SEQUENTIALLY CONTROLLED AUTOMATIC TRANSMITTER START (SCATS) SYSTEM

CONTROL STATION

DESCRIPTION, OPERATION, AND TEST PROCEDURE

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1. GENERAL

1.01 This section supersedes Issue A and Addendum.

1.02 This section is reissued to present pertinent information relative to three-line cross-office automatic tape relay operation which has not previously been described, and to incorporate that information pertaining to the transmitter "lead-trailer" arrangement previously covered in the Addendum.

1.03 This section provides a description, the operating principles, and test procedure for a control station of the Sequentially Controlled Automatic Transmitter Start (SCATS) System per EA-10669-SD.

1.04 In addition to the information furnished for the sequential transmitter start circuit on which SCATS operation is based, similar type information is furnished for numerous auxiliary features.

2. DESCRIPTION

2.01 The SCATS system operates on a torn-tape basis, utilizes 28 stuntbox operation for selectivity of stations, provides for sequential transmissions, and is simple in operation.

2.02 Operation may be at 60, 75, or 100 wpm, and either half or full duplex.

2.03 Sequential transmissions are effected by a control circuit which automatically transmits Transmitter Start Codes (TSC). These TSCs, through 28 stuntbox operation, automatically start polled outlying station transmitters if tape is available.

2.04 The TSC control circuit consists of a rotary selector, a relay circuit to generate codes, and a 14W transmitter-distributor for transmission of the TSCs.

2.05 Transmitting stations on any line are limited to a maximum of 22. In operation, this limit is reduced by the number of codes repeated in each cycle, by the use of group or broadcast codes, and the inclusion of FIGS H once in each cycle for selectivity assurance.

2.06 Each TSC is composed of four characters. The first, third, and fourth are constants, and consist of FIGS * S LTRS.

Note: The second may be any letter except H or Q which are reserved for special functions.

2.07 The individual station identifying character is provided by the use of strapped Jones plugs which are interchangeable in the TSC sequence.

2.08 The TSC polling circuit is equipped with a timing arrangement which can be optionally adjusted to resume search approximately 5, 2-1/2, or 1-1/4 seconds after a circuit idle period.

2.09 Automatic polling can be halted by use of a SK key in case of trouble in the sequential control equipment or if it is desired for any reason to interrupt the regular TSC poll.

2.10 At the control station where, because of the large volume of traffic, MXD transmitters are used, a priority arrangement is provided which permits a tape-available MXD gate to transmit out of the regular polling sequence.

2.11 One control and coding relay circuit is required at a control station for each terminating circuit.

2.12 Control station teletypewriter equipment, and the number and nature of auxiliary arrangements will vary depending upon the number of terminating line circuits.

2.13 Inasmuch as 28 ASR equipment is expected to be available to replace and supersede 19-type at the time this Section is issued, future discussion will assume the use entirely of 28-type equipment.

2.14 The most common control station circuit arrangements are as follows and are more fully described in Part 4.

(1) Single multistation line (half duplex)

(2) Two or more multistation lines (half duplex)

(3) Single multistation line (full duplex)

(4) Two or more multistation lines (full duplex)

(5) Two single or two full duplex multistation lines with automatic tape relay

(6) Three multistation lines (half duplex—automatic cross-office relay)

2.15 For three-line cross-office operation the automatic relaying action is provided by the use of Reperforator-Transmitters (RT).

2.16 While the reperforators are connected by use of CDCs and stuntbox operation, the message tapes automatically fed to the transmitters are transmitted through the operation of the SCATS control circuit.

2.17 No special or additional circuitry is required for this cross-office arrangement. The SCATS (EA-10669) and MXD timing and control (EA-10720) circuits are the basis for control of the transmitters.

3. STATION EQUIPMENT

3.01 For a single multistation terminating line circuit at a control station, the equipment would consist of the following.

1 — 28 ASR

1 — SCATS Control Circuit

1 — 28 RO Monitor (optional)

3.02 For two or more multistation terminating lines at a control station, the equipment for each line would consist of the following.

1 — MXD Gate

1 — Receiving Only-Typing Reperforator

1 — Reperforator-Transmitter

1 — SCATS Control Circuit

1 — MXD Timing and Control Circuit (Priority Circuit)

1 — 28 ASR (Tape Preparation, Monitor, Home Copy)

3.03 For a duplex multistation terminating line at a control station, the sending circuit equipment would consist of the following.

1 — MXD Gate (or more)

1 — SCATS Control Circuit

1 — MXD Timing and Control Circuit

1 — 28 ASR

1 — Duplex Control Circuit (with or without "quiet" feature)

3.04 The receiving circuit equipment for the above duplex circuit would consist of the following.

1 — Receiving Only-Typing Reperforator

1 — Reperforator-Transmitter

1 — 28 RO

3.05 The equipment required for a three-line, half duplex, cross-office automatic relay arrangement would consist of the following.

