TK-188/UG Teletypewriter Tool Kit

This article advises that stock of TK-188/UG Teletypewriter Tool Kit, FSN 5180-950-8152 is now depleted. No future procurements of this kit are planned. Activities requiring subject tool kits can requisition the component parts, which make up the TK-188/UG kit, through normal supply channels. The following Federal Stock Numbers apply:

Description	FSN
Oiler, Presto	4930-L00-2222
Oiler, Pump, Hand	4930-274-5713
Oil Can (4 oz)	9150-257-5449
Applicator, (Plastic)	5815-869-9149
Test Cable	5995-949-7662
Plug Assembly	5815-015-1294
Tape Gauge w/pins	5815-784-0316
Maintenance parts kit (9 wrenches)	5815-888-0794
Tuning Fork Case	5140-356-3891
Cleaning Cloth	Exeter #114666
Handwheel, large	5815-856-5311
Handwheel, small	5815-015-1292
Loctite (Cement)	5815-015-1296
Soldering Iron	3439-631-6821
Ungar Soldering Tip #4033	3439-827-3938
Ungar Soldering Tip #1235	3436-317-2732
Ungar Soldering Tip #333	3439-346-3537
Allen Handi-Hex Key 5/64"	5120-224-2508
Allen (all with handles) .50"	5120-293-9206
Allen (all with handles) .035"	5120-203-5107
Allen (all with handles) 7/64"	5120-L00-2221
Allen (all with handles) 1/16"	5120-293-2219
Wrench, Hexagon Key, Long	5120-954-5596-TX2X
Allen Wrench .110 or 7/64"	5120-889-2162
Allen Wrench .35"	5120-198-5400
Allen Wrench .050"	5120-198-5401
Allen Wrench 5/64"	5120-224-2504
Allen Wrench .062"	5120-198-5398
Allen Wrench .093"	5120-242-7410
Burnisher Control Tool (Contacts)	5120-247-1726
Armature Clip	5815-852-4288
Punch Bail Arm Gauge	5815-784-0317
Non-Fluid Oil	9150-252-6173
Scale, 70 Gram	6635-599-5507
Scale, 64 oz	6670-171-3987-FX5X
Tool Box	5140-494-2015
Pictorial Tool List	Not assigned

Description	FSN
Identification Plates for Tool Chest (Serialized)	Not assigned
Top Plate Adjusting Gauge	5815-784-0319
Tape Lid Gauge	5815-790-3718
Gauge Set w/metal case (TTY)	5815-448-3624
Contact Adjusting Tool (TTY)	5815-325-2204-GZ
Tommy Wrench (TTY)	5815-370-1289
Punch Block Cleaning Tool	5120-448-2082
Key Lever Remover	5815-370-1301
Alignment Tool (Orange Stick)	5120-293-2081
Contact File 6"	5110-392-2318
Spring, Hook-Pull	5120-873-4006
Spring, Hook-Push	5120-873-3998
Tool, Universal Function Bar	5120-859-7528
Socket Wrench - T	5815-370-1270
Offset Wrench 1/4" Open End	5815-412-5312
Pliers, Retaining Ring	5120-288-9717
Forceps, Retaining Ring	6515-334-7100
Forceps, Hemostatic Curved	6515-334-4300
Pliers, Long Nose	5120-247-5177
Pliers, Slip Joint	5120-223-7396
Pliers, Diagonal Cutting	5110-240-6209
Hammer, Hand, Machine	5120-243-2985
Screw Driver, 90 Degree Offset	5120-287-2130
Screw Driver, Phillips	5120-234-8913
Screw Driver 1"	5120-222-8866
Screw Driver 2c Small	5120-227-7377
Screw Driver 4"	5120-278-1282
Screw Driver 4-1/2"	5120-236-2127
Screw Driver 6" w/Holder	5120-293-3159
Screw Driver 8"	5120-278-1280
Screw Driver 10" w/Holder	5120-293-3178
Screw Driver, Jewelers	5120-180-0728
Screw Driver with Blades	5815-370-1241
Tweezers	5815-370-1242
Gauze, Tape 6" with 32nd and 05 scale	5815-125-4850
Rule 6C Machinist	5210-234-5223
Wrench, Spintite 3/16"	5120-224-2599
Wrench, Spintite 1/4"	5120-241-3188
Wrench, Spintite 5/16"	5120-224-2596
Wrench, Open End 7/16" and 3/8"	5120-277-2342
Wrench, Open End 5/16" and 3/8"	5120-277-2307
Wrench, Open End 1/4"	5120-184-8445
Wrench, Open End 3/16"	5120-184-8441
Wrench, Open End 3/8" and 9/16"	5120-293-0809
Wrench, Open End (Teleprinter)	5120-015-0811
Brush 6"	7510-550-8446
Brush 12"	7510-550-8448
Grease Gun	4930-356-3924
Grease, 8 oz tube	9150-985-7245

OPERATION WITHOUT LINE-SHUNT RELAY

When the line-shunt relay (Symbol No. K-1101, **Stock No. N5945-237-1139**) is deenergized, it contacts close the signal line circuit in the teletypewriter. When this occurs, the teletypewriter becomes inoperative. This condition may be caused by: (a) Loss of main a-c power; (b) Blown fuse; (c) Turning the a-c power switch to the "off" position; (d) Removing the typer unit from its base; (e) An open line-shunt relay coil.

Of the above cases, an open relay coil is the most difficult to detect and repair.

Reports from naval shipyards indicate that vessels have turned in for repair teletypewriters with only a defective line-shunt relay. In some instances, the coil had opened and insulating material had been inserted between the relay contacts. A spare relay was not provided with the equipment and a replacement was not immediately available from stock. Therefore it became necessary to disconnect the coil and contacts from the internal a-c and d-c circuitry to restore the teletypewriter to service and thereby meet the ship's availability date s.

It has been suggested that the relay be disconnected from the internal circuitry when the relay is defective and a replacement is not immediately available. The procedure suggested, to render the relay inoperative is as follows:

(1) In TT-47/UG, TT-48/UG, TT-69/UG, TT-70/UG. (See technical manual, NAVSHIPS 91393). Remove and tape leads C-25-0 and C-40-BL on switch S-1103. This removes the a-c from the coil of relay (K-1101). Remove and tape lead C-9-W on terminal 10 of the terminal block (TB-751). This removes the relay contacts from the d-c signal line.

(2) In TT-47/UG, TT-48A/UG, TT-69A/UG, TT-70A/UG. (See technical manual, NAVSHIPS 91713). Move the strap on terminal No. 5 to terminal 4 on terminal board TB-1104. This removes the a-c from the coil of K-1101. Remove and tape lead A-19-W on terminal 10 of terminal board TB-751. This removes the shunt contacts from the d-c signal line.

To restore a teletypewriter to service with an open shunt relay coil, it is recommended that the relay be temporarily disconnected in accordance with the above procedure. However, a replacement for the defective relay should be obtained from stock and installed as soon as practicable.

Note that with the line-shunt relay disconnected from the internal circuitry, there is no automatic means to close the signal line to prevent the teletypewriter (or other teletypewriters in the same signal circuit) from running open in case the a-c power switch is turned off or the typer unit is removed from its base. If the signal line or loop is opened because of these conditions, it will be necessary to close the line at the teletype panel by inserting a plug in the set jack.

LINE CURRENT REQUIREMENTS

TELETYPEWRITER TT-47/UG, TT-47A/UG, TT-48/UG, TT-48A/UG, TT-69/UG, TT-69A/UG, TT-70/UG, TT-70A/UG

The above teletypewriter equipments and later equipment including keyboard typing reperforators are equipped with a holding magnet selector mechanism and are wired for 60 milliampere operation. Their internal selector magnets are connected in parallel. Although this equipment is capable of satisfactory performance on a line current as low as 20 milliamperes by connecting their magnets in series, other considerations are necessary. Older equipments installed aboard ship require a 60 milliampere line current because of their type of pulling magnet selector mechanism. Until such time as certain improvements are incorporated in all terminal, teletypewriter and auxiliary equipment, each loop connecting equipment through Teletype Panel TT-23( )/SG must be adjusted to operate on a current of 60 milliamperes.

In connection with integration of radio teletypewriter equipment in a send loop, certain voltage requirements are also necessary. In the Keyer, KY-75/SRT, or similar keyers, and transmitters which have a built in f-s keyer, such as Radio Transmitting Set AN/UR T-2, 3, and 4, the teletypewriter key line input is terminated by resistors which vary from 40,000 to 150,000 ohms. One side of the resistor is normally grounded. This resistance is sifficiently high to reduce line current to a value far below the required 60 ma. It is therefore necessary to insert a parallel resistance to obtain the 60 ma. for the teletypewriter and 40 to 80 volts for the f-s keyer. The most desirable location for the parallel resistor is across line terminals 1 and 2 of the TT-23( )/SG panel. Location of the resistor at this point confines loop current to the panel and local teletypewriter lines. Voltage developed across this resistor is applied to the f-s keyer at a current of less than 1 milliampere. The value of such a resistor has been determined to be 800 ohms (JAN type RW-51-G-801, 10 watt, 5%, wirewound, dimensions, 2 in. X 5/8 in.).

