NO. 4A AND 4M SWITCHING SYSTEMS WITH ELECTRONIC TRANSLATOR SYSTEM NETWORK MANAGEMENT AND TRAFFIC DATA TELETYPEWRITERS AND DATASPEED® STATION OPERATING PROCEDURES

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1. GENERAL

1.01 This section describes the methods of operating the traffic teletypewriters (TTYs) and their associated equipment and the DATASPEED® 40 station as used in the No. 4A and 4M Toll Switching Systems which are equipped with the Electronic Translation System (ETS). In offices not equipped with the peripheral bus computer (PBC) system, the TTY facilities provide the primary means of communication between the stored program control (SPC) No. 1A and traffic personnel. In PBC offices, the DATASPEED® 40 station (KSR4030AAF) provides facilities for sending and receiving data between the PBC and traffic personnel.

1.02 When this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The SPC No. 1A, together with all of its associated systems, can be equipped with as many as 20 (0 through 19) TTY channels, depending on the particular application. However, in the ETS application there is a minimum of two independent TTY channels for maintenance purposes (channels 0 and 10), and two independent TTY channels for traffic administration purposes (channels 2 and 3). The first part of this section is concerned only with the operation of the TTYs and their associated equipment.

1.04 The PBC system is a peripheral system to the SPC No. 1A in the ETS application and uses DATASPEED® 40 terminals for input/output instead of TTYs. To avoid confusion, the DATASPEED® 40 channels are assigned channel numbers 20 and greater. The network management TTY (channel 2) is used in a PBC office as back-up for the network control console. This TTY (channel 2) can be used to input network management controls if the console goes down. The second part of this section is concerned with the operation of the DATASPEED® 40 station.

2. TELETYPEWRITERS AND ASSOCIATED EQUIPMENT

A. Network Management (Channel 2)

2.01 The network management TTY (channel 2) consists of a 35-type TTY which operates at a speed of 100 words per minute, a transmit-receive (TR) unit which serves as a buffer and conversion unit between the TTY and the SPC and several piggyback twister (PBT) areas which serve at strange areas for TTY messages and controls. The set is located in the network manager's office, preferably near the network control console. Messages can be sent by means of the keyboard or the paper tape unit provided as part of this set.

2.02 This set has access to groups of information in data block C (peg count and overflow information) and can be used to verify the office data tables.

2.03 The traffic network management TTY can be equipped to handle either roll-type paper or fanfold-type paper in the same manner as channel 10. It is expected that local procedures will determine how long messages received at this channel will be saved.

B. Traffic Data (Channel 3)

2.04 The traffic data TTY (channel 3) consists of a 35-type TTY, TR unit, and PBT areas. The set is a free standing 35 ROTR (receive only with separate typing perforator) and is located in

the dial administration area. No messages can be sent with this set. It has access to data blocks A, B, D, and E (traffic administrative and engineering data).

2.05 The traffic data TTY can be arranged to handle either roll-type or fanfold-type paper. An optional perforator is also available for a punched paper tape output. The traffic data blocks can be individually typed, or typed and perforated, under program control.

3. INPUT MESSAGES

3.01 Input messages from the traffic TTY (channel 2) to the SPC No. 1A will fall into two general categories: (1) requests for output and (2) data inputs. ***No permanent system changes can be effected from channel 2.*** Typical examples of the input messages are as follows.

(1) Requests for output—Print out one of three traffic register blocks (C, D, or E).

(2) Data inputs—Change or delete a traffic register assigned to an incoming trunk group.

(3) Network control inputs—Block all or a portion of traffic to a specified code.

3.02 All input messages conform to a basic format, consisting of two fields of information separated by a dash. These two fields are: (1) the identity field and (2) the information field. The input message format is shown in Fig. 1.

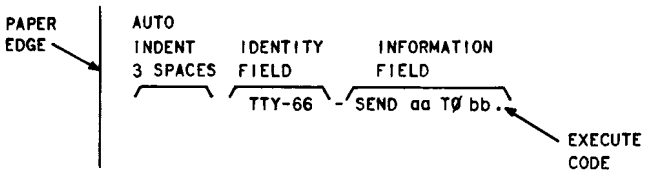


Fig. 1—Input Message Format

3.03 The identify field is further subdivided into two portions separated by a dash. These are: (1) the letter portion (from one to three letters) and (2) the number portion (two numbers). The letter portion indicates a family of input messages and the number portion indicates that particular message in the family.

3.04 The information field may contain mixed letters and numbers (which may or may not be variable), ordinarily not to exceed 60 characters. In some messages the format of this field shows lower-case letters (a, b, c, etc.) to indicate all variable data. In other messages, the format shows the variable data with the following standards:

(a) Lower case "b"—binary digit

(b) Lower case "d"—decimal digit

(c) Lower case "o"—octal digit

(d) Script "l"—letter.

3.05 A period (.) is used to terminate all input messages and act as an execute code for the TTY programs, when the entire message is contained in one line of information.

3.06 All input messages are automatically indented three spaces from the left-hand margin. After an execute code or an output message, the carriage is automatically repositioned by the system to the correct starting place, and no action is required by the attendant.

3.07 A complete list of input messages and an explanation of each input message is contained in the input message manual, IM-68500. Also listed in the input manual are the responses that can be expected from the system. The input message manual should always be consulted when typing an input message to insure that the correct message, message format, and spelling are used.

INPUT TIME-OUT

3.08 Since no output message can be received on a particular TTY channel while an input message is being typed on that channel, a time-out feature is provided by the TTY programs to insure that no excessive delays occur during the typing of the input message. While no specific time limit is imposed for an entire input message, each character of the input message must be typed within 45 seconds. If this time limitation is exceeded, the TTY program causes a ***?T*** printout and automatically repositions the carriage to its proper starting place. It is then necessary to retype the entire input message.

INPUT MESSAGE ACKNOWLEDGMENTS

3.09 Upon completion of the typing of an input message, including the execute code, the SPC causes an acknowledgment printout. This printout will indicate whether or not the message has been correctly received, and what action the system has taken because of the message. The acknowledgment is typed on the same line as the execute code for the input message, and the carriage is then automatically repositioned to its proper starting place. If the program to which the input message was directed does not respond with an acknowledgment of any kind within 2 minutes, a special acknowledgment, NA (no acknowledgment) will be printed out by the system. Table A indicates the possible input message acknowledgments and their meanings.

INPUT MESSAGE CONTROL CHARACTERS

3.10 A set of TTY keyboard characters has been designated as input message control characters, and as such, serve to control the TTY keyboard, carriage, and message format. These characters are as follows.

(1) ***Execute (.):*** The execute character is the period. It informs the system that the input message is complete and that it should begin processing the message.

(2) ***Continue (/):*** The continue character is the slash. It is used in messages that contain a list of items upon which the same action is to be taken. After the last item is typed, the period is used as the execute code. Only after the period is typed, does the system begin to process the entire message, item by item. See 5.01 and 5.02 for additional information.

(3) ***Dash (—):*** The dash is used to separate the various fields and subfields of the input messages.

(4) ***Underline (_):*** The underline is used to correct errors in an input message being typed, and its most practical use is when the TTY operator realizes almost immediately that he has made an error. Typing the underline causes the carriage to move forward and to print the underline character. However, it also causes the system to erase the last previous character typed. For example, if the characters ABCDE were mistakenly typed ABCRE, the corrected carriage copy would read ABCRE__DE; but to the system the corrected message would appear as ABCDE. To correct an error, the number of characters typed since the error was made must be counted, including the erroneous character, and an underline is typed once for each of these characters. Dashes and spaces, however, are not counted as characters when this count is made. In many cases, it may be easier to abandon the message and retype the entire message than to correct it by using the underline.

(5) ***Abandon Message (&):*** The abandon message character is the ampersand. It can be used to cancel a message at any time, prior to typing the execute or continue character. The use of this character causes the system to ignore the entire line and reposition the carriage to its proper starting place. Single line messages cannot be canceled by the ampersand after the execute character has been typed, because the system is already in the process of executing the message. Also, since the system only ignores the last line typed, a line of input cannot be canceled after the continue character has been typed.

3.11 When using the TTY for input messages, it will not be necessary to use any of the carriage positioning keys. All carriage positioning will be done automatically by the system. If, for some reason, the carriage should fail to reposition properly, the operation of either the ampersand or period key should initiate the proper repositioning of the carriage.

4. OUTPUT MESSAGES

4.01 Output messages consist of three basic fields of information. These three fields are: (1) a priority and time field, (2) an identity field, and (3) an information or data field. A typical output message format is shown in Fig. 2.

4.02 The priority and time field has a maximum of four characters. The first two characters define the priority to indicate the level of importance of the message (4.10). The second set of two characters indicates the minute after the hour that the message was sent.

