ADOSO II SYSTEM
(Automatic Distribution of Service Orders)

GENERAL INFORMATION

Contents

Illustrations

1. GENERAL

1.01 This is the first in a series of sections describing the ADOSO II System. It is a multi-line pickup system for a "before completion" and "after completion" service order network.

1.02 This section describes the system and its components in general terms. Following sections deal with testing the various equipment making up the control units at different locations.

2. DESCRIPTION

2.01 The ADOSO II System differs from the ADOSO I, in that it is designed for areas where the traffic flow is insufficient to economically use a long-haul toll trunk for sending data information to the processing points at directory (DI), traffic intercept (TI), and revenue accounting (RA), from each business office (BO), and plant service center (PSC). By using branch lines to feed a single long-haul toll trunk, more economical operation can be realized.

2.02 Branch lines are two-way circuits with a BO and associated PSC on each line. See Fig. 2. There can be as many as four of these lines terminated on the multi-line control unit (controller) at the control PSC.

2.03 Stations on a branch can send to each other, and send to the trunk. Traffic on the trunk is one-way only - toward the distant data processing center. The control unit supervises all transmission.

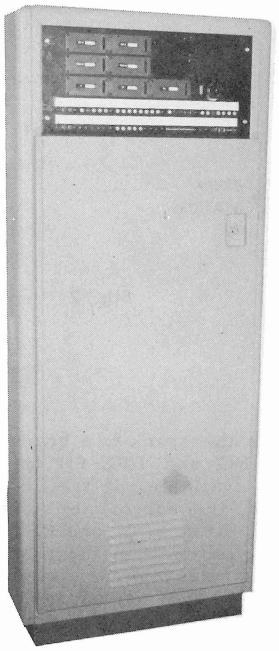


Fig. 1A
Multi-Line Control Unit Equipped for Operation with Two Branches

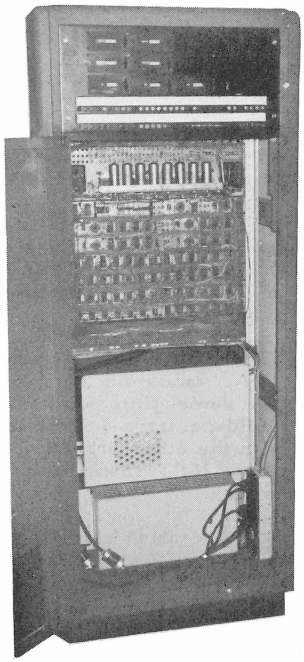


Fig. 1B
Multi-Line Control Unit with Cabinet Door Open

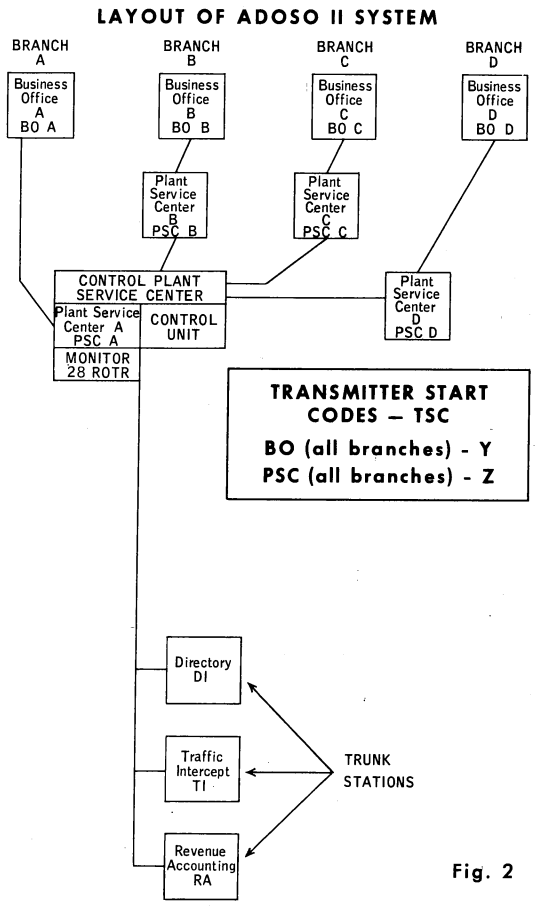


Fig. 2

2.04 It automatically connects the trunk to a branch, polls, or searches the BO and PSC for tape, starting transmitters, if it is available. If traffic is between stations on the branch, the control unit disconnects and moves to the next branch. If one of the branch stations has a message to be sent on the trunk, the control unit waits until the message is finished before moving on with its polling. This polling is done sequentially.

2.05 With this arrangement, it is possible for stations on each branch to send to each other at the same time with the trunk circuit idle. Or there could be intra-branch transmission on three branches with the other branch sending to the trunk at the same time. No transmission can take place from branch to branch.

2.06 Station selection is by call directing characters (CDCs). Service orders are prefixed by these CDCs to direct them to their destination.

2.07 The control unit, PSD-70012-01, is located at the control PSC. Up to four branch lines and one trunk line terminate on it.

2.08 The transmitters at the BO and PSC on each branch circuit are started by Transmitter Start Codes (TSC) sent by the control unit. If there is no tape in the transmitter, a discrete LTRS character is sent back causing the next transmitter in sequence to be searched.

2.09 The order may be code-directed to the PSC or BO on the branch circuit or may also include stations on the trunk circuit.

2.10 All branches may be transmitting at once between stations on the branch, but only one branch can transmit to the trunk at a time.

2.11 The control unit can not attempt to set up additional connections once the trunk circuit is busy. The trunk circuit must be connected at all times when code directing characters are being sent, so the station on the trunk can be selected if desired.

2.12 The transmitter start code (TSC) for the PSCs is Z and for the BOs is Y. The control unit attempts to start the transmitters in the following order:

PSC Branch A, BO Branch A, PSC Branch B, BO Branch B, PSC Branch C, BO Branch C, PSC Branch D, BO Branch D.

2.13 Polling is continuous until all branch circuits are busy or until a connection to the trunk is established.

2.14 Continuous tape operation is provided at both points, i.e., several orders can be in one tape.

2.15 Tape is prepared on a local room circuit machine consisting of a 15 keyboard teletypewriter, typing reperforator, and a transmitter-distributor.

