"DATASPEED® " MAGNETIC TAPE SET

DESCRIPTION AND PRINCIPLES OF OPERATION

CONTENTS

1. GENERAL

1.01 This section provides the description and principles of operation of the Dataspeed Magnetic Tape Set. It is reissued to include information presented in TCNs 1568 and 1707, to accommodate engineering changes, and to permit standard distribution. Since this is a general revision, marginal arrows to indicate changes and additions are omitted. Issues 1 and 2 of this section were limited printing and did not receive standard distribution.

1.02 There are two versions of the tape set. One is designed for stand-alone operation or for use with 33, 35, or 37 teletypewriters (Figure 1). The other is designed for use with parallel devices such as the CDT (Figure 2). The two versions differ mainly in the cabinet style, the control panel arrangement, and the interface circuitry. Most of the following descriptions apply to all models of the tape set. Descriptions that apply to only one version or the other are so indicated.

2. DESCRIPTION

2.01 The magnetic tape set is a data communications set capable of sending and receiving information at speeds up to 2400 words per minute. It will transmit data from magnetic tape or receive and record data on magnetic tape

Prepared for American Telephone and Telegraph Company by Teletype Corporation

in half-duplex operation in either the attended or unattended modes. This set is not code sensitive. The code used to represent data may be selected arbitrarily by the user, except for certain ASCII (American National Standard Code for Information Interchange) control characters.

2.02 The set may be used for point-to-point data gathering or distribution; for exchanging data from outlying stations, such as a computer; for local or on-line message preparation, transmission, and recording in conjunction with a local teletypewriter set; and for linking high and low speed data communication facilities.

2.03 The data recording medium is 1/2 inch computer grade magnetic tape. The tape is provided in a compact plastic cartridge (approximately 3 inches by 3 inches by 1 inch) with a 159,000 character capacity.

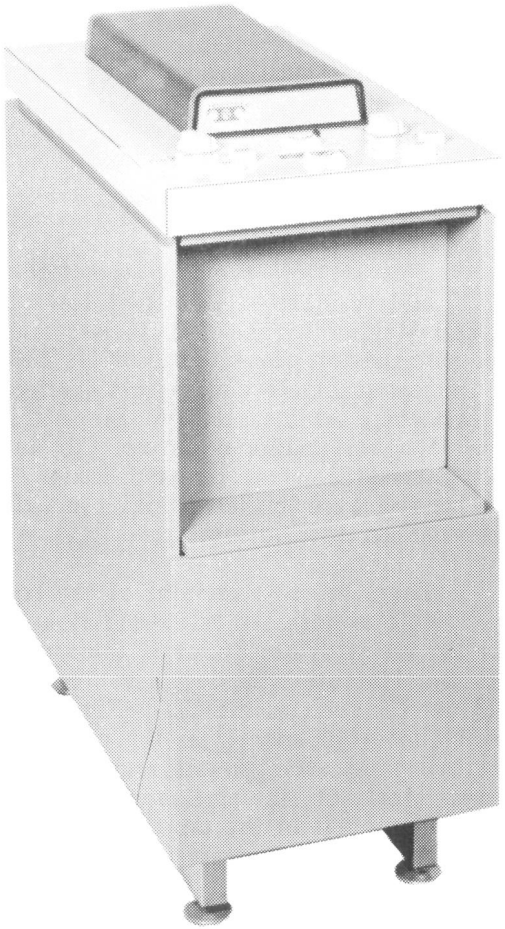


Figure 1 - Magnetic Tape Set for Stand-Alone Operation or for Use With 33, 35, or 37 Teletypewriter

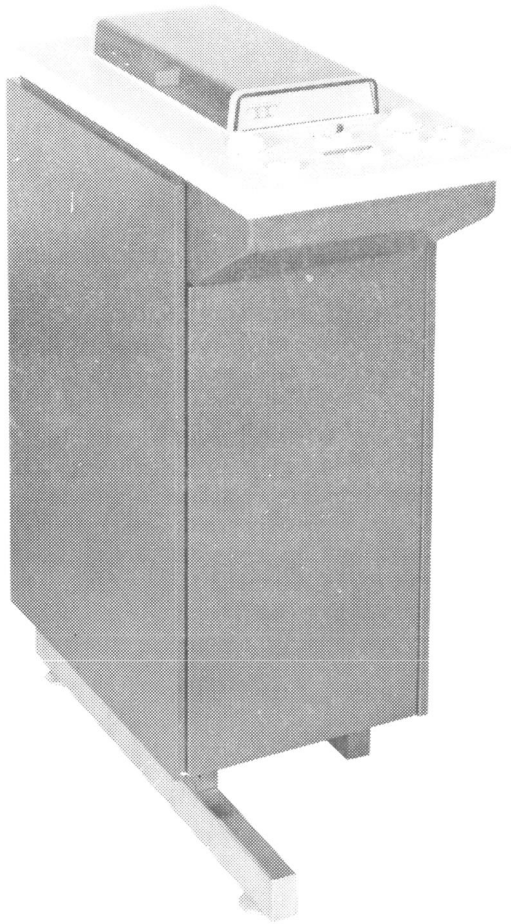


Figure 2 - Magnetic Tape Set for Use With Parallel Interface Devices Such as the CDT

TYPICAL APPLICATIONS

2.04 The magnetic tape set may be operated in a number of configurations (see table). Depending upon the application, appropriate interface cards, timing elements, and cables are used in assembling the set.

CABINET

2.05 The cabinet provides the mounting facilities for the components of the tape set. In the cabinets for both types of tape sets (Figures 1 and 2), the hinged top provides the mounting facilities for the control panel and the plastic tape transport cover. The upper level of the cabinet contains the tape transport. In the cabinet designed for stand-alone operation or 33/35/37 teletypewriter adjunct use, the center compartment of the cabinet provides mounting facilities for a 200 series data set (or equivalent), and the lower compartment houses the electronics module. In the parallel device adjunct cabinet, no provisions are made for data set mounting. The electronics module is mounted vertically in this cabinet.

2.06 In both versions of the cabinet, an ac power distribution assembly is contained in the module housing compartment. This assembly connects the tape transport motor and power supply to the ac line. A maintenance ON-OFF toggle switch and convenience receptacle are also provided.

CONTROL PANEL

2.07 The control panel (Figures 3 and 4) contains the switches and indicators necessary for operator control of the set. Briefly, the functions of the controls and indicators are as follows:

DATA MODE Switch (Stand-Alone or 33/35/37 Adjunct Only)

2.08 The DATA MODE switch is used to place the tape set in the local or on-line mode. When placed in either the ON-LINE MAN or ON-LINE AUTO mode, the set will be selected to operate either as a sender or a receiver through a 200 series data set (or equivalent). The ON-LINE AUTO position is used for unattended operation. When placed in the LOCAL mode, the tape set may be used with an associated teletypewriter for off-line tape preparation and editing or on-line low-speed operation via the low-speed data set in the teletypewriter (if provided).

2.09 The OPTION position provides unattended operation when the tape set is used with a 37 KSR to provide ASR operation. With SEND DATA or RECEIVE DATA preselected, a Reader On or Punch On, respectively, from the 37 KSR will turn on the tape set motor. A Reader Off or Punch Off will turn off the motor.

Note: Early design units do not include the OPTION setting of the DATA MODE switch. The unattended local operation is not possible with these units.

MOTOR CONTROL Switch (Parallel Device Adjunct Only)

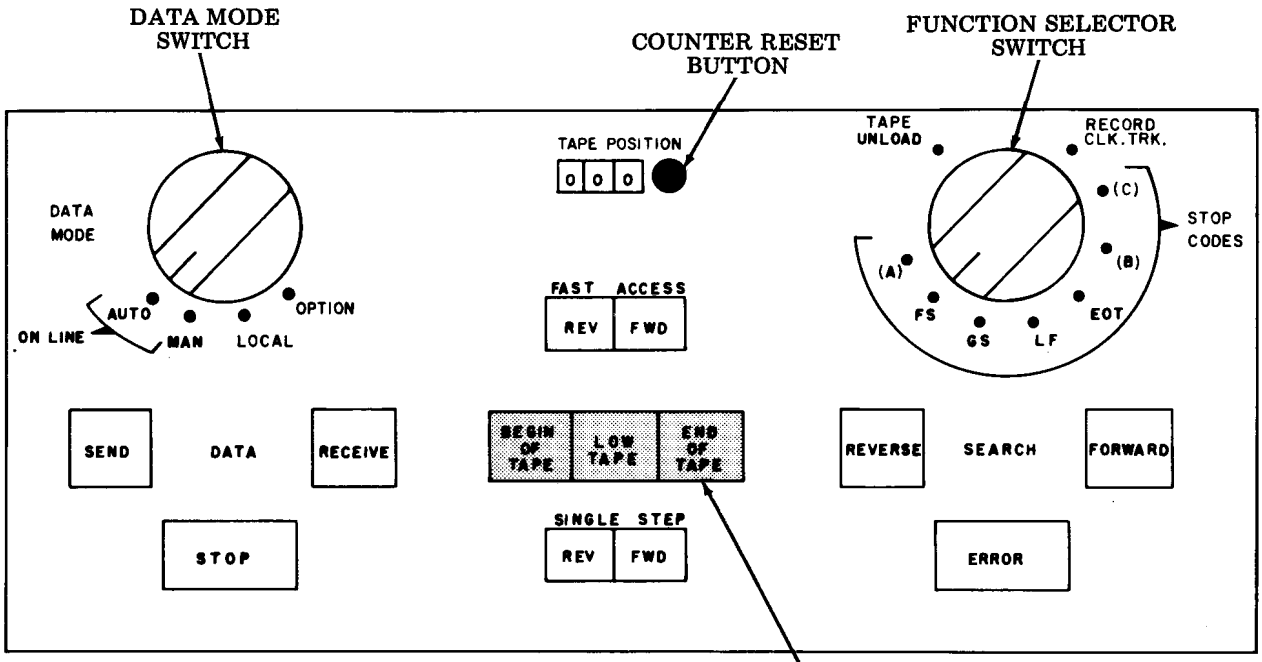
2.10 The tape set designed for use with a parallel interface terminal such as the CDT has a MOTOR CONTROL switch at the left side of the panel (Figure 4). When this switch is placed in the ON position, the tape set motor turns on and remains on whenever the tape set is activated. With the MOTOR CONTROL switch in the AUTO position, the tape set motor is turned on and off by the associated terminal when data transmission takes place.

APPLICATIONS OF TYPICAL MAGNETIC TAPE SET CONFIGURATIONS

CONFIGURATION	HIGH SPEED	LOW SPEED	APPLICATION
Stand-alone	200 series data set (or equivalent)	Not used	On-line: Tape set sends and receives data at high speed (1050, 1200, 2000, or 2400 baud determined by capability of data set).

APPLICATIONS OF TYPICAL MAGNETIC TAPE SET CONFIGURATIONS (Continued)

CONFIGURATION	HIGH SPEED	LOW SPEED	APPLICATION
Adjunct to 33/35 teletypewriter	200 series data set (or equivalent)	100 series data set used with 33/35 teletypewriter	On-line: Tape set sends and receives data at high speed (1050, 1200, 2000, or 2400 baud determined by capability of data set), and at 110 baud via the low speed data set of the teletypewriter. Off-line: Prepare tape at keyboard speed. Read tape and prepare page copy at 110 baud.
Adjunct to 37 ASR or KSR teletypewriter (EIA interface)	200 series data set (or equivalent)	Interfaces with teletypewriter (off-line)	On-line: Tape set sends and receives data at high speed (1050, 1200, 2000, or 2400 baud) determined by capabilities of data set. Teletypewriter is not on-line. Off-line: Prepare tape at keyboard speed. Read tape and prepare page copy at 150 baud.
Adjunct to 37 KSR teletypewriter (to provide ASR operation)	200 series data set (or equivalent)	100 series data set used in conjunction with 37 teletypewriter	On-line: Tape set sends and receives data at high speed (1050, 1200, 2000, or 2400 baud determined by capability of data set), and at 150 baud via the low speed data set of the teletypewriter. Off-line: Prepare tape at keyboard speed. Read tape and prepare page copy at 150 baud.
Adjunct to parallel device such as CDT	Operates through circuitry of associated terminal	Not used	Tape set sends data to and receives data from associated terminal at speeds up to 2400 baud. Prepare tape at keyboard speed (if associated terminal has keyboard facility). Read tape and prepare page copy or visual display at speeds up to 2400 baud.



Note: Early design units do not include the OPTION setting on the data mode switch. Also, the character (A), (B), and (C) positions may not be marked on early design units.

Figure 3 - Control Panel on Stand-Alone or 33/35/37 Adjunct Tape Set

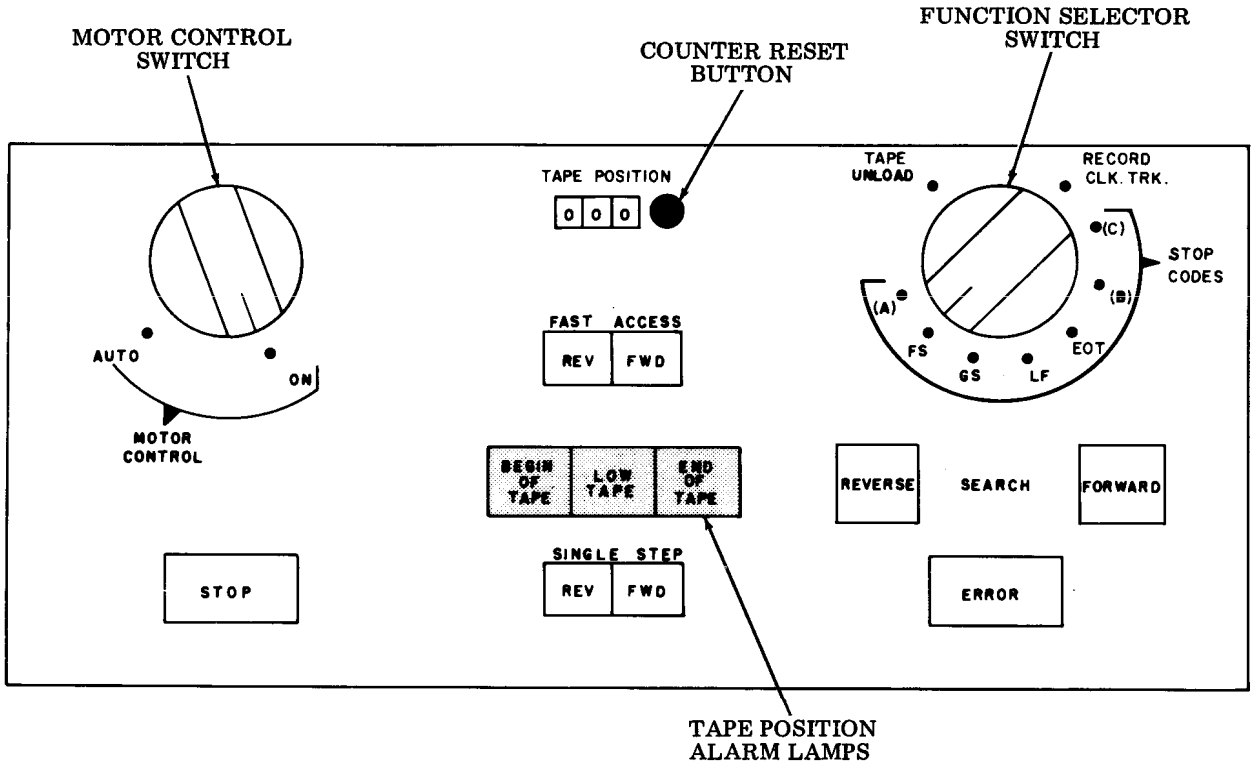


Figure 4 - Control Panel on Parallel Device Adjunct Tape Set

DATA Pushbuttons (Stand-Alone or 33/35/37 Adjunct Only)

2.11 The DATA SEND and DATA RECEIVE pushbuttons are used to establish the send or receive mode of the tape set. When the DATA SEND pushbutton is momentarily depressed, the lamp lights and the tape set is conditioned to the send mode. Depending upon whether the on-line or local mode is selected, the tape set will supply data from the magnetic tape to a 200 series data set or to an associated teletypewriter.

2.12 When the DATA RECEIVE pushbutton is depressed, its lamp will light and the tape set will be conditioned into the receive mode. Depending upon whether the on-line or local mode is selected, it will receive information from a 200 series data set or related teletypewriter.

STOP Pushbutton

2.13 The STOP lamp flashes whenever the tape is in motion (send or receive modes, record clock track, etc). If the STOP pushbutton is momentarily depressed, the tape set reverts to an idle state and the lamp remains on.

TAPE POSITION Indicator (Counter)

2.14 The TAPE POSITION indicator (mounted on tape transport) is visible through the cutout at the top center of the control panel. This three-digit counter is used primarily to access a given area on the tape. It can be reset to zero at the beginning of a tape by depressing the reset button.

FAST ACCESS Switch

2.15 The FAST ACCESS FWD and REV rocker switch, when held depressed, will cause the tape to move at a fast rate (33 inches/second) in the direction selected to arrive at the general area of the data to be transmitted. The fast access movement of the tape is referenced numerically by the tape position indicator (counter) on the control panel. The STOP lamp will flash during fast access operation.

Tape Position Alarm Lamps

2.16 Three alarm lamps in the center of the control panel provide a visual alarm at the beginning or end of the tape. These lamps are controlled by a photosensor assembly which detects reflective markers on the tape. As shown in Figure 5, the photosensor assembly consists of a lamp which projects an oblong spot of light across the width of the tape, and a pair of photocells (upper and lower) which receive light reflected by the markers. In order for the tape position alarm lamps to operate, the cartridge must be loaded onto the tape transport, and the pinch roller engagement lever must be in the ENGAGED position.

2.17 The BEGIN OF TAPE lamp will light when the foil marker near the beginning of the tape reaches the photosensor. At this position, all reverse functions except unload are inhibited. When there is space for only 9000 additional characters (approximately 6 feet) the LOW TAPE lamp will light and stay lit due to a reflection from a foil marker on the upper edge of the tape. If the set is in the receive mode, it will continue to receive after the LOW TAPE lamp goes on. Early design sets cannot be selected to receive after the low tape condition begins. This feature is modified in late design sets to permit new calls in the local mode. The END OF TAPE lamp will light and stay lit when the END OF TAPE marker is at the photosensor. This condition will inhibit all forward functions.

SINGLE STEP Switch

2.18 The SINGLE STEP FWD and REV rocker switch causes the tape to move one character at a time in either direction. In the forward direction (local mode) the set operates as a sender for one character. The STOP lamp (and SEND lamp in stand-alone or 33/35/37 adjunct sets) flashes each time the switch is operated. In the reverse direction, the tape moves back one character and the STOP lamp flashes, but no character is sent.

Function Selector Switch

2.19 The function selector switch at the right of the panel permits selection of the record clock track and unload functions. It also enables the set to respond to the ASCII control character of File Separator (FS), Group Separator (GS), Line Feed (LF), and End of Transmission (EOT).

2.20 When the function selector is placed in the TAPE UNLOAD position, the magnetic tape set will turn on its motor and allow the tape to be completely rewound into the cartridge.

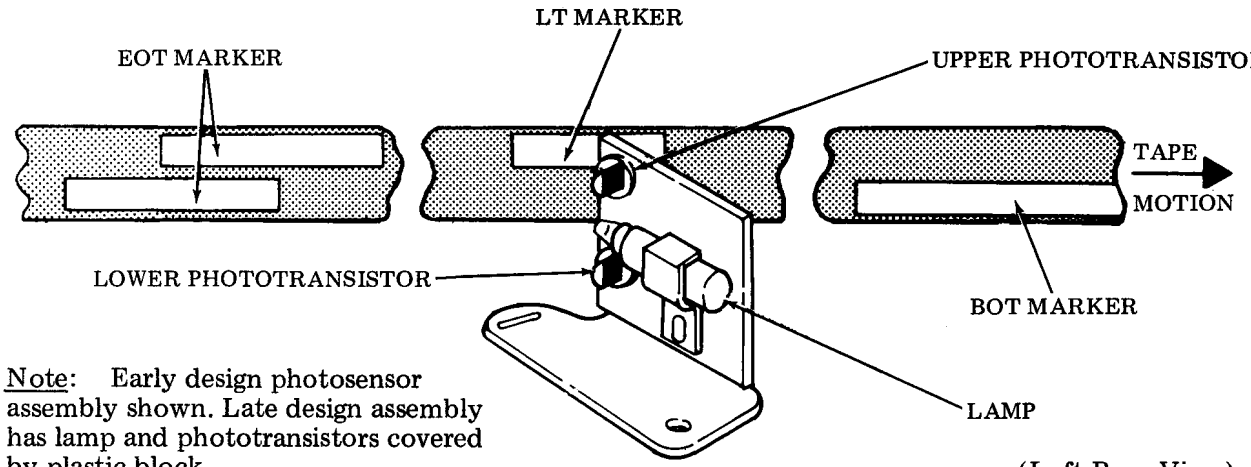


Figure 5 - Photosensor Assembly and Tape Position Markers

The motor will then shut off after a short timing interval. While unloading, the STOP lamp will flash.

> Note: After tape is rewound, the function selector switch should be moved out of TAPE UNLOAD so that all unload commands from the electronics module can be stopped. Also, the pinch roller engagement lever (Figure 7) on the tape transport should be set to the RELEASE position to prevent flats on the pinch roller.

2.21 With a tape at the Begin of Tape position and the function selector in the RECORD CLK. TRK. position, the magnetic tape set will record the clock track onto the magnetic tape. This process takes about 6-1/2 minutes. As the clock track is recorded, the STOP lamp flashes. When End of Tape is reached, the tape will cease to advance in a forward direction.

> Note: When End of Tape is reached, move function selector switch out of RECORD CLK. TRK. position.

2.22 The four ASCII control characters FS, GS, LF, and EOT are programmed into the set for the purpose of data access. When the function selector switch is placed in any of the four basic character positions, the set will search for the selected character and stop. The tape set can be placed in the send mode to transmit the accessed data.

2.23 If the tape set is equipped with a character recognition expander card, three additional search characters selected by the user can be provided at the A, B, and C positions of the selector switch. Search for parity error can be selected for the B position if desired. A "data blocking" feature (tape set supplies blocks of data to a remote receiver) can be selected for the C position. Details on these options and the method of programming the character recognition expander card are provided in Section 578-300-200.

2.24 If the tape set is equipped with an auto rewind for local print-out card, the auto rewind and special character recognition features are available at the A, B, and C positions of the function selector switch. With the function selector set to the A position, the tape set will rewind to an FS character upon recognition of a received EOT, switch to the local send mode and send the data to an adjunct teletypewriter, then revert to the on-line auto receive mode to await the next message. The A setting may also be programmed to rewind to the beginning of a message in process and await a new call in the event of a premature channel disconnect, or to provide on-line "data blocking" in conjunction with the rewind feature. The B setting can be used for on-line testing of a remote terminal equipped with an auto rewind card. The C setting provides on-line data blocking under control of an RS or ∧ character, programmable by the user, and also provides an additional search character (RS or ∧) in the search mode.

SEARCH Pushbuttons

2.25 When the SEARCH FORWARD or SEARCH REVERSE pushbutton is depressed, its lamp will light and the set will

search for the preselected ASCII control character (2.22). As the set is searching, the STOP lamp will flash. Upon detecting the character, the set will drop out of the search mode. The search lamp will go out and STOP lamp will return to steady on.

ERROR Pushbutton

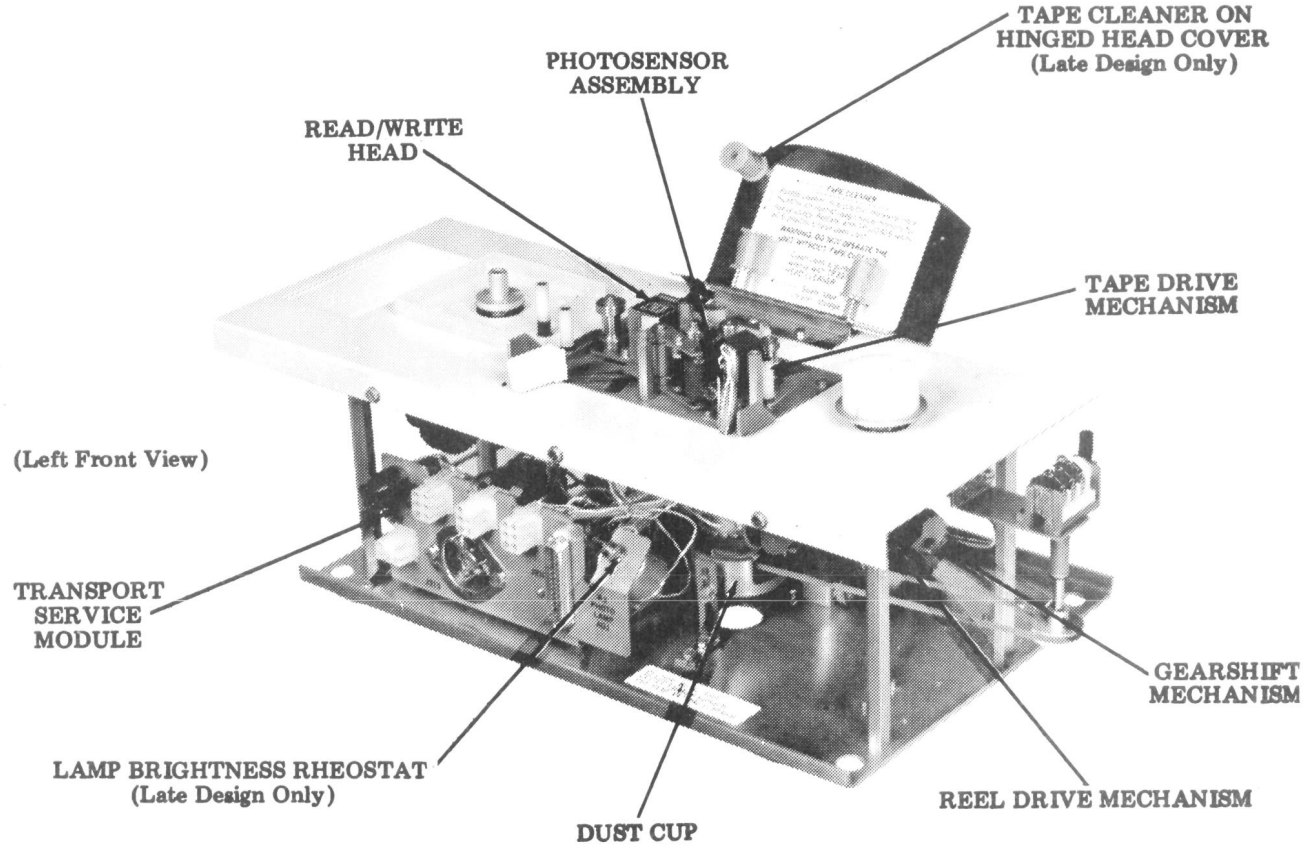
2.26 When in the send, search forward or reverse, or single step forward or reverse modes, the ERROR lamp will light if a parity error is detected. The lamp will remain on until the pushbutton is depressed. (Note that parity errors are not detected in the receive mode.)