Typical circuitry of a send loop in TT-23( )/SG, terminated by a teletypewriter across terminals 3 and 4, and a f-s keyer and terminating resistor across terminals 1 and 2, is shown in send circuitry portion of accompanying illustration. The 1000 ohm limiting resistor in the positive leg of each loop should never be strapped out of the circuit because it serves to protect the panel meter and teletypewriter selector magnets in the event of a cable or equipment ground.

With 120 volts applied to the loop, the following table shows the minimum and maximum loop currents and keyer input voltages obtained with the 800 ohm resistor across terminals 1 and 2:

al p Resistance	Total Loop Current	F-S Keyer Input Voltage
1860 ohms	64 ma	51 volts
4360 ohms	27 ma	21 volts

polarity of the voltage applied to the teletypewriter input terminals at the filter (Z-752) should be in accordance with that shown so that effective use is always made of the filter across key contacts in the teletypewriter. Contrary to other published information, the polarity shown on the miscellaneous jacks in the accompanying illustration is correct, and should be observed.

The internal loop circuitry in sertain TT-23/SG, TT-23A/SG, TT-23B/SG, TT-23C/SG, TT- 23D/SG, and TT[illegible]/SG panels has been found to be contrary to that sh[illegible]n the illustration. Exceptions to the illustrated circuitry will not only restrict use of the panel but could introduce sufficient difficulties to cause unsatisfactory performance.

Lock nuts, metal washers, and insulating washers on jacks in various TT- 23( )/SG panels have been found to vary in thickness. These should be of proper size to permit positive tip and sleeve connections between the patch cord plug and jack.

Typical loop circuitry terminated in a teletypewriter and f-s converter is shown in receive circuitry portion of illustration, figure 1.

TELETYPEWRITER MAINTENANCE

This material was included in a beneficial suggestion [illegible]ch proposed that the additional trouble shooting data be published for activities involved with the operation and maintenance of teletypewriter equipment.

This article includes only a portion of the data submitted.

Figures 2 and 4 contain copy samples with errors. Figures 3, 5 and 6 cover typical troubles and their cure, with reference to the copy sample involved.

[illegible]IGINAL

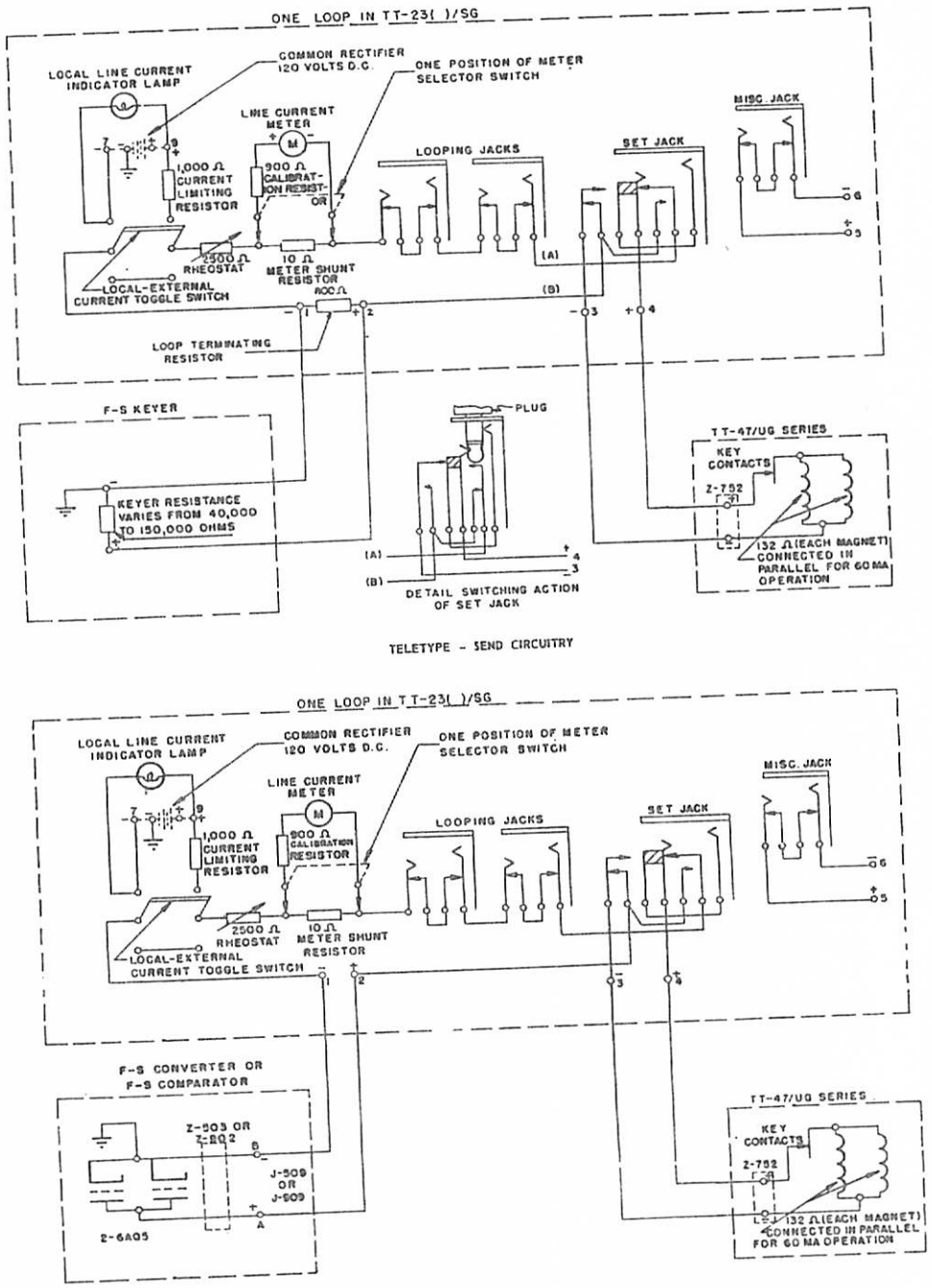


Figure 1. Teletype – Receive Circuitry

1 'HE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING

2 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DT
SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DT
SENDING

3 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS

4 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING

THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING

5 NGHE QUICK BROWN FOX JUMPED OVER A LAZY DOG J S BACK QWERTYUIOP DTS SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG J S BACK QWERTYUIOP DTS SENDING

6 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG' B
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG' B K

7 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 1234567890 DTS SENDING

8 THZ QQPCK BROWN FOX JUMPZD OVER A LAZYHDOG'S BACK 12"4561090 DTS SENDING
THZ QQPCK BROWN FOX JUMPZDHOVERHW LAZYHDOG'S BACK 12"4561090 DTS SENDPNG

9 THE QUICK BROWN FO JUM D OV R LAZY DOG'S BACK 1234567890 DTS SENDING
THE QUICK BROWN FOX J M D OVER AZY DOG' BACK 1234567890 DTS SENDING

10 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACKi234567890 DTS SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK1234567890 DTS SENDING

11 THE QUICK BROWN FOX JUMPED OVER A LAZY DOGJS BACK QWERTYUIOP DTS SENDING
THE QUICK BROWN FOX JUMPED OVER A LAZY DOG'S BACK 123 4567890 DTS SENDING

12 5 3178:(?492 , 19/ '7. 03$ 9;34 -)-"6 $9&' ?-:(1234567890 $5 3, $8, &
5 3178:(?492, 19/'7. 03$ 9;34 -)-"6 $9&' ?-:(1234567890 $5 3, $8, &

13 HHS QUICK ZROWN FMX KUMPSD MVSR U PAZY FOG'S XACK 12345678.0 FTS SSNFINV
HHS QUICK ZROWN FMX KUMPSD MVSC U PAZY FOG'S XACK 11345678. 0 FHS SSNFINV

14

Copy Samples with errors

TROUBLE	REMEDY	COPY SAMPLE #
First two characters on a line not spaced correctly	Spacing drum-stop arm adjustment. Spacing gears out of phase	1
Automatic carriage return and line feed mechanism operating too soon.	Automatic carriage and line feed adjustment.	2
Message overprints on right side.	Spacing cutout lever adjustment.	3
Extra space between lines.	Refine automatic carriage return and line feed adjustment.	4
More than one function not operating properly.	Function reset bail extension arm adjustment. Function reset bail blade adjustment	5 6
Right side of line does not print.	Printing track adjustment.	
Paper spindle too tight in bakelite guide blocks.	File end of spindle until a small amount of end play is evident when spindle is in its bakelite guide blocks.	7
Gains and loses fifth pulse.	Left decelerating slide spring broken or missing.	8
Misses several characters.	Horizontal positioning lock lever adjustment.	9
Incorrect spacing after figures shift.	Shift linkage adjustment.	10
Intermittent errors when shifting.	Slide plates adjustment.	11
Type box will not shift to letters position.	Shift lever link adjustment. Letters function pawl broken or inoperative. (Emergency repairs can be made by using unshift on space function pawl.)	12
Picks up third pulse.	Shift lever link adjustment.	13
Message piles up on left side.	Spacing cam plate adjustment. Function pawl stripper adjustment.	14