4.03 The identity field of the message consists of a maximum of five characters (two or

TABLE A

TTY INPUT MESSAGE ACKNOWLEDGMENTS

ACKNOWLEDGMENT	MEANING
OK	(1) The message was received. (2) The appropriate program was initiated. (3) Work was completed satisfactorily as far as the program could tell.
NG (No Good)	(1) The message was received. (2) The appropriate program was initiated. (3) The program was not able to complete the work satisfactorily. (a) Using the input message manual, verify that the message was typed correctly. (b) Verify that the variable data in the message is within office parameters. (c) Retype the message. If after several attempts an OK acknowledgment is not received, check for an equipment trouble.
NO	(1) The message was received. (2) Although the message was valid, the appropriate program could not be initiated. (a) Wait a short time and then retype the message. (The program may not be able to be initiated due to load conditions.) If after several attempts an OK acknowledgment is not received, check for an equipment trouble.
NA (No Acknowledgment)	(1) The message was received. (2) The appropriate program was initiated. (3) It is not known if the work was completed satisfactorily. (4) No other acknowledgment has been received within the last 2 minutes.
PF (Printout follows)	(1) The message was received. (2) The appropriate program was initiated. (3) The program has not completed the work. (4) When the work is complete, the program will print out the results.
PE (Parity Error)	(1) Parity error detected by TTY program. (2) Message not sent to SPC. (3) Retype the message. If repeated PE acknowledgments are received, the TTY diagnostic program should be requested.

TABLE A (Cont)

TTY INPUT MESSAGE ACKNOWLEDGMENTS

ACKNOWLEDGMENT	MEANING
?T (Input Time-Out)	(1) Message incomplete and not sent to SPC. (2) Interval of 45 seconds between characters. (3) Entire input message, up to the point of the acknowledgment, ignored by the system. (4) Retype entire message.
?F (Incorrect Format)	(1) The message was received. (2) Format of message not understood by the SPC. (3) No work performed by the system. (a) Using the input message manual, verify that the message was typed correctly. (b) Retype message using the correct format.
?C (Invalid Channel)	(1) Message cannot be sent from particular channel. (2) Error detected by TTY program. (3) Message not sent to SPC, and no work is performed. (a) Using the input message manual, check to determine which TTY channel(s) will accept the message. (b) Retype message at proper TTY channel.
?I (Invalid Identification)	(1) Identification field portion of input message is not valid. (2) Error detected by TTY program. (3) Message not sent to SPC, and no work is performed. (a) Using the input message manual, check for correct identification field portion of message. (b) Retype message using correct identification.

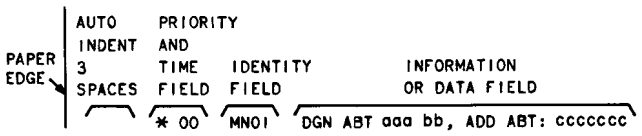


Fig. 2—Output Message Format

three letters and two numbers). Generally, the letter portion of the field indicates a family of output messages, and the two numbers indicate the particular message in that family.

4.04 The information field of the message has no limitation on its length. It varies from no information field to rather lengthy fields, depending on the nature of the message. This field may contain information which is easily read, or variable data which must be examined. The variable data conforms to a standard format as follows:

(a) Lower case "b"—binary digit

(b) Lower case "d"—decimal digit

(c) Lower case "o"—octal digit

(d) Script "l"—letter.

4.05 A complete list of output messages and an explanation of the message is contained in the output message manual, OM-68500. Also listed in the output manual is an explanation of the variable data and the action to be taken.

NETWORK MANAGEMENT (CHANNEL 2) TTY OUTPUT MESSAGES

4.06 Output messages received at the network management TTY will be either: (1) unsolicited or (2) the results of an input message. In all cases, the output messages will be associated with information known as data block C or the office data tables. Data block C information consists of peg count and overflow information on selected announcement trunks and 64 outgoing trunk groups, peg count information on 31 selected incoming trunk groups, and total decoder channel attempts. This output information can be scheduled to be printed out on a specific time basis, every 15 minutes being the minimum interval. It can also be printed on a demand basis (use of an input message). In either event, data block C is always printed in its entirety. Specific information as to which office data tables can be read is listed in the network management input and output manuals.

4.07 In the event of failure on the channel 2 TTY, the output of this channel will automatically be switched to channel 3. The output can also be manually switched to channel 3, via an input message, but this can only be accomplished from TTY channels 0 or 10.

TRAFFIC DATA (CHANNEL 3) TTY OUTPUT MESSAGES

4.08 Output messages received at the traffic data TTY will be either: (1) unsolicited or (2) the results of an input message. In all cases, the output messages will be associated with information known as data blocks A, B, D, and E. These data blocks consist of the following:

(1) Data block A—Machine engineering

(2) Data block B—Outgoing trunk groups peg count and overflow (1000 PC, 1000 OF)

(3) Data block D—Traffic administration

(4) Data block E—Division of revenue.

4.09 Data blocks A and B are available on a scheduled basis only. The minimum intervals being 30 minutes for block A and 60 minutes for block B. Neither block A nor block B are available on a demand basis. Data blocks D and E are available on a scheduled basis or on a demand basis. The minimum scheduled interval for both blocks is 24 hours. The demand for data blocks D and E is made via input message and must be made through channel 2. The 1000 outgoing trunk group peg count and overflow registers, which make up data block B, are originally assigned in the ETS questionnaire and are in protected memory. Any change of assignments of these registers must be done on a recent change basis through channel 10.

OUTPUT MESSAGE PRIORITIES

4.10 Occasionally, two or more output messages will have to compete for the same TTY. In order for the TTY routines to print out the more important messages first, priorities are assigned to output messages. In all, there is a total of six priorities, although only two are assigned priority symbols. The last three priorities (4, 5, and 6) have been established to reduce the possibility of losing pertinent messages under heavy load conditions. The symbols for priorities and their order of importance are given in Table B.

DATE AND TIME OUTPUT MESSAGES

4.11 Every hour on the hour a complete date and time message is printed out on all TTYs. The format for the date and time message is shown in Fig. 3.

4.12 Since this message is printed out each hour, it is used as the time base during the succeeding hour for all output messages. As a result, the minutes are the only time output associated with all TTY output messages during that hour. If it is desired to determine exactly when a particular output message occurred, the minutes that were printed out with the message will indicate how long after the hour the message was printed. The TTY printout listing must then be examined for the last date and time printout to determine the hour, day, and month.

TABLE B

TTY OUTPUT MESSAGE PRIORITIES

PRIORITY	SYMBOL	MEANING
1	**	(1) Immediate action is required by maintenance forces. (2) Major alarms. (a) Example — Results of diagnostic request. Both units of a paired frame are out of service.
2	*	(1) Action is required by maintenance forces but is not of an emergency nature. (2) Minor alarms. (a) Example — Diagnostic program aborted. One unit of a paired frame is out of service.
3 through 6	BLANK	(1) All other output messages which are not in the first two categories. (2) Priority assignments are internal (programmed) and are not assigned symbols. (a) Example — Traffic information. Time of day printout.

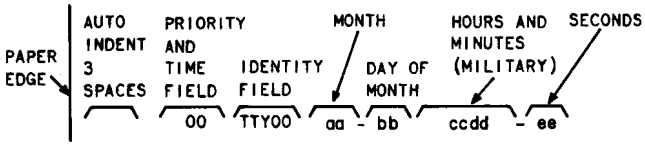


Fig. 3—Data and Time Message Format

5. CONTINUE MODE

5.01 The use of the continue character (3.10) automatically establishes the continue mode for the particular TTY channel in use. Although the continue mode is valid and can be used if desired, there are presently no messages which require the continue mode. There are two instances for which this mode was designed: (1) an input message exceeds the normal maximum of 60 characters (no such message exists at present) and (2) a list of items are to be sent, and the TTY operator decides to type in the information field only (the identity field will be deleted).

5.02 When using the continue mode, it is not necessary to retype the entire input message for each item of the list to be sent. To send such a message, the first identity field and the first information field are completely typed, and the message is ended with a slash (/) instead of the period, as the execute code. The slash tells the system that the first input has been completed, but that more items are to be expected. The programs then work on that line of information and return the standard acknowledgment for that particular message. From this point on, only the information field of each item need be typed, followed by the slash. The system will acknowledge each line of input. The period is typed after the last information field to indicate the end of the message.

6. CONTROL KEYS AND CODES

6.01 Control keys are generally located on control panels surrounding the TTY keyboard. The control codes are keytop control codes and are an integral part of the particular keyboard. Power and motor controls can be located either at the particular TTY or at the MCC panel.

CARRIAGE POSITION MANUAL CONTROL KEYS

6.02 The control keys are used to manually position the TTY carriage without generating an input to the system. The carriage position control keys are red and their designations and meanings are as follows:

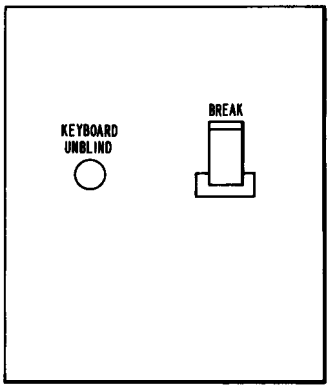
(a) LOC LF (TTY channels 2 and 3)—Local line feed. The operation of this nonlocking key causes a continuous line feed. The TTY printout paper will be fed out for as long as this key is held operated.