6 — Reperforator-Transmitters

4 — 28 ASR (3 Room Circuit — 1 Spare)

1 — Typing Reperforator

3 — MXD Gates

3.06 A key patching arrangement per EA-12377 is available for patching the spare 28 ASR to any circuit in the event of selective functioning failure or other trouble on a service ASR.

3.07 A typing reperforator when provided, should be available on a patch basis in the event of trouble on a RT.

3.08 Cabinetry at a control station for control circuit relays, power, rotary selector, and transmitters is dependent upon the number of terminating circuits. In general, one ED-91981 cabinet is required for each terminating circuit.

3.09 At an outlying station the equipment will consist only of a 28 ASR and control circuit equipment which will normally be housed in an ED-91472 cabinet.

4. OPERATION

4.01 At outlying stations message tapes are prepared and placed in the transmitter gate awaiting an automatic transmitter start.

4.02 At a control station the transmitter gate may be that of an MXD, a RT, or a 28 ASR.

4.03 Under normal operating conditions each station transmitter will be sequentially and automatically started if tape is available.

4.04 At control stations where a priority circuit is associated with MXD gates or RTs, those transmitters will pre-empt use of the line of in a "tape-available" condition.

4.05 Messages are received at all stations by properly coded tapes placing the typing mechanism in the print condition through 28 stuntbox operation.

4.06 If the proper format is used in message tapes, only those stations to whom messages are directed will receive them. All other stations should be locked out during transmission.

4.07 To transmit a message cross office from a station on A line to a station on B line, a tape is prepared in which the addresses of destination are preceded by a code for the reperforator whose transmitter is associated with B line.

4.08 At the control station the message is received on the reperforator to which it had been directed by the address coding and stuntbox operation, where it is stored until a sequential transmitter start permits transmission to B line.

4.09 The same operation is followed for messages from A to C, B to C, C to A, or C to B lines.

4.10 For transmission of a message from a station on A line to stations on both B and C lines, the procedure is similar to that above except that the CDCs for both the B and C line reperforators precede the station CDCs.

4.11 The reperforators whose transmitters are associated with B and C lines will be connected through the CDC coding and stuntbox operation. Both copy the message and store the tape awaiting a transmitter start for their respective lines.

4.12 The operation is similar when messages are directed from B line to A and C lines, or from C line to A and B lines.

5. TAPE PREPARATION

5.01 Message tapes when prepared, must follow the standard format for use with 28 TTY stuntbox operation in order to achieve the proper selectivity of desired stations and lockout of undesired stations.

5.02 Following is an example of the proper format for a message tape.

FIGS H LTRS BA LTRS BB LTRS
CR LF LTRS TEXT FIGS H LTRS

(1) FIGS H LTRS places all machines in the select "nonprint" condition.

(2) LTRS is used for timing as well as its normal function of shifting to lower case.

(3) BA is the station code of the sender for obtaining a home copy of the message as tapes are usually punched blind.

(4) BB is the code for station of message destination.

(5) CR LF places the selected machines in the nonselect "print" condition and locks out all other machines.

(6) TEXT is copied only on the two machines (BA, BB) which are in the nonselect "print" condition.

5.03 In a similar manner, broadcast and group code messages may be transmitted when receiving stations are equipped to operate on such codes, by inserting the desired codes in place of individual station codes.

5.04 Messages destined for relay at a control station must include the station code assigned to a RT or a receiving only-typing reperforator ahead of the station of destination.

5.05 The address coding for a cross-office message from a station on A line to a station on B line is as follows.

FIGS H LTRS BZ LTRS BA LTRS
CR LF LTRS TEXT FIGS H LTRS

5.06 BZ is the CDC to switch in the reperforator portion of the RT. BA is the CDC for the station of message destination.

5.07 CR LF locks out all other machines on A line except the reperforator, and when it reaches the point of transmission on B line, it will lock out all other stations but BA.

5.08 For transmission of a message cross-office from a station on A line to a station on each of B and C lines, it is necessary to include the CDCs for each of the reperforators associated with B and C lines, as well as the CDCs for the stations of destination.

5.09 The address coding is as follows.

FIGS H LTRS BZ LTRS CZ LTRS
BA LTRS CA LTRS CR LF LTRS
TEXT FIGS H LTRS

5.10 As in the preceding example, the CDCs BZ and CZ switch in the reperforators associated with B and C lines, while the separate tapes received, in turn, through the station CDCs, connect stations BA on B line and CA on C line.

5.11 The lock-out code, CR LF, operates in the same manner to cut off all nonselected stations on A, B, and C lines.

5.12 The final FIGS H LTRS is the disconnect code for both reperforators, and both stations BA and CA.

5.13 It will be noted that some address codes will appear in messages, depending upon the station's position in the tape's address sequence.

5.14 Inasmuch as printing at a station starts immediately after receipt of its CDC, it will copy any address codes which may be in the tape following its own CDC.

