

28 ASR TELETYPEWRITER
FULL DUPLEX OUTLYING STATION ARRANGED FOR
FAST INTER-LINE NON-PRINTING ACTIVATE CONTROL
(FINAC)
DESCRIPTION, OPERATION AND TESTS

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1. GENERAL

1.01 This section gives a description, the operating principles and test procedure for the "28 ASR-Teletypewriter-Full Duplex Outlying Station Arranged for Fast Inter-line Non-printing Activate Control" circuit per EA-12944.

2. DESCRIPTION

2.01 This circuit arrangement is designed for use at an outlying station on a full duplex circuit on which a master station automatically sends Transmitter Start Codes (TSC's) each time a carriage return (CR) is transmitted on the Master station send side.

2.02 In the absence of transmission on both sending and receiving circuits the Master station control equipment will automatically generate a CR followed by a TSC character until a transmitter start is effected.

2.03 The purpose of the circuit is to place the Transmitter-Distributor (T-D) of the station 28 ASR under the control of contacts in the stunt box so as to permit the T-D to respond to a TSC to which the typing unit under all conditions will be blind.

2.04 The TSC can be only one of the characters Y, B, A, X, Z, J, S, D, W, F or E, each preceded by CR.

2.05 For the most equitable distribution of TSC's, character assignments should be made per Table A of EA-12944-ED and be covered by Service Order.

2.06 Speed of operation may be 60, 75 or 100 WPM.

2.07 (a) Transmission from all outlying stations must be on a torn tape basis.

(b) Master station operation is designed for torn tape, but due to the normally heavy volume of traffic handled, it is expected that the tape will be fed mostly on a continuous basis. This continuous tape will have no effect on TSC transmissions unless the tape becomes taut. This condition is described in another paragraph.

2.08 The number of outlying transmitting stations is limited to eleven. A lesser number is permissible, in which case some stations should be arranged to respond to more than one TSC.

2.09 For economic reasons a circuit should not operate with less than three outlying sending stations.

2.10 In this type of duplex operation there are four conditions under which TSC's must be transmitted on the send circuit to obtain transmission on the receive circuit without extraneous printing on the outlying station received copy or interference to existing transmission on the Master station receiving circuit.

2.11 These conditions are as follows:

- (a) Master station transmitting - Outlying station transmitting.
- (b) Master station transmitting - Outlying stations idle.
- (c) Master station idle - Outlying station transmitting.
- (d) Master station idle - Outlying stations idle.

2.12 Under condition (a) the TSC generator will automatically transmit a BLANK character after every CR in the Master station tape.

All outlying station receiving units are blinded on every CR for the one character following (TSC), hence no printing occurs. The BLANK transmitted in place of a TSC character is a non-valid code so there can be no false transmitter starts to interfere with existing transmission.

2.13 Under condition (b) the TSC generator will transmit a new valid TSC character after each CR in the Master station tape until a successful transmitter start is effected at which time condition (a) again prevails. As in paragraph 2.10, all outlying station receiving units are blinded for the one character after CR so that no TSC's are copied.

2.14 Operation under condition (c) requires no TSC's to be transmitted inasmuch as transmission on the receiving circuit already exists. The code generator circuit becomes deactivated until either the Master station starts transmission or the receiving circuit becomes idle. TSC coding will then resume as in conditions (a), (b) or (d).

2.15 Under condition (d) the CR and TSC character will be generated and continuously transmitted until the circuit reverts to conditions (a), (b) or (c) at which time the TSC's will be transmitted as described in paragraph 2.12 and 2.13 respectively.

2.16 TSC characters are fixed in the coding selector and no changes should be made without referring to the Design Engineers Group.

2.17 Message format is the same as is used for AN stunt box operation which is fully described in Section P70.035.

2.18 Call Directing Codes (CDC), End of Address and End of Message coding are all standard operations.

2.19 Transmitter start operation is controlled by use of a TP-155560 relay which is mounted on the electrical service unit. The required stunt box modifications are described in EA-12944-ED.

2.20 Those functions which the stunt box must perform for the proper operation of the blinding and unblinding features are as follows:

Select-nonprint - After receipt of disconnect code.

Select-print - After receipt of CDC and before receipt of End of Address.

Nonselect-print - After selection and receipt of End of Address code.

Nonselect-nonprint - After receipt of End of Address at nonselected stations.

2.21 In addition to the above standard stunt box operations, a contact assembly is installed in slots 33 and 34 which will blind the typing unit after receipt of every CR character for the one character following.

2.22 Inasmuch as the character following every CR will normally be a valid or nonvalid TSC, a transmitter start will occur when required without the TSC character appearing in print at any station.

2.23 The transmitter start is effected through contacts in slot 20 and the TP-155560 relay.

2.24 In the event of taut, tangled or torn tape, the transmitter will be automatically halted and another valid TSC is required to restart transmission.

2.25 Inasmuch as all transmissions are directed to the Master station, it is not essential that serviced tape be restarted from the beginning, but if it is not, it will result in a piece-meal message if any other transmission occurs before a restart of the tape.

2.26 Operation of the Line-Test key to TEST position not only placed a short on both sending and receiving loops to maintain continuity on the sending and receiving circuits, but connects the keyboard with the line relay in a local dummy circuit.

2.27 In the TEST position a maintenance man can type his own TSC's and CDC for a local check of stunt box operation for blinding, unblinding, station connect and transmitter start operations.

3. TRANSMITTER START CODE OPERATION

3.01 A Transmitter Start Code such as "CR Y" will momentarily operate the contact over slot 20.

3.02 If the transmitter START-STOP and TAPE OUT switches are both closed, relay (TS) will operate to:

(a) Lock around the slot 20 contact.

