Technical Manual No.

799800-000D

OPERATION AND MAINTENANCE INSTRUCTIONS FOR MODEL 100X MAGNETIC TAPE RECORDER

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PREFACE

This manual presents the information required for operation and maintenance of the Cipher Model 100X Magnetic Tape Recorder. Please read this document thoroughly before unpacking, installing, or operating the recorder. The manual is divided into seven sections plus the addendum (if any) applicable to the specific recorder for which this manual is intended. The sections and addenda are as follows:

I Description and Specifications
II Unpacking, Inspection, and Installation
III Operation
IV Theory of Operation
V Maintenance
VI Troubleshooting
VII Parts Lists, Schematics, and Assembly Drawings

Addendum A - Phase-Encoded Recorders
Addendum D - Configuration for 75-ips Tape Speed

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SECTION I

DESCRIPTION AND SPECIFICATIONS

1-1. GENERAL

1-2. The Model 100X Magnetic Tape Recorder is a high-performance, digital, tape recorder manufactured by Cipher Data Products, Inc., San Diego, California. The recorder is available with a dual-gap head, providing read-after-write capability, or a single-gap head for applications where simultaneous read and write operations are not required. The recorder is designed to operate on 105- to 250-Vac, single-phase, 48- to 63-Hz line power. If the compliance arm retraction feature is not required, the recorder can operate on line power frequencies up to 420 Hz. Reels to 10.5 inches in diameter can be accommodated. Various tape-speed and density capabilities and other options are available, as follows:

a. Operation in the following modes:

   (1) Seven- or nine-track

   (2) Read-after-write

   (3) Read/write

   (4) Write only

   (5) Read only

b. Overwrite

c. Tape speeds:

   (1) Standard: 45, 37.5, 25, 18.75, or 12.5 ips

   (2) Nonstandard: Any fixed speed within the range of 2 to 45 ips

d. Data densities: 800, 556, 200 bpi (NRZI); 1600 bpi (PE)

e. Dual-density combinations: 800/556, 800/200, 556/200 bpi

f. Local density selection

g. Remote density selection

h. Power: 400-Hz operation (without compliance arm retraction system)

i. Logic options (see paragraph 4-29)

j. Facade color (white is standard)

1-3. PURPOSE

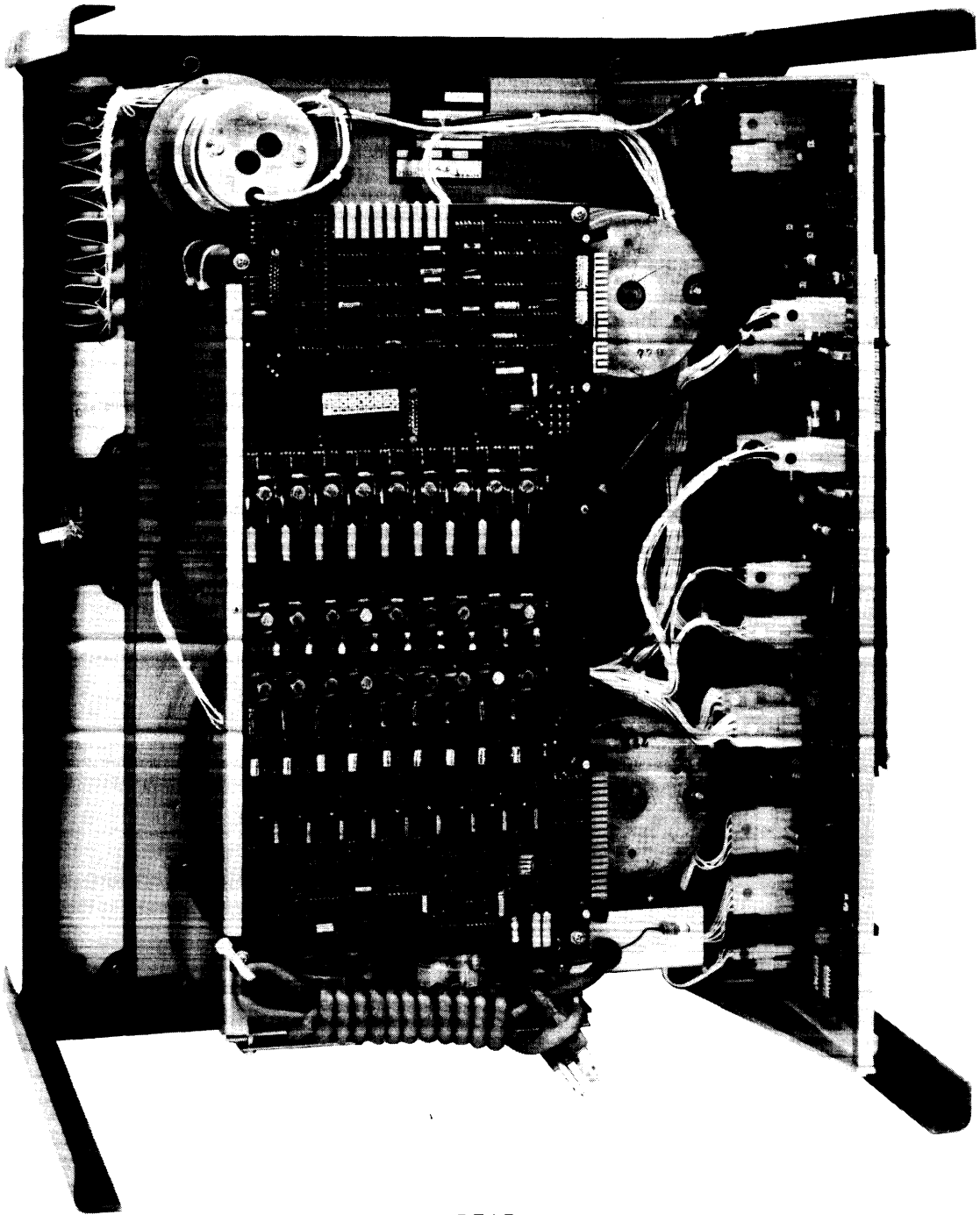
1-4. The recorder is designed to be used in data acquisition and computer processing systems in which data must be acquired and stored on magnetic tape. Writing and reading of digital data are performed in IBM-compatible, NRZI format. Data recorded by a Model 100X recorder is completely recoverable by IBM or similar equipment.

1-5. PHYSICAL DESCRIPTION

1-6. The Model 100X recorder (Figure 1-1) is designed to be hinge-mounted in a standard 19-inch equipment rack. All components are mounted on a precision-ground, cast-aluminum plate. When the equipment rack is securely anchored, the printed circuit boards and other internal components can be made accessible from the front by releasing the adjustable pawl fastener and swinging the recorder open on its hinges. A transparent, hinged, front cover protects the transport from dust and other foreign matter while allowing observation of tape motion. The pushbutton controls, which illuminate when the commanded sequence is complete, are mounted on the front trim panel, where they are accessible with the cover closed. The power connector is a standard, three-pin, grounded plug.

FRONT

Figure 1-1. Model 100X Recorder (Sheet 1)



REAR

NOTE: Recorder shown in shipping frame. (Removed in use.)

Figure 1-1. Model 100X Recorder (Sheet 2)

1-7. Four printed circuit boards are used in the Model 100X40 recorder: a read/write board, a control/servo board, and a power board, all mounted on the rear of the mounting plate. An EOT/BOT detector board is mounted on the front of the unit, under the head cover. The Model 100X60 recorder has a fifth board, a single-gap, head-adapter board mounted to the read/write board, providing for single-gap head operation.

1-8. TAPE TRANSPORT

1-9. The reel-to-reel transport uses two servo-controlled, direct-drive, dc torque motors to drive the tape reels. The reels are secured to their hubs by lever-actuated expanding rings. Two spring-loaded compliance arms maintain tape tension at 8 ounces and serve as tape-storage buffers. A compliance arm retractor system, energized when power is turned on, drives the compliance arms to their full-up positions for ease of tape threading. During the load sequence the compliance arms are returned to their operating positions to perform buffering and tensioning functions.

1-10. The tape path includes both roller and fixed guides, the head, cross-feed shield, and a tape cleaner. The roller guides utilize precision bearings to minimize friction and reduce wear, and the wearing surfaces of the fixed guides are hard-chrome plated. The fixed guides, on each side of the head, are of the single-edge type. The outer (reference) flange of each guide is fixed to an exact dimension, and the bottom flange is spring loaded to force the tape against the reference edge at all times. This arrangement provides minimum skew and minimizes the effect of tape width variations. In addition, the head and cross-feed shield are mounted on an adjustable plate which provides for precise azimuth alignment.

1-11. A tape cleaner is mounted between the supply reel and the lower compliance arm roller guide to minimize tape contamination. The curved cleaning surface is made of burr-free, nonmagnetic, stainless steel with chemical-etched perforations.

1-12. FUNCTIONAL DESCRIPTION

1-13. Figure 1-2 is a system block diagram. The Model 100X recorder uses a 180-degree-wrap capstan drive for controlling tape movement during write, read, and rewind operations. The capstan is controlled by a velocity servo. The velocity information is generated by a dc tachometer that is directly coupled to the capstan motor shaft and produces a voltage proportional to the angular velocity of the capstan. This voltage is compared to the reference voltage from the ramp generator by means of operational amplifier techniques, and the difference is used to control the capstan motor. This capstan control technique gives precise control of tape accelerations and tape velocities, thus minimizing tape tension transients.

1-14. During a write operation, the tape is accelerated in a controlled manner to the required velocity. This velocity is maintained constant, and data characters are written on the tape at a constant rate. Thus, the following relationship exists:

$$\text{Bit density} = \frac{\text{Character Rate}}{\text{Tape Velocity}}$$

1-15. When data recording is complete, the tape is decelerated to zero velocity in a controlled manner. Since the write operation relies on a constant tape velocity, inter-record gaps (IRG) must be provided to allow for the tape acceleration and deceleration periods. Control of tape motion to produce a defined IRG is provided externally by the customer controller, in conjunction with the tape acceleration and deceleration characteristics defined by the recorder specifications.

1-16. An optional overwrite feature provides for editing of previously recorded data. The Overwrite signal causes Write Enable to ramp on and off, minimizing the change in inter-record gap magnetism in rewriting a record. Write Reset, used with the over-write option, causes both write head current and erase head current to be turned off immediately after writing of the new record to prevent destruction of data in the following record.

1-17. During a read operation, the tape is accelerated to the required velocity in a time interval sufficiently short to allow tape velocity to become constant before data signals are received. Seven or nine data channels are presented to the interface, depending on the recorder model. They are accompanied by a Read Data Strobe (RDS) pulse derived from a monostable multivibrator circuit. The end of a record is detected in the customer controller by means of gap-detection circuits, and the tape is commanded to decelerate in a controlled manner. The transport can operate in the read mode in either the forward or reverse direction. When operating in a shuttling mode (e.g., synchronous forward, stop, synchronous reverse, and stop) no turnaround delay is required between the end of one motion command and the beginning of the next motion command in the opposite direction. To guarantee IBM-compatible tapes, with

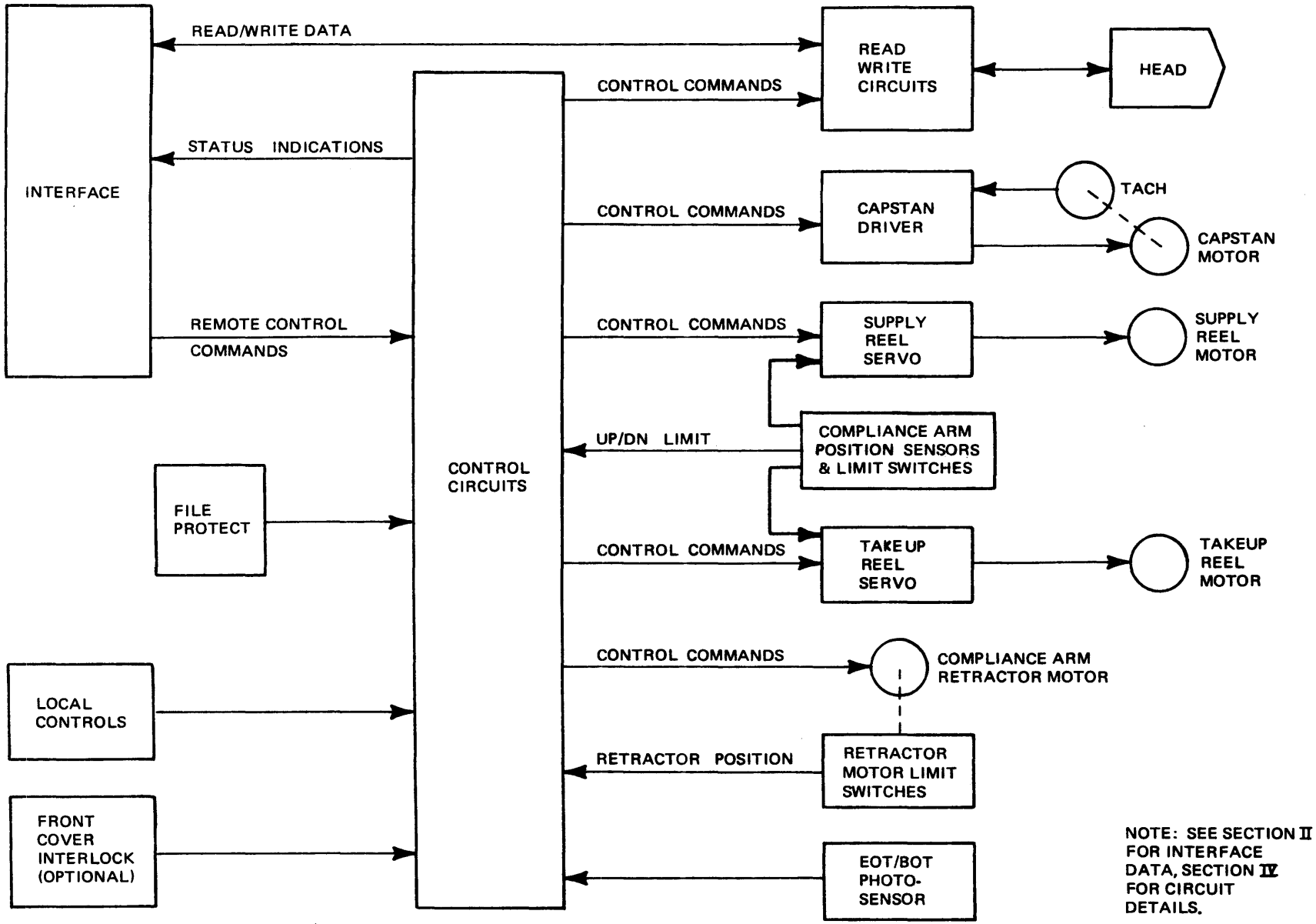


Figure 1-2. System Block Diagram

fully saturated gaps and precise dimensions, tape motion must be allowed to cease before switching of the motion control lines and Write Enable line.

1-18. In addition to the capstan control system, the recorder incorporates supply and takeup reel servo systems, a compliance arm system, a magnetic head and associated read/write electronics, and the control logic.

