC
AN935-2L	15 -018	PIFFC
AN935-2L	16A-090	PIFFC
AN935-2L	24 -054	PIFFC
AN935-2L	25 -023	PIFFC
AN935-3L	03 -093	XIFFC
AN935-3L	08 -011	XIFFC
AN935-3L	08 -027	XIFFC
AN935-3L	08 -032	XIFFC
AN935-3L	15 -040	XIFFC
AN935-3L	15 -074	XIFFC
AN935-3L	19 -016	XIFFC
AN935-4L	03 -004	PIFFC
AN935-4L	03 -007	PIFFC
AN935-4L	03 -018	PIFFC
AN935-4L	03 -032	PIFFC
AN935-4L	03 -140	PIFFC
AN935-4L	03 -218	PIFFC
AN935-4L	03 -235	PIFFC
AN935-4L	03E-258	PIFFC
AN935-4L	03E-288	PIFFC
AN935-4L	04 -007	PIFFC
AN935-4L	10 -002	PIFFC
AN935-4L	11 -005	PIFFC
AN935-4L	11 -015	PIFFC
AN935-4L	11 -019	PIFFC
AN935-4L	11 -051	PIFFC
AN935-4L	12 -021	PIFFC
AN935-4L	16A-092	PIFFC
AN935-4L	16A-095	PIFFC
AN935-4L	17 -023	PIFFC
AN935-4L	24 -058	
AN935-4L	27 -004	PIFFC
AN935-5L	04 -015	PIFFC
AN935-5L	27 -020	PIFFC
AN935-6L	01 -009	PIFFC
AN935-6L	01 -009	PIFFC
AN935-8L	27 -009	PIFFC
AN935-8L	27 -031	PIFFC
AN935-86	27 -025	NFFC
AN936A4C	24 -066	
AN960C10L	10 -008	
A0009	01 -000	
CL2S8L101VPS	25 -013	PIFFC
CL2S8L101VP3	26 -012	PIFFC
DA15P	25 -37	PIFFC
DA15S	24 -027	PIFFC
DE9P	26 -020	PIFFC
FS28-8	02 -026	PIFFC
KHYX245	24 -022	PIFFC
L562/1	23 -007	PIFFC
MS115-00619-2030	21 -005	
MS35233-13	03 -217	
NO NUMBER	03 -024	
NO NUMBER	04 -000	
NO NUMBER	06 -000	