(b) LOC SLF (TTY channel 2)—Local single line feed. As indicated, the operation of this nonlocking key causes just a single line feed of the TTY printout paper each time the key is operated.

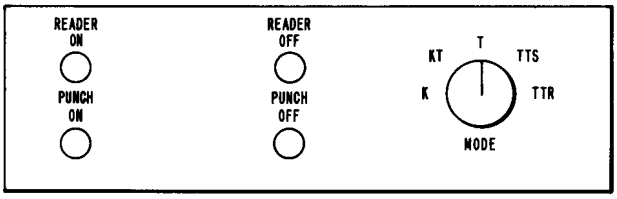
(c) LOC CR (TTY channels 2 and 3)—Local carriage return. The operation of this nonlocking key causes the TTY carriage to be returned to its normal start position (3 spaces from the left edge of the paper) regardless of its present condition.

(d) LOC B SP (TTY channel 2)—Local back space. The operation of this nonlocking key causes the carriage to move one space to the left with each operation of the key.

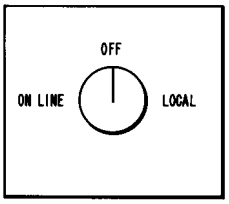
(e) REPT (TTY channel 2)—Repeat. The operation of this nonlocking key causes the TTY to repeatedly print whatever character is typed immediately after its operation for as long as the key is held operated.



A-RIGHT-HAND CONTROL PANEL



B-MODE SWITCH PANEL



C-POWER SWITCH PANEL

Fig. 4—TTY Switch and Key Panels

KEYBOARD CONTROL KEYS

6.03 The keyboard control keys are located on the right-hand control panel of TTY channel 2. They consist of the following:

(a) BREAK key: The BREAK key is a nonlocking lever key (Fig. 4A) and serves two functions.

(1) The operation of this key will open the signal line and interrupt an output message in order to type an input message. When the input message has been completed, the interrupted output message is typed from the beginning.

(2) This key is also used as part of the turn-on procedures for the TTYs as described in Part 8.

(b) KEYBOARD UNBLIND key: The KEYBOARD UNBLIND key is a pushbutton nonlocking key equipped with a lamp (Fig. 4). The key and the lamp within the key serve two separate, but related, functions.

(1) Prior to transmitting an output message the system causes the TTY keyboard to be mechanically locked (***blind***), so that the message cannot be garbled by an attempt to type an input message. If it becomes necessary to interrupt the output message, the BREAK key is normally depressed. If for any reason

the system fails to cause the keyboard to mechanically unlock (***unblind***), it can be unlocked by depressing the KEYBOARD UNBLIND key.

(2) The lamp does not serve solely to indicate key operation, but rather to continuously monitor the state of the keyboard. The lamp is ***lighted*** when the keyboard is mechanically locked (***blind***), and is ***extinguished*** when the keyboard is unlocked (***unblind***).

KEYBOARD CONTROL CODES

6.04 On TTY channel 2, the keyboard is equipped with 14 keytop control codes. These keytop control codes are associated with the tape input messages. Table C lists the keytop control codes and their functions.

MODE SWITCH PANEL

6.05 A mode switch panel is provided on the network management TTY (channel 2). It is located just to the left of the TTY keyboard. The panel is equipped with a 5-position mode switch and 4 local control keys (Fig. 4B). The switch and keys function as indicated in Table D.

7. POWER CONTROLS

7.01 Some of the power controls for the TTYs are located on the TTYs themselves, and others are located at the CD-PT-TTY frame control panel, or at the teletypewriter buffer (TTYB) frame.

NETWORK MANAGEMENT TTY (CHANNEL 2)

7.02 Power controls for TTY channel 2 are located at the TTY buffer frame (TTYB) control panel and at the TTY itself. The TTYB frame can be equipped with 4 buffer circuits. Buffer circuit 0 is assigned to TTY channel 2. Removing the buffer circuit from service, removes the TR unit associated with the TTY from service, and the TR unit will remove power from its associated TTY. The controls on the TTYB control panel consists of the following keys and lamps:

(a) OS-0 lamp—Indicates that TTY channel 2 is out of service due to:

(1) Quarantine by the system while the system is performing fault recognition and diagnostic tests.

(2) Fuse alarm (blown fuse in a circuit supplying power to the buffer circuit).

(3) Manual power removal (OFF-0 key operated).

(4) TTY removed from service as the result of an input message.

(b) PWR OFF lamp—Indicates that power has been removed from TTY buffer 0 (TTY channel 2) due to:

(1) Fuse alarm

(2) Manual power removal.

(c) OFF-0 key—Serves to remove power from TTY buffer circuit 0 (TTY channel 2). It is part of an interlocking combination of 2 keys (OFF and NOR) for removing and restoring power to the TTY buffer circuit 0.

(d) NOR key—Used to manually restore power to TTY buffer circuit 0.

(e) OFF NOR lamp—When lighted, it indicates that the OFF key is operated and the NOR key is released.

7.03 In addition to the power control keys on the TTYB frame, the channel 2 TTY is equipped with a 3-position power switch (Fig. 4C). The switch panel is located on the TTY, just to the right of the keyboard. The switch is designated and functions identical to the power switch on TTY channel 10.

TRAFFIC DATA TTY (CHANNEL 3)

7.04 Power controls for TTY channel 3 are located at the TTY buffer frame (TTYB) control panel and at the TTY itself. Buffer circuit 1 is assigned to TTY channel 3. The buffer and control

TABLE C

TTY KEYTOP CONTROL CODES

KEYTOP DESIGNATION	KEYTOP CONTROL CODE FUNCTION
X-ON	Turn on tape reader (automatically).
X-OFF	Turn off tape reader (automatically).
WRU	Open a break contact which serves as an "answer-back"
TAPE	Turn on tape punch (automatically).
~~TAPE~~	Turn off tape punch (automatically).
SOH	Blind keyboard.
ETX	Unblind keyboard.
*TAB	Cause carriage to move a predetermined distance across the page.
EOT	Operate a transfer contact.
*VT	Cause printer to spill out a predetermined amount of paper (fanfold paper only).
*FF	Cause printer to advance to the next form (fanfold paper only).
BELL	No function.
STX	
ESC	

* The TTY sets are arranged for horizontal and vertical tabbing and for remote form feed features. However, the TTY programs are not arranged to use these features.

key and lamp functions are identical to those for TTY channel 2 (7.03).

7.05 The only control at the TTY channel 3 is a TAPE ON-TAPE OFF switch which controls power to the tape perforator when TTY channel 3 is modified for paper tape output. Normally the perforator is controlled by TAPE ON and TAPE OFF control codes, which are under program control. The TAPE ON-TAPE OFF switch will override the programmed control codes when it is operated.

8. PROCEDURES

REMOVE FROM SERVICE

8.01 Table E shows the methods or operations required to remove a particular TTY channel from service.

REMOVE POWER

8.02 Table F shows the methods or operations required to remove power from a particular

TABLE D

TTY MODE SWITCH PANEL – SWITCH FUNCTIONS

MODE SWITCH POSITION	FUNCTION
K	(1) The keyboard and printer are connected to the signal line. (2) The tape reader is disabled. (3) The tape punch is placed on an auxiliary line.
KT	(1) The keyboard, printer, tape reader, and tape punch are connected to the signal line. (2) The tape reader is under the control of: (a) X-ON and X-OFF keyboard control codes, and (b) READER ON and READER OFF local control keys. (3) The tape punch is under the control of: (a) TAPE and ~~TAPE~~ keyboard control codes, and (b) PUNCH ON and PUNCH OFF local control keys.
T	(1) The printer and tape reader are connected to the signal line. (2) The keyboard and tape punch are placed on an auxiliary line. (3) The tape reader is under the control of: (a) X-ON and X-OFF keyboard control codes, and (b) READER ON and READER OFF local control keys.
TTS*	(1) The tape reader is connected to the signal line. (2) The printer is blinded. (3) The keyboard and tape punch are placed on an auxiliary local circuit.
TTR*	(1) The tape punch is connected to the signal line. (2) The tape reader is disabled. (3) The printer is blinded. (4) The keyboard is placed on an auxiliary local circuit.

* The TTS and TTR switch positions are intended for transmitting and receiving information which uses codes foreign to the set.

TTY channel. Before removing power insure that the TTY has been removed from service (8.01).

RESTORE POWER

8.03 Table G shows the methods or operations required to restore power to a particular TTY channel.

RESTORE TO SERVICE

8.04 Table H shows the methods or operations required to restore a particular TTY to service.

RECEIVE DATA

8.05 Table I shows the operations required to prepare a particular TTY to receive data (either page copy or paper-tape copy, or both).