1-19. The compliance arms compensate for differences in tape speed arising out of the relatively fast starts and stops of the capstan and those of the slower, high-inertia supply and takeup reels. When the rate of tape travel at the capstan differs from that at which the reels are supplying or taking up the tape, the supply and/or takeup reel compliance arms move to compensate for this difference. At the same time, a photoelectric sensor measures the resulting displacement of each arm and feeds an error signal to the respective reel motor servo. This signal is amplified and is used to control the reel motor, increasing or decreasing its speed as necessary to compensate for the momentary difference in tape speed and bring the compliance arm back to its nominal operating position. The compliance arm system is designed to provide a constant tape tension of 8 ounces, as long as the arms are within their operating regions. Tape spillage is prevented, in the event power is lost, by a self-braking feature designed into the servo circuitry. When power is lost the takeup reel motor terminals are connected together through a current-limiting resistor, and the supply reel motor terminals are directly connected, producing a dynamic braking action.

1-20. The magnetic head, under control of the read/write electronics, writes and reads the flux transitions on the tape. On the read-after-write recorder, the read function is operating continuously, while the write function must be enabled in order to operate. On the recorder with the single-gap head, the read and write functions are controlled by remote command. An erase head provides continuous dc erasure across the full width of the tape during write operations.

1-21. The control logic operates on manual commands to enable tape, once loaded, to be brought to the load point. At this stage remote commands control tape motion, writing, and reading. The logic also provides rewind and unload functions in conjunction with the manual REWIND control. A photoelectric sensor assembly, consisting of a lamp and two phototransistors, is used to detect the beginning-of-tape (BOT) and end-of-tape (EOT) markers as well as unthreaded or broken tape. The detection area of the sensor assembly is approximately 1.2 inches from the write head gap.

1-22. MECHANICAL AND ELECTRICAL SPECIFICATIONS

1-23. The mechanical and electrical specifications for the recorder are shown in Table 1-1.

1-24. INTERFACE SPECIFICATIONS

1-25. Section II contains a table of interface connections. Signal characteristics are as follows:

a. Levels

(1) True is low: 0 to 0.4 volt (approximately).

(2) False is high: +3 volts (approximately).

b. Pulses

(1) Levels as above.

(2) Edge transmission delay over 20 feet of cable is not greater than 200 nanoseconds.

1-26. The interface circuits are so designed that a disconnected wire results in a false signal. Figure 1-3 shows the interface configuration for which the recorder is designed.

Net Weight	80 pounds (36.29 kg)
Shipping Weight	117 pounds (45.36 kg)
Dimensions:	
Height	24.0 inches (62.2 cm)
Width	19.0 inches (48.3 cm)
Depth (from mounting surface)	12.5 inches (31.8 cm)
Depth (total)	15.1 inches (38.4 cm)
Mounting (standard 19-in. RETMA rack)	EIA specifications
Power	115/230 Vac 48 to 63 Hz (400-Hz model available without compliance arm retraction system.) 275 watts, max.
Fuse	6.25/3.0-ampere, 3AG, slow-blow 115/230-Vac
Tape (computer grade):	
Width	0.5 inch (1.27 cm)
Thickness	1.5 mil (0.04 mm)
Reel Diameter	10.5 inches (26.67 cm)
Tape Tension	8 ounces (226.8 grams)
Recording Mode & Density:	
Seven-Track: IBM-compatible NRZI	200/556/800 bpi
Nine-track: IBM-compatible NRZI	800 bpi
Nine-track: IBM-compatible PE	1600 bpi
Tape Speed: Standard	45/ 37.5/ 25/ 18.75/ 12.5 ips
Nonstandard available	2 to 45 ips

Table 1-1. Mechanical and Electrical Specifications

Speed Variation:	
Instantaneous	± 3% (max., byte-to-byte)
Long term	± 1% (max.)
Rewind Speed	150 ips (nom.)
Start/Stop Time (inversely proportional to tape speed)	8.0 (± 0.55) ms at 45 ips
Start/Stop Distance	0.19 (± 0.02) inch (0.48 (± 0.05) cm)
Interchannel Displacement Error:	
800 bpi	150 microinches (0.004 mm) max.
556 bpi	200 microinches (0.005 mm) max.
Beginning of Tape (BOT) and End of Tape (EOT) detectors	Photoelectric (IBM-compatible)
Interface	DTL (Low True)
Electronics	All Silicon
Operating Temperature	2° to 50° C
Relative Humidity	15 to 95%, noncondensing
Altitude	20,000 feet (6096 meters) max.

Table 1-1. Mechanical and Electrical Specifications (Continued)

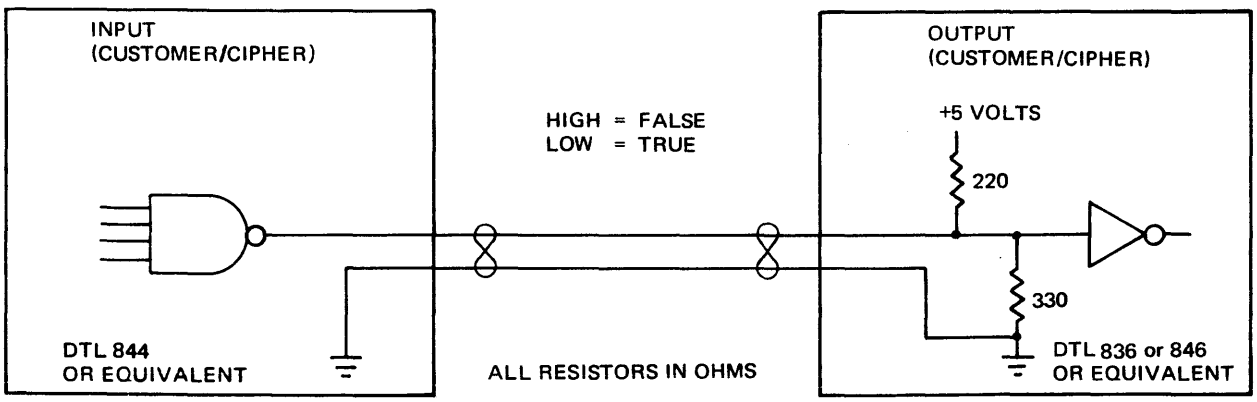


Figure 1-3. Interface Configuration

SECTION II

UNPACKING, INSPECTION, AND INSTALLATION

2-1. GENERAL

2-2. This section presents instructions for unpacking, inspecting, and installing the recorder.

2-3. UNPACKING AND INSPECTION

2-4. The recorder is shipped in a double container to minimize the possibility of damage during shipping. Unpack as follows:

a. With shipping container on floor or workbench, cut side and center tapes securing top of outer box.

b. Pull box-top flaps down along sides of box, and turn entire package over on open side of outer box. Lift off outer box and remove packing blocks.

CAUTION

Do not cut center tape of inner box without first cutting side tapes and pulling flaps away from top of container. Plastic door of recorder can be damaged by failure to observe this precaution.

c. Cut side tapes securing top of inner box, pull flaps up as far as possible, and cut center tape. Open box, fold flaps back, turn over on open side, and lift off box.

d. Check contents of shipping container against packing slip, and inspect for possible damage. **IF DAMAGE EXISTS, NOTIFY CARRIER.**

e. Examine compliance arms, reel hubs, capstan, and other components in tape path for foreign matter.

f. Check printed circuit boards and all connectors for correct installation. Check that plug-in relay on control/servo printed circuit board is securely in place.

g. Check that identification label on back of recorder bears correct model number and line voltage requirement. If actual line voltage at installation differs from that on identification label, change power transformer taps (Table 2-1). Retractor motor and power indicator wires should remain on 115-volt terminals.

2-5. POWER CONNECTION

2-6. A fixed, strain-relieved power cord is supplied for plugging into a polarized 115-volt outlet. For other power sockets, the supplied plug must be removed and the correct plug installed.

2-7. INITIAL CHECKOUT

2-8. Section III contains a detailed description of all controls. To check for proper recorder operation before placing in the system, proceed as follows:

a. Connect power cord. (Replace power plug and change power transformer primary connections if necessary.)

b. Clean tape path as directed under paragraph 5-3.

c. Load tape in accordance with instructions in paragraph 3-5.

d. Turn power on by depressing POWER control.

INPUT VOLTAGE	CONNECT TERMINALS	LINE TO TERMINALS
105	4 to 8; 3 to 7	3 to 4
115	4 to 8; 2 to 6	2 to 4
125	4 to 8; 1 to 5	1 to 4
210	4 to 7	3 to 8
220	4 to 7	2 to 8
230	4 to 6	2 to 8
240	4 to 6	1 to 8
250	4 to 5	1 to 8

Table 2-1. Power Connections

e. Momentarily depress LOAD control to apply capstan-motor and reel-motor power. Delay at this point is required to allow arm retractor mechanism to clear compliance arms.

f. Momentarily depress LOAD control a second time to initiate load sequence. Tape will move forward until it reaches BOT tab. LOAD indicator should illuminate when BOT tab reaches photosensor and remain illuminated until tape moves off load point. At this point there will be no action when LOAD control is depressed.

g. Check ON LINE pushbutton by depressing repeatedly and observing that ON LINE indicator is alternately illuminated and extinguished.

h. With recorder off line (ON LINE indicator not illuminated), press alternate-action FORWARD control. Run several feet of tape onto takeup reel, and press FORWARD control again to stop tape.

i. Press alternate-action REVERSE switch. Tape will move backward until BOT tab reaches photosensor, when it will stop.

j. Using FORWARD control, run several feet of tape onto takeup reel. Depress FORWARD control again to stop tape. Depress REWIND control momentarily to initiate rewind mode and light REWIND indicator. Tape will rewind past BOT tab, enter load sequence, return to BOT tab, and stop with LOAD indicator illuminated. If REWIND control is momentarily depressed when tape is at BOT, LOAD indicator will be extinguished, REWIND indicator will be illuminated, and tape will rewind until tape tension is lost. This action is used to unload tape (paragraph 3-7). Reel can then be removed.

k. Check components of tape path visually for correct tape tracking(tape riding smoothly in head, guides, etc.).

2-9. RACK MOUNTING

2-10. The recorder is designed to be mounted in a standard, 19-inch-wide, RETMA equipment rack. A front panel height of 24 inches and a minimum depth of 12.5 inches behind the mounting surface are required. Note outline dimensions in Figure 2-1, and, referring to Figures 2-2 and 2-3, mount the recorder as follows:

a. Install hinge pin blocks on equipment rack using 10-32 pan head screws (Figure 2-2). Do not fully tighten screws. Place No. 10 shim washer on each pin.

b. Set shipping frame down with front door of recorder facing up (i.e., lying in horizontal position). Remove screws securing recorder to frame.

c. Lift recorder out of shipping frame, position 60 degrees from closed position, and hang on hinge pin blocks. See Figure 2-3.

d. Adjust hinge blocks on equipment rack so that recorder hangs symmetrically in rack. Tighten screws.

e. Open recorder to 90 degrees and install safety blocks, using 4-40 screws (Figure 2-3).

f. Check that adjustable pawl fastener engages behind equipment rack. Adjust if necessary.

g. Clean tape deck as directed under paragraph 5-3.

2-11. INTERFACE CONNECTIONS

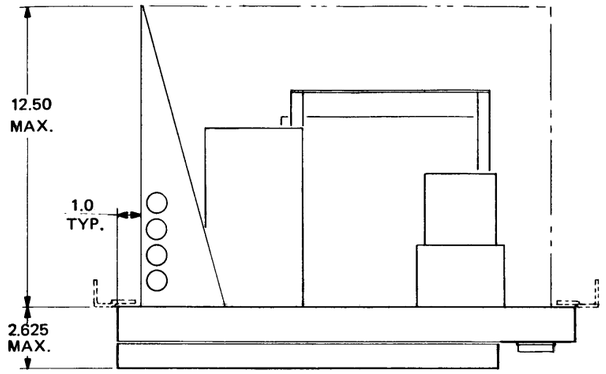
2-12. Interconnection of Cipher Data Products and customer equipment requires a harness of individual twisted pairs, each with the following characteristics:

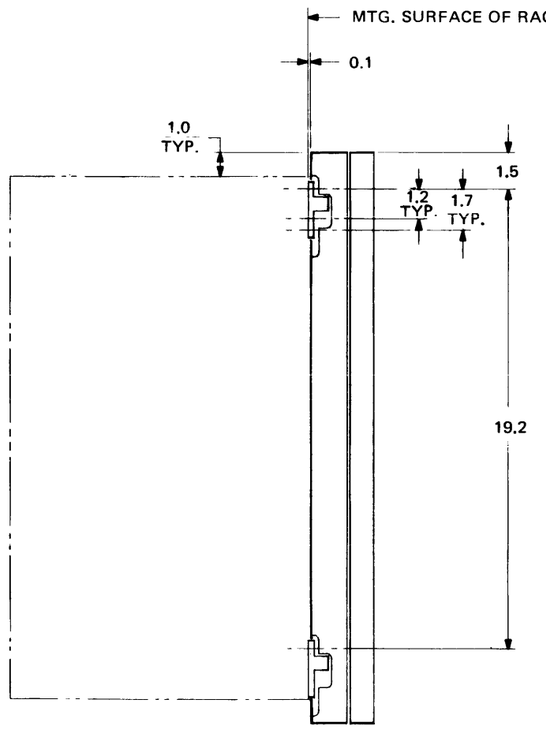
a. Maximum length of 20 feet.

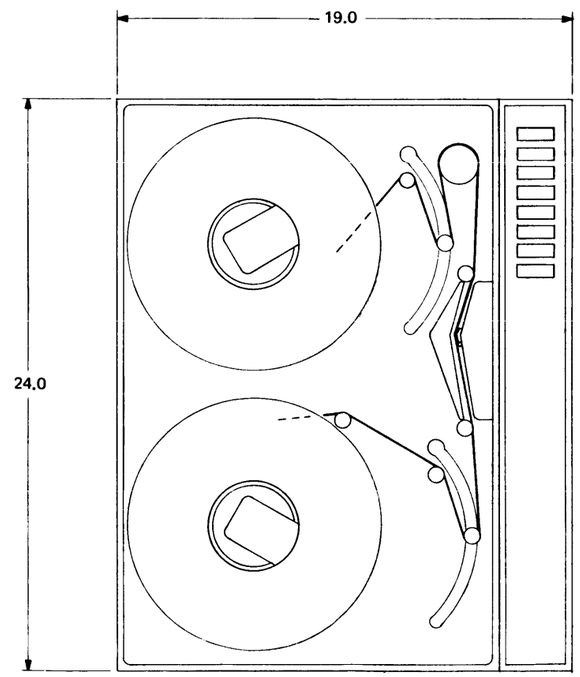
b. Not less than one twist per inch.

c. A 22 or 24-gauge conductor with minumum insulation thickness of 0.01 inch.

2-13. It is important that the ground side of each twisted pair be grounded within a few inches of the driver to which it is connected. The mating connectors (ELCO part number 00-6007-036-980-002 or equivalent) must be wired by the customer. As shown in Figure 2-4, interface signals are routed directly to and from the printed circuit boards. Strain relief should be provided. Table 2-2 shows the input/output lines required.

