

**MODIFIED 83B1 SELECTIVE CALLING SYSTEM
FOR AIRLINES RESERVATIONS USING REMINGTON
RAND UNIVAC EQUIPMENT
DESCRIPTION AND OPERATING PRINCIPLES**

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1. GENERAL

1.01 This section outlines the description and operating principles of the Modified 83B1 Selective Calling System arranged for operation with the Remington Rand Univac Airlines Reser-

vations System. Included in the section is a brief description of the operation of the customer provided Remington Rand Univac equipment with respect to its transmission and control characteristics, as well as other pertinent arrangements for its operation with the modified 83B1 system.

1.02 Throughout the section reference is made to the terms serial to parallel and parallel to serial signal conversions as well as to parallel and serial signal transmission. Parallel signals are those where the signal units or pulses are impressed upon the transmission medium at the same time in parallel and may be likened to the sensing contacts of the No. 14 transmitter-distributor whereby the contacts impress upon the distributor face the code selection read from the tape. Serial signals are those where the signal pulses follow one after the other in sequence and may be likened to the No. 14 transmitter-distributor brush arm sweeping over the start, the No. 1 through 5 selecting, and the stop segments of the distributor face by which action the signals are sent to the line in the conventional series type transmission.

1.03 Mention is also made throughout the section to computer inquiry messages and computer reply messages. Computer inquiry messages are those messages originated by operation of the Remington Rand Univac agent sets located at airlines ticket and reservations offices for seat reservations, flight information and other operational data and are directed to a Remington Rand Univac file computer located either in the same city or some distant city. Computer reply messages are those messages originated by the Univac file computer in reply to a computer inquiry message and furnishes the agent set operator with the desired information.

1.04 The Univac airlines reservations system includes a central Univac file computer installation which is connected to each of several groups of Univac agent sets, located either near the computer or at outlying station installations in distant cities. The agent sets are connected in a group of from 1 to 8 sets to a common Univac low speed programmer-scanner unit which in turn is connected to a specific Univac input-output unit installed at the central computer location by means of the modified 83B1 selective calling system.

1.05 The modified 83B1 control station equipment is installed at the Univac file computer location while the outlying station modified 83B1 equipment is installed at the programmer-scanner location. In most cases each outlying station installation will include up to eight agent sets feeding into a single programmer-scanner, although it is possible to operate two programmer-scanners in tandem, resulting in an equipment arrangement which appears to the modified 83B1 system to be identical to a single unit except that twice as many agent sets are serviced during each polling cycle. When the modified 83B1 system connects a particular low speed programmer-scanner to the Univac input-output unit, a transaction will be handled from each agent set which had a bid recorded in the low speed programmer-scanner prior to the time the station was polled. After the last agent set that had a bid recorded has completed its transaction, the low speed programmer-scanner will generate code H H (End-of-Transmission Code) informing the modified 83B1 system to disconnect the station and resume polling.

1.06 In general, standard telegraph channels will be employed as the communicating links between the programmer-scanner and the computer, although where a group of agent sets are located in the immediate vicinity of the computer, direct wire connections may be made to the appropriate input-output unit.

1.07 Computer inquiry messages originating at agent set locations such as city ticket offices, airport ticket counters, telephone reservations bureaus, etc., are generated by the agent

set equipment and sent to the modified 83B1 outlying station equipment via the programmer-scanner. The messages are received at the computer location via the modified 83B1 control station equipment and the input-output unit.

1.08 The modified 83B1 selective calling system described in this section is arranged for half-duplex multistation line operation, with one control station and up to a theoretical maximum of 38 outlying stations operating at speeds of 60, 75, or 100 wpm. The limitations with respect to the actual number of stations per system are discussed in greater detail elsewhere in this section. The system is based on the use of the No. 28A sequential selector to perform the individual station selection functions and the serial to parallel signal conversion. The transmitter start circuit in the control station equipment at the computer location initiates the starting, in a predetermined sequence, of messages from the outlying stations on the line. The order of connection to the stations is determined by the sending from the transmitter start circuit of two-letter Transmitter Start Codes (TSCs) that designate the individual stations to be started. This functions as a continuous polling process and when each station is polled it will connect the Univac equipment to the line. If traffic is available, transmission will begin immediately. If no traffic is available, the station will send the letter V (No Traffic Response) and the next station in the sequence will be polled. When traffic is available, the polling is stopped until the station connected completes its transmission and sends the code H H (End of Transmission). At each location a No. 28 distributor is provided for converting the parallel signals to serial signals for transmission to the line. No Call Directing Codes (CDCs) are involved.

1.09 The following list is the basic code and coding control arrangements used on the Univac airlines reservations system.

- (a) TSC (Transmission Start Code) — Uses two letters, the first of which is the letter Q. The second letter can be any letter of the alphabet except the letters O or M or the other codes used in this system as outlined below. This is discussed in more detail in Part 5.

(b) V (No Traffic Response) — Outlying station sends the letter V when it has no traffic and is polled by the transmitter start circuit at the control station.

(c) E (Start-of-Transmission Code)

(d) T (End-of-Message Code)

(e) H H (End-of-Transmission)

(f) Line Feed T (Repeat Transmission)

1.10 No teletypewriter apparatus other than the No. 28A sequence selector and No. 28 distributor associated with the modified 83B1 outlying station units is generally provided on the airlines reservations system. A No. 14 keyboard typing reperforator will be provided at the Univac computer location for monitoring purposes and emergency communications with the programmer-scanner locations.

2. DEFINITION AND DESCRIPTION OF SIGNALS

2.01 Fig. 1 shows schematically the signal transmission characteristics of the Univac reservations system. Each low-speed programmer-scanner will control from one to eight agent sets. Each agent set having traffic will be connected in a prearranged order following the receipt of a TSC. After all agent sets associated with a given programmer-scanner have been scanned and completed the transmission of traffic, if any, a sequence H H will be generated by the programmer-scanner. All traffic from the agent sets will be directed to the Univac file computer only, with the computer transmitting an immediate reply to the inquiring agent set while that set is still connected to the line.

2.02 At the outlying station, the No. 28 distributor and its associated applique circuit converts the 5 level parallel code received from the programmer-scanner to the conventional 5 unit series or serial teletypewriter selecting code for transmission over the line to the Univac computer. Likewise the No. 28A sequence selector and its associated applique circuit converts the conventional 5 unit serial teletypewriter signals received from the line to 5 level parallel code signals for transmission into the programmer-scanner. The input-output unit transmits a 5

level parallel code into the 83B1 control station unit and also receives from it a 5 level parallel code. The No. 28 distributor and its associated applique circuit convert the 5 level parallel code to the 5 unit serial teletypewriter selecting code for transmission over the line to the inquiring agent set location. The No. 28A sequence selector and its associated applique circuit converts the 5 unit serial teletypewriter signals received from the agent set location to 5 level parallel code signals for transmission into the input-output unit associated with the file computer.

2.03 Messages originated by the agent sets and directed to the Univac file computer consist of a sequence of from eight to nineteen characters by which certain inquiring intelligence is transmitted to the computer. This sequence when sent over the teletypewriter circuit would appear on a monitoring teletypewriter as an unintelligible grouping of miscellaneous characters. Each Univac character consists of four code levels and one (the fifth level) level which is used by the Univac as an indication of signal correctness (parity check), all of which are presented to the programmer-scanner in parallel. This will form a code corresponding to a teletypewriter character or function as shown in Table A. The 1 indicates a marking condition of the circuit and is produced by the individual contact closure to the common lead in the programmer-scanner at the agent set end of the circuit and in the input-output unit at the file computer end of the circuit. The 0 indicates a spacing condition of the circuit and is produced by an open of the individual contacts. The file computer and agent sets will transmit and recognize teletypewriter characters composed of an odd number of pulses only, i.e., characters where the marking pulses would add up to 1, 3 or 5 such as B (1-4-5 marking or total of 3), C (2-3-4 marking or total of 3), letters (1-2-3-4-5 marking or total of 5). An even number character such as A (1-2 marking or total of 2) or Q (1-2-3-5 or total of 4) is rejected by the computer. Should the computer receive such an even number character in an inquiry message from the agent set, the reply message returned by the computer would indicate an error to the agent set. The error character is the line feed function in the teletypewriter code. Table A shows the Univac inquiry codes and their corresponding teletypewriter characters.