2.16 A typing reperforator is in the connection at the PSC on some code combinations.

2.17 A monitor typing reperforator is on each trunk circuit. This is for service purposes only and is not used in normal traffic handling. Additional monitors can present some problems under certain conditions.

2.18 Message registers on the control unit, one for each trunk station, and one for each branch station, count the orders sent to each station on the system. The control unit keeps a recorded count of all messages it sends to each station.

2.19 Too, each trunk station and each branch station have message registers on their machines. These record a message count of all the orders they receive.

2.20 The control PSC periodically transmits a broadcast message giving counter readings for messages sent to each station. Each receiving point compares this reading with that on their counter as a check against lost messages.

2.21 A circuit assurance feature is provided for the trunk which causes an alarm to sound at a receiving station if it should become disconnected from the trunk.

2.22 "The broadcasting" of the message count, combined with the circuit assurance features require less circuit and attendant time to protect against lost messages than the "top line" broadcast method formerly used.

2.23 A "code converter" feature is provided at each PSC and reroutes orders by automatically changing their codes. This is helpful with orders sent by the BO to the PSC (Page and tape copy made) for retransmission when completed. The PSC reuses the tape in a room circuit to make up a new "complete

order" tape. When sent by the PSC, the code converter changes the code automatically to route the message to the stations that should receive the completion order. This is part of PSD-70011-01 Branch Station Control Circuit.

2.24 Carriage return (CR) is used as an end-of-codes signal and FIGS H LTRS as an end-of-message signal.

2.25 Provision is made in the multi-line control unit for the control PSC to clear the circuit if the FIGS H LTRS is not sent.

2.26 Form feed-out is provided on the page machines and tape feed-out on the typing-reperforators.

2.27 Either No. 15 or 28 teletypewriters can be used for receiving machines at RA, DI, and TI. Use of 15-type equipment on the trunk limits the entire system to 75 words-per-minute. 28-type machines are always required at the BO and PSC.

2.28 If No. 28 teletypewriters are used at all stations on the trunk, the entire system may be operated at 100 words-per-minute.

2.29 All branches and the trunk must operate at the same speed.

3. OPERATION

3.01 The service order is prepared in punched tape on the room circuit at the BO. It is preceded by ten or more LTRS characters for tape insertion and handling, the proper CDCs, LTRS CR LF LTRS. It is followed by end-of-message code FIGS H LTRS 10 LTRS.

EXAMPLE

10 LTRS AE LTRS CR LF LTRS TEXT FIGS H LTRS 10 LTRS

3.02 This tape is inserted in the transmitter. Several orders may be in one tape if they are separated by FIGS H and 10 or more LTRS characters.

3.03 Operation of the START button makes tape available.

3.04 The control unit connects the branch to the trunk and sends the transmitter start code (Z for the PSC or Y for the BO) in sequence.

3.05 Assume the transmitter at BO was started and sends an order to the PSC only. In this case, the trunk disconnects, and the control unit proceeds to search the next branch.

3.06 Assume the transmitter at the BO was started and an order sent to included points on the trunk. In this case, the trunk is left connected to this branch, and polling stops until this order is completed, FIGS H LTRS sent, and the feed-out interval elapsed.

3.07 The desired stations are selected by the CDCs. If the BO is sending, its own machine will make a copy if the CDC JJ, B or JX is in the tape.

3.08 The selected stations are converted to a printing condition on receipt of CR LF LTRS. All other stations are disconnected. The order is printed and FIGS H LTRS received.

3.09 FIGS H LTRS causes the forms to be fed out at all selected stations and new forms positioned for the next order. The PSC typing reperforator feeds out tape during this period if selected. The circuit is idle during the feed-out time. No connections can be made to the trunk and no polling can take place until the end of this interval.

3.10 Both tape and page copy are made of orders received at the PSC "before completion" station which are to be retransmitted after being worked by the PSC. The tape is filed with one copy of the order for use when the order is completed.

3.11 When an order is completed, changes are posted on the copy sent to the "after completion" section. The operator here takes the original tape and reruns it on the room circuit making a new tape on the typing reperforator. The tape is stopped at certain places by upper case characters sent by the BO to permit inserting required information. This is done by keyboard.

3.12 The new tape is put in the PSC line transmitter, a START key pressed, and the tape is automatically sent to the line when the station's TSC is received.

3.13 If the order requires rerouting to a different group of stations from those selected on the original transmission, the code converter does this automatically by adding a 4th pulse to the original character. This code converter is part of the PSC branch station control circuit PSD-70010-01.

3.14 As the order is transmitted on the line, the control unit's message registers record a count of each station to which it is being sent. As each station receives the order, its register makes a count.

3.15 Periodically the control PSC attendant sends a broadcast message to check the message count. She:

(a) operates the BROADCAST PREPARE key, non-locking, which stops the control unit at the end of the order being sent, and alarms.

(b) reads the registers.

(c) prepares a broadcast tape giving the readings.

(d) inserts this tape in the normal PSC transmitter.

(e) operates the BRANCH SELECT key for each branch–non-locking.

(f) operates the BROADCAST READY key - non-locking.

(g) The control unit starts the control PSC transmitter next and resumes normal operation after the broadcast message is sent.

4. EQUIPMENT

A. Service Order - Station Set for No. 15 Teletypewriter

4.01 Drawings

(a) PSD-70005-01 - Six Sheets - Schematic.
(b) PT-70005-10 - One Sheet - Control Unit Wiring
(c) PT-70005-11 - One Sheet - Electrical Service Unit, Typing Unit Modification, and Wiring.
(d) PJ-70005-A - Two Sheets - Control Unit Construction.

4.02 This circuit is used on the receiving-only stations at TI, DI, and RA locations when 75 wpm operation is used. Its features are:

(a) Station Selection.

(b) Print suppression of codes.

(c) Form feed-out and alignment.

(d) Disconnect on CR if not selected.

(e) Reconnect on idle line at end-of-transmission if not selected.

(f) Deactivate on CR if selected.

(g) Activate on FIGS H LTRS if selected.