SEND DATA (KEYBOARD)

8.06 Table J shows the operations required to manually send data (via the keyboard) from TTY channel 2. No data can be sent from TTY channel 3.

SEND DATA (TAPE)

8.07 Table K shows the operations required to automatically send data (via paper tape) from TTY channel 2. No data can be sent via tape from TTY channel 3.

TAPE PREPARATION AND VERIFICATION

8.08 Table L shows the operations required to prepare and verify the paper tapes used to send data from TTY channel 2.

9. MISCELLANEOUS PROCEDURES

9.01 Various miscellaneous functions can be performed on the TTYs as the result of input messages. Other miscellaneous functions should not be performed unless an input message first prepares the TTY for the function to be performed. Table M is provided to list these functions and their related messages. For further details of a particular message, refer to the input message manual, IM-68500.

DATASPEED® 40 STATION

10. DATASPEED® 40 STATION (KSR4030AAF)

10.01 The DATASPEED® 40 station (KSR4030AAF), Fig. 5, provides facilities for sending and receiving data between the PBC and operating personnel. The DATASPEED® 40 station includes a cathode-ray tube (CRT) display operator console, printer, and controller.

10.02 The DATASPEED® 40 station operates at 120 characters per second. Each character consists of 10 bits (1 start bit, 7 ASCII bits, 1 even parity bit, and 1 stop bit). A layout of the operator console is shown in Fig. 6.

TABLE E

REMOVE TTY FROM SERVICE

TTY CHANNEL	METHOD OR OPERATION
NETWORK MANAGEMENT	(1) Type the following input message at either the SPC or 4A maintenance TTY: REQ-01-ØØS-N-TTY-02-N. or (2) Operate power switch on TTY 02 power switch panel to OFF.
TRAFFIC DATA	(1) Type the following input message at either the SPC or 4A maintenance TTY: REQ-01-ØØS-N-TTY-03-N.

TABLE F

REMOVE POWER FROM TTY

TTY CHANNEL	METHOD OR OPERATION
NETWORK MANAGEMENT	(1) Remove TTY from service per Table E. (2) At TTY buffer frame, operate OFF-0 key.
TRAFFIC DATA	(1) Remove TTY from service per Table E. (2) At TTY buffer frame, operate OFF-1 key.

TABLE G

RESTORE POWER TO TTY

TTY CHANNEL	METHOD OR OPERATION
NETWORK MANAGEMENT	(1) At TTY buffer frame, operate NOR-0 key.
TRAFFIC DATA	(1) At TTY buffer frame, operate NOR-1 key.

11. MODE OF OPERATION

11.01 The conversational mode is the mode of operation with the DATASPEED® 40 station that will be used with the PBC. With this mode of operation the operator console (Fig. 6) is equipped with send/receive (S/R) and interrupt (INTRPT) keys. The carriage return (RETURN) key is used as the execute character and when operated causes a message to be sent to the PBC.

12. DATASPEED® 40 CHANNEL NUMBER ASSIGNMENTS AND FUNCTIONS

12.01 The PBC system is a peripheral system to the SPC No. 1A in the ETS application. Teletypewriter channels driven by the SPC No. 1A can be assigned the numbers between 0 and 19. To avoid confusion DATASPEED® 40 channels are assigned numbers 20 and greater. Table N lists the DATASPEED® 40 functions and channel number assignments.

A. Channel 20 (Required)

12.02 The No. 4A switching maintenance center (Channel 20) DATASPEED® 40 will provide input/output for the following functions:

(1) Ineffective attempt and sender retrial analysis

(2) Plant measurements

(3) Data table recent change and verification (initially for PBC data base only and ultimately for both the ETS and PBC resident data bases)

(4) PBC system maintenance.

12.03 Channel 20 is required in all PBC equipped offices and should be located in the No. 4A switching maintenance center near the test frames and trouble recorder.

B. Channel 21 (Optional)

12.04 The remote central processor unit (CPU) DATASPEED® 40 is assigned as channel 21. It is strongly recommended that the PBC be co-located with the SPC No. 1A. However, because some early ETS offices and offices which have been converted or will convert from card translator to ETS operation may not have sufficient floor space available to co-locate the PBC with the SPC No. 1A. A bus repeater is provided on the ETS miscellaneous frame which will allow the PBC to be located up to 300 cable feet away from the SPC No. 1A Processor. If the PBC must be located in another room or on another floor, channel 21 should be ordered. Channel 21 provides PBC system maintenance which is also provided as one of the channel 20 functions.

12.05 Channel 21 will also provide data table recent change and verification functions which are provided by channel 20. It is anticipated that large offices which experience a large volume (monthly) of recent activity will want to order channel 21 for that purpose regardless of the PBC location.

TABLE H

RESTORE TTY TO SERVICE

TTY CHANNEL	METHOD OR OPERATION
NETWORK* MANAGEMENT	(1) If power was removed and restored — (a) No action necessary. (2) If power was not removed and restored, but — (a) REQ-01-ØØS input message was used, type the following input message at either the SPC or 4A maintenance TTY: REQ-01-DGN-N-TTY-02-N. (b) Power switch on power switch panel was used, return switch to ON LINE position and operate BREAK key on right-hand control panel.
TRAFFIC* DATA	(1) If power was removed and restored — (a) No action necessary. (2) If power was not removed and restored — (a) Type the following input message from either the SPC or 4A maintenance TTY: REQ-01-DGN-N-TTY-03-N.

* At times, the network management TTY and/or the traffic data TTY cannot be returned to service after it has been turned down. The reason for this condition is that the SPC has done a WRU (Who Are You) check, and received no response from the TTY and will not return it to service. In this instance, it will be necessary to type in the request for diagnostic input message (REQ-01-DGN) from either the SPC or 4A maintenance TTY.

C. Channel 22 (Required)

12.06 The network management DATASPEED® 40 is required and is assigned as channel 22. Channel 22 provides data which is pertinent to the network management function and replaces the block C output on the ETS channel 2.

Note: The ETS channel 2 provides responses to network control console actions and is the prime backup for the console. The ETS channel 2 will be retained in ETS for these functions.

12.07 The basic features of the channel 22 output are analysis, calculations, and exception reporting of common control and trunk group data. Channel 22 output is designed to meet the following four basic objectives:

(1) Output should report on an automatic basis only data which indicates that a problem exists or may be developing.

(2) Alert the network manager quickly to this data.

(3) Output should be presented in a form which requires no aids to read it and no calculations to interpret it.

(4) Sufficient support data is available on demand to analyze potential existing problems.

TABLE I

RECEIVE DATA PREPARATIONS

TTY CHANNEL	TYPE COPY	PREPARATIONS
NETWORK MANAGEMENT	PAGE	(1) TTY in service. (2) Power switch (on TTY) in the ON LINE position. (3) Mode switch (on TTY) in the KT position.
	TAPE	(1) TTY in service. (2) Power switch (on TTY) in the ON LINE position. (3) Mode switch (on TTY) in the KT position. (4) PUNCH ON local control key operated.
TRAFFIC DATA	PAGE	(1) No preparations necessary, other than: (a) TTY in service.
	TAPE	(1) TTY in service. (2) TAPE ON-TAPE OFF switch in the TAPE ON position.

TABLE J

SEND DATA-OPERATIONS (KEYBOARD)

TTY CHANNEL	OPERATIONS
NETWORK MANAGEMENT	(1) Prepare TTY to send data. (a) Power switch (on TTY) to ON LINE position. (b) Mode switch (on TTY) to KT position. (2) Key in message. (a) Message is restricted to one line, and (b) Message ends with an execute code. (c) System will acknowledge message and reposition carriage.

12.08 Most of the exception calculations will be performed every 5 minutes. A few will be performed every 15 minutes.

D. Channel 23 (Required)

12.09 The dial administration DATASPEED® 40 is required and is assigned as channel 23. Channel 23 completely replaces the ETS TTY channel 3 and its associated buffer circuit. The PBC channel 23 output consists of exception, scheduled, and demand reports. Among the reports required are a machine load and service summary (MLSS) and an ineffective machine attempt (IMA) report.

E. Channel 25 (Optional)

12.10 The DATASPEED® 40 assigned as channel 25 is optional and is associated with the ineffective attempt and sender retrial analysis feature. Prior to PBC, auxiliary records of ineffective attempts and sender retrials were punched on cards by a gang summary punch. The punched cards were then analyzed for patterns by running the cards through a sorter.

