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

CONTENTS

1. GENERAL

1.01 This section gives a description, the operating principles, and test procedure for the "28ASR Teletypewriter - Full Duplex Outlying Station Arranged For Fast Inter-Line Non-Printing Activate" circuit per EA-12616.

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 (TSCs) every time a carriage return (CR) is transmitted on the Master station send side.

2.02 In the absence of transmission on both the 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) under the control of contacts in the stuntbox of a 28ASR so as to permit the T-D to respond to a TSC to which the typing unit 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 a CR.

2.05 For the most equitable distribution of TSCs, character assignments must be made according to the TSC Coding Table on EA-12616SD.

2.06 Speed of operation may be 60, 75, or 100 W.P.M.

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 to be handled, it is expected that the tape will be fed mostly on a continuous basis.

(C) 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 stations is limited to eleven. A lesser number is permissible, in which case some stations may be arranged to respond to more than one TSC.

2.09 In this type of duplex operation there are four conditions under which TSCs 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.

2.10 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 stationsidle.

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

(B) All outlying station receiving units are blinded on every CR for the one character following, hence no printing occurs.

(C) The BLANK transmitted in place of a TSC character is an non-valid code so there can be no false transmitter starts to interfere with existing transmission.

2.12 (A) 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.

(B) As in paragraph 2.11 all outlying station receiving units are blinded for the one character after CR so that no TSCs are copied.

2.13 (A) Operation under condition (C) requires no TSCs to be transmitted inasmuch as transmission on the receiving circuit already exists.

(B) The Coding circuit becomes deactivated until either the Master station starts transmission or the receiving circuit becomes idle.

(C) TSC coding will then resume as in conditions (A), (B) or (D).

2.14 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 TSCs will be transmitted as described in paragraphs 2.11 and 2.12 respectively.

2.15 (A) Only one two-character Call Directing Code (CDC) may be used on a stuntbox thus precluding the use of a broadcast or group code.

(B) CDCs may be composed of any two alphabetical characters with the usual restrictions as to the use of T,O,M, and V.

(C) The end-of-message code must be FIGS H CR.

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 Functions which the stuntbox must perform for the proper operation of this arrangement are as follows:

(a) Recognize its two character CDC and prepare to shift to the print condition following the next character after the CDC.

(b) Blind the receiving unit for a single character following CR.

(c) Place the stuntbox in the non-selective condition when the first line feed is registered.

(d) Recognize one or more assigned TSCs and start transmitter operation if there is tape in the gate when the TSC is received.

(e) Assume the selective condition when FIGS H is received and to then lock into the non-print condition on the next CR.

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

2.19 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 transmissions had occurred before a restart of the tape.

2.20 Operation of the LINE-TEST key to the TEST position not only places 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.

2.21 In the TEST position a maintenance man can type his own TSCs and CDC for a local check of stuntbox operation for blinding, unblinding, station connect, and transmitter start operation.

2.22 The control equipment consists of a TP155560 relay which is mounted

in the 28 cabinet. The required stuntbox modifications are described in EA-12616ED.

3. THEORY OF OPERATION

3.01 The major functional operations for this arrangement are concentrated in the function bars and levers in slots 33,34, and 35 of the stuntbox.

3.02 In the select condition, receipt of the CDC will operate the lever in slot 33 which will:

(A) Lock to the latch release bail until FIGS H.

(B) Unblock the bar in slot 34.

3.03 The function bar in slot 34 will respond to any character if the stuntbox is in the non-print condition, and if the bar has been unblocked by the slot 33 lever. Operation of the slot 34 lever will:

(A) Lock to the release stud of slot 35.

(B) Shift the stuntbox to the print condition.

3.04 Thus on a sequence; CDC-LTRS-CR, the LTRS character will put the stuntbox into print and the carriage will be returned in response to the CR character.

3.05 (A) The function lever in slot 35 will operate on any CR character when the stuntbox is in the print condition.

(B) This lever is equipped with a stud extending back to slot 34 so that its operation will release the lever in slot 34 thereby restoring the stuntbox to the non-print condition.

(C) If the lever in slot 33 is still operated, the slot 34 lever will re-operate on the next character so that the non-print condition may be seen to exist for one character only following each and every CR.