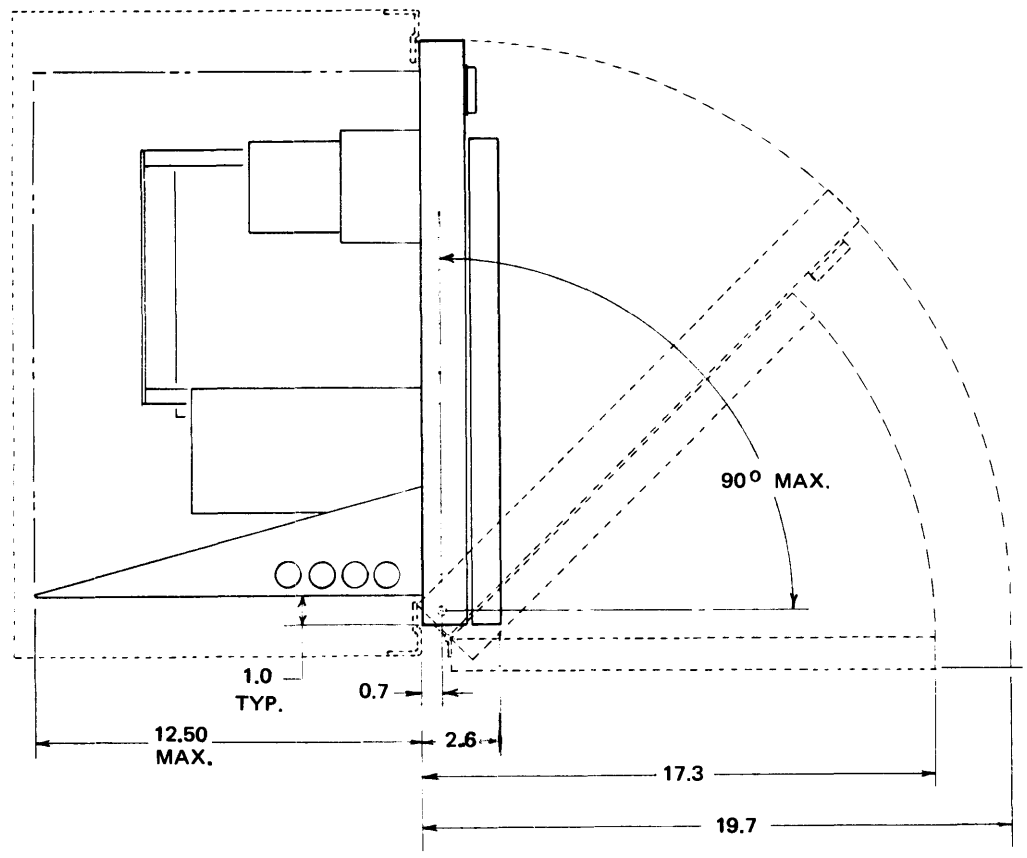


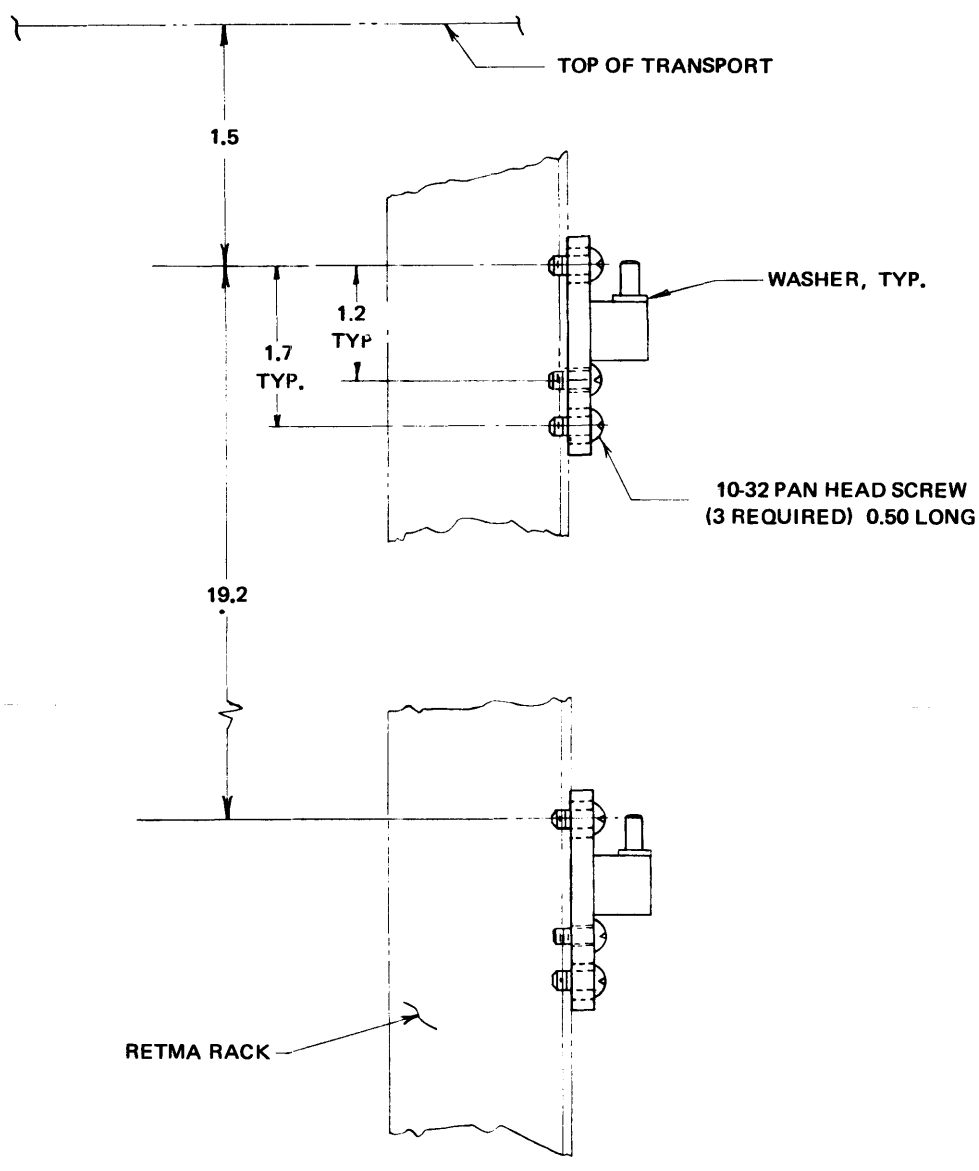




DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED

Figure 2-1. Model 100X Outline Dimensions





MOUNTING DETAIL

DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED

Figure 2-2. Rack Mounting and Dimensions

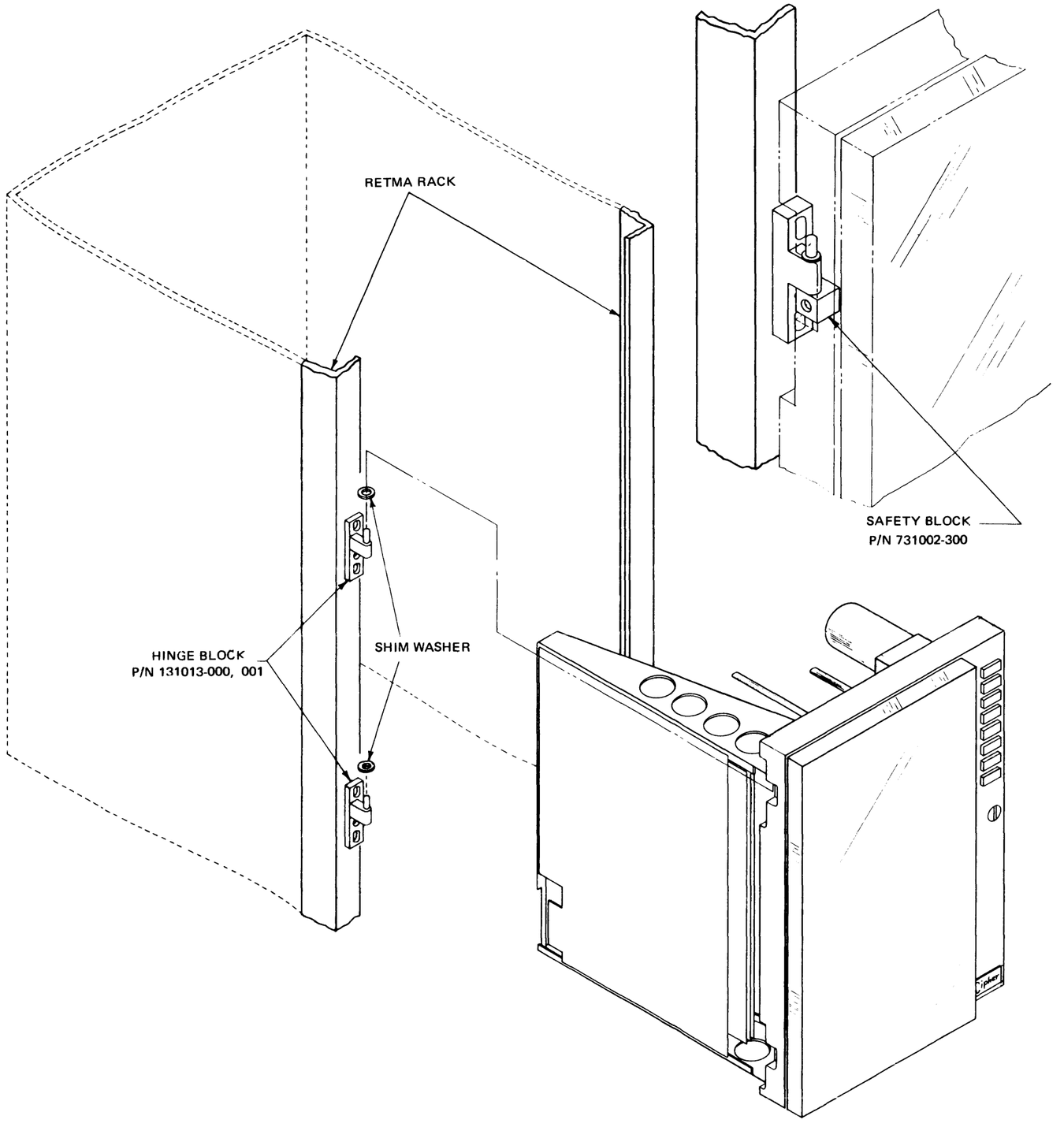


Figure 2-3. Installation Diagram

CONNECTOR	LIVE PIN	GROUND PIN	CONNECTOR
Input Commands J101	J	8	Select (SLT)
	C	3	Forward (FWD)
	E	5	Reverse (REV)
	H	7	Rewind (RWC)
	L	10	Off Line (OFL)
	K	9	Write Enable (WEN)
	B	2	Overwrite (OVW)
	15	–	Write Reset (WRS) (part of overwrite option)
	D	4	Data Density Select (DDS)
Output Indications J101	T	16	Ready (RDY)
	M	11	On Line (ON)
	N	12	Rewind (RWD)
	U	17	End of Tape (EOT)
	R	14	Beginning of Tape (BOT)
	P	13	File Protect (FPT)
	F	6	Density (DEN)
	S	–	+5V (Optional)
Write Inputs J102	A	1	Write Data Strobe (WDS)
	C	3	Write Reset (WRS)

Table 2-2. Interface Connections

CONNECTOR	LIVE PIN	GROUND PIN	SIGNAL
Write Inputs J102 (Continued)	E	5	Threshold (THLD) (100X60 only)
	L	10	Write Data Parity (WDP) (Write Data C for 7-Track)
	M	11	Write Data 0 (WD0) (Omit for 7-Track)
	N	12	Write Data 1 (WD1) (Omit for 7-Track)
	P	13	Write Data 2 (WD2) (Write Data B for 7-Track)
	R	14	Write Data 3 (WD3) (Write Data A for 7-Track)
	S	15	Write Data 4 (WD4) (Write Data 8 for 7-Track)
	T	16	Write Data 5 (WD5) (Write Data 4 for 7-Track)
	U	17	Write Data 6 (WD6) (Write Data 2 for 7-Track)
	V	18	Write Data 7 (WD7) (Write Data 1 for 7-Track)
Read Outputs J103	2	B	Read Data Strobe (RDS)
	1	A	Read Data Parity (RDP) (Read Data C for 7-Track)
	3	C	Read Data 0 (RD0) (Omit for 7-Track)
	4	D	Read Data 1 (RD1) (Omit for 7-Track)
	8	J	Read Data 2 (RD2) (Read Data B for 7-Track)
	9	K	Read Data 3 (RD3) (Read Data A for 7-Track)
(Optional)	10	L	Non-Return-to-Zero (NRZ)
(Optional)	11	M	7 Track (7TK)

Table 2-2. Interface Connections (Continued)

CONNECTOR	LIVE PIN	GROUND PIN	SIGNAL
Read Outputs J103 (Cont.) (Optional)	12	N	Single Gap (SGL)
(Optional)	13	P	Low Speed (SPD)
	14	R	Read Data 4 (RD4) (Read Data 8 for 7-Track)
	15	S	Read Data 5 (RD5) (Read Data 4 for 7-Track)
	17	U	Read Data 6 (RD6) (Read Data 2 for 7-Track)
	18	V	Read Data 7 (RD7) (Read Data 1 for 7-Track)

Table 2-2. Interface Connections (Continued)

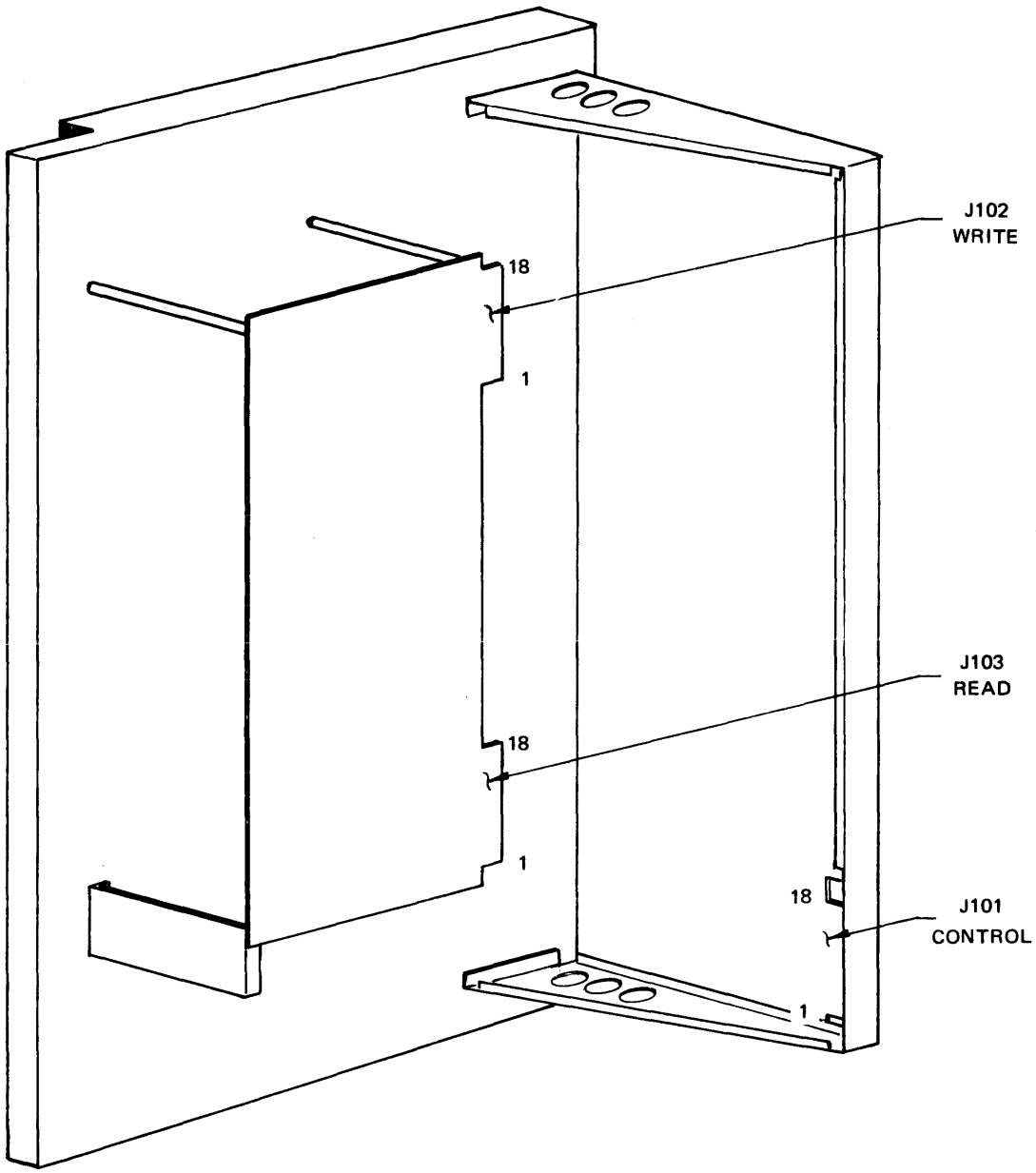


Figure 2-4. Interface Cable Installation

SECTION III

OPERATION

3-1. GENERAL

3-2. This section describes the controls and indicators and provides instructions for operating the Model 100X recorder.