(h) Counts all orders received.

(i) Alarms if circuit fails or paper runs out.

(j) Provides for retiring audible alarm, and leaving visual alarm until circuit is restored or paper inserted.

(k) Automatically restores alarm circuit when circuit normal.

B. Service Order - Station Set for No. 28 Teletypewriter

4.03 Drawings

(a) PSD-70013-01 - Five Sheets - Schematic

(b) PT-70013-10 - One Sheet - 28 Teletypewriter Control Unit Wiring.

(c) PT-70013-11 - One Sheet - Modification and Wiring 28 Teletypewriter Cabinet, Stunt Box, Feed-Out Switch and Line Relay.

(d) PJ-70013A - Two Sheets - Station Set Construction.

(e) PED-70013-10 - One Sheet - Typing Unit - Stunt Box Modification.

4.04 This circuit is used at the trunk stations: TI, DI, and RA when 28-type machines are needed - 100 wpm operation, etc. Its features are similar to that of the station set for No. 15 teletypewriter (PSD-70005-01).

C. Service Order - Branch Station Control Business Office

4.05 Drawings

(a) PSD-70010-01 - Twelve Sheets - Schematic

(b) PED-70010-10 - One Sheet - Equipment Modification, Wiring and Assembly.

(c) PJ-70010A - Four Sheets - Control Unit Construction

(d) PT-70010-10 - One Sheet - Control Unit Wiring

(e) PT-70010-11 - One Sheet - 28 Cabinet Wiring

(f) PT-70010-12 - One Sheet - 14BJ and 28G Transmitter Distributor

(g) PT-70010-13 - One Sheet - RE33B Cabinet Wiring for K Multi-Transmitter

4.06 This circuit at the BO provides the control for the following: Numbers 1, 14, or 28 transmitters, and a 28RO teletypewriter. It operates over a single local loop or toll facility and has the following features:

(a) Station selection on codes J, D, and B.

(b) Print suppression of all CDCs.

(c) If machine selected, form feed-out activated on FIGS H LTRS.

(d) Deactivate, non-print on CR when not selected.

(e) Deactivate, print on CR when selected.

(f) A message register counts all orders directed to this station.

(g) POWER ON lamp at receive-only position.

(h) Audible and visual PAPER-OUT alarms located at the 28 RO are activated when a transmitter start code is received for the station after forms run out of the machine or the cover is raised for ribbon change. The circuit is made busy at this time by sending continuous LTRS characters from the transmitting position.

(i) ALARM RELEASE key (NL) provided on 28 RO. It is operated momentarily to silence audible PAPER-OUT alarm. After a paper or ribbon change is completed, it is operated a second time to release busy condition on the circuit.

(j) BUSY lamp (amber) flashes at transmitting position when circuit is busy.

(k) BREAK ALARM lamp (red) lights, buzzer activates, and transmitter stopped by the following conditions. CR before a valid CDC, FIGS H LTRS end-of-message code omitted, an open or blank received while transmitting. This alarm can only be cleared by removing tape and operating START key momentarily.

(l) START key (NL) which is operated momentarily when tape is to be made available.

(m) START lamp (white) which lights when tape is made available.

(n) BREAK key provided on 28 RO so operator can send break to line if incoming transmission should be stopped. It is only operable when machine is selected.

(o) When transmitter start code Y is received and there is no tape available, two or more LTRS characters are sent on circuit as a no-tape response.

(p) When transmitter start code Y is received and there is tape available, transmitter will start.

(q) Circuit arranged for continuous tape operation. Transmitter stops on all FIGS H LTRS end-of-message codes.

D. Service Order Branch Station Control - Plant Service Center

4.07 Drawings

(a) PSD-70011-01 - Fifteen Sheets - Schematic.

(b) PED-70011-10 - One Sheet - Equipment Modification, Wiring and Assembly.

(c) PJ-70011A - Four Sheets - Control Unit Construction.

(d) PT-70011-10 - One Sheet - Control Unit Wiring.

(e) PT-70011-11 - One Sheet - Control Unit Wiring.

(f) PT-70011-12 - One Sheet - Electrical Service Unit and 14 Transmitter - Distributor Wiring.

(g) PT-70011-13 - One Sheet - 28 Cabinet Wiring.

(h) PT-70011-14 - One Sheet - 28G Transmitter-Distributor Wiring.

4.08 This circuit at the PSC on a branch line, controls the following: a 14 or 28 transmitter, 14 or 28 ROTR, and a 28 RO teletypewriter. It operates over a single loop or toll facility. It has the following features:

(a) Station selection of ROTR and 28 teletypewriter on codes AU, AA, EU, EE, KE, and KA.

(b) Individual selection of 28 RO on code JX.

(c) Print suppression of CDCs on page teletypewriters.

(d) Form feed-out of selected page machines activated by FIGS H LTRS.

(e) If ROTR selected, tape is fed out on receipt of FIGS H LTRS.

(f) ROTR prints on CDCs sent from BO and blinds on codes B, C, D, J, N, R, or X unless preceded by one of the CDCs given in 4.08 (a). It feeds out tape on FIGS H LTRS.

(g) MESSAGE REGISTERS count all orders directed to the PSC.

(h) Audible and visual PAPER-OUT alarm at 28 RO activated on receipt of station code if forms are out, or cover raised. Circuit is automatically busied by continuous LTRS sent on circuit during alarm condition.

(i) ALARM RELEASE key (NL) on the 28 RO. It is operated momentarily to silence audible paper-out alarm. After paper or ribbon change is made, it is operated a second time to release busy condition on circuit.

(j) Transmitter converts codes by adding a fourth pulse to all CDCs sent on line.

(k) BUSY lamp (amber) flashes at transmitting position when circuit is busy.

(l) BREAK ALARM lamp (red) lights, buzzer activates, and transmitter stopped by the following conditions. CR before a valid call directing code, FIGS H LTRS end-of-message code omitted, and open or blank received while transmitting. This alarm can only be cleared by removing tape and operating START key momentarily.

(m) START key (NL) which is operated momentarily when tape is to be made available.

(n) START lamp (white) which lights when tape is made available.