TABLE A										
UNIVAC INQUIRY CODES					CORRESPONDING TELETYPEWRITER CODES					CHARACTER OR FUNCTION
5	4	3	2	1	1	2	3	4	5	
0	0	0	1	0	S	M	S	S	S	Line Feed (LF)
1	0	0	1	1	M	M	S	S	M	W
0	0	1	0	0	S	S	M	S	S	Space
1	0	1	0	1	M	S	M	S	M	Y
1	0	1	1	0	S	M	M	S	M	P
0	0	1	1	1	M	M	M	S	S	U
0	1	0	0	0	S	S	S	M	S	Carriage Return (CR)
1	1	0	0	1	M	S	S	M	M	B
1	1	0	1	0	S	M	S	M	M	G
0	1	0	1	1	M	M	S	M	S	J
1	1	1	0	0	S	S	M	M	M	M
0	1	1	0	1	M	S	M	M	S	F
0	1	1	1	0	S	M	M	M	S	C
1	1	1	1	1	M	M	M	M	M	Letters (LTRS)
0	0	0	0	1 (Note 1)	M	S	S	S	S	E
1	0	0	0	0 (Note 1)	S	S	S	S	M	T
1	0	1	0	0 (Note 1)	S	S	M	S	M	H

Note 1: E (Start-of-Transmission Code), T (End-of-Message Code), H H (End-of-Transmission Code)

Note 2: The 5th level of the Univac inquiry code is used for parity checking purposes, except for its use in the end-of-transmission H H sequence. The 1 to 4 levels of the 5 level code are actually used for the transmission and receipt of intelligence. The 5th checking level may be marking or spacing, depending upon whether the other 4 level pulses are odd or even. All even numbered bit characters will be blocked and discarded by the receiving equipment at the file computer location.

Note 3: All 16 of the total available odd numbered teletypewriter codes are assigned to the operation of the reservations system with respect to the interchange of inquiry and answer intelligence except the E and T which are for the coded control signals mentioned in Note 1.

2.04 Each computer inquiry message originated by an agent set begins with the code E and ends with a code T. An exception occurs, however, with the sequence Line Feed T described elsewhere in this section, which is not preceded by the code E.

2.05 Computer reply messages originated by the Univac file computer consist of a sequence of two to six characters which contain the reply to the inquiry sent by the agent set.

Transmission is the same as that described in 2.03. Every computer reply message ends with code T, but no code E is used.

Control Connections

2.06 Control connections as provided for the operation of the Univac file computer reservations system are discussed below. These control connections consist of four pairs of conductors between the input-output unit and the 83B1

control station equipment at the computer location and six pairs of conductors between the programmer-scanner and the 83B1 outlying station equipment at the agent set end of the system.

(a) Bid — A normally open contact arrangement in the programmer-scanner equipment which when closed indicates to the modified 83B1 equipment that one or more agent sets desires to communicate with the computer. These contacts remain closed until each of the agent sets desiring to communicate with the computer has completed one inquiry-reply cycle, i.e., transmitted a computer inquiry message to the computer and received a reply.

(b) Start — A normally open contact in the input-output and programmer-scanner equipment which when closed indicates to the modified 83B1 equipment that the first character of a message to be transmitted has been set up on the transmitting data leads to the modified 83B1 equipment and that the input-output unit and the programmer-scanner is ready to accept "change" signals.

(c) Change — A "closed to open" transition in the modified 83B1 equipment which instructs the input-output and the programmer-scanner units to set up the next character on the transmitting data leads to the 83B1 equipment.

(d) Read — A contact closure in the serial to parallel converter which indicates to the input-output and the programmer-scanner units that a character is being presented on the receiving data leads from the modified 83B1 equipment.

(e) Station Cutoff Alarm — A normally open contact arrangement in the modified 83B1 equipment which will close should an open line condition occur during the time the programmer-scanner and the input-output unit associated with the file computer is connected to the line. The contacts will provide a closure to the programmer-scanner and the input-output unit indicating an alarm condition. Also should the line go idle and marking from 10 to 15 seconds, the transmitter start unit

associated with the modified 83B1 control station equipment at the computer location will transmit FIGS H H LTRS to the line which in turn will initiate an alarm condition and resume polling.

(f) Alternate Arrangements — A normally open contact in the 28A sequence selector stuntbox which will close upon the receipt of the sequence AA. AA is a broadcast code which when sent from the computer location will close these contacts in the stuntboxes. This closure in turn will advise all agent sets that the computer is out of service and that the agents should use alternate arrangements.

Coded Control Signals

2.07 A two-character sequence H H is generated by the programmer-scanner as an indication to the modified 83B1 outlying station equipment that one "bid" cycle has been completed.

2.08 A two-character sequence Line Feed T is generated by the programmer-scanner to instruct the input-output unit at the computer location to repeat the last computer reply message that was sent. This sequence is the only message transmitted by the programmer-scanner to the computer which is not preceded by code E character.

3. INTERCONNECTING ARRANGEMENTS

3.01 In order to provide a point of demarcation between the Remington Rand Univac equipment at both the file computer and programmer-scanner locations, a cord equipped with a U. S. Components male connector at one end and a female connector at the other end will be provided by the Telephone Company. This cord will interconnect the Univac equipment which will terminate in a comparable U. S. Components male plug connector with the outlying and control station 83B1 system equipment. The 83B1 equipment is terminated in a U. S. Components female connector. The interconnecting arrangements together with a detached contact schematic of certain components in the modified 83B1 control and outlying station arrangements are shown in Fig. 2.

4. BASIS FEATURES

4.01 Fig. 3 shows a block schematic of the airlines reservations system using the modified 83B1 control station equipment operating into Remington Rand Univac input-output units associated with the computer and the 83B1 outlying station equipment operating into the programmer-scanner units associated with the agent sets. The transmitter start circuit will poll each programmer-scanner on the system for traffic in accordance with a predetermined sequence. The programmer-scanner unit permits its associated agent sets to have access to the computer via the modified 83B1 system. Computer inquiry messages originated by the agent set are directed to the computer which sends back a computer reply message while both the agent set and the computer are connected to the line.

4.02 Other basic features of the system are:

- (a) The Remington Rand Univac equipment utilizes parallel signals. The necessary serial to parallel and parallel to serial conversion required to permit transmission over standard telegraph facilities is provided by the modified 83B1 system.
- (b) In connection with the transmitter start functions, individual station lamps and skip keys are provided on a unit panel basis for a maximum of 19 stations as required by the customer. Fig. 4 shows the arrangement of the key and lamp panels for the control station at the Univac computer location.
- (c) Polling of the programmer-scanner stations in search of traffic will be continuous, with no waiting period between polling cycles.
- (d) No priority traffic feature is provided in the system.
- (e) Each programmer-scanner will send one computer inquiry message to the computer at a time, and wait on the line for the reply from the computer. Upon completion of the last transaction, the code H H is sent by the programmer-scanner to the control station to signal the transmitter start circuit to resume polling.

(f) The letter V is used as a "no traffic response" from a polled station which has no computer inquiry message to send to the computer. This feature provides circuit assurance.

(g) Circuit operation may be at 60, 75 or 100 wpm.

(h) No Call Directing Characters (CDCs) are required since all traffic is directed to the file computer and the computer is connected to the line at all times.

(i) The transmitter start feature provides for the following:

- (1) Eliminates contention between programmer-scanner stations.
- (2) Lamps are provided at the control station to identify the programmer-scanner station being polled or connected.
- (3) Skip keys are provided, which when operated will prevent the TSC from being sent to poll a given station.
- (4) The polling cycle may be stopped at any time by the operation of the VS key to the SP position.

5. ARRANGEMENT AND CHOICE OF TRANSMITTER START CODES (TSCs)

5.01 Theoretically, the system could accommodate a maximum of 38 programmer-scanner stations which is based on the restriction that the number of such stations is limited to the available characters in the alphabet for the second letter of the TSC that are not critical codes to the operation of the Univac system. These critical codes are E, H, T, and V. Also the codes M and O are not usually used for TSCs since each of these letters can be produced by a single properly timed "open" of the circuit and consequently are readily produced falsely by "hits" on the line. The characters T and V which are used for the End-of-Message and No Traffic Response codes, respectively, also fall in this same category; however, such "hits" would have to occur within the limited periods that the control circuit equipment is conditioned, to them.

As an example, if a false code V should occur at exactly the right instant, i.e., immediately following the receipt of the TSC by the programmer-scanner and the subsequent start of the inquired message, the transmitter start circuit associated with the control station equipment at the computer location, would resume polling at about the same time the inquiry message started over the circuit. The resultant garble would soon bring in an "alarm" condition requiring operator attention.

5.02 The letter Y is arbitrarily excluded from use as a TSC in the 83B1 system, The characters E and H are also unavailable for TSCs in this system since they are used, respectively, for the Start-of-Transmission, and the End-of-Transmission sequence.

5.03 From the foregoing, it follows that a total of 19 characters are available for second letters of the two-letter TSCs.

5.04 In using modified 83B1 control station equipment for the Univac airlines reservations system, the first letter of all TSCs must be a Q or X, since these characters are generated by the transmitter start relay circuitry. The use of the Q and X with each of the above mentioned 19 characters, would result in the availability of a total of 38 TSCs since double codes QQ and XX can be used.