6. AUXILIARY FEATURES

6.01 There are numerous auxiliary features available for use with the SCATS system. Several of these are applicable only to outlying stations and will not be discussed in this section as they are covered in other sections.

MXD TIMING AND CONTROL CIRCUIT

6.02 As noted in 2.10, a priority arrangement is available for use with MXD transmitters at a control station inasmuch as a station handling relay traffic will have a greater volume of transmission than an outlying station.

6.03 This circuit, MXD timing and control circuit for use with EA-10720-SD, can be optionally adjusted to operate at one half the timing period of the SCATS control circuit.

6.04 Thus with tape-available in an MXD transmitter, the timing and control circuit will start that transmitter before the SCATS control circuit can resume polling.

6.05 This circuit is so designed that transmissions cannot occur simultaneously from the SCATS control and MXD transmitters.

6.06 A TAPE-STOP key is provided for tape servicing purposes. This key, while operated, halts the operation of the SCATS search circuit.

6.07 The timing and control circuit equipment consists of the following.

1 — 255A Relay

7 — U-Type Relays

1 — 376B Vacuum Tube

3 — Capacitors and Associated Resistors

6.08 This equipment is plate-mounted and is normally housed in the ED-91981 cabinet associated with the SCATS control equipment.

Caution: If the circuit timing approximates 1 second, trouble may develop due to propagation. This condition, when existing, should be referred to the engineering group for correction. The timing feature is controlled by the C1, C2, and C3 capacitors.

14 RT CONTROL CIRCUIT

6.09 The 14 RT control circuit operated from an external source per EA-11434-SD is an arrangement for control of the transmitter portion of an RT inasmuch as RT operation is not on a torn-tape basis.

6.10 The receiving portion of the RT will be normally connected and disconnected by the closing and opening of contacts in a 28 stuntbox.

6.11 To prevent overlong transmission from an RT, the circuit has a message count arrangement which will deactivate the transmitter after an optional 3, 6, or 9 message transmission.

6.12 If the RT transmitter reaches a point where all available tape has been transmitted, operation of the tape-available contact will halt the transmitter.

6.13 Visual and audible signals are provided for such conditions as open line, taut tape, universal contact failure, tape-out, and low tape.

6.14 A TRANSMITTER HOLD key, when operated, will deactivate the transmitter for tape servicing after a FIGS H has been scanned.

6.15 Transmission resumes when the key is restored to normal and the EMERGENCY START key is momentarily operated.

6.16. To stop transmission immediately, a TRANSMITTER STOP key is operated. Transmission resumes when this key is restored to normal.

6.17 The control circuit equipment consists of the following.

1 — 255A-Type Relay

23 — U-Type Relays

2 — 376B Vacuum Tubes, and Associated Capacitors and Resistors

6.18 This equipment is plate-mounted and normally housed in an ED-91981 cabinet.

Note: For various operating arrangements of RT transmitters with MXD transmitters and message count options refer EA-11434-SD Notes 1 and 3.

PREFERENCE CIRCUIT FOR MXD

6.19 The preference circuit for MXD with 2-14 RTs per EA-11535-SD is an arrangement to prevent interference between the transmitters of an MXD and those of 2 RTs when used jointly on a circuit.

6.20 It also provides an order of preference if a "tape-available" condition were to exist on all three transmitters.

6.21 In the event of a "tape-available" condition, in either of two idle transmitters, there will be no interference with the third transmitter if it is operating.

6.22 On completion of transmission from any transmitter the other two transmitters will automatically be activated in the order: MXD, RT1, RT2, if they are in a "tape-available" condition.

6.23 If a "tape-available" condition exists for all three transmitters, there will be no interference in transmitter starts and the order of activation is the same.

6.24 The circuit relay equipment consists of the following.

7 — U-Type Relays

5 — Y-Type Relays, and Associated Resistors

6.25 The power supply, under certain conditions, may be furnished from the rectifier associated with the preference circuit per EA-11535-SD.

6.26 The equipment will be normally housed in an ED-91981 cabinet which may also contain control circuit equipment of EA-11434-SD.

Note 1: The 3, 6, or 9 message count arrangement is effective through interconnection with EA-11434-SD.

Note 2: Refer EA-11535-SD Note 1 for message count options.

Note 3: The preference circuit was designed primarily for a specific customer but may be applicable to other customer's services.

CIRCUIT CONDITION ALARM FOR MXD

6.27 The break, busy, and open line alarm circuit (for use with EA-10720-SD) per EA-11885-SD provides a break circuit for an MXD with associated BUSY lamp and open-line visual and audible alarms.

6.28 An open-line condition of 0.3 seconds or more will deactivate the MXD transmitter, at the same time changing the BUSY lamp to a steady light alarm and operating the audible alarm.

6.29 The audible alarm is silenced by operation of an ACO key. The visual signal continues to operate while the "open-line" condition exists.