(o) BREAK key provided on 28 RO so operator can send a break to line if incoming transmission wants to be stopped. It is only activated when machine is selected.

(p) When transmitter start code Z is received and there is no tape available, two or more LTRS characters are sent on circuit as a no-tape response.

(q) When transmitter start code Z is received and tape is available, transmitter starts.

(r) Circuit arranged for continuous tape operation. Transmitter stops on all FIGS H LTRS end-of-message codes.

E. Service Order - Multi-Line Control Unit

4.09 Drawings

(a) PSD-70012-01 Forty-Three Sheets - Schematic

(b) PJ-70012A - Four Sheets - Control Cabinet Construction

(c) PJ-70012B - Four Sheets - Control Unit Construction

(d) PJ-70012C - Three Sheets - Control Panel Construction

(e) PT-70012-10 - One Sheet - Control Unit Wiring

(f) PT-70012-11 - One Sheet - Control Unit Wiring

(g) PT-70012-12 - One Sheet - Control Unit Wiring

(h) PT-70012-13 - One Sheet - Control Panel Wiring

(j) PT-70012-14 - One Sheet - 28 SEQ SEL & 28A Dist. Wiring

(k) PT-70012-15 - One Sheet - Control Cabinet Power Wiring

4.10 This control unit, located at the control PSC, is basically a line switching unit. It switches one line (called the trunk) having three receiving only teletypewriter stations, TI, DI, and RA to any one of the four sending lines (called branches). Each has one BO and PSC sending station. A message from a branch to the trunk is not stored by the switching unit and re-sent at some later time. The transmission on the branch is sent directly into the trunk when selected.

4.11 Associated with the control unit is a 28 RO typing reperforator (trunk monitor), 28 sequential selector and a 28A or D distributor, dependent on the speed of the system.

4.12 The control unit is installed at one of the four PSC stations, in addition to the normal PSD-70011-01 PSC station equipment. This PSC is called the control PSC and is geographically located in the same city or town as its serving toll testroom.

4.13 The multi-line control unit has the following features:

(a) An attendant's control panel on the upper section of the control unit's cabinet provides message registers, keys, and lamps for control of the entire system. See Fig. 3 on page 7.

(b) Each branch circuit is equipped with circuitry and a timer, which if the branch is busy within itself, indicates to the attendant and to the control unit that it is busy. The timer provides a delay to allow for form-feed after a FIGS H LTRS before removing the busy condition.

(c) Will connect each of the idle branch circuits to the trunk in sequence, and send the transmitter start codes (TSC) Z or Y. The TSCs are the same for all branches. The Z will start the transmitter at the PSC station, the Y the transmitter at the BO on the connected branch.

(d) After sending a TSC to a branch, the control unit waits for one of the following to take place.

(1) If one or more LTRS signals (no-tape-available indication, also referred to as circuit assurance) is received and the circuit goes idle, the control unit will step to the next position and send the required TSC.

(2) If LTRS signals followed by CDCs are received, the control unit analyzes the CDC and acts accordingly.

NOTE: Trunk CDCs lock the sending branch to the trunk until FIGS H LTRS is received. Branch CDCs, control unit busies the branch. It then steps to the next idle branch and automatically sends FIGS H LTRS to the branch. This conditions the control unit and 28 sequence selector to send a TSC Z to this new branch.

(e) If neither a circuit assurance signal nor a message is received within approximately 3 seconds, the control unit will alarm. The NA (no answerback), ALARM lamp, and BUZZER will operate. The attendant should operate the CLEAR key.

(f) During the search and connect period, the control unit will step over all busy branches. If all the branch circuits are busy, the control unit stops on the last branch made busy, connects to the trunk, and sends circuit assurance signals (LTRS) at 10 second intervals to the trunk. As soon as any branch becomes idle and times out, the control unit will step around and service it.

(g) When an OPEN LINE alarm occurs, the attendant operates the BUSY-OUT key for the branch whose SEARCH lamp is lit.

(1) If the OPEN LINE alarm retires and stays retired, it indicates that the branch is open.

(2) If the OPEN LINE alarm retires and immediately reoperates, it indicates that the trunk is open.

(3) In (1) above, the attendant should report to the serving toll testroom that a branch is open and leave the BO key operated until the toll testroom reports back that the trouble is cleared.

(4) In (2) above, the attendant should report to the serving toll testroom that the trunk is open. Operate the remaining BO keys and leave them operated until the toll testroom reports that the trouble is cleared. Then return all the BO keys to normal.

(h) If a branch is sending to the trunk and everything is normal, the following lamps will be lit:

(1) The SEARCH and CONNECT lamp lit indicating which station is doing the sending.

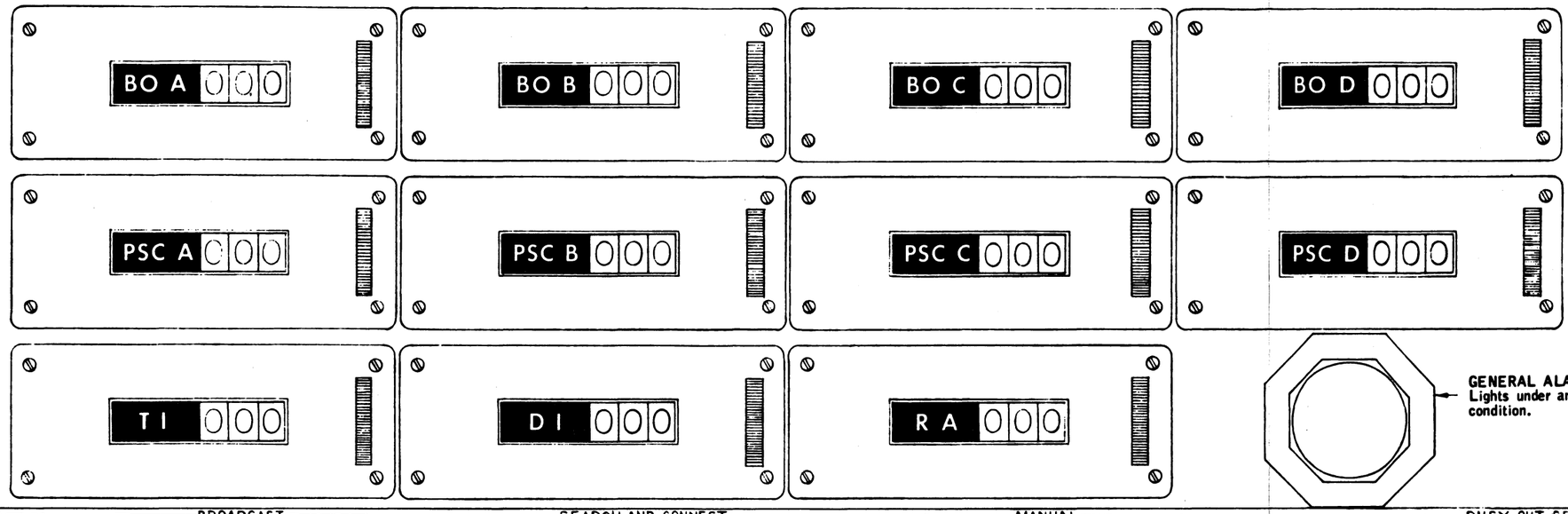
(2) The BUSY BRANCH and TRUNK lamps will be flashing.