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
NO 47	24 -007	PIFFC
RC0GF331J	25 -029	PIFFC
RC0GF332J	25 -032	
RC07GF103J	25 -015	PIFFC
RC07GF103J	26 -014	PIFFC
RC07GF182J	25 -033	PIFFC
RC07GF222J	25 -024	
RC20GF332J	25 -031	PIFFC
RC32GF560J	25 -014	PIFFC
RC32GF560J	26 -013	PIFFC
RR-50	18 -034	
RR-50	18 -041	XIFFC
RR-50		XIFFC
RS-62	18 -037	
SFR156PPK58	03C-169	XIFFC
SFR3PP	09 -035	
S11240-50	03E-263	PIFFC
S11240-50	03E-283	PIFFC
USN 2N526	25 -030	PIFFC
X30080	17 -019	P2FFC
X30081	17 -018	P2FFC
00201	03C-170	PIFFC
00202	03 -036	
00203	03E-253	NFFC
00204	03 -219	
00205	03 -190	AFFR
00215	12 -010	AFFR
00219	08 -034	
00220	09 -007	AFFR
00221	05 -017	PIFFC
00221	15 -083	PIFFC
00222	11 -003	AFFR
00223	11 -040	PIFFC
00224	08 -043	
00225	03A-084	
00226	27 -021	NFFC
00610	03C-150	XIFFC
00610	03C-155	XIFFC
00610	03C-158	XIFFC
00610	03C-161	XIFFC
00610	03C-164	XIFFC
00610	03C-167	XIFFC
00616	03 -191	P2FFC
00625	03B-129	XIFFC
00630	03E-256	P2FFC
00632	03 -196	P2FFC
00648	03B-128	P2FFC
00649	03 -028	P2FFC
00655	03B-121	P2FFC
00656	03B-124	XIFFC
00660	03B-116	XIFFC
00660	03B-127	XIFFC
00674	03 -041	P2FFC
00677	03B-120	XIFFC
00678	03B-131	XIFFC
00704	03A-098	XIFFC
00706	03A-097	XIFFC
00710	03E-259	P2FFC
00711	03 -030	P2FFC
00713	03 -242	XIFFC
00722	03C-177	XIFFC
00724	03C-142	PIFFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
00725	03E-276	P2FFC
00726	03 -033	P2FFC
00726	03 -037	P2FFC
00727	03 -038	P2FFC
00731	03 -022	P2FFC
00731	03 -113	P2FFC
00734	03 -134	P2FFC
00736	03 -008	P2FFC
00738	03C-171	P2FFC
00746	03 -009	P2FFC
00750	03E-252	P2FFC
00769	03 -014	NFFC
00770	03E-285	NFFC
00771	03E-286	NFFC
00774	03E-281	NFFC
00775	03E-261	NFFC
00776	03 -136	P2FFC
00791	03E-271	P2FFC
00805	03C-166	P1FFC
00806	03C-163	P1FFC
00807	03C-160	P1FFC
00808	03C-157	P1FFC
00809	03C-154	P1FFC
00810	03C-149	P1FFC
00811	03C-174	X1FFC
00815	03C-175	X1FFC
00816	03B-130	X1FFC
00817	03B-132	X1FFC
00819	03E-278	P2FFC
00821	03 -206A	
00824	03 -204	P1FFC
00824	09 -005	P1FFC
00824	18 -004	P1FFC
00824	18 -027	P1FFC
00831	03 -083	P2FFC
00833	03 -223	P2FFC
00835	03 -025	AFDC
00847	03 -248	P2FFC
00852	03 -081	P2FFC
00853	03 -069	P2FFC
00854	03 -057	P2FFC
00855	03B-123	P2FFC
00856	03E-264	P2FFC
00860	03 -071	X1FFC
00861	03 -072	X1FFC
00862	03 -073	X1FFC
00863	03 -074	X1FFC
00864	03 -075	X1FFC
00865	03 -076	X1FFC
00866	03 -077	X1FFC
00867	03 -078	X1FFC
00868	03 -079	X1FFC
00869	03 -080	X1FFC
00870	03 -059	X1FFC
00871	03 -060	X1FFC
00872	03 -061	X1FFC
00873	03 -062	X1FFC
00874	03 -063	X1FFC
00875	03 -064	X1FFC
00876	03 -065	X1FFC
00877	03 -066	X1FFC
00878	03 -067	X1FFC
00879	03 -068	X1FFC
00880	03 -046	X1FFC
00881	03 -047	X1FFC
00882	03 -048	X1FFC
00883	03 -049	X1FFC
00884	03 -050	X1FFC
00885	03 -051	X1FFC
00886	03 -052	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
00887	03 -053	X1FFC
00888	03 -054	X1FFC
00889	03 -055	X1FFC
00890	03 -056	X1FFC
00891	03 -027	X1FFC
00892	03 -070	AFDC
00893	03 -058	AFDC
00894	03 -045	AFDC
00895	03 -247	P2FFC
00899	03 -192	P2FFC
00929	03 -179	P2FFC
00930	03 -180	P2FFC
00931	03 -181	P2FFC
00932	03 -182	P2FFC
00933	03 -183	P2FFC
00936	03 -226	P2FFC
00937	03 -029	P2FFC
00937	03 -042	P2FFC
00937	03 -082	P2FFC
00940	03 -216	MOOC
00941	03 -043	P2FFC
00942	03 -001	P2FFC
00943	03 -005	P2FFC
00944	03 -240	P2FFC
00946	03 -016	MOOC
00951	03 -138	P2FFC
00956	03 -220	P2FFC
00958	03 -222	P1FFC
00960	03 -013	NFFC
00961	03 -208	P1FFC
00962	03 -214	P1FFC
00963	03E-260	P2FFC
00971	03A-091	P2FFC
00972	03A-105	X1FFC
00973	03A-106	X1FFC
00974	03A-104	X1FFC
00975	03A-108	X1FFC
00976	03A-109	X1FFC
00977	03A-101	X1FFC
00978	03A-111	X1FFC
00983	03E-274	AFFC
00990	03A-085	P1FFC
00994	03A-102	X1FFC
00996	03A-087	P1FFC
01103	19 -012	P2FFC
01104	19 -009	P2FFC
01106	19 -044	P2FFC
01106	19 -051	P2FFC
01106	19 -058	P2FFC
01106	19 -067	P2FFC
01108	19 -091	P2FFC
01108	19 -098	P2FFC
01114	19 -008	AFFC
01116	19 -042	P2FFC
01116	19 -047	P2FFC
01116	19 -054	P2FFC
01116	19 -063	P2FFC
01116	19 -087	P2FFC
01116	19 -094	P2FFC
01117	19 -100	P2FFC
01120	19 -013	P2FFC
01122	21 -008	X1FFC
01123	19 -041	P2FFC
01124	15 -079	X1FFC
01125	15 -076	X1FFC
01126	16 -031	
01126	16A-061	
01127	16A-055	P2FFC
01130	16A-058	X1FFC
01130	16A-075	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
01131	16 -025	AFFC
01133	16A-056	P1FFC
01137-0001	16A-062	P1FFC
01153	19 -034	P2FFC
01154	13 -042	X1FFC
01160	13 -013	AFFC
01163	13 -068	P2FFC
01166	18 -035	X1FFC
01174	18 -042	P1FFC
01175	04 -010	P2FFC
01178	18 -031	X1FFC
01179	18 -044	P1FFC
01183	18 -043	AFFR
01189	19 -036	P2FFC
01199	18 -030	X1FFC
01200	09 -037	
01205-0001	03B-125	P1FFC
01205-0001	05 -030	P1FFC
01205-0001	21 -028	P1FFC
01205-0001	22 -011	P1FFC
01205-0002	22 -012	P2FFC
01210	21 -019	P2FFC
01211	21 -020	P2FFC
01212	21 -021	P2FFC
01213	21 -022	P2FFC
01214	21 -023	P2FFC
01215	21 -024	P2FFC
01216	22 -004	P2FFC
01217	22 -005	P2FFC
01218	22 -006	P2FFC
01219	22 -007	P2FFC
01221	21 -030	X1FFC
01222	22 -017	P2FFC
01223	16 -007	P2FFC
01235	21 -029	X1FFC
01235	22 -003	X1FFC
01237	22 -013	P2FFC
01241-0002	09 -038	NFFC
01245	08 -033	P2FFC
01246	16 -008	P2FFC
01247	09 -022	P2FFC
01253	08 -028	P2FFC
01254	19 -026	P1FFC
01255	09 -032	P2FFC
01258	08 -035	AFFC
01261	08 -045	P1FFC
01262	08 -041	P2FFC
01265	19 -019	AFFR
01266	19 -031	P1FFC
01268	19 -029	P2FFC
01269	19 -021	P2FFC
01270	22 -015	P1FFC
01278-0001	18 -036	AFFR
01280-0001	18 -029	P1FFC
01281	18 -040	P1FFC
01284-0001	13 -021	P1FFC
01287	08 -066	
01288	08 -007	P2FFC
01311	15 -086	P2FFC
01313	09 -025	AFFC
01314	12 -011	P2FFC
01319	08 -056	X1FFC
01323	21 -001	P1FFC
01324	16A-104	
01332	12 -016	P2FFC
01338	13 -084	P2FFC
01343	08 -009	X1FFC
01344	08 -062	X1FFC
01345	08 -052	X1FFC
01346	08 -047	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
01347	22 -001	P2FFC
01349	19 -030	P2FFC
01362	16 -047	NFFC
01362	20 -034	NFFC
01363	16 -045	NFFC
01363	20 -014	NFFC
01363	20 -032	NFFC
01368	13 -001	P2FFC
01376	16 -004	P2FFC
01379-0001	08 -055	
01380	09 -013	P2FFC
01384	16A-078	P2FFC
01385	16A-076	X1FFC
01391	16A-064	P2FFC
01393	13 -014	P2FFC
01397	13 -094	X1FFC
01399	13 -051	P2FFC
01402	08 -048	NFFC
01407	12 -032	P2FFC
01408	13 -061	P2FFC
01425	13 -085	X1FFC
01426	21 -027	P2FFC
01426	22 -010	P2FFC
01434	13 -066	X1FFC
01440-0001	08 -014	
01502-0001	08 -020	P2FFC
01502-0002	08 -019	P2FFC
01507	21 -018A	
01510	19 -005	P2FFC
01526	21 -007	P2FFC
01539	13 -062	X1FFC
01565	08 -004	P2FFC
01566	08 -030	P1FFC
01578	17 -020	NFFC
01589	17 -013	P1FFC
01592	17 -001	NFFC
01597	17 -021	AFFC
01600	15 -077	X1FFC
01600		X1FFC
01601	15 -075	X1FFC
01606	15 -072	X1FFC
01607	15 -035	P2FFC
01607	15 -057	P2FFC
01612	15 -125	X1FFC
01614	20 -003	P2FFC
01615	12 -065	P2FFC
01624	15 -103	P1FFC
01628	20 -002	P2FFC
01630-0001	15 -070	
01656	15 -108	P2FFC
01663	12 -070	AFOC
01664	13 -043	AFOC
01666	15 -131	X1FFC
01668	15 -087	P2FFC
01673	05 -018	X1FFC
01673	13 -008	X1FFC
01673	15 -084	X1FFC
01673	19 -010	X1FFC
01673	21 -014	X1FFC
01676	15 -067	X1FFC
01677	15 -129	P2FFC
01678	15 -124	P2FFC
01680	15 -118	P2FFC
01681	15 -115	P2FFC
01682	15 -112	P2FFC
01684	15 -121	P2FFC
01685	15 -127	X1FFC
01686	15 -097	X1FFC
01688	15 -065	P2FFC
01689	15 -104	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
01689	15 -104	P2FFC
01692	15 -110	P2FFC
01698	15 -089	X1FFC
01699	15 -093	P2FFC
01700	15 -092	P2FFC
01701	15 -066	P2FFC
01703	12 -035	X1FFC
01718	15 -008	P2FFC
01728	09 -024	P2FFC
01730	13 -016	P2FFC
01731	13 -050	P2FFC
01733	08 -057	X1FFC
01737	09 -027	P2FFC
01741	15 -030	P2FFC
01744	15 -025	P2FFC
01745	12 -018	P2FFC
01746	12 -017	P2FFC
01747	15 -047	P2FFC
01748	16 -005	X1FFC
01750	13 -004	P2FFC
01753-0002	08 -001	
01755	08 -064	
01756	12 -026	P2FFC
01776	13 -059	P2FFC
01777	13 -056	P2FFC
01780	13 -017	P2FFC
01799	08 -016	X1FFC
01800	08 -013	P2FFC
01802	08 -012	P2FFC
01850	19 -004	P2FFC
01852	19 -032	P2FFC
01854	16A-033	NFFC
01856	16A-036	X1FFC
01866	16 -011	NFFC
01887	16 -012	X1FFC
01916	16 -053	X1FFC
01917	15 -024	X1FFC
01920	15 -032	P2FFC
01921	15 -034	P2FFC
01922	15 -033	P2FFC
01928-0001	12 -064	AFFR
01949	18 -011	P2FFC
01950	18 -008	X1FFC
01952	18 -013	X1FFC
01954	18 -012	P2FFC
01955	18 -010	X1FFC
01960	16A-073A	
01960	18 -006	P2FFC
01965	01 -006	AFFC
01965	04 -019	AFFC
01968	09 -030	P2FFC
01969	04 -021	P2FFC
01973	09 -029	P2FFC
02005	08 -046	X1FFC
02006	08 -051	X1FFC
02007	08 -058	X1FFC
02009	08 -022	P2FFC
02015	13 -039	P1FFC
02016	13 -041	P2FFC
02018	15 -105	P2FFC
02019	15 -119	P2FFC
02020	15 -111	P2FFC
02020	15 -116	P2FFC
02021	15 -113	P2FFC
02028	21 -011	P2FFC
02029	21 -016	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
02030	15 -096	P2FFC
02079	07 -008	P2FFC
02080	07 -009	P2FFC
02086	19 -001	P2FFC
02090	15 -094	AFFC
02093	20 -001	P2FFC
02095	16 -042	P2FFC
02095	20 -011	P2FFC
02102	09 -017	P2FFC
02105	13 -046	P2FFC
02106	13 -055	NFFC
02136	15 -095	NFFC
02137	20 -004	X1FFC
02151	09 -015	P2FFC
02156	09 -018	P2FFC
02157	09 -020	P2FFC
02158	09 -001	P2FFC
02165	08 -006	P2FFC
02189	19 -014	P2FFC
02194	19 -018	P2FFC
02214	09 -023	P2FFC
02219	09 -014	P2FFC
02222	24 -070	
02225	23 -004	P2FFC
02229	09 -011	P2FFC
02244	10 -003	X1FFC
02249	19 -002	
02264	10 -004	X1FFC
02272	15 -061	X1FFC
02307	13 -077	X1FFC
02309	13 -078	AFOC
02310	13 -072	AFOC
02312	13 -071	P2FFC
02374	19 -045	P2FFC
02379	13 -020	P2FFC
02381	13 -015	X1FFC
02385	13 -024	X1FFC
02407	09 -012	P2FFC
02408	13 -003	X1FFC
02413	20 -023	X1FFC
02414	20 -019	X1FFC
02415	20 -022	X1FFC
02439	16A-035	X1FFC
02461	15 -062	P2FFC
02462	15 -046	
02466	15 -027	AFOC
02467	15 -051	AFOC
02469	15 -044	X1FFC
02471	15 -063	X1FFC
02472	15 -045	P2FFC
02485	01 -011	P2FDR
02485	04 -023	P2FDR
02508	15 -088	X1FFC
02509-0001	16 -044	
02509-0001	20 -031	
02510-0001	20 -018	
02516	24 -006	P2FFC
02523	21 -003	P2FFC
02523	22 -016	P2FFC
02526	08 -060	X1FFC
02527	13 -093	X1FFC
02530	17 -025	P1FFC
02531	17 -026	P1FFC
02538-0003	01 -007	P1FFC
02538-0003	04 -002	P1FFC
02542	18 -007	P2FFC
02546	17 -016	X1FFC
02547	17 -017	X1FFC
02559	13 -070	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
02560	13 -019	P2FFC
02569	10 -000	P2FFC
02572	19 -059	P2FFC
02575	19 -053	AFFC
02589	19 -068	P2FFC
02590	19 -062	AFFC
02591	19 -093	AFFC
02592	19 -099	P2FFC
02599	19 -086	AFFC
02600	19 -092	P2FFC
02602	19 -046	AFFC
02605	19 -052	P2FFC
02610	19 -070	P2FFC
02611	19 -084	P2FFC
02612	19 -033	P2FFC
02613	19 -061	P2FFC
02621	12 -006	
02622	12 -004	P1FFC
02623	13 -102	P1FFC
02624	12 -005	P1FFC
02626	04 -005	X1FFC
02662	13 -012	MFOC
02695	12 -067	AFOC
02721	08 -042	P2FFC
02723	08 -025	P2FFC
02726	13 -035	X1FFC
02728	13 -034	P2FFC
02735	09 -006	P2FFC
02744	13 -040	P1FFC
02780	15 -042	P2FFC
02780	15 -059	P2FFC
02780	16A-065	P2FFC
02783	08 -049	NFFC
02835	15 -049	X1FFC
02836	15 -048	P2FFC
02841	16 -029	X1FFC
02841	16A-059	X1FFC
02842	13 -037	P2FFC
02843	17 -004	X1FFC
02864	05 -029	P2FFC
02921	19 -028	NFFC
02922	19 -027	P2FFC
02929	08 -059	P1FFC
02935	05 -001	NFFC
02936	05 -009	NFFC
02937	05 -022	NFFC
02938	05 -012	P1FFC
02938	05 -024	P1FFC
02950	05 -021	P1FFC
02964	05 -066	NFFC
02965	05 -043	NFFC
02968	05 -065	P2FFC
02969	05 -042	P2FFC
02973	05 -061	P2FFC
02993	04 -025	P2FFC
03004	15 -004	P2FFC
03007	15 -026	P2FFC
03012	05 -039	NFFC
03012	19 -017	NFFC
03013	05 -046	NFFC
03016	05 -045	P2FFC
03023	05 -023	NFFC
03024	16 -018	NFFC
03028	05 -055	P2FFC
03030	05 -063	P2FFC
03031	05 -032	P2FFC
03032	05 -025	P2FFC
03033	05 -013	P2FFC
03037	05 -033	P2FFC
03038	07 -020	NFFC
03039	05 -020	NFFC
03045	05 -036	NFFC
03049	01 -004	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
03056	04 -017	MOOC
03059	05 -011	NFFC
03061	05 -058	AFOC
03064	05 -003	P2FFC
03065	05 -004	P2FFC
03066	05 -008	P2FFC
03068	21 -017	X1FFC
03086	07 -032	X1FFC
03087	07 -004	X1FFC
03088	07 -005	X1FFC
03091	07 -002	P2FFC
03093	05 -027	P2FFC
03094	05 -015	NFFC
03095	05 -028	NFFC
03103	05 -014	P1FFC
03103	05 -026	P1FFC
03110	05 -040	P2FFC
03120	07 -000	P2FFC
03121	05 -002	NFFC
03123	05 -062	NFFC
03128	16A-085	P2FFC
03132	13 -095	AFFC
03133	16A-088	P2FFC
03134	19 -023	NFFC
03136	16A-069	P2FFC
03137	16A-084	P2FFC
03138	16A-083	P2FFC
03141	13 -082	AFOC
03141	15 -029	AFOC
03143	12 -029	P2FFC
03143	12 -037	P2FFC
03143	16 -049	P2FFC
03146	15 -055	
03147	16A-039	P2FFC
03149	16A-077	X1FFC
03159	12 -031	X1FFC
03159	12 -039	X1FFC
03159	12 -046	X1FF
03159	13 -074	X1FFC
03159	13 -080	X1FFC
03159	13 -098	X1FFC
03159	16 -003	X1FFC
03159	16 -023	X1FFC
03159	16 -051	X1FFC
03160	12 -042	P2FFC
03160	13 -075	P2FFC
03160	13 -099	P2FFC
03160	15 -054	P2FFC
03160	16 -001	P2FFC
03160	16 -021	P2FFC
03160	16 -028	P2FFC
03161	12 -040	X1FFC
03161	13 -081	X1FFC
03161	16 -052	X1FFC
03162	19 -037	NFFC
03163	16A-038	P2FFC
03165	13 -088	X1FFC
03173	12 -023	P2FFC
03178	13 -030	X1FFC
03181	13 -028	X1FFC
03182	16 -019	AFFC
03186	19 -048	P2FFC
03186	19 -055	P2FFC
03186	19 -064	P2FFC
03186	19 -088	P2FFC
03186	19 -095	P2FFC
03186	19 -101	P2FFC
03198	15 -041	X1FFC
03198	16A-067	X1FFC
03208	13 -010	P2FFC
03209	13 -011	P2FFC
03212	13 -007	AFFC
03213	16A-068	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
03214	13 -103	
03219	13 -086	P2FFC
03229	13 -032	X1FFC
03232	16A-032	P2FFC
03234	16A-070	P2FFC
03239	16 -014	X1FFC
03244	16A-073	P2FFC
03246	16A-081	P2FFC
03247	16A-080	P2FFC
03248	15 -036	P2FFC
03249	16A-079	P2FFC
03250	12 -014	X1FFC
03251	16 -026	P2FFC
03252	16A-071	P2FFC
03253	19 -039	X1FFC
03258	15 -091	X1FFC
03261	05 -034	P1FFC
03265	16 -015	X1FFC
03266	05 -060	P2FFC
03278	05 -016	NFFC
03280	16 -030	P2FFC
03280	16A-060	P2FFC
03286	24 -076	P2FFC
03290	15 -037	P2FFC
03292	25 -041	P1FFC
03292	26 -017	P1FFC
03303	24 -012	P2FFC
03308	24 -020	P2FFC
03309	24 -021	P2FFC
03311	24 -013	P2FFC
03319	11 -054	X1FFC
03322	12 -012	X1FFC
03323	17 -009	X1FFC
03345	02 -009	P2FFC
03346	02 -015	X1FFC
03356-0001	02 -008	
03357	02 -032	M00C
03359	02 -017	P2FFC
03361	02 -011	X1FFC
03362	02 -014	X1FFC
03363	02 -013	X1FFC
03364	02 -012	X1FFC
03369	02 -018	NFFC
03370	02 -024	P1FFC
03371	02 -023	MFOC
03372	02 -022	MFOC
03373	02 -021	MFOC
03376-0003	02 -004	NFFC
03382	02 -005	P2FFC
03383-0003	02 -003	NFFC
03384-0003	02 -007	NFFC
03386-0003	02 -001	P2FFC
03387	02 -020	P2FFC
03388	24 -077	P2FFC
03389	24 -075	P2FFC
03392	24 -073	P2FFC
03395	02 -033	M00C
03399	02 -034	M00C
03400	02 -036	M00C
03401	02 -035	M00C
03407	01 -001	P1FFC
03408	24 -059	P2FFC
03416	04 -026	
03417	04 -018	P1FFC
03417-0002	01 -013	P1FFC
03444	02 -010	P2FFC
03445	24 -040	NFFC
03447	02 -037	M00C
03486	24 -084	NFFC
03487	15 -038	P2FFC
03489	26 -002	NFFC
03493	26 -023	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
03495	25 -002	NFFC
03505	25 -044	X1FFC
03516	25 -021	X1FFC
03520	18 -045	P2FFC
03526	24 -016	P2FFC
03527	24 -017	P2FFC
03528	24 -004	P2FFC
03529	24 -005	P1FFC
03553	13 -031	P2FFC
03564	08 -005	P2FFC
03568	25 -008	NFFC
03576	23 -003	P2FFC
03577-0001	12 -060	AFFR
03604	27 -013	P2FFC
03605	24 -001	X1FFC
03614	24 -002	X1FFC
03618	03 -245	P2FFC
03619	03 -246	P2FFC
03625-0001	02 -028	NFFC
03628	02 -029	MFOC
03629	02 -030	NFFC
03632	07 -017	NFFC
03634	07 -016	X1FFC
03637	07 -015	P2FFC
03639	24 -081	NFFC
03640	16A-098	P1FFC
03642	27 -010	P2FFC
03648-0003	02 -031	NFFC
03649-0003	02 -038	NFFC
03651	13 -025	X1FFC
03652	13 -026	X1FFC
03653	13 -067	MFOC
03653	19 -060	MFOC
03654	08 -015	P2FFC
03655	21 -010	P1FFC
03656	05 -054	MFOC
03657	03C-153	
03657	12 -062	NFFC
03657	19 -073	NFFC
03658	13 -057	X1FFC
03658	18 -023	X1FFC
03658	19 -007	X1FFC
03660	03 -195	
03660	13 -101	
03661	22 -008	P2FFC
03662	03 -198	
03662	11 -007	
03665	27 -001	P2FFC
03667	13 -029	MFOC
03668	19 -040	
03716	27 -015	MFOC
03721	27 -034	X1FFC
03724	27 -038	M00C
03755	01 -012	NFFC
03757	07 -018	P2FFC
03758	07 -013	X1FFC
03759	07 -011	P2FFC
03761	11 -020	P2FFC
03762	11 -053	X1FFC
03765	11 -029	X1FFC
03770	11 -034	P2FFC
03771	11 -039	P2FFC
03772	11 -036	X1FFC
03773	11 -037	X1FFC
03774	11 -027	P2FFC
03775	11 -026	P2FFC
03779	11 -021	X1FFC
03780	11 -028	X1FFC
03781	11 -025	P2FFC
03782	11 -047	P2FFC
03783	11 -046	P2FFC
03784	11 -048	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
03785	11 -050	X1FFC
03786	11 -013	X1FFC
03790	11 -002	P2FFC
03791	11 -009	P2FFC
03795	11 -001	P2FFC
03796	11 -010	X1FFC
03797	11 -012	P2FFC
03800	11 -017	P2FFC
03801	11 -016	X1FFC
03803	07 -031	X1FFC
03804	03E-266	P1FFC
03805	03E-269	P1FFC
03806	03E-270	NFFC
03810-0008	27 -053	NFFC
03866	21 -026	NFFC
03866	22 -009	NFFC
03867	05 -031	P1FFC
03869	05 -047	P2FFC
03871	05 -049	X1FFC
03873	05 -048	X1FFC
03919-0002	17 -007	AFFR
03947	17 -002	AFRC
04067	25 -004	NFFC
04067	26 -004	NFFC
04068	25 -006	NFFC
04068	26 -006	NFFC
04133	11 -033	X1FFC
04135	11 -044	X1FFC
04137	11 -045	X1FFC
04141	08 -002	
04143	03A-099	X1FFC
04144	24 -083	NFFC
04145	16A-094	NFFC
04146	08 -063	P1FFC
04147	16A-091	NFFC
04149	02 -027	P1FFC
04172	27 -014	P2FFC
04176-0010	03 -015	NFFC
04177-0010	03 -011	NFFC
04195	27 -016	P1FFC
04199	27 -018	P2FFC
04202	24 -078	
04205	24 -026	NFFC
04210	27 -007	AFOR
04212	27 -042	MDOC
04213	27 -041	MDOC
04214	27 -040	MDOC
04215	27 -039	MDOC
04216	27 -046	MDOC
04218	27 -045	MDOC
04219	27 -048	MDOC
04220	27 -052	MDOC
04221	27 -050	MDOC
04223	27 -044	MDOC
04224	27 -006	AFOR
04227	11 -022	X1FFC
04244	24 -056	X1FFC
04245	24 -090	X1FFC
04251	16A-072	P2FFC
04258	19 -069	AFRC
04288	27 -037	MDOC
04289	27 -036	MDOC
04290	27 -051	MDOC
04291	27 -049	MDOC
04294	12 -048	X1FFC
04295	12 -055	P2FFC
04297	12 -053	P2FFC
04298	12 -056	P2FFC
04505	27 -017	NFFC
04510	09 -003	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
04511	11 -024	P2FFC
04512	03C-152	NFFC
04512	11 -023	NFFC
04515	20 -017	X1FFC
04518	24 -082	NFFC
04523	27 -035	MDOC
04525	20 -016	X1FFC
04527	27 -033	P2FFC
04529	21 -004	P2FFC
04530	21 -018	P1FFC
04531	20 -012	P2FFC
04532	12 -057	X1FFC
04546	17 -015	P2FFC
04547	17 -014	P2FFC
04553	05 -050	X1FFC
04557	27 -028	NFFC
04558	27 -023	NFFC
04560	08 -039	P2FFC
04563	02 -019	MDOC
04569	16 -016	P1FFC
04571	20 -008	NFFC
04572	20 -009	P2FFC
04573	20 -007	P2FFC
04574	03 -239	AFDC
04580	19 -078	NFFC
04582	19 -083	NFFC
04586	27 -043	MDOC
04589-0002	27 -059	NFFC
04593	24 -022	P1FFC
04594	27 -027	MDOC
04606	03 -019A	
04610	03A-100	X1FFC
04661-0001	03 -019	
04662	03A-110	X1FFC
04665	19 -075	P1FFC
04723	04 -004	X1FFC
04800	09 -008	P2FFC
04801	19 -071	P2FFC
04802	15 -064	X1FFC
04803	19 -103	P2FFC
04804	17 -024	P2FFC
04806	16 -024	X1FFC
04807	10 -007	X1FFC
04808	08 -037	X1FFC
04809	08 -017	X1FFC
04810	20 -026	P2FFC
04811	04 -022	X1FFC
04812	20 -028	P2FFC
04813	13 -100	P2FFC
04815	13 -006	P2FFC
04817-0001	13 -027	X1FFC
04818	13 -044	P2FFC
04819	13 -048	P1FFC
04820	13 -052	X1FFC
04821	13 -065	X1FFC
04822	13 -076	P2FFC
04823	13 -083	NFFC
04825	18 -015	X1FFC
04827	12 -071	P2FFC
04828	12 -068	P2FFC
04829	12 -041	X1FFC
04830	15 -078	X1FFC
04837	03C-151	X1FFC
04838	03C-156	X1FFC
04839	03C-159	X1FFC
04840	03C-162	X1FFC
04841	03C-165	X1FFC
04842	03C-168	X1FFC
04844	03E-265	NFFC
04846	12 -063	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
04851	11 -011	P1FFC
04852	24 -003	X1FFC
04854	25 -007	X1FFC
05002-0065	27 -054	NFFC
05002-0066	27 -056	NFFC
05003-0001	13 -096	
05003-0002	04 -008	NFFC
05004-0003	08 -044	
05004-0027	05 -006	P2FFC
05006-0004	24 -040C	
05006-0009	03 -089	P1FFC
05006-0009	16A-109	
05006-0019	24 -088	
05007-0001	03 -088	P1FFC
05007-0002	03 -092	X1FFC
05007-0002	08 -067	X1FFC
05007-0002	15 -073	X1FFC
05007-0002	19 -015	X1FFC
05007-0004	03 -228	P1FFC
05007-0005	07 -001	
05007-0006	02 -006	P2FFC
05007-0006	03 -020	P2FFC
05007-0009	20 -010	P1FFC
05007-0013	03 -002	P1FFC
05007-0013	03E-287	P1FFC
05007-0016	03E-272	P1FFC
05007-0016	05 -037	P1FFC
05007-0016	05 -069	P1FFC
05007-0016	15 -068	P1FFC
05007-0016	20 -025	P1FFC
05007-0016	24 -009	P1FFC
05007-0016	24 -011	P1FFC
05007-0016	24 -057	P1FFC
05007-0016	25 -003	P1FFC
05007-0016	25 -005	P1FFC
05007-0016	26 -005	P1FFC
05007-0017	03 -003	P1FFC
05007-0017	03 -006	P1FFC
05007-0017	12 -020	P1FFC
05007-0018	09 -033	NFFC
05007-0019	08 -021	NFFC
05007-0024	03 -012	P1FFC
05007-0024	03 -017	P1FFC
05007-0024	03 -021	P1FFC
05007-0024	03 -024	P1FFC
05007-0024	03 -026	P1FFC
05007-0024	03 -031	P1FFC
05007-0024	03 -044	P1FFC
05007-0024	03 -209	P1FFC
05007-0024	03 -217	P1FFC
05007-0024	03 -234	P1FFC
05007-0024	03 -243	P1FFC
05007-0024	03 -249	P1FFC
05007-0024	03E-254	P1FFC
05007-0024	03E-257	P1FFC
05007-0024	03E-267	P1FFC
05007-0024	20 -005	P1FFC
05007-0024	24 -028	P1FFC
05007-0024	24 -040B	
05007-0024	24 -039	P1FFC
05007-0024	24 -042	P1FFC
05007-0024	24 -060	P1FFC
05007-0024	24 -065	P1FFC
05007-0024	24 -071	P1FFC
05007-0024	25 -011	P1FFC
05007-0024	25 -019	P1FFC
05007-0024	25 -038	P1FFC
05007-0024	25 -042	P1FFC
05007-0024	26 -003	P1FFC
05007-0024	26 -010	P1FFC
05007-0024	26 -018	P1FFC
05007-0024	26 -021	P1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
05007-0024	27 -003	P1FFC
05007-0029	16 -048	
05007-0030	12 -008	
05007-0032	03 -221	P1FFC
05007-0033	05 -056	P1FFC
05007-0033	05 -064	P1FFC
05007-0033	10 -001	P1FFC
05007-0033	12 -043	P1FFC
05007-0033	15 -002	P1FFC
05007-0033	16 -020	P1FFC
05007-0038	07 -006	P1FFC
05007-0038	07 -021	P1FFC
05007-0038	12 -036	P1FFC
05007-0038	15 -082	P1FFC
05007-0038	16 -006	P1FFC
05007-0040	24 -018	P1FFC
05007-0042	03C-172	P1FFC
05007-0042	16A-089	P1FFC
05007-0046	08 -026	
05007-0046	08 -031	
05007-0048	12 -009	
05007-0048	20 -024	
05007-0051	18 -002	P2FFC
05007-0051	18 -025	P2FFC
05007-0053	13 -018	
05007-0055	24 -035	P1FFC
05007-0055	25 -022	P1FFC
05007-0057	13 -069	
05007-0061	04 -006	X1FFC
05007-0062	20 -027	
05007-0068	24 -053	P1FFC
05007-0072	04 -016	P1FFC
05007-0079	03A-086	P1FFC
05007-0080	01 -008	P1FFC
05007-0081	04 -013	P2FFC
05007-0085	03 -139	P1FFC
05007-0087	02 -025	P1FFC
05007-0089	03 -203	NFFC
05007-0089	09 -004	NFFC
05007-0093	08 -003	P1FFC
05007-0116	24 -086	
05007-0119	07 -012	P1FFC
05007-0124	11 -042	P1FFC
05007-0133	27 -019	P2FFC
05007-0134	27 -008	P2FFC
05007-0134	27 -030	P2FFC
05007-0140	15 -002B	
05007-0151	27 -022	NFFC
05007-0158	03A-095	P1FFC
05008-0003	16 -041	P1FFC
05008-0004	15 -020	P1FFC
05008-0007	08 -018	NFFC
05008-0007	19 -035	NFFC
05008-0008	09 -009	P2FFC
05008-0008	11 -018	P2FFC
05008-0008	15 -099	P2FFC
05008-0008	15 -099	P2FFC
05008-0008	16 -013	P2FFC
05008-0008	17 -022	P2FFC
05008-0010	11 -049	P1FFC
05008-0010	15 -071	
05008-0013	19 -079	X1FFC
05008-0014	16A-106	
05008-0015	11 -014	P2FFC
05008-0015	13 -060	P2FFC
05008-0021	11 -004	P1FFC
05008-0021	11 -004	P1FFC
05008-0021	18 -014	
05008-0021	19 -076	P1FFC
05008-0028	16 -046	NFFC
05008-0028	20 -015	NFFC
05008-0028	20 -033	NFFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
05008-0029	08 -010	P2FFC
05008-0031	13 -047	P2FFC
05008-0046	13 -053	P1FFC
05008-0047	13 -033	P1FFC
05008-0052	08 -053	P1FFC
05008-0053	12 -066	P1FFC
05008-0053	12 -069	P1FFC
05008-0053	13 -036	P1FFC
05008-0054	12 -072	P1FFC
05008-0054	13 -045	
05008Q0029	15 -039	P2FFC
05009-0001	05 -019	P2FFC
05009-0001	13 -009	P2FFC
05009-0001	15 -085	P2FFC
05009-0001	19 -011	P2FFC
05009-0001	21 -015	P2FFC
05009-0004	27 -057	
05009-0005	10 -006	P2FFC
05009-0005	15 -022	P2FFC
05009-0006	03 -200	P2FFC
05009-0006	03E-275	P2FFC
05009-0006	04 -024	P2FFC
05009-0006	05 -053	P2FFC
05009-0012	16A-037	NFFC
05009-0012	18 -020	NFFC
05009-0020	16A-086	NFFC
05009-0031	21 -013	P1FFC
05009-0044	03A-094	X1FFC
05012-0001	03B-115	
05012-0001	19 -024	P1FFC
05012-0002	18 -039	
05012-0003	12 -013	
05012-0003	13 -089	
05012-0004	09 -035	
05012-0005	08 -050	
05012-0014	03C-169	
05012-0015	03B-117	
05012-0016	08 -061	
05012-0028	04 -011	P2FFC
05012-0029	03B-126	
05013-0001	21 -005	
05013-0001	22 -014	
05013-0002	22 -002	
05013-0003	18 -033	P1FFC
05016-0003	16 -009	
05019-0003	08 -036	P2FFC
05019-0005	08 -029	P2FFC
05019-0006	01 -021	
05020-0001	03E-280	NFFC
05028-0002	23 -002	
05030-0001	12 -024	
05030-0002	03C-146	P1FFC
05030-0002	13 -064	P1FFC
05030-0002	15 -016	P1FFC
05030-0002	16 -097	P1FFC
05030-0002	24 -055	
05030-0003	03 -210	P1FFC
05030-0003	11 -052	P1FFC
05030-0003	15 -023	P1FFC
05030-0003	24 -014	P1FFC
05030-0003	24 -025	P1FFC
05030-0004	24 -040D	
05030-0004	24 -087	
05030-0006	03 -034	P2FFC
05030-0006	03 -039	P2FFC
05030-0006	11 -031	P2FFC
05030-0006	17 -008	P2FFC
05030-0007	13 -054	X1FFC
05030-0007	19 -049	X1FFC
05030-0007	19 -056	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
05030-0007	19 -065	X1FFC
05030-0007	19 -089	X1FFC
05030-0007	19 -096	X1FFC
05030-0007	19 -102	X1FFC
05030-0007	21 -012	X1FFC
05030-0009	18 -009	X1FFC
05030-0010	16A-093	X1FFC
05030-0010	16A-096	X1FFC
05030-0010	16A-110	
05030-0010	18 -021	X1FFC
05030-0010	19 -082	X1FFC
05030-0013	15 -053	P2FFC
05030-0015	27 -032	P2FFC
05032-0003	04 -014	NFFC
05032-0003	16 -010	NFFC
05032-0004	03 -236	P1FFC
05032-0004	05 -038	P1FFC
05032-0005	03A-096	P2FFC
05032-0005	16 -017	P2FFC
05032-0005	18 -003	P2FFC
05032-0005	18 -026	P2FFC
05032-0005	19 -077	P2FFC
05032-0005	25 -012	P2FFC
05032-0005	25 -020	P2FFC
05032-0005	26 -011	P2FFC
05032-0006	16A-107	
05032-0006	19 -080	NFFC
05032-0007	03 -090	P1FFC
05032-0007	03 -194	P1FFC
05032-0007	07 -007	P1FFC
05032-0007	08 -023	P1FFC
05032-0009	01 -010	P1FFC
05032-0009	27 -012	P1FFC
05032-0010	15 -100	NFFC
05032-0010	15 -100	NFFC
05032-0012	10 -008	P1FFC
05032-0013	20 -006	NFFC
05032-0014	11 -043	X1FFC
05032-0015	15 -017	P1FFC
05032-0016	09 -034	P2FFC
05032-0016	12 -034	P2FFC
05032-0020	03 -230	P1FFC
05032-0029	12 -028	P1FFC
05032-0029	12 -044	P1FFC
05032-0039	27 -024	NFFC
05044-0003	12 -029	
05044-0003	12 -037	
05044-0003	12 -042	
05044-0003	13 -075	
05044-0003	13 -099	
05044-0003	15 -054	
05044-0003	16 -001	
05044-0003	16 -021	
05044-0003	16 -028	
05044-0003	16 -049	
05045-0003	24 -023	
05048-0001	01 -005	P1FFC
05056-0001	20 -020	
05068-0005	27 -029	NFFC
05070-0001	04 -003	P1FFC
05070-0001	12 -051	P1FFC
05070-0005	18 -032	X1FFC
05072-0002	15 -101	P2FFC
05072-0002	15 -101	P2FFC
05072-0003	03B-119	NFFC
05077-0002	05 -051	X1FFC
05079-0001	03B-122	P2FFC
05080-0001	03E-284	P1FFC
05080-0003	03E-262	P1FFC
05080-0003	03E-282	P1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
05080-0004	20 -021	P1FFC
05080-0005	05 -059	P1FFC
05080-0006	09 -031	P2FFC
05090-0003	27 -058	NFFC
05099-0001	27 -057	NFFC
05123-0001	27 -026	NFFC
05152-0001	03 -010	
05180-0001	12 -002	P1FFC
05502-4R7J	25 -028	
05511-0018	17 -005	P2FFC
05511-0024	17 -010	P2FFC
05511-0024	24 -068	P2FFC
05511-0026	24 -044	P1FFC
05511-0026	25 -036	P1FFC
05511-0037	17 -011	NFFC
05511-0037	24 -069	NFFC
05511-0133	24 -041	P1FFC
05511-0135	24 -027	P1FFC
05511-0136	25 -037	P1FFC
05514-0005	24 -063	
05514-0006	03 -215	NFFC
05516-0008	24 -046	NFFC
05516-0016	24 -040A	
05525-0004	24 -067	
05534-0008	27 -002	
05539-0001	17 -003	P1FFC
05546-0005	25 -025	P1FFC
05546-0005	26 -015	P1FFC
05554-0005	24 -062	P1FFC
05554-0007	25 -026	P1FFC
05561-0015	25 -027	P1FFC
05561-0016	25 -040	P1FFC
05572-0003	12 -059	NFFC
05577-0004	03 -212	P1FFC
05577-0004	24 -051	P1FFC
05577-0005	24 -049	
05577-0010	24 -050	
05581-0001	03 -213	P1FFC
05611-0002	23 -005	P1FFC
05611-0002	24 -030	P1FFC
05611-0006	23 -006	P1FFC
05611-0006	24 -031	P1FFC
05611-0007	23 -007	P1FFC
05611-0007	24 -032	P1FFC
05611-0010	23 -008	P1FFC
05611-0010	24 -033	P1FFC
05618-10R0	24 -052	
0618	03C-143	X1FFC
06182-0004	01 -023	AFFR
06182-0004	27 -000	AFFR
06260-0006	01 -002	AFFR
06260-0006	02 -000	AFFR
0651	03 -202	P2FFC
0721	03 -135	P2FFC
0733	03 -133	P2FFC
0776	03 -137	P2FFC
0821	03 -205	P2FFC
0834	03 -199	P2FFC
0844	03A-110	X1FFC
0846	03A-100	X1FFC
0959	03C-170	X1FFC
0964	03A-085	P2FFC
0964	03A-087	P2FFC
1-2-3-1041	01 -015	P2FOR
1-2-3-1041	04A-000	
1N1318	25 -027	P1FFC
1N645	25 -025	P1FFC
1N645	26 -015	P1FFC
10117	08 -065	P1FFC
10125	09 -037	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
11-1041	16 -000	
1104-00	24 -019	P1FFC
1137	16A-062	P2FFC
12-104	15 -000	P2FOR
1202-00	08 -054	
1202-00	13 -063	
1203-00	08 -068	P1FFC
1204-00	03 -211	P1FFC
1204-00	03 -218	P1FFC
1204-00	03 -241	P1FFC
1204-00	03 -244	P1FFC
1204-00	03 -250	P1FFC
1204-00	03E-255	P1FFC
1204-00	03E-268	P1FFC
1204-00	03E-273	P1FFC
1204-00	07 -022	P1FFC
1204-00	13 -087	P1FFC
1204-00	20 -030	P1FFC
1204-00	24 -015	P1FFC
1204-00	24 -024	P1FFC
1204-00	24 -058	P1FFC
1204-00	24 -061	P1FFC
1204-00	24 -066	P1FFC
1204-03	15 -069	
1241	09 -038	
1269	19 -026	X1FFC
1284	13 -021	AF0C
13-104	13 -000	P2FOR
1320	15 -058	
1322	04 -009	
1379	08 -055	P2FOR
1379	08 -065	
1389	21 -006	P2FFC
1400-00	24 -019	
15-104	09 -000	
1501	16A-104	
1504	16A-105	
1504-00	20 -029	P1FFC
1514	15 -021	X1FFC
165-11	24 -038	
1683	15 -107	X1FFC
1690	18 -016	P2FFC
17-1041	05 -000	
1753	08 -001	P2FFC
1807	18 -005	
1809	19 -075	X1FFC
1928	12 -064	P2FFC
1960	03 -189	P2FFC
2-4028	24 -045	
2N526	25 -030	P1FFC
201	19 -022	P1FFC
2020	15 -122	
2020	15 -123	X1FFC
2073	13 -038	P2FFC
2073-0002	13 -038	AFFR
208	03A-112	
2084		P2FFC
2095		X1FFC
21-1041	12 -001	
2159	20 -000	
2188	18 -028	P2FFC
22-104	15 -098	X1FFC
22200-0001	19 -000	
22201	01 -020	
22214-0001	01 -022	
2228	01 -019	
2318	09 -007	
24-104	24 -048	
2490	17 -000	
25-104	20 -035	NFFC
	04 -012	