B

R

15 O

W

N

16 THE QUICK BROWN FOX JUMPED OVER A LAZY DOG JS BACK QWERTYUIOP DTS SENDING

THE QUICK BROWN FOX JUMPED OVER A LAZY DOG JS BACK QWERTYUIOP DTS SENDING

	12345 6789	12345 YUIO
17 (Copy transmitted)	12345 6789	12345 YUIO (Copy received)
	12345 6789	12345 YUIO

18 THE QUICK BROWN FOX JUMPED OVER A ZK DOG'S BACK 1234567890 DTS SENDING
THE QUICK BRWFOX JUMPED OVER A LAZY DOG'S BACK1234567890 DTS SENDING

19 EHZ QUICK BROWN FOX JUMPZD OVZR A LWZY DOG'S BWCK 12"4567890 DTS SENDING
THZ QUICK BROWN FOX JUMPZD OVZR A LWZY DOG'S BWCK 12"4567890 DTS SENDING

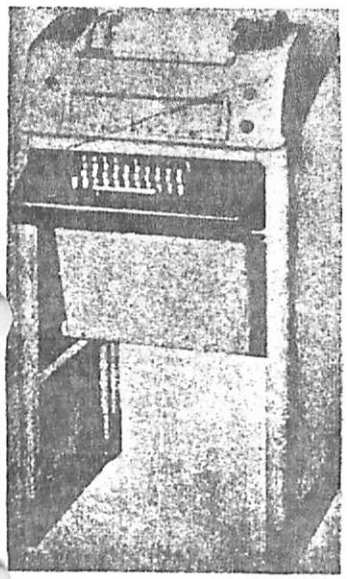
20 THEZQUICKQBRGWNHFYXFJUMPIDB VCZGAWLRZESDBG;S BACKQ12345678908DBS SEHDHH;
THEZQUICKQBRGWNHFYXFJUMPIDB VCZGAWLRZESDBG;S BACKQ12345678908DBS SEHDHH;

21 OME QUICK BRO N FOX JUMVED OVER A LAZY DOG'S BACK 3456789; DTS SENDING
OME QUICK BRO N FOX JUMVED OVER A LAZY DOG'S BACK 3456789; DTS SENDING

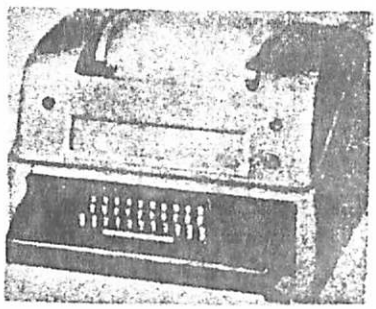
22 EHZHQQPCKHBROWNHFOXHJQMPZDHOVZRHWHLWZYHDOG'YHBWCKH12"4561090HDTYHYZNDPNG
EHZHQQPCKHBROWNHFOXHJQMPZDHOVZRHWHLWZYHDOG'YHBWCKH12"4561090HDTYHYZNDPNG

23 @HE QUICK BGOWN FOX JUMPED OVER A LAZY DOG S BACK 1234567890 DTS SENDING
@HE QUICK BGOWN FOX JUMPED OVER A LAZY DOG S BACK 1234567890 DTS SENDING

Copy Samples with errors



TT-47/UG
TT-48/UG



TT-69/UG
TT-70/UG

TROUBLE	REMEDY	COPY SAMPLE #
Copy appears as illustated.	Automatic Carriage Return and Line Feed Bell Crank not engaged properly with code bar extension. This can happen when front plate is replaced	15
Type box will not shift to figures position.	Figures function pawl broken or inoperative.	16
Copy appears as illustrated.	Unshift on space function not disabled.	17
Irregular spacing and overprinting.	Spacing feed pawl spring broken or missing.	18
Picks up fifth pulse.	Shift slide drive mechanism adjustment.	
	Right decelerating slide spring broken or missing.	19
Printing carriage incorrectly positioned.	Printing carriage position adjustment.	20
Copy appears as illustrated.	Horizontal motion stop slide springs broken or missing.	
	(Top group-Upper slide spring)	21
	(Middle group-Common slide spring)	22
	(Bottom group-Lower slide spring)	23
Keytop will not return to upward position after operation under power and printer will keep repeating selected keytop.	Non-repeat lever adjustment.	
	Code bar reset bail adjusting screw adjustment.	
	Code bar bail adjusting screw adjustment.	
Keytop will not return to upward position after operation under power.	Keytop guide not positioned correctly. (Keytops rubbing on keytop guide hole).	
	Code lever bail latch lever eccentric adjustment.	
	Keylever lock ball track adjustment.	
	Code bar bail bumper adjustment.	

TROUBLE	REMEDY	COPY SAMPLE #
Space bar will not return to upward position, all other keytops do.	Broken lever Space bar pivot adjustment	
[illegible]e Delay Mechanism [illegible]empts to stop motor while copy is being received.	Adjust	
	Add clearance between start magnet core and anti-freeze rivet on start armature.	
Two teletypewriters operate satisfactorily on separate loops but not together on the same loop.	Refine Selector Armature Spring Tension.	
Errors received that can not be eliminated by refining tuning of associated radio equipment and signal sounds normal.	Patch another teletypewriter into signal loop and take first unit out of loop. If trouble still exists, most likely it is caused by associated equipment. If trouble has disappeared, original teletypewriter is faulty, most likely in automatic typer:	
Ribbon does not feed properly after all adjustments and parts have been checked and re-checked. (applies to TT-47/UG, TT-48/UG, TT-69/UG, and TT-70/UG only)**	Most common trouble has been found to be too much tension on the right ribbon spool shaft spring. This has been corrected by reducing tension of spring (located under ribbon spool) by cutting off 1/2 turn at a time and re-checking ribbon feed operation each time	

**The TT-47A/UG, TT-48A/UG, etc., teletypewriters have a different ribbon feed mechanism. No repetitious troubles with this mechanism have been noticed.

TELETYPEWRITER (Part 2) MAINTENANCE
TT-47( )/UG, TT-48( )/UG
TT-69( )/UG, TT-70( )/UG

The previous article carries some trouble shooting data in a unique form. The originator of the material also included point-to-point checks to aid trouble isolation and assure proper operation. The point-to-point checks are presented in this second and final installment.

You can readily see that the form used lends itself to additional steps and procedures which may evolve through use of this material. If you find yourself adding a bit here and there, pass the information along and we'll try to publish revised tables from time to time so everybody can benefit.

S E L E C T O R U N I T C H E C K

Procedure	Observation	Instructions
Patch teletypewriter into a steady 60 M.A. supply at the TT-23/SG panel.		
Alternately type "R" and "Y" and move selector unit range scale arm up toward 100 until errors occur in copy.	Note the highest reading obtained with no errors in copy.	
Move the selector unit range scale arm down away from 100 until errors again occur in copy.	Note the lowest reading obtained with no errors in copy.	
	For the TT-47/UG, -48/UG, -69/UG and -70/UG, the high reading should be between 90 and 100 and the low reading should be between 30 and 40. When the lower reading is	If reading is okay, set the selector unit range scale arm between 75 to 80. (This is the setting usually found to be correct after check-

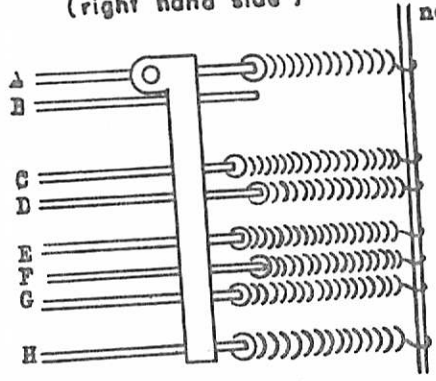
rocedure	Observation	Instruction
	subtracted from the higher reading, the result should be 60 points or more. For TT-47A/UG,-48A/UG,-69A/UG -70A/UG, the high reading should be between 110 to 120 and the low reading should be between 30 and 40. When the lower reading is subtracted from the higher reading, the result should be 70 points or more.	teletypewriter on a bias test set. If reading is okay, set the selector unit range finder knob between 70 to 75. (This is the setting usually found to be correct after checking the teletypewriter on a bias test set. If reading is not right go to next step
Check selector unit adjustments.		If trouble not found go to next step.
Check assemblies between check point #2 and check point #3 (see Block Diagram).		If trouble corrected go to Check Point #3 procedure.