(j) The CDC C in effect selects the control unit which reacts as follows:

(1) Prints the message on the 28 ROTR trunk monitor.

(2) When the FIGS H LTRS is received, the unit alarms and lights the MA lamp indicating to the attendant that there is a message on the monitor.

FRONT PANEL OF MULTI-LINE CONTROL UNIT SHOWING KEYS, LAMPS AND REGISTERS



MESSAGE REGISTERS make a count of orders sent to each branch station and each trunk station on the system.

GENERAL ALARM lamp - Lights under any alarm condition.

POWER FAILURE lamp - Lights whenever either the 48 volt or 120 volt rectifier fails.

ALARM RELEASE key - Retires audible alarm.

FUSE 120 lamp - Lights whenever a 120 volt fuse is blown.

FUSE 48 lamp - Lights when 48 volt fuse is blown.

RF1 120 lamp - Lit when AC power is on and 120 volt rectifier operating normally.

RF2 48 lamp - Lit when AC power is on and 48 volt rectifier is operating.

RELEASE BROADCAST key - If operated before the **BROADCAST READY** lamp lights, it cancels the broadcast.

BROADCAST PREPARE lamp - When lit, indicates the attendant is preparing a broadcast.

BROADCAST PREPARE key - Causes the control unit to stop its searching.

BROADCAST READY lamp - Indicates that entire system is idle and ready to receive the broadcast.

BROADCAST READY key - When operated, it causes the control unit to send TSC Z to the PSC on branch A.

BROADCAST BRANCH SELECT lamps - When lit, indicates which branch will receive the broadcast.

BROADCAST BRANCH SELECT keys - Individual operation of these keys after the **BROADCAST PREPARE**, but before the **BROADCAST READY** keys are operated, selects the branch to receive the broadcast.

SEARCH AND CONNECT lamps - Lighted lamp indicates which station and branch the control unit is searching.

BUSY TRUNK lamp - When flashing, indicates that the trunk is connected to a branch and is busy.

BUSY BRANCH lamps - Flashing, shows which branches are busy.

MASTER MANUAL lamp - When lit, indicates the control unit is operating on manual.

MASTER MANUAL key - Operated, it allows the attendant to operate the system on a manual basis.

MANUAL BRANCH lamps - Indicates branches are being serviced manually.

MANUAL BRANCH keys - When operated, puts that branch on manual operation. Only one key to be operated at a time.

NO ANSWER-BACK lamp - When lit, indicates a station is in trouble. The lighted **SEARCH AND CONNECT** lamp shows which station it is.

CLEAR key - Operated, it causes the control unit to send, CR LF LTRS VOID FIGS H LTRS to the connected branch. It is usually sent after a "No Answer-Back" alarm.

MESSAGE ALARM lamp - Indicates to the attendant that a service message has been sent and is on the 28 ROTR.

OPEN LINE lamp - When lit, indicates that the trunk, or the branch connected to the trunk is open.

BUSY OUT lamp - Informs attendant that a branch should be busied-out. The lighted **SEARCH AND CONNECT** lamp shows which station is in trouble.

BUSY OUT BRANCH lamps - Shows which branch has been busied-out.

BUSY OUT BRANCH keys - Removes the branch from service.

Fig. 3

5. FUNCTIONAL DESIGNATIONS CONTROL UNIT (PSD-70012-01)

5.01 Relays

DESIG	FUNCTION
AL1	General Alarm
AL2	Buzzer Cut Off
B1	Branch Only Connect
B2	Branch Only Connect Slave
BL	Blank
BC1	Broadcast Prepare
BC2	Broadcast Ready
BC3	Broadcast TSC to Branch A
BC4	Transmit Broadcast
BR1A	Branch A Busied-Out to Controller
BR1B	Branch B Busied-Out to Controller
BR1C	Branch C Busied-Out to Controller
BR1D	Branch D Busied-Out to Controller
BR2A	Branch A removes Busy Condition
BR2B	Branch B removes Busy Condition
BR2C	Branch C removes Busy Condition
BR2D	Branch D removes Busy Condition
BR3A	Branch A Busied Out Paper Change
BR3B	Branch B Busied Out Paper Change
BR3C	Branch C Busied Out Paper Change
BR3D	Branch D Busied Out Paper Change
BS1	Broadcast Sent to Branch B
BS2	Broadcast Sent to Branch C
BS3	Broadcast Sent to Branch D
C1	28 Distributor Aux Count 1st Make
C2	28 Distributor Aux Count 1st Break
C3	28 Distributor Aux Count 2nd Make
C4	28 Distributor Aux Count 2nd Break
CM1	Transmit Void Message
CM2	Transmit Void Message Slave
CM3	Transmit TSC for Second Time
CM4	Releases CM1 and CM3 relays so that the Void Message may be repeated.
CO1	PSC Message Register Connect
CO2	BO Message Register Connect
CR	Carriage Return, End of CDC
CR1	Prevents the garbling of the LTRS signal following the CR LF on the trunk after a branch CDC has been sent.
EN	End of Void Message on FIGS H LTRS Transmission
FA1	Fuse Alarm 48V
FA2	Fuse Alarm 120V
H	FIGS H LTRS Received
HO	28 Distributor Hold
L1	Repeats Signals from Branch A to Trunk
L2	Repeats Signals from Branch B to Trunk
L3	Repeats Signals from Branch C to Trunk
L4	Repeats Signals from Branch D to Trunk
L5	Repeats Signals from Trunk to 28 Sequence Selector and Broadcast Circuit
L6	Repeats Broadcast into Branch B
L7	Repeats Broadcast into Branch C
L8	Repeats Broadcast into Branch D
L9	Controls V and V1A Tube Circuits
L10	Controls V and V1B Tube Circuits
L11	Controls V and V1C Tube Circuits
L12	Controls V and V1D Tube Circuits
LT1	LTRS No Tape Available
LT2	LTRS No Tape Available Slave
MA	Message on Monitor Alarm
NC1	Prepares CS Switch to Send FIGS H LTRS