5.05 The second letters of the TSCs are coded from the selector switch in the transmitter start circuit. In the modified 83B1 system, if nine stations or less are needed, the second letters available for assignment as TSCs are:

A, C, I, L, N, P, R, S, and Z

This differs from the standard 83B1 system because the E cannot be used as a TSC, since it is used as the Start-of-Transmission code. In order to avoid extensive wiring changes, the SKIP key in the key and lamp cabinet for the E station (No. 3) *must be left in the SKIP position.*

5.06 In the modified 83B1 system, if more than nine stations and up to nineteen are needed, the second letters available for assignment as TSCs are:

A, C, I, L, N, P, R, S, Z, W, K, D, U, G, X, Q, J, F, and B

This differs from the standard 83B1 system because the E cannot be used for the reason outlined in 5.05. In this case the SKIP key in the key and lamp cabinet for the E station (No. 3) *must be left in the SKIP position.*

5.07 The foregoing arrangements, therefore, reduce the number of stations assigned from a theoretical 20 station system to 19 stations. In view of traffic load and time interval considerations it is not expected that one circuit will have more than 19 programmer-scanner stations assigned to it, even though the theoretical maximum is 38 such stations as discussed heretofore.

5.08 The TSC assignments on this system must be as follows:

Station	1	2	3	4	5	6
TSC	QA	QC	—	QI	QL	QN
Station	7	8	9	10	11	12
TSC	QP	QR	QS	QZ	QW	QK
Station	13	14	15	16	17	18
TSC	QD	QU	QG	QX	QQ	QJ
Station	19	20				
TSC	QF	QB				

6. METHOD OF OPERATION, MODIFIED 83B1 OUTLYING STATION EQUIPMENT ARRANGED FOR OPERATION WITH PROGRAMMER-SCANNER UNITS

6.01 The modified 83B1 outlying station control circuit and its associated applique equipment are provided at each Remington Rand Univac programmer-scanner location on the airlines reservation system to perform the following basic functions.

(a) To recognize the assigned TSC and upon receipt of the TSC, to connect the programmer-scanner to the line if it has placed a "bid" on the circuit. If no "bid" has been placed on the circuit by the programmer-scanner, a V character is returned to the control

station to release the transmitter start circuit for polling the next programmer-scanner station.

(b) To disconnect the programmer-scanner unit from the line upon receipt of the code H H signal sequence.

(c) To convert the 5 level parallel signals received from the programmer-scanner to the conventional 5 unit serial teletypewriter signals and to transmit them to the line.

(d) To convert the 5 unit serial teletypewriter signals received from the line to 5 level parallel signals and to transmit them to the programmer-scanner unit.

(e) To provide an alarm if an "open" line condition should occur during the time the programmer-scanner is connected to the line. This will indicate to the programmer-scanner that the system has ceased to accept the current "bid" for the transmission of an inquiry message to the line.

(f) To provide control keys, lamps, audible and visual alarms necessary for the proper operation and supervision of the system.

(g) To provide a means whereby the programmer-scanner can be disconnected from the 83B1 station equipment and a test loop connected in its place for testing the serial to parallel and parallel to serial conversion.

(h) To recognize the alternate arrangement broadcast code AA, to advise the programmer-scanner of its receipt and to withdraw the alternate arrangement condition upon the receipt of H H.

6.02 The No. 28 distributor is provided for the purpose of converting the 5 level parallel signals received from the programmer-scanner to the conventional 5 unit serial teletypewriter signals for transmission to the line. The distributor is under the control of the start contacts in the programmer-scanner and a corresponding relay in the modified 83B1 outlying station circuit. Closure of the start contacts indicates to the 83B1 equipment that the first character of

an inquiry message to be transmitted has been on the transmitting signal leads associated with the input of the distributor and that the programmer-scanner is ready to accept a "change" signal. The distributor auxiliary contacts are connected to the programmer-scanner to furnish a "change" signal to that unit indicating that the character presented to the input of the distributor has been transmitted to the line and it is ready for the next character to be presented. The programmer-scanner will change the character on the input leads to the distributor immediately after the "closed to open" transition of the distributor auxiliary contacts has occurred.

6.03 The 28A sequence selector is modified to omit the normal station connection functions of its stuntbox. The latch release bail is arranged to operate upon receipt of the sequence H H instead of the FIGS H LTRS sequence. The lockout shift slide is operated upon receipt of E instead of the CR LF sequence. A suppression shift slide is added which operates upon receipt of a sequence consisting of the second character of the TSC and the start of the transmission, character E. The TSC make and break contacts, the end-of-transmission break contacts the double blank make contacts and the universal make contacts are retained in the unit and used in the same manner as on a standard 83B1 system. A FIGS make contact is added in parallel with the double blank make contacts. The code V, the normal FIGS H LTRS make contacts as well as the CDC contacts are removed or disabled. Six additional make contacts which are associated with function bars and function lever parts have been added for use in connection with the conversion of the 5 unit serial signals from the line to 5 level parallel signals and to facilitate their transmission to the programmer-scanner over the computer reply leads. The function bars associated with these contacts are restricted to the "print" condition and therefore operate only between the time the suppression code bar has been shifted to the "print" position and the End-of-Transmission code has been received. One set of these contacts is arranged for universal operation thereby furnishing a contact closure to the programmer-scanner to indicate that a character has been set up on the computer reply message leads and that this character may be read by the programmer-scanner.

6.04 The 83B1 outlying station circuit is modified to handle all traffic on the first polling cycle, thereby eliminating the priority feature. Relays A and V therefore operate immediately after the bid contacts in the programmer-scanner close. Certain contacts of the V and TS relays are removed from the alarm guard circuit and brought out in series to terminals in the key and lamp cabinet so that they may be used to record waiting time if desired. Another modification consists of wiring the AL and AS relays in parallel, so that the AS alarm signal relay will operate along with the AL relay. Certain contacts of the AL relay are used to provide an operating path for the auxiliary alarm relay in the applique circuit instead of "shunting down" the V relay. The leads from the six new contacts in the 28A sequence selector which are used for the serial to parallel conversion are connected to the applique circuit. Relays PR (priority), KS (keyboard send), SC (station connect), and RC (reperforator connect) are not used in the circuitry of the modified 83B1 equipment and should therefore remain unoperated. Other basic circuitry and features of the 83B1 outlying station equipment will function as described in CD-70832-01 except that the V answer back feature is not used. The code V, however, is used in the modified system.

6.05 The station cutoff alarm is obtained by using the (auxiliary alarm) ALX relay in the applique circuit per drawing CA-12462-SD and operating it from the AL relay in the outlying station unit. Contacts on the ALX relay are used to furnish the station cutoff alarm, light the alarm lamp and operate the buzzer.

6.06 Operation of the MR key in the key and lamp panel will operate the T1 and T2 relays in the applique circuit per drawing CA-12462-SD. This will disconnect the 83B1 outlying station circuit from the Univac equipment and connect a test loop provided to the serving telegraph testroom to permit testing the serial to parallel and parallel to serial conversion. Signals received on the regular loop will be converted from serial to parallel signals and then reconverted back to serial signals for transmission over the test loop. This arrangement will permit the testroom to send a test message over the regular loop and to receive it back over

the test loop approximately one character later. It is possible with this arrangement to determine whether trouble conditions may be in the customer provided Univac equipment or in the Telephone Company equipment.

6.07 The general method of operation of the modified 83B1 outlying station equipment with the programmer-scanner unit in handling an inquiry message from an agent set to the Univac file computer and the returning reply is reviewed in the following.

(a) Closure of the "bid" contacts in the programmer-scanner will operate relays in the 83B1 outlying station circuit and light the BID lamp in the key and lamp cabinet. Receipt of the TSC for the particular programmer-scanner station involved will operate another relay via the transmitter start contacts in the stuntbox of the 28A sequence selector. With these relays operated, the DS (Distributor Start) relay also operates to prepare an operate path for the distributor clutch release magnet. The closure of the start contacts in the programmer-scanner completes the operate path for the distributor clutch release magnet, allowing the distributor shaft to rotate. The distributor will then transmit to the line any character presented to the programmer-scanner computer input message leads.

(b) The first character of the computer inquiry message is the code E character which is used as a "lock-out" code for the 28A sequence selectors to lockout other programmer-scanner stations on the system until polling is resumed. The last character of the two-letter TSC in sequence with the code E character is used to activate the serial to parallel signal conversion feature of the 28A sequential selector in preparation for the receipt of the computer reply message.

(c) The opening of the No. 28 distributor auxiliary contacts provides a "change" signal to the programmer-scanner, indicating that the next character should be presented to the computer input message leads. The distributor shaft is "free wheeling" and a new character is presented to the computer input mes-

sage leads after each "close to open" transition of the auxiliary contacts until the complete inquiry message has been transmitted to the computer.

(d) At the end of the computer inquiry message, the start contacts in the programmer-scanner will open and release the 28 distributor magnet, thereby stopping the rotation of the distributor shaft. The system now waits for a computer reply message, the characters of which will be received by the 28A sequence selector. When a reply character is received from the computer, contacts in the stuntbox of the 28A sequential selector are closed in accordance with the 5 unit teletypewriter code for the particular character and at the same time another contact closes to inform the programmer-scanner to read the character set up in the contacts. This procedure is repeated for each character received.

(e) The foregoing sequence (a) through (d) is repeated until a scan cycle is completed by the programmer-scanner.