C H E C K P O I N T O N E

Procedure	Observation	Instructions
Power off, select letter "R".	Observe the right hand end of code bars. Code bars #2 and #4 should move to right or mark position, #1, #3 and #5 should stay at left or space position.	If correct action takes place do next step, if not, go to step 3.
Rotate motor by hand until signal generator clutch is disengaged Select letter "T".	Code bars #1, #3 and #5 should move to right, #2 and #4 should stay at left.	If operation is satisfactory go to Check Point #2 procedure. If operation is unsatisfactory go to next step.
Make visual check of code bars and springs.		If trouble not found go to next step.
Remove automatic typer, rotate keyboard signal generator shaft by hand until signal generator clutch is disengaged, select any character or function.	The selected signal code calls for a code bar to go to the right or marking position and it does not operate.	Check for missing springs or binds in code levers, code bars or keyboard lock bar. Refer to Theory of Operation of the instruction books.

A common cause of intermittent trouble at this check point can be found in the following manner. Rotate the signal generator shaft until the signal generator clutch is disengaged and select "R".	Code bar #2 and #4 go to right.	Next step.
Now tap keylever "R" a few times while it is in its downward position.	See if code bars #1, #3 or #5 slip to right.	Next step.
Repeat check with letter "Y"	Observe if any code bar slips to the right when the teletypewriter signal code does not call for a mark pulse.	Check the code lever bail latch lever adjustment.

KEYBOARD CODE BARS
(right hand side)

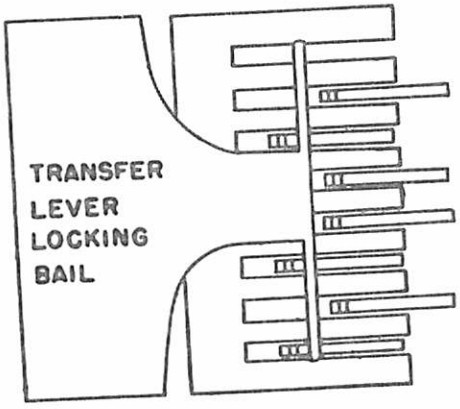


A. CLUTCH TRIP BAR
B. UPSTOP
C. No.1 CODE BAR
D. No.2 CODE BAR
E. No.3 CODE BAR
F. No.4 CODE BAR
G. No.5 CODE BAR
H. KEYBOARD LOCK BAR

Code bars positioned as at left when letter "R" keylever is depressed.

MARK SPACE

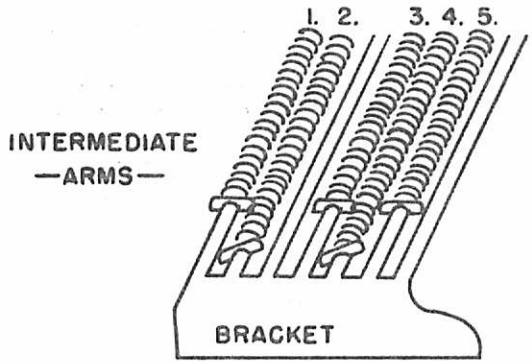
KEYBOAD TRANSFER LEVERS
(as viewed from top)



No.1 TRANSFER LEVER
No.2 TRANSFER LEVER
STOP (Permanent Right)
No.3 TRANSFER LEVER
No.4 TRANSFER LEVER
No.5 TRANSFER LEVER
START (Permanent Left)

MARK ← → SPACE

TRANSFER LEVERS POSITIONED AS ABOVE WHEN LETTER "R" KEY LETTER IS DEPRESSED



MARK (forward)
SPACE (rear)
(as viewed from the front of the automatic typer)

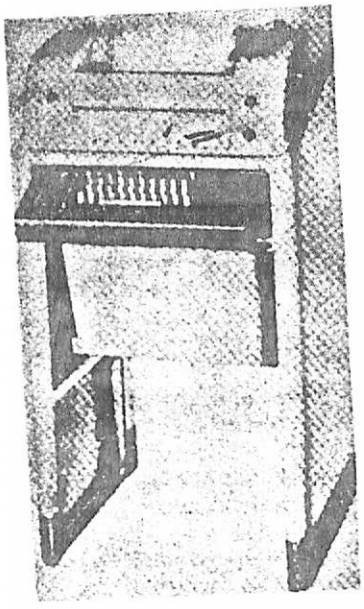
INTERMEDIATE ARMS POSITIONED AS SHOWN ABOVE WHEN LETTER "R" IS SELECTED (as viewed from the right side of the automatic typer)

C H E C K P O I N T T W O

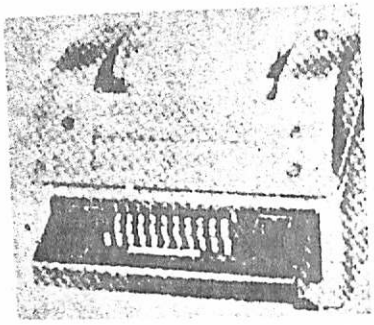
Procedure	Observation	Instructions
Power off, select letter "R".	Observe upper end of transfer levers. Upper end of transfer levers #2 and #4 should move to left, #1, #3 and #5 should stay at right.	If correct action takes place, do next step, if not go to step 3.
Rotate motor by hand until signal generator clutch is disengaged. Select letter "Y".	Upper end of transfer levers #1, #3 and #5 should move to left, #2 and #4 should stay at right.	If operation is satisfactory go to Check Point #3 procedure. If operation is not satisfactory and Check Point #1 is satisfactory, go to next step.
Check signal generator mechanism.		If trouble not found go to next step.
Check locking bail spring tension.	A common cause of intermittent trouble at this check point was found to be an insufficient amount of tension on the locking bail spring.	Turn power on, apply pressure downward on the transfer lever locking bail with one finger, type with other hand. If errors stop, increase tension on locking lever bail spring.

C H E C K P O I N T T H R E E

Power on, type letter "R".	Observe intermediate arms and associated springs. Intermediate arms #2 and #4 should be forward in a mark position, #1, #3 and #5 should be toward the rear in a space position.	
type letter "Y".	The opposite conditions exist from those above.	
Repeat step 1 test by alternately typing "R" and "Y".	Watch for any intermittent operation of intermediate arms.	If intermediate arms operate correctly, go to Check Point #4 procedure. If intermediate arms not operating correctly and Check Point #2 is okay, go to next step.
Check assemblies between Check Point #2 and Check Point #3 (see Block Diagram).		When trouble corrected, go to Check Point #4 procedure.



TT-47/UG
TT-48/UG



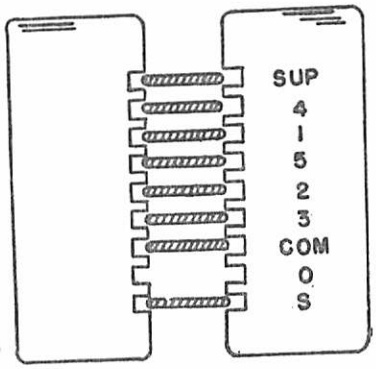
TT-69/UG
TT-70/UG

C H E C K P O I N T F O U R

Procedure	Observation	Instructions
wer on, type any character.	The code bars should be in the left position for a mark pulse and the right for a space pulse.	
type letter "R".	Code bars #2 and #4 should go to left, #1, #3 and #5 should go to right.	
type letter "Y".	Condition of Code bars are opposite from above (for R).	
Repeat above, alternately typing "R" and "Y".	Watch for any intermittent operation of code bars.	If Code bars do not set up right, check assemblies between Check Point #3 and Check Point #4 (see Block Diagram). If code bars set up okay and trouble is a function error, go to next step. If code bars set up okay and trouble is a printing error, go to step 5.

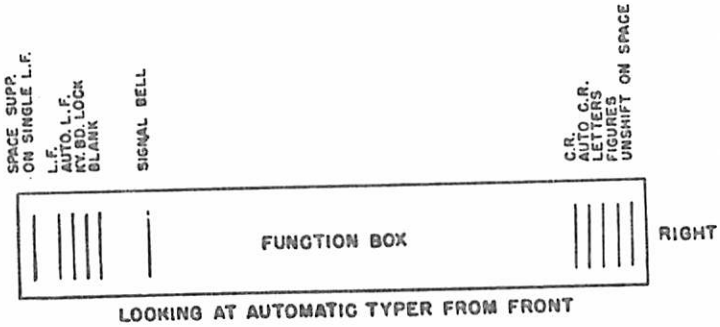
AUTOMATIC TYPER CODE BARS

MARK (left)--SPACE (right)
(as viewed from front of automatic typer)



Function Error:
Turn motor off, remove automatic typer, and lift roll of paper out of typer so that function box can be observed.