5.01 Relays (Continued)

DESIG	FUNCTION
NC2	Sends FIGS H LTRS from CS Switch
OL1	Open Line Branch or Trunk
OL2	Sends Break to Branch
RF1	Rectifier Failure 120V
RF2	Rectifier Failure 48V
ST1	Steps LS Switch
ST2	Waits for LS Switch to Step
ST3	Prepares CS Switch to Step
ST4	Steps CS Switch
ST5	Operates 28 Distributor
T1	Branch A to Trunk Connect
T2	Branch B to Trunk Connect
T3	Branch C to Trunk Connect
T4	Branch D to Trunk Connect
T5	LTRS Signal Generator to Trunk
T6	Places Control on Manual
T6A	Slave for T6 Relay
T7	Time Delay for T1, 2, 3 and 4A Relays
T1A	Slave for T1 Relay
T2A	Slave for T2 Relay
T3A	Slave for T3 Relay
T4A	Slave for T4 Relay
TF	Tape Feed-Out on 28 Monitor
TK1	Holds Trunk Connected to Branch
TK2	Slave for TK1 Relay
TM	General System Timing
TM1A	Branch A Busy Timing
TM1B	Branch B Busy Timing
TM1C	Branch C Busy Timing
TM1D	Branch D Busy Timing
TM2	LTRS Signal Generator and Second Transmission of TSC after Void Message
TR1	Transfers CS Switch arcs to Distributor
TR2	Transfers from LTRS to 1st TSC
TR3	Converts 1st TSC to 2nd TSC

5.02 Lamps in Control Panel

DESIG	COLOR	FUNCTION
Alarm	Red	General Alarm
AZ	White	Search Lamp for PSC Branch A
AY	White	Search Lamp for BO Branch A
BZ	White	Search Lamp for PSC Branch B
BY	White	Search Lamp for BO Branch C
CZ	White	Search Lamp for PSC Branch C
CY	White	Search Lamp for BO Branch C
DZ	White	Search Lamp for PSC Branch D
DY	White	Search Lamp for BO Branch D
BO	Red	Busy Out Some Branch
BOA	Amber	Branch A Busied Out
BOB	Amber	Branch B Busied Out
BOC	Amber	Branch C Busied Out
BOD	Amber	Branch D Busied Out
BP	White	Broadcast Prepare
BR	Green	Broadcast Ready to Send
BSB	White	Branch B Selected to Receive the Broadcast
BSC	White	Branch C Selected to Receive the Broadcast
BSD	White	Branch D Selected to Receive the Broadcast
BYA	White	Branch A Busy
BYB	"	" B "
BYC	"	" C "
BYD	"	" D "
BYT	"	Trunk Busy
FA1	Red	120V Fuse Operated
FA2	"	48V " "

5.02 Lamps in Control Panel (Continued)

DESIG	COLOR	FUNCTION
MA	White	Message Alarm
MM	"	Lights When Control Unit is on Manual
MBA	"	Lights When Branch A is Operating on Manual
MBB	"	Lights When Branch B is Operating on Manual
MBC	"	Lights When Branch C is Operating on Manual
MBD	White	Lights When Branch D is Operating on Manual
NA	"	Lights When a LTRS Assurance Signal was not Received
OL	Red	Open Line either Branch or Trunk
PF	"	Power Failure on either Rectifier
RF1	Green	Lights When 120V Rectifier is ON
RF2	"	Lights When 48V Rectifier is ON

5.03 Keys

NAME	ABBREV	FUNCTION
Alarm Release	AR(NL)	Stops Buzzer
Branch Busy Out	BOA(L)	Busies Out Branch A
Branch Busy Out	BOB(L)	Busies Out Branch B
Branch Busy Out	BOC(L)	Busies Out Branch C
Branch Busy Out	BOD(L)	Busies Out Branch D
Broadcast	BP(NL)	Prepares for Broadcast
Broadcast Ready	BR(NL)	Sends Broadcast Message
Broadcast Selects	BSB(NL)	Selects Branch B to Receive Broadcast
Broadcast Select	BSC(NL)	Selects Branch C to Receive Broadcast
Broadcast Select	BSD(NL)	Selects Branch D to Receive Broadcast
Clear Key	CLR(NL)	Transmits Void Message
CS Key	CS(NL)	Manually Steps CS Switch
LS Key	LS(NL)	Manually Steps LS Switch

NOTE: CS and LS keys located inside cabinet and are for maintenance purposes only.

Master Manual	MM(L)	Places Control Unit on Manual
Manual Branch	MBA(L)	Places Branch A on Manual
Manual Branch	MBB(L)	Places Branch B on Manual
Manual Branch	MBC(L)	Places Branch C on Manual
Manual Branch	MBD(L)	Places Branch D on Manual
Broadcast Release	RB(NL)	Releases Selected Branches

5.04 Message Registers

DESIG	FUNCTION
BOA	Registers Message Received at the BO on Branch A.
BOB	Registers Message Received at the BO on Branch B.