TABLE K

SEND DATA-OPERATIONS (TAPE)

TTY CHANNEL	OPERATIONS
NETWORK MANAGEMENT	(1) Prepare TTY to send data. (a) Power switch (on TTY) to LOCAL position. (b) Mode switch (on TTY) to T position. (2) Place tape in ready by (a) Depress tape lid release button. (b) Insert tape on feed wheel. (c) Close tape lid. (3) Depress READER ON local control key. (a) READER ON lamp lights. (b) First line of message is sent. (4) At the end of message line: (a) X-OFF control code turns off tape reader. (b) READER OFF lamp lighted (READER ON lamp extinguished). (c) System acknowledges message and repositions carriage. (5) The system will automatically turn on the tape reader with the X-ON control code for the next line, and proceeds as described above until the end of the message.

12.11 The PBC completely eliminates the entire gang summary punch/card sort type of operation and performs the analysis on-site. The plant personnel are automatically alerted by exception reports on channel 20 (the No. 4A switching maintenance center data terminal) when a problem or a potential problem exists. Therefore, the need for centralization of the analysis function which existed because punched cards, card sorting equipment, and knowledgeable analysts were required is eliminated by use of the PBC. To accommodate operating companies which may have been using the central analysis bureau (CAB) concept prior to the availability of PBC, channel 25 provides an optional means to monitor the results of the PBC ineffective attempts and sender retrial analysis which are being output on channel 20 and optionally on channels 26 and 27. Channel 25 is not provided unless both channels 26 and 27 are provided.

F. Channels 26 and 27 (Both Optional)

12.12 The DATASPEED® 40s assigned as channels 26 and 27 are both optional and both are to be located in the trunk maintenance areas. The basic function of these two channels is to provide ineffective attempt and sender retrial reports which pertain to trunk groups and circuits. The reason two trunk maintenance channels are optionally provided is for offices which have two separate and distinct trunk maintenance areas. This situation is usually the case in offices which are jointly owned and maintained by Long Lines and an associated company. If an office does not have a joint administration environment, only one of the two possible optional trunk maintenance channels need be equipped. Neither of the two trunk maintenance channels need be equipped if the location of the trunk maintenance personnel is

TABLE L

TTY TAPE PREPARATION AND VERIFICATION

PREPARATION
(1) Operate power switch (on TTY) to LOCAL position.
(2) Operate mode switch (on TTY) to KT position.
(3) Depress PUNCH ON local control key.
(a) PUNCH ON lamp lights.
(4) Initiate the tape by keying a series of rub out characters (RUB OUT key on keyboard).
(5) Type the first line of the message.
(a) Page copy and punched tape will result.
(6) At end of first line operate key for execute code (period).
(7) Follow the execute code with the X-OFF control code.
(8) Follow the X-OFF control code with a series of rub outs.
(9) Reposition the carriage with the
(a) LOC CR (local carriage return) key, and
(b) LOC SLF (local single line feed) key.
(10) Repeat Steps 5 through 9 for each succeeding line of input.
(11) Depress PUNCH OFF local control key
(a) PUNCH OFF lamp lights.
(b) PUNCH ON lamp extinguished.

VERIFICATION
(1) Operate mode switch (on TTY) to T position.
(2) Place tape in reader by
(a) Depress tape lid release button.
(b) Insert tape on feed wheel.
(c) Close tape lid.
(3) Depress READER ON key.
(a) READER ON lamp lights.
(b) First line of message is read.
(4) At the end of each line of the message, the system will
(a) Turn off the reader.
(b) Light the READER OFF lamp.
(c) Extinguish the READER ON lamp.
(5) Reposition the carriage with the
(a) LOC CR (local carriage return) key, and
(b) LOC SLF (local single line feed) key.
(6) Repeat Steps 3, 4, and 5 for each line of input.
(7) Remove tape from reader.

TABLE M

TTY INPUT MESSAGES

INPUT MESSAGE	FUNCTION
TTY-01-aa,S.	(1) Suspend operation of TTY channel aa. It is possible to suspend TTY channels as follows: (a) Suspend TTY channels 2 and 3 from TTY channel 0. (b) Suspend TTY channels 2 and 3 from TTY channel 10. (c) Suspend TTY channel 2 only from TTY channel 2.
TTY-01-aa,R.	(1) Restore TTY channel aa, which has been suspended, to normal service. (a) Message only effective from TTY channels 0 and 10.
TTY-01-aa,P.	(1) Suppress all output messages to TTY channel aa. Message is used when paper change or ribbon change is necessary. It is possible to suppress output messages to TTY channels as follows: (a) Suppress output messages to TTY channels 10, 2, and 3 from TTY channel 0. (b) Suppress output messages to TTY channels 0, 2, and 3 from TTY channel 10. (c) Suppress output messages to TTY channel 2 only, from TTY channel 2. (2) To restore TTY channel 0, 10, or 2 to service: (a) Operate BREAK key on right-hand control panel.
TTY-07-aa.	(1) Restore TTY channel aa to service, after paper change or ribbon change is completed. (a) Normally for use to restore TTY channel 3 only. (b) Can be used to restore TTY channels 0, 10, and 2, if operation of the BREAK key does not restore TTY to service.
TTY-66-SEND aa TØ bb.	(1) Send all output messages normally printed at TTY channel aa to TTY channel bb. (a) Any TTY output can be diverted to any other TTY. (b) Message invalid if TTY channel bb is suspended.

convenient to the No. 4A switching maintenance center where channel 20 is provided. In this situation channel 20 will provide trunk-related output reports, for trunk groups which are not specified on Form Code 04 of the Western Electric Company, Inc, ETS Data Table Questionnaire (E-8075), to be outputted on the trunk maintenance channels. Channel 20 always outputs all reports which are also output to channels 25, 26, and 27.

13. DATA TABLE QUESTIONNAIRE (ETS-8075)

13.01 The PBC DATASPEED® 40 requires supporting data in the PBC data base.

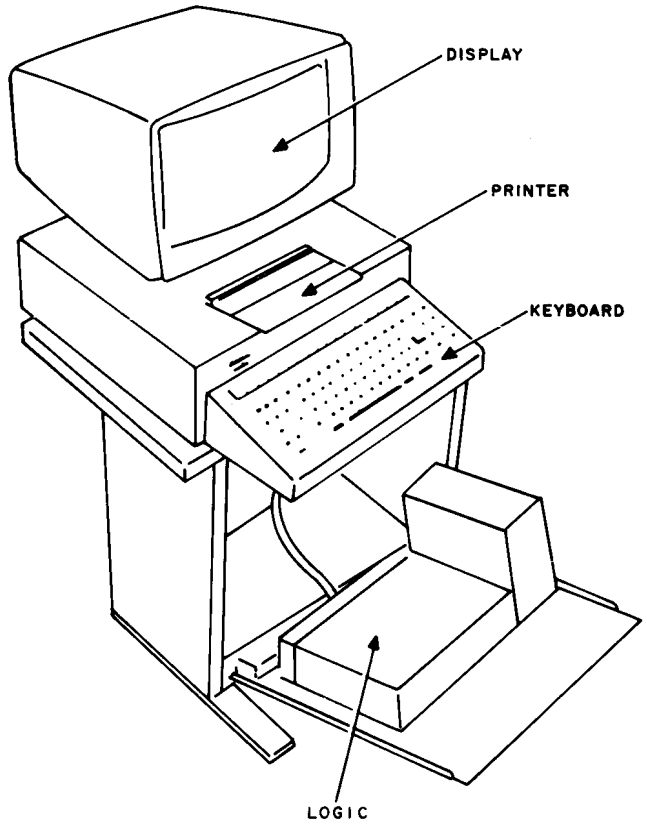


Fig. 5—DATASPEED® 40 Station (KSR4030AAF)

The supporting data is office variable and is submitted to WECo for data base compilation via Issue 8 or later of ETS Data Table Questionnaire (ETS-8075).

14. SYSTEM OPERATION

CONVERSATIONAL MODE

14.01 The conversational mode permits the transmission of single line communications ending in carriage return.

14.02 When operating in the conversational mode, the operation of the DATASPEED® 40 station is as follows:

(1) Operate the LOCAL key.

(2) The send/receive (S/R) key is then operated to activate the conversational mode. The DATASPEED® 40 station will be in a receive condition.

(3) The interrupt (INTRPT) key lamp is lighted to prevent an output message from being received while preparing an input message.

(4) A line of data is entered on the screen, ending with the operation of the carriage return (RETURN) key.

(5) The cursor is automatically returned to the start of the line (left margin).

(6) The send mode is automatically established.

(7) The line of data is transmitted through the carriage return character. The DATASPEED® 40 station automatically reverts to the receive mode. The data remains on the screen.

(8) The INTRPT key lamp is now extinguished to allow output.

(9) The PBC may now send.

(10) The next line may be entered as soon as the distant transmission ends.

14.03 An INTRPT key is provided with the conversational mode to permit the received transmission to be interrupted. Operation of the INTRPT key will turn off the supervisory transmitted data lead. This lead will remain off as long as the INTRPT key lamp is lighted. Restoring the INTRPT key turns on the supervisory transmitted data lead and extinguishes the INTRPT key lamp.