MAGNETIC TAPE TRANSPORT

2.27 The tape transport (Figure 6) provides all of the mechanics used for tape handling, and for reading and writing data. The transport includes a motor unit, gearshift mechanism, reel drive mechanism, tape drive mechanism, tape transport service module, tape position indicator with zero reset button, record interlock switch, photosensor assembly, and read/write head.

A. Gearshift Mechanism

2.28 The gearshift mechanism provides the proper constant speeds for the reel drive mechanism and tape drive mechanism to function in all operational modes.



Note: Late design transport shown. Early design units do not include lamp brightness rheostat or hinged head cover with tape cleaner. Also, drive mechanism is modified slightly in late design units to accommodate tape cleaner.

Figure 6 - Tape Transport

B. Reel Drive Mechanism

2.29 The reel drive mechanism provides the reel drive assemblies with the motion necessary for operating the supply and take-up hubs.

C. Tape Drive Mechanism

2.30 The tape drive mechanism provides the mechanics for tape movement, guiding, reading, writing, tensioning, photosensing, and position indication. In late design units, the drive mechanism is modified slightly to include a hinged head cover with a tape cleaner.

D. Transport Service Module

2.31 The transport service module provides the mounting facilities for electrical components used in motor control and cabling. Late design units include a lamp brightness rheostat adjacent to the 25-pin connector, not found in early design transports.

E. Tape Position Indicator (Counter)

2.32 The tape position indicator with its zero reset button provides the means for referencing a tape position. A count of one corresponds to approximately 150 data characters. The three digits and reset button are visible on the control panel.

F. Record Interlock Switch

2.33 The record interlock switch (Figure 7) is provided to protect against accidental recording over or erasing of data. It is operated by placing a plastic plug in the bottom of the tape cartridge after a recording is made.

G. Photosensor Assembly

2.34 The photosensor assembly contains the lamp and the phototransistors which sense the reflective markers on the tape. The phototransistors provide the operating signals for the tape position indicator lamps and control system.

H. Read/Write Head

2.35 The read/write head is composed of nine coils which write information on the tape and also read the information from a recorded tape. Eight of the coils process the eight bits of an ASCII character, and the ninth coil processes a clock bit which establishes the character positions on the tape.

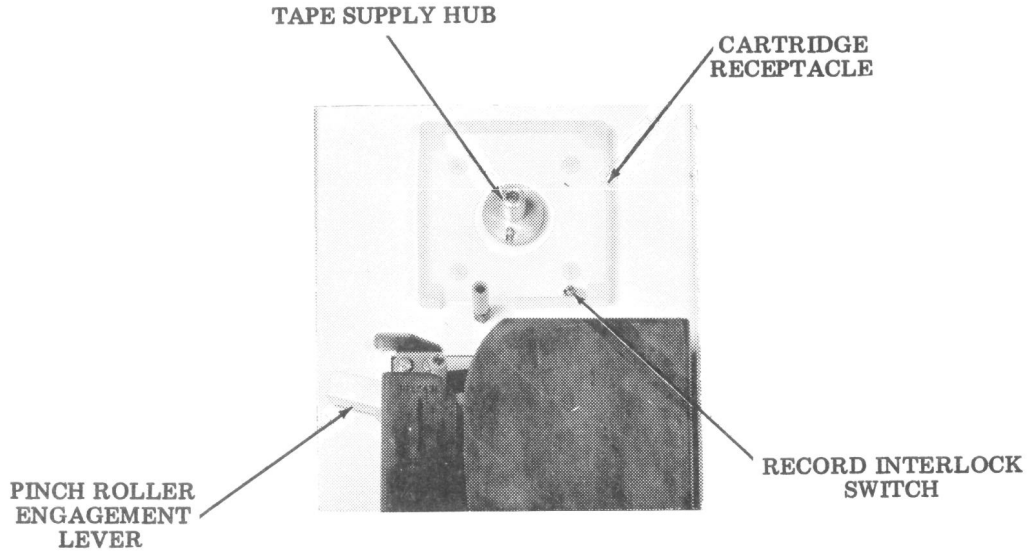


Figure 7 - Cartridge Location

ELECTRONICS MODULE

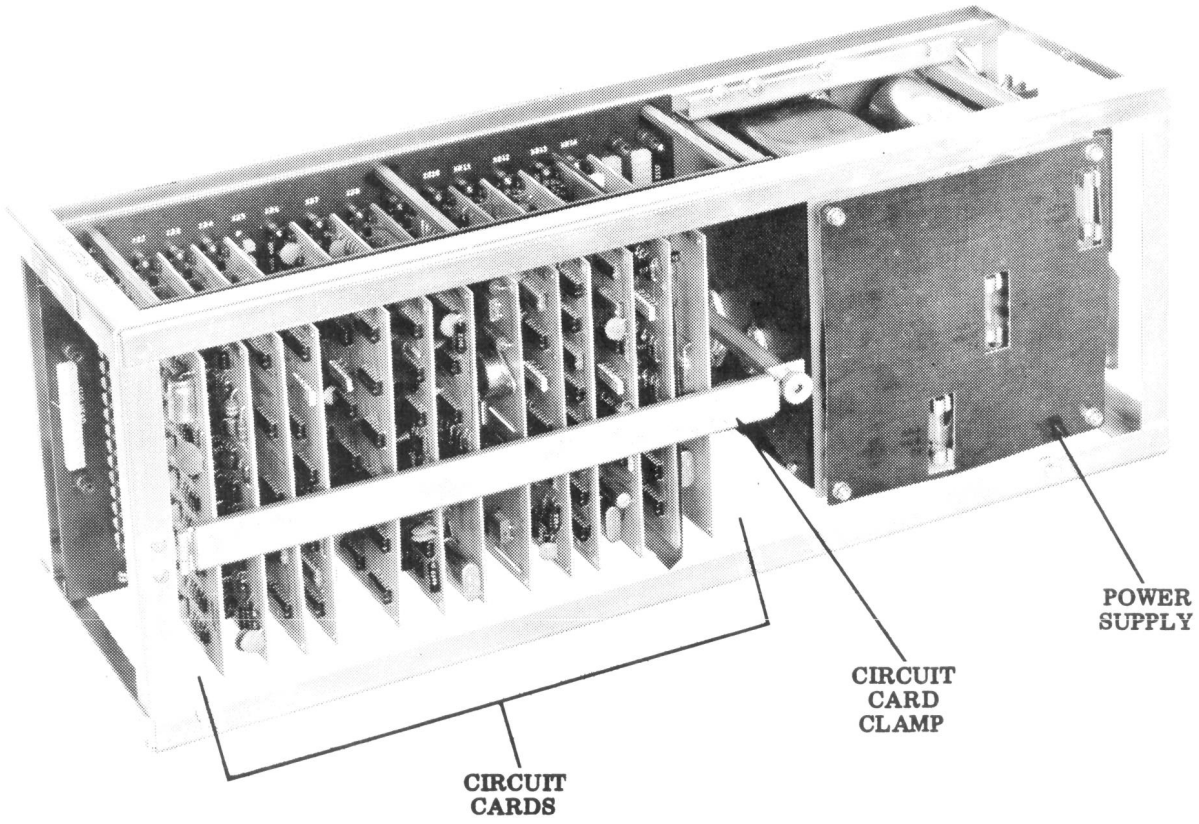
2.36 The electronics module (Figure 8) with its self-contained power supply provides all logic circuitry for set operation and termination points for all interconnecting cables. The module can accept up to 14 circuit cards. A circuit card clamp is provided to hold the cards to the connector board.

2.37 Tape sets designed for CDT adjunct service include an accessory interface module mounted "piggyback" on the basic module. This module includes two circuit cards to interface the voltage-sensitive circuits of the tape set to the current-sensitive circuits of the CDT.

MAGNETIC TAPE CARTRIDGE

2.38 The magnetic tape is contained in a single-reel plastic cartridge which mounts in the cartridge receptacle of the tape transport. As shown in Figure 9, there is an instruction label over the open end of a new cartridge. This label is removed to expose a mylar leader for threading the tape through the drive mechanism.

(Right Side View)



Note: Hinged circuit card clamp shown. Late design modules have removable clamp.

Figure 8 - Electronics Module

2.39 A cartridge in position on the tape transport is shown in Figure 10. The record interlock plug is on the index label side of the cartridge away from the record interlock switch. With the plug in this position, the tape set can be placed in the write mode.

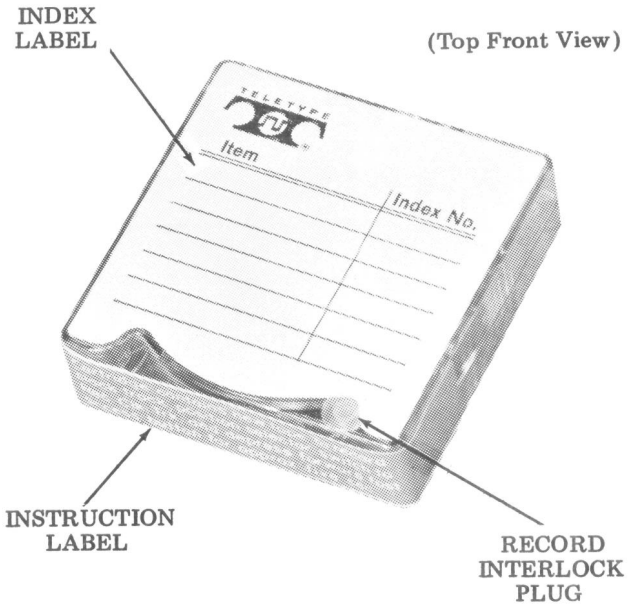


Figure 9 - Magnetic Tape Cartridge

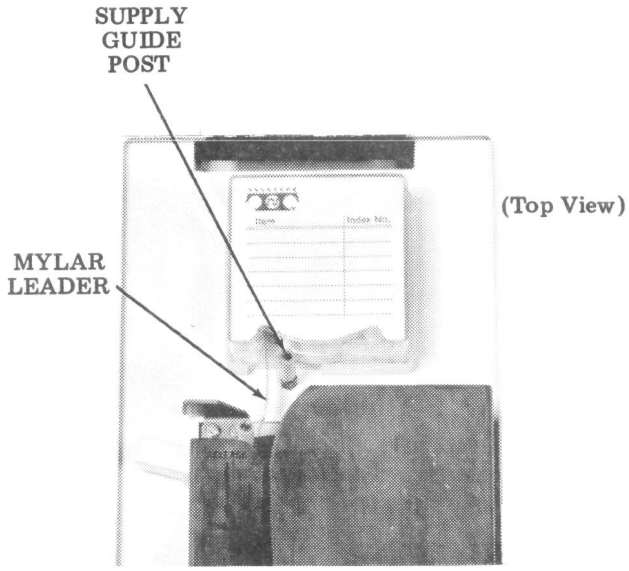


Figure 10 - Cartridge Loading

2.40 When a tape has been recorded, the operator places the record interlock plug in the hole on the underside of the cartridge. In this position, the plug will depress the record interlock switch when the cartridge is placed on the transport. This disables the write mode, preventing accidental recording over previously recorded material.

2.41 The path of the tape is illustrated in Figure 11. The beginning end of the tape is placed in the slot between the left and right head covers, and the mylar leader is pressed into the slot in the take-up reel. When the pinch roller engagement lever is placed in the ENGAGE position (Figure 11), the tape is pressed firmly

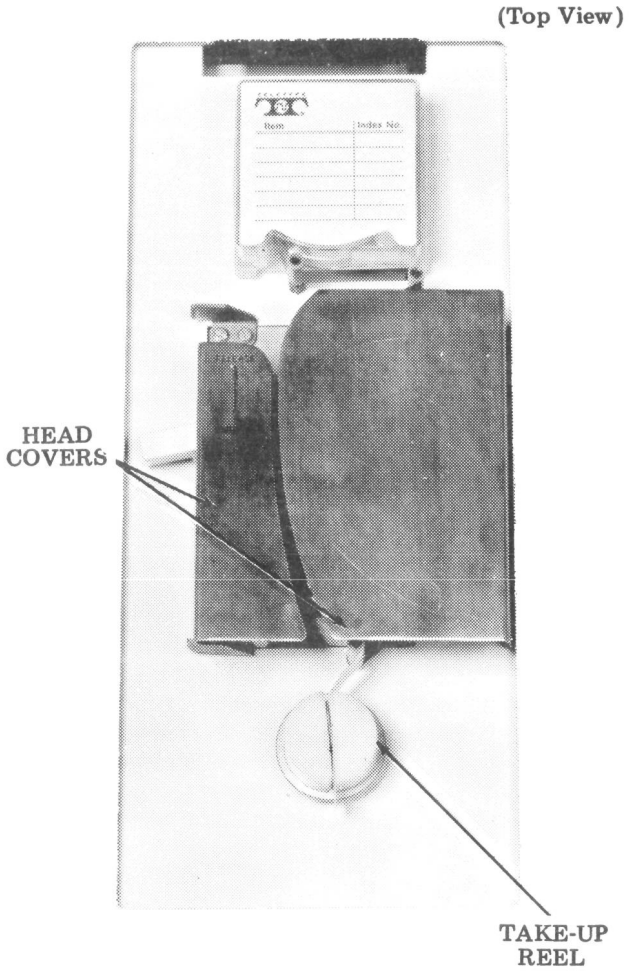


Figure 11 - Tape Path, Pinch Roller Lever Engaged

against the read/write head and drive elements beneath the head covers.

3. PRINCIPLES OF OPERATION

RECORDING METHOD

3.01 The tape is stepped across the face of the read/write head at a rate of 3.3 inches per second, character by character, upon command from the control logic. The tape motion occurs only when a character is to be read or written, and the transport remains idle between characters.

3.02 Information is stored in the form of magnetic flux patterns on the tape. These patterns are formed by applying signal voltages to the coils of the read/write head. Nine head coils are stacked vertically to provide nine parallel tracks of information (eight data tracks and a clock track). The positions of the tracks corresponding to eight data bits and the clock bit are shown in Figure 12.

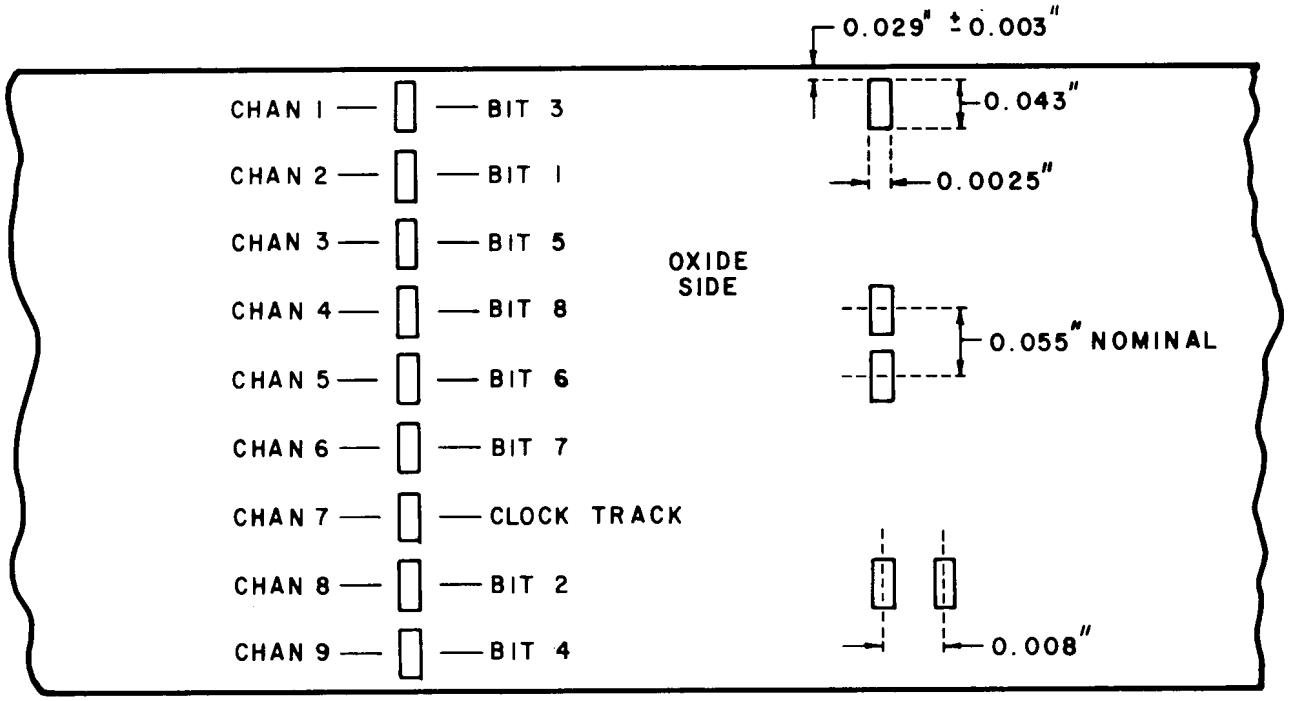


Figure 12 - Bit Positioning on Magnetic Tape

3.03 The signal voltages applied to the head coils are shown in Figure 13. The clock track is produced by a series of positive-going pulses which vary between a reference or bias level of -0.2 v and a positive pulse level of +0.2 v. The eight information bits are produced by negative-going pulses which vary between a bias level of +0.2 v and a pulse level of -0.2 v. The -0.2 v level for bits 1 through 7 corresponds to a spacing condition, whereas the -0.2 v level for bit 8 corresponds to a marking condition.

A. Prerecording the Clock Track

3.04 A new tape must be passed through the recorder in the Record Clock Track mode to prerecord the clock track and thus establish the character positions. This operation also records a marking bit in the 8-level track at

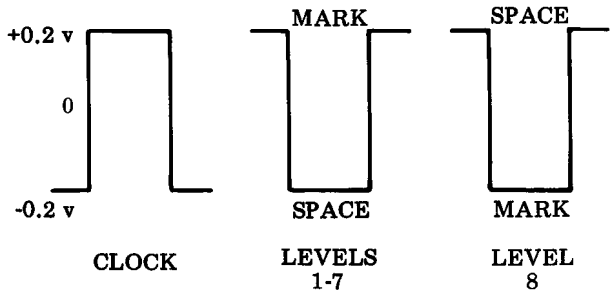


Figure 13 - Signal Voltages Applied to Head Coils for Write Operation

each clock position, and prebiases all other tracks to the marking state to remove any spurious information on the tape.

3.05 The method of prerecording the tape is illustrated in Figure 14. In this diagram, a fresh tape is moving from left to right across the face of the read/write head. In the record clock track mode, the tape moves continuously until the entire tape is prerecorded. A constant +0.2 v signal is applied to the level-1 through level-7 head coils, magnetizing the sections of tape that pass these coils to a constant positive flux polarity along the full length of the tape. These positive flux polarities are represented by the white bands to the right of the head in Figure 14.

3.06 In this mode of operation, a clock pulse oscillator supplies a continuous train of positive pulses to the clock coil. Each positive pulse produces a positive flux polarity on the section of tape passing the clock coil. The -0.2 v levels between pulses produce sections of negative flux polarity between the recorded clock pulses.

3.07 Each time a clock pulse is recorded, a negative-going pulse is also applied to the level-8 coil. This pulse produces an area of negative flux polarity in the level-8 track. The "pulses" of negative flux are separated by positive flux areas between pulses.

3.08 As a result of the clock track recording process, the tape is prerecorded with a train of positive clock bits, a train of negative (marking) level-8 bits, and prebiased positive tracks (continuous marking) in the level-1 through level-7 positions. If this tape is read, it will generate continuous rubout or delete characters with even parity (all eight data levels marking).

B. Writing Code Characters

3.09 Figure 15 shows the method of writing information on a preconditioned tape. The tape is stepped from left to right past the read/write head, and the magnetic states of the level-1 through level-8 tracks change according to the signal voltages applied to the head coils. In this example, the ASCII characters for the word CAT have been applied to the head coils, and the magnetic patterns appear on the tape to the right of the tape head.

3.10 To establish the character positions, the clock coil is connected to the read logic when the set is operating in the write mode. When a character is available for writing, the control logic energizes the transport and feeds the tape past the head. When the clock coil senses a clock pulse, the write circuits are turned on and the character is written in the level-1 through level-8 tracks. The write circuits are disabled at the end of the clock pulse, and the tape is stopped to complete the step. This process is repeated for each character of the message.

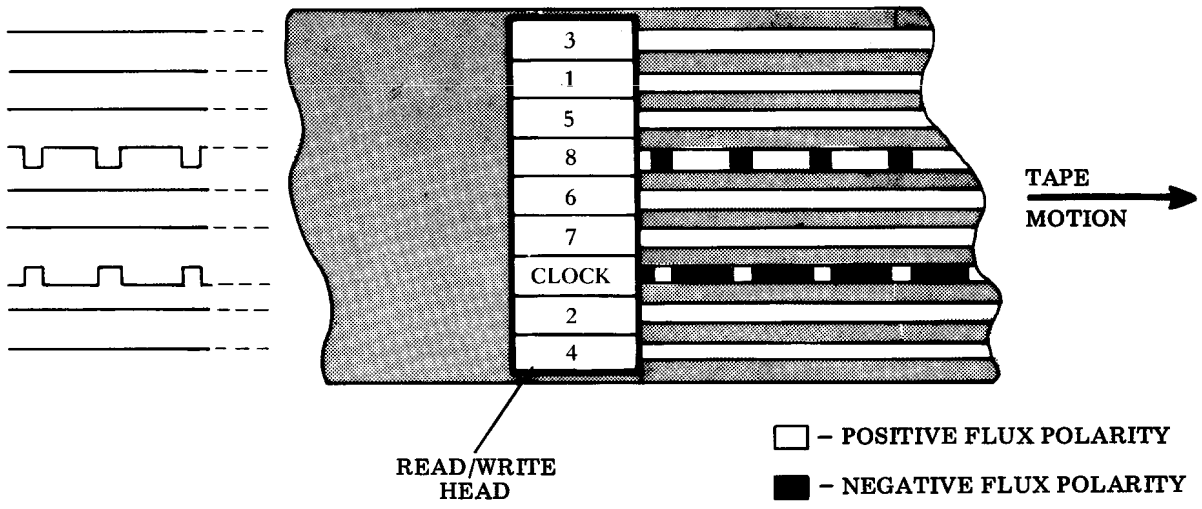


Figure 14 - Prerecording the Clock Track and 8-Level Bit

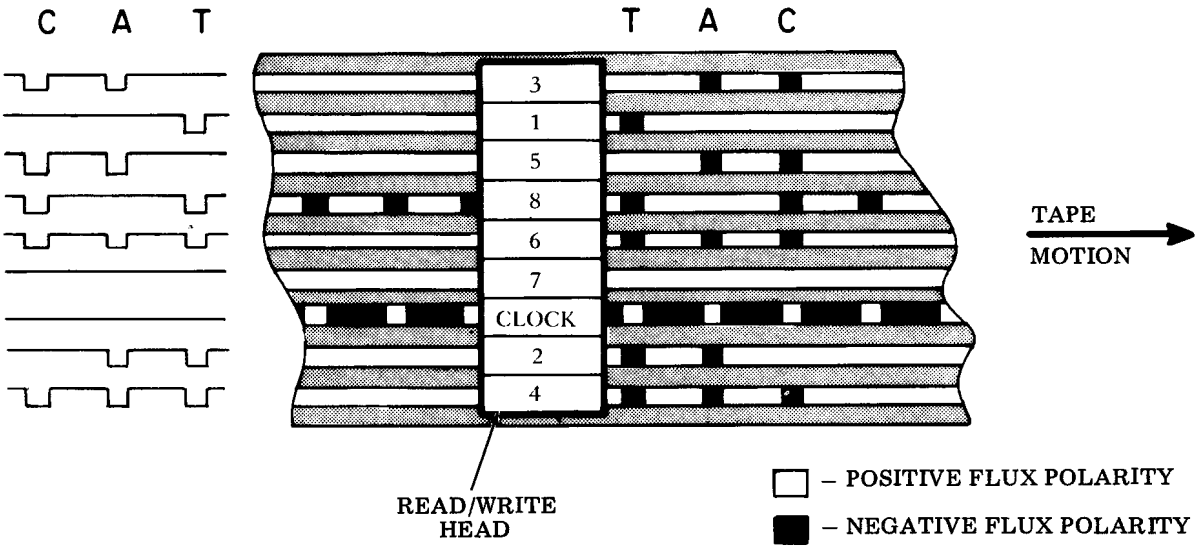


Figure 15 - Writing the ASCII Characters for the Word CAT

3.11 The signal voltages required to write the word CAT are shown at the left of Figure 15. ASCII for the letter C is levels 1, 2, 7, and 8 marking; all others spacing. Thus, levels 1, 2, and 7 on the tape remain in the positive magnetic state, while levels 3, 4, 5, and 6 are switched to the negative magnetic state by the negative-going pulses applied to the corresponding coils. The level-8 track remains in the negative state (marking).