Set up function desired by pushing transfer levers or code bar shift bars to the rear when the teletypewriter signal code calls for a mark pulse; ie; to check line feed, hold #2 transfer lever or #2 code bar shift bar to a rear position.
Rotate main shaft by hand.



LOOKING AT AUTOMATIC TYPER FROM FRONT

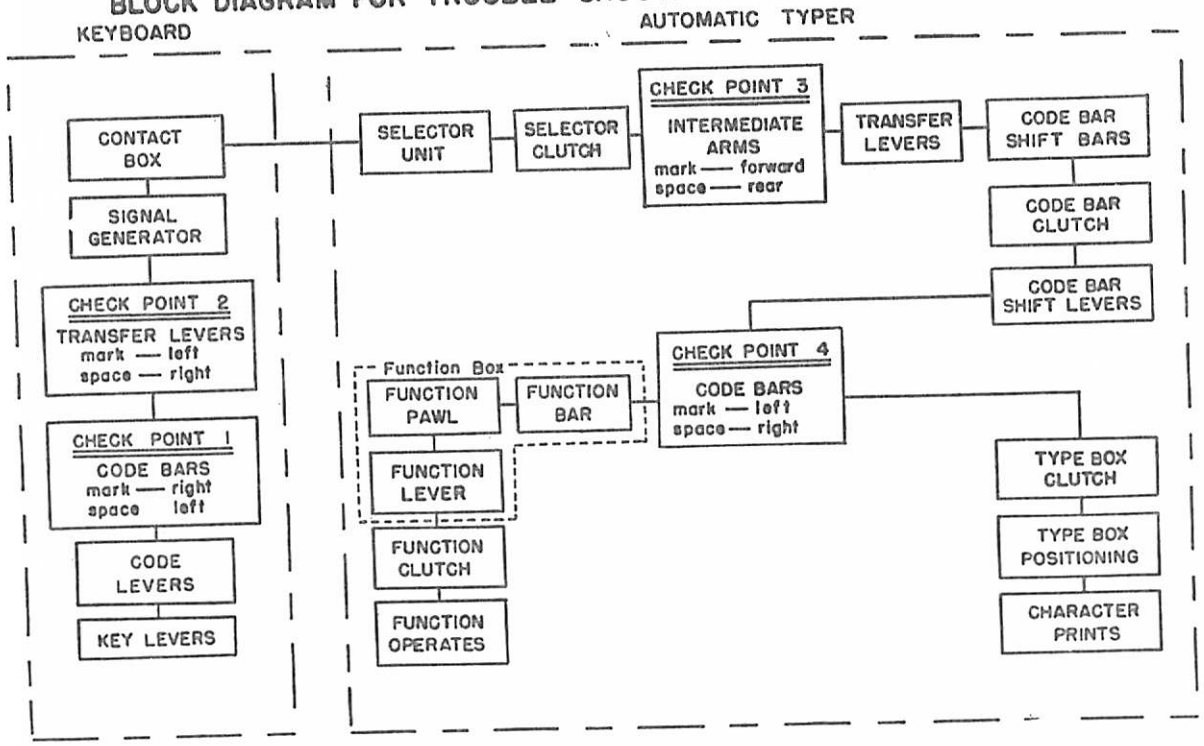
Observe action of function bar, function pawl, and function lever of suspected function.

Repeat Function Error test above as necessary.

If trouble is not apparent check Instruction Book ! theory of operation of the function causing trouble.

Procedure	Observation	Instruction
Printing Error: Set up code bars by pushing transfer levers or code bar shift bars to the rear when the teletypewriter signal code calls for a mark pulse; ie; to check "R", hold #2 and #4 transfer lever or #2 and #4 code bar shift bar to a rear position.	Observe horizontal and vertical positioning mechanism.	If trouble is not apparent, check Instruction Book 'theory of operation' of vertical and horizontal positioning mechanism.
Errors received that can not be eliminated by refining tuning of associated radio equipment and signal sounds normal.	If function trouble is indicated, start at check point #4. If intermittent or garble perform Selector Unit Check.	
Errors appear in copy while typing at local keyboard.	Refer to check point #1 procedure.	

BLOCK DIAGRAM FOR TROUBLE SHOOTING MOD. 28 TELETYPEWRITER



CAREFUL MAINTENANCE REQUIRED FOR HIGHER SPEEDS IN TELETYPEWRITERS

Maintenance personnel are hereby advised that more careful and exacting maintenance will be required when teletypewriters are geared for 100-word-per-minute speeds.

Equipments operating at 100 words per minute will require greater mechanical maintenance than those operating at 60 words per minutes.

NAVSHIPS 93241 and NAVSHIPS 92361, technical manuals for teletypewriters, contain detailed instruction for the maintenance of equipments which will be geared for 100 words per minute. Further operating experience at 100-word-per-minute speeds may indicate the need to make changes in the maintenance standards contained in Chapter 6 of the Technical Manual. Suggestions from operating and maintenance personnel are welcome.

Particular emphasis should be placed on the selector margin minimum requirements, listed in section 6 of the manuals. If a signal distortion test set is available, the printer should show a range of 72 points for zero distortion. At midpoint orientation range setting, the printer should tolerate 35-percent end distortion, as well as 35-percent marking or spacing bias.

The orientation range setting should be checked by striking the R and Y keys alternately on the local keyboard. The selector margin should be 72 points and the final range setting should be midway between the determined limits.

The manufacturer's recommended lubrication interval was omitted from NAVSHIPS 93241. This omission should be corrected by inserting the following table at the end of subparagraph 5-5a, page 5-6 of the manual.

Operating speed (Words per minute)	Lubrication and Preventive Maintenance (Whichever Occurs First)
60	3000 hours or 1 year
75	2400 hours or 9 months
100	1500 hours or 6 months

TEMPORARY HANDLES FOR TELETYPE EQUIPMENT

The purpose of this article is to provide fabrication details of handles for use in handling the TT-47, TT-48, AN/UGC-5, AN/UGC-6, AN/UGC-15, and AN/UGC-16 Teletypewriters.

The fabrication details are shown in figure 1. Parts required are standard items and are available in most sheet metal or machine shops. Two handles should be fabricated. Handles mount in existing holes located on sides of teletypewriter cabinet (see figure 2).

List of Material Required (for one handle):

Qty	Description
1	Square Steel Tubing, 7/8 in. x 16 in. long
2	Round Head Screws, 5/16 in. x 18 in. x 1-3/8 in. long
2	Extension Studs, 5/16 in. x 1 in. long
2	Steel Plates, 3 in. x 3 in. 1/16 in. thick
2	Felt Pads, 3 in. x 3 in. square
2	Nuts, 5/16 in. x 18 in.
2	Flatwashers, 5/16 in.

Fabricate two handles in accordance with details shown in figure 1.

The distance of 13-3/4 inches between the two studs is required in order that handles will fit existing holes in teletypewriter cabinet. The felt pads are glued permanently to the steel plates to protect cabinet finish. Figure 2 illustrates how handles are mounted on side of cabinet.

Handles can be used in lifting, or to tie machine to pallets in moving, relocating, hoisting aboard ship, and so on. Handles should be marked for return to teletype shop or repair area for reuse.

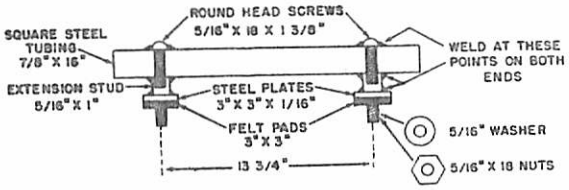


Figure 1. Temporary Handles for Teletype Equipment

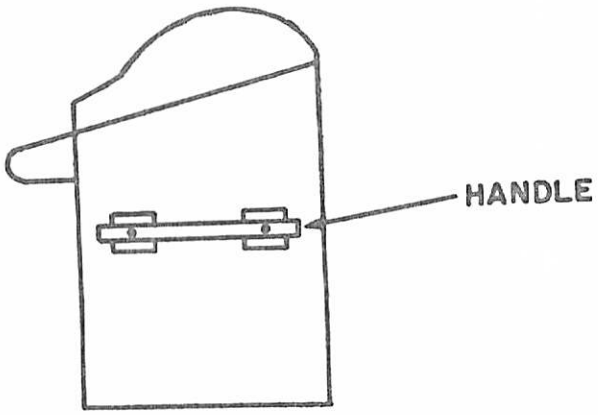


Figure 2. Mounting Location of Handles

TT-331/UG, TT-331A/UG Model 28 Torn Tape Teletypewriter Equipment Receive Group Modified for Low Level - Elimination of Electrical Shock Hazard

A shock hazard exists at the equipment tape feed-out magnet terminals after conversion to low level using modification kit MK-1110/UG. When the equipment is rewired in accordance with the modification kit installation instructions, the tape feed-out terminals are placed on the hot side of the A.C. line presenting a hazard to operating personnel when changing tape.