6.30 When the "open-line" condition has been cleared, the MXD transmitter will again become activated and the steady light alarm will restore to BUSY lamp operation.

6.31 The relay equipment is mounted on a single plate and consists of the following.

2 — 208A-Type Relays

2 — U-Type Relays

1 — Y-Type Relay, Fusing and Resistors

6.32 The mounting plate will normally be housed in a spare space in the ED-91981 SCATS equipment cabinet.

START AND BREAK CONTROL FOR MXD

6.33 The start and break control for MXD gate circuit per EA-11849-SD is designed to automatically start an MXD transmitter from a momentary contact closure derived from a 28 stuntbox or a similar arrangement.

6.34 An "open-line" condition of about 0.7 seconds will operate visual and audible signals.

6.35 A nonlocking key is provided which, when operated, will furnish a manual start for the MXD transmitter.

6.36 The manual start key will have no effect until all line transmission has stopped.

6.37 An ACO key, when operated, will silence the audible alarm. The visual alarm remains operated until the line circuit closes.

6.38 Equipment for one control circuit consists of the following.

2 — 276-Type Relays

3 — U-Type Relays

4 — Y-Type Relays, Fusing and Resistors

6.39 The mounting plates are arranged to hold the relay equipment for two circuits.

6.40 Inasmuch as the use of MXD gates indicates multicircuit operation, the control circuit equipment is housed in an ED-92185 cabinet which is large enough to contain the relay equipment for at least six circuits in addition to the required power supply.

28 MONITOR CONTROL FROM MXD

6.41 Connect 28 on transmission from MXD (SCATS) circuit per EA-12126-SD is an arrangement for placing a 28 monitor in the "print" condition to copy all transmissions from an associated MXD transmitter at a control station.

6.42 Placing the 28 in the "print" condition is effected through interconnection with the CX relay of EA-10720-SD, and an off line solenoid control set of parts on the 28.

6.43 The required equipment is an SEM relay to operate the print-suppress code bar to the "print" condition.

6.44 The SEM relay is usually mounted in a 28 table.

6.45 Minor wiring changes are required on the CX relay of EA-10720-SD in addition to the use of the offline solenoid SOP on the 28 TTY.

BLINDING MONITOR

6.46 The blind 28 monitor during start code circuit per EA-12153-SD provides for suppression of printing TSCs on a 28 monitor at a control station.

6.47 The blinding action is effected by interconnection with EA-10669-SD and offline stunt shift control parts on the 28.

6.48 The control circuit equipment consists of the following.

1 — SEM Relay

2 — U-Type Relays, Fusing and Resistors

6.49 The SEM relay is usually mounted in the 28 table while the remaining equipment is mounted on a plate which will accommodate two circuits, and is housed in the ED-91981 SCATS equipment cabinet.

DUPLEX CONTROL CIRCUIT

6.50 The duplex control circuit for use with EA-10669-SD per EA-11625-SD is an arrangement for use on a duplex circuit to effect transmitter starts on the receiving side of a circuit from TSCs generated on the send side.

6.51 Circuitry provides for noninterference between a message transmitter and the SCATS control circuit transmitter.

6.52 If the receive side of the circuit is idle, the control station transmitter will halt after a FIGS H, and the SCATS control circuit transmitter will operate.

6.53 The TSC circuit will poll five stations if no transmitter start is effected or will stop search upon activating a station transmitter and allow the control station message transmitter to restart.

6.54 The control circuit is so arranged that the 28 monitor on the send side will be placed in the select "nonprint" condition during transmission of TSCs.

6.55 With a "no-tape" condition in the message transmitter, and the receiving side idle, the search circuit will proceed to operate. If tape is made available in the message transmitter during these TSC searches, polling will continue until five stations have been polled before the message transmitter becomes activated.

6.56 In the event of a race for a start between the message transmitter and the TSC search transmitter, priority over relay circuit operation will determine which transmitter starts.

6.57 If both transmitters were to try to start simultaneously, the message transmitter would obtain preference.

6.58 The control equipment consists of the following.

1 — Rectifier

1 — SEM Relay

5 — Vacuum Tubes

16 — U-Type Relays

4 — Y-Type Relays

9 — 437QA Capacitors, Associated Resistors, and Networks

6.59 The SEM relay is mounted in a 28 table, while the balance of the equipment is housed in an ED-91981 cabinet.

Note: Refer EA-11625-SD for time out options.

DUPLEX CONTROL WITH "QUIET" FEATURE

6.60 Similar to the circuit described in 6.50 is the transmitter start (SCATS) full duplex control circuit for 14 TD with "quiet" feature for use with EA-10669-SD circuit per EA-12361-SD for use on a duplex circuit to control the operation of message and TSC search transmitters.

6.61 The "quiet" feature of the circuit is designed to recognize a bid-for-start from an outlying station. This is made possible by the addition of a TSC (FIGS QS LTRS) once in each cycle of search.