3.12 As the tape moves past the head, character bits approximately 0.0025 inch long are written in the C character position. When this step is completed, the logic circuits call for the next character and the process is repeated to record the character A, then the character T to complete the word. The flux patterns are as shown in Figure 15.

C. Reading Code Characters

3.13 To read the information stored on a tape, the tape is stepped past the read/write head with the logic set to the read mode. Changes in magnetic flux on the tape are sensed by the coils, and the voltages at the coil terminals correspond to the electrical signals originally used to produce the recording.

3.14 The voltage waveforms produced by the coils are illustrated in Figure 16. The shaded areas in each of these waveforms represent the magnetic states of the tape as it passes the head coils. The beginning of each clock pulse is a negative-to-positive flux reversal on the tape. This change in flux induces a positive voltage pulse in the clock coil. Since induction occurs only when there is a change in flux, the pulse drops to zero for the remainder of the clock bit. Then, when the flux goes from positive to negative at the end of the clock bit, a negative voltage pulse is induced in the coil.

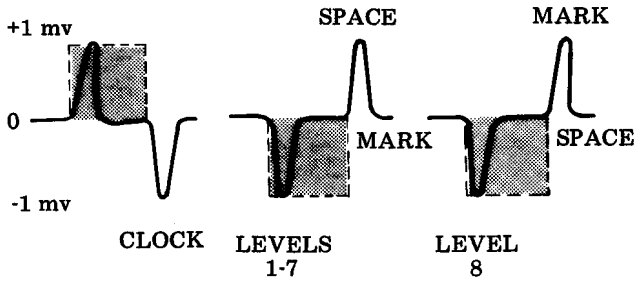


Figure 16 - Signal Voltages Induced in Head Coils for Read Operation

3.15 As shown in Figure 16, the level-1 through level-8 signals are produced in the same manner. The logic circuits are designed to respond to the positive pulses produced by the negative-to-positive flux reversals at the end of each character interval. For bits 1 through 7, the +1 mv level of this pulse corresponds to a space, and the zero level to a mark. For bit 8, the +1 mv level corresponds to a mark, and the zero level to a space.

3.16 Figure 17 shows the signals produced when the tape with the recorded word CAT is stepped from left to right past the read/write head. Notice that the presence or absence of output waveforms from coils 1 through 8 in this figure corresponds to the presence or absence of write signal waveforms in Figure 15.

POWER DISTRIBUTION

3.17 The ac power is brought into the set through the power cord to terminal block TB100 of the power distribution assembly (Figure 18). Power is switched through S100 and distributed to the power supply and tape transport.

3.18 The ac power for the tape transport is provided through connectors P215 and J215 for operation of the solid state switch, motor start relay, and motor unit. A 2-1/4 amp slow-blow fuse is provided for motor and solid state switch protection.

3.19 The ac power is cabled to the power supply where it is converted to dc for use within the set. Dc power is provided to the electronics module through connectors J101 and P101.

3.20 Plus 5 volts is provided on pin 4 of P101 and distributed to pins A1 and B1 of all circuit cards in the set. Plus 12 volts is provided on pin 1 of P101 and distributed to pins A2 and B2 of all circuit cards. Minus 12 volts is provided on pin 2 of P101 and distributed to pins A33 and B33 of all circuit cards. Ground is provided on pin 3 of P101 and distributed to pins A34 and B34 of all circuit cards. Plus 28 volts is provided on pin 5 of P101 and distributed to pins A3 and B3 of all circuit cards except cards 1 through 6 in positions XZ1 through XZ6. Minus 28 volts (return side of +28 volt supply) is provided on pin 6 of P101 and wired to pin B12 of connector XZ9. Through circuitry on card 9 this voltage is tied to ground to reference the +28 volt supply.

MOTOR CONTROL

3.21 With the set in the local mode, the motor unit can be turned on by operating any of the following switches (Figure 19):

S5	—	Forward Search switch
S6	—	Reverse Search switch
S8	—	Forward Single Step switch
S9	—	Reverse Single Step switch
S3	—	Fast Access Forward switch
S4	—	Fast Access Reverse switch
S1(10)	—	Unload switch
S1(1)	—	Record Clock Track switch

In stand-alone or 33/35/37 adjunct tape sets, the motor is also controlled by the Send Data switch (S11) and the Receive Data switch (S10).

3.22 Switch S5, S6, S8, or S9 provides a VL signal to card 10 on pin B14, A13, B10, or B16. In stand-alone or 33/35/37 adjunct sets only, switch S11 provides a VL signal on pin A15. This VL signal is processed by card 10 and card 12. Card 12 gates this signal and provides a VL signal (Send Message) on pin A6. Card 14 straps this signal to card 7 where it is used to provide a motor start signal VL on pin B22. This signal provides the path to ground for the +5 v applied to the coil of the solid state switch.

3.23 Switch S3 or S4 provides a VL signal to card 7 on pin B24 or B26. This signal provides the motor start signal on pin B22.

3.24 Switch S1(10) provides a VL signal to card 7 on pin A21. This signal provides the motor start signal on pin B22.

3.25 Switch S1(1) provides a VL signal to card 8 on pin A13. This VL signal is processed by card 8. The output of card 8 pin A11 (Record Clock Track Switch Delayed) is applied to card 7 on pin B16. This signal provides the motor start signal on pin B22.

3.26 Switch S2(7) provides a VL signal to card 14 on pin A20. The signal is strapped through the card and appears on pin A22 as the Remote Motor Control signal. This signal is applied to card 7 on pin A23 and provides the motor start signal on pin B22.

3.27 In stand-alone or 33/35/37 adjunct tape sets, switch S10 provides a VL signal to card 10 on pin A17. This signal is

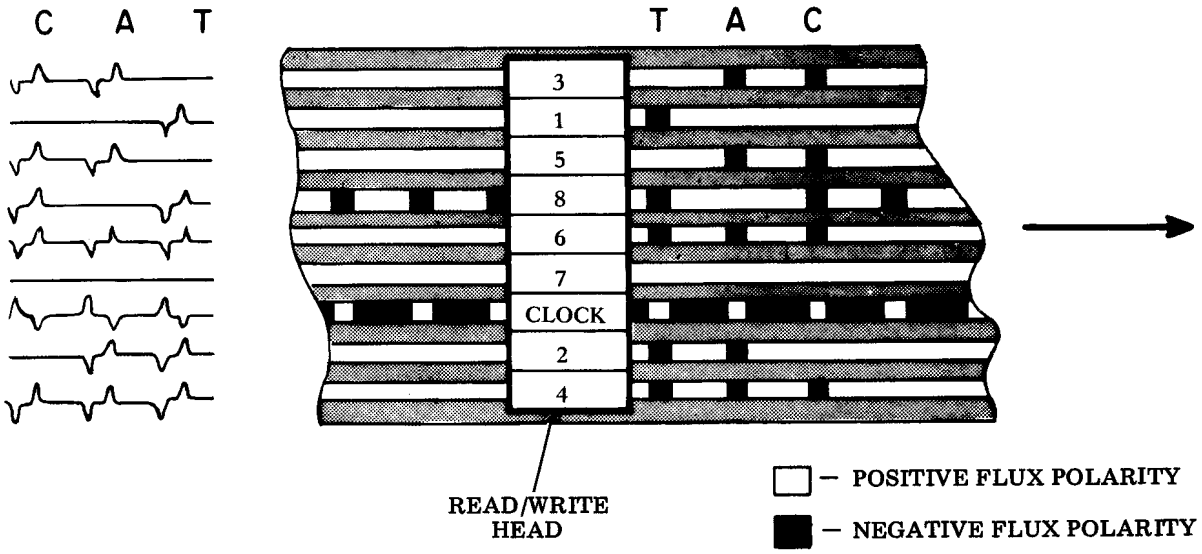


Figure 17 - Reading the Recorded Word CAT From the Tape

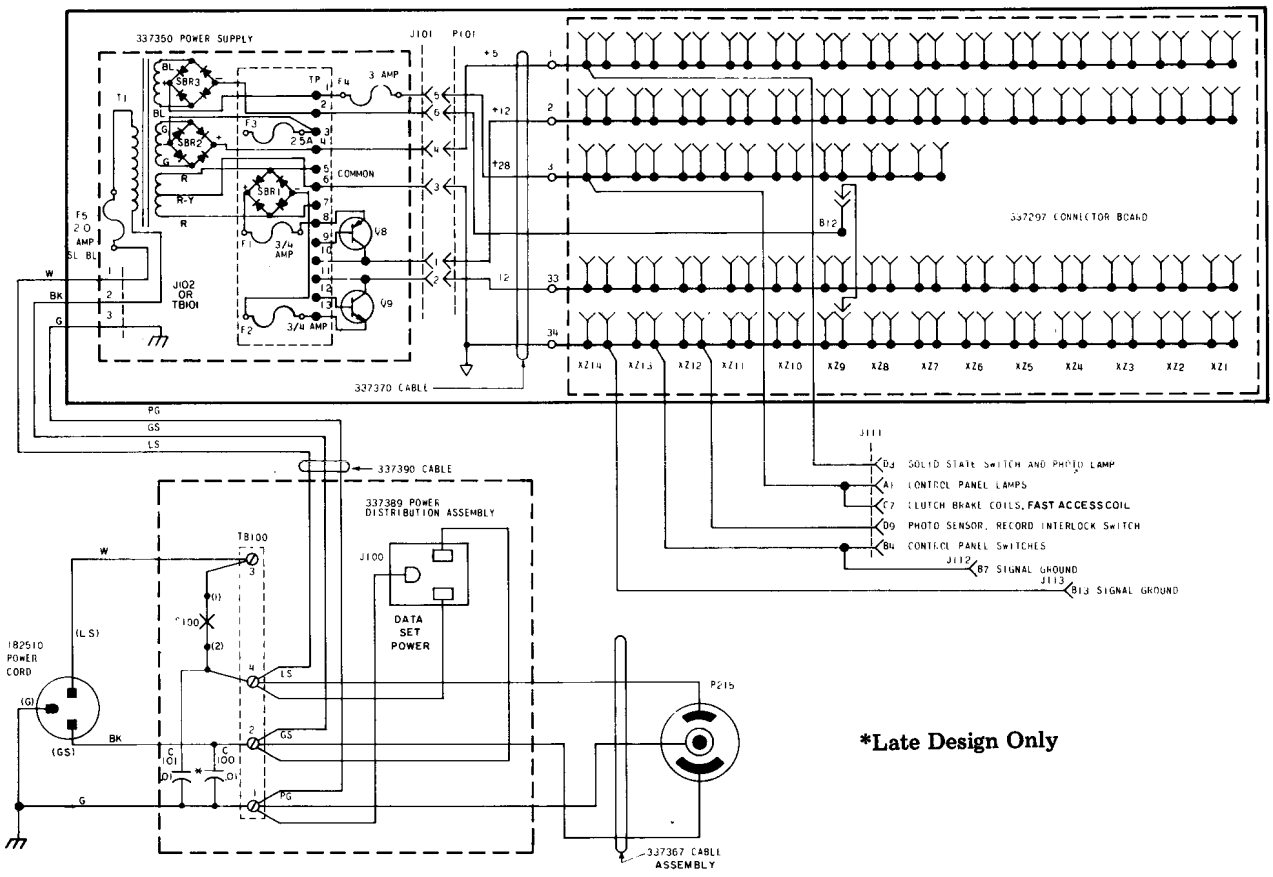
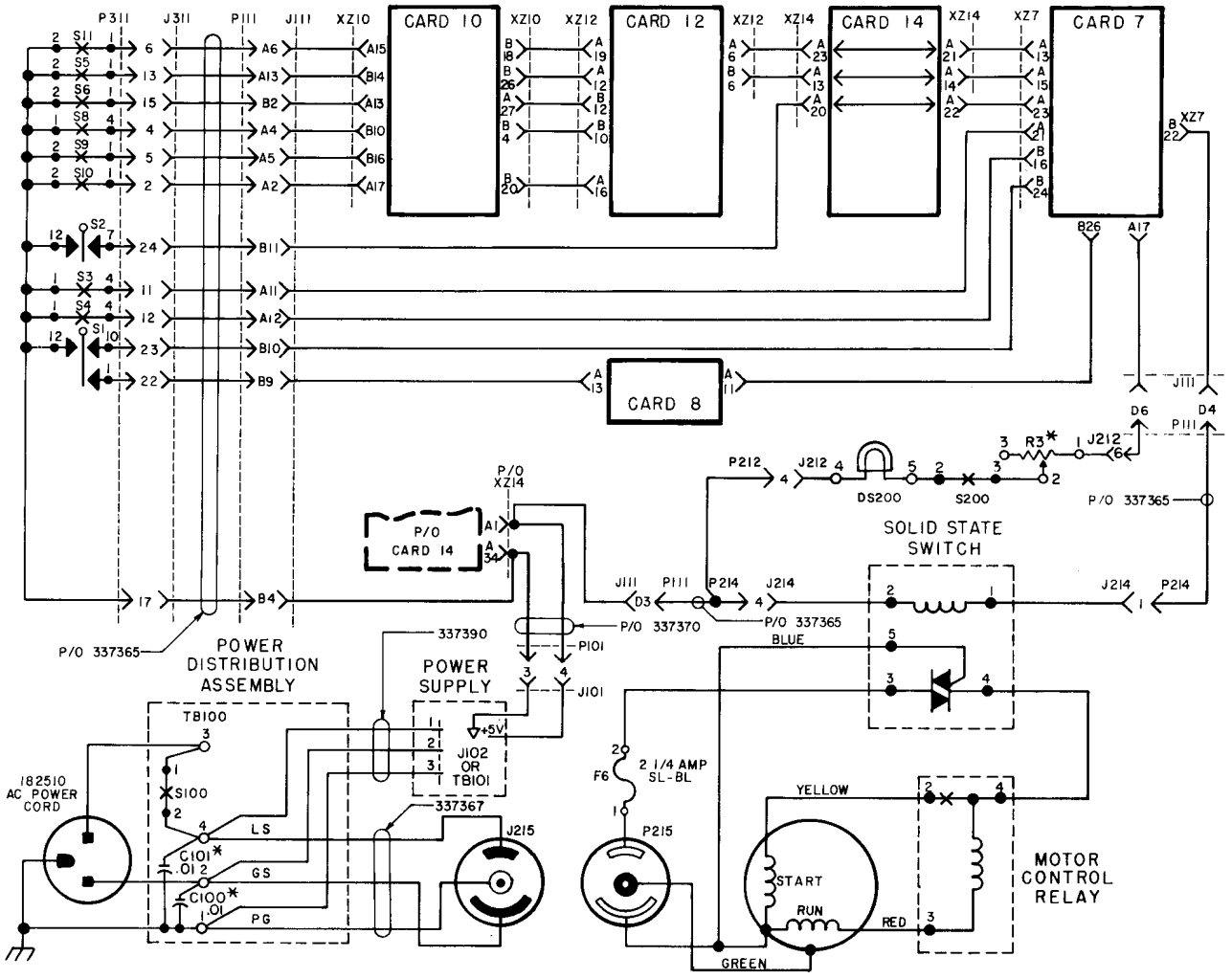


Figure 18 - Power Distribution



Early design units do not include lamp brightness rheostat R3; pin 3 of S200 connects to pin 6 of J212. Also, C100 and C101 not present in early design units.

Figure 19 - Motor Control

processed by card 10 and card 12 with the output of card 12, pin B6 becoming the Receive Message signal. This signal is strapped through card 14 and applied to card 7, pin A15 to provide the motor start signal on pin B22.

3.28 The motor unit will not start unless the Capstan Interlock switch S200 is closed. With S200 closed, a VH signal is applied through photolamp DS200 (and lamp brightness rheostat R3 on late design units only) to card 7 on pin A17. This allows the photolamp to turn on. This VH signal is applied to the circuitry on card 7 to either blind or unblind the motor start latch. If the photolamp burns out, a VL will be present at pin A17 of card 7, and the motor start latch will not go into a set condition.

3.29 Whenever switch S1(1), S1(10), S3, S4, S5, S6, S8, or S9 (and S10 and S11 in stand-alone or 33/35/37 adjunct tape sets) is operated, the appropriate function of the switch takes place after the motor is turned on and comes up to operating speed.

3.30 For a stand-alone or 33/35/37 adjunct tape set, when switch S2(7) is operated, the set is conditioned for the on-line auto mode. The set must also have either the Send Data or Receive Data switch operated in order to respond to the data set for unattended operation. In parallel device adjunct sets, S2(7) provides the automatic motor control operation, whereby the motor is turned on or off by the associated terminal.

MAGNETIC TAPE TRANSPORT

A. Gearshift Mechanism

3.31 With the motor energized, the motor unit pinion gear rotates in the direction shown by the arrow in Figure 20. This causes the overload clutch input gear to rotate in the direction shown by the arrow. The reverse direction shaft output gear rotates in this same direction, producing a rotation of the cross shaft input gear. The cross shaft output gear drives the forward direction shaft in a counterclockwise direction.

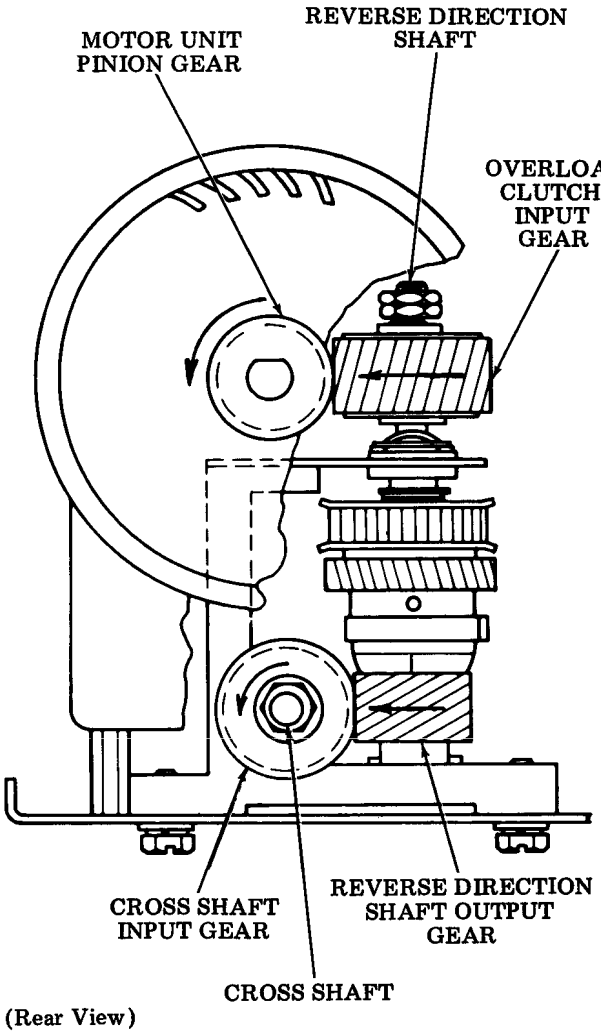


Figure 20 - Gearshift Mechanism (Power Drive)

3.32 The pulley on the reverse direction shaft is coupled by a belt to the rotor of the reverse clutch on the capstan drive assembly. This linkage continuously drives the reverse clutch rotor in a clockwise direction. Through a similar linkage, the pulley on the forward direction shaft continuously drives the forward clutch rotor of the capstan drive assembly in the counterclockwise direction.

3.33 When the set is operated in a mode other than fast access or unload, the gearshift mechanism drives the two pulleys at low speed through the path shown by the arrows in Figure 21.

3.34 The low speed operation (Figure 21) of the pulleys is provided by the reduction in the high speed clutch mounted on the reverse direction shaft. The drive is from the overload clutch input gear, through the reverse direction shaft and output gear to the cross shaft, over to the forward direction shaft, up to the low speed clutch gear, transferring to the high speed clutch gear. The low speed gear rotates at the same rate as the forward direction shaft. When operating at low speed, it transfers its low speed to the reverse clutch gear to drive the reverse pulley at the same low speed rate.

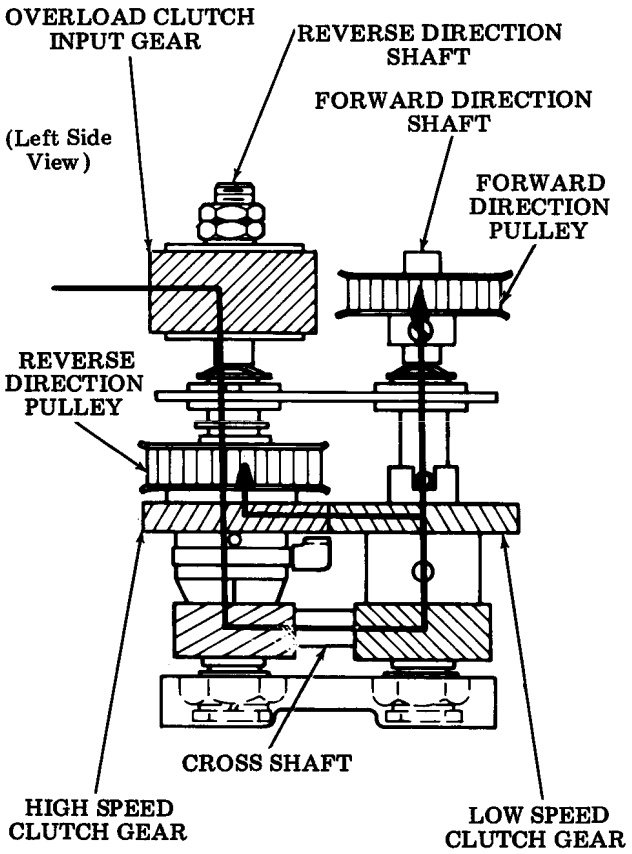


Figure 21 - Gearshift Mechanism (Low Speed Operation)

3.35 The high speed operation is illustrated in Figure 22. With the fast access coil energized, the high speed clutch engages the reverse direction shaft. The low speed clutch on the bottom of the forward direction shaft now operates in an overrun condition, and there is no transfer of power through the cross shaft. As shown by the arrows in Figure 22, the drive is from the overload clutch input gear to the reverse direction (high speed) clutch gear. This gear transfers the high speed motion to the forward direction (low speed) clutch gear.

B. Reel Drive Operation

3.36 The gearshift mechanism also provides a power take-off for operating the reel drive mechanism (Figure 23). Mounted to the front of the cross shaft is a pulley which rotates clockwise driving the toothed reel drive belt. The toothed belt is wrapped around the reel drive mechanism input pulley and causes the drive shaft to rotate clockwise.

3.37 Located at the front and rear of the drive shaft are two output gears which cause the supply reel drive gear to rotate clockwise (viewed from top) and the take-up reel drive gear to rotate counterclockwise (viewed from top).

3.38 As part of the reel drive mechanism there are two slip clutches: one for the supply and the other for the take-up. The gear train operates at a constant speed and the amount of slip of these clutches is determined by the capstan speed.

C. Tape Drive Mechanism

Pinch Roller Engagement Operation

3.39 To engage the pinch roller (Figure 24) with the capstan, the pinch roller engagement lever is moved toward the front of the unit. Moving this lever causes the pinch roller arm assembly and the tension arm cam plate link to operate.

3.40 As the pinch roller engagement lever is moved toward the front of the unit, the extension post of the pinch roller arm assembly is cammed to the left, causing the arm assembly to pivot about its mounting post so the pinch roller moves to the right toward the capstan. The pinch roller just contacts the capstan and the arm assembly as the extension post reaches the beginning of the detent position. To detent the pinch roller arm assembly, the lever must be pushed slightly beyond this point.