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
2509	16A-044	
2510	20 -018	P2FFC
2524	22 -015	P2FFC
2533	04 -001A	
26-104	11 -000	P2FOR
26786	04 -001	P1FFC
26801	18 -030	X1FFC
26804	03B-118	X1FFC
26805	18 -043	P2FFC
26808	17 -026	P2FFC
26809	17 -025	P2FFC
26810	18 -031	X1FFC
26810	21 -001	
26811	18 -042	X1FFC
26816	03B-128	X1FFC
26819	19 -031	X1FFC
26839	03B-121	X1FFC
28625	07 -024	
28626	07 -030	
29116	03B-123	X1FFC
29117	03B-114	P2FOR
29118	16A-104	P2FFC
29120	19 -019	P2FFC
29121	18 -035	P2FFC
29122	18 -029	P2FFC
29124	05 -070	X1FFC
29124-0002	05 -070	NFFC
29127	01 -007	P2FFC
29127	04 -002	
29132	16A-103	
29132-0002	16A-103	NFFC
29133	12 -007	
29134-0002	05 -000	AFFR
29136	12 -058	X1FFC
29138	12 -047	NFFC
29139-0003	20 -035	NFFC
29141	12 -050	P2FFC
29144	12 -049	P2FFC
29145	21 -006	AFFR
29241	03A-103	X1FFC
29242	03A-107	X1FFC
30017	12 -019	P1FFC
30018	12 -022	P1FFC
30080	17 -019	P1FFC
30081	17 -018	P1FFC
30182	18 -018	P1FFC
30183	18 -019	P1FFC
30261	18 -005	P1FFC
30262	18 -028	P1FFC
30272	23 -010	NFFC
30273	23 -001	NFFC
30274	23 -009	NFFC
30275	26 -007	
30277	17 -006	NFFC
30279	05 -068	NFFC
30286	03 -133	P1FFC
30294	16A-100	P1FFC
30305	16A-101	P1FFC
30331	14 -000	AFFR
30359	04 -009	X1FFC
30361	16A-099	P1FFC
30392-0002	18 -016	P1FFC
30393	18 -022	NFFC
30394	19 -074	AFFR
30401	15 -058	P1FFC
30442	26 -020	P1FFC
30443	26 -008	AFFR
30448-0005	19 -000	AFFR
30449-0005	14 -000	AFFR
30450-0008	01 -015	AFFR