The following wiring change initiated by NAVCOMSTA SAN DIEGO is forwarded to all users for implementation to eliminate this hazardous condition.

1. In Teletype Corporation wiring diagram package WDP-0057, refer to AAC terminal block on wiring diagram 8424WD.
2. Change equipment wiring as follows:
   a. Relocate wire BD-27-P from terminal AAC-2 to AAC-5
   b. Relocate wire BC-27-BL from terminal AAC-4 to AAC-5
   c. Relocate wire AP-1-W from terminal AAC-5 to AAC-2 *(803)*

Model 28 Teletypewriter
Motor Burn-Out

Motor burn-out in Teletypewriter Model 28 equipped with series-governed motor has been caused by careless installation of the noise suppressor metal cover, thereby shorting out the motor governor resistor. To alleviate this situation, insert a piece of insulating fiber in the cover to prevent a short circuit. (481)

ADJUSTMENT OF PRINT HAMMER ON MODEL 28 PRINTER

The following is reprinted from a Teletype Corporation Information Letter:

"Our attention has been called to the fact that some customers are experiencing undue wear of print hammer and type pallets on the Model 28 Printer.

"Such a situation can develop where the parts involved get out of adjustment and are permitted to operate in that condition for an extended period of time. To guard against this, we recommend that your maintenance procedures be reviewed to provide that each time the typing unit is given routine servicing, the pertinent adjustments be checked and if necessary, remade. These adjustments are as follows (figure and page numbers refer to Teletype Bulletin 217B):

1. Carriage Wire Rope Requirement. Fig. 59.
2. Printing Carriage Position Requirement. Fig. 67.
3. Printing Hammer Bearing Stud Requirement Fig 67.
4. Printing Hammer Stop Bracket Requirement. Fig. 71.
5. Printing Hammer Operating Bail Spring Bracket Position. See Note: Page 1-71.

"If a routine check of the above adjustments is made whenever the typing unit is lubricated, wear of the print hammer and type pallets will be negligible. Bulletin 217B is being revised to include this recommendation." (453)

TELETYPE MAINTENANCE FOR 100 WORDS PER MINUTE (WPM) OPERATION

The Teletype Corporation Model 28 series page printers were designed for operation at 60, 75, and 100 words per minute (WPM). Parts wear because of friction, and the increased strain associated with higher speeds has created maintenance problems that were not realized at lower speeds. A machine properly maintained can be expected to give long dependable service. The following remarks and hints on maintenance should be helpful in keeping your equipment on the line.

ADJUSTMENTS

The Model 28 series teletype equipment does not require any unusual adjustment for 100 WPM operation. However, adjustments as outlined in the technical manual must be followed closely. An adjustment requiring a clearance from 0.010 to 0.020 inch should be set at 0.015 inch to expect optimum performance. An exception to the above is the gap between the clutch shoe lever wnd its stop lug. This should be adjusted to the high side (0.075 inch) of the required clearance as shown in the technical manual. DO NOT DEPEND UPON YOUR MEMORY WHEN MAKING ADJUSTMENTS - REFER TO THE TECHNICAL MANUAL.

TYPE BOX

Unless the print hammer strikes the type pallets squarely, excessive wear will result. Readjust - REFER TO THE TECHNICAL MANUAL.

COMMON TROUBLES WHEN OPERATING AT 100 WPM

At 100 WPM, the adjustments for the spring tensions on the print hammer operating bail spring and print hammer bail spring become critical. Extreme care must be exercised to assure the correct tension on these springs. Too much tension will cause excessive wear on the type pallets and, in some cases, split the type box. It is recommended that the lower prescribed limit, as outlined in the instruction book, be used, depending upon the satisfactory printing of the characters. Replace ribbon if frayed or if the printing becomes too light. Never increase tension on print hammer spring to darken print. If type smudges, remove type box and clean pallets with a stiff brush.

DASH POT

Adjustment of the dash pot screw will correct a mechanical carriage return bounce that occurs when machine speeds are increased from 60 to 100 WPM. Follow the procedure outlined in the technical manual.

VIBRATION

A check of terminal blocks and all electrical connections should be made a part of maintenence schedules. Vibration at higher speeds will sometimes loosen these connections enough to give intermittent troubles which are difficult to find. Ensure that lock washers are in place.

WORN PARTS

Do not adjust to compensate for worn parts in a mechanism. Model 28 series machines contain case hardened steel parts, and, when worn or maladjusted, may break or damage other components. Worn parts must be replaced and the associated mechanisms readjusted.

CLEANING

Failures often occur immediately after cleaning. It is important that adjustments, moving parts, and springs not be distrurbed during the cleaning process. After overhaul of a printer, check the lubrication every 2 days for a period of 8 to 10 days. The cleaning solvent remaining in the felts dilutes the lubricant and relubrication is required.

LUBRICATION

The lubrication interval for Model 28 equipment operating at 100 WPM is a critical area of maintenance. Equipment under continuous operation should be checked weekly for lubrication. A complete lubrication guide is available in the technical manual.

The recommended lubricants for teletype equipment are:

KS-7470 lube oil, FSN 9W9150-261-8297
KS-7471 grease, FSN W9158-205-6843

Proper lubrication can best be accomplished by removing the typing unit from the keyboard unit and lubricating each felt, slide, and other metal-to-metal moving parts. A check

for loose screws and nuts should be made while lubricating the equipment. Over-lubrication can be as bad as under-lubrication. Remove excess oil and grease.

RUNNING UNDER POWER

At the conclusion of any adjustment, cleaning, or lubricating, turn the motor by hand, counter-clockwise at fan end, to assure that there are no parts binding. This is important at lower speeds but becomes even more important at higher speed operation.

CONCLUSION

Proper operation at 100 WPM can be maintained by a preventive maintenance program which gives extra care in adjustments and strict attention to the lubrication intervals. DO NOT DEPEND UPON YOUR MEMORY REFER TO THE TECHNICAL MANUAL. (617–647)

TELETYPE MAINTENANCE HINTS

When servicing or adjusting teletype machines, it is sometimes necessary to clean the contacts on the selector magnet to remove pits, dirt, or corrosion. A strip of clean bond paper may be used to perform this task; however, standard teletype paper or teletype paper tape should NEVER be used because it is impregnated with oil and may form an insulating film on the selector magnet contacts. (617)

RECOMMENDED TOOLS FOR SERVICING MODEL 28 SERIES TELETYPEWRITERS

The new TE-50 (B) Teletypewriter Tool Kit contains a large number of items not required for servicing Model 28 series machines. It is recommended that activities servicing these teletypewriters draw the following listed tools and tool boxes, in lieu of the TE-50 (B) Kit, from the Naval Supply System. A large percentage of the tools on this list are available in Supply Shopping Marts. Procurement of these tools and boxes will provide servicing activities with an economical and adequate teletypewriter tool kit.

Recommended Tools for Servicing Model 28 Series Teletype Machine

Teletype Corp. No.	Description	Fed. Stock No.	Unit Price
	Tool Box (Note 1)	5140-494-2015	12.00
	Tool Box (Note 2)	5140-584-5558	3.71
152292	Armature Clip	N5815-091-9568	1.01
	Brush	7510-550-8446	.07
	Brush	7510-550-8448	.22
	Case Tuning Fork	5140-356-3891	.36
	Cloth, Cotton	8305-269-1350	.06 yd.
156170	Contact Adjusting Tool	N5815-799-3577	.45
88993	Contact Burnishing	N5120-369-8864	.61
125758	File, Contact	N5815-369-9943	.13
	Forceps, Hemostatic, Curved	6515-334-4300	2.20
	Forceps, Hemostatic, Straight	6515-334-7100	2.02
117781	Gauge set with case	N5815-448-3624	35.50
95960	Gauge, Tape	N5815-125-4850	1.60
88975	Greasegun	N4930-356-3924	4.00
	Hammer, hand, machine	9G5120-243-2985	.65
161430	Handwheel	N5815-856-5311	3.00
104457	Hexagon Wrench (.050)	KZ5120-198-5401	.01
110271	Hexagon Wrench	KZ5120-224-2504	.03
124682	Hexagon Wrench (.062)	KZ5120-198-5398	.01
159841	Hexagon Wrench (.093)	KZ5120-242-7410	.02
151383	Keylever remover	N5815-370-1301	.60
108	Magnifier with case	N5815-412-5989	.90
	Oiler, Hand	4930-204-3737	1.15*
	Oiler (Pres-to)	4930-277-1044	.90*
94646	Orange Stick	N5120-293-2081	.31
	Pliers, Cutting (Diagonal) 4½"	9G5110-240-6209	1.10
	Pliers, Long nose	9G5120-247-5177	1.20
	Pliers, Retaining ring	5120-288-9717	1.15
	Pliers, Slip joint	9G5120-223-7396	.51
159926	Punch Bail Arm Gauge with Pin	N5815-784-0317	.90
99947	Punch Block Cleaner	9G5120-448-2082	.65