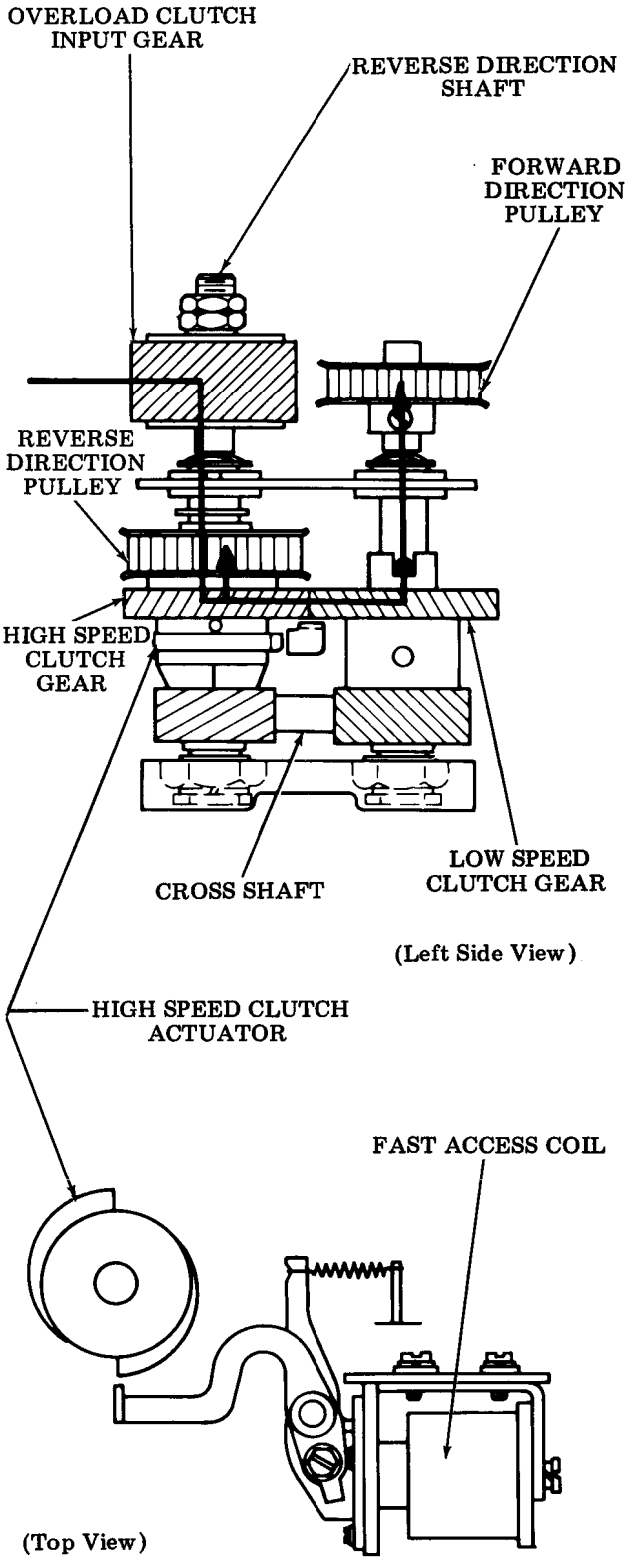


Figure 22 - Gearshift Mechanism (High Speed Operation)

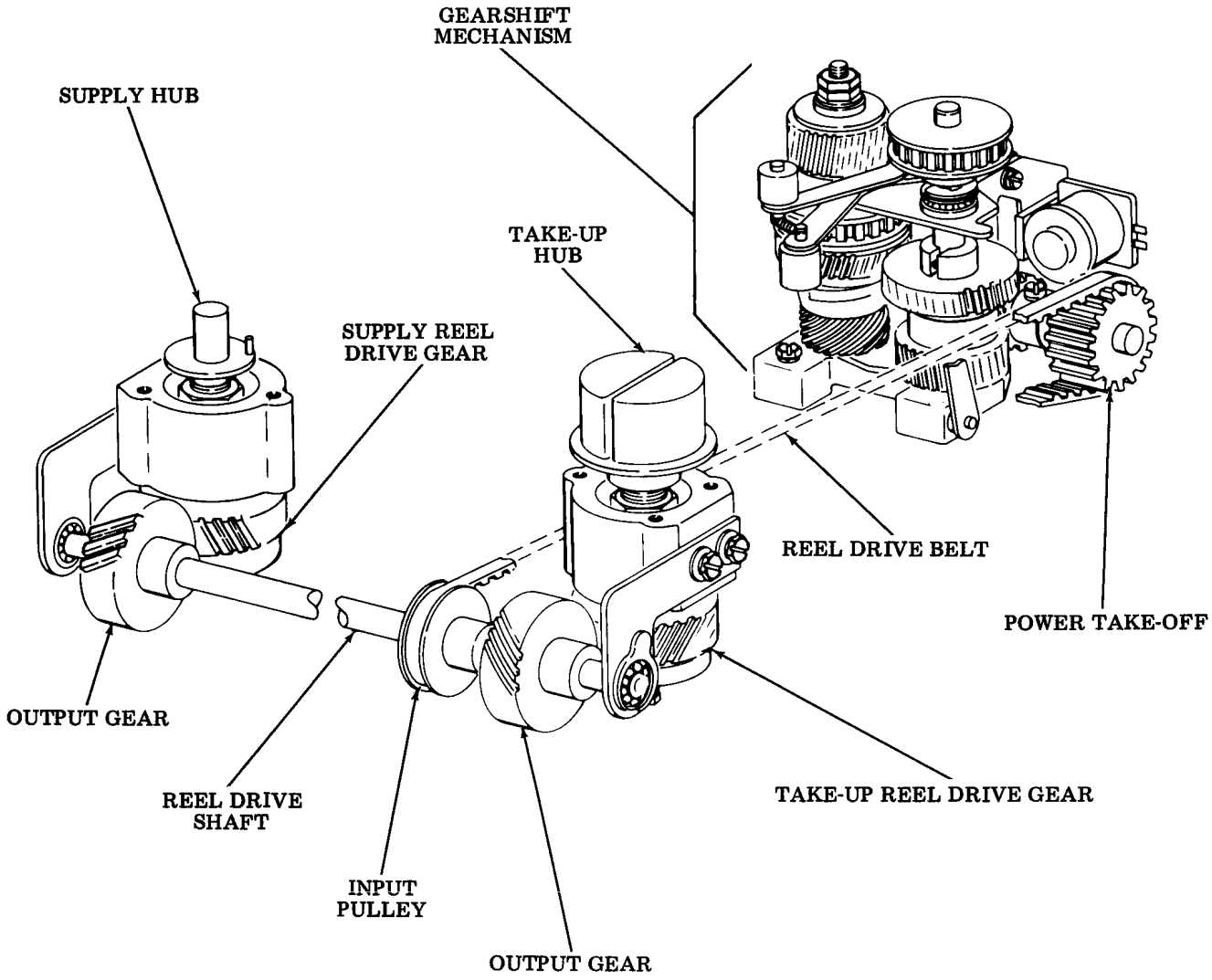


Figure 23 - Gearshift Mechanism With Reel Drive Mechanism

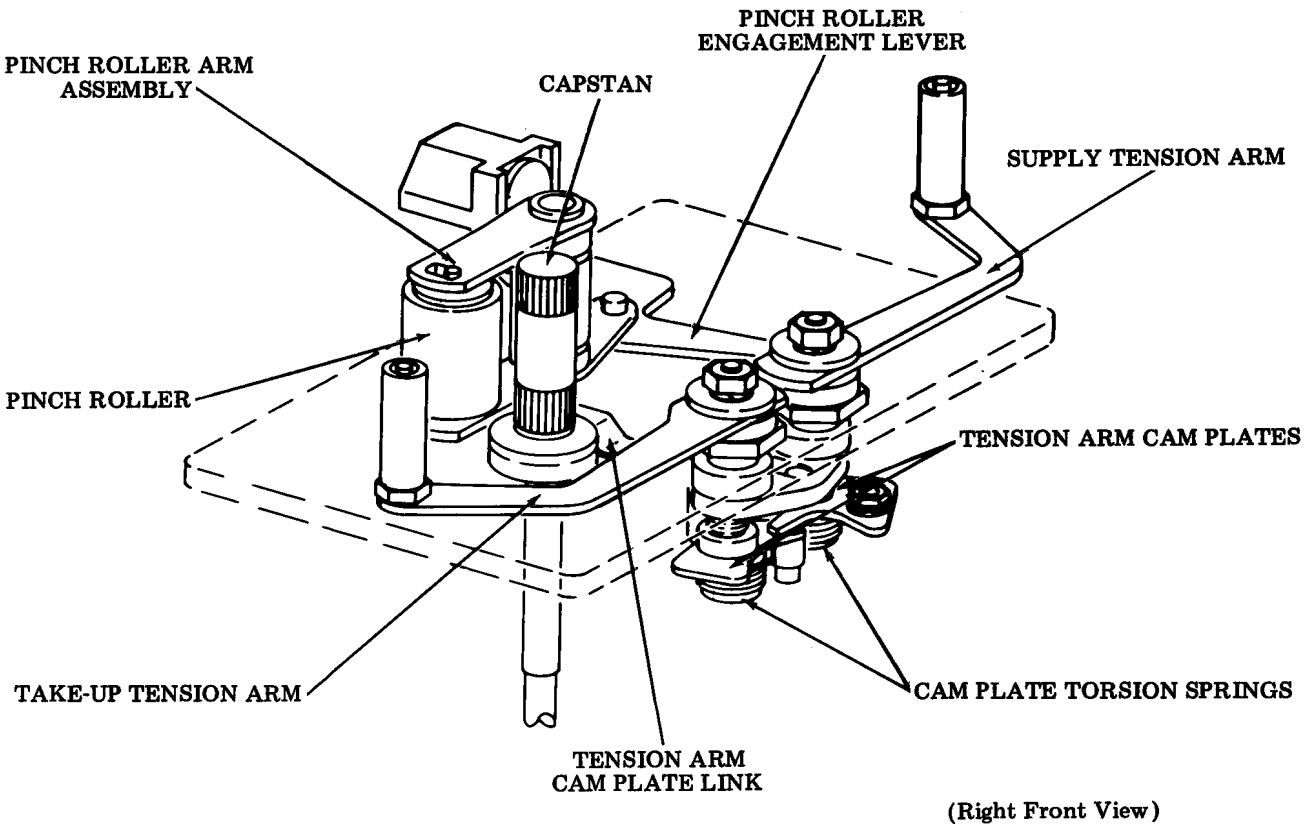


Figure 24 - Pinch Roller Engagement Operation

3.41 Attached to the lower end of the pinch roller arm assembly extension post is the tension arm cam plate link. Moving the engagement lever to the front of the unit causes the extension to pull the cam plate link to the left. At the right end of the link is a post which controls the tension arm cam plate torsion springs. As the link is pulled to the left, the torsion springs follow the post; the other spring ends control the cam plates. As the springs rotate they cause the supply (rear) and take-up (front) torsion arm cam plates to rotate clockwise and counterclockwise, respectively. Attached to the cam plates are the supply and take-up tension arms. When the cam plates rotate they cause the tension arms to pivot toward the right side of the unit.

Capstan Interlock Operation

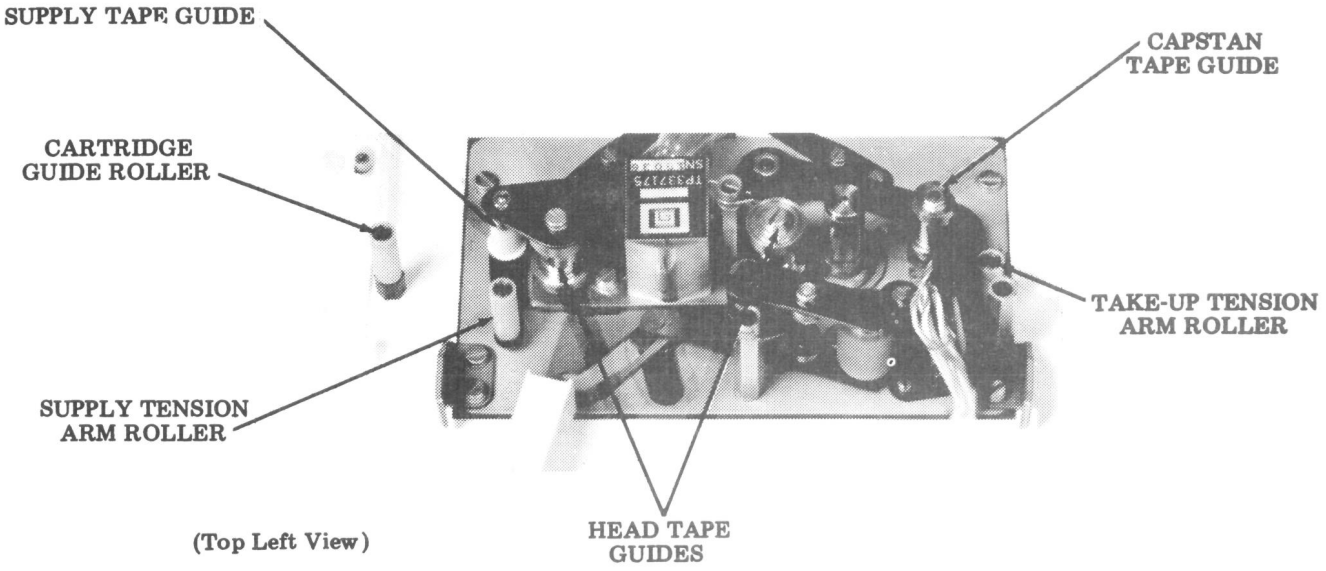
3.42 As the tension arm cam plate link moves left, the middle post contacts and operates the capstan interlock switch. Operation of this switch will provide a path for +5 v to flow through the photolamp, turn it on, and place a signal (Photolamp) into the electronics module.

Tape Guidance Mechanism

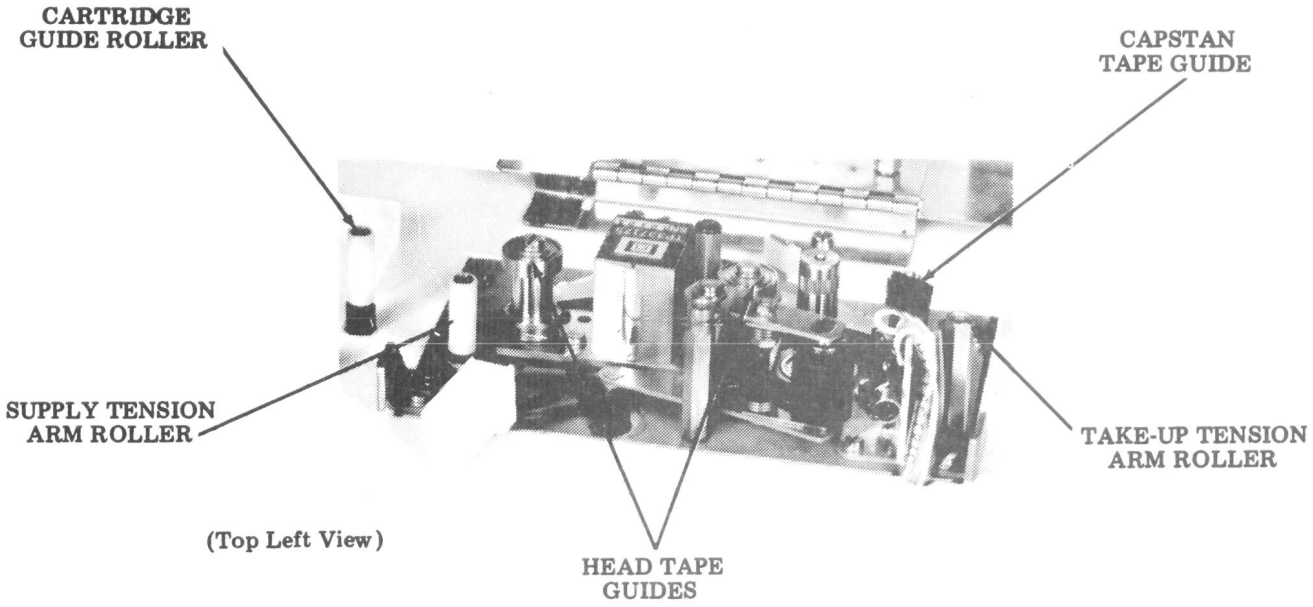
3.43 Mounted on the tape drive mechanism are three tape guide posts: one on each side of the recording head and one to the front of the capstan. All three of the tape guides have tension springs to bias the magnetic tape toward the top of the recording head. On early design units, the guidance mechanism also includes the supply tape guide roller and cartridge guide roller. On late design units, the guidance mechanism is modified slightly to accommodate the tape cleaner mounted in the head cover, and the supply tape guide is omitted. Both arrangements are illustrated in Figure 25.

Capstan Operation

3.44 Capstan movement is controlled by the operation of the gearshift mechanism in conjunction with the electronics module. Electronic operation will be discussed in detail later.



EARLY DESIGN



LATE DESIGN

Note: Supply tape guide function of early design mechanism is served by tape cleaner when head cover is closed on late design unit.

Figure 25 - Tape Guidance Mechanism

3.45 The capstan drive mechanism is shown in Figure 26. Riding the forward and reverse direction pulleys of the gearshift mechanism are two toothed belts which cause the rotors of the forward and reverse clutches on the capstan drive to rotate counterclockwise and clockwise, respectively. This motion is illustrated by the arrows in Figure 26.

3.46 In the idle condition (no tape movement), the capstan is kept from rotating by an on condition of the brake. Both the forward and reverse clutches are de-energized, so neither clutch rotor is coupled to the capstan shaft.

3.47 The capstan will rotate forward, either low speed or high speed, only when the electronics module provides the forward clutch with an on command and the brake with an off command. Once the commands are issued, the forward clutch will be electromagnetically coupled to the capstan shaft, and the forward clutch rotor will cause the capstan to rotate counterclockwise.

3.48 The capstan will rotate in the reverse direction, either low speed or high speed, only when the electronics module provides the reverse clutch with an on command and the brake with an off command. Once the commands are issued, the reverse clutch will be electromagnetically coupled to the capstan shaft, and the reverse clutch rotor will cause the capstan to rotate clockwise.

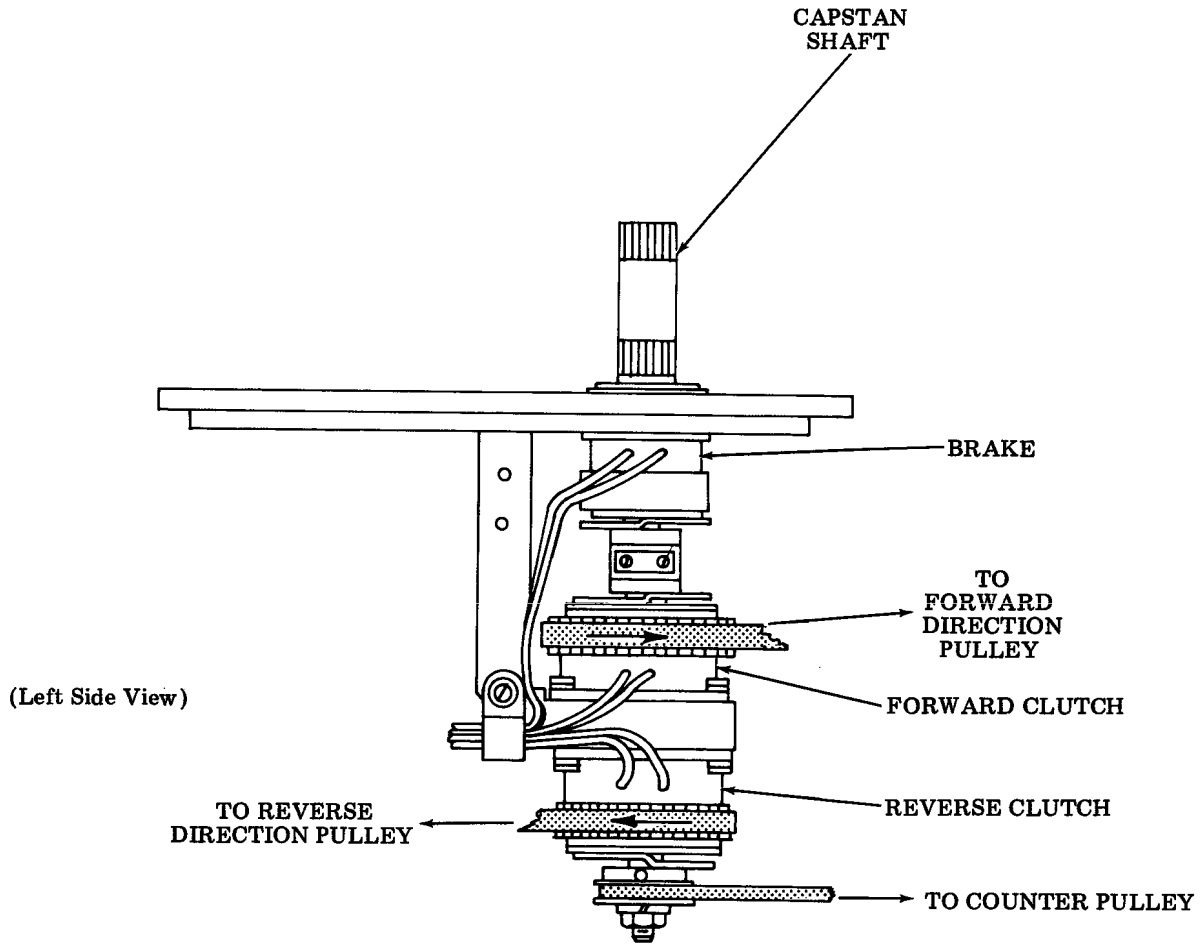


Figure 26 - Capstan Drive Mechanism

D. Tape Position Indicator

3.49 Counting Operation: Whenever the capstan shaft rotates clockwise or counterclockwise, the belt riding the pulley at the bottom of the shaft will cause the tape position indicator (Figure 27) to either count up or count down. The drive belt will rotate the position indicator pulley clockwise to count down and counterclockwise to count up.

3.50 Reset Operation: The tape position indicator may be reset by the button to the right of the three digits. When the button is depressed, it will cause a rake to be disengaged from the counter drive and operate the cams attached to the digit wheels. When the button is released, the rake will engage with the drive gear and the counter can again count up or down.

ELECTRONICS MODULE

3.51 The electronics module contains the electronic circuitry of the tape set. There are a number of basic circuit cards that are common to all tape sets. Variable circuit cards permit interfacing the tape set to a variety of terminals.

3.52 The following description of circuit operation is based on the signal conditions of the input and output leads of the circuit cards for various operating modes. Figure 28 is a block diagram of the 33/35/37 adjunct tape set in a typical installation. In this example, the tape set is an adjunct to a 33 or 35 teletypewriter, and also operates on-line through a high-speed data set. Refer to 1054SD and 1054CD of wiring diagram package WDP0247 for details of the circuitry, and for information on the circuit options used in other installations.

3.53 Figure 29 is a block diagram of the tape set used as an adjunct to a parallel interface terminal such as the CDT. Basic circuit functions are the same in this version of the tape set as in the 33/35/37 adjunct, but there is a difference in the send/receive control requirements and in the data interfacing requirements (serial data interface in 33/35/37 adjunct; parallel data interface in parallel device adjunct). In the following description, the operations that apply to only one or the other of these adjuncts are so indicated. All other operations are common to both versions of the tape set.

3.54 In the following descriptions, a voltage high (VH) is nominally +5 volts, and a voltage low (VL) is nominally 0 volt. The EIA voltages are nominally +8 volts for the ON condition and -8 volts for the OFF condition.