3.06 The "End-of-Address" code is "line-feed" and operates the function lever in slot 14 which will:

(a) Lock to the latch release bail until FIGS H.

(b) Make the stuntbox non-selective to prevent further response to CDCs.

3.07 The "End-of-Message" code, FIGS H CR, provides the following action:

(a) The FIGS H operates the latch release bail which will unlock the levers in slots 14 and 33.

(b) The stuntbox is now in the select-print condition.

(c) The CR will unlock the lever in slot 34 and the stuntbox then becomes non-printing.

(d) Additional characters cannot re-operate the slot 34 lever since the function bar is blocked from slot 33 until another valid CDC is received.

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

3.09 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.

3.10 (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 the 28ASR and its functional operations it is advisable, when possible, to observe operations during actual service.

4.02 The desired results of these observations would be such as would occur from the operations described in paragraph 2.11, 2.12, 2.13 and 2.14.

4.03 Co-ordination 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 Aside from 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 stuntbox.

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

4.07 (A) It should be noted that if the STTC were to transmit test by Keyboard, they would have to insert some character after CR at the end of a line, otherwise the LINE FEED following CR would be lost due to the blinding on CR.

(B) When using the automatic FOX test sentence this lost function does not occur as the FOX test has a double CR before the LINE FEED.

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

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

Codes	Function
CR	Blind typing unit
CR A (Valid TSC)	Blind typing unit Transmitter Start
CR X (Nonvalid TSC)	Blind typing unit
CR BLANK (Nonvalid TSC)	Blind typing unit
FIGS H CR (End of Message)	Prepare for new CDC
CDC LTRS	Prepare to print
CDC LTRS LF (End of Address)	Prepare to print-all others locked out.

4.10 To make tests locally, arrange the 28ASR 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 28ASR Keyboard can now be used to type the 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:

(B) BLANK and X are assumed nonvalid TSCs. A is assumed a valid TSC.

(C) FIGS H CR LTRS CDC LTRS LF TEST CR X LF TEST CR A LF TEST CR BLANK LF TEST FIGS H CR.

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

TEST
TEST
TEST
TEST

(E) If tape were in the transmitter, a transmitter start should have been effected upon receipt of CR A.

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

Characters	Conditions
FIGS H CR	Shifts to select non-print.
CDC	(a) Prepares to shift to print after receipt of the next character. (b) Unblocks blinding arrangement.
LTRS	(a) Print condition after receipt of character. (b) Activate blinding arrangement. (c) Any other character can be used but no printing will occur until receipt of the next character. (d) If LTRS is used the unshift does not occur until after the next character.
LF	(a) Line feed. (b) Lock to latch release bail until "End-of-Message". (c) All stuntboxes nonselective to CDCs.
TEST	Prints characters.
CR	(a) Carriage return. (b) Shifts to non-print condition.
X	(a) Character does not print. (b) Shifts to print condition after receipt of character.
LF	Line feed
TEST	Prints characters.
CR	(a) Carriage return (b) Shifts to non-print condition.
A	(a) Transmitter start (If tape available) (b) Character does not print (c) Shifts to print condition after receipt of character.
LF	Line Feed
TEST	Prints Characters.
CR	(a) Carriage return. (b) Shifts to non-print condition.
BLANK	(a) Shifts to print condition after receipt of character. (b) No functional operation.
LF	Line feed.
TEST	Prints characters.
FIGS H CR	Shifts to select non-print.

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

EA12615 - Transmitter Control Arrangement for Master Station (FINAC)

E12.762 - 28ASR Teletypewriter - Full Duplex Outlying Station Arranged for Fast Inter-Line Non-Printing Activate Control.

P70.923 - Transmitter Control Arrangement for Master Station (FINAC) Description, Operation and Tests.

P34.101 - 28ASR Description

P34.102 - " "

P34.103 - " "

P34.104 - " Requirements and Procedures.

P34.614 - 28ASR Requirements and Procedures.

P34.631 - 28ASR Requirements and Procedures.
P34.632 - 28ASR Requirements and Procedures.
P34.301 - 28ASR Wiring
P34.304 - 28ASR Wiring