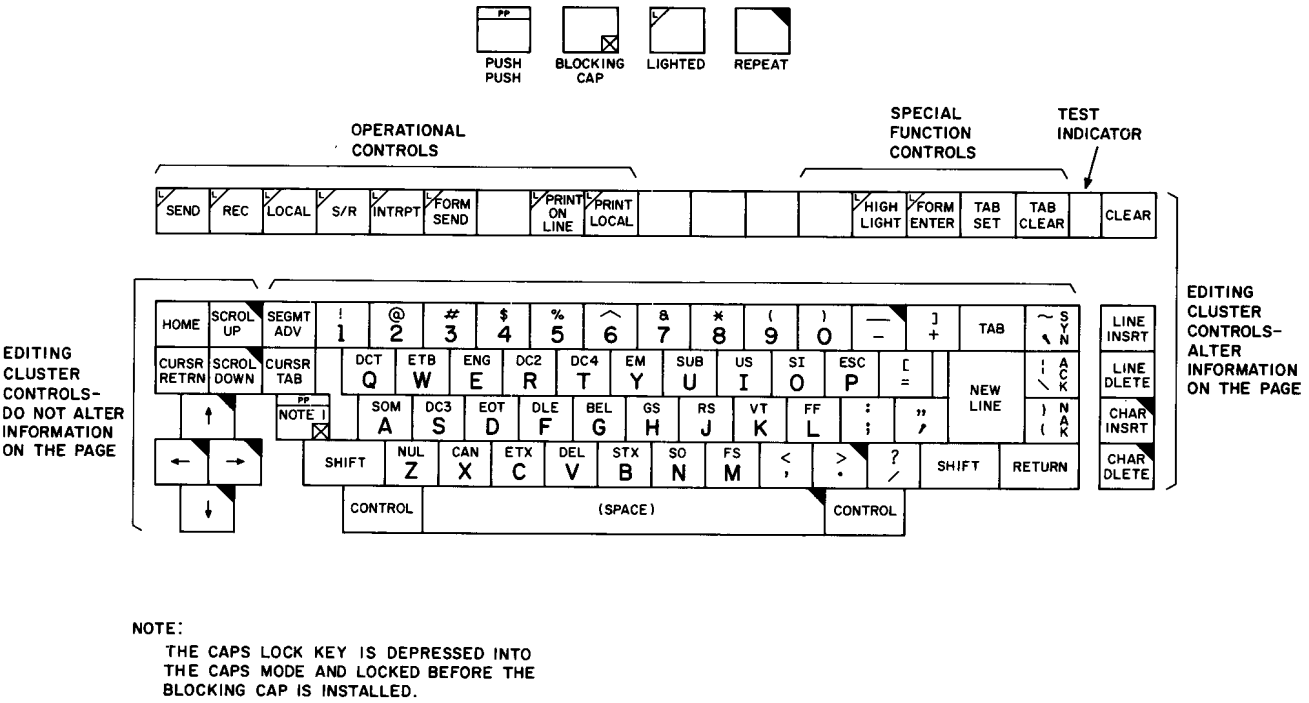
MESSAGE PREPARATION ALARMS

14.04 An audible alarm is provided to assist the operator when data is being entered from the operator console. The volume of this alarm is operator adjustable.

14.05 The following conditions will cause the alarm to sound:

(1) Writing a character in the eighth character position prior to the end of a line. (See Note.)

Note: The end of a line is the eightieth character position or the character position just prior to a protected new line.



NOTE:
THE CAPS LOCK KEY IS DEPRESSED INTO THE CAPS MODE AND LOCKED BEFORE THE BLOCKING CAP IS INSTALLED.

Fig. 6—Layout of Operator Console

TABLE N

PBC DATASPEED® 40 CHANNEL NUMBER ASSIGNMENTS AND FUNCTIONS

CHANNEL NUMBER	DATA SPEED® 40 FUNCTION	REQUIRED OR OPTIONAL
20	4A Switching Maintenance Center	Required
21	Remote CPU	Optional
22	Network Management	Required
23	Dial Administration	Required
24	Not Assigned	—
25	Central Analysis Bureau	Optional
26	Trunk Maintenance	Optional
27	Trunk Maintenance	Optional

(2) Writing a character in the last character position of a line. (See Note above.)

(3) Attempting to write a character over a protected character.

(4) Attempting to write a character on a line following a new line character.

15. TERMINAL OPERATION

POWER AND CONVENIENCE CONTROLS

15.01 The power and convenience controls are located on the bottom of the display monitor. Each control is operated by rotating a thumb wheel.

Monitor (MONITOR)

15.02 The MONITOR control is located at the front lower left corner of the display monitor. This control turns the display monitor on or off. Data stored in the display logic will not be altered but the keyboard will be inoperable. The operational and special function indicators will remain lighted on the operator console to show

the status of the station. In the on condition there will always be a cursor displayed on the screen.

Brightness (BRIGHTNESS)

15.03 The BRIGHTNESS control is located at the front lower right corner of the display monitor. Rotating this control to the right or to the left will increase or decrease the intensity of the display, respectively.

Tube Tilt (TUBE TILT)

15.04 The TUBE TILT control is located approximately midway back along the bottom on the right side of the display monitor. Rotating this control will tilt the tube face through an angle of −5 to +15 degrees from the vertical.

OPERATION WITH ONLY UNPROTECTED CHARACTERS

15.05 The following is a description of the operation of the DATASPEED® 40 station with only unprotected characters.

A. Keyboard

15.06 The keyboard (Fig. 6) is normally operational only when the DATASPEED® 40 station is in the local mode. The output of the keyboard is sent only to the display device storage for display on the monitor. The stored information is then the source for any transmission on-line or to the printer.

15.07 The operation of a key on the keyboard will result in the designated graphic being displayed at the cursor location and the cursor moving one character position to the right. If a character is already displayed at the cursor location, keying of a new character will cause the existing character to be replaced by the new selection. The following four keys provide an alternate action.

New Line (NEW LINE)

15.08 This key will cause the new line symbol ( ) to be displayed and will position the cursor at the first character position of the next line. If the display has expanded storage (48 or 72 lines) and the NEW LINE key is operated with the cursor on the last line of the screen, the new line symbol will be displayed and the display will "scroll up" one line. To "scroll up" one line means that the top line will no longer be visible, the remaining lines will move up one line on the screen and the cursor will be in the first character position of the new line which is moved up onto the screen. This action will continue until the last line in the page is displayed.

15.09 If a character (including the space character) is written into the last position of a line and the very next action is an attempt to write a new line character, the character will not be overwritten but the new line function will be performed. If, however, the cursor is moved and then returned to this position, writing of the new line character will overwrite the character in the last position. If it is desired to overwrite the character in the eightieth position with new line, operate key CHAR DLETE and then operate key NEW LINE. Characters other than new line or backspace will always overwrite a last character position.

15.10 When the new line character is placed in a line, no character can be written to its right. Also, any characters which may have been present to the right, prior to operating the NEW LINE key, will be changed to spaces. Multiple new line characters can be placed in the last line of the page as a means for advancing paper in a printer. In addition, other characters can be placed after the new line characters in the last line of the page. (See Note.)

> ***Note:*** The alarm will sound for each character entered after the new line characters in the last line of the page. These characters will be transmitted unless preceded by a page ending character.

15.11 All lines which do not contain a new line character will have a new line character sent automatically following the eightieth character of the line. However, transmission time will be increased since space characters will be sent to fill in the line. It is recommended that a new line character be placed immediately to the right of the last character on the line for efficient transmission.

Space (SPACE)

15.12 The SPACE key pulses a space, which appears as a blank on the screen, at the cursor position. This key is repeatable.

Note: Operation of the SPACE key will replace any character at the cursor position with a space character and therefore ***should not*** be used for positioning the cursor.

Tab (TAB)

15.13 Each operation of the TAB (horizontal tab) key places the horizontal tab character ( ) at the cursor location. If the horizontal tabulation option is not provided, the cursor moves to the next character position. If this option is provided, the cursor will move to the next tab mark; or if no tab marks are present, the cursor will move to the first character position of the next line. Any characters between the horizontal tab character ( ) and the tab mark, or the first character position of the next line, are replaced by spaces.

Underline (_)

15.14 Characters may be underlined by first writing the character to be underlined and then positioning the cursor over the character and writing an underline character (_). The character will remain underlined during all editing operations except when overwritten. Overwriting an underline character, with a character other than underline, will cause the underline to be removed. An underlined character is sent as a three-character sequence (character, backspace, underline). When the underline option is not provided, the display will treat underline as it does other characters and overwrite any character that already exists at the cursor position.

B. Left Side Editing Controls

15.15 There are ten editing control keys (Fig. 6) located on the left side of the keyboard. These ten keys are called the left side editing control cluster. Operation of any of the keys in this cluster will not alter any information on the screen or in the display logic.