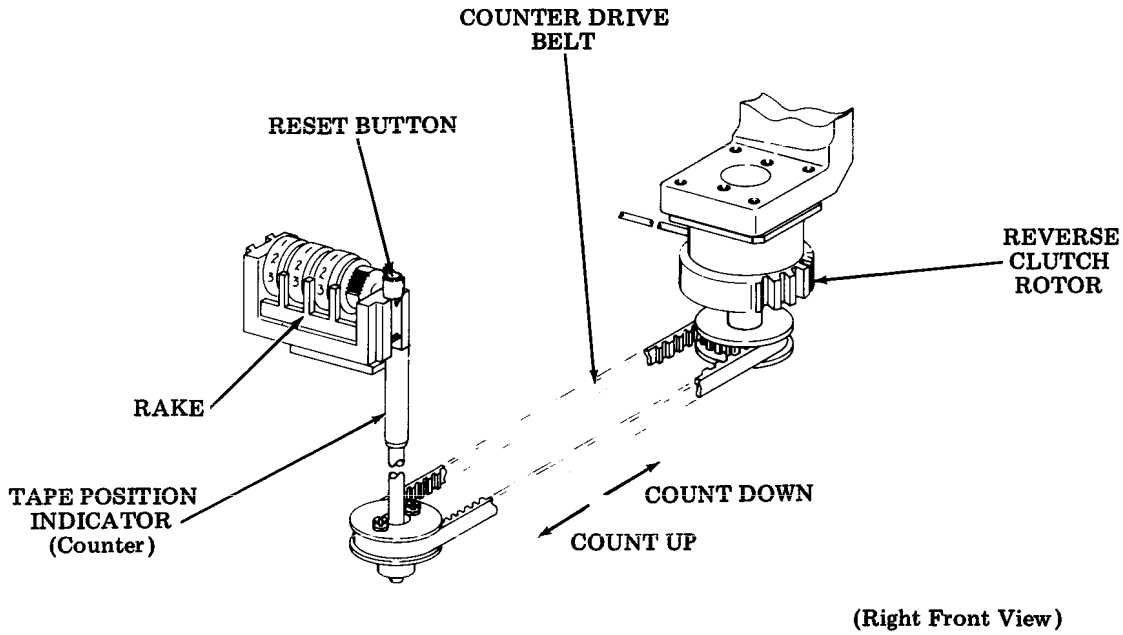


Figure 27 - Tape Position Indicator

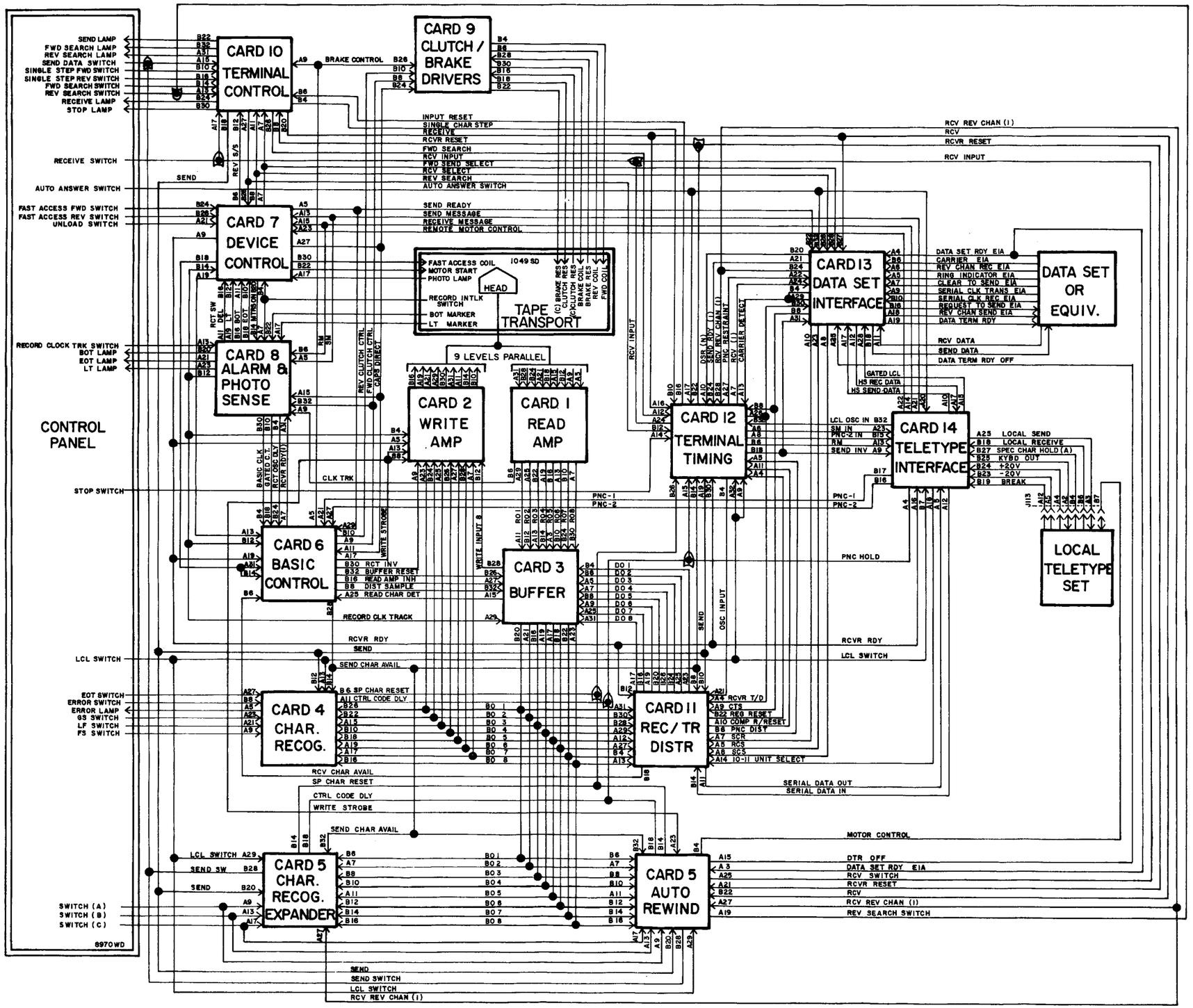


Figure 28 - Block Diagram of Electronics Module Operation (33/35 Adjunct)

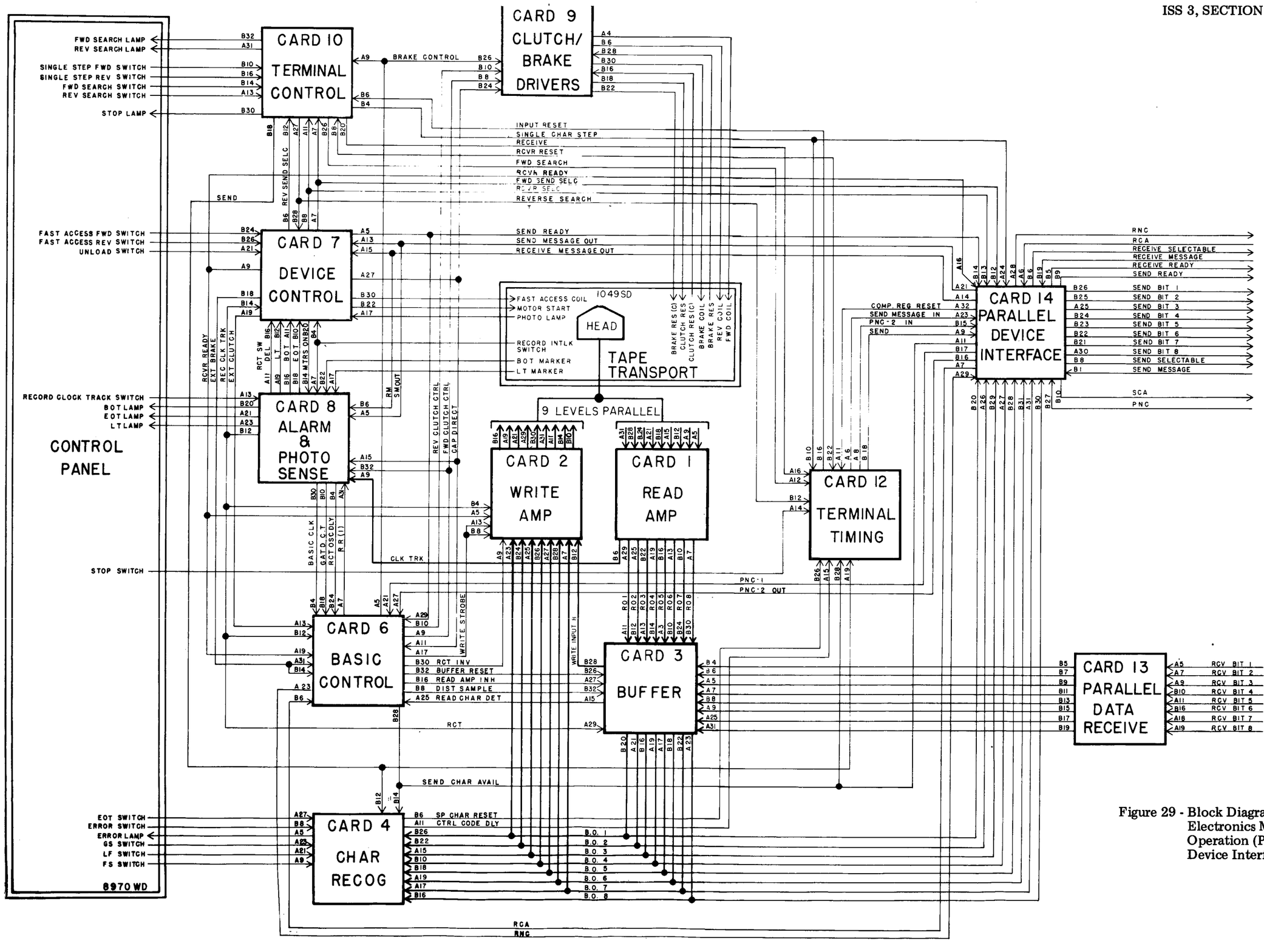


Figure 29 - Block Diagram of Electronics Module Operation (Parallel Device Interface)

ELECTRONICS MODULE

3.51 The electronics module contains the electronic circuitry of the tape set. It consists of a power supply and up to fourteen circuit cards. Ten of these circuit cards are basic to all tape sets while four are variable. These variable cards provide optional features and permit interfacing the tape set to a variety of terminals.

3.52 Below is a brief functional description of each circuit card and the primary functions each circuit card is to perform. Refer to 1054SD for details of the circuitry.

3.53 Card 1 (Read Amplifier Card TP322461) — Used to recognize the flux changes on the magnetic tape in all read modes (send, search, single step). After reading the parallel data from the tape, amplifies these signals to the voltage levels required by the buffer (Card 3). In the receive mode, detects the clock track pulses on the tape to determine the appropriate position to record (write) a character.

3.54 Card 2 (Write Amplifier Card TP322462) — Receives parallel data from the buffer in write mode (receive) and records this parallel data on the tape.

3.55 Card 3 (Buffer Card TP322463) — Provides storage for the eight parallel bits of a character. Used in the write mode to store a character prior to that character being written on the tape by Card 2. Used in the read modes (send, search, single step) to store the parallel data received from Card 1 prior to the character being sent to the distributor (Card 11).

3.56 Card 4 (Character Recognition Card TP322464) — Monitors the parallel data leaving the buffer in all read modes. The data is monitored to provide recognition of four preprogrammed characters (FS, GS, LF, EOT) and characters with odd parity. Also Card 4 will recognize a printer control code (VTAB, HTAB, FF, SO) and provide a time delay after one of these characters is detected while sending locally. (Provisions are made to allow the adjunct teletypewriter to control the length of the delay.)

3.57 Card 5 (Search Expander Card TP322465 or Automatic Rewind Card TP322485) — These two circuit cards provide optional features to augment the standard tape set operation. These circuit cards are not required for the basic operation of the tape set, and will not be described here. They are described in detail in Section 578-300-100.

3.58 Card 6 (Basic Control Logic Card TP322466) — Contains the basic character timing controls to provide the incremental motion required for operating the tape set in read and write modes.

3.59 Card 7 (Device Control Logic Card TP322467) — Controls the motor in the tape set. Also controls the fast access and unload functions. Generates signals such as Selectable and Ready required for a parallel device interface.

3.60 Card 8 (Alarm and Photosense Card TP322468) — Responsible for indicating the three alarm conditions — Begin of Tape, Low Tape, and End of Tape. Also contains circuitry for control of the tape set in the record clock track mode.

3.61 Card 9 (Clutch/Brake Driver Card TP303869) — Provides the high current needed to energize the clutch and brake coils of the tape drive mechanism in the tape transport.

3.62 Card 10 (Terminal Control Logic Card TP322470) — Generates mode control signals used to control the tape set. Contains all mode latches, arranged on a noncontention basis. Also provides the circuitry for the nonlatching single step mode. Outputs are provided to light the lamps on the control panel.

3.63 Card 11 (Receiving/Transmitting Distributor Card TP322471) — In the send mode, converts parallel data from the buffer to serial data for transmission at high or low speed. In the receive mode, converts serial data received from the data set or the local adjunct to parallel data to be sent to the buffer.

3.64 Card 12 (Terminal Timing Logic Card TP322472) — Generates signals required for bit and character timing when the terminal is arranged for serial data transmission. Also generates reset signals upon depression of the STOP button, and upon receipt of character recognition signals from Card 4.

3.65 Card 13 (Data Set Interface Card TP322473) — Establishes the interface between the tape set and a 200 Series data set. Converts micrologic voltages (0 and 5 v) to EIA voltages and vice versa. Consists of input and

output amplifiers plus controlling logic used to provide the necessary EIA signals to drive the data set.

3.66 Card 14 (Local Interface Card — The circuit card used for this purpose is variable and depends on the type of adjunct used.) — In 33/35/37 adjuncts, establishes a standard speed interface between the tape set and its adjunct, and provides circuitry to stop the tape set from sending while the adjunct is performing certain printer functions such as tabbing. In parallel device adjuncts, provides the logic to control the data interchange.

3.67 The following description of circuit operation is based on the signal conditions of the input and output leads of the circuit cards for various operating modes. Figure 28 is a block diagram of the 33/35/37 adjunct tape set in a typical installation. In this example the tape set is an adjunct to a 33 or 35 teletypewriter, and also operates on-line through a high-speed data set. Refer to 1054SD and 1054CD of wiring diagram package WDP0247 for details of the circuitry, and for timing diagrams of the various signal voltages.

3.68 Figure 29 is a block diagram of the tape set used as an adjunct to a parallel interface terminal such as the CDT. Basic circuit functions are the same in this version of the tape set as in the 33/35/37 adjunct, but there is a difference in the send/receive control requirements and in the data interfacing requirements (serial data interface in 33/35/37 adjunct; parallel data interface in parallel device adjunct). In the following description, the operations that apply to only one or the other of these adjuncts are so indicated. All other operations apply to both versions of the tape set.

3.69 In the following descriptions, a voltage high (VH) is nominally +5 v and a voltage low (VL) is nominally 0 v. The EIA voltages are nominally +8 v for the ON condition and -8 v for the OFF condition.

A. Stop Condition

3.70 With power on and the motor on or off, the set is in the stop condition if no mode of operation is in process. The STOP lamp is on and not blinking. No other control panel lamps are on (except possible alarm lamps).

B. Record Clock Track

3.71 To enter the RCT mode, the function selector switch must be in the RECORD CLK. TRK. position and the tape must be positioned so that a BOT alarm exists. With the function selector set to RECORD CLK. TRK., the RCT Switch signal is VL on pin A13 of Card 8. This signal is delayed for approximately 10 μs and appears as a VL output (RCT Switch Delayed) on pin A11 of Card 8. This VL, applied to pin B16 of Card 7, causes Card 7 to turn the motor on. When the BOT alarm exists, a VL is presented to pin B22 of Card 8. This sets a latch on Card 8 which controls the RCT output of pin B12.

3.72 With the conditions of paragraph 3.71 met, the RCT signal at pin B12 of Card 8 is VL. This signal is applied to Card 7, pin B14; Card 6, pin B12; Card 2, pin B4; and Card 3, pin A29.

3.73 The VL RCT signal at pin B12 of Card 6 causes a VL (Buffer Reset) output on pin B32. This VL Buffer Reset signal, applied to pin B26 of Card 3, forces bits 1 thru 7 to the marking state as long as the function selector switch is in the RECORD CLK. TRK. position. Also, the VL RCT input to pin B12 of Card 6 is inverted and provides a VH RCT Inverted output on pin B30. This VH RCT Inverted signal, applied to pin A9 of Card 2, allows the Write Strobe signal (from Card 6) to pass pulses to the clock track write amplifier. The VL RCT input to pin B12 of Card 6 is used to keep the Write Brake Control signal off during the RCT mode and to prime Card 6 for generation of the Write Strobe signal.

3.74 The VL RCT signal generated by Card 8 (See Paragraph 3.72) is applied to pin A29 of Card 3. This signal is used by Card 3 to keep the bit 8 buffer output in the marking condition.

3.75 The RCT signal is also applied to pin B4 of Card 2. This primes all write amps to receive the eight marking bits from the buffer.

3.76 The RCT signal is also applied to pin B14 of Card 7. This signal forces all the Selectable signals on Card 7 off and inhibits the fast access function (no other operation is allowed while in the RCT mode). Also, this signal turns on (VL) the Ext Clutch signal on pin A19, and turns off (VH) the Ext Brake signal on pin B18.

3.77 The VL Ext Clutch signal is applied to pin A13 and the VH Ext Brake signal is applied to pins B14 and A31 of Card 6. These two signals cause a VH (off) Brake Control output from Card 6 on pin A5, a VL (on) Fwd Clutch Control output on pin A9, and a VH (off) Rev Clutch Control output on pin B10. These three signals, applied to Card 9, de-energize the brake coil and reverse clutch coil, and energize the forward clutch coil to allow the tape to move forward. The Brake Control signal is applied to pin A9 of Card 10 to cause the blinking of the STOP lamp when the brake is off.

3.78 Once the tape starts to move forward, the BOT alarm foil moves away from the photolamp beam, causing the BOT alarm to go off. This results in a VH at pin B22 of Card 8. The BOT alarm going off initiates a 400 ms delay before providing a VL output (RCT Osc Delay) on pin B4. This delay is provided so that no clock track pulses are recorded over the BOT foil. (This results in approximately 1 inch of blank tape immediately following the BOT alarm foil.)

3.79 The VL RCT Osc Delay signal is presented as an input to Card 6, pin B24. This signal allows the timer on Card 6 to receive clock pulses from the crystal oscillator on Card 8. These clock pulses are sent through the timer on Card 6 and a Write Strobe signal appears as an output on pin A17 of Card 6. This output consists of a pulse train with a VH pulse every 2.424 ms.

3.80 The Write Strobe pulses are presented as inputs to Card 2 on pins B8 and A13. These pulses allow the write amplifiers (Card 2) to pass the eight marking bits from the buffer to be written as no flux changes for bits 1 thru 7 (marking) and a flux reversal for bit 8 (marking). Also, the Write Strobe input to Card 2 on pin B8 activates the clock track write amplifier on Card 2 to produce a clock track pulse on the tape each time a Write Strobe pulse occurs.

3.81 An EOT alarm will stop the RCT process. Pin B22 of Card 8 goes VL when the EOT foil reflects the photolamp beam. (A low tape alarm is assumed to exist at this time.) This causes the RCT signal on pin B12 of Card 8 and the RCT Osc Delay signal on pin B4 of Card 8 to go VH. The brake turns on, the forward clutch de-energizes, the timer on Card 6 stops, etc.

3.82 The RCT mode may be terminated prior to an EOT by moving the function selector switch out of the RECORD CLK. TRK. position. This causes pin A13 of Card 8 as well as pin A11 of Card 8 to go VH. This has the same effect as the EOT condition in Paragraph 3.81.

3.83 If the EOT alarm is allowed to terminate the RCT mode, the function selector switch must be moved out of the RECORD CLK. TRK. position before attempting to move the tape. Once the EOT alarm condition is detected and pins B12 and B4 on Card 8 go VH, Card 7 allows the Selectable leads to be on (EOT alarm cleared for forward modes). Other modes of operation are not inhibited even though the function selector switch is in the RECORD CLK. TRK. position. This can lead to undesirable situations as illustrated by the following example.

EXAMPLE: Suppose the switch is left in the RECORD CLK. TRK. position and the FAST ACCESS REV button is depressed. If the BOT alarm foil is detected, the two conditions necessary for the RCT mode are met (switch in RECORD CLK. TRK. position and BOT alarm on) and the clock track will be recorded in the reverse direction between the stiff tape leader and the BOT foil. This will cause confusion later if this tape is loaded and the SINGLE STEP FWD button is depressed to position the tape to the first available clock track position, usually 18 inches after the stiff leader (1 inch after the BOT alarm foil).

C. Unload Operation

3.84 To unload the tape from the take-up reel into the cartridge, the function selector switch is placed in the TAPE UNLOAD position. This supplies a VL signal (Unload Switch) to Card 7 on pin A21 and causes a VL (Scan Coil) as an output on pin B30 to energize the scan coil and the high speed clutch, and a VH signal (Capstan Direct) on pin A27 to indicate that the reverse direction has been chosen. Also, Card 7 turns on (VL) the motor start signal at pin B22. If the motor is off when the unload function is chosen, the VL Unload Switch input on pin A21 of Card 7 activates a 2-second timer which causes pin B20 to go VH. (This signal indicates to the logic that the motor is on and up to speed.) This VH turns on (VL) the Ext Clutch lead (pin A19) which, in turn, causes pin B18 to go VH (Ext Brake off).

3.85 The VH Capstan Direct signal from pin A27 of Card 7 is applied to pin A11 of Card 6. This causes pin A9 of Card 6 to remain VH (Forward Clutch Control off) and allows pin B10 to go VL (Reverse Clutch Control on) when

the Brake Control signal at pin A5 turns off (VH). The Brake Control signal goes VH when the VL (Ext Clutch) and the VH (Ext Brake) from Card 7 are applied to pins A13 and B14, respectively, on Card 6.

3.86 The VH Brake Control signal from pin A5 of Card 6 is applied to pin A9 of Card 10 to cause the STOP lamp to flash. It is also applied to pin B26 of Card 9. This VH signal causes pin B22 of Card 9 (Brake Resistor common) to change from 0 to +28 v, thus removing the ground path from the brake coil. The brake coil de-energizes and allows the tape to move.

3.87 The VH Forward Clutch Control (off) of Paragraph 3.85 is applied to pin B8 of Card 9 to keep the forward clutch de-energized. The VL Reverse Clutch Control (on) from pin B10 of Card 6 is applied to pin B10 of Card 9. This causes pin B16 (Clutch Resistor common) to go from +28 v to 0, thus providing a current path for the reverse clutch coil. This energizes the reverse clutch coil and electromagnetically couples the reverse clutch to the capstan.

3.88 As the capstan is pulling the tape in a reverse direction into the cartridge, it will, if left in the unload mode long enough, bring the BOT alarm foil to the photosensor assembly. When the BOT foil is detected by the photosensor assembly, a VL (BOT Marker on) is provided to pin B22 of Card 8. This signal will be VL as long as the BOT foil is at the photosensor assembly. This momentary VL at pin B22 causes a momentary VL on pin B20 of Card 8 causing the BEGIN OF TAPE lamp to flash momentarily. It also produces a momentary VL output on pin B16. This VL output (BOT on) is also applied to pin A11 of Card 7, where it activates the unload timer. Two to three seconds after the BEGIN OF TAPE lamp flashes on, a VH output on pin B22 of Card 7 (Motor Start off) turns the motor off. (This two or three seconds is provided so that the tape can be drawn completely into the cartridge.)

3.89 The STOP lamp continues to blink (due to the brake being off) until the function selector switch is moved from the TAPE UNLOAD position.

D. Alarm Lamp Operation

3.90 Alarm positions are detected when the beam of photolamp DS200 reflects off of the alarm foils on the tape. This reflection is detected by the two phototransistors (Q200, Q201). Refer to Figure 30 for the circuitry.

3.91 Three alarm indications are provided: BEGIN OF TAPE (BOT), LOW TAPE (LT), and END OF TAPE (EOT). These foils provide the alarm conditions as follows:

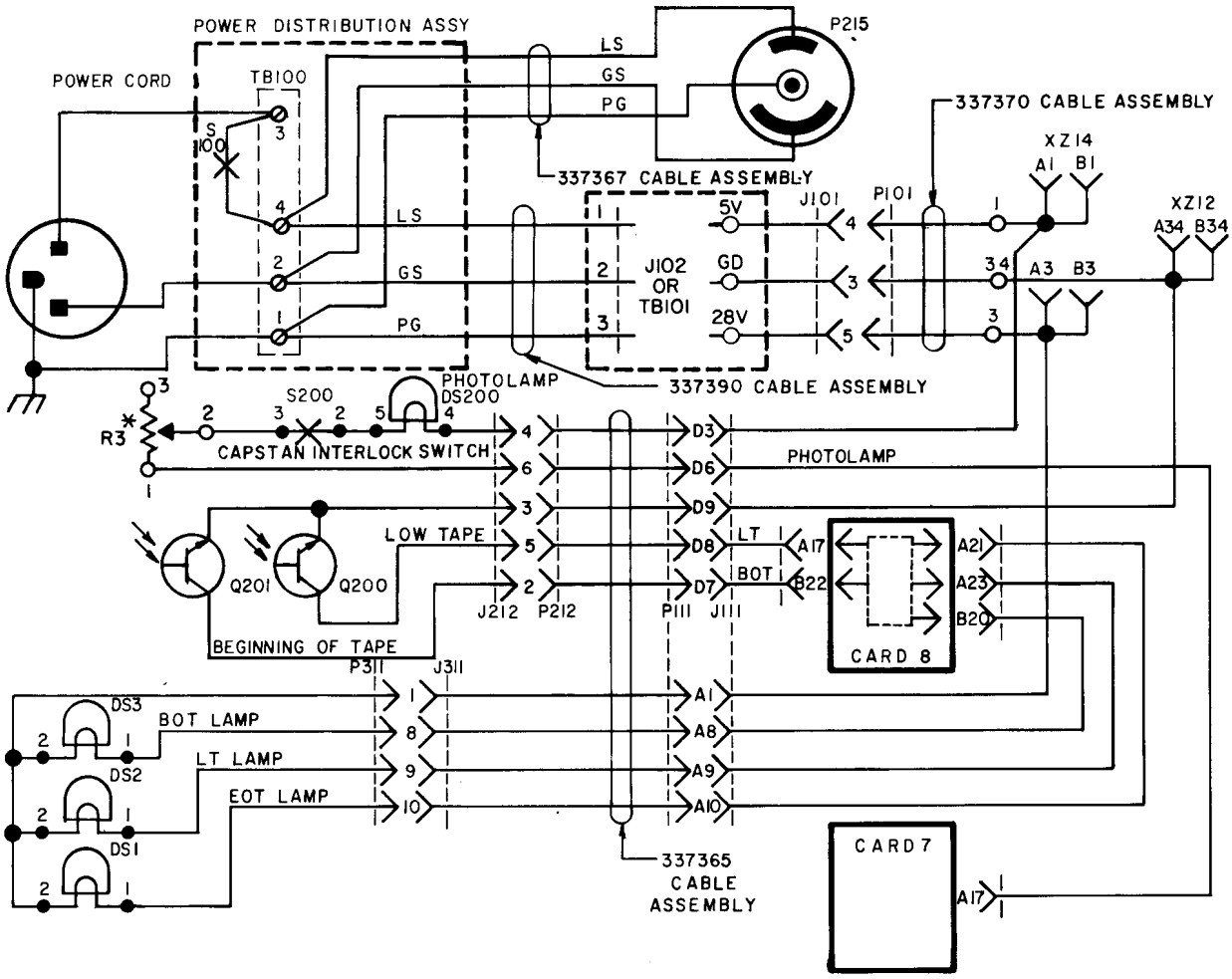
BOT foil — A 1 inch long reflective foil on the lower half of the magnetic tape approximately 2 feet behind the stiff leader. The reflection from this marker is detected by phototransistor Q201. This alarm will be indicated as long as the BOT is reflecting the photolamp beam.

LT foil — A 1 inch long reflective foil on the upper half of the tape approximately 6-1/2 feet from the end of the tape. The reflection from this marker is detected by phototransistor Q200. This alarm will be indicated as long as the photolamp beam is on the foil or on blank tape behind the foil. This activates a latching circuit to maintain the low tape alarm until the LT foil passes under the photolamp beam with the tape moving in the reverse direction. At this time the low tape alarm will be cancelled.