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
30450-0008	04A-000	AFFR
30451-0005	20 -000	AFFR
30452-0003	16 -000	AFFR
30456	18 -001	AFFR
30457	03E-279	
30458	18 -024	AFFR
30470-0002	01 -016	NFFC
30470-0002	23 -000	NFFC
30472	12 -052	AFFR
30473-0002	25 -035	AFFR
30475	REF ONL	AFFR
30489	01 -018	NFFC
30493	27 -047	NFFC
30498	27 -005	NFFC
30502	03 -189	P1FFC
30504	03C-145	P1FFC
30506	03 -137	P1FFC
30507	03 -178	P1FFC
30508	03 -207	P1FFC
30509	03 -184	P1FFC
30513	03 -187	P1FFC
30514	03 -205	P1FFC
30515	03 -199	P1FFC
30516	03 -206	P1FFC
30517	03C-143	AFFR
30519	03 -202	X1FFC
30520	03 -201	P1FFC
30523	03 -186	
30524	24 -048	NFFC
30565	07 -010	P1FFC
30577	15 -019	P1FFC
30590	03 -232	P1FFC
30592	03 -229	P1FFC
30593	03 -238	NFFC
30594	03 -237	P1FFC
30595	03 -231	P1FFC
30597	12 -000	AFFR
30600-0002	01 -000	AFFR
30601	15 -000	AFFR
30602	13 -000	AFFR
30605	01 -017	AFFR
30605	24 -000	AFFR
30610	01 -003	AFFR
30610	03 -000	AFFR
30611	03B-118	P2FFC
30612	03 -135	AFFR
30613	03 -233	P2FFC
30615	03 -227	AFFR
30617	03B-114	P2FFC
30623	03E-251	NFFR
30624	03E-279	NFFC
30628	24 -085	NFFC
30633	25 -009	NFFC
30660	15 -098	P1FFC
30661	15 -102	P1FFC
30670	27 -055	NFFC
30671	03 -023	P1FFC
30673	15 -015	P1FFC
30675	15 -003	P1FFC
30677	15 -006	P1FFC
30725	03A-112	NFFC
30726	03A-084	AFFR
30745	25 -034	NFFC
30872	24 -037	NFFC
30896	24 -034	NFFC
30897	03C-147	P1FFC
31-1041	21 -000	
3145	08 -030	
32-1041	22 -000	
3218	15 -102	X1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
3257	16A-056	X1FFC
33015-0002	09 -000	AFFR
33024-0002	17 -000	AFFR
33025-0001	01 -014	NFFC
33025-0001	04 -012	NFFC
33026	11 -000	AFFR
33032	22 -000	AFFR
33058	24 -038A	
33131-0002	21 -000	AFFR
33222	13 -091	P1FFC
33225	15 -123	P1FFC
33275	25 -017	NFFC
33275	26 -016	NFFC
33283-0001	26 -009	AFFR
33283-0002	25 -010	NFFC
33285	26 -001	NFFC
33287	24 -010	P2FFR
33287	26 -000	P2FFR
33295	25 -001	NFFC
33296	24 -008	P2FFR
33296	25 -000	P2FFC
33345	24 -047	NFFC
33346		NFFC
33352	25 -018	AFFR
33353	24 -080	NFFC
33354	24 -079	AFFC
33361	15 -001	AFFR
33366	15 -012	P1FFC
33372	15 -014	P1FFC
33377	15 -009	P1FFC
33379	15 -122	P1FFC
33381	15 -107	P1FFC
33383	15 -021	P1FFC
33384	15 -081	AFFR
33589	24 -089	
33611	12 -001	P1FFC
33612	12 -003	P1FFC
33621	15 -080	P1FFC
3376	02 -004	X1FFC
33810	16A-108	
33813	16A-107A	
3383	02 -003	X1FFC
3384	02 -007	X1FFC
3386	02 -001	P2FFC
33863	15 -002A	
33864	12 -001A	
33944	07 -025	
33945	07 -027	
33946	07 -028	
33947	07 -026	
33948	07 -029	
3477	24 -013	P2FFC
3507	25 -010	
3507	26 -016	P2FFC
3508	25 -017	P1FFC
3517	25 -018	P2FFC
3524	25 -001	
3577	12 -060	P2FFC
3592	23 -009	NFFC
3625	02 -028	NFFC
3648	02 -031	A00R
3649	02 -038	A00R
3787	11 -011	P2FFC
3878	17 -007	P2FFC
3881	24 -080	
413-1041	01 -003	P2FOR
413-1041	03 -000	
4157	03E-251	A00R
4177	03 -011	X1FFC
42W	24 -036	P1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
4217	27 -047	MOOC
4249	21 -013	X1FFC
4260	16A-111	
4262	24 -091	P2FFC
4263	24 -047	X1FFC
4279	27 -005	P2FFC
4551	18 -018	
4552	18 -019	
4581	19 -074	P2FFC
4585	27 -053	NFFC
4589	27 -059	
4724	27 -055	NFFC
4814	13 -091	
4817	13 -027	P2FFC
4826	18 -022	
50 FA 440	03 -193	P1FFC
50 FA 440	08 -024	P1FFC
50 FA 440	16A-087	P1FFC
50 FA 440	19 -081	P1FFC
50 FA 440	24 -072	P1FFC
50 FA 440	25 -039	P1FFC
50 FA 440	25 -043	P1FFC
50 FA 440	26 -019	P1FFC
50 FA 440	26 -022	P1FFC
50 FK 632	16 -054	
50FA440	24 -029	P1FFC
50FA440	24 -043	P1FFC
5000-37	12 -015	P1FFC
5000-37	13 -090	P1FFC
5007-51	16 -016	
5007-82	03A-095	X1FFC
5008-28	13 -033	
5008-38	12 -066	X1FFC
5008-38	12 -069	NFFC
5008-38	13 -036	
5008-41	12 -072	NFFC
5008-5	08 -053	
5017-11	20 -021	
5032-13	07 -022	
5032-5	12 -028	
5032-5	12 -044	P1FFC
5060-3	01 -018	AFOR
5068-4	27 -029	
5100-12	05 -007	P1FFC
5100-12	11 -030	P1FFC
5100-12	15 -106	P1FFC
5100-12	15 -109	P1FFC
5100-12	15 -114	P1FFC
5100-12	15 -117	P1FFC
5100-12	15 -120	P1FFC
5100-12	15 -117	P1FFC
5100-15	15 -031	
5100-18	12 -012	P1FFC
5100-18	13 -092	P1FFC
5100-25	18 -038	
5100-31	05 -052	
5100-34	19 -043	X1FFC
5100-34	19 -050	
5100-34	19 -057	X1FFC
5100-34	19 -066	X1FFC
5100-34	19 -090	X1FFC
5100-34	19 -097	X1FFC
5101-50	16A-063	X1FFC
5103-12	16 -074	P1FFC
5103-18	21 -009	X1FFC
5103-25	04 -020	X1FFC
5103-25	15 -128	X1FFC
5103-31	15 -130	P1FFC
5103-31	19 -025	
5103-37	21 -002	P1FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
5103-50	21 -025	
5131-25	19 -020	P1FFC
5133-12	05 -010	NFFC
5133-12	05 -044	NFFC
5133-12	05 -067	NFFC
5133-12	08 -008	NFFC
5133-12	09 -002	NFFC
5133-12	09 -016	NFFC
5133-12	09 -019	NFFC
5133-12	11 -008	NFFC
5133-12	12 -027	NFFC
5133-12	15 -005	NFFC
5133-12	15 -010	NFFC
5133-12	15 -028	NFFC
5133-12	15 -050	NFFC
5133-12	15 -052	NFFC
5133-12	24 -074	NFFC
5133-14	16A-034	
5133-15	03E-277	X1FFC
5133-15	15 -056	X1FFC
5133-15	15 -126	X1FFC
5133-15	27 -011	X1FFC
5133-18	03C-148	P1FFC
5133-18	03C-176	P1FFC
5133-18	03 -225	P1FFC
5133-18	05 -057	P1FFC
5133-18	12 -033	P1FFC
5133-18	12 -045	P1FFC
5133-18	13 -005	P1FFC
5133-18	13 -023	P1FFC
5133-18	13 -049	P1FFC
5133-18	15 -090	P1FFC
5133-18	18 -017	P1FFC
5133-18	19 -006	P1FFC
5133-21	13 -022	P1FFC
5133-25	19 -072	P2FFC
5133-25	19 -085	P2FFC
5133-31	12 -061	
5133-31	12 -061	
5133-6	05 -035	P1FFC
5133-6		P1FFC
5133-6	11 -035	X1FFC
5133-6	11 -038	X1FFC
5133-6	15 -043	P1FFC
5133-6	15 -043A	X1FFC
5133-6	15 -060	P1FFC
5133-6	15 -060	P1FFC
5133-6	16A-040	P1FFC
5133-6	16 -050	P1FFC
5133-6	16A-066	P1FFC
5133-6	16A-082	P1FFC
5133-6	19 -038	P1FFC
5133-9	03 -185	P2FFC
5133-9	05 -005	P2FFC

PART NUMBER	FIG & INDEX NUMBER	SOURCE CODE
5133-9	07 -014	P2FFC
5133-9	07 -019	P2FFC
5133-9	09 -026	P2FFC
5133-9	09 -028	P2FFC
5133-9	10 -005	P2FFC
5133-9	12 -054	P2FFC
5133-9	13 -002	P2FFC
5133-9	16 -043	P2FFC
5133-9	16 -074	
5133-9	16A-102	P2FFC
5133-9	20 -013	P2FFC
5139-15	16 -027	
5139-15	16A-057	
5139-18	10 -009	NFFC
5144-12	08 -038	NFFC
5144-9C	02 -016	P1FFC
5144-9C	09 -010	P1FFC
5144-9C	15 -007	P1FFC
5144-9C	15 -011	P1FFC
5144-9C	15 -013	P1FFC
516-104	01 -017	P2FOR
516-104	24 -000	
5322	26 -001	
533-104	24 -010	P2FOR
533-104	26 -000	P2FOR
543-104	24 -008	P2FOR
543-104	25 -000	P2FOR
5511-23	24 -041	X1FFC
5519-1	24 -036	P2FFC
5555-12	03 -188	P1FFC
5555-12	03 -197	P1FFC
5555-12	05 -041	P1FFC
5555-12	07 -003	P1FFC
5555-12	08 -040	P1FFC
5555-12	11 -006	P2FFC
5555-12	12 -030	P1FFC
5555-15	12 -038	P1FFC
5555-15	13 -073	P1FFC
5555-15	13 -079	P1FFC
5555-15	13 -097	P1FFC
5555-15	16 -002	P1FFC
5555-15	16 -022	P1FFC
5555-18	03C-141	P1FFC
5555-18	09 -021	P1FFC
5555-18	09 -036	P1FFC
5555-18	13 -058	P1FFC
5555D-18	03 -224	P1FFC
6182-1041	01 -023	A0OR
6182-1041	27 -000	
626-1041	01 -002	A0OR
626-1041	02 -000	
70-120	11 -041	
744-104	01 -016	AFFC
744-104	04 -001	
853	24 -064	

SECTION III

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A-A009	01 -000	A0009	1AMP03387	02 -020	03387
1A-1	01 -017	516-104	1AMP03395	02 -033	03395
1A-3376	02 -004	3376	1AMP03399	02 -034	03399
1A-3383	02 -003	3383	1AMP03400	02 -036	03400
1A-3384	02 -007	3384	1AMP03401	02 -035	03401
1A-3386	02 -001	3386	1AMP03407	01 -001	03407
1A-3592	23 -009	3592	1AMP03417	04 -018	03417
1A-3625	02 -028	3625	1AMP03417	01 -013	03417-0002
1A-3648	02 -031	3648	1AMP03444	02 -010	03444
1A-3649	02 -038	3649	1AMP03447	02 -037	03447
1A-4217	27 -047	4217	1AMP03576	23 -003	03576
1A-4279	27 -005	4279	1AMP03604	27 -013	03604
1A-4580	27 -059	4589	1AMP03625-0001	02 -028	03625-0001
1A-4585	27 -053	4585	1AMP03628	02 -029	03628
1A-4724	27 -055	4724	1AMP03629	02 -030	03629
1A-5060-3	01 -018	5060-3	1AMP03642	27 -010	03642
1A-6182-1041	01 -023	6182-1041	1AMP03648-0003	02 -031	03648-0003
1A-6182-1041	27 -000	6182-1041	1AMP03649-0003	02 -038	03649-0003
1A-626-1041	01 -002	626-1041	1AMP03665	27 -001	03665
1A-744-104	01 -016	744-104	1AMP03716	27 -015	03716
1A-744-104	04 -001	744-104	1AMP03721	27 -034	03721
1A-9	01 -003	413-1041	1AMP03724	27 -038	03724
1AMP00226	27 -021	00226	1AMP03755	01 -012	03755
1AMP00821	03 -206A	00821	1AMP03810-0008	27 -053	03810-0008
1AMP01175	04 -010	01175	1AMP03866	22 -009	03866
1AMP01507	21 -018A	01507	1AMP04149	02 -027	04149
1AMP01965	01 -006	01965	1AMP04172	27 -014	04172
1AMP01965	04 -019	01965	1AMP04195	27 -016	04195
1AMP01969	04 -021	01969	1AMP04199	27 -018	04199
1AMP02225	23 -004	02225	1AMP04210	27 -007	04210
1AMP02538-0003	01 -007	02538-0003	1AMP04212	27 -042	04212
1AMP02538-0003	04 -002	02538-0003	1AMP04213	27 -041	04213
1AMP02626	04 -005	02626	1AMP04214	27 -040	04214
1AMP03049	01 -004	03049	1AMP04215	27 -039	04215
1AMP03056	04 -017	03056	1AMP04216	27 -046	04216
1AMP03345	02 -009	03345	1AMP04218	27 -045	04218
1AMP03346	02 -015	03346	1AMP04219	27 -048	04219
1AMP03356-0001	02 -008	03356-0001	1AMP04220	27 -052	04220
1AMP03357	02 -032	03357	1AMP04221	27 -050	04221
1AMP03359	02 -017	03359	1AMP04223	27 -044	04223
1AMP03361	02 -011	03361	1AMP04224	27 -006	04224
1AMP03362	02 -014	03362	1AMP04288	27 -037	04288
1AMP03363	02 -013	03363	1AMP04289	27 -036	04289
1AMP03364	02 -012	03364	1AMP04290	27 -051	04290
1AMP03369	02 -018	03369	1AMP04291	27 -049	04291
1AMP03370	02 -024	03370	1AMP04505	27 -017	04505
1AMP03371	02 -023	03371	1AMP04523	27 -035	04523
1AMP03372	02 -022	03372	1AMP04527	27 -033	04527
1AMP03373	02 -021	03373	1AMP04557	27 -028	04557
1AMP03376-0003	02 -004	03376-0003	1AMP04558	27 -023	04558
1AMP03382	02 -005	03382	1AMP04563	02 -019	04563
1AMP03383-0003	02 -003	03383-0003	1AMP04586	27 -043	04586
1AMP03384-0003	02 -007	03384-0003	1AMP04589-0002	27 -059	04589-0002
1AMP03386-0003	02 -001	03386-0003	1AMP04594	27 -027	04594

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
LAMP04723	04 -004	04723	LAMP22200-0001	01 -020	22200-0001
LAMP04811	04 -022	04811	LAMP22201	01 -022	22201
LAMP05002-0065	27 -054	05002-0065	LAMP22214-0001	01 -019	22214-0001
LAMP05002-0066	27 -056	05002-0066	LAMP26786	04 -001	26786
LAMP05003-0002	04 -008	05003-0002	LAMP28625	07 -024	28625
LAMP05004-0015	04 -020	5103-25	LAMP28626	07 -030	28626
LAMP05004-0018	27 -011	5133-15	LAMP30272	23 -010	30272
LAMP05004-0045	02 -016	5144-9C	LAMP30273	23 -001	30273
LAMP05006-0004	04 -007	AN935-4L	LAMP30274	23 -009	30274
LAMP05006-0004	27 -004	AN935-4L	LAMP30359	04 -009	30359
LAMP05006-0004	24 -040C	05006-0004	LAMP30470-0002	01 -016	30470-0002
LAMP05006-0005	04 -015	AN935-5L	LAMP30470-0002	23 -000	30470-0002
LAMP05006-0005	27 -020	AN935-5L	LAMP30489	01 -018	30489
LAMP05006-0006	01 -009	AN935-6L	LAMP30493	27 -047	30493
LAMP05006-0006	01 -009	AN935-6L	LAMP30498	27 -005	30498
LAMP05006-0009	16A-109	05006-0009	LAMP30600-0002	01 -000	30600-0002
LAMP05006-0017	27 -009	AN935-8L	LAMP30670	27 -055	30670
LAMP05006-0017	27 -031	AN935-8L	LAMP33025-0001	01 -014	33025-0001
LAMP05006-0019	24 -088	05006-0019	LAMP33025-0001	04 -012	33025-0001
LAMP05006-0034	27 -025	AN935-86	LAMP33589	24 -089	33589
LAMP05007-0006	02 -006	05007-0006	LAMP33810	16A-108	33810
LAMP05007-0024	24 -040B	05007-0024	LAMP33813	16A-107A	33813
LAMP05007-0024	27 -003	05007-0024	LAMP33863	15 -002A	33863
LAMP05007-0061	04 -006	05007-0061	LAMP33864	12 -001A	33864
LAMP05007-0072	04 -016	05007-0072	LAMP33944	07 -025	33944
LAMP05007-0080	01 -008	05007-0080	LAMP33945	07 -027	33945
LAMP05007-0081	04 -013	05007-0081	LAMP33946	07 -028	33946
LAMP05007-0087	02 -025	05007-0087	LAMP33947	07 -026	33947
LAMP05007-0133	27 -019	05007-0133	LAMP33948	07 -029	33948
LAMP05007-0134	27 -008	05007-0134	LAM9	01 -003	30610
LAMP05007-0134	27 -030	05007-0134	LA1	01 -017	30605
LAMP05007-0140	15 -002B	05007-0140	LA1	24 -000	30605
LAMP05007-0151	27 -022	05007-0151	LA1-1400-00	24 -019	1400-00
LAMP05012-0028	04 -011	05012-0028	LA1-2318	24 -048	2318
LAMP05019-0006	01 -021	05019-0006	LA1-3477	24 -013	3477
LAMP05028-0002	23 -002	05028-0002	LA1-3881	24 -080	3881
LAMP05030-0003	24 -040D	05030-0004	LA1-4262	24 -091	4262
LAMP05030-0010	16A-110	05030-0010	LA1-4263	24 -047	4263
LAMP05030-0015	27 -032	05030-0015	LA1-5006-4	24 -058	AN935-4L
LAMP05032-0003	04 -014	05032-0003	LA1-5068-4	27 -029	5068-4
LAMP05032-0009	01 -010	05032-0009	LA1-516-104	24 -000	516-104
LAMP05032-0009	27 -012	05032-0009	LA1AJ1-3-4-6-7	24 -068	05511-0024
LAMP05032-0039	27 -024	05032-0039	LA1AJ2-5	24 -069	05511-0037
LAMP05044-0003	12 -029	05044-0003	LA1C1	24 -070	02222
LAMP05044-0003	12 -037	05044-0003	LA1E8	24 -056	04244
LAMP05044-0003	12 -042	05044-0003	LA1F-1	23 -008	
LAMP05044-0003	13 -075	05044-0003	LA1F-2	23 -007	L562/1
LAMP05044-0003	13 -099	05044-0003	LA1F-3	23 -006	
LAMP05044-0003	15 -054	05044-0003	LA1F-4	23 -005	
LAMP05044-0003	16 -001	05044-0003	LA1F1	23 -008	05611-0010
LAMP05044-0003	16 -021	05044-0003	LA1F1	24 -033	05611-0010
LAMP05044-0003	16 -028	05044-0003	LA1F2	23 -007	05611-0007
LAMP05044-0003	16 -049	05044-0003	LA1F2	24 -032	05611-0007
LAMP05048-0001	01 -005	05048-0001	LA1F3	23 -006	05611-0006
LAMP05068-0002	02 -002	AG-1704	LA1F3	24 -031	05611-0006
LAMP05068-0005	27 -029	05068-0005	LA1F5	23 -005	05611-0002
LAMP05070-0001	04 -003	05070-0001	LA1J10	24 -041	05511-0133
LAMP05082-0001	02 -026	FS28-8	LA1J11	24 -044	05511-0026
LAMP05090-0003	27 -058	05090-0003	LA1J8	24 -038	165-11
LAMP05099-0001	27 -057	05009-0004	LA1J9	24 -027	05511-0135
LAMP05099-0001	27 -057	05099-0001	LA1K1	24 -022	04593
LAMP05123-0001	27 -026	05123-0001	LA1MP02516	24 -006	02516
LAMP05516-0016	24 -040A	05516-0016	LA1MP03286	24 -076	03286
LAMP05534-0008	27 -002	05534-0008	LA1MP03303	24 -012	03303
LAMP05587-0004	24 -038A	33058	LA1MP03308	24 -020	03308
LAMP06182-0004	01 -023	06182-0004	LA1MP03309	24 -021	03309
LAMP06182-0004	27 -000	06182-0004	LA1MP03311	24 -013	03311
LAMP06260-0006	01 -002	06260-0006	LA1MP03388	24 -077	03388
LAMP06260-0006	02 -000	06260-0006	LA1MP03389	24 -075	03389