Cursor Return (CURSR RETRN)

15.16 Operation of the CURSR RETRN key returns the cursor to the first character position in the same line.

Cursor Up (↑)

15.17 Operation of the ↑ key moves the cursor up one line at a time in the same column until the cursor reaches the top line on the screen. This key is repeatable. When the display is receiving on-line, the action is the same except after the cursor has reached the top line on the screen additional cursor up commands will cause the displayed information to scroll down until the first line of the page is displayed. This action occurs if more than 24 lines of storage are provided. Scrolling will halt at this point.

Cursor Down (↓)

15.18 Operation of the ↓ key moves the cursor down one line at a time in the same column until the cursor reaches the bottom of the screen. This key is repeatable. When the display is receiving on-line, the action is the same except after the cursor has reached the bottom line of the screen additional cursor down commands will cause the displayed information to scroll up until the last line of the page is displayed, if more than 24 lines of storage are provided. Scrolling will halt at this point.

Cursor Right (→)

15.19 Operation of the → key moves the cursor one character position at a time to the right in the same line until the end of the line is reached. This key is repeatable.

Cursor Left (←)

15.20 Operation of the ← key moves the cursor one character position at a time to the left in the same line until the beginning of the line is reached. This key is repeatable.

Note: The ← key performs the same functions as the ASCII backspace control.

Home (HOME)

15.21 Operation of the HOME key places the cursor in the first character position of the first line of the page. This is called the home position. If the display has an expanded storage (3840 or 5760 characters), operation of the HOME key will cause segment 1 to be displayed and the cursor will be placed in the first character position of the first line.

Scroll Up (SCROL UP)

15.22 This key is provided when the display has an expanded storage. Operation of the SCROL UP key causes the displayed lines to move up one line at a time. The top line will be removed from view and the next line of the page will move onto the screen as the bottom line. This key is repeatable. Scrolling up will be inhibited where the last line of the page is at the bottom of the screen.

Scroll Down (SCROL DOWN)

15.23 This key is provided when the display has an expanded storage. Operation of the SCROL DOWN key causes the displayed lines to move down one line at a time. The bottom line will be removed from view and the previous line of the page will move onto the screen as the top line. This key is repeatable. Scrolling down will be inhibited when the first line of the page is at the top of the screen.

Segment Advance (SEGMT ADV)

15.24 This key is provided when the display has an expanded storage. Operation of the SEGMT ADV key causes the next segment of the page to be displayed. For example, if segment 1 is displayed, the screen will advance to segment 2 when the SEGMT ADV key is operated. If the last part of segment 1 and the first part of segment 2 is displayed, segment 2 will be displayed when the SEGMT ADV key is operated. If segment 3 of a 72-line display device is fully displayed on the screen, operation of the SEGMT ADV will cause segment 1 to be displayed.

> ***Note:*** The cursor position on the screen will not change during the operation of the SCROL UP, SCROL DOWN, or SEGMT ADV keys.

Cursor Tab (CURSR TAB)

15.25 Operation of the CURSR TAB key will advance the cursor to the next tab mark if present, or to the first character position of the next line. No horizontal tabulation character will be written at the cursor position nor will space characters be written in any character position.

C. Right Side Editing Controls

15.26 There are five editing control keys, Fig. 6, located on the right side of the keyboard. These five keys are called the right side editing control cluster. Operation of any of the keys in this cluster will alter the information on the screen and in the display logic.

Clear (CLEAR)

15.27 Operation of the CLEAR key will clear all data starting from the cursor position to the end of the display storage and place a space character in these positions. If the entire storage is to be cleared, the HOME key is operated prior to operation of the CLEAR key. A display completely cleared of data will have only the cursor, tab marks, and segment marks displayed on the screen.

Line Insert (LINE INSRT)

15.28 Operation of the LINE INSRT key causes the line in which the cursor is located and all lines below it to move down one line on the screen and in the display logic storage. The cursor will be placed in the first character position of the line and all character positions will be filled with space characters. For this function to occur, the last line of the storage must contain all spaces.

Line Delete (LINE DLETE)

15.29 Operation of the LINE DLETE key will cause the line in which the cursor is located to be deleted from the screen and the display logic storage. All lines below the deleted line will move up one line position filling the gap created by deleting the line. The cursor will be positioned in the first character position of the line. This operation results in one additional line of space characters following the last line of data.

Character Insert (CHAR INSRT)

15.30 Operation of the CHAR INSRT key will cause the character located at the cursor and all characters to the right of the cursor, to the end of the character field, to shift one position to the right. A space character will appear at the cursor position. If a character is displayed in the last character position of the character field, the function will not be performed. This key is repeatable.

Character Delete (CHAR DLETE)

15.31 Operation of the CHAR DLETE key will cause the character located at the cursor to be deleted. All characters to the right of the cursor, to the end of the character field, will move one position to the left and a space character will appear in the rightmost position. This key is repeatable.

D. Special Function Controls

15.32 The special function controls (Fig. 6) are located to the right and above the keyboard. Three of the special function controls (described below) are used only in the operation with only unprotected characters.

Tab Set (TAB SET)

15.33 This key is provided with the horizontal tabulation option. Operation of the TAB SET key will cause a tab mark to be placed in the character position located by the cursor and all character positions below the cursor, in that column, to the end of the page. The tab mark is displayed as a single dot in the lower left corner of the character position. No data on the page is altered.

Tab Clear (TAB CLEAR)

15.34 This key is provided with the horizontal tabulation option. Operation of the TAB CLEAR key clears all tab marks from the cursor position to the end of the line and all tab marks in the column below the cursor and to the right of this column. No data is altered.

Highlight (HIGH LIGHT)

15.35 This key is provided with the highlight option. The highlighting feature provides the ability to blink character positions to allow data to stand out from surrounding information. Highlighted characters will blink at approximately 1 Hz, going from full intensity to one-half intensity. Highlighted characters may be generated either locally or on-line. To enter highlighted data in local mode, the HIGH LIGHT key is operated. Operation of the HIGH LIGHT key will light the key lamp. All data entered with the HIGH LIGHT key lamp lit will be highlighted. Highlighted information will remain highlighted throughout all editing operations except when overwritten in the nonhighlighted mode. Restoring of the HIGH LIGHT key will extinguish the HIGH LIGHT key lamp and subsequent character entries will be displayed in the normal unhighlighted condition. When highlighted information is transmitted, each group of one or more highlighted characters will be preceded by the highlight on sequence and followed by the highlight off sequence.

16. INPUT MESSAGES

16.01 All input messages conform to a basic format consisting of three fields of information separated by a colon between each field. The input message format is shown in Fig. 7.

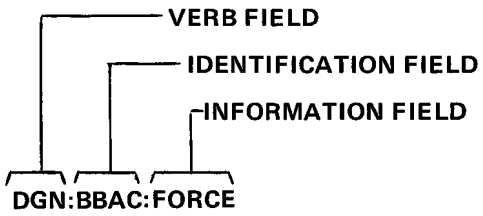


Fig. 7—Input Message Format

16.02 The three fields of the input message format are:

(1) ***Verb Field***—The verb field consists of one to six characters and indicates the action to be performed.

(2) ***Identification Field***—The identification field consists of one to six characters and identifies where the action is to be performed.

(3) ***Information Field***—This field can either be blank or contain only information needed to perform that action.

16.03 After the input message has been entered, operation of the carriage return (RETURN) key will execute the input message.

16.04 A complete list of input messages and an explanation of each input message is contained in the input message manual, IM-68500. The input message manual also lists the responses that can be expected from the system. The input message

manual should always be consulted when typing an input message to insure that the correct message, message format, and spelling are used.

INPUT MESSAGE ACKNOWLEDGMENTS

16.05 Upon completion of the typing of an input message, including the execute code, the PBC causes an acknowledgment printout. This printout will indicate whether or not the message has been correctly received, and what action the system has taken because of the message. The acknowledgment is typed on the line following the input message and the cursor is automatically returned to the start of the next line (left margin). If the program to which the input message was directed does not respond with an acknowledgment within 2 minutes, a special acknowledgment, NA (no acknowledgment) will be printed out by the system. Table O indicates the possible input message acknowledgments and their meanings.

INPUT MESSAGE CONTROL KEYS

16.06 A group of keys on the keyboard of the DATASPEED® 40 station are used to control the input message format. The following is a description of these keys.

Execute (RETURN)

16.07 The carriage return (RETURN) key is used to execute the input message. It informs the system that the input message is complete and that it should begin processing the message. The cursor is automatically returned to the start of the line (left margin).

Colon (:)

16.08 The colon (:) is used to separate the various fields of the input messages.

Abandon Message (&)

16.09 To abandon a message the ampersand (&) is used. It can be used to cancel a message at any time. If an incorrect input message is typed, the use of the & character causes the system to ignore any data prior to the & character. The new input message can now be typed immediately following the & character, or the HOME key can be operated returning the cursor to the start of the line (left margin).