(f) At the end of the scan cycle the programmer-scanner sends the H H sequence and opens its "bid" and "start" leads. The receipt of the H H by the stuntbox of the 28A sequential selector will release the outlying station circuit restoring the programmer-scanner station to the "unselected" condition. Should the station receive a TSC without presence of a bid, the outlying station control circuit will generate a code V signal and polling of other programmer-scanner stations will continue from the control station at the computer location.

(g) Should an "open" line condition occur during the time the programmer-scanner is connected to the line, the double blank contacts in the stuntbox of the 28A sequential selector will close, operating the alarm relays in the outlying station control circuit. The operation of these relays will sound the buzzer, light the AL alarm lamp in the key and lamp cabinet and close the station cutoff contacts which will advise the programmer-scanner that an alarm condition exists. The operation of the AG key in the key and lamp cabi-

net to the ACO alarm cutoff position will silence the buzzer and light the ACO lamp. Operation of the AR alarm release key will restore the alarm circuit if the condition that caused the alarm no longer exists. The AG key should then be restored to normal.

(h) Should the line circuit go idle and marking for a period of from 10 to 15 seconds, the transmitter start unit at the computer location will time out and transmit the FIGS H H LTRS sequence to the line. The receipt of the FIGS character will operate the alarm relays in the outlying station control circuit from contacts in the stuntbox of the 28A sequential selector and initiate an alarm as covered in (g).

7. METHOD OF OPERATION, MODIFIED 83B1 CONTROL STATION EQUIPMENT ARRANGED FOR OPERATION WITH THE INPUT-OUTPUT UNITS ASSOCIATED WITH THE UNIVAC FILE COMPUTER

7.01 The modified 83B1 control station equipment and its associated applique circuit arrangement is provided at the Remington Rand Univac file computer location on the airlines reservations system to perform the following basic functions.

(a) To control the connection of the various programmer-scanner stations to the Univac file computer by polling these stations in sequence.

(b) To recognize a code V signal from any of the outlying programmer-scanner stations and to continue polling the other stations. Polling will be continuous and traffic will be handled on the first polling of a station since no priority feature is included in the system.

(c) To convert the 5 level parallel signals from the Univac input-output units to serial signals and to transmit them to the line.

(d) To convert the 5 unit serial teletypewriter signals received from the line to 5 level parallel signals and to transmit them to the input-output units.

(e) To provide an alarm if an "open" line condition should occur during the time the input-output unit is connected to the line. This will indicate to the computer that the system has ceased to accept the current bid for the line.

(f) To provide keys, lamps, audible and visual alarms necessary for the proper operation and supervision of the system.

(g) To provide a means whereby the computer input-output unit can be disconnected from the 83B1 station equipment and a test loop connected for testing the serial to parallel and parallel to serial conversion.

(h) To provide arrangements whereby a spare modified 83B1 control station can be substituted for any one of four regular control station units.

7.02 The No. 28 distributor is provided for the purpose of converting the 5 level parallel signals received from the output of the Univac input-output unit to the conventional 5 unit serial teletypewriter signals for transmission to the line. The unit also provides for serial to parallel signal conversion for testing purposes as well as for sending TSCs to the line in connection with the polling operation. These functions will be further discussed.

7.03 The 28A sequence selector has been modified to omit the normal station connection functions of the stuntbox since station CDCs are not used in this system. The latch release bail is arranged to operate upon the receipt of H H instead of the FIGS H LTRS sequence. The lockout shift slide is operated upon receipt of E instead of the CR LF sequence. The transmitter start make contacts, the end-of-transmission make and break contacts, the double blank make contacts, the V make contacts and the universal make contacts are retained on the unit and used in the same manner as in a standard 83B1 system. The V make contacts are, however, relocated to another slot. All other contacts normally used with the standard 83B1 system are removed or disabled. Six additional make contacts which are associated with function bars and function lever parts have been added for use in connection with the conversion of the 5 unit

serial signals received from the line to 5 level parallel signals for transmission into the input-output unit. One set of these contacts is arranged for universal operation thereby furnishing a contact closure in the way of a "read" signal to indicate that a character has been set up on the input-output data leads and may be read by the Univac equipment.

7.04 The 83B1 control station circuit is modified as follows.

(a) The A and V relays are held operated at all times except when the H H contacts in the stuntbox of the 28A sequence selector are operated or the power is turned off.

(b) The AL and AS relays are wired in parallel so that the AS alarm signal relay will operate along with the AL alarm relay. Both relays will therefore operate upon receipt of a "break" (double blank).

(c) Certain contacts of the AL alarm relay are removed from the shunt path around the winding of the V relay and are used to provide an operate path for the ALX auxiliary alarm relay in the applique circuit described later.

(d) Eight leads are added between the B and C connectors to extend the contacts of the serial to parallel conversion features of the 28A sequential selector stuntbox to the applique circuit.

(e) Relays PR, KS, SC, and RC serve no useful function in this application to remain unoperated.

Other features of the 83B1 control station unit are as described in CD-70832-01 except that the LTRS signal generator is not used.

7.05 The transmitter start circuit has been modified to control the operation of the applique circuit which transfers the No. 28 distributor from its parallel to serial conversion function to the transmitter start circuit to send TSCs. The strapping on the selector bank of the transmitter start unit is changed such that the first four characters transmitted from this unit will be FIGS H H LTRS instead of the usual

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FIGS H LTRS V. The other functions of the transmitter start circuit are basically the same as those described in CD-70831-01.

7.06 The applique circuit per drawing CA-12463-SD provides a means of testing the serial to parallel and parallel to serial conversion from the telegraph testroom by disconnecting the modified 83B1 equipment from the Univac equipment and connecting it to a test loop. Test signals transmitted from the testroom will be converted from serial to parallel signals and reconverted back from parallel to serial for transmission over the test loop to the testroom. The circuit also provides certain additional alarm features among which are the closure of the station cutoff contacts to inform the input-output unit that an alarm condition exists.

7.07 A spare modified 83B1 control station equipped with a transfer unit per drawing CA-12463-SD can be provided at the file computer location. This unit can be substituted in place of one of four regularly assigned units for maintenance and operation purposes.

7.08 The general method of operation of the modified 83B1 control station equipment with the input-output units associated with the file computer is as follows.

- (a) To start the polling operation, remove the outlying programmer-scanner stations that are available for operation from "skip" by restoring the SK keys to normal. Operate the VS key to normal.
- (b) After the line has remained closed and idle for approximately 10 seconds, the transmitter start circuit will cause its selector to step to Step 1. At this time the applique circuit per drawing CA-12463-SD will transfer the No. 28 distributor to the transmitter start circuit which will send FIGS H H LTRS to the line followed by the individual TSCs.
- (c) The first programmer-scanner station in the polling sequence not on "skip" will now be polled. If this first station polled has no traffic (no bid) to send to the file computer,

a code V will be generated by the outlying station equipment and when this character is received at the computer location the transmitter start equipment will proceed to poll the next programmer-scanner station in the sequence.

- (d) Assume that the next programmer-scanner station not on "skip" has inquiry traffic (bid) when it is polled. After the transmission of the TSC, the programmer-scanner station begins the transmission of the computer inquiry message as described in 6.07(a) and (d). The first character of the message will be the code E which will be used as a "lockout" code for the 28A sequence selector. When the E is received in the stuntbox, contacts over slots 29 and 34 close. The contact over slot 34 indicates to the input-output unit the presence of a teletypewriter character on the computer input data leads and the contact over slot 29 indicates the teletypewriter character E has been received in parallel form.

- (e) This sequence is repeated for each character of the inquiry message sent from the programmer-scanner station with the contacts over slots 29 through 33 providing the intelligence and the one over slot 34 indicating its presence to the input-output unit.

- (f) After the computer inquiry message has been received by the Univac file computer the input-output unit will initiate a "computer reply" message character placing it in parallel form on the computer reply leads to the modified 83B1 control station equipment. The input-output unit will also close the start leads to operate the 28 distributor clutch release magnet permitting the distributor shaft to begin rotating. The receipt of the first computer input message character transfers the distributor back to its normal condition as a parallel to serial converter. The distributor transmits to the line in the conventional 5 unit serial teletypewriter code any characters presented to the computer reply. The opening of the 28 distributor auxiliary contacts provides a "change" signal to the input-output unit indicating that the next character in the computer reply message should be presented to the computer reply leads. The 28 distributor shaft is

"free wheeling" as long as its clutch release magnet start leads are closed. A new character is therefore presented to the computer reply leads after each "closed to open" transition of the auxiliary contacts until the complete computer reply message has been transmitted. At the end of the computer reply message, the input-output unit will open the start leads releasing the distributor clutch release magnet and stopping the transmission.

(g) The sequence (d) through (f) is repeated until a scan cycle is completed by the programmer-scanner.

(h) At the end of the scan cycle, the programmer-scanner sends the code H H sequence. Upon receipt of this sequence by the 28A sequence selector at the computer location, the transmitter start circuit will resume polling immediately.