Teletype Corp. No.	Description	Fed. Stock No.	Unit Price
	Rule, Machinist 6"	9G5210-234-5223	.64
152223	Scale, Gram (70 gr)	N6635-599-5461	4.48
94644	Screwdriver (30° offset)	5120-240-5244	1.00
94645	Screwdriver (90° offset)	5120-241-3162	1.00
	Screwdriver (Phillips)	9G5120-234-8913	.23
	Screwdriver 1"	9G5120-222-8866	.17
	Screwdriver (2" Small)	9G5120-227-7377	.11
	Screwdriver 4"	9G5120-278-1282	.24
	Screwdriver 4½"	9G5120-222-8862	.15
	Screwdriver (6" with holder)	9G5120-293-3159	.31
	Screwdriver 8"	9G5120-278-1272	.51
	Screwdriver (10" with holder)	9G5120-293-3178	.38
151384	Screwdriver with blades	N5815-370-1241	1.80
89954	Socket Wrench - "C"	N5120-392-0012	.90
89955	Socket Wrench	N5120-392-0013	.90
162279	Soldering Iron	3432-240-5641	11.48
142554	Spring Hook - Pull	**	.21
142555	Spring Hook - Push	**	.21
100443	Spring Scale (8 oz)	6670-599-5296	3.10
100444	Spring Scale (32 oz)	6670-291-8721	3.10
82711	Spring Scale (64 oz)	N6670-171-3987	2.20
156011	Tape Gauge with pins	N5815-784-0316	6.00
156743	Tape Lid Gauge	N5815-790-3718	1.30
73404	Tommy Wrench		.44
161686	Tool, Universal Function Bar	**	.13
159133	Top Plate Adjusting Gauge	N5815-784-0319	1.50
104986	Tuning Fork - 120 VPS	N5815-412-9066	11.00
151392	Tweezers	N5815-370-1566	.32
129537	Wrench	N5120-293-0809	.70
125765	Wrench, Open End	N5905-174-7929	3.20
125777	Wrench, Open End	N5815-412-5312	.30
113756	Wrench, Set with Case	**	
125779	Wrench, Socket	N5815-370-1270	1.72
(627-637-638)			

Note 1 – Tool Box for Large Ships
Note 2 – Tool Box for DL, DLG, DD's and below
* Approximate price
** Use teletype Corporation Number when ordering

AN/UGC-13 - CRITICOM EQUIPMENT; PAGE PRINTER SETS, MODEL 28

See article in AN/UGC-13 section under the same title.

MODEL 28KSR TELETYPEWRITERS - DISABLING OF AUTOMATIC MOTORSTOP FEATURE

The purpose of this article is to advise maintenance personnel of the proper procedures for disabling the Automati Motorstop Feature on Model 28KSR Teletypewriters.

Information obtained during shipboard inspections and from field servicing activities indicates that improper maintenance procedures are being employed to disable the Automatic Motorstop Feature on Model 28KSR Teletypewriter:

The bending or distorting of the motor control mechanism on the Electrical Service Unit (LESU) shall not be used to disable this feature. (642)

Maintenance personnel are advised that the disablement of the Automatic Motorstop Feature shall be accomplished by adjusting the time delay eccentric follower pawl to a point where it does not engage its ratchet wheel. Maintenance personnel shall accomplish this adjustment in accordance with the procedures set forth in one of the following applicable technical manuals.

Equipment	NAVSHIPS No.	Figure No.
TT-47/UG	91393	7-28
TT-47A/UG	91713	7-28
TT-47C/UG	93241	6-71
TT-176/UG	92361	7-25

MODEL 28 TELETYPEWRITERS, SELECTOR UNIT – INFORMATION CONCERNING

The purpose of this article is to clarify difference in armature and armature springs used on various units.

Armatures with one anti-freeze button, part numbers 152424, 153543, and 160180, should be used with armature spring 151715. Adjustment requirement: (A) 1-1/2 to 2 ounces for 20 MA operation, (B) 2-1/2 to 3 ounces for 60 MA operation.

Armatures with two anti-freeze buttons, part number 195251, should be used with armature spring 104824. Adjustment requirement: (a) approximately 1/2 ounce for 20 MA operation, (b) approximately 3/4 ounces for 60 MA operation.

NOTE: WITH THE SELECTOR MAGNETS ENERGIZED, THE FRONT ANTI-FREEZE BUTTON MUST BE IN CONTACT WITH ITS MAGNET CORE.

The spring tensions given above permit operation of the typing unit prior to measurement of receiving margins. Refine the spring tension for maximum selector performance, with unit connected to specific circuit in which it is to operate.

When a distortion test set is available, refine the selector armature spring adjustment to meet selector receiving margins outlined in the Technical Manual.

The two anti-freeze button armatures are being used on the latest teletypewriter equipment being manufactured. This armature is a quick release armature that helps to overcome the adhesive effect of any oil film that may be present on the armature. (673)

MOD 28 SERIES TELETYPEWRITERS AND TT-187/UG SERIES TRANSMITTER DISTRIBUTORS; MAINTENANCE OF GOLD CONTACTS UTILIZED FOR LOW-LEVEL KEYING

The purpose of this article is to provide teletypewriter maintenance personnel with recommended maintenance procedures for the Gold Contacts used in low-level keying.

CAUTION: Care must be taken to ensure that Current and Voltage higher than the 110v d-c at 5 milliamperes not be allowed through the contacts as this will damage them. NEVER PLACE LOW/LEVEL GOLD PLATED CONTACTS ON A 20 or 60 MILLIAMPERES CIRCUIT FOR TEST OR CHECKING OPERATIONS

1. The gold-plated signal contacts may be strobed with a standard distortion test set (DXD) such as the TS-383/UG. Current and voltage shall be limited to 110v dc at 5 milliamperes.

2. After strobing, clean the contacts only with TWILL JEAN CLOTH (KS2423). Burnishers, files or any type of abrasives shall not be used.

3. To clean the contacts, draw the center area of a Twill Jean strip up and down between the closed contacts but do not permit the edge of the strip to be drawn between the contacts. This procedure will prevent small fibers from the edge of the Twill Jean strip from lodging between the contacts.

4. The above recommended, on these contacts should be conducted at approximately every 1500 hours of operation or sooner if required due to improper operation.

5. After a period of service, loose specks or flakes of gold will collect in the contact box and the contact area may appear to have lost its plating. However, if clean, the contacts will conduct reliably even though the gold may not be seen without the use of a microscope.

6. When it becomes necessary to replace these contacts, order the complete contact assembly by teletype part nr. 179639, rather than individual parts in order to simplify installation.

Operating and maintenance personnel are advised that the operation of more than two teletypewriters from the output of the TSEC/KWR-37 may result in garbling. Under normal operating conditions, reliable operation of no more than two teletypewriters may be obtained from the output of the TSEC/KWR-37.

If operational requirements demand the operation of more than two teletypewriters from the TSEC/KWR-37, it is recommended that a Teletype corporation **selector magnet driver** be installed in each teletypewriter in excess of two in order to ensure reliable operation.

These **selector magnet drivers** are available in Navy stock at an estimated cost of $36.00 each. Pertinent supply data is as follows:

Nomenclature	Teletype Corp. Part No.	Federal Stock Number
Selector Magnet Driver (660)	177010	1N-5815-065-9728

MODEL 28, KSR AND ASR TELETYPEWRITERS – IMPROVED LONG RANGE LUBRICATION OF THE TYPE-BOX CLUTCH BEARING

The purpose of this article is to provide long range lubrication for the type box bearing P/N 150046 by the addition of an oil wick, P/N 74756 (FSN 1N5815-125-8117) on the type box clutch.

Remove drive link 150244 in order to slide the oil wick 74756 over the left end of the bearing 150046. Replace the 150244 drive link and lubricate the oil wick with KS-7470 oil. (689)

MODEL 28 SERIES TELETYPEWRITERS – MAINTENANCE HINT

Several reports have been received indicating that the spacing shaft helical driving fear mounting screws have loosened, causing a bind in the main shaft of the typing unit. This results in stripped gears in the drive mechanism. Maintenance personnel should check tightness of the 152887 screws during routine maintenance periods by using a 5/32 inch open end wrench (Teletype Part No. 154393) contained in the TK-188/UG tool kit. (EIB 715)

Model 28, ASR Teletypewriters–Shock Hazard

This article provides a warning that Model 28, ASR Teletypewriters, Typing Reperforator units with non-interferring Tape Feed-out availability have a possible shock hazard due to exposed terminal connections to Tape Feed-out magnets.

Teletypewriter units mamufactured since January 1969 have these terminal connections covered with heat shrinkable tubing. All commands should insure that terminal lugs for the Tape Feed-out magnets be checked and necessary precautions be taken to eliminate the possible shock hazard by installing heat shrinkable tubing, insulating spaghetti or replacement of the present terminal lugs with insulated lugs.