6.62 Assuming outlying stations equipped to recognize this "quiet" code, an answer-back of one or two LTRS is received from each polled station which is in a "no-tape" condition.

6.63 These LTR answer-backs operate a relay circuit which in turn keeps the search circuit activated until a valid transmitter start is effected.

6.64 With transmission started on the receiving side, automatic search is halted and the control station message transmitter will operate if tape is available.

6.65 For tape servicing purposes, a TAPE SVC key is provided which will stop all control station transmissions.

6.66 The automatic TSC circuit can be deactivated by use of an AUTO-MAN key for maintenance purposes. This permits continuous operation of the message transmitter. An auxiliary key may be furnished for customer convenience.

6.67 Operation of a RLS-QT key will disable the "quiet" feature to permit continuous TSC search for maintenance purposes. This is effective only if the receiving circuit is in the closed condition.

6.68 The control equipment consists of the following.

2 — 276H Vacuum Tubes

11 — U-Type Relays

4 — Y-Type Relays

3 — 437QA Capacitors and Associated Resistors

6.69 This equipment and the AUTO-MAN and RLS-QT keys are plate mounted for housing in the ED-91981 cabinet associated with the SCATS control circuit.

SWITCHING CIRCUIT CONTROL

6.70 A switching circuit control per EA-12147-SD was designed for use with SCATS for the purpose of cutting off a loop, leg, section, or local machine(s) during transmission of TSCs.

6.71 The splitting or cutting action is made effective through a relay circuit activated by transmission of any TSCs from the SCATS control circuit.

6.72 The relay circuit, in turn, activates a central office switching circuit relay which completes the splitting action.

6.73 Local equipment may be cut off by the use of optional wiring without the use of central office relays.

6.74 No provision is made for deactivation of the splitting action. Under present design it becomes a permanent part of the circuitry when installed.

6.75 The relay circuit equipment consists of the following.

2 — U-Type Relays, Associated Resistors, and Fusing

6.76 The mounting plate will hold the equipment for two circuits and is normally housed in the ED-91981 SCATS control circuit cabinet.

MXD CIRCUIT FOR "LEAD-TRAILER" OPERATION

6.77 The multiple transmitter (SCATS) applique circuit to permit single or successive ("lead-trailer") operation of a pair of gates (for use with EA-10720-SD) per EA-12442-SD is an arrangement which will sequentially and immediately, transmit tapes placed in the "lead" and "trailer" gates of a pair of MXD transmitters.

6.78 The "lead" gate contains addresses for the "trailer" gate tape which consists of message text.

6.79 If message tape is first placed in the "trailer" gate followed by address tape in the "lead" gate, the "lead" gate through its interconnection with the MXD timing and control circuit (EA-10720) will immediately start to transmit.

6.80 At the end-of-tape in the "lead" gate, the "trailer" gate will immediately start to transmit.

6.81 Transmission from the "trailer" gate cannot occur unless preceded by transmission from the "lead" gate.

6.82 A tape containing both addresses and text may be placed in the "lead" gate and will be completely transmitted.

6.83 The two TAPE-STOP keys of the transmitters are wired together so that for tape servicing, both transmitters will be halted.

6.84 A visual signal operates when either TAPE-STOP key is operated. Tape may then be removed and replaced without disturbing the sequence of operations.

6.85 The relay equipment consists of the following.

1 — Y-Type Relay

2 — U-Type Relay

2 — Varistors

2 — Resistors

6.86 The equipment is mounted on a 609DL plate and is normally housed in the SCATS equipment cabinet.

7. TESTS

7.01 Inasmuch as a control station is the hub of operations for any SCATS system, it will be necessary most times to obtain a release of the circuit(s) involved to make tests.

7.02 It will usually be more desirable to the customer to have tests performed out of service hours. This should be done whenever possible.

7.03 For most testing, coordination is required between the Serving Test Center (STC) and a repairman at the control station.

7.04 Transmission measurements should be made by the STC on all transmissions to and from the control station during tests.

7.05 A sufficient number of tests shall be made to insure satisfactory operation.

7.06 At the control station a monitor, if available, should be connected to any circuit under test.

BASIC CONTROL CIRCUIT EQUIPMENT

A. SCATS Control Circuit

7.07 To test the SCATS control circuit it is necessary to know the TSC sequence and the time-out option in use. This information can be obtained by inspection or from the STC records.

7.08 If all 22 steps of the selector are not in use, it is recommended that the unused steps be activated during the test for a more complete check of the selector.

7.09 No tape should be made available in any transmitters at this time.

(1) With the TSC control circuit in operation, and assuming a "C" time-out option, the TSC sequence should be transmitted with five-second intervals between codes.

(2) Observe on the local monitor or compare with the STC for proper sequence of codes. Also note that FIGS HS LTRS should appear at least once in each cycle.