EOT "foil" — Actually two foils, one on the lower half and one on the upper half of the tape. These two foils are staggered so that the foil on the lower half of the tape precedes the foil on the upper half of the tape. The EOT alarm will be indicated as long as the photolamp beam is reflected by both EOT alarm foils. A low tape alarm must exist before an EOT alarm can be indicated.

3.92 A BOT alarm is detected when the photolamp beam strikes the BOT foil, causing an increase in light reflected to the lower phototransistor (Q201) of the photosensor assembly. This causes phototransistor Q201 to turn on and provide high current through pin 2 of connector J212 and pin D7 of connector P111 to pin B22 of Card 8. Output pin B20 of Card 8 goes to approximately +2 v and lights the BEGIN OF TAPE lamp on the control panel. Also, it causes output pin B16 of Card 8 to go VL, enabling the record clock track mode, if the function selector switch is in the RECORD CLK. TRK. position. The VL is also applied to pin A11 of Card 7 to inhibit the receive mode and all modes that would attempt to move the tape in the reverse direction. This VL on pin A11 of Card 7 activates the unload timer if the unload mode is selected.

3.93 An LT alarm is detected when the photolamp beam strikes the LT foil, increasing the light reflected to the upper photo-



*Lamp brightness rheostat R3 included in late design units only. In early design units, terminal 3 of capstan interlock switch S200 connects to pin 6 of J212.

Figure 30 - Tape Position Indicator Lamp Operation

transistor (Q200) on the photosensor. Phototransistor Q200 turns on and provides high current through pin 5 of connector J212 and pin D8 of connector P111 to pin A17 of Card 8. Output pin A23 of Card 8 goes to approximately +2 v and lights the LOW TAPE lamp. It also sets a latch to provide a VL on output pin A19 of Card 8. This VL is applied to pin B12 of Card 7 to inhibit the receive mode.

Note: If the tape set is in the local mode and an LT alarm exists, the Local Switch signal at pin B24 of Card 8 will be VL. This keeps pin A19 VH, thus enabling the receive mode to be entered during a low tape condition in the local mode only. This applies to issue 10 or greater Card 8's and late design electronics modules. Also, with issue 10 or greater Card 8's and late design modules, the low tape alarm causes a VL on output pin A25 on Card 8 (if option strap 8A on Card 8 is in). This VL is applied to pin A23 of Card 13 and causes the tape set to stop sending reverse channel in the on-line receive mode upon detection of a low tape alarm. This feature can be disabled by removing strap 8A.

3.94 An EOT alarm is detected when the photolamp beam strikes the upper and lower foils simultaneously. This increases the light reflected to both the upper and lower phototransistors (Q200 and Q201) on the photosensor assembly. Both phototransistors turn on and provide high current through the paths described in Paragraphs 3.92 and 3.93. Both pins A17 and B22 on Card 8 receive this increased current. As a result, Card 8 provides approximately +2 v on output pin A21 to turn on the END OF TAPE lamp. Card 8 also provides a VL output on pin B18. This is used by Card 8 to terminate the record clock track mode. It is also applied to pin B10 of Card 7 to inhibit all functions that would attempt to move the tape forward.

3.95 The BOT and EOT alarms are on only as long as the photolamp beam is shining on the reflective foils. The LT alarm is a latching circuit which is set when the LT foil passes the photolamp beam and the tape is advancing. This LT latch is reset when the LT foil passes the photolamp beam in the reverse direction. When the tape is moving in the reverse direction, pin A15 of Card 8 (Capstan Direct reverse) is VH. When the LT foil passes the photolamp beam, pin A17 goes VL. This causes pin A23 of Card 8 (Low Tape Lamp) to go to approximately +28 v and cancel the alarm. Also, pin A19 of Card 8 goes VH (Low Tape off) indicating to the tape set logic that the alarm is cancelled.

E. Single Step Operation

3.96 The tape set has the capability of stepping one character in the forward or reverse direction. In the forward direction the tape set enters the send mode and transmits one character (locally only) before dropping the send mode. In the reverse direction the reverse search mode is entered for one character. The character is not transmitted when stepped in the reverse direction.

3.97 When the SINGLE STEP FWD button is depressed, a VL is presented to pin B10 of Card 10. This causes pin B22 (Send Lamp) of Card 10 to go VL, lighting the SEND lamp (unless send mode is inhibited). Also, pin B18 goes VL (Send-on). This VL is applied to pin A19 of Card 12 and pin B10 of Card 11. The switch closure also causes Card 10 to generate a Mode Control signal and a Delayed Single Step Switch signal. This latter signal comes on approximately 20 ms after the initial switch closure. This turns on (VL) the Single Char. Step signal on pin B4 of Card 10 and pin B10 of Card 12 (and pin A24 of Card 14 for parallel device interface only).

3.98 The VL applied to pin A19 (Send-on) is used to set the PNC reset latch on Card 12. It also causes pin B18 to go VH. This VH is applied to pin A9 of Card 14 to allow the character to be sent to the adjunct (if tape set is in local mode). The VL on pin A19 of Card 12 also causes pin A6 (Send Message In) of Card 12 to turn on (VL). This signal is strapped through Card 14 (pin A23 to pin A21) and applied to pin A5 of Card 8 (Send Message — on) to inhibit the record clock track mode. It is also applied to pin A13 of Card 7. This signal inhibits the receive and fast access modes by placing a VH on pins B8 (Receiver Selectable) and B30 (Scan Coil), and also causes the motor to turn on (if not already on) by causing pin B22 of Card 7 to go VL (Motor Start — on). This starts the motor control timer which causes pin B20 of Card 7 to go VH (Motor-on) 2 seconds after the motor has initially turned on. This causes a VL on pin A5 of Card 7 (Send Ready — on) which is applied to pin A29 of Card 6 and pin B22 of Card 13. Card 13 then generates a VH Send Ready Inverted (Send Ready — on) on pin A21. This signal is applied to pin B24 of Card 12. This Send Ready signal turns control of the incremental character-by-character read mode of the tape set over to the PNC-2 signal (for parallel type tape set interfaces, PNC-1

is used in place of PNC-2) and the SCA (Send Character Available) signal. The Send Ready signal is used by Card 7 to put a VH on pin B18 (Ext Brake — off). This Ext Brake signal is applied to pin A31 of Card 6. At this time, pin B32 of Card 6 is VL (Buffer Reset) thus resetting the buffer on Card 3. Also, pin B28 is VH (SCA-off).

3.99 The VH Send Ready Inverted signal input on pin B24 of Card 12 causes pin A27 to go VH (PNC Restraint — off). This allows the VL input on pin A19 of Card 12 (Send-on) to generate a VL pulse on pin A8 (PNC-2 — on). It also allows the VL input on pin B10 of Card 12 (Single Char Step — on) to force Card 12 to generate a reset pulse upon reading one character.

3.100 The VL PNC-2 pulse from pin A8 of Card 12 is applied to pin A27 of Card 6. The PNC-2 signal is a request by the tape set logic for a character. This pulse causes pin B32 to go VH (Buffer Reset — off) and unblind the buffer. Also, the PNC-2 pulse causes pin A5 to go VH (Brake Control — off) and pin A9 VL (FWD Clutch Control — on). These signals, applied to Card 9, allow the tape to move in search of a character. The buffer (Card 3) receives parallel signals from the read amplifiers (Card 1). Card 3 generates a Read Char. Detect pulse upon detecting a spacing bit in levels 1 through 7 or marking bit in the 8th level.

> Note: An odd parity delete will not be detected as a character. This character should not be recorded on the tape. The Read Char. Detect signal indicates that there is a character available in the buffer. This signal is generated by Card 3 on pin A15 and presented to Card 6 on pin A25. After Card 6 receives the Read Char. Detect signal, it generates (after .757 ms) a VH Read Amp. Inhibit signal for 1.060 ms on pin B16. This is applied to pin A27 of Card 3 to blind the buffer from reading further signals from the tape until this character is distributed.

3.101 The Read Char. Detect pulse input on pin A25 of Card 6 causes Card 6 to generate a VL pulse (SCA) on pin B28. This causes Card 6 to generate a VL pulse (Brake Control — on) on pin A5 and a VH (FWD Clutch Control — off) on pin A9, thus stopping the tape.

3.102 The VL SCA pulse on pin B28 of Card 6 is applied to pin B14 of Card 4. This signals Card 4 to check the character for odd parity. If it is an odd parity character, Card 4 generates a VL on pin A5, thus causing the ERROR lamp to light.

3.103 The SCA pulse is also applied to pin B8 of Card 11. This unblinds the distributor, allowing the distributor to serialize the parallel data from the buffer. The serial mark-space signal of the character is an output of Card 11 on pin A11 (Serial Data). This signal is applied to pin A5 of Card 14 (serial interfaces only) to be sent to the adjunct (if tape set is in local).

3.104 Finally the SCA pulse from Card 6 is applied to pin B14 of Card 12. This plus the signals mentioned in Paragraph 3.99 causes Card 12 to put a VL pulse on pin B16 (Input Reset). This VL pulse is applied to pin B6 of Card 10, causing Card 10 to turn off (VH) the Send signal on pin B18 and to apply approximately +28 v on pin B22, thus extinguishing the SEND lamp and terminating the send mode. Also, the SCA and PNC-2 signals go off and the Buffer Reset and Read Amp Inhibit signals go back on.

3.105 The tape set has the capability of stepping the tape in either direction while in the receive mode. Single step forward in the receive mode causes the same sequence of events as stated in Paragraphs 3.97 thru 3.104. However, the RECEIVE lamp extinguishes and the SEND lamp lights for the one character. After the character has been stepped, the SEND lamp extinguishes and the RECEIVE lamp comes back on. This circuitry is internal to Card 10.

3.106 Reverse single step operates in the same manner as forward single step except that, in reverse single stepping, the tape set actually reverse searches for one character instead of entering the send mode for one character. (Normally, the SEARCH REVERSE lamp does not light due to the speed of this function. If the motor is off when this mode is initiated, the SEARCH REVERSE lamp lights, otherwise it usually does not). Differences between the forward and reverse single step modes are explained below.

3.107 When the SINGLE STEP REV button is depressed, a VL is presented to pin B16 of Card 10. If the reverse search mode is not inhibited, this causes Card 10 to produce a VL pulse on pin A27 (Reverse Search — on) which is presented to pin B28 of Card 7 and pin B12 of Card 12.

3.108 The VL pulse on pin B28 of Card 7 is used by Card 7 to generate a VH (reverse) signal on pin A27 (Capstan Direction) to

indicate to the tape set to move the tape in the reverse direction. The Capstan Direction signal is applied to pin A11 of Card 6. This causes Card 6 to generate a VL on pin B10 (Reverse Clutch Control — on) when the Brake Control lead goes off.

3.109 The VL Reverse Search pulse on pin B12 is used by Card 12 to generate a VL signal on pin A6 (Send Message In). At this point the other signals (ie Send Ready, Motor On, PNC-2, SCA, Buffer Reset, Read Amp Inhibit, Input Reset, Single Char. Step, Brake Control, etc) have the same functions as explained for single step forward. However, since the send mode is never entered on the single step reverse mode (Send Ready signal comes on but Send signal does not), the character stepped is not sent to the local adjunct.

F. Fast Access Operation

3.110 The fast access mode of operation provides a method of rapidly moving tape as long as the FAST ACCESS button is depressed. The tape moves in the forward or reverse direction at 33 ips depending on which fast access button is depressed. The fast access mode energizes the scan coil, causing the tape transport gear shift mechanism to shift to the high speed mode.

3.111 When the FAST ACCESS FWD button is depressed, a VL is presented to pin B24 of Card 7. Card 7 turns off (VH) the Forward and Reverse Send Selectable signals (pins A7 and B6) and the Receiver Selectable signal (pin B8), thereby inhibiting all other modes while fast accessing.

3.112 If the tape set motor is off when the fast access feature is initiated, Card 7 turns the motor on by forcing a VL on pin B22 of Card 7 (Motor Start — on). Also, the VL on pin B24 of Card 7 starts a 2-second motor control timer to inhibit all tape movement until the motor is up to speed. After 2 seconds, Card 7 puts a VH on pin B20 (Motor On) to indicate to the tape set that the motor is up to speed.

3.113 The VL on pin B24 of Card 7 also energizes the scan coil (fast access coil) by putting a VL on pin B30. Also, Card 7 forces pin A19 VL (Ext Clutch — on) and pin B18 VH (Ext Brake — off). The Capstan Direction Signal on pin A27 is normally VL (forward direction), so no change occurs in this signal when entering forward fast access from an idle state.

3.114 The VL Ext Clutch and VH Ext Brake signals are applied to pins A13 and B14, respectively, of Card 6. The VL Capstan Direct signal from pin A27 of Card 7 is applied to Card 6 on pin A11. These three signals cause Card 6 to provide a VH on pin A5 (Brake Control — off), a VL on pin A9 (Forward Clutch Control — on), and a VH on pin B10 (Reverse Clutch Control — off).

3.115 The VH from pin A5 of Card 6 (Brake Control — off) is applied to Card 9 on pin B26. This causes Card 9 to remove the VL on pin B22 and allow it to go to +28 v, thus de-energizing the brake coil and allowing the tape to move. This VH from pin A5 of Card 6 is also applied to pin A9 of Card 10 to cause the STOP lamp to blink.

3.116 The VL from pin A9 of Card 6 (Forward Clutch Control — on) is applied to Card 9 on pin B8. This causes Card 9 to provide a VL on pin B16 (Clutch Resistor), thus providing a current path for the forward clutch coil. Card 9 also provides a low resistance path from pin B4 of Card 9 (Forward Clutch Coil) to pin B18 of Card 9 (Clutch Resistor), thereby completing the current path for the forward clutch coil and energizing the forward clutch to allow the tape to move in the forward direction. The clutch resistor limits the current in the forward clutch coil to 250 mA.

3.117 The VH from pin B10 of Card 6 (Paragraph 3.114 — Reverse Clutch Control — off) is applied to pin B10 of Card 9. This causes Card 9 to keep the reverse clutch de-energized by not providing a low resistance path from pin B6 on Card 9 (Reverse Clutch Coil) to pin B18 of Card 9 (Clutch Resistor).

3.118 The reverse fast access mode is like the forward fast access mode except for the Reverse Clutch and Capstan Direction signals.

3.119 When the FAST ACCESS REV button is depressed, a VL is presented to Card 7 on pin B26. Card 7 turns off (VH) the Forward and Reverse Send Selectable signals (pins A7 and B6) and the Receiver Selectable signal (pin B8), inhibiting all other modes while fast accessing.

3.120 If the motor is off when the reverse fast access mode is chosen, the motor turn-on circuitry and signals are the same as explained in Paragraph 3.112 for forward fast access except that the VL on pin B24 is replaced by a VL on pin B26 for reverse fast access.

3.121 The VL on pin B26 of Card 7 causes the scan coil to energize by putting a VL on pin B30. Also, Card 7 forces pin A19 VL (Ext Clutch — on) and pin B18 VH (Ext Brake — off). Also pin A27 goes VH (Capstan Direction — reverse).

3.122 The VL Ext Clutch and VH Ext Brake signals are applied to pins A13 and B14, respectively, of Card 6. The VH Capstan Direct signal from pin A27 of Card 7 is applied to Card 6 on pin A11. These three signals cause Card 6 to provide a VH on pin A5 (Brake Control — off), a VH on pin A9 (Forward Clutch Control — off), and a VL on pin B10 (Reverse Clutch Control — on).

3.123 The VH from pin A5 of Card 6 (Brake Control — off) is applied to Card 9 on pin B26. This causes Card 9 to remove the VL on pin B22 and allow it to go to +28 v, thus de-energizing the brake coil and allowing the tape to move. This signal is also applied to pin A9 of Card 10 to cause the STOP lamp to blink.

3.124 The VH from pin A9 of Card 6 (Forward Clutch Control — off) is applied to Card 9 on pin B8. This causes Card 9 to keep the forward clutch coil de-energized by not providing a low resistance path from pin B4 (Forward Clutch Coil) to pin B18 (Clutch Resistor).

3.125 The VL from pin B10 of Card 6 (Reverse Clutch Control — off) is applied to pin B10 of Card 9. This causes Card 9 to provide a VL on pin B16 (Clutch Resistor), thus providing a current path for the reverse clutch coil. Card 9 also provides a low resistance path from pin B6 (Reverse Clutch Coil) to pin B18 (Clutch Resistor), thereby completing the current path for the reverse clutch coil. This energizes the reverse clutch to allow the tape to move in the reverse direction. The clutch resistor limits the current in the reverse clutch coil to 250 mA.

3.126 The fast access mode is inhibited when the tape set is actively operating in another mode. Also, forward fast access is inhibited by an EOT alarm and reverse fast access is inhibited by a BOT alarm. These inhibits are performed by Card 7.

3.127 Releasing the FAST ACCESS button removes the VL input to Card 7 (B24 or B26). The removal of the VL input causes the scan coil to de-energize and the brake to go on. Both clutches are off, and the Capstan Direction signal reverts (or remains) in the forward direction.

G. Search Operation

3.128 In the search mode the tape set rapidly reads each character on the tape (400 char/sec), searching for a desired code. This code can be GS, FS, LF, EOT, or one of three programmable codes if the search expander card is used, or RS or ^ if the rewind card is used. The function selector switch position determines which character the tape set is to search for.

3.129 The forward search mode is inhibited if the tape set is in another mode of operation or an EOT alarm is indicated. The reverse search mode is inhibited if the tape set is in another mode of operation or a BOT alarm is indicated.

3.130 Depression of the FORWARD SEARCH button provides a VL on pin B14 of Card 10. Depression of the REVERSE SEARCH button provides a VL on pin A13 of Card 10. Card 10 then provides a VL on pins B26 and B32 to light the FORWARD SEARCH lamp, or a VL on pins A27 and A31 to light the REVERSE SEARCH lamp. If pin B26 is VL, the send and reverse search modes are inhibited via Card 10. If pin A27 is VL, the send and forward search modes are inhibited via Card 10.

3.131 If the reverse search mode is chosen, the VL on pin A27 of Card 10 is applied to pin B28 of Card 7. Card 7 then generates a VH output on pin A27 (Capstan Direction — reverse) to indicate that the reverse direction is chosen. This signal is applied to pin A11 of Card 6.

> Note: Since the Capstan Direction signal on Card 7 (pin A27) is normally VL (forward direction), it does not require an input signal for forward tape moving modes.

3.132 The VL on pin B26 of Card 10 (for forward search) or the VL on pin A27 of Card 10 (for reverse search) is applied to Card 12, pin A12 (Forward Search) or pin B12 (Reverse Search). Either of these signals will cause pin A6 of Card 12 to go VL (Send Message In — on). Either will also prime the PNC Restraint signal to go off when Send Ready Inverted goes on and will prime the PNC Search signal to respond to SCA signals.

3.133 The VL signal on pin A6 of Card 12 (Send Message In — on) is applied to Card 8, pin A5 to inhibit the record clock track mode. It is also applied to Card 7, pin A13 to inhibit the receive and fast access modes. Also, if the tape set motor is off when the search mode is selected, Card 7 starts the motor by placing a VL on pin B22 (this output pin is already VL if the motor is already on). Card 7 also activates a 2 second timer to allow the motor to come up to speed. After 2 seconds, pin B20 on Card 7 goes VH (Motor On).

3.134 When the Motor On signal goes VH, Card 7 generates a Send Ready signal by putting a VL on pin A5. This causes pin B18 to go VH (Ext Brake — off) which is applied to pin A31 of Card 6. The VL Send Ready signal is applied to Card 13, pin B22 and Card 6, pin A29.

3.135 The VL Send Ready signal on pin B22 of Card 13 is inverted and used as an output (VH) on pin A21. This VH Send Ready signal is applied to pin B24 on Card 12, causing Card 12 to turn the PNC Restraint signal off by placing a VH on pin A27.

3.136 The VL on pin A12 (Forward Search) or pin B12 (Reverse Search) (Paragraph 3.132) plus the PNC Restraint signal going off causes Card 12 to generate a PNC-2 signal by placing a VL on pin A8. (The PNC-2 signal is also controlled by the PNC Search signal which in turn is controlled by the SCA signal.) The PNC-2 signal is generated by Card 12 as a request to the basic control logic to read a character from the tape.

3.137 The VL PNC-2 signal from pin A8 of Card 12 is applied to pin A27 of Card 6. This PNC-2 signal plus the VH Ext Brake signal on pin A31 (Paragraph 3.134) causes pin B32 of Card 6 to go VH (Buffer Reset — off) to unblind the buffer. The VL Send Ready signal on pin A29 of Card 6 causes Card 6 to unblind the read amplifiers by putting a VL on pin B16 (Read Amp Inhibit — off). Also, the PNC-2 signal and the Send Ready signal inputs to Card 6 cause Card 6 to put a VH on pin A5 (Brake Control — off) to release the brake.

3.138 When pin A5 goes VH and the brake is off, Card 6 provides a signal to Card 9 to energize either the forward or reverse clutch. Depending on which search button is depressed (Paragraph 3.131), the Capstan Direction signal on pin A11 of Card 6 is either VL or VH. This signal is VL if the forward direction is chosen and VH if the reverse direction is chosen. If the forward direction is chosen, Card 6 applies a VL on pin A9 (Forward Clutch Control — on). If the reverse direction is chosen, Card 6 applies a VL on pin B10 (Reverse Clutch Control — on). These outputs are applied to Card 9 to de-energize the brake coil and energize the appropriate clutch coil.

3.139 With the tape moving, the read amplifier card searches for a character. When a character is found on the tape, the buffer card (Card 3) provides a VH pulse on pin A15 (Read Char Detect).

> Note: A character is defined as being "found" when the buffer card detects at least one space in bit levels 1 through 7 or a mark in bit 8.

3.140 The VH Read Char Detect pulse on pin A15 of Card 3 is applied to Card 6 on pin A25. This causes Card 6 to turn on the brake by placing a VL on pin A5 (Brake Control — on) and to de-energize the appropriate clutch by forcing a VH on pin A9 or B10. The timer on Card 6 turns on, and approximately 600 µs after the Read Char Detect pulse, generates a VL on pin B28 (SCA-on). This SCA signal is applied to Card 4, pin B14; Card 5, pin B32; Card 11, pin B8; and Card 12, pin B14. Also, .757 ms after the Read Char Detect pulse, Card 6 applies a 1.06 ms VH pulse on pin B16 (Read Amp Inhibit — on). This signal is applied to Card 3, pin A27 to inhibit the buffer from reading any spurious information while the character is being distributed.

3.141 The VL SCA pulse applied to pin B14 of Card 4 (and pin B32 of Card 5 in tape sets equipped with this card) causes Card 4 (and 5) to sample the parallel data from the buffer to check whether or not this character is the selected search code.

3.142 The VL SCA pulse applied to pin B14 of Card 12 causes Card 12 (after a delay of approximately 400 µs) to turn off the PNC-2 signal by putting a VH on pin A8. This PNC-2 signal is applied to pin A27 of Card 6. Card 6 then resets the buffer by putting a VL on pin B32 (Buffer Reset — on), which is applied to Card 3, pin B26. The Buffer Reset going VL causes Card 6 to turn off the SCA signal by placing a VH on pin B28.

3.143 This VH SCA signal is applied to pin B14 of Card 12. After a time delay determined by Card 12, Card 12 generates another PNC search signal which causes the PNC-2 signal from pin A8, Card 12, to go on (VL).

3.144 At this point, the signal flow is as stated in Paragraphs 3.137 through 3.143. It continues until the search mode is terminated.

3.145 A search mode can be terminated in the following ways: Forward search terminates in the event of an EOT alarm; reverse search terminates in the event of a BOT alarm; both search modes terminate upon depression of the STOP button or detection of the selected search code.

3.146 An EOT alarm terminates the forward search mode by causing a VL on pin B10 of Card 7. Card 7 turns off the Forward Send Selectable signal by putting a VH on pin A7. This VH is applied to pin A7 of Card 10. Card 10 terminates the forward search mode by putting a VH on pin B26 and removing the VL from pin B32, thus turning the FORWARD SEARCH lamp off.

3.147 A BOT alarm terminates the reverse search mode by causing a VL on pin A11 of Card 7. Card 7 turns off the Reverse Send Selectable signal by putting a VH on pin B6. This VH is applied to pin B12 of Card 10. Card 10 terminates the reverse search mode by putting a VH on pin A27 and removing the VL from pin A31, thus turning the REVERSE SEARCH lamp off.

3.148 Both search modes can be terminated by depression of the STOP button. When the STOP button is depressed, a VL is presented to Card 12 on pin A14. This causes Card 12 to generate a VL pulse on pin B16 (Input Reset) after a 1 second time interval. This VL pulse is applied to pin B6 of Card 10. Card 10 terminates the search mode by placing a VH on pin B26 (Forward Search) and A27 (Reverse Search) which turns the SEARCH lamp off.

3.149 The search mode is normally terminated by the detection of a search code. The desired search code is denoted by the position of the function selector switch. When the selected character is detected, a VL is applied to one of the following points: Card 4 — pin A27 (EOT), pin A23 (GS), pin A21 (LF), or pin A9 (FS); Card 5 — pin A9 (Char. A), pin A13 (Char. B), or pin A17 (Char. C).

Note: Card 5 can be one of two optional circuit cards. Refer to Section 578-300-100 for option information.