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A1MP03392	24 -073	03392	1A2	01 -015	30450-0008
1A1MP03445	24 -040	03445	1A2	04A-000	30450-0008
1A1MP03486	24 -084	03486	1A2A-1	01 -015	1-2-3-1041
1A1MP03526	24 -016	03526	1A2A-1	04A-000	1-2-3-1041
1A1MP03527	24 -017	03527	1A2A1	17 -000	33024-0002
1A1MP03528	24 -004	03528	1A2A1-X30080	17 -019	X30080
1A1MP03529	24 -005	03529	1A2A1-X30081	17 -018	X30081
1A1MP03605	24 -001	03605	1A2A1-11-1041	16 -000	11-1041
1A1MP03614	24 -002	03614	1A2A1-11-1041	15 -000	12-104
1A1MP03639	24 -081	03639	1A2A1-1137	16A-062	1137
1A1MP04144	24 -083	04144	1A2A1-1241	09 -038	1241
1A1MP04202	24 -078	04202	1A2A1-1269	19 -026	1269
1A1MP04205	24 -026	04205	1A2A1-1284	13 -021	1284
1A1MP04245	24 -090	04245	1A2A1-1320	15 -058	1320
1A1MP04518	24 -082	04518	1A2A1-1322	04 -009	1322
1A1MP04852	24 -003	04852	1A2A1-1379	08 -055	1379
1A1MP05004-0019	24 -074	5133-12	1A2A1-1379	08 -065	1379
1A1MP05006-0002	24 -054	AN935-2L	1A2A1-1389	21 -006	1389
1A1MP05006-0009	24 -015	1204-00	1A2A1-1514	15 -021	1514
1A1MP05006-0009	24 -024	1204-00	1A2A1-1683	15 -107	1683
1A1MP05006-0009	24 -058	1204-00	1A2A1-1690	18 -016	1690
1A1MP05006-0009	24 -061	1204-00	1A2A1-1753	08 -001	1753
1A1MP05006-0009	24 -066	1204-00	1A2A1-1807	18 -005	1807
1A1MP05006-0018	24 -019	1104-00	1A2A1-1809	19 -075	1809
1A1MP05007-0016	24 -009	05007-0016	1A2A1-1928	12 -064	1928
1A1MP05007-0016	24 -011	05007-0016	1A2A1-2-3878	17 -007	3878
1A1MP05007-0016	24 -057	05007-0016	1A2A1-2020	15 -122	2020
1A1MP05007-0024	24 -028	05007-0024	1A2A1-2020	15 -123	2020
1A1MP05007-0024	24 -039	05007-0024	1A2A1-2073	13 -038	2073
1A1MP05007-0024	24 -042	05007-0024	1A2A1-2084		2084
1A1MP05007-0024	24 -060	05007-0024	1A2A1-2095	12 -001	2095
1A1MP05007-0024	24 -065	05007-0024	1A2A1-2159	18 -028	2159
1A1MP05007-0024	24 -071	05007-0024	1A2A1-2188	15 -098	2188
1A1MP05007-0040	24 -018	05007-0040	1A2A1-22-104	19 -000	22-104
1A1MP05007-0055	24 -035	05007-0055	1A2A1-2228	09 -007	2228
1A1MP05007-0068	24 -053	05007-0068	1A2A1-2449	21 -013	4249
1A1MP05016-0002	24 -072	50 FA 440	1A2A1-2490	20 -035	2490
1A1MP05016-0002	24 -029	50FA440	1A2A1-2509	16A-044	2509
1A1MP05016-0002	24 -043	50FA440	1A2A1-2510	20 -018	2510
1A1MP05030-0002	24 -055	05030-0002	1A2A1-2524	22 -015	2524
1A1MP05030-0003	24 -014	05030-0003	1A2A1-26-104	11 -000	26-104
1A1MP05030-0003	24 -025	05030-0003	1A2A1-26801	18 -030	26801
1A1MP05045-0003	24 -023	05045-0003	1A2A1-26805	18 -043	26805
1A1MP05514-0005	24 -063	05514-0005	1A2A1-26808	17 -026	26808
1A1MP05516-0008	24 -046	05516-0008	1A2A1-26809	17 -025	26809
1A1MP05519-0007	24 -036	42W	1A2A1-26810	18 -031	26810
1A1MP05530-0001	24 -007	NO 47	1A2A1-26811	18 -042	26811
1A1MP05534-0005	24 -045	2-4028	1A2A1-26819	19 -031	26819
1A1MP05596-0001	24 -064	853	1A2A1-29112	18 -029	29122
1A1MP05611-0002	24 -030	05611-0002	1A2A1-29120	19 -019	29120
1A1MP30524	24 -048	30524	1A2A1-29121	18 -035	29121
1A1MP30628	24 -085	30628	1A2A1-29124	05 -070	29124
1A1MP30872	24 -037	30872	1A2A1-29127	01 -007	29127
1A1MP30896	24 -034	30896	1A2A1-29127	04 -002	29127
1A1MP33345	24 -047	33345	1A2A1-29132	16A-103	29132
1A1MP33346		33346	1A2A1-29818	16A-104	29118
1A1MP33353	24 -080	33353	1A2A1-31-1041	21 -000	31-1041
1A1MP33354	24 -079	33354	1A2A1-3145	08 -030	3145
1AIR2	24 -067	05525-0004	1A2A1-32-1041	22 -000	32-1041
1AIR3	24 -062	05554-0005	1A2A1-3218	15 -102	3218
1AIR4	24 -052	05618-10R0	1A2A1-3257	16A-056	3257
1AIS1	24 -051	05577-0004	1A2A1-3577	12 -060	3577
1AIS2	24 -050	05577-0010	1A2A1-3787	11 -011	3787
1AIS3	24 -059	03408	1A2A1-4551	18 -018	4551
1AIS5	24 -049	05577-0005	1A2A1-4552	18 -019	4552
1A1X-F	24 -036	5519-1	1A2A1-4581	19 -074	4581
1A14-10	24 -041	5511-23	1A2A1-4814	13 -091	4814
1A14-9	24 -027	DA15S	1A2A1-4817	13 -027	4817
1A15-1	24 -022	KHYX245	1A2A1-4826	18 -022	4826

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2A1-5004-16		5133-6	1A2MP01205-0001	05 -030	01205-0001
1A2A1-5006-9	24 -066	AN936A4C	1A2MP01205-0001	21 -028	01205-0001
1A2A1-5007-51	16 -016	5007-51	1A2MP01205-0001	22 -011	01205-0001
1A2A1-5008-28	13 -033	5008-28	1A2MP01205-0002	22 -012	01205-0002
1A2A1-5008-38	12 -069	5008-38	1A2MP01210	21 -019	01210
1A2A1-5008-38	13 -036	5008-38	1A2MP01211	21 -020	01211
1A2A1-5008-41	12 -072	5008-41	1A2MP01212	21 -021	01212
1A2A1-5008-5	08 -053	5008-5	1A2MP01213	21 -022	01213
1A2A1-5012-4	09 -035	SFR3PP	1A2MP01214	21 -023	01214
1A2A1-5013-1	21 -005	MS115-00619	1A2MP01215	21 -024	01215
1A2A1-5032-5	12 -028	5032-5	1A2MP01216	22 -004	01216
1A2A1-5032-5	12 -044	5032-5	1A2MP01217	22 -005	01217
1A2A1-5133-9	16 -074	5133-9	1A2MP01218	22 -006	01218
1A2A2	01 -011	02485	1A2MP01219	22 -007	01219
1A2A2	04 -023	02485	1A2MP01221	21 -030	01221
1A2A2MP02993	04 -025	02993	1A2MP01222	22 -017	01222
1A2A2MP05009-0006	04 -024	05009-0006	1A2MP01223	16 -007	01223
1A2A203416	04 -026	03416	1A2MP01235	21 -029	01235
1A2MP	09 -037	10125	1A2MP01235	22 -003	01235
1A2MP00215	12 -010	00215	1A2MP01237	22 -013	01237
1A2MP00219	08 -034	00219	1A2MP01241-0002	09 -038	01241-0002
1A2MP00220	09 -007	00220	1A2MP01245	08 -033	01245
1A2MP00221	05 -017	00221	1A2MP01246	16 -008	01246
1A2MP00221	15 -083	00221	1A2MP01247	09 -022	01247
1A2MP00222	11 -003	00222	1A2MP01253	08 -028	01253
1A2MP00224	08 -043	00224	1A2MP01254	19 -026	01254
1A2MP00824	09 -005	00824	1A2MP01255	09 -032	01255
1A2MP00824	18 -004	00824	1A2MP01258	08 -035	01258
1A2MP00824	18 -027	00824	1A2MP01261	08 -045	01261
1A2MP01103	19 -012	01103	1A2MP01262	08 -041	01262
1A2MP01104	19 -009	01104	1A2MP01265	19 -019	01265
1A2MP01106	19 -044	01106	1A2MP01266	19 -031	01266
1A2MP01106	19 -051	01106	1A2MP01268	19 -029	01268
1A2MP01106	19 -058	01106	1A2MP01269	19 -021	01269
1A2MP01106	19 -067	01106	1A2MP01270	22 -015	01270
1A2MP01108	19 -091	01108	1A2MP01278-0001	18 -036	01278-0001
1A2MP01108	19 -098	01108	1A2MP01280-0001	18 -029	01280-0001
1A2MP01114	19 -008	01114	1A2MP01281	18 -040	01281
1A2MP01116	19 -042	01116	1A2MP01284-0001	13 -021	01284-0001
1A2MP01116	19 -047	01116	1A2MP01288	08 -007	01288
1A2MP01116	19 -054	01116	1A2MP01311	15 -086	01311
1A2MP01116	19 -063	01116	1A2MP01313	09 -025	01313
1A2MP01116	19 -087	01116	1A2MP01314	12 -011	01314
1A2MP01116	19 -094	01116	1A2MP01319	08 -056	01319
1A2MP01117	19 -100	01117	1A2MP01323	21 -001	01323
1A2MP01120	19 -013	01120	1A2MP01324	16A-104	01324
1A2MP01122	21 -008	01122	1A2MP01332	12 -016	01332
1A2MP01123	19 -041	01123	1A2MP01338	13 -084	01338
1A2MP01124	15 -079	01124	1A2MP01343	08 -009	01343
1A2MP01125	15 -076	01125	1A2MP01344	08 -062	01344
1A2MP01126	16 -031	01126	1A2MP01345	08 -052	01345
1A2MP01126	16A-061	01126	1A2MP01346	08 -047	01346
1A2MP01127	16A-055	01127	1A2MP01347	22 -001	01347
1A2MP01130	16A-058	01130	1A2MP01349	19 -030	01349
1A2MP01130	16A-075	01130	1A2MP01362	16 -047	01362
1A2MP01131	16 -025	01131	1A2MP01362	20 -034	01362
1A2MP01133	16A-056	01133	1A2MP01363	16 -045	01363
1A2MP01137-0001	16A-062	01137-0001	1A2MP01363	20 -014	01363
1A2MP01153	19 -034	01153	1A2MP01363	20 -032	01363
1A2MP01154	13 -042	01154	1A2MP01368	13 -001	01368
1A2MP01160	13 -013	01160	1A2MP01376	16 -004	01376
1A2MP01163	13 -068	01163	1A2MP01379-0001	08 -055	01379-0001
1A2MP01166	18 -035	01166	1A2MP01380	09 -013	01380
1A2MP01174	18 -042	01174	1A2MP01384	16A-078	01384
1A2MP01178	18 -031	01178	1A2MP01385	16A-076	01385
1A2MP01179	18 -044	01179	1A2MP01391	16A-064	01391
1A2MP01183	18 -043	01183	1A2MP01393	13 -014	01393
1A2MP01189	19 -036	01189	1A2MP01397	13 -094	01397
1A2MP01199	18 -030	01199	1A2MP01399	13 -051	01399

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2MP01402	08 -048	01402	1A2MP01741	15 -030	01741
1A2MP01407	12 -032	01407	1A2MP01744	15 -025	01744
1A2MP01408	13 -061	01408	1A2MP01745	12 -018	01745
1A2MP01425	13 -085	01425	1A2MP01746	12 -017	01746
1A2MP01426	21 -027	01426	1A2MP01747	15 -047	01747
1A2MP01426	22 -010	01426	1A2MP01748	16 -005	01748
1A2MP01434	13 -066	01434	1A2MP01750	13 -004	01750
1A2MP01440-0001	08 -014	01440-0001	1A2MP01753-0002	08 -001	01753-0002
1A2MP01501	16A-104	1501	1A2MP01756	12 -026	01756
1A2MP01502-0001	08 -020	01502-0001	1A2MP01776	13 -059	01776
1A2MP01502-0002	08 -019	01502-0002	1A2MP01777	13 -056	01777
1A2MP01504	16A-105	1504	1A2MP01780	13 -017	01780
1A2MP01510	19 -005	01510	1A2MP01799	08 -016	01799
1A2MP01526	21 -007	01526	1A2MP01800	08 -013	01800
1A2MP01539	13 -062	01539	1A2MP01802	08 -012	01802
1A2MP01565	08 -004	01565	1A2MP01850	19 -004	01850
1A2MP01566	08 -030	01566	1A2MP01852	19 -032	01852
1A2MP01578	17 -020	01578	1A2MP01854	16A-033	01854
1A2MP01589	17 -013	01589	1A2MP01856	16A-036	01856
1A2MP01592	17 -001	01592	1A2MP01866	16 -011	01866
1A2MP01597	17 -021	01597	1A2MP01887	16 -012	01887
1A2MP01600	15 -077	01600	1A2MP01916	16 -053	01916
1A2MP01601	15 -075	01601	1A2MP01917	15 -024	01917
1A2MP01606	15 -072	01606	1A2MP01920	15 -032	01920
1A2MP01607	15 -035	01607	1A2MP01921	15 -034	01921
1A2MP01607	15 -057	01607	1A2MP01922	15 -033	01922
1A2MP01612	15 -125	01612	1A2MP01928-0001	12 -064	01928-0001
1A2MP01614	20 -003	01614	1A2MP01949	18 -011	01949
1A2MP01615	12 -065	01615	1A2MP01950	18 -008	01950
1A2MP01624	15 -103	01624	1A2MP01952	18 -013	01952
1A2MP01628	20 -002	01628	1A2MP01954	18 -012	01954
1A2MP01630-0001	15 -070	01630-0001	1A2MP01955	18 -010	01955
1A2MP01656	15 -108	01656	1A2MP01960	16A-073A	01960
1A2MP01663	12 -070	01663	1A2MP01960	18 -006	01960
1A2MP01664	13 -043	01664	1A2MP01968	09 -030	01968
1A2MP01666	15 -131	01666	1A2MP01973	09 -029	01973
1A2MP01668	15 -087	01668	1A2MP02005	08 -046	02005
1A2MP01673	05 -018	01673	1A2MP02006	08 -051	02006
1A2MP01673	13 -008	01673	1A2MP02007	08 -058	02007
1A2MP01673	15 -084	01673	1A2MP02009	08 -022	02009
1A2MP01673	19 -010	01673	1A2MP02015	13 -039	02015
1A2MP01673	21 -014	01673	1A2MP02016	13 -041	02016
1A2MP01676	15 -067	01676	1A2MP02018	15 -105	02018
1A2MP01677	15 -129	01677	1A2MP02019	15 -119	02019
1A2MP01678	15 -124	01678	1A2MP02020	15 -111	02020
1A2MP01680	15 -118	01680	1A2MP02020	15 -116	02020
1A2MP01681	15 -115	01681	1A2MP02021	15 -113	02021
1A2MP01682	15 -112	01682	1A2MP02028	21 -011	02028
1A2MP01684	15 -121	01684	1A2MP02029	21 -016	02029
1A2MP01685	15 -127	01685	1A2MP02030	15 -096	02030
1A2MP01686	15 -097	01686	1A2MP02073-0002	13 -038	2073-0002
1A2MP01688	15 -065	01688	1A2MP02079	07 -008	02079
1A2MP01689	15 -104	01689	1A2MP02080	07 -009	02080
1A2MP01689	15 -104	01689	1A2MP02086	19 -001	02086
1A2MP01689	15 -104	01689	1A2MP02090	15 -094	02090
1A2MP01689	15 -104	01689	1A2MP02093	20 -001	02093
1A2MP01689	15 -104	01689	1A2MP02095	16 -042	02095
1A2MP01692	15 -110	01692	1A2MP02095	20 -011	02095
1A2MP01698	15 -089	01698	1A2MP02102	09 -017	02102
1A2MP01699	15 -093	01699	1A2MP02105	13 -046	02105
1A2MP01700	15 -092	01700	1A2MP02106	13 -055	02106
1A2MP01701	15 -066	01701	1A2MP02136	15 -095	02136
1A2MP01703	12 -035	01703	1A2MP02137	20 -004	02137
1A2MP01718	15 -008	01718	1A2MP02151	09 -015	02151
1A2MP01728	09 -024	01728	1A2MP02156	09 -018	02156
1A2MP01730	13 -016	01730	1A2MP02157	09 -020	02157
1A2MP01731	13 -050	01731	1A2MP02158	09 -001	02158
1A2MP01733	08 -057	01733	1A2MP02165	08 -006	02165
1A2MP01737	09 -027	01737	1A2MP02189	19 -014	02189