(3) Between TSC codes transmit a random character and note that there should be no TSC transmission until 5 seconds after transmission of the random character.

(4) Note also that the TSC circuit will not become activated as long as any character is repeatedly transmitted before completion of the five-record interval.

(5) Operation of SK key during an idle period should deactivate the TSC control circuit.

(6) Observe that if SK key is operated during transmission of a TSC, deactivation will not occur until after completion of the TSC being transmitted.

B. MXD Timing and Control Circuit

7.10 Where an MXD gate is used as a station transmitter, it will usually be associated with a priority circuit (EA-10720-SD).

(1) Assuming the priority circuit to be adjusted to operate at one-half the time-out period of the SCATS control circuit or 2-1/2 seconds, operate the TS key and place a short tape in the MXD gate.

(2) Restoral of the TS key to normal should now automatically start the MXD transmitter after no more than 2-1/2 seconds.

(3) Observe that after the tape has run through the MXD gate, the TSC control will become activated after 5 seconds.

(4) During the TSC transmissions, tapes should be made available in the MXD gate. As these tapes are placed in the gate, note that either the TSC circuit will operate or the MXD transmitter will operate but that transmission does not occur from both transmitters simultaneously.

(5) Operate the TS key during transmission from the MXD gate. Observe operation of the visual signal, deactivation of the SCATS control circuit, and that tape may be removed from the gate and serviced.

(6) Restoral of the TS key to normal should deactivate the visual signal and restart the MXD transmitter if tape is replaced.

(7) Operation of the tape stop SK key will deactivate the TSC control circuit. Observe that it is now possible to transmit at will from the MXD gate without interference.

AUXILIARY CONTROL CIRCUITS AND EQUIPMENT

A. RT Control Circuit

7.11 At those control stations where a RT and associated control circuit per EA-11434-SD is used for automatic relay of messages, the sending and receiving portions are controlled through 28 stuntbox or sequence selector operation.

(1) Test of the receiving portion of the RT requires that properly coded tape be transmitted on the circuit to connect the reperforator.

(2) Prepare a tape as follows and have it placed in a transmitter gate. The transmitter may be a local sending station or an outlying point.

FIGS H LTRS BR CR LF LTRS BB LTRS TEXT FIGS H LTRS

(3) BR is the code for connecting the reperforator, and BB is the code for the station of message destination.

(4) With the SCATS system in operation the test message should, in its sequential order, be transmitted and copied on the reperforator.

(5) Observe that the message is copied on the reperforator and that the reperforator is cut off at the end of the message—FIGS H LTRS. The cutoff can be tested by transmitting random characters immediately after the end of message code (FIGS H LTRS) and observing that they are not copied on the reperforator.

(6) Test of the transmitter requires a message tape be made available which contains one more message than that for which the optional message count arrangement is adjusted.

(7) This message count of 3, 6, or 9 is controlled by the X, Y, Z wiring options of EA-11434-SD.

(8) With message tape in the transmitter of the RT and with the SCATS system in operation, the messages should be automatically transmitted.

(9) Observe that the required number of messages are transmitted before deactivation of the transmitter, and that transmission resumes upon receipt of another valid TSC.

(10) Note that when the last available message in the tape has been transmitted, the transmitter should become deactivated while the TSC circuit proceeds to search.

B. Keys and Alarms

7.12 A visual and audible signal should operate with any of the alarm conditions

(1) Operation of the TRANSMITTER HOLD key should stop transmission from the RT gate after scanning a FIGS H LTRS. A visual signal operates.

(2) Resume transmission by restoring the TRANSMITTER HOLD key and momentarily operating the EMERGENCY START key. The visual signal should be deactivated.

(3) Operation of the TRANSMITTER STOP key should halt transmission from the RT transmitter immediately. A visual signal should operate.

(4) Resume transmission by restoring the TRANSMITTER STOP key to normal. The visual signal should be deactivated.

(5) Tests of various trouble conditions such as "open-line" of more than 0.7 seconds, "taut tape" contact operation, universal contact, "tape-out", and "low tape" all may be simulated locally.

(6) Operation of the ACO key will deactivate both signals except in the case of "tape-out" and "low tape", when the audible only will be silenced, while the visual remains operated until the condition is cleared.

C. Preference Circuit for MXD

7.13 To test the preference circuit (EA-11535-SD) when one MXD transmitter is associated with two RT transmitters operated as a single station, three test tapes are required.

(1) Tapes for the two RT transmitters should be prepared in standard message format and consist of 3, 6, or 9 messages to conform with the message count arrangement of EA-11434-SD with which this circuit is associated.

(2) Tape for the MXD transmitter should be torn. No message format is required. Place tapes in the three transmitters and activate the system.

(3) Observe that the transmitters are activated in the order: MXD, RT1, RT2, and that no TSC searches occur between transmission of messages.

(4) Place tapes in the transmitters in the other possible combinations such as: MXD and RT1, MXD and RT2, RT1 and RT2, also singly.