3-3. CONTROLS AND INDICATORS

3-4. Figure 3-1 shows the controls and indicators. Control/indicator types, functions, and the conditions required for enabling the corresponding functions are given in Table 3-1.

NOTE

The head and guide-cleaning procedures described in paragraph 5-5 must be performed daily to maintain recorder reliability.

3-5. LOADING TAPE

3-6. To load tape, see Figure 3-2 and proceed as follows:

a. Pull out reel-locking lever on supply hub. Ensure that tape reel has write enable ring installed if Write mode is to be utilized. Place reel of tape on hub so that tape will unwind when reel is rotated in clockwise direction. Press reel evenly and firmly against hub's back flange and push in locking lever. Spin reel counterclockwise while looking along its rim to ensure even mounting.

b. Install empty reel on takeup hub in same manner as loaded reel was mounted in step a.

c. Actuate POWER pushbutton. POWER indicator will illuminate, and compliance arms will be driven to full-up positions.

d. Thread tape along path shown in Figure 3-2. Wrap several turns clockwise around takeup reel. Check that tape is correctly seated on guides and properly threaded through photosensor and head assembly.

CAUTION

Ensure that tape is positioned correctly on all guides, or tape damage may result.

e. Close front cover to protect tape and transport from dust.

CAUTION

Dust cover must remain closed at all times when tape is on takeup reel. Data reliability may be impaired by contaminants if cover is left open.

f. Actuate LOAD pushbutton and observe that tape is tensioned. (See Figure 3-3.) Delay at this point is required to allow arm retractor mechanism to clear compliance arms. Actuate LOAD pushbutton again. Tape will advance until BOT tab is positioned at photosensor. LOAD indicator will illuminate, indicating recorder is ready for use.

3-7. UNLOADING TAPE

3-8. To unload the tape, proceed as follows:

NOTE

Recorder must be in off-line mode (ON LINE indicator extinguished).

a. If power is off, actuate POWER pushbutton and proceed to step b. If power is on, start with step c.

b. Actuate LOAD pushbutton to tension tape.

c. Actuate REWIND pushbutton. REWIND indicator will illuminate.If tape is at load point tape will rewind until tension is lost. If tape is not at load point, rewind ceases when BOT tab is reached. BOT tab is then positioned automatically at photosensor, and LOAD indicator illuminates. Actuate REWIND pushbutton second time to complete unload sequence.

NOTE

Manual REWIND command will override load sequence. This can be used to return tape to load point in event load sequence is inadvertently initiated after BOT tab has passed photosensor.

3-9. INTERFACE DATA

3-10. Interface specifications are presented in paragraph 1-24. Interface inputs and outputs are listed in Tables 3-2 and 3-3, respectively.

3-11. MULTIPLE-TRANSPORT (DAISY-CHAIN) SYSTEM MODIFICATION

3-12. When two or more transports are used in a "daisy-chain" system, the transmission line (cable) terminators in all transports except the last in the system must be removed, or the resulting impedance mismatch will cause undesirable signal reflections in the cable. The termination impedance networks in the Model 100X recorder are all incorporated in two 330-ohm and two 220-ohm resistor packs which plug into integrated circuit sockets. For multiple-transport operation it is necessary simply to remove the four resistor packs from their sockets on all but the last transport. One 330-ohm pack and one 220-ohm pack are located in the bottom, right-hand corner of the control/servo board (component side) near connector J-101, and the other two are located in the upper, right-hand corner of the read/write board near J-102. Refer also to the technical manual on the multiple-transport cable assembly, Part No. 138631-000.

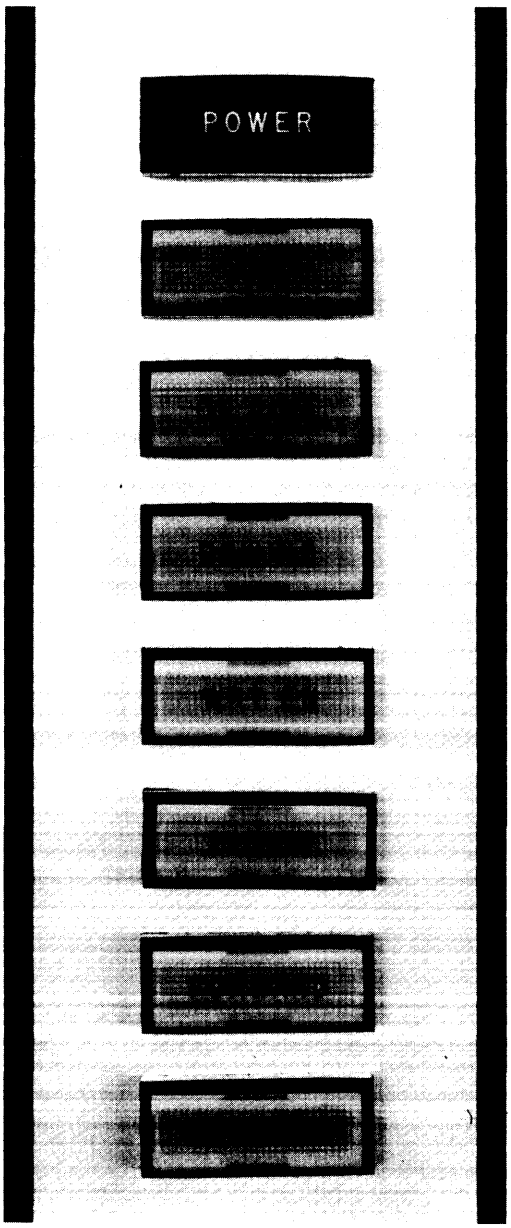


Figure 3-1. Control Panel

CONTROL OR INDICATOR	TYPE	FUNCTION	CONDITIONS
POWER	Alternate-Action Pushbutton/Indicator	Switches line Power on and off. Illuminates red to indicate power is on.	Fuse installed. Line cord connected.
LOAD	Momentary-Action Pushbutton/Indicator	Initial actuation energizes motors and servo system and tensions tape.	Power restored after being off. Loss of tape tension.
		Second actuation advances tape to load point.	Motors and servo system energized. Tape tensioned by initial actuation.
		Illuminates to indicate BOT tab is positioned at photosensor.	
ON LINE	Momentary-Action Pushbutton/Indicator	Switches recorder to on-line mode. Illuminates to indicate recorder is on line.	Initial Load or Rewind actuation. Recorder in off-line mode. (ON LINE indicator extinguished.)
		Second actuation switches recorder off line. Indicator extinguished to indicate recorder is off line.	Recorder in on-line mode. (ON LINE indicator illuminated.)
REWIND	Momentary-Action Pushbutton/Indicator	Rewinds tape to load point. REWIND indicator illuminates during rewinding, then goes out.	Recorder in off-line mode. (ON LINE indicator not illuminated.

Table 3-1. Controls and Indicators

CONTROL OR INDICATOR	TYPE	FUNCTION	CONDITIONS
REWIND (Continued)		LOAD indicator illuminates to indicate BOT tab is positioned at photosensor.	
		Second actuation of REWIND push-button unloads tape.	
WRT EN (Write Enable)	Indicator	Illuminates to indicate write function may be performed.	Tape reel with write enable ring installed mounted on supply hub.
HI DEN (High Density)	Alternate-Action Pushbutton/Indicator	Selects read density. Illuminates to indicate high-density mode is selected. NOTE: See Section IV for optional configurations.	
FORWARD	Alternate-Action Pushbutton/Indicator	Starts/stops tape forward motion. Illuminates to indicate recorder in forward mode.	Recorder in off-line mode (ON LINE indicator extinguished).
REVERSE	Alternate-Action Pushbutton/Indicator	Starts/stops tape reverse motion. Illuminates to indicate recorder in reverse mode.	Recorder in off-line mode (ON LINE indicator extinguished).

Table 3-1. Controls and Indicators (Continued)

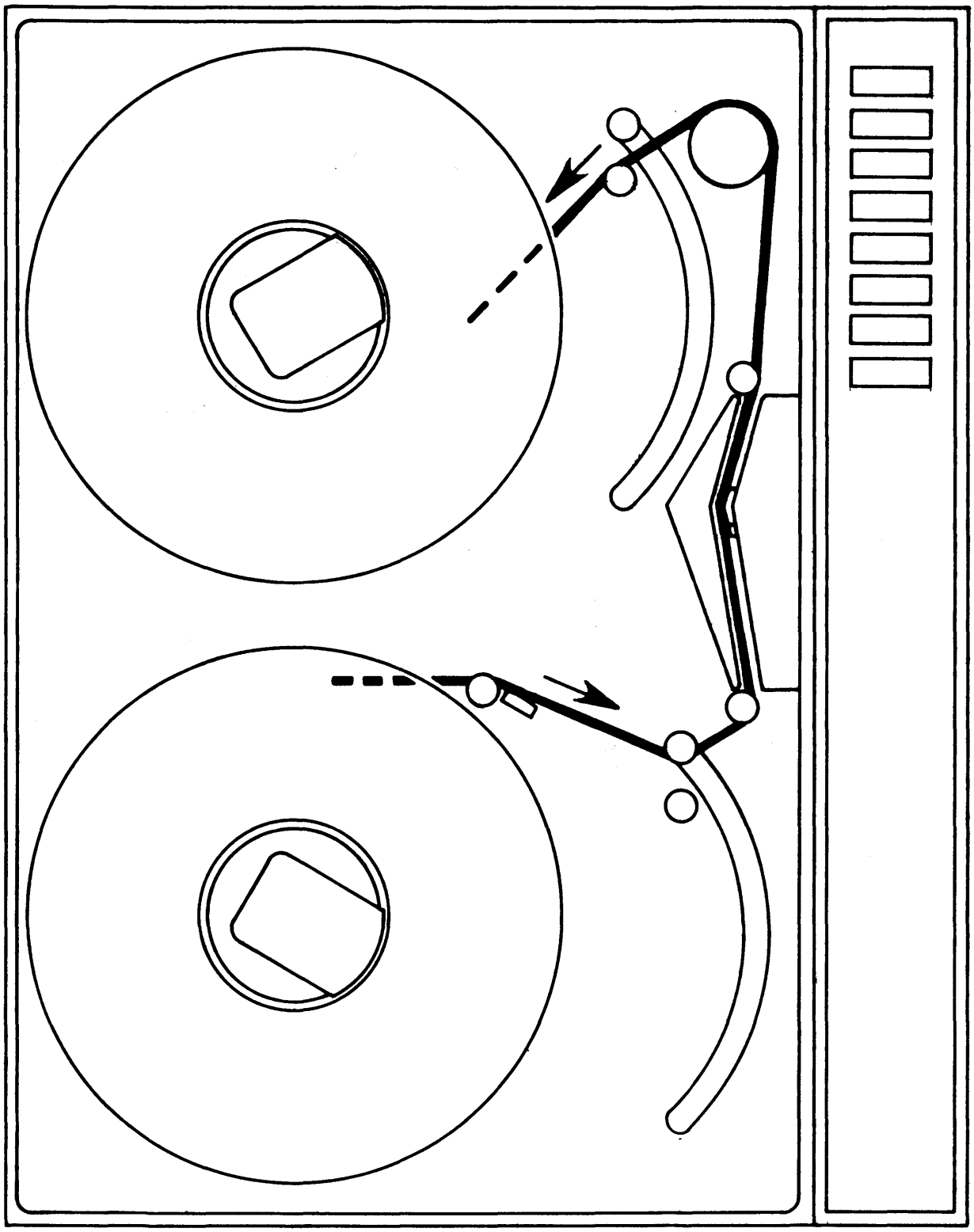


Figure 3-2. Tape-Threading Path

3-9. INTERFACE DATA

3-10. Interface specifications are presented in paragraph 1-24. Interface inputs and outputs are listed in Tables 3-2 and 3-3, respectively.