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2MP02194	19 -018	02194	1A2MP02728	13 -034	02728
1A2MP02214	09 -023	02214	1A2MP02735	09 -006	02735
1A2MP02219	09 -014	02219	1A2MP02744	13 -040	02744
1A2MP02229	09 -011	02229	1A2MP02780	15 -042	02780
1A2MP02244	10 -003	02244	1A2MP02780	15 -059	02780
1A2MP02249	19 -002	02249	1A2MP02780	16A-065	02780
1A2MP02264	10 -004	02264	1A2MP02783	08 -049	02783
1A2MP02272	15 -061	02272	1A2MP02835	15 -049	02835
1A2MP02307	13 -077	02307	1A2MP02836	15 -048	02836
1A2MP02309	13 -078	02309	1A2MP02841	16 -029	02841
1A2MP02310	13 -072	02310	1A2MP02841	16A-059	02841
1A2MP02312	13 -071	02312	1A2MP02842	13 -037	02842
1A2MP02374	19 -045	02374	1A2MP02843	17 -004	02843
1A2MP02379	13 -020	02379	1A2MP02864	05 -029	02864
1A2MP02381	13 -015	02381	1A2MP02921	19 -028	02921
1A2MP02385	13 -024	02385	1A2MP02922	19 -027	02922
1A2MP02407	09 -012	02407	1A2MP02929	08 -059	02929
1A2MP02408	13 -003	02408	1A2MP02935	05 -001	02935
1A2MP02413	20 -023	02413	1A2MP02936	05 -009	02936
1A2MP02414	20 -019	02414	1A2MP02937	05 -022	02937
1A2MP02415	20 -022	02415	1A2MP02938	05 -012	02938
1A2MP02439	16A-035	02439	1A2MP02938	05 -024	02938
1A2MP02461	15 -062	02461	1A2MP02950	05 -021	02950
1A2MP02462	15 -046	02462	1A2MP02964	05 -066	02964
1A2MP02466	15 -027	02466	1A2MP02965	05 -043	02965
1A2MP02467	15 -051	02467	1A2MP02968	05 -065	02968
1A2MP02469	15 -044	02469	1A2MP02969	05 -042	02969
1A2MP02471	15 -063	02471	1A2MP02973	05 -061	02973
1A2MP02472	15 -045	02472	1A2MP03004	15 -004	03004
1A2MP02508	15 -088	02508	1A2MP03007	15 -026	03007
1A2MP02509-0001	16 -044	02509-0001	1A2MP03012	05 -039	03012
1A2MP02509-0001	20 -031	02509-0001	1A2MP03012	19 -017	03012
1A2MP02510-0001	20 -018	02510-0001	1A2MP03013	05 -046	03013
1A2MP02523	21 -003	02523	1A2MP03016	05 -045	03016
1A2MP02523	22 -016	02523	1A2MP03023	05 -023	03023
1A2MP02526	08 -060	02526	1A2MP03024	16 -018	03024
1A2MP02527	13 -093	02527	1A2MP03028	05 -055	03028
1A2MP02530	17 -025	02530	1A2MP03030	05 -063	03030
1A2MP02531	17 -026	02531	1A2MP03031	05 -032	03031
1A2MP02533	04 -001A	2533	1A2MP03032	05 -025	03032
1A2MP02542	18 -007	02542	1A2MP03033	05 -013	03033
1A2MP02546	17 -016	02546	1A2MP03037	05 -033	03037
1A2MP02547	17 -017	02547	1A2MP03038	07 -020	03038
1A2MP02559	13 -070	02559	1A2MP03039	05 -020	03039
1A2MP02560	13 -019	02560	1A2MP03045	05 -036	03045
1A2MP02569	10 -000	02569	1A2MP03059	05 -011	03059
1A2MP02572	19 -059	02572	1A2MP03061	05 -058	03061
1A2MP02575	19 -053	02575	1A2MP03064	05 -003	03064
1A2MP02589	19 -068	02589	1A2MP03065	05 -004	03065
1A2MP02590	19 -062	02590	1A2MP03066	05 -008	03066
1A2MP02591	19 -093	02591	1A2MP03068	21 -017	03068
1A2MP02592	19 -099	02592	1A2MP03086	07 -032	03086
1A2MP02599	19 -086	02599	1A2MP03087	07 -004	03087
1A2MP02600	19 -092	02600	1A2MP03088	07 -005	03088
1A2MP02602	19 -046	02602	1A2MP03091	07 -002	03091
1A2MP02605	19 -052	02605	1A2MP03093	05 -027	03093
1A2MP02610	19 -070	02610	1A2MP03094	05 -015	03094
1A2MP02611	19 -084	02611	1A2MP03095	05 -028	03095
1A2MP02612	19 -033	02612	1A2MP03103	05 -014	03103
1A2MP02613	19 -061	02613	1A2MP03103	05 -026	03103
1A2MP02621	12 -006	02621	1A2MP03110	05 -040	03110
1A2MP02622	12 -004	02622	1A2MP03120	07 -000	03120
1A2MP02623	13 -102	02623	1A2MP03121	05 -002	03121
1A2MP02624	12 -005	02624	1A2MP03123	05 -062	03123
1A2MP02662	13 -012	02662	1A2MP03128	16A-085	03128
1A2MP02695	12 -067	02695	1A2MP03132	13 -095	03132
1A2MP02721	08 -042	02721	1A2MP03133	16A-088	03133
1A2MP02723	08 -025	02723	1A2MP03134	19 -023	03134
1A2MP02726	13 -035	02726	1A2MP03136	16A-069	03136

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1A2MP03137	16A-084	03137	1A2MP03290	15 -037	03290
1A2MP03138	16A-083	03138	1A2MP03319	11 -054	03319
1A2MP03141	13 -082	03141	1A2MP03322	12 -012	03322
1A2MP03141	15 -029	03141	1A2MP03323	17 -009	03323
1A2MP03143	12 -029	03143	1A2MP03487	15 -038	03487
1A2MP03143	12 -037	03143	1A2MP03519	13 -074	03159
1A2MP03143	16 -049	03143	1A2MP03520	18 -045	03520
1A2MP03146	15 -055	03146	1A2MP03553	13 -031	03553
1A2MP03147	16A-039	03147	1A2MP03564	08 -005	03564
1A2MP03149	16A-077	03149	1A2MP03577-0001	12 -060	03577-0001
1A2MP03159	12 -031	03159	1A2MP03632	07 -017	03632
1A2MP03159	12 -039	03159	1A2MP03634	07 -016	03634
1A2MP03159	12 -046	03159	1A2MP03637	07 -015	03637
1A2MP03159	13 -080	03159	1A2MP03640	16A-098	03640
1A2MP03159	13 -098	03159	1A2MP03651	13 -025	03651
1A2MP03159	16 -003	03159	1A2MP03652	13 -026	03652
1A2MP03159	16 -023	03159	1A2MP03653	13 -067	03653
1A2MP03159	16 -051	03159	1A2MP03653	19 -060	03653
1A2MP03160	12 -042	03160	1A2MP03654	08 -015	03654
1A2MP03160	13 -075	03160	1A2MP03655	21 -010	03655
1A2MP03160	13 -099	03160	1A2MP03656	05 -054	03656
1A2MP03160	15 -054	03160	1A2MP03657	12 -062	03657
1A2MP03160	16 -001	03160	1A2MP03657	19 -073	03657
1A2MP03160	16 -021	03160	1A2MP03658	13 -057	03658
1A2MP03160	16 -028	03160	1A2MP03658	18 -023	03658
1A2MP03161	12 -040	03161	1A2MP03658	19 -007	03658
1A2MP03161	13 -081	03161	1A2MP03660	13 -101	03660
1A2MP03161	16 -052	03161	1A2MP03661	22 -008	03661
1A2MP03162	19 -037	03162	1A2MP03662	11 -007	03662
1A2MP03163	16A-038	03163	1A2MP03667	13 -029	03667
1A2MP03165	13 -088	03165	1A2MP03668	19 -040	03668
1A2MP03173	12 -023	03173	1A2MP03757	07 -018	03757
1A2MP03178	13 -030	03178	1A2MP03758	07 -013	03758
1A2MP03181	13 -028	03181	1A2MP03759	07 -011	03759
1A2MP03182	16 -019	03182	1A2MP03761	11 -020	03761
1A2MP03186	19 -048	03186	1A2MP03762	11 -053	03762
1A2MP03186	19 -055	03186	1A2MP03765	11 -029	03765
1A2MP03186	19 -064	03186	1A2MP03770	11 -034	03770
1A2MP03186	19 -088	03186	1A2MP03771	11 -039	03771
1A2MP03186	19 -095	03186	1A2MP03772	11 -036	03772
1A2MP03186	19 -101	03186	1A2MP03773	11 -037	03773
1A2MP03198	15 -041	03198	1A2MP03774	11 -027	03774
1A2MP03198	16A-067	03198	1A2MP03775	11 -026	03775
1A2MP03208	13 -010	03208	1A2MP03779	11 -021	03779
1A2MP03209	13 -011	03209	1A2MP03780	11 -028	03780
1A2MP03212	13 -007	03212	1A2MP03781	11 -025	03781
1A2MP03213	16A-068	03213	1A2MP03782	11 -047	03782
1A2MP03214	13 -103	03214	1A2MP03783	11 -046	03783
1A2MP03219	13 -086	03219	1A2MP03784	11 -048	03784
1A2MP03229	13 -032	03229	1A2MP03785	11 -050	03785
1A2MP03232	16A-032	03232	1A2MP03786	11 -013	03786
1A2MP03234	16A-070	03234	1A2MP03790	11 -002	03790
1A2MP03239	16 -014	03239	1A2MP03791	11 -009	03791
1A2MP03244	16A-073	03244	1A2MP03795	11 -001	03795
1A2MP03246	16A-081	03246	1A2MP03796	11 -010	03796
1A2MP03247	16A-080	03247	1A2MP03797	11 -012	03797
1A2MP03248	15 -036	03248	1A2MP03800	11 -017	03800
1A2MP03249	16A-079	03249	1A2MP03801	11 -016	03801
1A2MP03250	12 -014	03250	1A2MP03803	07 -031	03803
1A2MP03251	16 -026	03251	1A2MP03866	21 -026	03866
1A2MP03252	16A-071	03252	1A2MP03867	05 -031	03867
1A2MP03253	19 -039	03253	1A2MP03869	05 -047	03869
1A2MP03258	15 -091	03258	1A2MP03871	05 -049	03871
1A2MP03261	05 -034	03261	1A2MP03873	05 -048	03873
1A2MP03265	16 -015	03265	1A2MP03919-0002	17 -007	03919-0002
1A2MP03266	05 -060	03266	1A2MP03947	17 -002	03947
1A2MP03278	05 -016	03278	1A2MP04133	11 -033	04133
1A2MP03280	16 -030	03280	1A2MP04135	11 -044	04135
1A2MP03280	16A-060	03280	1A2MP04137	11 -045	04137

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2MP04141	08 -002	04141	1A2MP05004-0003	07 -003	5555-12
1A2MP04145	16A-094	04145	1A2MP05004-0003	08 -040	5555-12
1A2MP04146	08 -063	04146	1A2MP05004-0003	11 -006	5555-12
1A2MP04147	16A-091	04147	1A2MP05004-0004	16 -074	5103-12
1A2MP04227	11 -022	04227	1A2MP05004-0005	21 -002	5103-37
1A2MP04251	16A-072	04251	1A2MP05004-0006	21 -025	5103-50
1A2MP04258	19 -069	04258	1A2MP05004-0008	18 -038	5100-25
1A2MP04260	16A-111	4260	1A2MP05004-0009	12 -012	5100-18
1A2MP04294	12 -048	04294	1A2MP05004-0009	13 -092	5100-18
1A2MP04295	12 -055	04295	1A2MP05004-0010	12 -015	5000-37
1A2MP04297	12 -053	04297	1A2MP05004-0010	13 -090	5000-37
1A2MP04298	12 -056	04298	1A2MP05004-0011	05 -005	5133-9
1A2MP04510	09 -003	04510	1A2MP05004-0011	07 -014	5133-9
1A2MP04511	11 -024	04511	1A2MP05004-0011	07 -019	5133-9
1A2MP04512	11 -023	04512	1A2MP05004-0011	09 -026	5133-9
1A2MP04515	20 -017	04515	1A2MP05004-0011	09 -028	5133-9
1A2MP04525	20 -016	04525	1A2MP05004-0011	10 -005	5133-9
1A2MP04529	21 -004	04529	1A2MP05004-0011	12 -054	5133-9
1A2MP04530	21 -018	04530	1A2MP05004-0011	13 -002	5133-9
1A2MP04531	20 -012	04531	1A2MP05004-0011	16 -043	5133-9
1A2MP04532	12 -057	04532	1A2MP05004-0011	16A-102	5133-9
1A2MP04546	17 -015	04546	1A2MP05004-0011	20 -013	5133-9
1A2MP04547	17 -014	04547	1A2MP05004-0012	05 -007	5100-12
1A2MP04553	05 -050	04553	1A2MP05004-0012	11 -030	5100-12
1A2MP04560	08 -039	04560	1A2MP05004-0012	15 -106	5100-12
1A2MP04569	16 -016	04569	1A2MP05004-0012	15 -109	5100-12
1A2MP04571	20 -008	04571	1A2MP05004-0012	15 -114	5100-12
1A2MP04572	20 -009	04572	1A2MP05004-0012	15 -117	5100-12
1A2MP04573	20 -007	04573	1A2MP05004-0012	15 -120	5100-12
1A2MP04580	19 -078	04580	1A2MP05004-0012	15 -117	5100-12
1A2MP04582	19 -083	04582	1A2MP05004-0013	16A-063	5101-50
1A2MP04665	19 -075	04665	1A2MP05004-0014	15 -130	5103-31
1A2MP04800	09 -008	04800	1A2MP05004-0014	19 -025	5103-31
1A2MP04801	19 -071	04801	1A2MP05004-0015	15 -128	5103-25
1A2MP04802	15 -064	04802	1A2MP05004-0016	11 -035	5133-6
1A2MP04803	19 -103	04803	1A2MP05004-0016	11 -038	5133-6
1A2MP04804	17 -024	04804	1A2MP05004-0016	15 -043A	5133-6
1A2MP04806	16 -024	04806	1A2MP05004-0017	12 -061	5133-31
1A2MP04807	10 -007	04807	1A2MP05004-0017	12 -061	5133-31
1A2MP04808	08 -037	04808	1A2MP05004-0018	15 -056	5133-15
1A2MP04809	08 -017	04809	1A2MP05004-0018	15 -126	5133-15
1A2MP04810	20 -026	04810	1A2MP05004-0019	19 -003	
1A2MP04812	20 -028	04812	1A2MP05004-0019	05 -010	5133-12
1A2MP04813	13 -100	04813	1A2MP05004-0019	05 -044	5133-12
1A2MP04815	13 -006	04815	1A2MP05004-0019	05 -067	5133-12
1A2MP04817-0001	13 -027	04817-0001	1A2MP05004-0019	08 -008	5133-12
1A2MP04818	13 -044	04818	1A2MP05004-0019	09 -002	5133-12
1A2MP04819	13 -048	04819	1A2MP05004-0019	09 -016	5133-12
1A2MP04820	13 -052	04820	1A2MP05004-0019	09 -019	5133-12
1A2MP04821	13 -065	04821	1A2MP05004-0019	11 -008	5133-12
1A2MP04822	13 -076	04822	1A2MP05004-0019	12 -027	5133-12
1A2MP04823	13 -083	04823	1A2MP05004-0019	15 -005	5133-12
1A2MP04825	18 -015	04825	1A2MP05004-0019	15 -010	5133-12
1A2MP04827	12 -071	04827	1A2MP05004-0019	15 -028	5133-12
1A2MP04828	12 -068	04828	1A2MP05004-0019	15 -050	5133-12
1A2MP04829	12 -041	04829	1A2MP05004-0019	15 -052	5133-12
1A2MP04830	15 -078	04830	1A2MP05004-0022	05 -057	5133-18
1A2MP04846	12 -063	04846	1A2MP05004-0022	12 -033	5133-18
1A2MP04851	11 -011	04851	1A2MP05004-0022	12 -045	5133-18
1A2MP05003-0011	13 -096	05003-0001	1A2MP05004-0022	13 -023	5133-18
1A2MP05004-0001	21 -009	5103-18	1A2MP05004-0022	13 -049	5133-18
1A2MP05004-0002	19 -043	5100-34	1A2MP05004-0022	15 -090	5133-18
1A2MP05004-0002	19 -050	5100-34	1A2MP05004-0022	18 -017	5133-18
1A2MP05004-0002	19 -057	5100-34	1A2MP05004-0022	19 -006	5133-18
1A2MP05004-0002	19 -066	5100-34	1A2MP05004-0023	05 -035	5133-6
1A2MP05004-0002	19 -090	5100-34	1A2MP05004-0023	15 -043	5133-6
1A2MP05004-0002	19 -097	5100-34	1A2MP05004-0023	15 -060	5133-6
1A2MP05004-0003	08 -044	05004-0003	1A2MP05004-0023	15 -060	5133-6
1A2MP05004-0003	05 -041	5555-12	1A2MP05004-0023	16A-040	5133-6