(i) If an "open" line condition should occur during the time the input-output unit is connected to the line, the double blank contacts in the stuntbox of the 28A sequential selector will close, operating the alarm relays in the modified 83B1 control station equipment. The operation of these relays will sound the buzzer, light the AL lamp in the key and lamp cabinet and via the applique circuit close the station cutoff contacts which will inform the input-output unit that an alarm condition exists. The operation of the AG key to the ACO position will silence the buzzer and light the ACO lamp. The operation of the AR key will restore the alarm circuit if the alarm condition no longer exists. The AG key should then be restored to normal to extinguish the ACO lamp.

(j) If the line should go idle and marking from 10 to 15 seconds, the transmitter start circuit will "time out" and transmit the FIGS H H LTRS sequence to the line. The transmitter start circuit will light the ALT and AL lamps in the key and lamp cabinet at the computer location and the receipt of the FIGS at the outlying station will give an alarm at the programmer-scanner locations as described in 6.07(g) and (h).

8. SUPERVISORY KEYS, LAMPS, AND ALARMS

OUTLYING PROGRAMMER-SCANNER STATIONS

8.01 The 83B1 outlying station control circuit key and lamp cabinet has been modified to provide the various supervisory features required for the proper operation of the airlines reservations system. The PR lamp and PR key (priority), the MS key (manual send), and the KS key (keyboard send), have all been deactivated. The monitor MR key has been rewired for use with the test feature of the applique circuit per drawing CA-12462-SD. The alarm guard AG key has been rewired in part to provide a means of silencing the buzzer alarm. The remainder of the key and lamp cabinet is rewired to agree with drawing CA-12462-SD, Fig. 5. Fig. 5 shows the key and lamp arrangement in the control panel of the key and lamp cabinet. The functions performed by the keys and the indications given by the lamps are discussed as follows.

AR Key	— Restores the alarm circuit.
AG Key	— When operated to the ACO position, this key silences the buzzer and lights the ACO alarm cutoff lamp.
MR Key	— This key has been disconnected from the normal circuitry in the standard 83B1 outlying station equipment and is wired to operate the relays in the applique circuit which disconnects the Telephone Company equipment from the programmer-scanner unit and connects it to a test loop to the telegraph testroom.
BID Lamp	— This lamp is lighted by the closure of the bid contacts in the programmer-scanner equipment and remains lighted as long as the contacts remain closed, indicating that the programmer-scanner is either connected or awaiting connection to the line.

SEND Lamp — This lamp is lighted upon receipt of the station TSC during the presence of a bid from the programmer-scanner. The lamp will remain lighted for the duration of the connection of the programmer-scanner equipment to the line and will be extinguished upon receipt of the code H H sequence. The lamp basically indicates that a connection to the line has been established.

AL Lamp — This lamp is lighted by the operation of the auxiliary alarm relay in the applique circuit indicating an alarm condition.

ACO Lamp — This lamp is lighted when the AG key is operated to silence the buzzer.

BUZZER — The buzzer provides an audible indication of an alarm condition and is activated by relays associated with the station control and auxiliary circuits.

UNIVAC FILE COMPUTER STATION

8.02 The 83B1 transmitter start circuit portion of the key and lamp cabinet is unchanged and functions the same as that described in CD-70831-01. The station control key and lamp circuitry is modified to provide only the supervisory features for the airlines reservations system. The key and lamp panel arrangement is shown in Fig. 4. The PR lamp, and PR key, the MS key, and the KS key have been deactivated. The MR key has been rewired for use with the test circuit arrangement provided in the applique circuit. The AG key is rewired in part to provide a means of silencing the buzzer after an alarm condition. The remainder of the key and lamp cabinet is rewired to agree with drawing CA-12463-SD, Fig. 5. The functions performed by the keys and the indications given by the lamps are discussed as follows.

AR Key — Restores the alarm circuit.

AG Key — When operated to the ACO position, this key silences the buzzer and lights the ACO alarm cutoff lamp.

MR Key — This key has been disconnected from the normal circuitry in the standard 83B1 outlying station equipment and is wired to operate the relays in the applique circuit which disconnects the Telephone Company equipment from the input-output unit and connects it to a test loop to the telegraph test-room. This key in the normal position permits continuous polling.

VS Key — This key in the normal position permits continuous polling. The key stops the polling when operated to the SP position. When operated to the VTST position polling will stop if an alarm is received.

KS Keys — These keys are provided to permit the removal of an outlying programmer-scanner station from the polling pattern.

Note: For the reasons outlined in 5.05 and 5.06, the SK key for the E station (No. 3) must be left in the "SKIP" position.

BID Lamp — This lamp is lighted and will remain lighted while the power is turned on to the modified 83B1 control station equipment. The lamp serves only to indicate which modified 83B1 control station unit is in service at locations where there are both regular and spare units provided.

- AL Lamp** — This lamp is lighted by the operation of the auxiliary alarm relay in the applique circuit indicating a major alarm condition.
- ACO Lamp** — This lamp is lighted when the AG key is operated to silence the buzzer.
- ALT Lamp** — This lamp, when lighted, indicates failure of a station to respond to its TSC. The lamp only lights momentarily unless the VS key is operated to the VTST position. Also, this lamp is lighted when an idle circuit condition from 10 to 15 seconds occurs in which case the AL lamp will also light.
- STA Lamps** — These lamps indicate the programmer-scanner station that is connected or is being polled.
- BUZZER** — The buzzer provides an audible indication of an alarm condition.

9. TESTING AND MAINTENANCE FEATURES

9.01 Means are provided at both the Univac Computer location and the outlying station programmer-scanner locations whereby the operation of the MR key in the key and lamp panel will (1) disconnect the modified 83B1 equipment from the Univac equipment, (2) connect a test loop provided between the Serving Telegraph Test Center (STTC) and the substation to the send side of the No. 28 distributor, and (3) interconnect the parallel sides of the 28 sequence selector and 28 distributor through coding relays. Test signals transmitted over the regular loop from the STTC will thus be converted from serial to parallel and reconverted from parallel to serial for transmission over the test loop to the STTC. This arrangement is intended to enable the STTC to send a test message to test the transmission characteristics of the signal conversion arrangement and at the same time to determine with reasonable certainty, whether transmission trouble conditions

are in the Telephone Company or the Univac equipment.

9.02 If after a TSC has been transmitted from the modified 83B1 control station equipment at the Univac file computer location, neither a code V signal nor the start of an inquiry message has taken place over the circuit, there will be a time-out period of 2 seconds, followed by a momentary alarm and the resumption of polling with the next station in the polling sequence. The alarm is retired by the next code V character or by the start of the inquiry message. Therefore, a momentary alarm, repeated every time a particular programmer-scanner station is polled, indicates trouble at that station. For positive identification, however, the VS key in the key and lamp panel at the computer location may be operated to the VTST position, thereby causing the polling to stop, the next time around, on the station in trouble. The SKIP key for that particular station may then be operated to SKIP and polling of the rest of the stations will proceed without further interruption or alarm after the VS key is restored to normal. The trouble condition may then be explored further by the STTC.

9.03 63C1 loop switchboards are provided at both the Univac file computer and the programmer-scanner locations to facilitate patching and testing.

9.04 The stuntbox of the 28A sequence selector is arranged so that it may be easily removed. An R-Y test mechanism is provided on the 28A sequence selector to facilitate the setting of orientation limits or for other error detection on the R-Y sequence.

9.05 At the Univac file computer location, a transfer arrangement is provided whereby a spare modified 83B1 control station arrangement may be substituted for any one of four regular units. If it is necessary to substitute one regular unit for another regular unit, this must be done at the loop switchboard.

10. REFERENCES

10.01 The following are the various references pertinent to the modified 83B1 system used on the airlines reservations system related to this section.

SECTION 581-100-902LL

AA286.040 — 83B1 Selective Calling System — Engineering Considerations

AA286.919 — Selective Calling System for Airlines Reservations System Using Remington Rand Univac File Computer — Equipment Design Requirements

E12.775 — Office Responsibilities, Operating and Testing Procedures for Circuits Associated with the Modified 83B1 Selective Calling System for Airlines Reservations Using Remington Rand Univac Equipment

E12.776 — Office Responsibilities, Operating and Testing Procedures for Circuits Associated with 83B1 Teletypewriter Selective Calling System

P65.200 — 83B1 Selective Calling System — Operating Tests

P70.036 — 83B1 Selective Calling System — Description and Operating Principles

P70.037 — 28A Sequence Selector and No. 28 Distributor Description and Operating Principles