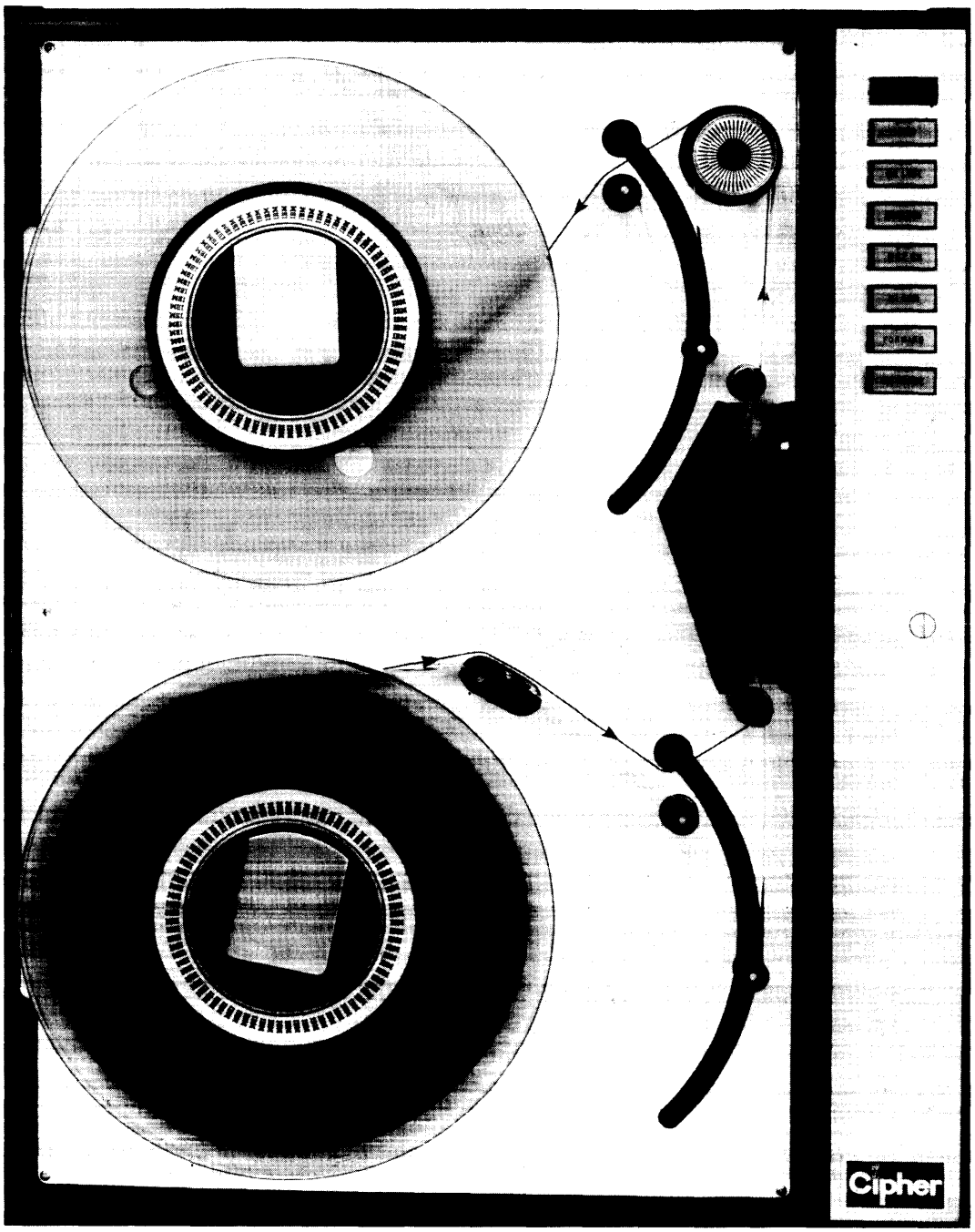


Figure 3-3. Operating Configuration (Tape Tensioned)

INPUT	TYPE	FUNCTION
Select (SLT)	Level	When true, enables all interface drivers and receivers in transport, thus connecting transport to controller.
Forward (FWD)	Level	When true, with transport ready and on line, causes tape to move forward at specified speed.
Reverse (REV)	Level	When true, with transport ready and on line, causes tape to move in reverse at specified speed.
Rewind (RWC)	Pulse	With transport ready and on line, this pulse causes tape to move in reverse at 150 ips to BOT.
Off-Line (OFL)	Level or pulse (min. width, 2 microseconds)	Resets on-line flip-flop to 0 state, placing transport under manual control.
Write Data Strobe (WDS)	Pulse (min., 2 microseconds)	Trailing edge triggers code generator in transport.
Write data (WD)	9 lines for 9-track; 7 lines for 7-track	When true from 0.5 microsecond before leading edge to 0.5 microsecond after trailing edge of write strobe, results in recording of flux transition when in write mode.
Write Enable (WEN)	Level	When true for 20 microseconds, minimum, after leading edge of FORWARD or REVERSE command, initiates write mode of operation.
Reset (RS)	Pulse (min., 2 microseconds)	When true, resets write amplifier circuits on leading edge. Purpose is to write LRCC at end of record, causing all channels to be erased in IRG.
Data Density Select (DDS)	Level	When true, conditions read electronics to operate in high-density mode. When false, operation is in low-density mode.
Overwrite (OVW)	Level	When true, conditions appropriate circuitry, in conjunction with Write Reset (WRS) pulse, for updating (rewriting) of select record. Transport must be in write mode.

Table 3-2. Interface Inputs

INPUT	TYPE	FUNCTION
On-Line	Level	When true (on-line flip-flop set), transport is under remote control. When false, transport is under local control.
Read Data (RD) (RDP, RD0-7 for 9-channel; RDC, RD2-7 for 7-channel)	Bits	Sampling of RDP, RD0-7 simultaneously on trailing edge of Read Data Strobe (RDS) provides complete data character.
Read Data Strobe (RDS)	Pulse (min., 2 ms)	Provides complete data character when RDP, RD0-7 sampled on trailing edge.
End of Tape (EOT)	Level	True for duration of EOT tab. Transitions to and from true state not to be assumed clean.
Density (DEN)	Level	True only when manual HI DEN switch on transport is set for high density.
Ready (RDY)	Level	True when load sequence is complete and transport is on line and not rewinding. (Transport ready to receive remote command.)
Beginning of Tape (BOT)	Level	True when BOT tab is under photosensor, initial load sequence is complete, and transport is not rewinding.
Rewind (RWD)	Level	True only when transport is engaged in rewind operation or load sequence following rewind.
File Protect (FPT)	Level	True when power is on and reel of tape without write ring is mounted on transport.
NRZ1 Transport Identification (NRZ)	Level (Optional)	True when transport is configured for NRZI data. False level indicates phase-encode configuration.
7-Track Head Identification (7TK)	Level (Optional)	True for 7-track transport; false for 9-track configuration.
Single-Gap Head Identification (SGL)	Level (Optional)	True when transport has single-gap head; false level indicates dual-gap head.
Transport Speed Identification (SPD)	Level (Optional)	True when transport has lower of two speeds available in multiple-transport system.

Table 3-3. Interface Outputs

SECTION IV

THEORY OF OPERATION

4-1. GENERAL

4-2. The basic concepts of digital recording, recorder applications, and principles of operation for the Model 100X recorder are presented in this section. A thorough knowledge of this section will enhance the user's operational capabilities and will aid in troubleshooting, if required.

4-3. BASIC CONCEPTS OF DIGITAL RECORDING

4-4. The concept of digital magnetic tape recording has grown in acceptance as a result of the increased use of digital techniques, the increasing variety of recorders available, and the decreased cost of these recorders. The digital recording process involves methods and equipment capable of recording information expressed in a digital (binary) code (1's and 0's). The IBM NRZI system (non-return-to-zero interrupt) is the one most widely used throughout the industry.

4-5. Figure 4-1 depicts various codings, including the NRZI code. On magnetic tape, binary 1's are represented by transitions between plus and minus saturation magnetism (+SAT and - SAT) produced by the corresponding write head current. When a written tape is passed across the tape head, a change of flux occurs at the gap. The magnetic heads respond, producing the read voltage waveforms illustrated in Figure 4-1. Absence of a change in flux represents a binary 0, for which no voltage is recovered from the head.

4-6. NRZI SYSTEM. In the NRZI system, recording is carried out by a saturation current driven through the head in a direction determined by a flip-flop which toggles for each 1 bit recorded. The NRZI system requires the recording of at least one bit for every character. Otherwise, in an all-0 character there would be no indication of the presence of that character.

4-7. SEVEN-TRACK SYSTEM. In a seven-track system (Figure 4-2), six of the tracks are data channels, while the seventh (track C) is the parity channel. Parity may be either odd or even; bits may be added to track C to make the sum of the bits in the character odd or even. Even parity is used with binary-coded decimal (BCD) coding, while odd parity is used in binary mode operation.

4-8. BINARY CODED DECIMAL (BCD)

4-9. The IBM eight-bit code and BCD relations are shown in Table 4-1. There are 63 available combinations of the six data bits, representing numerals, letters, and special symbols.

4-10. BINARY MODE. In the binary mode, tape characters represent binary numbers. This mode is used only with numeric inputs. Thus, a six-bit character can represent a six-digit binary number 0 (000000) to 63 (111111). Larger numbers may be represented by the use of more than one character. In some cases, this results in a considerable saving of space on the tape and in computer time. For example, the decimal number 56 occupies two character spaces in BCD (0101-0110) but only one in binary (111000). Obviously, odd parity must be used, because six 0's can be a perfectly valid portion of a binary number.

4-11. NINE-TRACK CODING. The nine-track tape in IBM System 360 uses a modified ASCII code. (See Figure 4-3.) Parity in the nine-track 800-bpi system is always odd. With this sytem, when programmed properly, it is possible to write data in the binary mode. Two four-bit numerics per byte may be written, with a consequent doubling of effective data rate.

4-12. LONGITUDINAL REDUNDANCY CHECK CHARACTER (LRCC). A longitudinal parity bit is written at the end of each record. This character is written by the return of the write head current to the reference condition. Since the reference condition is established before the first character of the record and reestablished by writing of the LRCC, an even number

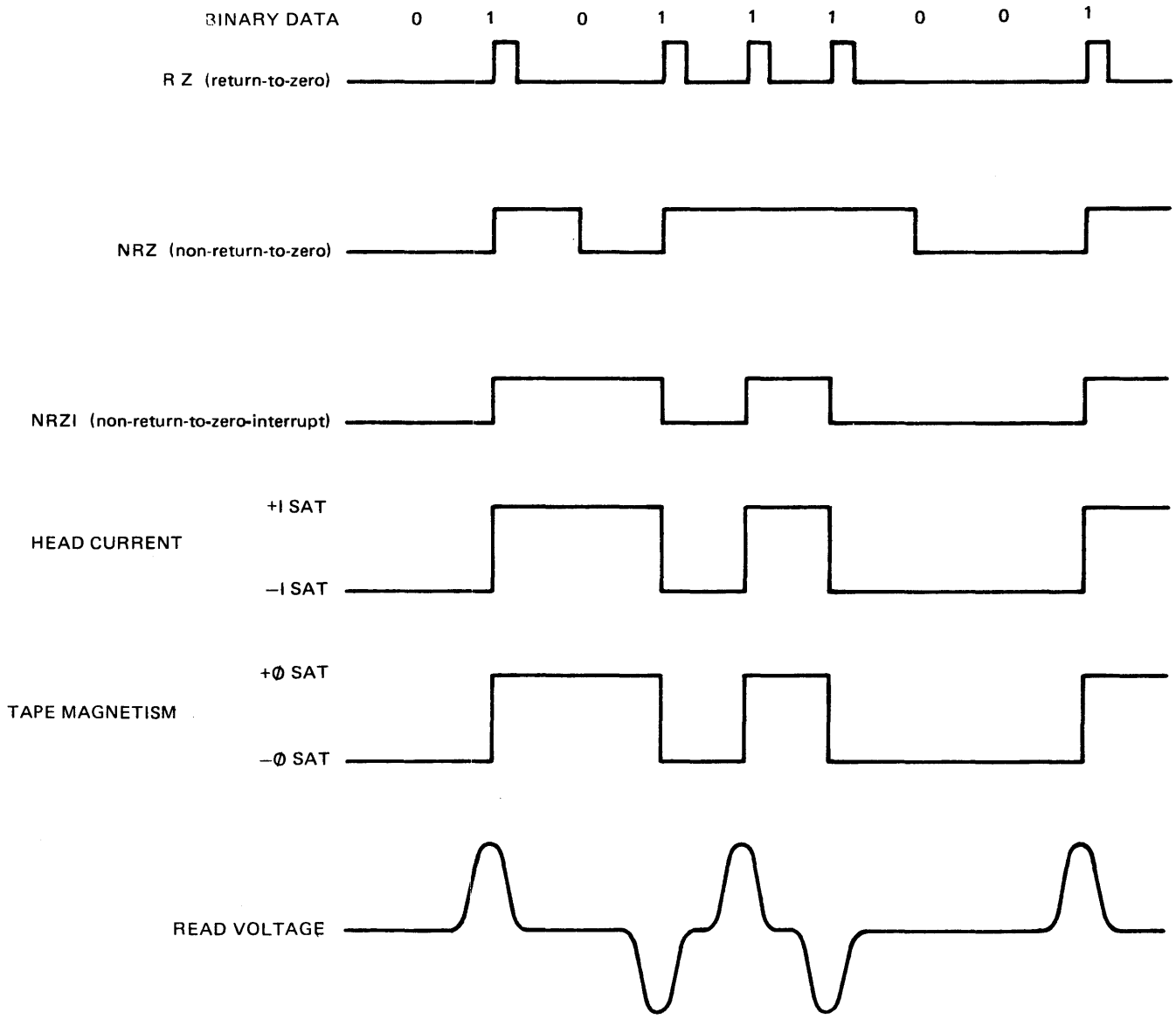
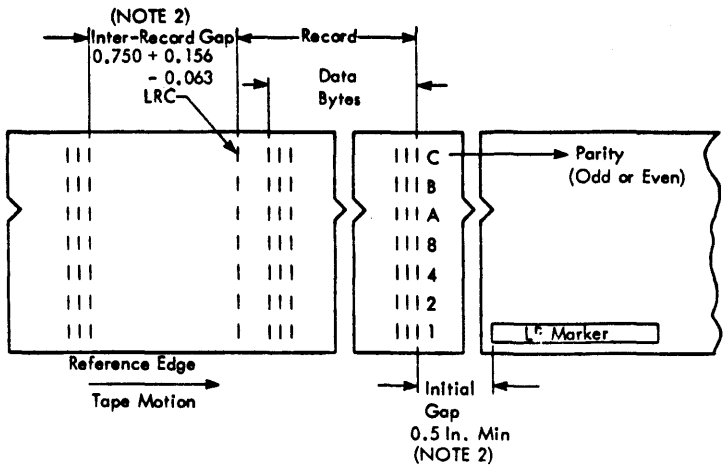