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2MP05004-0023	16 -050	5133-6	1A2MP05007-0016	05 -037	05007-0016
1A2MP05004-0023	16A-066	5133-6	1A2MP05007-0016	05 -069	05007-0016
1A2MP05004-0023	16A-082	5133-6	1A2MP05007-0016	15 -068	05007-0016
1A2MP05004-0023	19 -038	5133-6	1A2MP05007-0016	20 -025	05007-0016
1A2MP05004-0025	09 -021	5555-18	1A2MP05007-0017	12 -020	05007-0017
1A2MP05004-0025	09 -036	5555-18	1A2MP05007-0018	09 -033	05007-0018
1A2MP05004-0025	13 -058	5555-18	1A2MP05007-0019	08 -021	05007-0019
1A2MP05004-0027	05 -006	05004-0027	1A2MP05007-0024	20 -005	05007-0024
1A2MP05004-0027	19 -072	5133-25	1A2MP05007-0029	16 -048	05007-0029
1A2MP05004-0027	19 -085	5133-25	1A2MP05007-0030	12 -008	05007-0030
1A2MP05004-0028	05 -052	5100-31	1A2MP05007-0033	05 -056	05007-0033
1A2MP05004-0028	13 -005	5133-18	1A2MP05007-0033	05 -064	05007-0033
1A2MP05004-0029	08 -038	5144-12	1A2MP05007-0033	10 -001	05007-0033
1A2MP05004-0030	13 -022	5133-21	1A2MP05007-0033	12 -043	05007-0033
1A2MP05004-0031	19 -020	5131-25	1A2MP05007-0033	15 -002	05007-0033
1A2MP05004-0033	15 -031	5100-15	1A2MP05007-0033	16 -020	05007-0033
1A2MP05004-0036	10 -009	5139-18	1A2MP05007-0038	07 -006	05007-0038
1A2MP05004-0041	12 -030	5555-15	1A2MP05007-0038	07 -021	05007-0038
1A2MP05004-0041	12 -038	5555-15	1A2MP05007-0038	12 -036	05007-0038
1A2MP05004-0041	13 -073	5555-15	1A2MP05007-0038	15 -082	05007-0038
1A2MP05004-0041	13 -079	5555-15	1A2MP05007-0038	16 -006	05007-0038
1A2MP05004-0041	13 -097	5555-15	1A2MP05007-0042	16A-089	05007-0042
1A2MP05004-0041	16 -002	5555-15	1A2MP05007-0046	08 -026	05007-0046
1A2MP05004-0041	16 -022	5555-15	1A2MP05007-0046	08 -031	05007-0046
1A2MP05004-0042	16 -027	5139-15	1A2MP05007-0048	12 -009	05007-0048
1A2MP05004-0042	16A-057	5139-15	1A2MP05007-0048	20 -024	05007-0048
1A2MP05004-0043	16A-034	5133-14	1A2MP05007-0051	18 -002	05007-0051
1A2MP05004-0045	09 -010	5144-9C	1A2MP05007-0051	18 -025	05007-0051
1A2MP05004-0045	15 -007	5144-9C	1A2MP05007-0053	13 -018	05007-0053
1A2MP05004-0045	15 -011	5144-9C	1A2MP05007-0057	13 -069	05007-0057
1A2MP05004-0045	15 -013	5144-9C	1A2MP05007-0062	20 -027	05007-0062
1A2MP05005-0001	18 -034	RR-50	1A2MP05007-0089	09 -004	05007-0089
1A2MP05005-0001	18 -041	RR-50	1A2MP05007-0093	08 -003	05007-0093
1A2MP05005-0001		RR-50	1A2MP05007-0116	24 -086	05007-0116
1A2MP05005-0002	18 -037	RS-62	1A2MP05007-0119	07 -012	05007-0119
1A2MP05006-0002	15 -018	AN935-2L	1A2MP05007-0124	11 -042	05007-0124
1A2MP05006-0002	16A-090	AN935-2L	1A2MP05008-0003	16 -041	05008-0003
1A2MP05006-0003	08 -011	AN935-3L	1A2MP05008-0004	15 -020	05008-0004
1A2MP05006-0003	08 -027	AN935-3L	1A2MP05008-0007	08 -018	05008-0007
1A2MP05006-0003	08 -032	AN935-3L	1A2MP05008-0007	19 -035	05008-0007
1A2MP05006-0003	15 -040	AN935-3L	1A2MP05008-0008	09 -009	05008-0008
1A2MP05006-0003	15 -074	AN935-3L	1A2MP05008-0008	11 -018	05008-0008
1A2MP05006-0003	19 -016	AN935-3L	1A2MP05008-0008	15 -099	05008-0008
1A2MP05006-0004	10 -002	AN935-4L	1A2MP05008-0008	15 -099	05008-0008
1A2MP05006-0004	11 -005	AN935-4L	1A2MP05008-0008	16 -013	05008-0008
1A2MP05006-0004	11 -015	AN935-4L	1A2MP05008-0008	17 -022	05008-0008
1A2MP05006-0004	11 -019	AN935-4L	1A2MP05008-0010	11 -049	05008-0010
1A2MP05006-0004	11 -051	AN935-4L	1A2MP05008-0010	15 -071	05008-0010
1A2MP05006-0004	12 -021	AN935-4L	1A2MP05008-0013	19 -079	05008-0013
1A2MP05006-0004	16A-092	AN935-4L	1A2MP05008-0014	16A-106	05008-0014
1A2MP05006-0004	16A-095	AN935-4L	1A2MP05008-0015	11 -014	05008-0015
1A2MP05006-0004	17 -023	AN935-4L	1A2MP05008-0015	13 -060	05008-0015
1A2MP05006-0007	08 -054	1202-00	1A2MP05008-0021	11 -004	05008-0021
1A2MP05006-0007	13 -063	1202-00	1A2MP05008-0021	11 -004	05008-0021
1A2MP05006-0008	08 -068	1203-00	1A2MP05008-0021	18 -014	05008-0021
1A2MP05006-0009	07 -022	1204-00	1A2MP05008-0021	19 -076	05008-0021
1A2MP05006-0009	13 -087	1204-00	1A2MP05008-0028	16 -046	05008-0028
1A2MP05006-0009	20 -030	1204-00	1A2MP05008-0028	20 -015	05008-0028
1A2MP05006-0012	11 -032	AN935-10L	1A2MP05008-0028	20 -033	05008-0028
1A2MP05006-0012	12 -025	AN935-10L	1A2MP05008-0029	08 -010	05008-0029
1A2MP05006-0012		01600	1A2MP05008-0029	15 -039	05008-0029
1A2MP05006-0016	20 -029	1504-00	1A2MP05008-0031	13 -047	05008-0031
1A2MP05006-0021	15 -069	1204-03	1A2MP05008-0046	13 -053	05008-0046
1A2MP05007-0002	08 -067	05007-0002	1A2MP05008-0047	13 -033	05008-0047
1A2MP05007-0002	15 -073	05007-0002	1A2MP05008-0052	08 -053	05008-0052
1A2MP05007-0002	19 -015	05007-0002	1A2MP05008-0053	12 -066	05008-0053
1A2MP05007-0005	07 -001	05007-0005	1A2MP05008-0053	12 -069	05008-0053
1A2MP05007-0009	20 -010	05007-0009	1A2MP05008-0053	13 -036	05008-0053

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2MP05008-0054	12 -072	05008-0054	1A2MP05032-0012	10 -008	05032-0012
1A2MP05008-0054	13 -045	05008-0054	1A2MP05032-0013	20 -006	05032-0013
1A2MP05009-0001	05 -019	05009-0001	1A2MP05032-0014	11 -043	05032-0014
1A2MP05009-0001	13 -009	05009-0001	1A2MP05032-0015	15 -017	05032-0015
1A2MP05009-0001	15 -085	05009-0001	1A2MP05032-0016	09 -034	05032-0016
1A2MP05009-0001	19 -011	05009-0001	1A2MP05032-0016	12 -034	05032-0016
1A2MP05009-0001	21 -015	05009-0001	1A2MP05032-0029	12 -028	05032-0029
1A2MP05009-0005	10 -006	05009-0005	1A2MP05032-0029	12 -044	05032-0029
1A2MP05009-0005	15 -022	05009-0005	1A2MP05044-0004	16A-104	
1A2MP05009-0006	05 -053	05009-0006	1A2MP05056-0001	20 -020	05056-0001
1A2MP05009-0012	16A-037	05009-0012	1A2MP05070-0001	12 -051	05070-0001
1A2MP05009-0012	18 -020	05009-0012	1A2MP05070-0005	18 -032	05070-0005
1A2MP05009-0020	16A-086	05009-0020	1A2MP05072-0002	15 -101	05072-0002
1A2MP05009-0031	21 -013	05009-0031	1A2MP05072-0002	15 -101	05072-0002
1A2MP05012-0001	19 -024	05012-0001	1A2MP05077-0002	05 -051	05077-0002
1A2MP05012-0002	18 -039	05012-0002	1A2MP05080-0004	20 -021	05080-0004
1A2MP05012-0003	12 -013	05012-0003	1A2MP05080-0005	05 -059	05080-0005
1A2MP05012-0003	13 -089	05012-0003	1A2MP05080-0006	09 -031	05080-0006
1A2MP05012-0004	09 -035	05012-0004	1A2MP05180-0001	12 -002	05180-0001
1A2MP05012-0005	08 -050	05012-0005	1A2MP05511-0024	17 -010	05511-0024
1A2MP05012-0016	08 -061	05012-0016	1A2MP05511-0037	17 -011	05511-0037
1A2MP05013-0001	21 -005	05013-0001	1A2MP05539-0001	17 -003	05539-0001
1A2MP05013-0001	22 -014	05013-0001	1A2MP05572-0003	12 -059	05572-0003
1A2MP05013-0002	22 -002	05013-0002	1A2MP05598-0001	11 -041	70-120
1A2MP05013-0003	18 -033	05013-0003	1A2MP10117	08 -065	10117
1A2MP05015-0001	19 -022	201	1A2MP29124-0002	05 -070	29124-0002
1A2MP05016-0002	08 -024	50 FA 440	1A2MP29132-0002	16A-103	29132-0002
1A2MP05016-0002	16A-087	50 FA 440	1A2MP29133	12 -007	29133
1A2MP05016-0002	19 -081	50 FA 440	1A2MP29134-0002	05 -000	29134-0002
1A2MP05016-0003	16 -009	05016-0003	1A2MP29136	12 -058	29136
1A2MP05016-0009	16 -054	50 FK 632	1A2MP29138	12 -047	29138
1A2MP05019-0003	08 -036	05019-0003	1A2MP29141	12 -050	29141
1A2MP05019-0005	08 -029	05019-0005	1A2MP29144	12 -049	29144
1A2MP05030-0001	12 -024	05030-0001	1A2MP29145	21 -006	29145
1A2MP05030-0002	13 -064	05030-0002	1A2MP30017	12 -019	30017
1A2MP05030-0002	15 -016	05030-0002	1A2MP30018	12 -022	30018
1A2MP05030-0002	16 -097	05030-0002	1A2MP30080	17 -019	30080
1A2MP05030-0003	11 -052	05030-0003	1A2MP30081	17 -018	30081
1A2MP05030-0003	15 -023	05030-0003	1A2MP30182	18 -018	30182
1A2MP05030-0004	24 -087	05030-0004	1A2MP30183	18 -019	30183
1A2MP05030-0006	11 -031	05030-0006	1A2MP30261	18 -005	30261
1A2MP05030-0006	17 -008	05030-0006	1A2MP30262	18 -028	30262
1A2MP05030-0007	13 -054	05030-0007	1A2MP30277	17 -006	30277
1A2MP05030-0007	19 -049	05030-0007	1A2MP30279	05 -068	30279
1A2MP05030-0007	19 -056	05030-0007	1A2MP30294	16A-100	30294
1A2MP05030-0007	19 -065	05030-0007	1A2MP30305	16A-101	30305
1A2MP05030-0007	19 -089	05030-0007	1A2MP30331	14 -000	30331
1A2MP05030-0007	19 -096	05030-0007	1A2MP30361	16A-099	30361
1A2MP05030-0007	19 -102	05030-0007	1A2MP30392-0002	18 -016	30392-0002
1A2MP05030-0007	21 -012	05030-0007	1A2MP30393	18 -022	30393
1A2MP05030-0009	18 -009	05030-0009	1A2MP30394	19 -074	30394
1A2MP05030-0010	16A-093	05030-0010	1A2MP30401	15 -058	30401
1A2MP05030-0010	16A-096	05030-0010	1A2MP30448-0005	19 -000	30448-0005
1A2MP05030-0010	18 -021	05030-0010	1A2MP30449-0005	14 -000	30449-0005
1A2MP05030-0010	19 -082	05030-0010	1A2MP30451-0005	20 -000	30451-0005
1A2MP05030-0013	15 -053	05030-0013	1A2MP30452-0003	16 -000	30452-0003
1A2MP05032-0003	16 -010	05032-0003	1A2MP30456	18 -001	30456
1A2MP05032-0004	05 -038	05032-0004	1A2MP30458	18 -024	30458
1A2MP05032-0005	16 -017	05032-0005	1A2MP30472	12 -052	30472
1A2MP05032-0005	18 -003	05032-0005	1A2MP30565	07 -010	30565
1A2MP05032-0005	18 -026	05032-0005	1A2MP30577	15 -019	30577
1A2MP05032-0005	19 -077	05032-0005	1A2MP30597	12 -000	30597
1A2MP05032-0006	16A-107	05032-0006	1A2MP30601	15 -000	30601
1A2MP05032-0006	19 -080	05032-0006	1A2MP30602	13 -000	30602
1A2MP05032-0007	07 -007	05032-0007	1A2MP30660	15 -098	30660
1A2MP05032-0007	08 -023	05032-0007	1A2MP30661	15 -102	30661
1A2MP05032-0010	15 -100	05032-0010	1A2MP30673	15 -015	30673
1A2MP05032-0010	15 -100	05032-0010	1A2MP30675	15 -003	30675