The VL from the function selector switch primes Card 4 (or Card 5 if so equipped) to present a signal when that code is detected. Card 4 (or 5) monitors the parallel data from the buffer (Card 3) and when the appropriate code is detected and the SCA signal is on (VH on pin B14 of Card 4), presents a VL pulse (approximately 0.5 ms) on pin B6 (Spec Char Reset). This VL pulse is applied to pin B26 of Card 12. Card 12 provides a VL pulse (approximately 75 μs) on pin B16 (Input Reset) when Card 12 detects PNC-2 going off. The VL Input Reset pulse is applied to pin B6 of Card 10. Card 10 applies a VH on pin B26 or A27 and turns off the SEARCH lamp.

H. Send Data Operation
Stand-Alone or 33/35/37 Adjunct

3.150 Depressing the DATA SEND switch produces a VL on pin A15 of Card 10 (Send Switch). This causes Card 10 to produce a VL on pin B18 (Send-on) and a VL on pin B22 (Send Lamp — on) to light the Send lamp. The VL Send signal on pin B18 of Card 10 is applied to: Card 4, pin B12; Card 5, pin 20; Card 11, pin B10; and Card 12, pin A19.

3.151 The Send-on signal applied to pin B12 of Card 4 primes Card 4 to generate a reset pulse (a VL pulse on pin B6 — Spec Character Reset) when Card 4 detects that an EOT control code has been sent (Strap 4A1 in). This Send-on signal is also used so that, if the tape set is in the local mode, Card 4 will generate a VL pulse (approximately 450 ms) on pin A11 (Control Code Delay) whenever Card 4 detects that a printer control code has been sent (ie, FF, HTAB, VTAB, SO). This VL pulse is used by Card 12 to delay the sending of characters after these printer control codes.

3.152 The VL Send-on signal at pin B20 of Card 5 is used by the search expander card in conjunction with the programmable stop codes. It is used for the rewind card for the control code delay feature to indicate the appropriate sample time for character detection.

3.153 The VL Send-on signal is also applied to pin A19 of Card 12. This causes Card 12 to produce a VH (Send-on) on pin B18. This VH Send-on from pin B18 of Card 12 is applied to pin A9 of Card 14 to indicate to the local interface card that the tape set is in the send mode. (If the tape set is in the local mode, a VL will be presented to pin B7 of Card 14 and Card 14 will then be able to pass the serial data to the local adjunct.) Card 12 also presents a VL on pin A6 (Send Message In — on), which is applied to pin A5 of Card 8 to inhibit the record clock track mode, and to pin A13 of Card 7.

3.154 The VL (Send Message — on) on pin A13 of Card 7 inhibits the receive mode by keeping pin B8 VH (Receiver Selectable — off) and the fast access mode, and also causes the motor to turn on (if not already on) by causing pin B22 of Card 7 to go VL (Motor Start — on). This also starts the motor control timer which causes pin B20 (Motor On) of Card 7 to go VH 2 seconds after the motor has initially turned on. (This indicates to the logic that the motor is on and has had enough time to come up to speed.) When the Motor On signal is VH, Card 7 generates a VL on pin A5 (Send Ready — on). When the Send Ready indication is on, Card 7 generates a VH on pin B18 (Ext Brake — off).

3.155 The VL Send Ready — on signal from pin A5 of Card 7 is applied to pin B22 of Card 13. Card 13 then generates a VH Send Ready Inverted — on at pin A21. This signal is applied to pin B24 of Card 12.

3.156 If the tape set is in the local mode, a VL is presented to pin A9 of Card 12. Also, a VL is presented to pin B7 of Card 14 which causes a VL on output pin A15 of Card 14. This VL is applied to pin A28 of Card 13 (Gated Local). With strap 13A in, the VL on pin A28 of Card 13 causes Card 13 to produce a VH on pin B24 (Received Reverse Channel Inverted — on). This VH is applied to Card 12 on pin B28. This, coupled with the Send Ready Inverted signal (Paragraph 3.155) and the VL Local signal on pin A9 of Card 12, causes Card 12 to place a VH on pin A27 (PNC Restraint — off).

3.157 If the tape set is in the on-line mode and a line connection has been made (if reverse channel is used) Card 13 should receive a positive signal (+8 v nominal) on pin A6 (Reverse Channel Received — on). This causes Card 13, after a 1 second delay, to produce a VH on pin B24 (strap 13A in) — Received Reverse Channel Inverted. This VH is applied to pin B28 of Card 12. Also, Card 13 must receive a positive signal (+8 v nominal) on pin A7 (Clear to Send — on). This causes pin A8 of Card 13 to go VL (Clear to Send — on). This CTS signal is applied to pin B8 of Card 12. These signals coupled with the Send Ready Inverted signal (Paragraph 3.155) cause Card 12 to place a VH on pin A27 (PNC Restraint — off).

3.158 The PNC Restraint signal, when on, inhibits the generation of PNC-2 signals and prohibits the tape set from sending. The PNC Restraint signal goes off when the tape set interface logic determines that all conditions are met to allow transmission of characters. For the local send mode these conditions are explained in Paragraph 3.156. For the on-line send mode, refer to Paragraph 3.157. The PNC Restraint — off signal allows the PNC-2 signal to be controlled by the PNC Dist signal inputs on pin A5 of Card 12.

3.159 The VL from pin A5 of Card 7 (Send Ready — on, Paragraph 3.154) is applied to pin A29 of Card 6. This causes the character-by-character generation to be controlled by two signals: PNC-2 (PNC-1 is used when the tape set is arranged as a parallel send device) and SCA.

3.160 The VH from pin B18 of Card 7 (Ext Brake — off, Paragraph 3.154) is applied to Card 6 on pin A31. This allows the generation of the Buffer Reset signal (pin B32) to be controlled by the PNC-2 input on pin A27. The Ext Brake — off signal is also applied to Card 6 on pin B14. This allows the timer on Card 6 to control the brake and forward clutch, thereby controlling the incremental stepping of the tape while reading each character.

3.161 The VL Send-on signal from pin B18 of Card 10 is applied to pin B10 of Card 11 (Paragraph 3.150). Card 11 then generates a VL pulse on pin B6 (PNC Dist) which is applied to pin A5 of Card 12. This causes Card 12 to generate a VL pulse on pin A8 (PNC-2 — on, Paragraph 3.158). This PNC-2 pulse is applied to pin A27 of Card 6. Card 6 then turns off the Buffer Reset signal by putting a VH on pin B32 (Paragraph 3.160). This unblinds the buffer and allows it to receive the parallel data from the read amp card.

3.162 When Card 6 receives the PNC-2 pulse, it generates a VH on pin A5 (Brake Control — off) and a VL on pin A9 (Forward Clutch Control — on). This causes the brake coil to de-energize and the forward coil to energize. The tape starts moving, searching for a character.

3.163 When a character is found on the tape (approximately 2.5 ms), the buffer, which is monitoring the parallel data from the read amps, generates a VH pulse on pin A15 of Card 3 (Read Character Detect).

> Note: A character is "found" when the buffer detects at least one space in bit levels 1 through 7 or a mark in bit 8. Note that odd parity delete will not be detected as a character and should not be recorded on the tape.

The VH Read Character Detect pulse is applied to pin A25 of Card 6. This pulse starts the timer on Card 6 which, after approximately 300 μs, applies a VL on pin A5 (Brake Control — on) and a VH on pin A9 (Forward Clutch Control — off), thus stopping the tape. Card 6 also produces a VH on pin B16 (Read Amp Inhibit — on) which is applied to pin A27 of Card 3 to inhibit the buffer from receiving any spurious information from the read amps after a character is read. It also provides a VL on pin B28 (SCA-on) to indicate that a character is present at the output of the buffer.

3.164 The VL (SCA-on) pulse from pin B28 of Card 6 is applied to pin B14 of Card 4 to indicate that now is the time to sample the character for a parity error or to see if it is an EOT code. The SCA-on signal is also applied to pin B32 of Card 5. This indicates that this is the proper time to monitor the character to see if it is a specific control code.

3.165 The VL (SCA-on) pulse from pin B28 of Card 6 is also applied to pin B8 of Card 11. This causes Card 11 to generate an internal VL pulse (Register Input Sample) to unblind the distributor and enable the distributor to accept the parallel data from the buffer through the Buffer Out inputs to Card 11. After the parallel data is stored in the distributor, Card 11 is blinded from receiving any other parallel data bits until the character in the distributor is serialized. Card 11 also places a VH on pin B22 (Reg Reset — off), thereby allowing the bit timing pulses (pin A21 — Osc Input) to control Card 11. (In the local mode, the timing pulses are originated by the crystal in Card 14. In the on-line mode, the timing pulses are originated by the crystal in Card 12.) Card 11 then shifts a serial data signal out on pin A11 (Serial Data Out).

3.166 Once the character is completely serialized, Card 11 resets the distributor by applying a VL pulse on pin B22 (Reg Reset — on) and also disables the bit timing pulses. The serial signal is applied to pin A5 on Card 14. Card 14 decides whether or not the tape set is in the local mode. If so, Card 14 presents the serial data signal to the local adjunct. If the tape set is in the on-line mode, Card 14 provides the serial data output on pin A10 (High Speed Send Data). This serial data is applied to pin A17 of Card 13 which converts the micrologic voltage levels to EIA voltage levels and provides a serial EIA Send Data output on pin B18 which is presented to the data set.

3.167 When the parallel character is stored in the Card 11 distributor and before it is serialized (refer to Paragraph 3.165), the timing pulses on Card 11 apply a VH to pin B6 (PNC Dist — off). This VH is applied to pin A5 of Card 12. Card 12 then puts a VH on pin A8 (PNC-2 — off). This VH PNC-2 signal is applied to pin A27 of Card 6. Card 6 applies VL pulse on pin B32 (Buffer Reset — on). This Buffer Reset signal is applied to pin B26 of Card 3 to reset the buffer. Also, Card 6 applies a VH on pin B28 (SCA-off) which is applied to pin B8 of Card 11.

3.168 Card 11 now puts a VL on pin B6 (PNC Dist — on). This causes the same chain of events as explained in Paragraphs 3.161 through 3.167 until the control code delay (CCD) feature is initiated, the SEND button is depressed, a stop code (eg EOT) is detected, a loss of reverse channel occurs (on-line send mode), or the special character hold feature is initiated.

3.169 The special character hold feature can only be initiated in the local send mode. This feature delays the tape set from sending immediately after a printer control code (VTAB, HTAB, FF, SO) has been sent. If the tape set is in the local mode, a VL is presented to Card 4 on pin A13. If the tape set is in the send mode, a VL is presented to pin B12 of Card 4. These two signals prime Card 4 to generate a 450 ms VL pulse on pin A11 (Control Code Delay) whenever Card 4 detects one of the four printer control codes mentioned above. This VL pulse is applied to pin A15 of Card 12. Card 12 then inhibits the generation of PNC-2 signals for the 450 ms duration.

3.170 If the local adjunct has a sprocket feed printer, the tab or form-out, etc, contacts in the adjunct energize and apply a signal on pin B27 of Card 14 (Spec Char Hold). (This signal can be either VH or VL depending on the adjunct contacts and the strapping of shunt screw 14A1 and 14A2 on Card 14.) Card 14 then provides a VL on pin A4 (PNC Hold — on). This VL is also applied to pin A15 of Card 12 (along with the

control code delay signal from Card 4). This VL increases the duration of the delay before Card 12 is allowed to generate the next PNC-2 signal.

3.171 When the tab, etc, is completed on the adjunct printer, the appropriate contacts in the adjunct release and this voltage change is applied to pin B27 of Card 14. Card 14 then removes the VL on pin A4 (PNC Hold — on), thereby removing the VL on pin A15 of Card 12. This allows Card 12 to continue the generation of PNC-2 signals.

3.172 The control code delay feature is an optional feature provided by one of the two optional Card 5's (either the rewind card or the search expander card). This feature causes the tape set to delay sending additional characters immediately after sending a specific stop code that can be programmed at the customer's request.

3.173 If the tape set is in the send mode, a VL is presented to Card 5 on pin B20 (Send-on). If the function selector switch is in position C, (or other positions depending on Card 5 coding) a VL is also presented to Card 5 on pin A17. These two signals prime Card 5 to generate a VL on pin B18 (Control Code Delay) when Card 5 (which monitors the parallel data from the buffer card) detects the stop code and the SCA signal input to Card 5 on pin B32 is on (VL). The VL Control Code Delay signal is applied to pin A15 of Card 12 to prohibit Card 12 from generating PNC-2 signals. (The tape set remains in the send mode.) The VL on pin B18 of Card 5 (Control Code Delay) remains at VL until reset.

3.174 If the tape set is in the local mode, this feature can be reset by depressing the SEND button (VL on pin B28 of Card 5) or by applying and removing a VL on pin B4 of Card 5 (eg energizing a normally open stunt box contact to ground in the local adjunct). If the tape set is in the on-line mode, the feature can be reset by depressing the SEND button (VL on pin B28 of Card 5), or by having the distant receiver turn off its reverse channel transmitter momentarily and then turn it back on. This causes pin A27 of Card 5 to go from VH to VL and back to VH. If any of these methods are used to reset the control code delay feature, Card 5 replaces the VL on pin B18 with a VH (Control Code Delay — off). This VH signal is applied to pin A15 of Card 12, allowing Card 12 to resume generating the PNC-2 signals.

3.175 If the tape set is sending in an on-line mode, and if the reverse channel feature is being used (strap 13B omitted from Card 13), the tape set will stop sending if it does not receive an indication from the data set that reverse channel is being received.

3.176 If the data set associated with the tape set detects a loss or absence of the reverse channel frequency (387 Hz) from the distant receiver, it applies a negative voltage (-8 v nominal) to pin A6 of Card 13 (Reverse Channel Received — off). Card 13 then places a VL on pin B24 (Reverse Channel Received Inverted — off). This signal is applied to Card 12, pin B28. When this signal is VL and the tape set is in the on-line send mode, Card 12 applies a VL on pin A27 (PNC Restraint — on). The PNC Restraint signal inhibits Card 12 from generating any PNC-2 signals (refer to Paragraph 3.158). The tape set resumes sending when the data set indicates to the tape set that it is once again receiving reverse channel from the distant receiver by providing a positive voltage (+8 v nominal) on pin A6 of Card 13.

3.177 The send mode can be terminated upon the transmission of the EOT code (strap 4A1 present on Card 4) or upon the transmission of a programmable code on optional Card 5. When the tape set is in the send mode a VL is presented to pin B12 of Card 4. This primes Card 4 to generate a VL pulse when it detects an EOT control code and an on condition for the SCA signal (VL on pin B14). When these conditions are met, Card 4 provides a VL pulse on pin B6 (Spec Char Reset). This VL pulse is applied to pin B26 of Card 12. Card 12 then generates a VL pulse on pin B16 (Input Reset) which is applied to pin B6 of Card 10 to extinguish the SEND lamp.

3.178 If the tape set is in the on-line auto send mode and an EOT is transmitted, the sequence of events outlined in Paragraph 3.177 will occur. However, a VL is presented to Card 12 on pin A17 (Auto Answer Switch). This causes Card 12, upon receiving the Spec Char Reset pulse from Card 4, to generate a VL pulse on pin A24 (Receiver Input). This Receiver Input VL pulse is applied to Card 10, pin A17 and causes Card 10 to turn the RECEIVE lamp on.

3.179 If the tape set is in the on-line auto send mode and the distant receiver is no longer sending reverse channel (systems where reverse channel is used), the sequence of events outlined in Paragraph 3.175 will occur. However,

if this condition persists for approximately 45 seconds (2 minutes on early design tape sets), Card 13 will institute an automatic time-out by providing a negative signal (-8 v nominal) on pin A19 (Data Terminal Ready — off). This causes the data set to terminate the line connection.

3.180 The send mode can also be terminated by depressing the STOP button. This produces a VL on pin A14 of Card 12, causing Card 12 to generate a VL pulse on pin B16 (Input Reset). This VL pulse is applied to pin B6 of Card 10. Card 10 then extinguishes the SEND lamp.

3.181 The circuit card used in position 14 of the module depends on the type of local adjunct teletypewriter to be used. Card 14 interfaces the tape set to the adjunct. This includes providing the data to the adjunct in the form of a signal that the adjunct can use.

3.182 If the tape set is interfaced to a 33 or 35 teletypewriter with a 101 Data Set, Card 14 will be a TP322474 Card. If the tape set is in the local send mode, a VL is presented to pin B7 (Local Switch) and a VH to pin A9 (Send-on) of Card 14. These signals route the serial data signal at pin A5 through Card 14 to pin A25, where they are available for the teletypewriter. The serial signal at pin A25 will be approximately -20 v for marking bits and +20 v for spacing bits. (These voltages are supplied by the local teletypewriter.)

3.183 The Send signal input to Card 14 blinds the tape set from reacting to any signals from the teletypewriter keyboard. The Local signal input to Card 14 causes a VL on pin A18 (11-unit) which is presented to pin A4 of Card 11 to indicate to Card 11 to insert a Stop pulse two bits long for each serial character. This card also monitors the tab and break contacts of the local teletypewriter for initiating the PNC-Hold signal if required (refer to Paragraph 3.169).

3.184 If the tape set is interfaced to a 33 or 35 teletypewriter with UCC29 Call Control Unit, Card 14 will be a TP322480 Card. If the tape set is in the local send mode, a VL will be present on pin B7 (Local Switch) and a VH on pin A9 (Send-on) of Card 14. These two signals have the same function as explained in Paragraph 3.182 for the 101C Data Set interface. However, the serial send data circuitry is different.

3.185 Card 14 receives the serial (11-unit) signal from Card 11 on pin A5. Card 14 routes this signal to pin A25 (tape set in local). This serial signal will be approximately -20 v for marking bits and +24 v for spacing bits. (These voltages are supplied by the local teletypewriter.)

3.186 From pin A25 on Card 14, the data signal is supplied to the Call Control Unit logic assembly. From the logic assembly, the signal is routed back to Card 14 on pin B18 (Local Receive). This signal will be 0 v for marking bits and -0.6 v for spacing bits. Card 14 modifies the data signal and provides a 20 mA signal output on pin A30 (Local Receive Output). From pin A30 of Card 14, the 20 mA signal is routed to the selector magnet driver in the local teletypewriter.

3.187 If the tape set is interfaced to a 37 teletypewriter via the data set connector (EIA interface), a TP322475 Card is used in Position 14. Since the tape set acts as a data set to the teletypewriter, the teletypewriter must be in the on-line mode when transferring data to or from the tape set.

3.188 If the tape set is in the local mode, a VL is presented to pin B7 (Local Switch) of Card 14. If option 14C1 is in, this signal indicates to Card 11 that an 11-unit code is desired and Card 11 inserts a Stop pulse two bits long after each serial character. If option 14C1 is out, this signal indicates to Card 11 to send a 10-unit code. Also, the Local signal acts to route the serial data signal to the local adjunct rather than to the high speed data set interface.

3.189 Since the tape set functions as a data set to the teletypewriter, the teletypewriter supplies a Data Terminal Ready (DTR) signal on pin A30 of Card 14. If the tape set is to send to the teletypewriter, this input to Card 14 must be a positive signal (+8 v nominal). If the tape set is in the local mode, the tape set supplies a positive voltage (+8 v nominal) on pin B21 (Data Set Ready — on). When this DSR signal goes on, the teletypewriter motor turns on. If the tape set is in the send mode, a VL is presented to pin B14 of Card 14 (Send Ready — on). This primes Card 14 to pass the serial data to the teletypewriter. This serial data is an input from Card 11 to Card 14 on pin A5, and Card 14 converts this serial data to EIA signals and provides this serial EIA output on pin B22 to the teletypewriter.

3.190 If the tape set is interfaced to a 37 teletypewriter via the teletypewriter's RT connector, a TP322476 Card is used in Position 14. This is the KSR for ASR application, in which the tape set replaces the paper tape RT module of the teletypewriter.

3.191 In this application the tape set is controlled by the teletypewriter. If the tape set is to send to the teletypewriter, the PRINTER LOCAL and READER LOCAL lamps on the teletypewriter must be on. This provides a VL on pin A6 of Card 14 (Run-on). Also, the tape set must have a VL on pin B12 (FWD Send Selectable — on) so the send mode is not inhibited. If the tape set is in the send mode, a VH is presented to pin A9 of Card 14 (Send-on). Finally, if the tape set is in the local mode, a VL is presented to pin B7 of Card 14.

3.192 If all the aforementioned signals are present, Card 14 produces a VL on pin B8 (Send Selectable — on) which is presented to the teletypewriter. The teletypewriter responds by placing a VL on pin B11 of Card 14 (Send Message — on). The tape set will receive a VL on pin A23 of Card 14 (Send Message In — on) from Card 12, pin A6 (refer to Paragraph 3.153).

3.193 When the tape set receives the Send Message — on indication on pin B11 of Card 14, it places a VL on pin A21 (Send Message Out — on) which is applied to pin A13 of Card 7 (refer to Paragraph 3.154). Card 7 then starts the tape set motor (if not already on — refer to Paragraph 3.154) and provides a VL on pin B14 of Card 14 (Send Ready — on). Card 14 now applies a VL on pin B9 (Send Ready — on) which is presented to the teletypewriter. The teletypewriter can now request characters from the tape set by providing VL pulses on pin B27 of Card 14 (PNC-on). Card 14 then provides corresponding VL pulses on pin B17 (PNC-1-on) which are applied to pin A21 of Card 6.

3.194 In this application, the tape set sends parallel data to the teletypewriter (0 v space, +5 v mark). Card 14 receives the parallel data directly from the buffer card. Therefore, the distributor on Card 11 is not used and the PNC-1 (not PNC-2) signal is the request to the tape set for another character. When the tape set generates a VL on pin A11 of Card 14 (SCA-on), the character, in parallel form, is sent to the teletypewriter.

3.195 The teletypewriter can temporarily delay the send mode if a reader off command is received by placing a VH on pin A6 of Card 14 (Run — off). Transmission can resume if the teletypewriter places a VL on pin A6 (Run — on). In this application the OPTION position of the Data Mode switch places a VL on pin A19 of Card 14 and provides unattended operation of the tape set, controlled by the teletypewriter via the Run signal (pin A6 of Card 14). In this mode, the tape set motor is on only when the teletypewriter provides a Run — on indication.

Parallel Device Adjunct

3.196 A tape set designed for use with parallel interface devices, such as the CDT, is placed in the send mode by the related terminal. If the tape set is capable of being selected as a sender, its Sender Selectable leads are on. The related terminal may then initiate the send mode by turning on its Send Message lead.

3.197 The tape set is selectable if there are no alarm conditions and if it is not already in an operating mode. With no alarm conditions, the Low Tape, End of Tape, and Begin of Tape leads are all off, placing a VH at pins B12, B10, and A11 of Card 7. If the photolamp is operating, no alarm signal is produced by the photolamp burnout detect circuitry, and if the Record Interlock lead is off, there is a VH at pin B4. To assure that the tape set is not already in an operating mode, the Send Message, Receive Message, and Record Clock Track leads are off, placing a VH at pins A13, A15, and B14 of Card 7. This results in a VL on the Forward Send Selectable lead (Card 7, pin A7), which is applied to Card 14, pin B12. This VL is gated through to pin B8, and is fed to the related terminal.

> Note: A VL on any of the leads in 3.197 or an alarm from the photolamp burnout detect circuit on Card 7 would cause pin B8 of Card 14 to be VH, preventing the send mode from being initiated.

3.198 To initiate the send mode of the tape set, the related terminal turns on its Send Message lead. This places a VL on Card 14, pin B1, which is gated through to pin A21 and fed to Card 7, pin A13. A VL on this pin inhibits the fast access circuitry on Card 7, and inhibits the Receiver Selectable signal at pin B8. It also turns on the Motor Start lead (pin B22) to turn on the motor. After a short time delay to insure that the motor is up to operating speed, the Motor On lead (pin B20) turns on.

3.199 With the Motor On and Send Message signals present, the Send Ready lead turns on (VL on pin A5 of Card 7). This VL is fed to Card 14, pin B14, and is gated through to pin B9 to indicate to the related terminal that the tape set is in the send mode.

3.200 The Send Ready signal is also applied to Card 6, pin A29, where it produces a VH on the Buffer Reset lead (pin B32). This VH, fed to pin B26 of Card 3, enables the buffer register. The Send Ready signal is also responsible for setting the clutch/brake latch on Card 6, which turns off the Brake Control signal (VH at pin A5) and turns on the Forward Clutch Control signal (VL at pin A9). The VH Brake Control signal, fed to pin B26 of Card 9, provides a VL Brake Coil signal at pin B30. This signal is also applied to Card 10 on pin A9 to cause the STOP lamp to flash. The VL Forward Clutch Control signal comes into Card 9 on pin B8 to provide a VL Forward Coil signal on pin A4.

3.201 With the forward clutch coil energized, the tape moves forward past the read/write head, and the read amplifiers on Card 1 read the data. Data levels 1 through 8 appear at pins A29 through A7 of Card 1, and are applied to pins A11 through B30 of Card 3. When the buffer has accepted the character, it produces a Read Character Detect pulse at pin A15 of Card 3. This pulse is applied to pin A25 of Card 6 to turn on the timer.

3.202 Data transfer from the tape set to the related terminal is controlled by a Present Next Character (PNC) signal from the terminal and a Send Character Available (SCA) signal from the tape set. The terminal requests a character by turning on its PNC lead (VL on pin B27 of Card 14). This signal is gated through to pin B17, where it is fed to Card 6, pin A21 as PNC-1.

3.203 Approximately 300 µs after the timer is turned on, the Forward Clutch Control signal will be turned off and the Brake Control signal will be turned on to stop the tape. After an additional 300 µs the SCA signal turns on to place a VL on pin B28 of Card 6. This VL is fed to Card 14, pin A11, where it is used to enable the transfer gates for send bits 1 through 8. The character at the buffer output is thus transferred through Card 14 and appears on the data leads to the related terminal (pins B26 through A30 of Card 14).