Figure 4-1. Magnetic Recording Waveforms

Collating Sequence	Graphics		Eight - Bit Code								BCD					
	8 Bit	BCD	0	1	2	3	4	5	6	7	B	A	8	4	2	1
00	blank	blank	0	1	0	0	0	0	0	0	0	0	0	0	0	0
01	.	.	0	1	0	0	1	0	1	1	1	1	1	0	1	1
02	←	↑)	0	1	0	0	1	1	0	0	1	1	1	1	0	0
03	(	[	0	1	0	0	1	1	0	1	1	1	1	1	0	1
04	+	<	0	1	0	0	1	1	1	0	1	1	1	1	1	0
05	GM	GM	0	1	0	0	1	1	1	1	1	1	1	1	1	1
06	&	& +	0	1	0	1	0	0	0	0	1	1	0	0	0	0
07	$	$	0	1	0	1	1	0	1	1	1	0	1	0	1	1
08	*	*	0	1	0	1	1	1	0	0	1	0	1	1	0	0
09	)	]	0	1	0	1	1	1	0	1	1	0	1	1	0	1
10	;	;	0	1	0	1	1	1	1	0	1	0	1	1	1	0
11	MC	MC	0	1	0	1	1	1	1	1	1	0	1	1	1	1
12	-	-	0	1	1	0	0	0	0	0	1	0	0	0	0	0
13	/	/	0	1	1	0	0	0	0	1	0	1	0	0	0	1
14	,	,	0	1	1	0	1	0	1	1	0	1	1	0	1	1
15	%	% (	0	1	1	0	1	1	0	0	0	1	1	1	0	0
16	WS	WS	0	1	1	0	1	1	0	1	0	1	1	1	0	1
17	↓	\	0	1	1	0	1	1	1	0	0	1	1	1	1	0
18	SM	SM	0	1	1	0	1	1	1	1	0	1	1	1	1	1
19	↳	↳	0	1	1	1	1	0	1	0	0	1	0	0	0	0
20	↑	↑ =	0	1	1	1	1	0	1	1	0	0	1	0	1	1
21	@	@ '	0	1	1	1	1	1	0	0	0	0	1	1	0	0
22	▽	:	0	1	1	1	1	1	0	1	0	0	1	1	0	1
23	=	>	0	1	1	1	1	1	1	0	0	0	1	1	1	0
24	TM	TM	0	1	1	1	1	1	1	1	0	0	1	1	1	1
25	♂	♂	1	1	0	0	0	0	0	0	1	1	1	0	1	0
26	A	A	1	1	0	0	0	0	0	1	1	1	0	0	0	1
27	B	B	1	1	0	0	0	0	1	0	1	1	0	0	1	0
28	C	C	1	1	0	0	0	0	1	1	1	1	0	0	1	1
29	D	D	1	1	0	0	0	1	0	0	1	1	0	1	0	0
30	E	E	1	1	0	0	0	1	0	1	1	1	0	1	0	1
31	F	F	1	1	0	0	0	1	1	0	1	1	0	1	1	0
32	G	G	1	1	0	0	0	1	1	1	1	1	0	1	1	1
33	H	H	1	1	0	0	1	0	0	0	1	1	1	0	0	0
34	I	I	1	1	0	0	1	0	0	1	1	1	1	0	0	1
35	♁	♁	1	1	0	1	0	0	0	0	1	0	1	0	1	0
36	J	J	1	1	0	1	0	0	0	1	1	0	0	0	0	1
37	K	K	1	1	0	1	0	0	1	0	1	0	0	0	1	0
38	L	L	1	1	0	1	0	0	1	1	1	0	0	0	1	1
39	M	M	1	1	0	1	0	1	0	0	1	0	0	1	0	0
40	N	N	1	1	0	1	0	1	0	1	1	0	0	1	0	1
41	O	O	1	1	0	1	0	1	1	0	1	0	0	1	1	0
42	P	P	1	1	0	1	0	1	1	1	1	0	0	1	1	1
43	Q	Q	1	1	0	1	1	0	0	0	1	0	1	0	0	0
44	R	R	1	1	0	1	1	0	0	1	1	0	1	0	0	1
45	RM	RM	1	1	1	0	0	0	0	0	0	1	1	0	1	0
46	S	S	1	1	1	0	0	0	1	0	0	1	0	0	1	0
47	T	T	1	1	1	0	0	0	1	1	0	1	0	0	1	1
48	U	U	1	1	1	0	0	1	0	0	0	1	0	1	0	0
49	V	V	1	1	1	0	0	1	0	1	0	1	0	1	0	1
50	W	W	1	1	1	0	0	1	1	0	0	1	0	1	1	0
51	X	X	1	1	1	0	0	1	1	1	0	1	0	1	1	1
52	Y	Y	1	1	1	0	1	0	0	0	0	1	1	0	0	0
53	Z	Z	1	1	1	0	1	0	0	1	0	1	1	0	0	1
54	0	0	1	1	1	1	0	0	0	0	0	0	1	0	1	0
55	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1
56	2	2	1	1	1	1	0	0	1	0	0	0	0	0	1	0
57	3	3	1	1	1	1	0	0	1	1	0	0	0	0	1	1
58	4	4	1	1	1	1	0	1	0	0	0	0	0	1	0	0
59	5	5	1	1	1	1	0	1	0	1	0	0	0	1	0	1
60	6	6	1	1	1	1	0	1	1	0	0	0	0	1	1	0
61	7	7	1	1	1	1	0	1	1	1	0	0	0	1	1	1
62	8	8	1	1	1	1	1	0	0	0	0	0	1	0	0	0
63	9	9	1	1	1	1	1	0	0	1	0	0	1	0	0	1

Table 4-1. Eight-Bit Code/BCD Relationship



NOTES:

1. Tape shown with oxide side down; NRZI recording. Bit produced by reversal of flux polarity. Tape fully saturated in each direction.
2. Tape to be fullly saturated in erased direction in initial gap and inter-record gap; tape to be magnetized so that rim end of tape is north-seeking pole.
3. LRCC: longitudinal redundancy check character; odd or even; spaced four bits from data character.
4. Parity bit: vertical parity bit is written for each character.
5. Must conform to all 729 specifications (IBM).

Figure 4-2. Seven-Track Data Format

of 1 bits in each track is written for each record. As the tape is read, the number of 1's read in each track is counted. If the sum is odd, an error is indicated. The LRCC is spaced four character spaces from the end of the block.

4-13. CYCLIC REDUNDANCY CHECK CHARACTER (CRCC). Nine-track, 800-bpi, System 360 tapes include a CRCC located at the end of each record before the LRCC. The CRCC is generated by application of a complex equation of the data within the block. This character makes the probability of an undetected error almost zero. The CRCC may be used with the computer read function to determine which track contains the error.

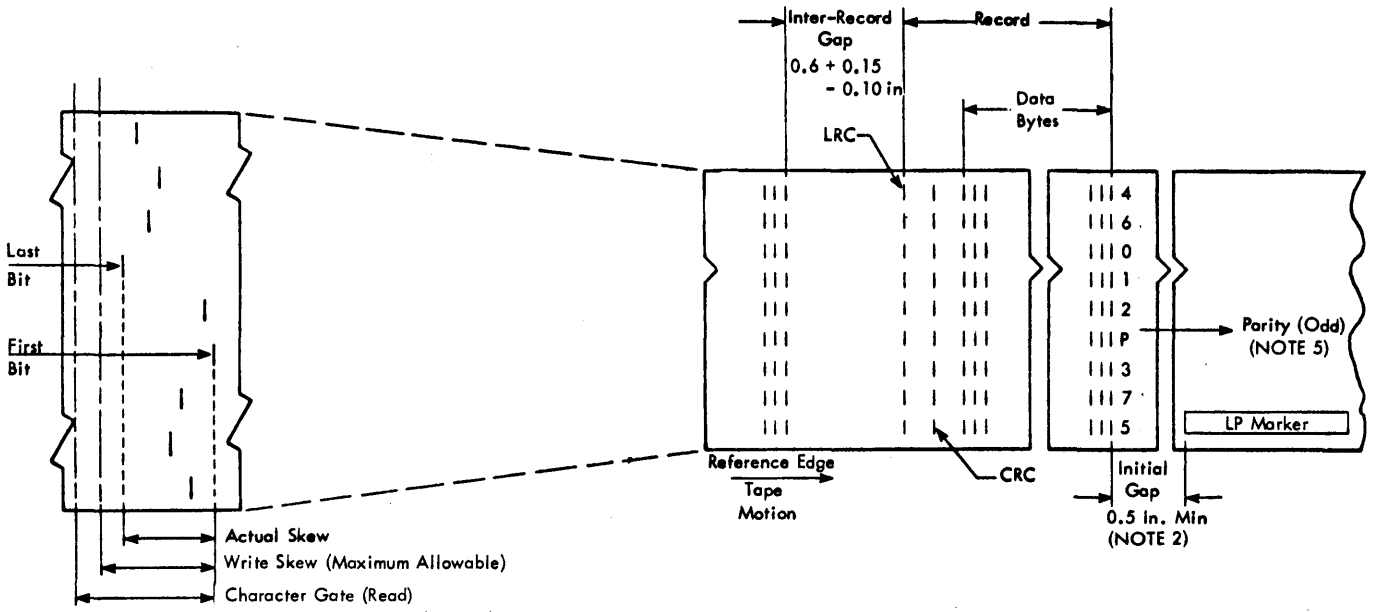
4-14. The information supplied by the CRCC, combined with that of the LRCC and vertical parity, may be used to correct detected errors. Errors involving more than one track within the same record are detected but not correctable.

4-15. LOST-CHARACTER CHECK. System 360 incorporates a lost-character check which detects, during reading, the loss of a complete byte. A byte is assumed lost if the time between bytes is longer than normal but not long enough for check character spacing.

4-16. The lost-character requirement limits the instantaneous variation of byte spacing on the tape being read. With the Cipher Model 100X recorder, a byte spacing tolerance well within the limits set by the lost-character check is assured.

4-17. PRINCIPLES OF OPERATION

4-18. The Cipher Model 100X recorder is composed of four main assemblies (Figure 4-4): the transport assembly, which includes the tape drive components and the compliance arm system; the read/write system, consisting of a head assembly and a read/write board; a control/servo board containing the transport control circuitry, the reel and capstan motor servos, and the power supply regulator circuits; and a power supply, consisting of the power transformer mounted on the rear of the mounting plate, the power supply circuit board, and the front-panel-mounted power switch and indicator. The schematic diagrams in Section VII should be referred to in studying circuit descriptions presented in this section. A description of major logic elements used in the recorder, available logic options, and a detailed discussion of recorder operation are presented in the following paragraphs.



NOTES:

1. Tape shown with oxide side down; NRZI recording. Bit produced by reversal of flux polarity. Tape fully saturated with each direction.
2. Tape to be fully saturated in erased direction in initial gap and inter-record gap; tape to be magnetized so that rim end of tape is north-seeking pole.
3. CRCC: cyclic redundancy check character. Parity of CRCC determined by number of data characters in record. Odd number of data character, even CRCC, etc. CRCC used only in System 360, 800 bpi. CRCC spaced four bits from data characters.
4. LRCC: longitudinal redundancy check character, always odd parity. Spaced four bits from CRCC.
5. Parity bit: vertical parity bit written for each character containing even number of bits.

Figure 4-3. Nine-Track Data Format

4-19. NAND/NOR GATES

4-20. Multiple NAND gate packages are used for all logic gating. (See Section VII, Figure 7-1.) An individual NAND gate device may be used as either a NAND or NOR gate, however, depending upon the logic function involved. When used as a NAND gate, the true output is normally an electrical low (0 to +0.2V) and requires both inputs to be high (+4V). When used as a NOR gate, the true output is normally an electrical high, which requires one or more inputs to be low.

4-21. J-K FLIP-FLOPS

4-22. This flip-flop operates on a master-slave principle. A logic diagram of the flip-flop is shown in Figure 4-5. The flip-flop is designed so that the threshold voltage of AND gates 1 and 2 is higher than that of AND gates 3 and 4. Since operation depends exclusively on voltage levels, any waveform of the proper voltage level can trigger the J-K flip-flop.

4-23. Assuming that the trigger voltage is initially low, as the trigger voltage goes high AND gates 3 and 4 are disabled. Subsequently, AND gates 1 and 2 are enabled by the trigger pulse, the J and K inputs, and the information previously stored at the output of the slave unit. The J and K input information at this time is transferred to the input of the master unit. As the trigger voltage goes low, AND gates 1 and 2 are disabled. AND gates 3 and 4 are then enabled, and the information stored in the master unit is transferred to the output of the slave unit.

4-24. The direct set and direct clear inputs are used to set the flip-flop to a known state. A low input to direct set will set Q high and $\overline{Q}$ low. A low input to direct clear will set Q low and $\overline{Q}$ high.

4-25. RETRIGGERABLE MONOSTABLE MULTIVIBRATORS

4-26. A retriggerable monostable multivibrator is utilized in many areas of the recorder's logic circuitry to