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A2MP30677	15 -006	30677	1A3MP30745	25 -034	30745
1A2MP33015-0002	09 -000	33015-0002	1A3MP33275	25 -017	33275
1A2MP33026	11 -000	33026	1A3MP33295	25 -001	33295
1A2MP33032	22 -000	33032	1A3P-1	25 -37	DA15P
1A2MP33131-0002	21 -000	33131-0002	1A3P1	25 -037	05511-0136
1A2MP33222	13 -091	33222	1A3T1	25 -041	03292
1A2MP33225	15 -123	33225	1A4	24 -010	33287
1A2MP33361	15 -001	33361	1A4	26 -000	33287
1A2MP33366	15 -012	33366	1A4-3507	26 -016	3507
1A2MP33372	15 -014	33372	1A4-3508	25 -017	3508
1A2MP33377	15 -009	33377	1A4-5322	26 -001	5322
1A2MP33379	15 -122	33379	1A4-533-104	24 -010	533-104
1A2MP33381	15 -107	33381	1A4-533-104	26 -000	533-104
1A2MP33383	15 -021	33383	1A4A1CR-1	26 -015	1N645
1A2MP33384	15 -081	33384	1A4CR1-2-3-4-5	26 -015	05546-0005
1A2MP33611	12 -001	33611	1A4C1-2	26 -012	CL2SBL101VP3
1A2MP33612	12 -003	33612	1A4MP03489	26 -002	03489
1A2MP33621	15 -080	33621	1A4MP03493	26 -023	03493
1A2M29139-0003	20 -035	29139-0003	1A4MP04067	26 -004	04067
1A2P1	17 -005	05511-0018	1A4MP04068	26 -006	04068
1A2S1	11 -040	00223	1A4MP05007-0016	26 -005	05007-0016
1A3	24 -008	33296	1A4MP05007-0024	26 -003	05007-0024
1A3	25 -000	33296	1A4MP05007-0024	26 -010	05007-0024
1A3-3517	25 -018	3517	1A4MP05007-0024	26 -018	05007-0024
1A3-3524	25 -001	3524	1A4MP05007-0024	26 -021	05007-0024
1A3-543-104	24 -008	543-104	1A4MP05016-0002	26 -019	50 FA 440
1A3-543-104	25 -000	543-104	1A4MP05016-0002	26 -022	50 FA 440
1A3A1	25 -010	33283-0002	1A4MP05032-0005	26 -011	05032-0005
1A3A1CR-1	25 -025	1N645	1A4MP30275	26 -007	30275
1A3A1CR1-2-3-4	25 -016	AF IN 645	1A4MP30443	26 -008	30443
1A3A1C1-2	25 -013	CL2SBL101VPS	1A4MP33275	26 -016	33275
1A3A1R1	25 -014	RC32GF560J	1A4MP33283-0001	26 -009	33283-0001
1A3A1R2	25 -015	RC07GF103J	1A4MP33285	26 -001	33285
1A3A2	25 -018	33352	1A4P-1	26 -020	DE9P
1A3A2-Q	25 -030	2N526	1A4P1	26 -020	30442
1A3A2CR-6	25 -027	1N1318	1A4R1	26 -013	RC32GF560J
1A3A2CR1-2-3-4-8-	25 -025	05546-0005	1A4R2	26 -014	RC07GF103J
1A3A2CR6-7	25 -027	05561-0015	1A4T1	26 -017	03292-
1A3A2Q1-2-3	25 -030	USN 2N526	1A9	03 -000	30610
1A3A2R1	25 -026	05554-0007	1A9-04606	03 -019A	04606
1A3A2R2-3	25 -024	RC07GF222J	1A9-0618	03C-143	0618
1A3A2R4	25 -031	RC20GF332J	1A9-0651	03 -202	0651
1A3A2R5	25 -032	RC0GF332J	1A9-0721	03 -135	0721
1A3A2R6	25 -029	RC0GF331J	1A9-0732	03 -189	1960
1A3A2R7-9	25 -028	05502-4R7J	1A9-0733	03 -133	0733
1A3A2R8	25 -033	RC07GF182J	1A9-0776	03 -137	0776
1A3CR5	25 -040	05561-0016	1A9-0821	03 -205	0821
1A3J1	25 -036	05511-0026	1A9-0834	03 -199	0834
1A3MP03495	25 -002	03495	1A9-0844	03A-110	0844
1A3MP03505	25 -044	03505	1A9-0846	03A-100	0846
1A3MP03516	25 -021	03516	1A9-0959	03C-170	0959
1A3MP03568	25 -008	03568	1A9-0964	03A-085	0964
1A3MP04067	25 -004	04067	1A9-0964	03A-087	0964
1A3MP04068	25 -006	04068	1A9-13-104	13 -000	13-104
1A3MP05006-0002	25 -023	AN935-2L	1A9-15-104	09 -000	15-104
1A3MP05007-0016	25 -003	05007-0016	1A9-208	03A-112	208
1A3MP05007-0016	25 -005	05007-0016	1A9-225	03A-084	00225
1A3MP05007-0024	25 -011	05007-0024	1A9-26804	03B-118	26804
1A3MP05007-0024	25 -019	05007-0024	1A9-26816	03B-128	26816
1A3MP05007-0024	25 -038	05007-0024	1A9-26839	03B-121	26839
1A3MP05007-0024	25 -042	05007-0024	1A9-29116	03B-123	29116
1A3MP05007-0055	25 -022	05007-0055	1A9-30457	03E-279	30457
1A3MP05016-0002	25 -039	50 FA 440	1A9-413-1041	03 -000	413-1041
1A3MP05016-0002	25 -043	50 FA 440	1A9-4157	03E-251	4157
1A3MP05032-0005	25 -012	05032-0005	1A9-4177	03 -011	4177
1A3MP05032-0005	25 -020	05032-0005	1A9-5007-82	03A-095	5007-82
1A3MP30473-0002	25 -035	30473-0002	1A9-5012-14	03C-169	SFR156PPK58
1A3MP30475	REF ONLY	30475	1A9E1	03A-085	00990
1A3MP30633	25 -009	30633	1A9FL1	03 -208	00961

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A9L1	03 -233	30613	1A9MP00852	03 -081	00852
1A9M&00936	03 -226	00936	1A9MP00853	03 -069	00853
1A9M&05004-0022	03 -225	5133-18	1A9MP00854	03 -057	00854
1A9MP00201	03C-170	00201	1A9MP00855	03B-123	00855
1A9MP00202	03 -036	00202	1A9MP00856	03E-264	00856
1A9MP00203	03E-253	00203	1A9MP00860	03 -071	00860
1A9MP00204	03 -219	00204	1A9MP00861	03 -072	00861
1A9MP00205	03 -190	00205	1A9MP00862	03 -073	00862
1A9MP00610	03C-150	00610	1A9MP00863	03 -074	00863
1A9MP00610	03C-155	00610	1A9MP00864	03 -075	00864
1A9MP00610	03C-158	00610	1A9MP00865	03 -076	00865
1A9MP00610	03C-161	00610	1A9MP00866	03 -077	00866
1A9MP00610	03C-164	00610	1A9MP00867	03 -078	00867
1A9MP00610	03C-167	00610	1A9MP00868	03 -079	00868
1A9MP00616	03 -191	00616	1A9MP00869	03 -080	00869
1A9MP00625	03B-129	00625	1A9MP00870	03 -059	00870
1A9MP00630	03E-256	00630	1A9MP00871	03 -060	00871
1A9MP00632	03 -196	00632	1A9MP00872	03 -061	00872
1A9MP00648	03B-128	00648	1A9MP00873	03 -062	00873
1A9MP00649	03 -028	00649	1A9MP00874	03 -063	00874
1A9MP00655	03B-121	00655	1A9MP00875	03 -064	00875
1A9MP00656	03B-124	00656	1A9MP00876	03 -065	00876
1A9MP00660	03B-116	00660	1A9MP00877	03 -066	00877
1A9MP00660	03B-127	00660	1A9MP00878	03 -067	00878
1A9MP00674	03 -041	00674	1A9MP00879	03 -068	00879
1A9MP00677	03B-120	00677	1A9MP00880	03 -046	00880
1A9MP00678	03B-131	00678	1A9MP00881	03 -047	00881
1A9MP00704	03A-098	00704	1A9MP00882	03 -048	00882
1A9MP00706	03A-097	00706	1A9MP00883	03 -049	00883
1A9MP00710	03E-259	00710	1A9MP00884	03 -050	00884
1A9MP00711	03 -030	00711	1A9MP00885	03 -051	00885
1A9MP00713	03 -242	00713	1A9MP00886	03 -052	00886
1A9MP00722	03C-177	00722	1A9MP00887	03 -053	00887
1A9MP00724	03C-142	00724	1A9MP00888	03 -054	00888
1A9MP00725	03E-276	00725	1A9MP00889	03 -055	00889
1A9MP00726	03 -033	00726	1A9MP00890	03 -056	00890
1A9MP00726	03 -037	00726	1A9MP00891	03 -027	00891
1A9MP00727	03 -038	00727	1A9MP00892	03 -070	00892
1A9MP00731	03 -022	00731	1A9MP00893	03 -058	00893
1A9MP00731	03 -113	00731	1A9MP00894	03 -045	00894
1A9MP00734	03 -134	00734	1A9MP00895	03 -247	00895
1A9MP00736	03 -008	00736	1A9MP00899	03 -192	00899
1A9MP00738	03C-171	00738	1A9MP00929	03 -179	00929
1A9MP00746	03 -009	00746	1A9MP00930	03 -180	00930
1A9MP00750	03E-252	00750	1A9MP00931	03 -181	00931
1A9MP00769	03 -014	00769	1A9MP00932	03 -182	00932
1A9MP00770	03E-285	00770	1A9MP00933	03 -183	00933
1A9MP00771	03E-286	00771	1A9MP00937	03 -029	00937
1A9MP00774	03E-281	00774	1A9MP00937	03 -042	00937
1A9MP00775	03E-261	00775	1A9MP00937	03 -082	00937
1A9MP00776	03 -136	00776	1A9MP00940	03 -216	00940
1A9MP00791	03E-271	00791	1A9MP00941	03 -043	00941
1A9MP00805	03C-166	00805	1A9MP00942	03 -001	00942
1A9MP00806	03C-163	00806	1A9MP00943	03 -005	00943
1A9MP00807	03C-160	00807	1A9MP00944	03 -240	00944
1A9MP00808	03C-157	00808	1A9MP00946	03 -016	00946
1A9MP00809	03C-154	00809	1A9MP00951	03 -138	00951
1A9MP00810	03C-149	00810	1A9MP00956	03 -220	00956
1A9MP00811	03C-174	00811	1A9MP00958	03 -222	00958
1A9MP00815	03C-175	00815	1A9MP00960	03 -013	00960
1A9MP00816	03B-130	00816	1A9MP00962	03 -214	00962
1A9MP00817	03B-132	00817	1A9MP00963	03E-260	00963
1A9MP00819	03E-278	00819	1A9MP00972	03A-105	00972
1A9MP00824	03 -204	00824	1A9MP00973	03A-106	00973
1A9MP00831	03 -083	00831	1A9MP00974	03A-104	00974
1A9MP00833	03 -223	00833	1A9MP00975	03A-108	00975
1A9MP00835	03 -025	00835	1A9MP00976	03A-109	00976
1A9MP00847	03 -248	00847	1A9MP00977	03A-101	00977

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A9MP00983	03E-274	00983	1A9MP05007-0024	03 -031	05007-0024
1A9MP00994	03A-102	00994	1A9MP05007-0024	03 -044	05007-0024
1A9MP01205-0001	03B-125	01205-0001	1A9MP05007-0024	03 -209	05007-0024
1A9MP03618	03 -245	03618	1A9MP05007-0024	03 -217	05007-0024
1A9MP03619	03 -246	03619	1A9MP05007-0024	03 -234	05007-0024
1A9MP03657	03C-153	03657	1A9MP05007-0024	03 -243	05007-0024
1A9MP03660	03 -195	03660	1A9MP05007-0024	03 -249	05007-0024
1A9MP03662	03 -198	03662	1A9MP05007-0024	03E-254	05007-0024
1A9MP03804	03E-266	03804	1A9MP05007-0024	03E-257	05007-0024
1A9MP03805	03E-269	03805	1A9MP05007-0024	03E-267	05007-0024
1A9MP03806	03E-270	03806	1A9MP05007-0032	03 -221	05007-0032
1A9MP04143	03A-099	04143	1A9MP05007-0042	03C-172	05007-0042
1A9MP04176-0010	03 -015	04176-0010	1A9MP05007-0079	03A-086	05007-0079
1A9MP04177-0010	03 -011	04177-0010	1A9MP05007-0085	03 -139	05007-0085
1A9MP04512	03C-152	04512	1A9MP05007-0089	03 -203	05007-0089
1A9MP04574	03 -239	04574	1A9MP05007-0158	03A-095	05007-0158
1A9MP04610	03A-100	04610	1A9MP05009-0006	03 -200	05009-0006
1A9MP04661-0001	03 -019	04661-0001	1A9MP05009-0006	03E-275	05009-0006
1A9MP04662	03A-110	04662	1A9MP05009-0044	03A-094	05009-0044
1A9MP04837	03C-151	04837	1A9MP05012-0001	03B-115	05012-0001
1A9MP04838	03C-156	04838	1A9MP05012-0014	03C-169	05012-0014
1A9MP04839	03C-159	04839	1A9MP05012-0015	03B-117	05012-0015
1A9MP04840	03C-162	04840	1A9MP05012-0029	03B-126	05012-0029
1A9MP04841	03C-165	04841	1A9MP05016-0002	03 -193	50 FA 440
1A9MP04842	03C-168	04842	1A9MP05020-0001	03E-280	05020-0001
1A9MP04844	03E-265	04844	1A9MP05030-0002	03C-146	05030-0002
1A9MP05004-0003	03 -188	5555-12	1A9MP05030-0003	03 -210	05030-0003
1A9MP05004-0003	03 -197	5555-12	1A9MP05030-0006	03 -034	05030-0006
1A9MP05004-0011	03 -185	5133-9	1A9MP05030-0006	03 -039	05030-0006
1A9MP05004-0018	03E-277	5133-15	1A9MP05032-0004	03 -236	05032-0004
1A9MP05004-0022	03C-148	5133-18	1A9MP05032-0005	03A-096	05032-0005
1A9MP05004-0022	03C-176	5133-18	1A9MP05032-0007	03 -090	05032-0007
1A9MP05004-0025	03C-141	5555-18	1A9MP05032-0007	03 -194	05032-0007
1A9MP05004-0044	03 -224	5555D-18	1A9MP05032-0020	03 -230	05032-0020
1A9MP05006-0002	03C-173	AN935-2L	1A9MP05055-0002	03E-263	S11240-50
1A9MP05006-0003	03 -093	AN935-3L	1A9MP05055-0002	03E-283	S11240-50
1A9MP05006-0004	03 -004	AN935-4L	1A9MP05072-0003	03B-119	05072-0003
1A9MP05006-0004	03 -007	AN935-4L	1A9MP05079-0001	03B-122	05079-0001
1A9MP05006-0004	03 -018	AN935-4L	1A9MP05080-0001	03E-284	05080-0001
1A9MP05006-0004	03 -032	AN935-4L	1A9MP05080-0003	03E-262	05080-0003
1A9MP05006-0004	03 -140	AN935-4L	1A9MP05080-0003	03E-282	05080-0003
1A9MP05006-0004	03 -235	AN935-4L	1A9MP05152-0001	03 -010	05152-0001
1A9MP05006-0004	03E-258	AN935-4L	1A9MP05514-0006	03 -215	05514-0006
1A9MP05006-0004	03E-288	AN935-4L	1A9MP0978	03A-111	00978
1A9MP05006-0009	03 -089	05006-0009	1A9MP29241	03A-103	29241
1A9MP05006-0009	03 -211	1204-00	1A9MP29242	03A-107	29242
1A9MP05006-0009	03 -218	1204-00	1A9MP30286	03 -133	30286
1A9MP05006-0009	03 -241	1204-00	1A9MP30502	03 -189	30502
1A9MP05006-0009	03 -244	1204-00	1A9MP30504	03C-145	30504
1A9MP05006-0009	03 -250	1204-00	1A9MP30506	03 -137	30506
1A9MP05006-0009	03E-255	1204-00	1A9MP30507	03 -178	30507
1A9MP05006-0009	03E-268	1204-00	1A9MP30508	03 -207	30508
1A9MP05006-0009	03E-273	1204-00	1A9MP30509	03 -184	30509
1A9MP05006-0012	03 -035	AN935-10L	1A9MP30513	03 -187	30513
1A9MP05006-0012	03 -040	AN935-10L	1A9MP30514	03 -205	30514
1A9MP05007-0001	03 -088	05007-0001	1A9MP30515	03 -199	30515
1A9MP05007-0002	03 -092	05007-0002	1A9MP30516	03 -206	30516
1A9MP05007-0004	03 -228	05007-0004	1A9MP30517	03C-143	30517
1A9MP05007-0006	03 -020	05007-0006	1A9MP30519	03 -202	30519
1A9MP05007-0013	03 -002	05007-0013	1A9MP30520	03 -201	30520
1A9MP05007-0013	03E-287	05007-0013	1A9MP30523	03 -186	30523
1A9MP05007-0016	03E-272	05007-0016	1A9MP30590	03 -232	30590
1A9MP05007-0017	03 -003	05007-0017	1A9MP30592	03 -229	30592
1A9MP05007-0017	03 -006	05007-0017	1A9MP30593	03 -238	30593
1A9MP05007-0024	03 -012	05007-0024	1A9MP30594	03 -237	30594
1A9MP05007-0024	03 -017	05007-0024	1A9MP30595	03 -231	30595
1A9MP05007-0024	03 -021	05007-0024	1A9MP30611	03B-118	30611
1A9MP05007-0024	03 -024	05007-0024	1A9MP30612	03 -135	30612
1A9MP05007-0024	03 -026	05007-0024	1A9MP30615	03 -227	30615

REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER	REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER
1A9MP30617	03B-114	30617	1A9MP30897	03C-147	30897
1A9MP30623	03E-251	30623	1A9S-1	03A-091	00971
1A9MP30624	03E-279	30624	1A9S-1	03B-114	29117
1A9MP30671	03 -023	30671	1A9S2	03A-087	00996
1A9MP30725	03A-112	30725	1A9S3	03 -212	05577-0004
1A9MP30726	03A-084	30726	1A9S4	03 -213	05581-0001
Reference designation symbols have not been assigned to the following parts:					
REFERENCE DESIGNATION	FIG & INDEX NUMBER	PART NUMBER			
	03 -218	AN935-4L			
	10 -008	AN960C10L			
	03 -217	MS35233-13			
	03 -024	NO NUMBER			
	04 -000	NO NUMBER			
	06 -000	NO NUMBER			
	09 -037	01200			
	08 -066	01287			
	08 -064	01755			
	25 -007	04854			
	05 -000	17-1041			
	20 -000	21-1041			
	17 -000	24-104			
	04 -012	25-104			
	21 -001	26810			
	25 -010	3507			
	12 -066	5008-38			
	20 -021	5017-11			
	07 -022	5032-13			
	02 -000	626-1041			