3.204 When the terminal recognizes that SCA is on, it accepts the character on the data leads and turns off its PNC signal to indicate that no further data should be sent. This turns off PNC-1 at Card 6, pin A21. After a brief delay, the Buffer Reset signal goes to VL at pin B32, and the clutch/brake latch is set to advance the tape in search of a new character. When the character is located, the Read Character Detect lead is turned on by the buffer, and the timer turns on to begin a new character cycle. However, the SCA signal will not turn on until the PNC signal is received from the related terminal.

I. Receive Data Operation
Stand-Alone or 33/35/37 Adjunct

3.205 To initiate the receive data mode, the DATA RECEIVE pushbutton is depressed to provide a VL Receive Switch signal on pin A17 of Card 10. The Receiver Selectable signal on pin A11 is at VL to prime the Receive signal to go VL. The VL Receive signal is provided on pin B20 and a VL Receive Lamp signal is provided on pin B24. The RECEIVE lamp lights and remains lit when the switch is operated.

3.206 The VL Receive signal is applied to Card 12 on pin A16 to provide a VL Receive Message (RM) signal on pin B6. The VL RM signal is applied to Card 14 on pin A13. It is strapped through Card 14 to pin A14, and onto Card 7 on pin A15. This signal is brought into Card 7 to generate the VL Receiver Ready signal on pin A9. It also provides a VH Ext Brake signal on pin B18.

3.207 The VL Receiver Ready signal is applied to Card 12 on pin B30 but will have no effect unless the Local Switch signal is VL on pin A9, or for high speed the Carrier Detect signal on pin A13 is VL. With either of these two conditions present and the VL Receiver Ready signal present, the RCV R-T/D signal will go from VH to VL on pin A26. The VL Receiver Ready signal is brought into Card 11 on pin B12 to hold the Serial Data Out lead (pin A11) at VL.

3.208 Serial Data is brought into Card 14 on pin B18 (Low Speed) or A17 (High Speed). The condition of the Local Switch lead, VL (Local) or VH (High Speed) at pin B7 determines which serial data input is used. Serial data coming into Card 14 on pin B18 (RCV On Line) is of the value VH Mark, VL Space. A VL Space signal provides a VL signal on pin A12. A VH Mark signal provides a VH signal on pin A12. The data is passed through Card 14 in this manner. The low speed crystal on Card 14 provides the Local Oscillator Input signal on pin B32. These pulses are passed to Card 12 and become an input on pin B32. The Local Switch input on pin A32 of Card 12 determines whether the high or low speed oscillator on this card will provide the Oscillator Input signals on pin B4.

3.209 The Oscillator Input comes into Card 11 on pin A21 to provide the clock pulses to advance the serial data at pin B14 into the register on a bit by bit basis. As the last bit enters the register, the first bit has reached the last element of the register. When this happens, a VL Receive Character Available (RCA) signal appears on pin B18 of Card 11. When the character is loaded into the register, the bit 1 through bit 8 outputs corresponding to the character appear at pins A23 through A17. These signals are on the order of VL Space and VH Mark.

3.210 When VH or VL distributor output pulses are available for pins B4 through A31 of Card 3 (buffer), the VL RCA signal is applied to Card 6 on pin B6 to provide a VL Distributor Sample pulse 100 ms long on pin B8. This pulse also provides a VH Brake Control signal on pin A5. Along with the VL Distributor Sample signal, a VL Capstan Direct signal will provide a VL FWD Clutch Control and a VH REV Clutch Control signal, respectively, on pins A9 and B10 of Card 6. The VL Distributor Sample signal is applied to Card 3 on pin B32 to set the Distributor Output signals into the Buffer. After this the register on Card 11 will be reset and the VL RCA signal on pin B18 will go to VH.

3.211 A VH Brake Control signal is applied to Card 9 to provide a VH Brake Coil signal on pin B30; the brake turns off. A VL FWD Clutch Control signal is applied to Card 9 on pin B8 to cause the FWD Coil signal on pin A4 to go to VL to turn on the forward coil. A VH REV Clutch Control signal on pin B10 holds the REV Coil signal on pin B6 at VH. The capstan begins to move the tape, and simultaneously the Ninth Track Amplifier on Card 1 (read amplifier card) reads the clock track signal on the tape and causes the CLK TRK signal on pin B6 to go from VL to VH to VL. This signal is passed to Card 8 on pin A9, where a VL to VH to VL Gated Clock Track signal is generated on pin B10. This signal comes into Card 6 on pin B18 to turn on the Timer Control Latch.

3.212 As the timer begins to count, on the first output of the frequency divider, the VL Write Strobe signal on pin A17 will go to VH. This signal is applied to Card 2 (write amplifier) on pins A13 and B8. The VL Receiver Ready signal is applied to Card 2 on pin A5 to prime the logic for passing the incoming parallel data. The VH Write Strobe signal allows the parallel data to enter Card 2 on pins A23, B24, A25, B26, A27, B28, and A7. These signals are called Buffer Outputs 1 through 7. The Write Input 8 signal comes out of Card 3 on pin B28 and into Card 2 on pin B12. A VH Mark signal or a VL Space signal will be transformed by Card 2 into a polar signal of the order VH (+1 v) Mark through 0 v to VL (-1 v) Space and back to VH (+1 v) upon the Write Strobe signal returning to VL.

3.213 The write mode will be concluded as the Buffer Reset signal goes to VL and the Brake Control signal goes to VL. The FWD Clutch Control signal will return to VH. While the Brake Control signal changes state, its input to Card 10 on pin A9 causes the STOP lamp to blink.

3.214 The high speed receive mode utilizes the same procedure with the exception of using the High Speed Receive Data input to Card 14 on pin A17 and the high speed oscillator on Card 12.

3.215 The receive data mode of operation can continue, either high or low speed continuously. The only signal that will completely inhibit this mode is a VL Record Interlock Switch signal applied to Card 7 on pin B4. This signal will hold the Receive Select signal at VH and prevent the Receive signal from going to VL. The only other manner of inhibiting the entry into the receive data mode is by Tape Position Indicator signals being VL.

Parallel Device Adjunct

3.216 In tape sets designed for use with parallel interface devices, such as the CDT, the receive mode is established by the message control circuitry on Card 7 (Device Control). Assuming the tape set is capable of being selected as a receiver (the Receiver Selectable lead is on), the related terminal places it in the receive mode by turning on its Receive Message lead.

3.217 The tape set is selectable if there are no alarm conditions and if it is not already in another operating mode. With no alarm conditions, the Low Tape, End of Tape, and Begin of Tape leads are all off, placing highs at pins B12, B10, and A11 of Card 7. If the photolamp is operating, no alarm signal is produced by the photolamp burnout detect circuitry, and if the Record Interlock lead is off, there is a VH at pin B4. To assure that the set is not already in an operating mode, the Send Message, Receive Message, and Record Clock Track leads are off, placing highs at pins A13, A15, and B14. These highs are gated together to produce a low at pin B8 (Receiver Selectable) of Card 7.

3.218 The Receiver Selectable signal is fed to pin B13 of Card 14, and is gated through to pin B6. A VL on this lead indicates to the adjunct terminal that the tape set is capable of being placed in the receive mode.

Note: A VL on any of the leads mentioned in 3.217 or an alarm from the photolamp burnout detect circuit on Card 7 would cause pin B6 of Card 14 to go VH (off), and prevent the receive mode from being initiated.

3.219 To initiate the receive mode, the related terminal turns on its Receive Message lead. This places a VL on pin B19 of Card 14 which is gated through to pin A14. This VL is fed to Card 7, pin A15.

3.220 The VL on pin A15 inhibits the Forward and Reverse Send Selectable signals at pins A7 and B6, and inhibits the fast access circuitry on Card 7. It also turns on the Motor Start lead (pin B22) to turn on the transport motor. After a short time delay to insure that the motor is up to operating speed, the Motor On lead (pin B20) turns on. This enables the receiver ready circuitry.

3.221 The Receive Message signal at pin A15 of Card 7 results in a VL Receiver Ready signal at pin A9, a VH External Brake signal at pin B18, a VL Capstan Direction signal at pin A27, and a VL External Clutch signal at pin A19. The Receiver Ready signal is applied to Card 2, pin A5 to serve as a write prime for the write amplifier, and to Card 6, pin A19 to prime the gated clock track circuitry. It is also applied to Card 14, pin A16, where it is gated through to pin B5 to complete the initial signal interchange between the tape set and the related terminal.

3.222 In the receive mode, the exchange of data is controlled by the Request Next Character (RNC) and Receive Character Available (RCA) signals. When the Receiver Ready signal turns on, it causes the RNC signal at Card 6, pin A23 to turn on (VL). This signal is applied to Card 14, pin A29, and is gated through to pin A28. Fed to the related terminal, it is an indication that the tape set is ready to receive a character. If the terminal has a character to send, it places the eight bits on its data leads. The bits are applied to pins A5 through A19 of Card 13, are gated through to pins B5 through B19, and are fed to pins B4 through A31 of Card 3.

3.223 When the related terminal places a character on its data leads, it supplies an RCA signal (VL) to pin A6 of Card 14. This signal is gated through to pin A7, and is fed to Card 6, pin B6 to produce a Distributor Sample pulse at pin B8. The VL Distributor Sample pulse is applied to pin B32 of Card 3, where it loads the eight data bits into the buffer. The RNC signal is also turned off to indicate to the related terminal that a character is being processed and no further data should be sent. The related terminal turns off its RCA lead and removes the character from its data leads.

3.224 The Distributor Sample pulse also sets a clutch/brake latch on Card 6, causing the Brake Control lead (pin A5) to turn off and the Forward Clutch Control lead (pin A9) to turn on. The VH Brake Control signal is applied to Card 9 to provide a VH Brake Coil signal out of Card 9 on pin B30, and the brake turns off. The VL Forward Clutch Control signal is applied to Card 9 on pin B8 to cause the Forward Coil signal on pin A4 to go to VL to turn on the forward coil. A VH Reverse Clutch Control signal on pin B10 holds the Reverse Coil signal on pin B6 at VH.

3.225 The capstan begins to move the tape, and simultaneously the ninth track amplifier on Card 1 (read amplifier card) reads the clock track signal on the tape and causes the Clock Track signal on pin B6 to go from VL to VH to VL. This signal is passed to Card 8 on pin A9, where a VL to VH to VL Gated Clock Track signal is generated on pin B10. This signal comes into Card 6 on pin B18 to turn on the timer control latch. As the timer begins to count, the VL Write Strobe signal on pin A17 will go to VH. This signal is applied to Card 2 (write amplifier) on pins A13 and B8. The VL Receiver Ready signal is applied to Card 2 on pin A5 to prime the logic for passing the incoming parallel data. The VH Write Strobe signal allows the parallel data to enter Card 2 on pins A23, B24, A25, B26, A27, B28, and A7. The Write Input 8 signal comes out of Card 3 on pin B28 and into Card 2 on pin B12. A VH Mark signal or a VL Space signal will be transformed by Card 2 into a polar signal of the order VH (+1 v) Mark through 0 v to VL (-1 v) Space and back to VH (+1 v) upon the Write Strobe signal returning to VL.

3.226 The write mode will be concluded as the Buffer Reset signal goes to VL and the Brake Control signal goes to VL. The Forward Clutch Control signal will return to VH. The RNC lead turns on to indicate that the tape set is ready for the next character. While the Brake Control signal changes state, its input to Card 10 on pin A9 causes the STOP lamp to blink.

J. Auto Rewind

3.227 The auto rewind card (TP322485) is an optional circuit card used to provide the rewind operations described in Paragraph 2.24. This card, when used, mounts in connector XZ5 of the electronics module. Details of installation and special wiring required for this card are provided in Section 578-300-200.

Note: The auto rewind card is an alternative to the TP322465 character recognition expander card (only one of these cards can be used in a terminal). This card cannot be used in a tape set used as an adjunct to a parallel device or to a 37 KSR to provide ASR operation (37 R-T interface).

3.228 The card contains a counter/decoder and the control logic necessary to detect control codes and initiate the rewind action. This card effectively "switches" the tape set to various operating modes by manipulating the control switch leads. The circuitry is shown in wiring diagrams 1054SD-B19 and B20. Operation is described in the following paragraphs.

Start in Receive Mode

3.229 If the tape set is set up for auto-answer (on-line) in the receive mode, with the function selector switch set to character A, the rewind card will initiate a rewind upon detecting an EOT character at the end of the received message. The logic switches the tape set out of the receive mode and places it in the reverse search mode until an FS is detected. The tape set then switches to the local send mode, sends the message to the local adjunct for print-out, and reverts to the receive mode upon detecting the EOT at the end of the message. Note that the incoming message must start with an FS and end with an EOT to provide the rewind operation.

3.230 With the DATA MODE switch set to ON LINE AUTO, the DATA RECEIVE button depressed, and the function selector switch set to the (A) position, the following preliminary conditions exist: The function selector switch places a VL on pin A9 and the Receive signal from Card 10 places a VL on pin B22. These signals prime the rewind logic, which monitors the buffer output at pins B6, A7, B8, B10, A11, B12, B14, and B16 of Card 5. The tape set provides its normal receive operation.

3.231 Rewind is triggered by an EOT, which is detected by a decoder on Card 5. The VH Write Strobe pulse at pin A23, together with the output signal of the EOT decoder, sets the counter in the rewind circuit. The output of the counter is decoded to produce a VL at pin A19 when the Write Strobe pulse ends. (Waiting for the end of the Write Strobe pulse insures that the EOT will be written on the tape before rewind takes place.)

3.232 The VL on pin A19 turns on the Reverse Search Switch lead, placing the tape set in the reverse search mode. The logic also places a VL on pin A21 (Receive Reset). This VL is fed to pin B8 of Card 10, where it is used to drop the tape set out of the receive mode. The Receive signal at pin B22 of Card 5 then goes VH, removing the Receive Reset pulse from pin A21.

3.233 A VL is also applied to pin A29, turning on the Local Switch lead and placing the tape set in the local mode. A VL at pin B4 turns on the Motor Control lead to energize the motor in the local teletypewriter adjunct. The DTR(N) lead is turned off by a VL at pin A15, disconnecting the data set from the high-speed line to prevent it from answering calls during rewind.

3.234 The tape set goes through its normal reverse search routine with Card 5 monitoring the buffer output for an FS character. When FS is detected, an end-of-rewind latch is set on Card 5. This results in a VH on pin A19, turning off the Reverse Search Switch lead. A VL pulse is also placed on pin B24, turning off the Search Only — Stop Prime lead. The tape set drops out of the reverse search mode.

3.235 When the end-of-rewind latch is set, it triggers an end-of-rewind timer on Card 5. After a 150 ms time-out, this timer generates a brief pulse to advance the counter to its next state. In this state the decoded output of the counter produces a VL at pin B28 which turns on the Send Switch lead. This VL is fed to pin A15 of Card 10, where it initiates the send mode. The Send signal at pin B20 of Card 5 is driven VL. Through the Card 5 logic, this causes the Send Switch signal at pin B28 to go back to VH.

3.236 The tape set is now in the local send mode. It reads the characters from the tape and provides a print-out on the local teletypewriter adjunct. Card 5 monitors the buffer output for the EOT at the end of the message. When EOT is read, the EOT decoder output clocks the counter and advances it to a "print-out complete" state.

3.237 The counter remains in this state until the SCA pulse ends. (This insures that the EOT is completely sent.) In this state the counter/decoder primes the logic to revert to the original auto on-line receive mode, which does not occur until the transmitted EOT is detected by the character recognition logic on Card 4.

3.238 When the EOT is detected by Card 4, the Send signal at pin B20 of Card 5 is driven VH. Through the circuit logic, this places the counter in its original "receive" state which, in turn, causes a VL to appear on the Receive Switch lead (pin A25). This VL is fed to Card 10, where it initiates the receive mode and thereby produces a VL at pin B22 of Card 5. The VL on pin B22 results in a VH at pin A25, turning off the Receive Switch signal.

3.239 With the counter returned to its receive state, the logic turns off the Local Switch signal, placing the tape set on-line. The Motor Control signal also turns off, de-energizing the motor of the local teletypewriter adjunct. The DTR(N) lead goes VH, permitting the data set to respond to incoming calls. The tape set is now back in its initial auto on-line receive mode.

Option: Strap 5B provides the option of rewinding to the beginning of the message printed out locally before switching back to the receive mode. If strap 5B is removed, the counter control logic is modified so that detection of EOT at the end of the local print-out causes the Reverse Search Switch lead to turn on (a VL at pin A19). The tape set reverse searches to FS, which causes the Search Only — Stop Prime signal to turn on (a VL at pin B24) and the end-of-rewind latch to be set. When the end-of-rewind timer times out (150 ms) the counter advances to the receive state to await the next message.

3.240 The rewind circuit can be reset by moving the function selector switch out of the selected character position, or by depressing the STOP button. Either of these operations places a VL on the master reset lead of the counter and resets the counter to its zero state.

Rewind in Send Mode

3.241 If the tape set is set up for auto-answer (on-line) in the send mode, with the function selector switch set to character A, the rewind card will monitor the message being sent, then switch to the receive mode to await incoming calls when an EOT is sent. Once the circuitry has been placed in the receive mode, all operation is as explained for the Rewind in Receive Mode.

3.242 In the initial on-line send mode, the Send lead is on and the Receive lead is off, placing a VL at pin B20 and a VH at pin B22 of Card 5. The decoders monitor the transmitted characters as they appear at the output of the buffer. Each time a character is placed in the buffer, the SCA lead turns on (a VL at pin B32) and the decoders sample the character.

3.243 This sampling occurs character-by-character until an EOT appears. The resulting change in the EOT decoder output is gated to clock the counter of the rewind circuit. This advances the counter to an "EOT sent" state. The EOT is also detected by the character recognition circuit on Card 4, dropping the tape set out of the send mode. The Send signal at pin B20 of Card 5 turns off, and the resulting VH is used to advance the counter to its "receive" state.

3.244 In this state the counter/decoder turns on the Receive Switch lead (a VL at pin A25). The tape set is placed into the auto on-line receive mode, and is ready to accept incoming calls from the high-speed line. Once this mode has been established, operation is exactly as explained for the Rewind in Receive Mode.

Option: Strap 5C provides the option of rewinding to the beginning of the message sent out on-line before switching to the receive mode. With this strap removed, the counter control logic is modified so that detection of EOT at the end of the transmitted message causes the Receive Reset lead to turn on (a VL at pin A21). This prevents the tape set from going into the receive mode, and initiates a reverse search by turning on the Reverse Search Switch lead (a VL at pin A19). When FS is detected the Search Only — Stop Prime lead turns on (a VL at pin B24) and the end-of-rewind latch is set. When the end-of-rewind timer times out (150 ms) the counter is advanced to the receive state.

On-Line Test Mode

3.245 With the tape set in the on-line receive mode and the function selector switch set to character B, the auto rewind card provides an on-line operating test of transmission accuracy. In this mode the tape set receives the incoming message from the high-speed line, rewinds to FS upon detection of EOT at the end of the message, then transmits the message back to the sender and reverts to the receive mode. The return message can be compared to the original to check for accuracy.

3.246 The (B) setting of the function selector places a VL on pin A13. This VL is coupled to pin A9 to enable the rewind operation as described for character A. It is also applied to the control logic to prevent the circuit from going into the local mode after rewind, and to hold the DTR(N) lead on for retransmission of the message. Thus the rewind is the same as explained for the switch A position but the tape set sends the message on-line rather than providing a local print-out after the rewind occurs.

3.247 The 5B and 5C options of Paragraphs 3.239 and 3.244 are the same for the (B) setting as for the (A) setting.

Data Blocking

3.248 The auto rewind card provides data blocking when the function selector switch is in the (C) position and the tape set is in the on-line send mode. In this mode of operation the tape set transmits data until a blocking character is detected, at which time it stops transmitting but remains in the send mode. The remote terminal turns off its reverse channel carrier in response to the stop character, and processes the block of data received up to that point. Transmission resumes when the remote terminal turns its reverse channel back on. This action is repeated each time a blocking character appears in the message.

3.249 The blocking character can be either an RS or Λ. The user selects one of these characters by means of a shunt screw on the TP322485 card. The method of programming is explained in Section 578-300-200.

3.250 With the function selector switch in position (C), a VL is applied to pin A17. Each time the SCA signal at pin B32 goes VL, a decoder samples the buffer output for the blocking character. If the blocking character is not present, normal send operation continues.

3.251 The output of the decoder serves as one input of a blocking character latch. This latch is also controlled by the Send Switch signal (pin B28), the Local Switch signal (pin A29), the Send signal (pin B20), and the $\overline{\text{RCR}}$ signal (pin A27). With the tape set operating in the send mode and receiving reverse channel from the remote receiver, the latch is in its reset state and does not affect the send operation.

3.252 When the stop character is detected, the decoder output sets the latch. This results in a VL Control Code Delay signal on pin B18. This VL, applied to pin A15 of Card 12, prevents further transmission by disabling the PNC signal. The remote terminal turns off its reverse channel carrier, forcing the $\overline{\text{RCR}}$ signal to go VL at pin A27. This VL resets the blocking character latch. The tape set resumes transmission when the remote terminal turns its reverse channel back on, thereby enabling the PNC circuitry.

Option: Strap 5D provides the option of data blocking in the (A) and (B) positions of the function selector switch (in addition to the basic blocking action in the (C) position). A VL on the Switch A lead (pin A9) enables the decoder to permit selection of the selected stop character (RS or Λ). During the on-line send portion of the message, the blocking action occurs as explained for data blocking in the (C) position. This feature is disabled by removing strap 5D.

3.253 The blocking character latch can be reset manually by depressing the SEND button. This places a VL on the Send Switch lead (pin B28) to reset the latch and turn off the Control Code Delay signal (pin B18 goes VH). This gives the operator a method of overriding the automatic blocking action and restarting transmission manually.

Rewind on Premature Channel Disconnect

3.254 With the function selector switch in the (A) or (B) position, the TP322485 card provides a rewind in case of a premature channel disconnect during on-line transmission. This function is controlled by a latch which is set by the first SCA pulse of the transmission. If no channel disconnect occurs, the message will be completely transmitted in the normal manner. Completion of the message will reset the latch.

3.255 If a disconnect occurs during the transmission, the DSR (EIA) signal turns off. This places a negative voltage on pin A3 and, through the control logic, advances the counter to a "rewind-on-premature-disconnect" state. The decoder detects this change in the counter output to reset the premature disconnect latch and to turn on the Receive Reset lead (a VL at pin A21). The VL Receive Reset signal is fed to pin B22 of Card 12, where it is gated to produce a VL Input Reset signal at pin B16. The Input Reset signal, in turn, is fed to the mode control logic on Card 10, where it serves to remove the tape set from the send mode. The Reverse Search Switch lead (pin A19) of Card 5 also goes VL to initiate the reverse search mode.

3.256 The tape set reverse searches to the FS at the beginning of the message. When the FS is decoded, the tape set drops out of the reverse search mode as described previously, and the counter is advanced to turn on the Send Switch lead (VL at pin B28). When the tape set goes into the send mode, the Send Switch signal turns off and the counter is advanced to its start mode. The tape set is now set up in its send mode at the beginning of the message, ready to transmit the complete message when a new call is established.

Manual Search

3.257 With the function selector switch in position (A) or (B), the auto rewind card permits manual search for an FS character. Depressing the SEARCH button (forward or reverse) provides a normal search function. When an FS character is detected by the FS decoder on Card 5, the Search Only — Stop Prime signal at pin B24 goes VL to remove the tape set from the search mode.

3.258 If the function selector switch is set to position (C), the auto rewind card permits manual search for an RS or Λ character, whichever is programmed on the card. The SEARCH button (forward or reverse) is depressed to provide the normal search function. When the RS or Λ character is detected by the RS/Λ decoder, the Search Only — Stop Prime signal goes VL at pin B24, removing the tape set from the search mode.

4. STRAP OPTIONS

4.01 There are a number of strap options that can be performed on the electronics module. Examples of options are: 10-11 Unit Code option; Reverse Channel option; or Internal/External Clocking option. The options are discussed in detail in Section 578-300-200.

5. TECHNICAL DATA

5.01 The following dimensions are for the floor-mounted magnetic tape set:

33/35/37 Teletypewriter Adjunct

Height	29 to 30 inches (adj)
Width	12 inches
Depth	23 inches
Weight	97 pounds

Parallel Device Adjunct

Height	32 inches
Width	12 inches
Depth	24 inches
Weight	97 pounds

5.02 The magnetic tape set reads and records data on one-half inch computer grade magnetic tape, which is provided in a 150,000 character capacity cartridge. The set provides in-line threading and automatic unloading features for tape handling.

5.03 The following are the electrical characteristics of the magnetic tape set:

Power Consumption (less data set)	180 watts
Voltage	117 v ac ±10%
Frequency	60 Hz ±0.5 Hz
Start Current	.11 amp
Run Current	2-1/2 amp
Power Input	Power cord, 10 ft long three-wire grounded type

5.04 The following are the interface requirements:

33/35 Teletypewriter Set	20 mA at +20 v dc
37 Teletypewriter Set	RS232B
200 Series Data Set	RS232B
Parallel Device (with voltage-sensitive interface)	0 and 5 v dc parallel
CDT (with accessory module)	0 and 25 mA

5.05 This equipment is to be operated in a room environment within the temperature range of +40°F to +110°F. Serious damage to it could result if this range is exceeded. In this connection, particular caution should be exercised in using acoustical or other enclosures.