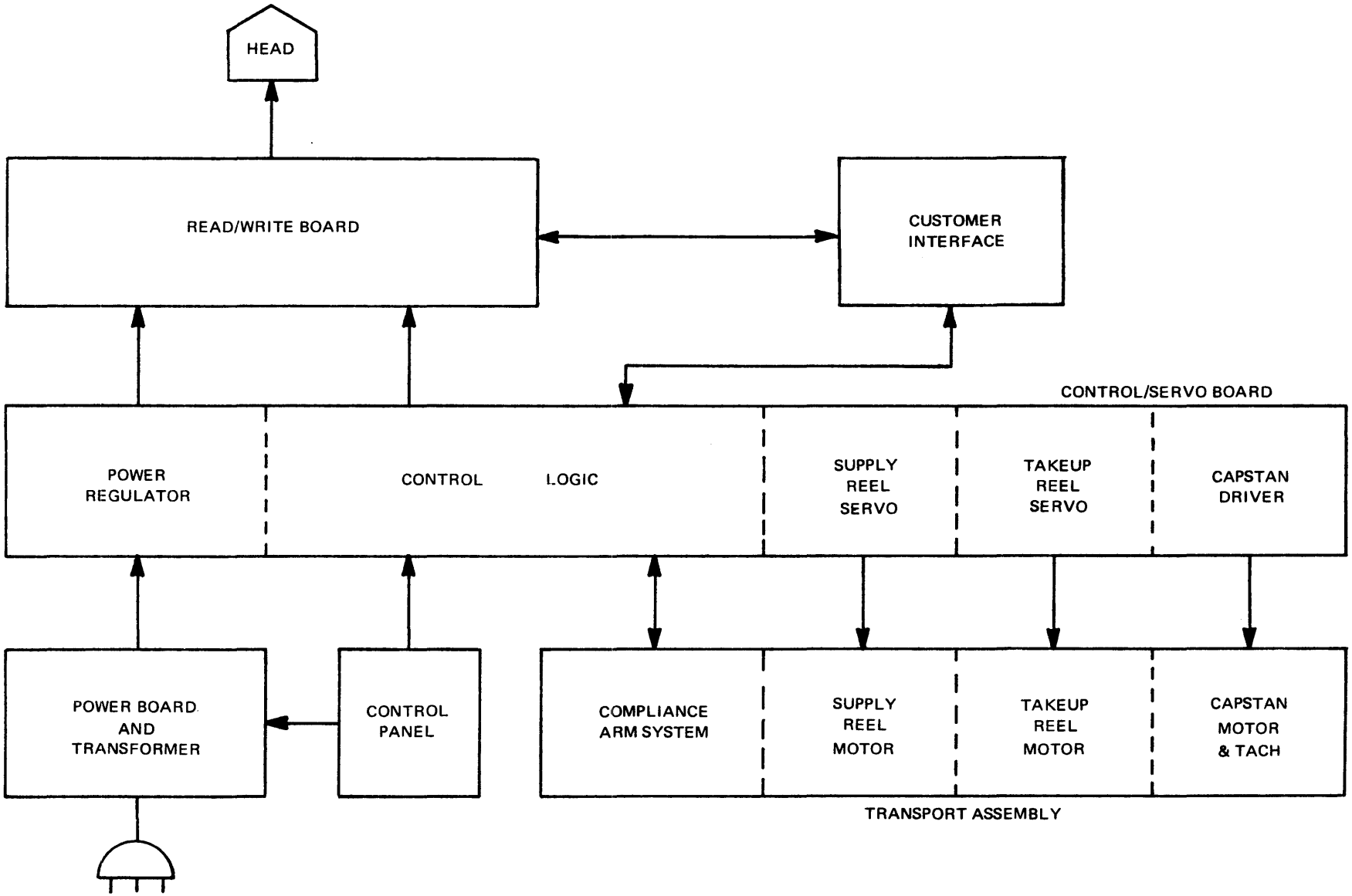


Figure 4-4. Recorder Organization

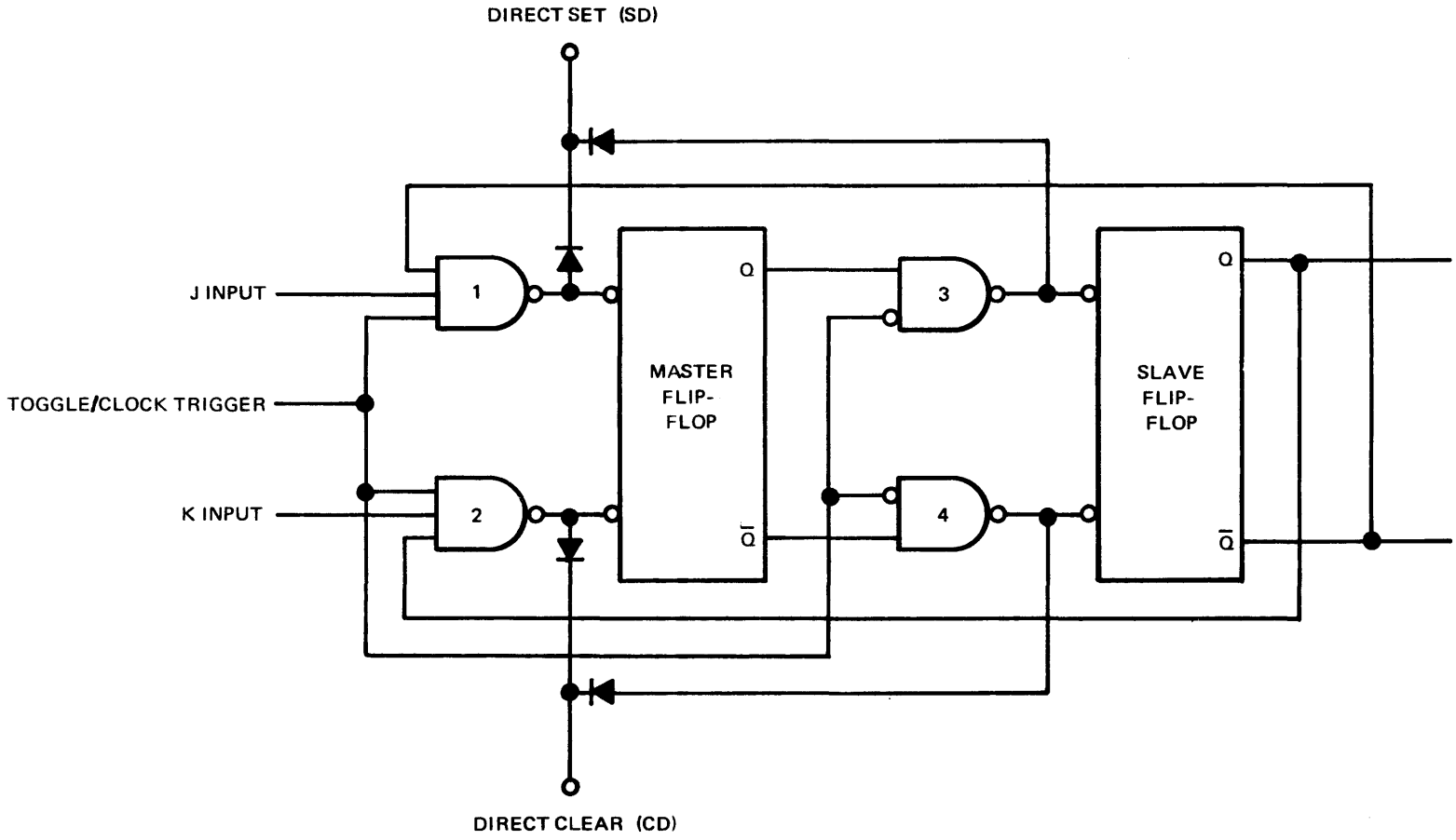


Figure 4-5. Simplified Logic Diagram, J-K Flip-Flop

generate precisely timed clock or gating pulses derived from up to four different inputs. The device is used in two ways (Figure 4-6), as described in the following subparagraphs.

4-27. In the first method, either or both inputs to the NOR-gate portion are set low and one input to the NAND-gate portion is set high to enable the gate. When the second input to the NAND gate goes high, a positive pulse appears at the Q output. The duration of this pulse is determined by the timing circuit connected to pins 11 and 13. This timing circuit employs a resistor and capacitor for relatively short pulse durations. Longer durations can be achieved by the addition of a diode to the circuit. An even longer pulse can be obtained by the use of a large-value electrolytic capacitor, with a transistor to regulate the current and protect the device.

4-28. In the second method, both inputs to the NAND-gate portion are set high, and the Q function is controlled by the inputs to the NOR-gate portion. When one of the NOR-gate inputs goes low, a positive pulse appears at the Q output. The duration of the pulse is determined in the same manner as described in the preceding paragraph. In both cases, $\overline{Q}$ will be the complement of Q. Both the Q and $\overline{Q}$ outputs may be utilized in the recorder's logic.

4-29. LOGIC OPTIONS

4-30. Various logic options are available in the Model 100X recorder. These options are selected by jumpers soldered into the read/write and control/servo boards (Tables 4-2 and 4-3). These optional logic configurations will be wired in at the factory in accordance with the customer's request.

4-31. HEAD ASSEMBLY

4-32. The Model 100X recorder is available with either a single-gap head for alternate read and write functions or a dual-gap head for read-after-write operation. A choice of seven or nine tracks is also provided. Track locations, track width, and gap separation are all IBM-compatible (Table 4-4).

4-33. A cross-feed shield is provided to reduce the voltage induced in the read head when writing. The shield is composed of copper and ferrite flux blocks cemented to a hinge plate (Section V, Figure 5-3).

4-34. DATA RECORDING (See Drawing No. 331512-300, Section VII)

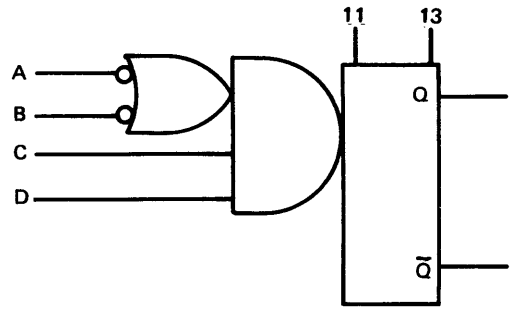
4-35. The following description applies to read-after-write (RAW) recorders. Read or write (R/W) recorders are similiar in operation, except that the deskew circuitry is not used.

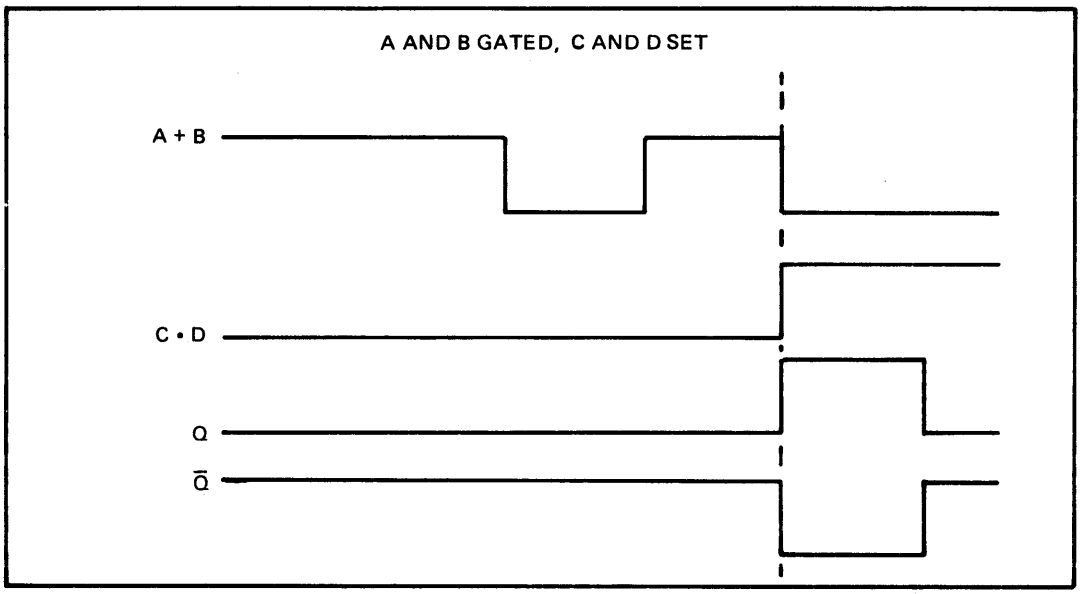
4-36. Five inputs to the write circuitry, in addition to the seven or nine data channels, are required for writing (Figure 4-7). The customer supplies the Write Data Strobe (WDS), Write Reset (WRS), and Select inputs. The WDS triggers the internal write strobe monostable, U102, which, in turn, strobes the data into the write deskewing circuit. The WRS senses the condition of the write flip-flops and clocks them to a reference condition to create the longitudinal redundancy check character (LRCC) at the end of each record. The Reset input is routed from the control logic and is synonymous with WRS. It is used only with the overwrite option as desired by the customer. Select, which is routed from the control logic, is required to enable the WDS and WRS inputs. $\overline{\text{Run}}$ and $\overline{\text{Read}}$ inputs are generated in the control logic; they control the write register direct set (S_D) and direct clear (C_D) circuitry. The following description is keyed to track 0 but is applicable to all tracks. See timing diagram, Figure 4-8.

4-37. DATA INPUT. A low pulse or level applied to J102, pin M, in conjunction with the WDS, is considered to be a binary 1. This low is inverted by U100B and applied to the data gate, U108C, to be strobed into the deskew monostable. The internal Write strobe is derived from a monostable, U102, which is triggered from the WDS applied to J102, pin A, inverted by U103E. The internal strobe generator may be triggered by either the leading or trailing edge of the WDS. (See Figure 4-8 for proper jumper connections.) The $\overline{Q}$ output of U102 is inverted by U101A and applied as a high-level strobe to the data gate, U108C. With a binary 1 (high) also applied to the gate, a low pulse is generated at the output; this is used to trigger the deskew monostable, U122. Obviously, if a binary 0 is to be generated, the data gate input will be low at the time of the Write strobe, inhibiting the strobe and preventing the monostable from being triggered.

4-38. DESKEW MONOSTABLE. The deskew monostable is triggered by the low pulse from the data gate or the reset gate, U108D. The trailing edge of the high-going pulse output is time-variable through the use of potentiometer R119, skew adjust. This trailing edge is the actual write clock which compensates for mechanical skew inherent in the dual-gap head. (See paragraph 5-40.)

4-39. WRITE REGISTER. The write register, U126A,





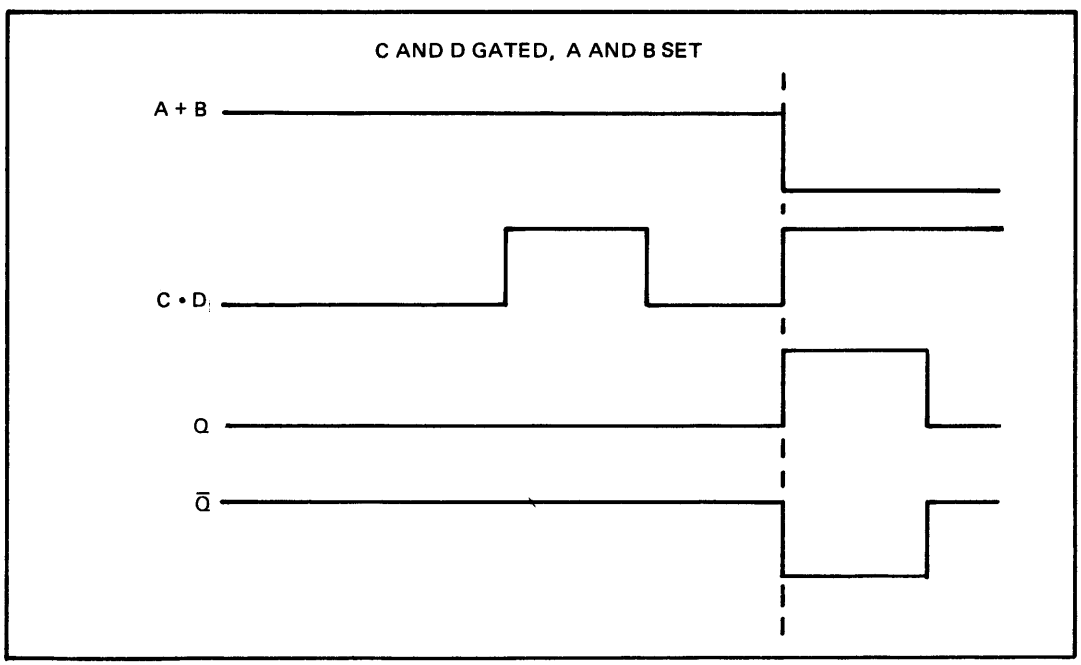


Figure 4-6. Monostable Multivibrator Characteristics

FUNCTION	JUMPER	PURPOSE
STATUS INDICATIONS	A to B	When installed, provides status indications to interface when recorder is on line and selected. When not installed, status indications are provided whenever recorder is selected.
LOCAL/REMOTE DENSITY SELECT	C to F	Provides local density control, with indicator, on seven-track models.
	D to F	Provides remote density control, with indicator, on seven-track models.
	E to F	Used with fixed-density models. Indicator always illuminated.
OVERWRITE	G to H	Installed with overwrite option. Note write reset jumper on read/write board.
ON LINE/READY	J to K	When installed, depression of ON LINE pushbutton will force ready status in middle of tape.
REWIND/OFF LINE	L to M	When installed, will cause unit to revert to off-line status when rewind is commanded remotely.
+5V SUPPLY	DIODE N to P	Diode can be installed (cathode to N, anode to P) to provide +5 volts for customer's terminators.
WRITE ENABLE	S to T	Normal configuration: Write Enable line is sampled and stored 20 microseconds after RUN command is given. Output of stored signal becomes Read/Write signal to read/write board.
	R to T	Read/Write signal is controlled directly from Write Enable line.

Table 4-2. Control/Servo Board Logic Options

FUNCTION	JUMPER	PURPOSE
WRITE DATA TIMING	A to C	Write data on trailing edge of WDS.
	A to B, C to D	Write data on leading edge of WDS.
WRITE RESET	H to J	Standard WRS path
	H to K	Used with overwrite option on read/write models. Only one RESET command required for either overwrite or normal mode.
THRESHOLD COMMAND PATH	E to F	Standard path for THRESHOLD command in read/write models.
	E to G	Standard path for automatic THRESHOLD command in read-after-write models.