5.04 Message Registers (Continued)

DESIG	FUNCTION
BOC	Registers Message Received at the BO on Branch C.
BOD	Registers Message Received at the BO on Branch D.
PSC A	Registers Messages Received at the PSC on Branch A.
PSC B	Registers Messages Received at the PSC on Branch B.
PSC C	Registers Messages Received at the PSC on Branch C.
PSD D	Registers Messages Received at the PSC on Branch D.
TI	Registers Messages Received at TI.
RA	Registers Messages Received at RA.
DI	Registers Messages Received at DI.

5.05 Jacks

DESIG	FUNCTION
28SS	When controller is on manual, it allows repairman to pick up the 28 sequence selector for testing.
28DIS	When controller is on manual, it allows repairman to pick up the 28 distributor for testing.
LPG	While controller is operating normally, it allows the repairman to place a test instrument or meter in series with the 28 sequence selector or when controller is on manual, he may send test signals into the 28 sequence selector.
TEST	Allows the repairman to patch the 28SS or 28 DIST to the toll testroom for testing.

5.06 Electron Tubes

DESIG	FUNCTION
V	General Timing of Controller
V1A	Timing for Branch A
V1B	Timing for Branch B
V1C	Timing for Branch C
V1D	Timing for Branch D
V2	Controls timing of LTRS assurance signals to trunk and timing of sending the same transmitter start code to a branch in case of trouble.

5.07 Switches

DESIG	FUNCTION
Switch	Controls 110V AC power to cabinet.
CS	Codes 28 Distributor to send CR LF VOID FIGS H LTRS or FIGS H LTRS.
LS	Arc 1 steps switch past positions 9, 10 and 11. Arc 2 determines whether TSC Z or Y is to be sent. Arc 3 steps switch past busy branches. Arc 4 lights SEARCH lamp indicating which branch is being serviced. Arc 5 selects line to be serviced. Arc 6 indirectly controls operation of 28 distributor.

6. OPERATION DETAILED

6.01 Assume this is a three branch system, branches A, B, and C and the LS switch has just stepped to position 1. Branch B is busy within itself.

6.02 The LS switch on position 1 connects branch A to the trunk, 28 distributor to branch A, and lights the AZ SEARCH lamp.

6.03 The 28 distributor will send LTRS Z to the branch which in turn is repeated to the trunk by the L1 relay.

6.04 The trunk operates the L5 relay which transmits the LTRS Z to the 28 sequence selector.

6.05 The LTRS signal opens the LTRS contacts in the 28 sequence selector (28SS), but the Z closes them again, forming a lock path for the operated LT1 relay.

6.06 The Z is the transmitter start code for the PSC on any branch.

6.07 PSC A having no tape available would send one or two LTRS signals into branch A.

6.08 These LTRS signals will be relayed to the 28SS via the L1 and L5 relays opening the LTRS contacts in the 28SS allowing the LT1 relay to release.

6.09 The LT1 relay in releasing will disconnect the 28 distributor from branch A and from the trunk. Then the LS switch will step from position one to position two.

6.10 The LS switch stepping to position two will put out the AZ lamp, light the AY lamp, connect branch A to the trunk, and connect the 28 distributor to branch A again.

6.11 The 28 distributor will send LTRS Y to branch A and to the 28SS via the L1 and L5 relays.

6.12 The Y is the TSC for the BO on any branch.

6.13 Assume the BO A has a tape in its transmitter with the following format in it: LTRS LTRS (CDC) AU LTRS CR (end-of-code signal) LF LTRS TI, RA, and DI stations on the trunk.

6.14 The TSC Y will start the BO A transmitter and send the order into branch A, then via the L1 relay into the trunk.

6.15 The CDC AU will select station PSC A on branch A. This CDC is a non-assigned code for the TI, and stations on the trunk.

6.16 When the AU is received by the 28SS, it prepares to attach the "busy and timing circuit" to branch A and prepares the controller to step off of branch A by releasing the LT1 relay.

6.17 When CR LF is transmitted, the CR places the PSC A in a print condition and it LFs to the correct position on the form for the first line of text.

(a) CR places the TI, RA, and DI stations on the trunk in a non-select (busied out) condition.

(b) CR places the 28SS in a non-select condition and closes the CR contacts operating the CR relay of the control unit.

6.18 The LT1 relay in releasing disconnects the 28 distributor from branch A. Branch A then disconnects from the trunk and causes the LS switch to step from position two to three.

6.19 Assume branch B is busy within itself the same as branch A. This will cause the LS switch to immediately step from position three to four, then on to position five.

6.20 As the LS switch stepped from position two to three to four and stopped on position 5, the AY lamp went out, the BZ and BY lamps flashed, and the CZ lamp remains lit.

6.21 When the LS switch stopped on position five, it caused branch C to be connected to the trunk and the 28 distributor to branch C.

6.22 Assume that PSC C has a tape in its transmitter with the following format in it:

LTRS LTRS (CDC) AU LTRS CR (end of CDC code).

LF LTRS (CDC) AU LTRS text of order FIGS H LTRS (end-of-transmission).

6.23 The operated CR relay in 6.17 (b) conditions the 28 distributor by indirectly operating the CS switch to send FIGS H LTRS into branch C.

6.24 This is necessary as the 28SS and the three stations on the trunk are in a non-select condition and cannot act on CDCs as a result of the action covered in 6.14-6.17 for branch A.

6.25 The FIGS H LTRS via the 28SS releases the CR relay and conditions the controller and 28 distributor to send TSC Z to branch C.

6.26 When the FIGS H LTRS is received on the trunk, it places the three trunk stations in a select condition ready to receive the next CDCs.

6.27 The 28 distributor will send LTRS Z into branch C which in turn is relayed to the trunk by the L3 relay where it is received by the 28SS and the three stations connected to the trunk. The TSC Z is a non-assigned code to TI, RA, and DI, but in the 28SS it locks the LT1 relay operated.

6.28 PSC C transmitter will start and send the tape as explained in 6.22.

6.29 The CDC AU will be converted by the PSC station circuitry to JK which is transmitted to the branch and via the L3 relay to the trunk.

6.30 This CDC JK will select stations BO C, TI, RA, and DI and will condition the control unit via the 28SS to keep branch C connected to the trunk until a FIGS H LTRS is received.