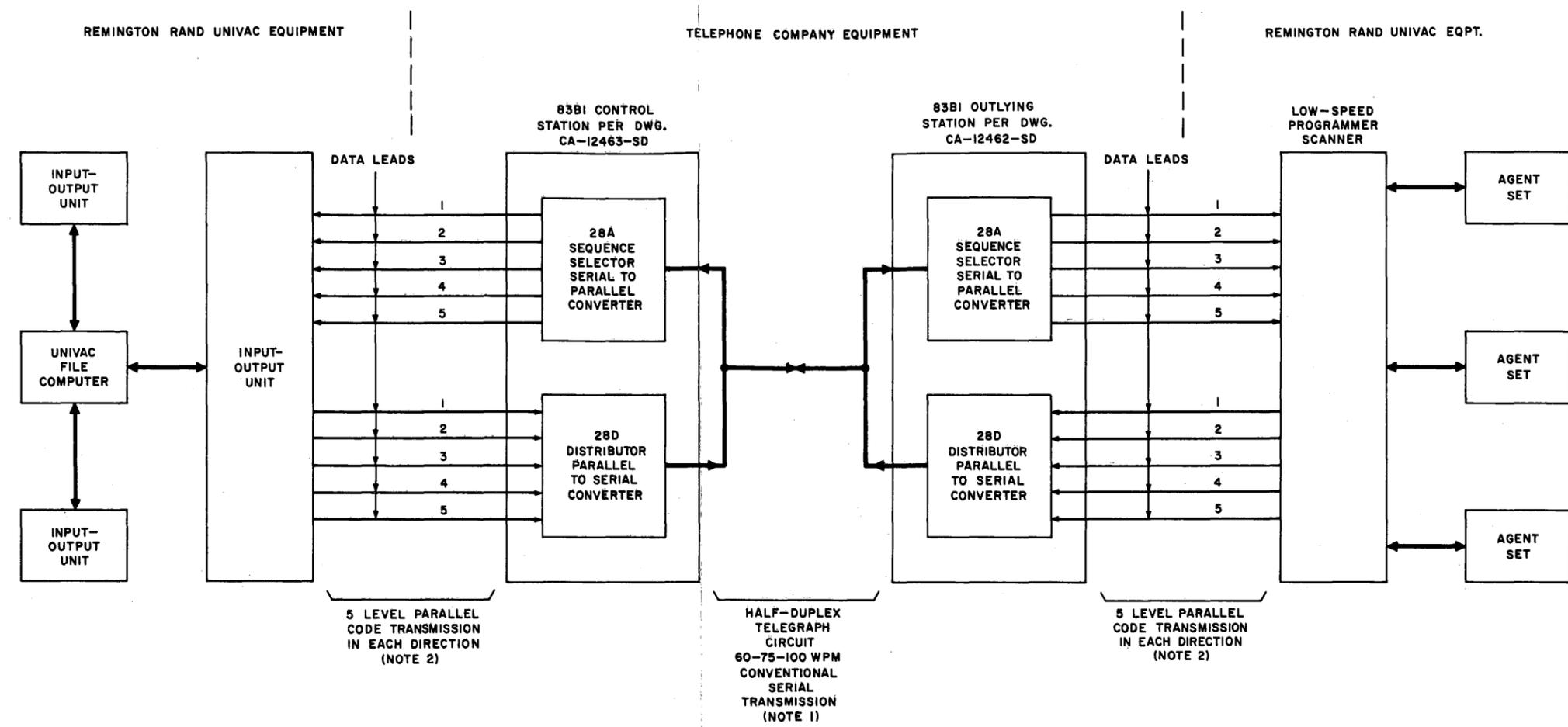
581-100-903 LL — Modified 83B1 Selective Calling System for Airlines Reservations Using Remington Rand Univac Equipment — Operating Tests

CA-12462-SD, ED, and T — 83B1 Modified Selective Calling System for Airlines Reservations System — Outlying Station at Programmer-Scanner Locations
CA-12462-CD

CA-12463-SD, ED, and T — 83B1 Modified Selective Calling System for Airlines Reservations System — Control Station at Univac File Computer Location
CA-12463-CD

SD-70831-01 — 83B1 Transmitter Start Circuit
CD-70831-01

SD-70832-01 — 83B1 Station Control Circuit
CD-70832-01



CHARACTER	FUNCTION
E	START OF MESSAGE
HH	END OF TRANSMISSION
T	END-OF-MESSAGE
V	NO TRAFFIC RESPONSE
LINE FEED T	REPEAT TRANSMISSION
FIGS. HH LTRS.	TRANSMITTER START CIRCUIT DISCONNECT CODE

NOTES:
 1. CONVENTIONAL 5 UNIT TELETYPE-WRITER SELECTING CODE.
 2. LEVELS 1 TO 4 USED FOR SELECTING OR TRANSMISSION OF INTELLIGENCE. 5TH LEVEL USED FOR PARITY CHECKING.

Fig. 1 — Signal Transmission

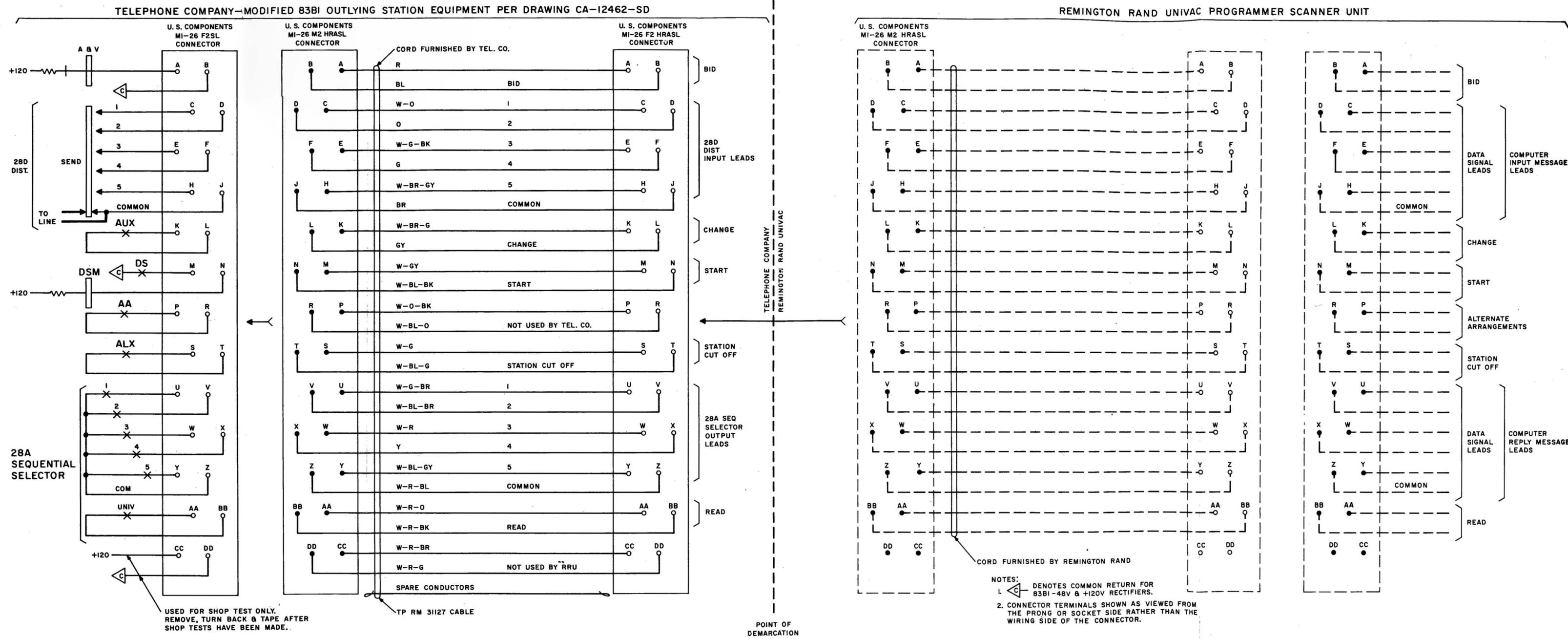
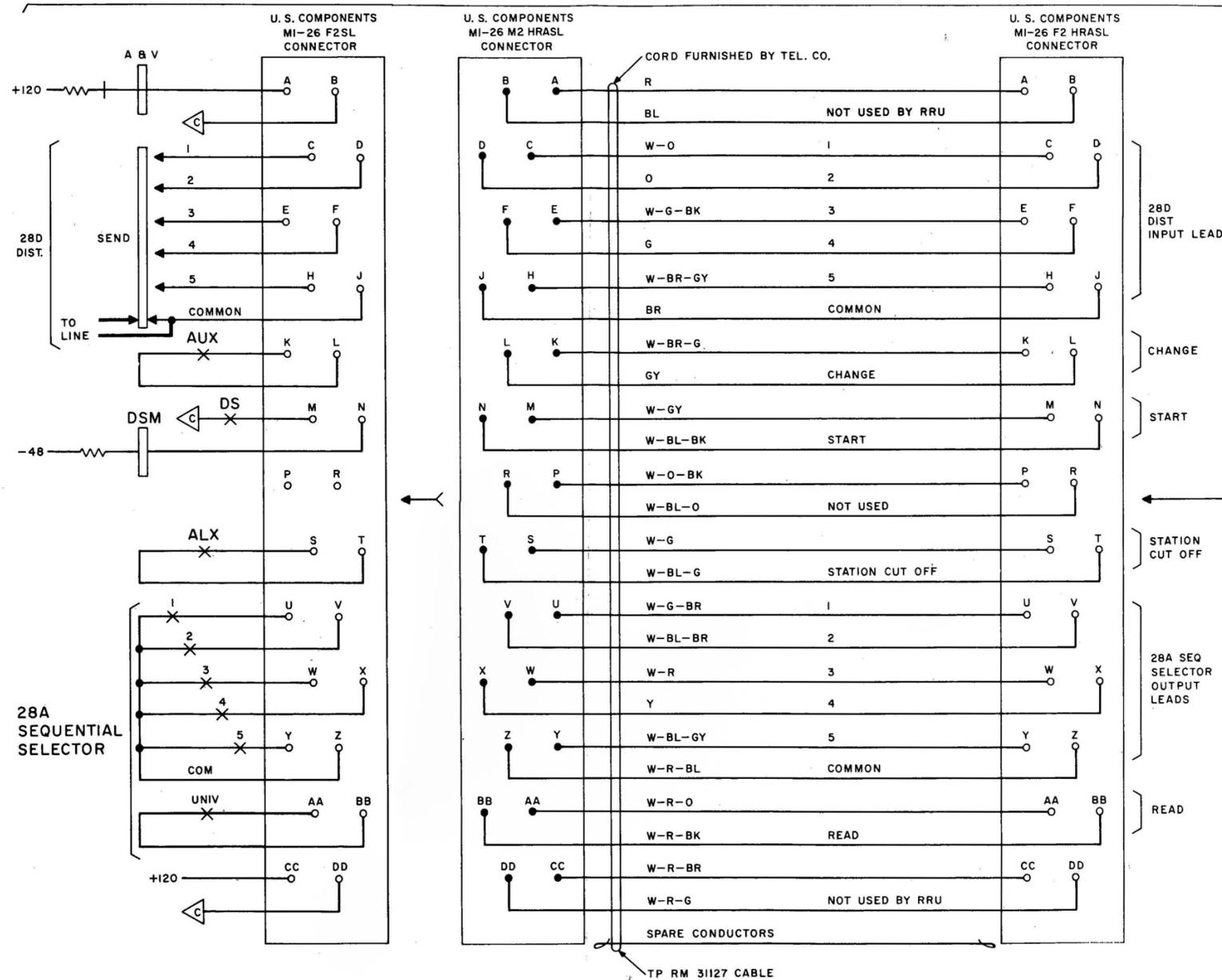