TELETYPE MODEL 28 CONSOLE, AN/UGC-15, -16, -16A, AND -18--INSTALLATION PROBLEMS

The new Teletype Model 28 ASR sets are similar to older Model 28 units, but differences exist which may cause installation problems. AN/UGC-15, -16, -16A, and -18 correspond to AN/UGC-5, -6, -6A, and -8, respectively, but have three significant changes.

1. AN/UGC-15, -16, -16A, and -18, as delivered, are are equipped for 7.00 unit code because of a planned conversion of Naval equipment to this code. Because of delay of the planned conversion, this equipment must be operated at 7.42 unit code in many cases. The 7.42 unit code transmission is necessary when operating non-stepping into a crypto device. However, if a distribution system for stepping pulses can be arranged, the sets may be operated at 7.00 unit code/75 baud without incompatibility. Where crypto devices are not involved, 7.00 and 7.42 unit codes will interoperate if the baud rates are nearly equal. For instance, 7.00 code/75 baud and 7.42 code/74.2 baud are compatible with only slight loss of range at the receiving selector.

Where conversion from 7.00 unit code to 7.42 unit code is necessary, installing activities should order mod kits direct from Teletype Corp., since they will not be available in Navy stock for 6 to 9 months. Teletype mod kit 194266 ($61.80 each) converts AN/UGC-15 to 7.42 unit code; mod kit 194265 ($76.56 each) converts AN/UGC-16, -16A and -18 to 7.42 unit code. All 7.00 code parts removed during modification should be retained for eventual reconversion from 7.42 to 7.00 unit code when directed by the Chief of Naval Operations.

2. The AN/UGC-15, -16, -16A, and -18 include the necessary magnet, armature, contact, and linkage in the keyboard for synchronous pulsed transmission. Nonpulsing operation requires disabling of this feature. As shown in the equipment technical manual (T-2 and T-3 changes to NAVSHIPS 93534), a mechanical clamp is provided to hold the armature against the magnet. Clamping the armature holds the linkage in the activated position and allows free-running transmission from the keyboard. This method of disabling allows on-line keyboard signal generation in all operating modes, including the normal off-line tape preparation "T" mode. Since this condition is not desirable in most installations, an alternate method of disabling the synchronous pulse transmission system is available. Energize the pulsing magnet (50 milliamps d.c. maximum) in the "K" and "KT" modes to allow free-running signal generation. Open the pulsing circuit in the "T" mode to allow tape preparation without keyboard signal generation. This switching may be done by adding a separate switch or by using the mode selector switch. It shoual be noted that the transmitter-distributor is also equipped for stepping operation. For non-pulsing operation, the clutch magnets must be wired parallel as shown in the equipment technical manual.

3. The AN/UGC-15, -16, -16A, and -18 include a keyboard typing reperforator rather than the typing perforator used on the older sets. The reperforator, since it has a receiving selector, can produce tape either electrically on-line or mechanically off-line. However, regardless of the mode of operation used, the selector must be terminated to avoid continuously running open. If only keyboard mechanical perforation "T" mode is needed, the selector can be terminated with a holding d.c. (60 milliamp maximum) or with a mechnical strap to hold the armature stationary. If signal line tape preparation is required on the keyboard reperforator, as well as on the auxiliary reperforator, connect the selector to the signal line, using appropriate line battery and relay (not provided with the set). If both of these methods are used together, an external patching arrangement is required for connection to holding d.c. for keyboard perforation, to a signal line for receive reperforation, or to the keyboard signal line for monitor use.

Detailed installation instructions and wiring diagrams, in the form of an improved supplement to the equipment technical manual, are now available. This supplement is identified as temporary change T-4 to NAVSHIPS 93534, data January 1964. It has been distributed to equipment holders where end destinations were available and to NSD Philadelphia for stock. Copies should be requisitioned by the usual procedures. If present installations of equipment are satisfactory, no changes are required by the issuance of this technical manual supplement.

AN/UGC-20, AN/UGC-25 TELETYPEWRITERS–MAINTENANCE HINT

Caution should be exercised when handling the LP-111 Automatic Typers of the AN/UGC-20, AN/UGC-25 Teletypewriters. Due to the shortened side frames, the LP-111 Automatic Typer cannot be rotated to the number three maintenance position. It is stressed once again that no Automatic Typer should ever be rested on the front plate mechanism. (689)

AN/UGC-20 TELETYPEWRITER MAINTENANCE HINT-IMPROVED REPEAT KEY OPERATION

Reports have been received that the repeat key on Teletypewriter AN/UGC-20 is sticking. Refer to NAVSHIPS 0967-059-9010, technical manual for Teletypewriter AN/UGC-20, Section 573-116-703, Paragraph 2.06, Keyboard Transmitter Positioning. Ensure that the left and right brackets are positioned all of the way forward against the rear mounting screws.

When the requirement of the above paragraph is met and the 195307 keylever has not been distorted, the keylever with line up with the center of the actuator on the 195322 switch. This prevents the keylever from slipping by the actuator and sticking in the operated position. (704)

AN/UGC-20, AN/UGC-20A TELETYPEWRITER SETS–MAINTENANCE HINT

Many activities have reported breaking the plastic projections of the keytop guide plate on AN/UGC-20 Series equipments. The keyboard must be removed from the keyboard base pan by means of the four shoulder mounting screws before the keytop guide plate can be removed. With the two keytop guide plate retaining rings and the left keyboard bracket mounting screws removed, disengage the left keyboard bracket. With the right keyboard mounting screws loosened, lift the keytop guide plate at the end and disengage from the keylevers and right keyboard bracket. Avoid complete disengagement of the right keyboard bracket frame. The keytop guide plate may now be rotated to the rear of the keyboard to permit maintenance. For complete keytop guide plate removal, the fuse holder and "ON/OFF" switch must be removed from the keytop guide plate by means of their mounting nuts. (EIB 722)

AN/UGC-20, AN/UGC-25 Teletypewriters—Installation Information

Several reports have been received of activities improperly installing the AN/UGC-20, AN/UGC-25 series teletypewriters. NAVSHIPS 0967-059-9010, Section 573-100-202, provides installation information. The 305051 shipping stud, which secures the equipment to the plywood pallet for shipping, disables the internal shock mounts of the equipment, figure 1.

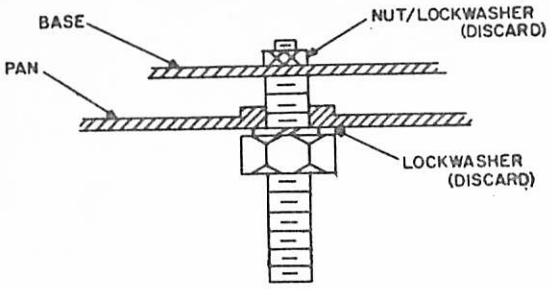


Figure 1. 305051 Shipping Stud

If the 305051 studs are to be used for mounting the equipment without external shock mounts, the 305051 stud should be modified as shown in figure 2. This may be accomplished

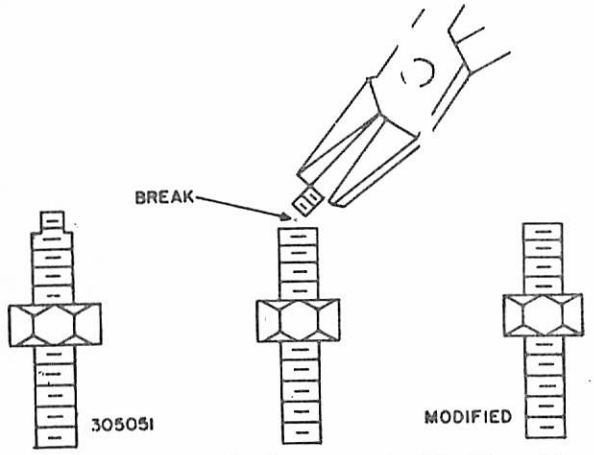


Figure 2. Method of Modifying Stud for Use with Equipments without External Shock Mounts

by holding the stud in a vise and snapping off the top portion with pliers. A flat washer, approximately 1/8" thick must be inserted between the stud nut and the bottom of the equipment pan as shown in figure 3. This

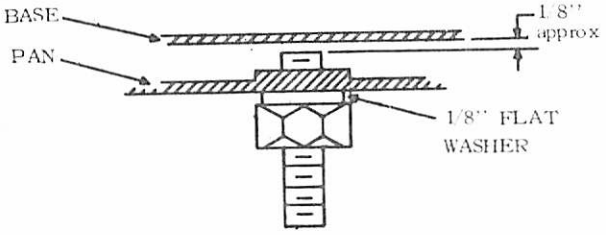


Figure 3.. Modified Stud Installed

method of mounting permits the equipment internal shock mounts to function, reducing noise and harmful vibration. This action should be taken immediately by activities with noise and vibration problems. (836)