Corrections

16.10 The left side editing control cluster is used to correct any characters in the input message. For an explanation of the left side editing control cluster refer to 15.15 through 15.25.

17. OUTPUT MESSAGES

17.01 Output messages from the DATASPEED® 40 channels consist of five basic fields of information (Fig. 8).

17.02 The five fields of the output message format are:

(1) ***Priority Field***—The priority field has a maximum of two characters. This field defines the priority to indicate the level of importance of the message (17.04).

(2) ***Time Field***—The time field consists of two characters that indicates the minute after the hour after the message was sent.

(3) ***Verb Field***—The verb field consists of a maximum of six characters. This field indicates what action was performed.

(4) ***Identification Field***—The identification field consists of one to six characters and identifies where the action was performed.

(5) ***Information Field***—The information field has no limitation on its length. It varies from no information field to a rather lengthy field depending on the nature of the message.

17.03 A complete list of output messages and an explanation of the message is contained in the output message manual, OM-68500. Also listed in the output manual is an explanation of the action to be taken.

OUTPUT MESSAGE PRIORITIES

17.04 Occasionally, two or more output messages will have to compete for the same DATASPEED® 40 station. In order for the DATASPEED® 40 station routines to printout the more important messages first, priorities are assigned to output messages. A total of three priorities have been assigned with the first two priorities (1 and 2) being established to reduce the possibility

TABLE O

INPUT MESSAGE ACKNOWLEDGMENTS FOR DATASPEED® 40

ACKNOWLEDGMENT	MEANING
OK	(1) The message was received. (2) The appropriate program was initiated. (3) Work was completed satisfactorily as far as the program could tell.
NG (No Good)	(1) The message was received. (2) The appropriate program was initiated. (3) The program was not able to complete the work satisfactorily. (a) Using the input message manual, verify that the message was typed correctly. (b) Retype the message. If after several attempts an OK acknowledgment is not received, check for an equipment trouble.
RL (Request Later)	(1) The message was received. (2) Although the message was valid, the appropriate program could not be initiated. (a) Wait a short time and then retype the message. (The program may not be able to be initiated due to load conditions.) If after several attempts an OK acknowledgment is not received, check for an equipment trouble.
NA (No Acknowledgment)	(1) The message was received. (2) The appropriate program was initiated. (3) It is not known if the work was completed satisfactorily. (4) No other acknowledgment has been received within the last 2 minutes.
PF (Printout Follows)	(1) The message was received. (2) The appropriate program was initiated. (3) The program has not completed the work. (4) When the work is complete, the program will print out the results.
?D (Incorrect Data Format)	(1) The message was received. (2) Data field format of message not understood by PBC. (3) No work performed by the system. (a) Using the input message manual, verify that the message was typed correctly. (b) Retype message using the correct format.

TABLE O (Cont)

INPUT MESSAGE ACKNOWLEDGMENTS FOR DATASPEED® 40

ACKNOWLEDGMENT	MEANING
?C (Invalid Channel)	(1) Message cannot be sent from particular channel. (2) Error detected by DATASPEED® 40 control program. (See note.) (3) Message not sent and no work is performed. (a) Using the input message manual, check to determine which TTY channel(s) will accept the message. (b) Retype message at proper DATASPEED® 40 channel.
?V (Invalid Verb)	(1) Verb field portion of input message is not valid. (2) Error detected by DATASPEED® 40 control program. (3) No work is performed. (a) Using the input message manual, check for correct verb field portion of message. (b) Retype message using correct verb.
?I (Invalid Identification)	(1) Identification field portion of input message is not valid. (2) Error detected by DATASPEED® 40 control program. (3) No work is performed. (a) Using the input message manual, check for correct identification field portion of message. (b) Retype message using correct identification.
?T (Time-Out)	(1) DATASPEED® 40 control program timer timed out because of: (a) Interrupt key being depressed for 2 minutes or (b) Terminal not in S/R mode. (2) Error detected by DATASPEED® 40 control program. (3) Release interrupt key. Ensure DATASPEED® 40 is in S/R mode.

Note: Data Terminal Input/Output Control Program — PD68510-01.

of losing pertinent messages under heavy load conditions. The priority field of the output message (Fig. 8) consists of two characters. None, one, or both of these characters may be blank depending on the priority indicated. The symbol for priorities and their order of importance are given in Table P.

18. PROCEDURES

REMOVE FROM SERVICE

18.01 Channels must be removed from service by the maintenance department. The network manager and the dial administrator cannot

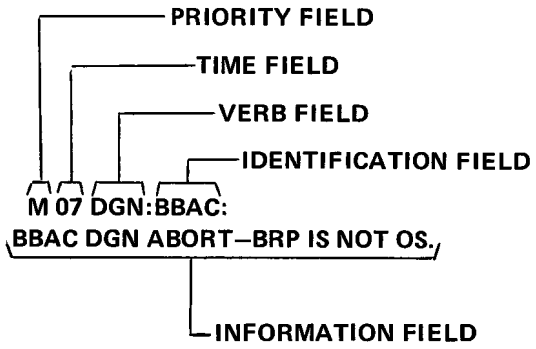


Fig. 8—Output Message Format

TABLE P

OUTPUT MESSAGE PRIORITIES

PRIORITY	SYMBOL	DESCRIPTION
1	**	Immediate action is required by maintenance forces.
2	*	Action is required by maintenance forces but is not of an emergency nature.
3	M	Message generated by some manual method. (a) Example — Input message requesting a diagnostic.
	A	Some automatic event caused the message. (a) Example — A threshold was exceeded causing an IA message.
		All other information type messages.

remove their channel nor any other channel from service. If the network manager or the dial administrator have to change paper in the printer at their locations, they must request to be removed from service by the plant personnel. The following procedure describes the method for removing from service a DATASPEED® 40 station:

(1) Enter the input message

RMV:DTERM:nn←

nn = the channel number (20 through 27) to be removed from service.

(2) An output message will be printed when the channel is out of service.

M59 RMV:DTERM:CHANNEL NO. nn REMOVED FROM SERVICE

(3) The output for this channel will be switched to a back-up channel. If there is no backup, the output will be lost.

(4) The channel may now be placed in the local mode and power may be removed by operating the AC switch on the DATASPEED® 40 to OFF.

Note: The DATASPEED® 40 interface cable should be connected or removed from the PBC processor (PDP® 11/45) only when the DATASPEED® 40 station and the PBC processor are removed from service.

RESTORE TO SERVICE

18.02 The following procedure describes the method for restoring to service a DATASPEED® 40 station:

(1) The PBC processor (PDP® 11/45) must be in operation.

(2) Operate the DATASPEED® 40 station ON OFF switch to the ON position.

- The LOCAL key lamp is lighted.

(3) Operate the S/R key.

- The S/R key lamp is lighted.

(4) Operate the PRINT ON LINE key.

- The PRINT ON LINE key lamp is lighted.

The maintenance department will perform the following procedure:

(5) If the INTRPT key lamp is lighted, extinguish the lamp by operating the INTRPT key.

(6) Return the cursor to the start of the line (left margin) by operating the HOME key.

(7) Input the message

RST:DTERM:nn←

nn = the channel number.

(8) The following message will appear on the display:

RST:DTERM:CHANNEL RESTORED TO SERVICE

The DATASPEED® 40 station is now ready to receive output messages.

INPUT MESSAGE PREPARATION

18.03 The following procedure describes the method for preparing the DATASPEED® 40 station to accept and transmit input messages:

(1) Place the DATASPEED® 40 station in service (18.02).

(2) Operate the INTRPT key.

(a) This will stop an output message if an output message was in progress.

(b) No output messages will be received until the INTRPT key is restored.

(c) The INTRPT key lamp is lighted.

(3) Return the cursor to the first character position of the line by operating the HOME key.

(4) Enter the message.

(5) End the message by operating the RETURN key.

(a) When the RETURN is typed, the cursor will automatically return to the start of the line.

(b) The message is transmitted including the RETURN.

(c) The cursor is now at the end of the message.

(6) Restore the INTRPT key.

(a) The INTRPT key lamp is extinguished.

(b) The acknowledgment will print at the end of the message.

(c) If an output message was printing when the INTRPT key lamp was lighted (step 2), the interrupted output will be reprinted and the DATASPEED® 40 station will be ready for future output.

Note: The INTRPT key lamp should be lighted only when preparing an input message.

TABLE Q

ABBREVIATIONS AND ACRONYMS

CAB	Central Analysis Bureau
CPU	Central Processor Unit
CRT	Cathode Ray Tube
ETS	Electronics Translation System
INTRRT	Interrupt
IMA	Ineffective Machine Attempt
MLSS	Machine Load and Service Summary
NA	No Acknowledgment
PBC	Peripheral Bus Computer
PBT	Piggyback Twistor
SPC	Stored Program Control
S/R	Send/Receive
TR	Transmit Receive
TTY	Teletypewriter
TTYB	Teletypewriter Buffer