Fig. 2 — Interconnection Diagram

TELEPHONE COMPANY—MODIFIED 83BI CONTROL STATION EQUIPMENT PER DRAWING CA-12463-SD



REMINGTON RAND UNIVAC INPUT-OUTPUT UNIT AT COMPUTER LOCATION

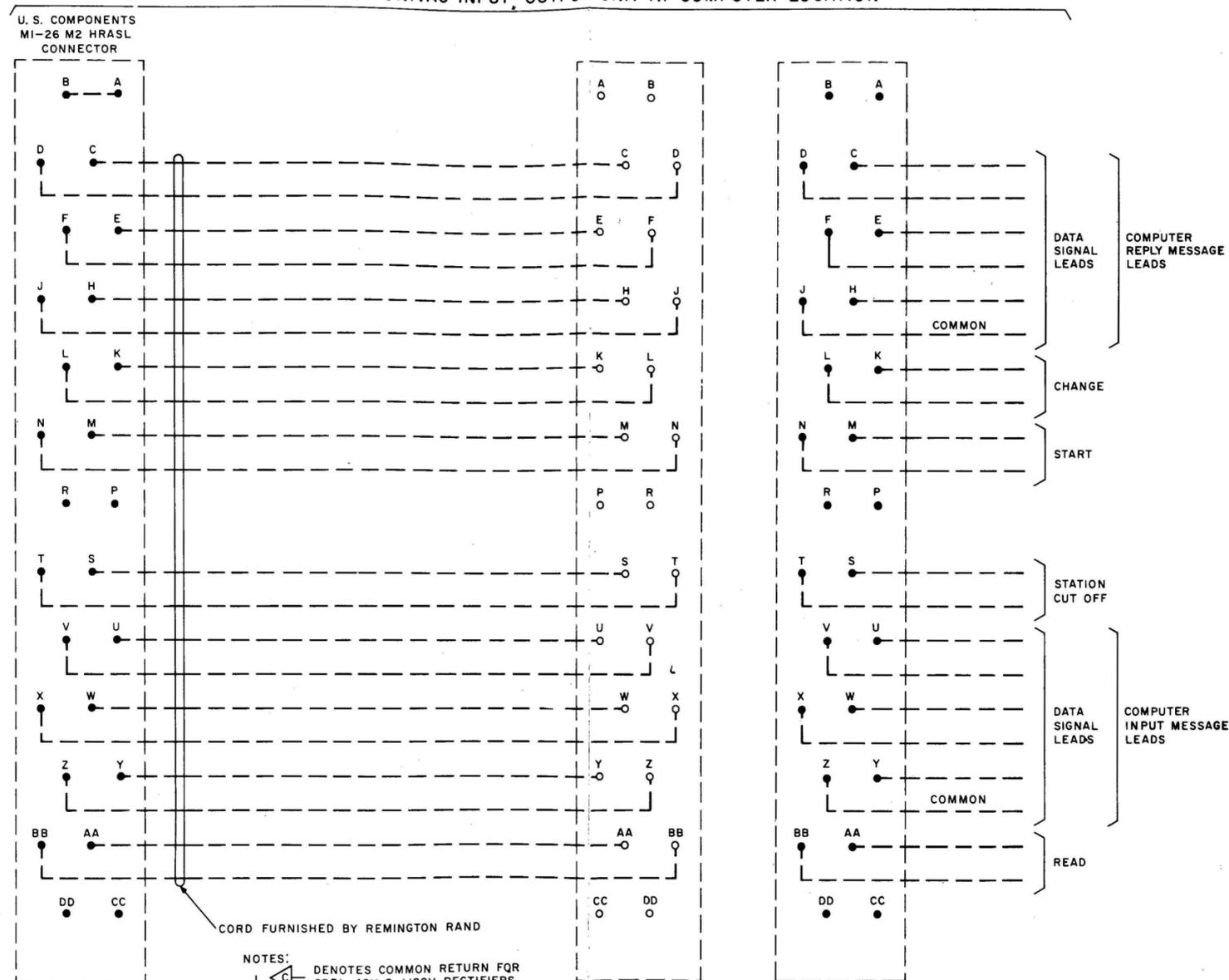
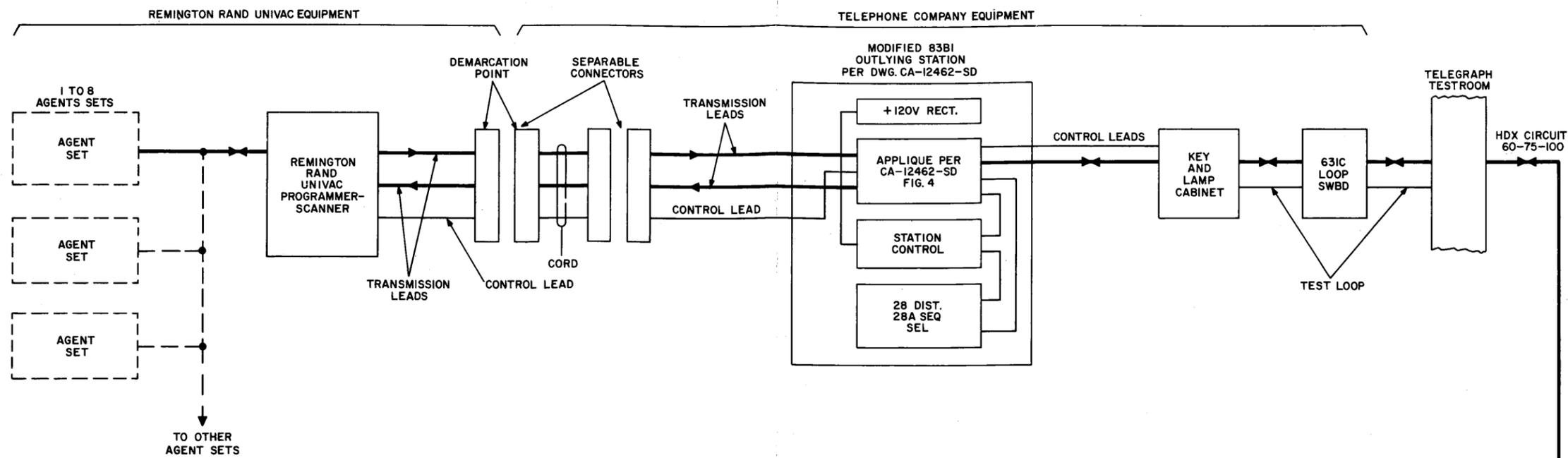


Fig. 2 — Interconnection Diagram (Cont)