(b) Close the Micro-switch contacts to operate the T-D clutch magnet to start transmission.

3.03 (a) If the tape becomes taut, tangled or torn, the lock path for the (TS) relay will be broken and transmission cannot start again until another valid TSC is received.

(b) At the end of tape the (TS) relay will be unlocked to stop transmission in the normal manner.

4. TESTS

4.01 When testing a 28 ASR or RO for functional operation it is advisable, when possible, to observe operations during actual service.

4.02 The desired results would be such as occurs from the operations described in paragraphs 2.12, 2.13, 2.14 and 2.15.

4.03 Coordination of the Serving Toll Test Center is required inasmuch as an outlying station is blinded to all transmissions from the Master station unless connected by a CDC and sees nothing of transmissions on the Master station receiving circuit except the operation of its own transmitter.

4.04 Besides making transmission measurements in both directions, the STTC after assuring that the TSC coding circuit is operating correctly, should then keep the outlying station constantly advised as to every operation that occurs which is concerned with the blinding and unblinding features.

4.05 As each functional operation is described by the STTC the outlying station should check for the proper response by its stunt box.

4.06 A complete check of operation includes reception of a message during which valid and nonvalid TSC's have been transmitted, a successful transmitter start and a restart after tape servicing.

4.07 Note that if the STTC were to transmit test by keyboard, they would have to insert some random character or another CR after CR at the end of a line, otherwise the following LF would be lost due to the blinding action after CR.

4.08 More detailed description of the results to be expected from functional operations are described in the following paragraphs covering tests with the 28 ASR in the TEST condition.

4.09 Those functions which must be tested to insure proper operation of this arrangement are as follows:

Code	Function
CR	Blind typing unit
CR A (Valid TSC)	Blind typing unit Transmitter Start
CR C (Non-valid TSC)	Blind typing unit
CR BL (Non-valid TSC)	Blind typing unit
FIGS H LTRS (end of message)	Prepare for new CDC
CDC LTRS	Prepare to print
CR LF LTRS (end of address)	Prepare to print all others locked out

4.10 To make tests locally, arrange the 28 ASR as follows:

- (a) Power on
- (b) LINE-TEST key in TEST position
- (c) K-KT-T key in K position
- (d) Place torn tape containing test sentence in transmitter gate. No address format is required.
- (e) Transmitter START-STOP switch in RUN position. (Right)

4.11 The 28 ASR keyboard can now be used to type characters and codes necessary to produce all the functional operations that would normally occur on a transmission from the Master station.

4.12 (a) The message below, when typed by keyboard, will simulate all those operations to be expected in actual operation.

Note: BL and C are assumed non-valid TSC while A is assumed valid. FIGS H LTRS CDC LTRS CR BL LF LTRS TEST CR A LF TEST CR BL LF TEST CR C LF TEST CR LTRS LF FIGS H LTRS

(b) The result of this test sentence should be only four lines of copy, each line reading TEST and located at the extreme left edge of the paper as below:

TEST
TEST
TEST
TEST

(c) If tape were in the transmitter a transmitter start should have been effected upon receipt of a CR A. No

printing should have occurred upon receipt of CR C, CR A or CR BL and line feed should have been activated each time LF was transmitted.

4.13 During the typing of the test message, the following operations should have been observed:

<u>Characters</u>	<u>Conditions</u>
FIGS H LTRS (End of Message)	Select-Nonprint Prepare for new CDC
CDC LTRS	Select-print-LTRS
CR (First part of TSC) (End of Address)	Carriage return Blind typing unit to character following
BL (Non-Valid TSC) (End of Address)	No operation
LF (End of Address)	Line feed-Non-select
LTRS (End of Address)	LTRS
TEST (TEXT)	PRINT
CR (First part of TSC)	Carriage Return Blind typing unit to character following
A (Valid TSC)	Transmitter start if tape available
LF	Line Feed
TEST (TEXT)	PRINT
CR (First part of TSC)	Carriage Return Blind typing unit to character following
BL (Non-valid TSC)	No operation
LF	Line Feed
TEST (TEXT)	PRINT
CR (First part of TSC)	Carriage Return Blind typing unit to character following
C (Valid TSC)	Transmitter start if tape available
LF	Line feed
TEST (TEXT)	PRINT
CR (First part of TSC)	Carriage Return Blind typing unit to character following
LTRS (Non-valid TSC)	LTRS
FIGS H LTRS (End of Message)	Select nonprint - Prepare for new CDC

4.14 (a) Taut, tangled or torn tape may be simulated by operating the transmitter START-STOP switch to the LATCH (Center) position while tape is being transmitted.

(b) Observe that transmission will not restart when the switch is restored to the RUN (right) position, but that a new valid TSC is required.

4.15 These tests should be made over a ten to fifteen minute period to insure that the blinding and unblinding, TSC and CDC features all operate satisfactorily.

4.16 In the event of finding and clearing any trouble, all tests should be repeated and special attention given the faulty feature to prevent a recurrence.

5. REFERENCES

EA-12615	Transmitter Control Arrangement for Master Station (FINAC)
E12.762	28 ASR Teletypewriter-Full Duplex Outlying Station arranged for Fast Inter-Line Non-Printing Activate Control (FINAC)
P70.923	Transmitter Control Arrangement for Master Station (FINAC) Description, Operation and Tests
P34.101	28 ASR - Description
P34.102	" - "
P34.103	" - "
P34.104	" - Requirements and Procedures
P34.614	" - " " "
P34.631	" - " " "
P34.632	" - " " "
P34.301	" - Wiring
P34.304	" - "
P70.035	28 Stunt Box - Description and Operating Principles