(5) Observe that tapes are transmitted in the proper preferential order, regardless of transmitter combination used, and that no TSC polling takes place as long as tape is made available within the five-second time-out period.

(6) Observe that there should be no interference to any transmission while placing tapes in other gates.

D. Start and Break Control MXD

7.14 Test of the break and control circuit (EA-11849-SD) requires a continuous tape in the MXD gate. No message format is required. Provide continuous transmission from the MXD gate.

(1) Observe operation of the BUSY lamp.

(2) Observe deactivation of the transmitter on an "open-line" condition of 0.7 seconds or more, with the BUSY lamp changing to a steady light alarm, and operation of an audible signal.

(3) The audible alarm is silenced by operation of the ACO key.

(4) The MXD transmitter is restarted after closure of the line circuit, a continual idle condition, and after momentary operation of the EMERGENCY START key.

(5) The steady alarm lamp is changed to a "BUSY lamp" condition when transmission has resumed.

E. Monitor Control from MXD

7.15 To test the connect 28 on transmission from MXD circuit (EA-12126-SD), it is necessary to observe that the 28 monitor involved

copies only all transmissions from the associated MXD while the SCATS system is in operation.

F. Blinding Monitor

7.16 Test of the blind 28 monitor circuit (EA-12153-SD) is made by activating the SCATS system and observing that the 28 monitor copies all line transmissions but is blinded during transmission of TSC codes.

G. Duplex Control Circuit

7.17 For a test of the duplex control circuit (EA-11625-SD) it is necessary that the SCATS control circuit be in operation, in addition to a sending station at the control office and at least one outlying station. A monitor is required on the receiving circuit.

(1) Place the SCATS control circuit in operation.

(2) Ascertain that the receiving circuit is closed and idle.

(3) Make tape available at the control station and at an outlying station.

(4) Observe noninterference between the transmitters of the SCATS control and message circuits.

(5) Observe that the message transmitter obtains preference over the SCATS transmitter in case of an attempt at simultaneous start.

(6) The message transmitter will be deactivated after a FIGS H if the receiving circuit becomes idle. An automatic start of the TSC circuit occurs.

(7) The control station message transmitter will restart if a transmitter start has been effected on the receiving circuit or the transmission of five consecutive TSCs if a "no-tape-available" condition exists at outlying stations.

(8) When the receiving circuit is idle and there is a "no-tape" condition in the control station message transmitter, the TSC circuit should be activated.

(9) During TSC transmission, if tape is made available in the control station message transmitter, the TSC circuit should continue polling until the end of the five count sequence which was in the progress of transmission.

(10) A 28 monitor will usually be associated with the send circuit and should copy all transmission except TSCs.

H. Duplex Control with "Quiet" Feature

7.18 To test the duplex control circuit with "quiet" feature (EA-12361-SD) requires operation of the SCATS control circuit as well as continuity on both sending and receiving circuits. Required also is a sending station at the control office, at least one outlying station, and a monitor for the receiving circuit.

(1) Having ascertained that FIGS QS LTRS is in the TSC sequence, and that outlying stations are equipped to recognize this code, operate the SCATS control circuit.

(2) With the receiving circuit closed and idle, tape-available in the control station message transmitters, and the TSC circuit in operation, TSCs should continue to be transmitted until a valid transmitter start is effected on the receiving circuit from an outlying station.

(3) Upon a "tape-available" condition at an outlying station, a LTRS character should be transmitted from that station on the next TSC transmitted.

(4) Upon being polled the tape-available station should have its transmitter started while the SCATS control circuit becomes deactivated.

(5) Having tape available in the control station transmitter at this time should result in an automatic start of the message transmitter.

(6) If the receiving circuit now becomes idle, the TSC circuit will operate. If the control station transmitter had been operating, it would

become deactivated in favor of the TSC circuit until another valid transmitter start on the receiving circuit.

(7) With transmission in progress from the control station message transmitter, operate the TAPE SVC key. Both message and TSC transmitters should be halted while tape is serviced. The message transmitter should resume operation when the key is restored to normal.

(8) Operation of the AUTO-MAN key to MAN should deactivate the TSC circuit and make it possible to transmit continuously from the message transmitter.

(9) Operation of the RLS-QT key should deactivate the "quiet" feature and provide continuous TSC operation, if required, for maintenance purposes.

I. Switching Circuit Control

7.19 To observe results of the switching circuit control (EA-12147-SD), it is necessary to determine if the equipment to be switched is located at the control station or is remotely located and controlled by switching circuit relays at the STC.

(1) If located at the control station, observe that the machine is deactivated during all TSC transmissions.

(2) If the switching action takes place at the STC, have that office monitor for the proper cutoff during TSC transmissions.

J. "Lead-Trailer" Circuit for MXD

7.20 Except for making telegraph transmission measurements, the TSC is not required for coordination of tests on the "lead-trailer" circuit per EA-12442-SD.