6.31 The CR following this CDC performs the following functions:

(a) Places all the selected stations in a print condition and they LF to the correct position on the form box for the first line of text.

(b) Places the 28SS in a non-select condition so that it cannot read the text as CDCs. It can read FIGS H LTRS only which indicates end-of-transmission.

6.32 FIGS H LTRS end-of-message code received performs the following functions:

(a) Disconnects all selected stations placing them in a non-print select condition and starts them to form feed.

(b) Causes the message registers at all selected stations and associated ones in the control unit to take one count.

(c) Places the 28SS unit in a select condition.

(d) Disconnects the C branch from the trunk and steps the control unit back to branch A.

6.33 Branch A being busy (see 6.14 - 6.17), the control unit will step over branch A toward branch B.

6.34 Branch B was busy (see 6.01 and 6.19), but by this time has become idle. In doing so, it removes the stepping around from the LS switch so the controller stops on position 3 and sends TSC Z to branch B.

6.35 Transmission of an order in which two CDCs are involved. BO B sending an A or E order to PSC B on the branch and to directory on the trunk simultaneously.

(a) BO B has a tape in its transmitter with the following format in it:

LTRS LTRS (CDC) AA LTRS (CDC) N LTRS CR (end of CDC code) LF LTRS AA LTRS N LTRS text of order FIGS H LTRS (end-of-transmission).

(b) The BO B transmitter starts due to receiving the TSC Y.

(c) When the CDC AA is transmitted, the following takes place:

(1) AA is punched and typed on the tape of the ROTR at PSC B.

(2) The AA selects the 28 RO page teletypewriter at PSC B.

(3) The AA is read by the 28SS, closing its AA contacts which operate the CO1, B1, and B2 relays of the control unit.

NOTE: The CO1 relay prepares the control unit to take a message count. The B1 and B2 relays prepare the control unit to make branch B busy and places the LT1 relay in a slow release condition.

(d) When the CDC N is transmitted, the following takes place:

(1) The CDC N selects the teletypewriter at directory.

(2) The N is read by the 28SS closing its N contacts which operate the TK1, TK2 relays, and prepares the D1 message register to operate.

(3) The operated TK1 relay releases the B1 and B2 relays.

(4) The B1 and B2 relays in releasing prevents the control unit from making branch B busy.

(e) The CR (end-of-code signal) LF LTRS perform their normal functions i.e.:

(1) Places stations BO B, TI, and RA Stations in a non-select condition.

(2) Places the 28SS in a non-select condition and operates the CR contacts operating the CR relay in the control unit.

(f) The text of the order is now transmitted followed by FIGS H LTRS.

(g) The FIGS H LTRS performs the normal functions as previously explained.

6.36 Service messages:

(a) If a station wishes to send a service message to the control PSC, the station would prepare a tape using the following CDC and format:

10 LTRS C LTRS CR LF LTRS text of message FIGS H LTRS.

(b) When this tape is placed in the station transmitter, it will be picked up and sent in the normal manner.

(c) This message will be transmitted into the trunk, but the CDC C is valid in the 28SS only.

(d) The CR will place all the stations on the branch and trunk in a non-select non-print condition and the 28SS will also go into a non-select condition.

(e) The message will be printed on the 28 monitor teletypewriter at the control PSC only.

(f) When the FIGS H LTRS is received, all the stations on the branch and trunk will be placed in a select non-print condition. No forms will feed-out nor will any message register operate.

(g) At the control PSC, the MA lamp will light and the BUZZER will operate. This will indicate to the operator that there is a message on the 28 monitor that requires servicing.

(h) The LS switch will then step to the next position and send the next TSC.

6.37 Service Message from One Branch to Another:

(a) The message shall be prepared using the following format:

10 LTRS C LTRS CR LF LTRS please send the following message to "branch C town" 10 LTRS BO or PSC - (CDC) LTRS CR LF LTRS text of message FIGS H LTRS. (SAMPLE: LTRS 10 LTRS C LTRS CR LF LTRS please send the following to branch C at Fresno LTRS 10 LTRS B LTRS text FIGS H LTRS).

(b) This message would be handled as given in 6.36.

(c) The control PSC would tear off at the 10 LTRS of the first address and use the second address to resend the message via the broadcast circuit.

6.38 Broadcast messages.

(a) Any time the control PSC operator wishes to send a broadcast message, proceed as follows:

(b) Operate the BP key (BROADCAST PREPARE key), and the BP lamp will light.

(c) When all the branches become idle, the BR lamp (BROADCAST READY) will light and the BUZZER will operate.

(d) The operator would then operate the BS key (BROADCAST SELECT) for the branch or branches that are to receive the broadcast message.

(e) As the BS keys are operated, the associated BS lamp will light indicating the branch selected to receive the message.

(f) The operator then places the message to be broadcasted in the transmitter of the PSC A station and operates its START key.

(g) The BR key on the control panel is now operated and the control unit steps to position one, connects branch A to the trunk, and sends the TSC Z.

(h) This TSC Z will start the transmitter at the control PSC, sending the broadcast message from branch A to the trunk.

(j) In the trunk is the L5 relay which in turn repeats the message to branches B, C, and D if their BS key were operated (6.38/D1).

(k) When the FIGS H LTRS is received at the end of broadcast, all the selected stations' message registers, as well as the one in the control unit, take one count. The forms are fed out and all stations go to a select non-print condition.

(l) All the broadcast circuitry is returned to normal and the control unit steps to the next position sending TSC Y to branch A for the BO.

7. RELATED MATERIAL

7.01 The various alarm circuits and other features are covered in detail by the sequence charts. See PSD-70012-01 in the E sheets.

7.02 Other BSPs covering the ADOSO II System follow this general section. They contain information on:

(1) Installation and Maintenance of the ADOSO II System - PSD-70010-01, PSD-70011-01, PSD-70012-01.

(2) Maintenance Tests for Multi-Line Control Unit - PSD-70012-01.

(3) Maintenance Tests for Branch Station - BO Control Unit - PSD-70010-01.

(4) Maintenance Tests for Branch Station - PSC Control Unit - PSD-70011-01.