OUTLYING STATION PROGRAMER-SCANNER LOCATION



CONTROL STATION COMPUTER LOCATION

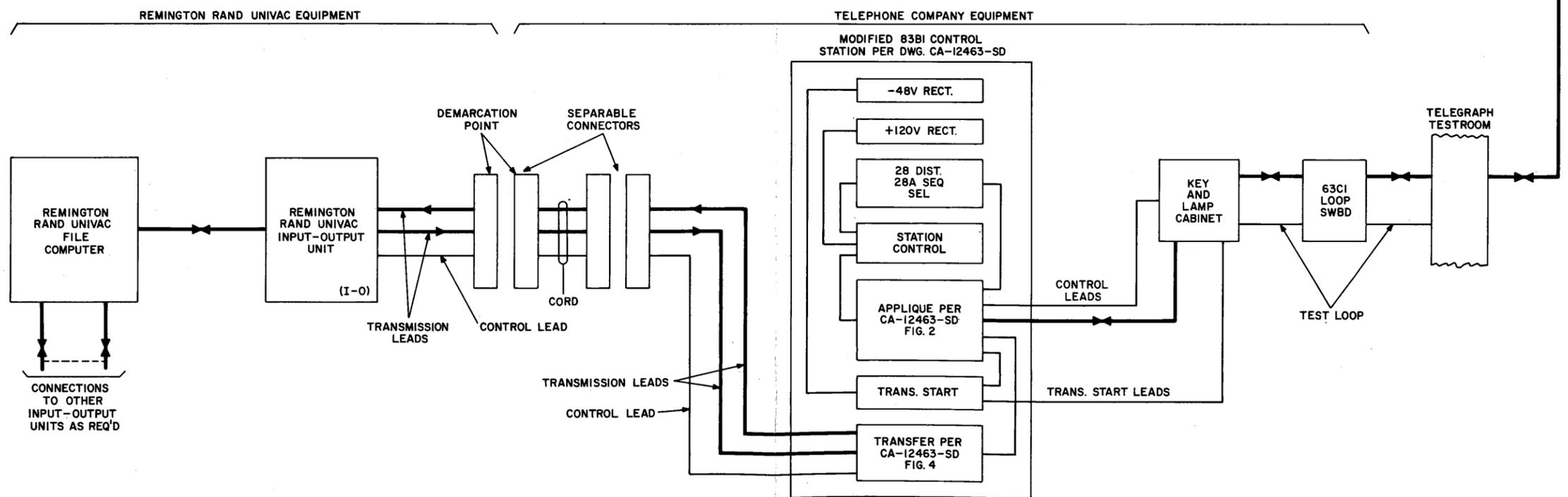


Fig. 3 - Block Diagram

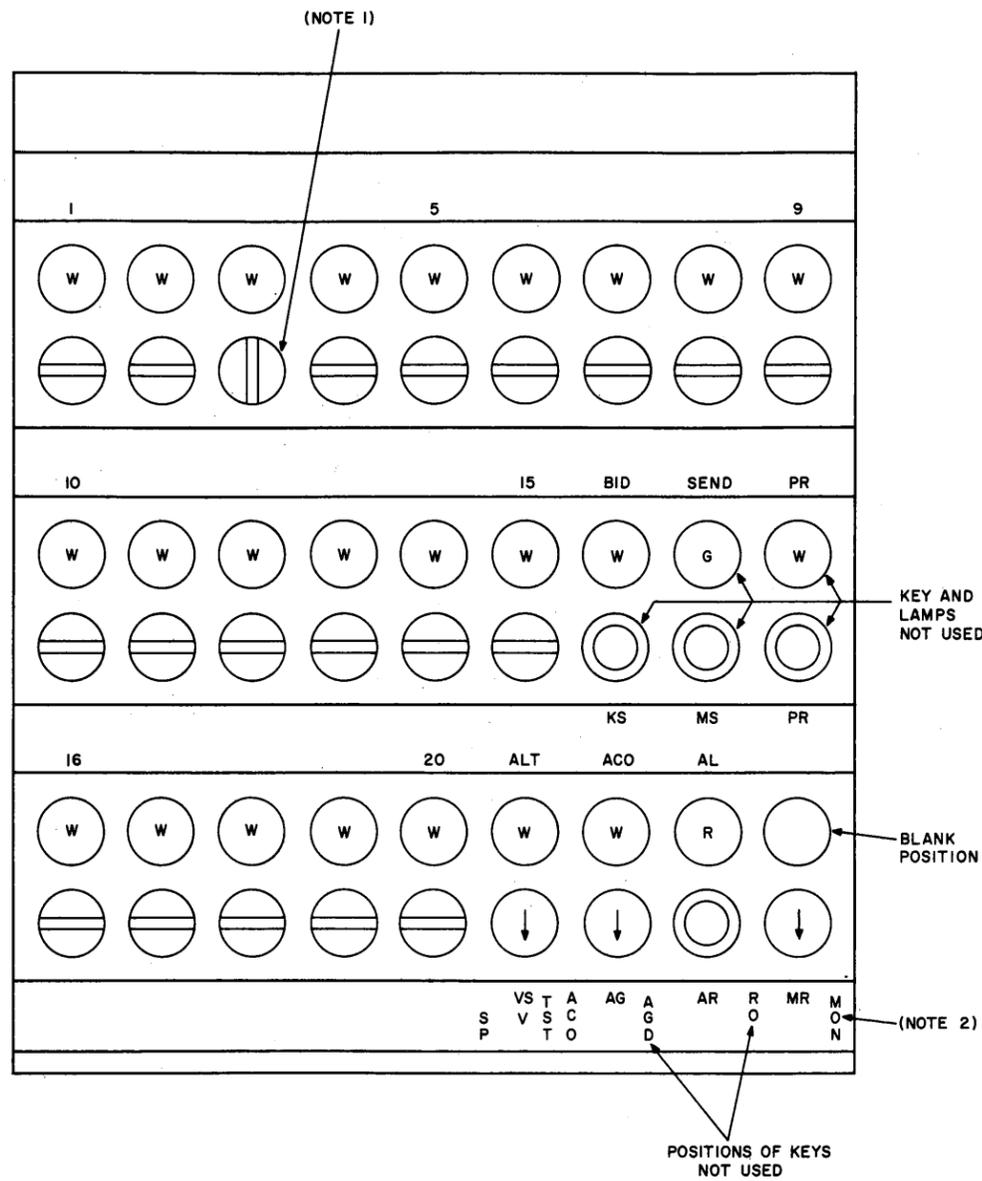


Fig. 4 — Key and Lamp Panel Univac Computer Location

NOTES:

1. SKIP KEY IN POSITION 3 MUST BE LEFT IN THE SKIP POSITION.
2. THE MON (MONITOR) POSITION OF THIS KEY IS USED AS THE TEST POSITION.

LEGEND

- SKIP KEY NORMAL POSITION
- SKIP KEY SKIP POSITION
- KEY NORMAL POSITION
- PUSH BUTTON KEY
- WHITE LAMP
- RED LAMP
- GREEN LAMP

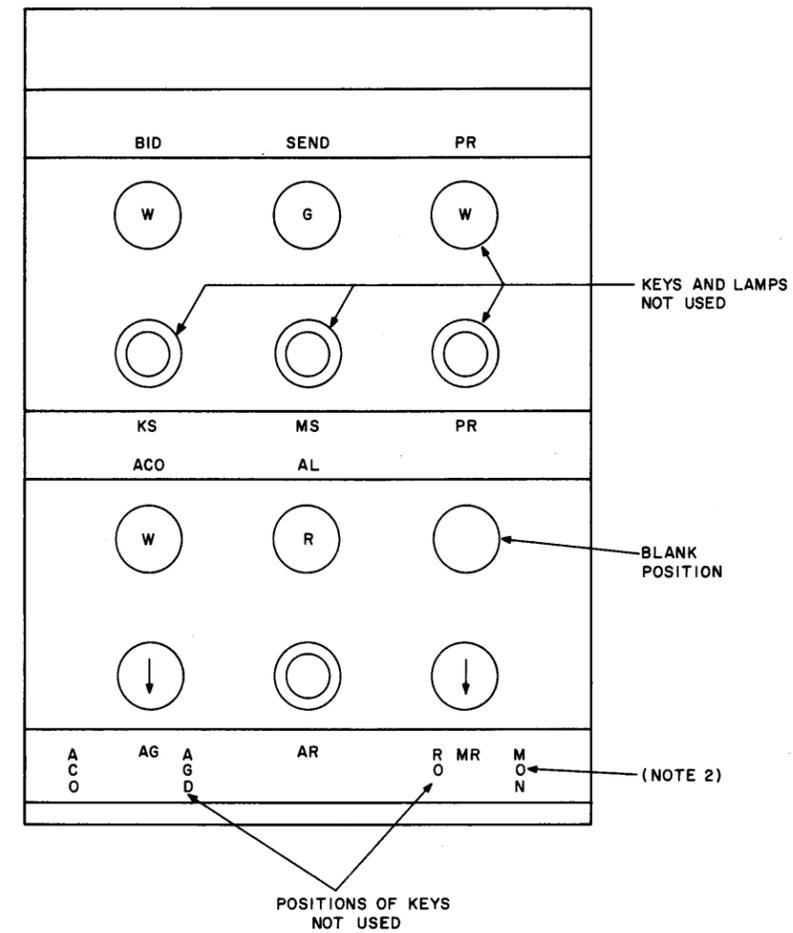


Fig. 5 — Key and Lamp Panel Univac Outlying Station Programmer-Scanner Location