(1) Prepare three tapes:

(a) Address only for the "lead" transmitter,

(b) Text only for the "trailer" transmitter, and

(c) Address followed by text.

Standard mesage and address format is not required.

(2) With the SCATS control circuit in operation, place the tape as covered in (b) in the "trailer" transmitter followed by the tape as covered in (a) in the "lead" transmitter. These operations should result in the immediate transmission, first of the "lead" gate addresses, followed by immediate transmission of the text in the "trailer" gate.

(3) Place the tape as covered in (a) in the "lead" transmitter and observe that upon a transmitter start the tape is completely transmitted, and that there is no action from the "trailer" transmitter.

(4) While transmission is in progress from either gate, operate one of the TAPE-STOP keys.

(5) Operation of the key should light the S signal lamp.

(6) Remove a tape, as for servicing, and replace. After restoring the key, note that the S lamp is released, and that transmission resumes from the point at which it had been halted.

(7) Repeat the steps in (4), (5), and (6) for a test of the TAPE-STOP key operation associated with the second transmitter.

K. Cross-Office Operation

7.21 To test two-line and three-line automatic cross-office tape relay operation, coordination with the STC is not required except for making telegraph transmission measurements.

(1) To test a two-line cross-office transmission, prepare a message tape as described in 5.05. This assumes the CDC for the B line reperforator is BZ, and that the B line station CDC is BA.

(2) Place tape in the A line transmitter and await a sequential transmission.

(3) Upon transmission of the tape, observe that the B line reperforator is switched in when its CDC (BZ) is transmitted and that the CDC (BA) is copied along with the lock-out, text, and end-of-message code.

(4) The received tape is now in the transmitter portion of the RT awaiting a sequential or priority start for transmission to B line.

(5) After transmission of the reperforator tape to B line, place a tape in the B line transmitter with appropriate coding for switching in the reperforator-transmitter associated with A line.

(6) Upon a sequential transmitter start, observe that the A line reperforator is connected, and that the tape is transmitted on A line as in (3) and (4) above.

(7) Repeat the above tests with properly coded tapes for transmission from A to C, B to C, C to A, and C to B lines.

(8) In all of the above tests, check for the disconnect of the reperforator by the end-of-message code.

7.22 Test of a three-line cross-office arrangement requires a tape similar to that described in 5.09. For these tests, the following CDCs will be assumed.

AZ to A line RT

BZ to B line RT

CZ to C line RT

AB to A line station

BA to B line station

CA to C line station

(1) Place a tape in the A line transmitter coded for transmission of a message from A line to a station on B line and a station on C line.

(2) Observe that the B line reperforator is connected after receipt of its CDC (BZ), thereafter copying the C line reperforator CDC (CZ) along with any station, lock-out, and end-of-message codes.

(3) The C line reperforator is connected after receipt of its CDC (CZ), and then copies the station, lock-out, and end-of-message codes. Transmission of the CDC (CZ) on the B line and the CDC (BA) on the C line is unimportant as they are nonvalid CDCs on lines B and C and will cause no functional operations.

(4) The B and C line transmitters should now have been automatically loaded, each with a message tape awaiting a sequential or priority transmitter start.

(5) Assuming completion of the message transmission in the reperforators before a transmitter start is made on lines B and C, the reperforators should have been cut off by the end-of-message code in the tape.

(6) Repeat the steps in (1) to (5) for tests from line B to A and C, and from line C to A and B by substituting the proper CDCs for connecting the desired reperforators.

8. REFERENCES

8.01 The following are EA drawings and Bell System Practices related to this section.

AA128.006 — List of General Requirement Sections

AA286.021 — WSU for Telegraph Subscriber Lines

AA286.031 — 128B2 Teletypewriter Subscriber Set

AA286.039 — 130B1 Teletypewriter Subscriber Set

P33.301 — No. 1 Type Multiple Transmitters and Base-Wiring Diagram

EA-10965 — Interconnect Arrangement for Cabinet Mounted ROTR and Automatic Feed Out with Rectifier

EA-11202 — AC255 Cabinet Arranged for Individual Power Supply

EA-11508 — Modified 100-Type Cabinet Circuit and 14 RT Controlled from External Circuit

EA-11544 — Transmitter Console

EA-11623 — 28 TTY-Wiring for TP152345 Stuntbox Control Parts

EA-11655 — 28 TTY Stuntbox Equipment Option Chart for Certain Special Functions

EA-11660 — 28 TTY Stuntbox Equipment Option Chart — 4 Letter Connect Codes

EA-12096 — Automatic Noninterfering Tape Feed Out Arrangement for 14 AS Typing Reperforator

EA-12377 — Key Patching Unit for 28 ASR on 3-Line Cross-Office SCATS System

Note: For information on basic teletypewriter apparatus, refer to standard instructions covering the particular apparatus.