Table 4-3. Read/Write Board Logic Options

is a J-K flip-flop (paragraph 4-21). The Q output is fed back to the K input, and the $\overline{Q}$ output is fed back to the J input. This ensures reversal of the Q and $\overline{Q}$ output levels each time a clock is provided by the deskew monostable. The Q and $\overline{Q}$ outputs are inverted by U125F and U125C, respectively, and serve to switch the head drivers, Q100 and Q101, resulting in a flux reversal (binary 1) on the magnetic tape. The lack of an input to clock U126A results in the recording of a binary 0 on the tape (no flux reversal).

4-40. CHECK CHARACTER GENERATION (CRCC AND LRCC). In nine-track operation, the cyclic redundancy check character (CRCC) is written four character times after the last record block character in the same manner as used for the data characters. The longitudinal redundancy check character (LRCC) occurs either four character times after the CRCC (nine-track) or last record block character (seven-track). The customer-supplied Write Reset (WRS) input applied through J102, pin C, is inverted by U103D and routed to U109 through jumper H-J. With the overwrite option, the jumper may be installed from H to K, and the reset would then be generated from the control logic. The WRS is gated through U109B, if enabled by select, to the reset gate, U108D. If the reset gate input from Q of the write flip-flop is high, signifying that an odd number of binary 1's have been written, the WRS pulse will trigger the deskew monostable. This will create a write clock, which will write an additional binary 1 and set the write flip-flop in a reference condition.

4-41. Write current is supplied through a transistor switch, Q118, from a 5-volt source and is ramped to prevent unwanted flux reversals from occurring. The $\overline{Read}$ input from the control logic determines when the write current is to be on or off. A false-going $\overline{Read}$ level enables the current switch driver, Q119, and C109 charges through R165, which, in turn, allows Q118 to become fully saturated. The ramp time when switching from read to write is approximately 1.5 milliseconds. At the same time Q120 is turned on and the Direct Set (S_D) occurs, the Direct Clear (C_D) inputs to the write register are allowed to go high, ensuring that the flip-flop is in the reference condition. When $\overline{Read}$ becomes true (low), Q119 turns off, turning off Q118 and Q120. The ramp is approximately 1.2 milliseconds long, and the current path for C109 is through CR100. C_D becomes low at the time $\overline{Read}$ goes true, and S_D becomes low when Q120 reaches the off condition. This ensures that neither write driver (Q100 or Q101) can be switched during the read operation. The relationship of S_D and C_D, when going from read to write or write to read, is important. See Figure 4-9.

4-42. NRZ-TO-NRZI CONVERSION. The use of J-K flip-flops in the write register allows for input data to be presented in NRZ form. The Q and $\overline{Q}$ outputs are coupled back to the J and K inputs, ensuring that the flip-flop will toggle each time a clock is received, causing a 1 to be written. Since the clock is independent of the data input, the data line may remain low or high for consecutive 1's or 0's. The only restriction is that the conversion of the data must occur at least 0.5 microsecond before or after the WDS (Figure 4-8).

FUNCTION	SINGLE GAP READ/WRITE	DUAL GAP READ AFTER WRITE
Track Locations		
7-Track	0.070 (± 0.001) inch, center to center	
9-Track	0.055 (± 0.001) inch, center to center	
Effective Track Width		
7-Track	0.040 (± 0.001) inch	Write: 0.048 (± 0.001) inch Read: 0.030 (± 0.001) inch
9-Track	0.040 (± 0.001) inch	Write: 0.044 (± 0.001) inch Read: 0.040 (± 0.001) inch
Parallelism	– – –	± 200 microinches (write to read)
Gap Separation (Write-Read)	– – –	0.150 (± 0.005) inch
Gap Line Azimuth Per Section	± 150 microinches maximum from reference perpendicular to mounting surface	
Gap Scatter Per Section	100 microinches, maximum	
Crosstalk		
Read	– – –	2%, maximum, of nominal read voltage.
Voltage Induced in Read Winding While Writing at 800 bpi, 12.5 ips, and up	– – –	5%, maximum, of read voltage
Inductance	6 mH ± 20% (Full Winding)	Write: (each leg) 500 μH maximum Read: (each leg) 10 mH maximum
Dc Resistance	22 ohms ± 20% (Full Winding)	Write: (each leg) 10 ohms maximum Read: (each leg) 25 ohms maximum
Write Current (100% saturation)	11 mA ± 20%	35 mA ± 20%

Table 4-4. Head Specifications

FUNCTION	SINGLE GAP READ/WRITE	DUAL GAP READ AFTER WRITE
Read Voltage	10 mV ± 20% @ 15 ips, 200 bpi	700 μV/inch/sec. ± 10%
Read Pulse Width (200 bpi)	1650 μin., maximum	1250 μin., maximum
Self Erasure (Read Signal Reduction After 10 Passes)	5% maximum	10% maximum
Erase Head Resistance	80 ohms	
Erase Current	50 mA	

Table 4-4. Head Specifications (Continued)

4-43. DATA RECOVERY

4-44. Five inputs are required to enable the read circuitry. Select, Read, and Run are derived from the control logic and routed through the write circuitry. Threshold is a customer-generated level routed through J102E on the read/write board. $\overline{\text{Hi Den}}$ comes from the control logic and is either switched high or low locally from the control panel or remotely fixed high (for nine-track recording). The following description is keyed to track 0 but is applicable to all tracks. (See Figure 4-10.)

4-45. The input to the first stage of the read amplifier, U1, is a low-level, analog signal. The output from the head is 700 microvolts/inch/second ±20%. (I.e., at a tape speed of 10 inches/second the input to the amplifier would be 7.5 millivolts, peak-to-peak.) The first-stage differential amplifier gain is controlled by a shunt feedback potentiometer, R7. The compensation components, C3, R4, and C4, are selected for a 100-kHz roll-off, while C5, R6, and R7 determine the low-frequency roll-off. The voltage level at TP1 will be approximately 1.3 volts peak-to-peak; however, the actual gain is adjusted to obtain the proper level at TP4 (located in the peak detector).

4-46. The second stage, U2, is an active filter. R9, R10, C6, and C7 determine the 3-dB point, which is the high-band cutoff. The 3-dB frequency is 100 kHz for all tape speeds in the range of 25 to 45 ips. For lower speed units, the 3-dB point is set at three times the maximum fundamental analog frequency, which is 1.5 times the data rate. The signal-to-noise ratio becomes more of a factor at lower tape speeds because of the lower head output level. The effective gain of the second stage is 8 and is determined by R13 and R17. This gain is required to reduce the effect of the dead band created by the full-wave rectifying action of CR9 through CR12. The voltage at TP2 will be approximately 12 volts peak to peak. The voltage at TP3 will be approximately 1.3 volts peak to peak, due to the voltage divider action of R13 and R17.

4-47. The buffer amplifier, U3, serves the purpose of isolation and threshold offset provisioning. The threshold level is determined by the offset current from Q7 into the inverting input of U3. The output of U3 is fed into a Schmitt trigger (peak detector).

4-48. THRESHOLD. An understanding of threshold is helpful in considering the function of the peak detector. The threshold is defined in terms of percentage and is the part of a nominal signal that must be reached in order to be detected as a bit of data. This percentage is determined by the reference point, trigger point, and overall amplitude of the signal (Figure 4-11).

4-49. SCHMITT TRIGGER. The Schmitt trigger circuit detects the peak of the rectified analog signal from U3. As the voltage to the common emitter output of Q1 and Q2 (TP4) drops from the reference level, Q1 is turned off and capacitor C14 is being discharged through Q2 (Figure 4-12). When the voltage at TP4 drops below the +3.6-volt level, transistor Q3 is enabled through CR13, which will allow the circuit to trigger later. Q4 is off at this time, since base current is not being supplied by Q3. Peak detection takes place when the output of Q2 at TP4 reaches its lowest level and starts to

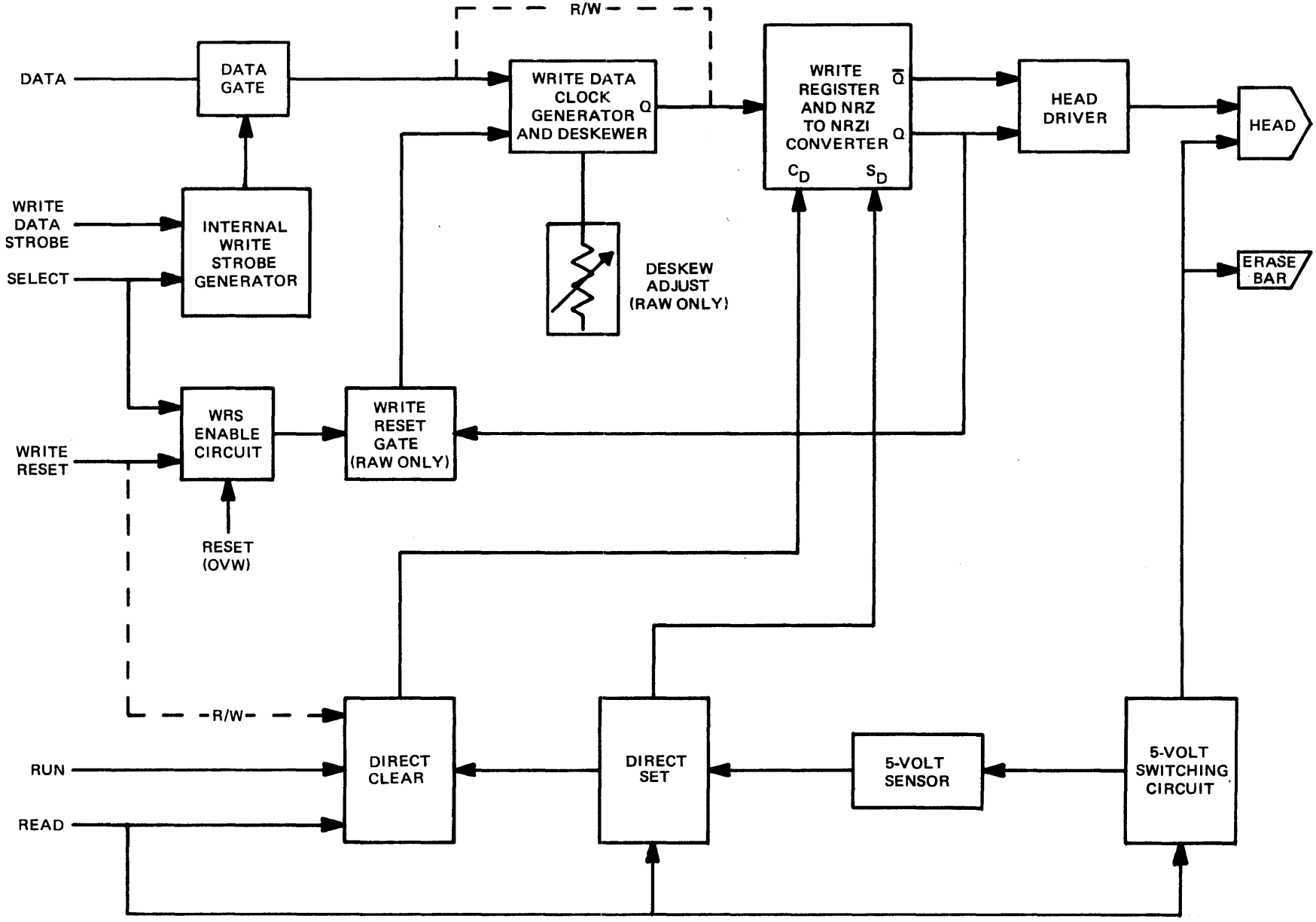


Figure 4-7. Data Recording Block Diagram

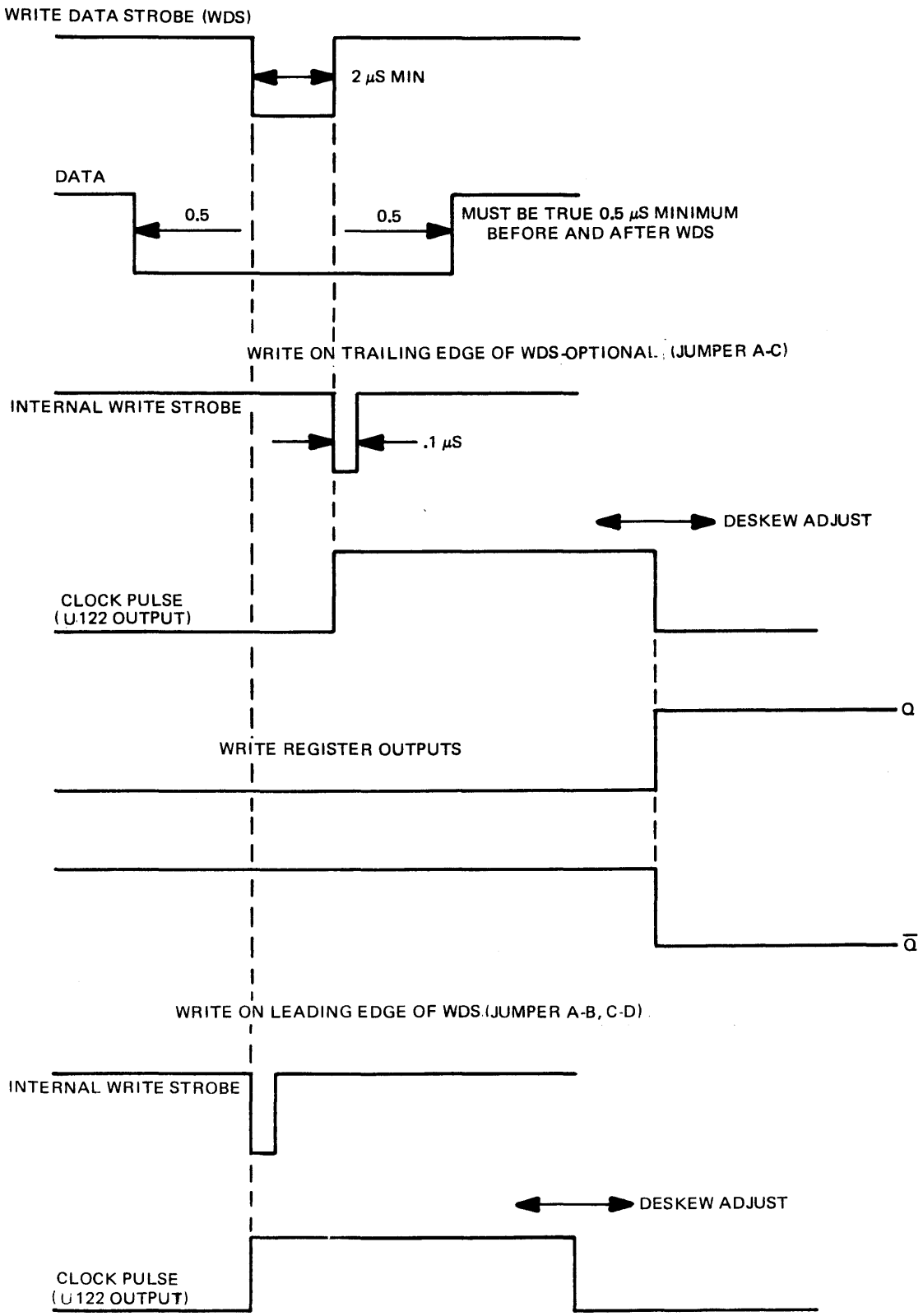
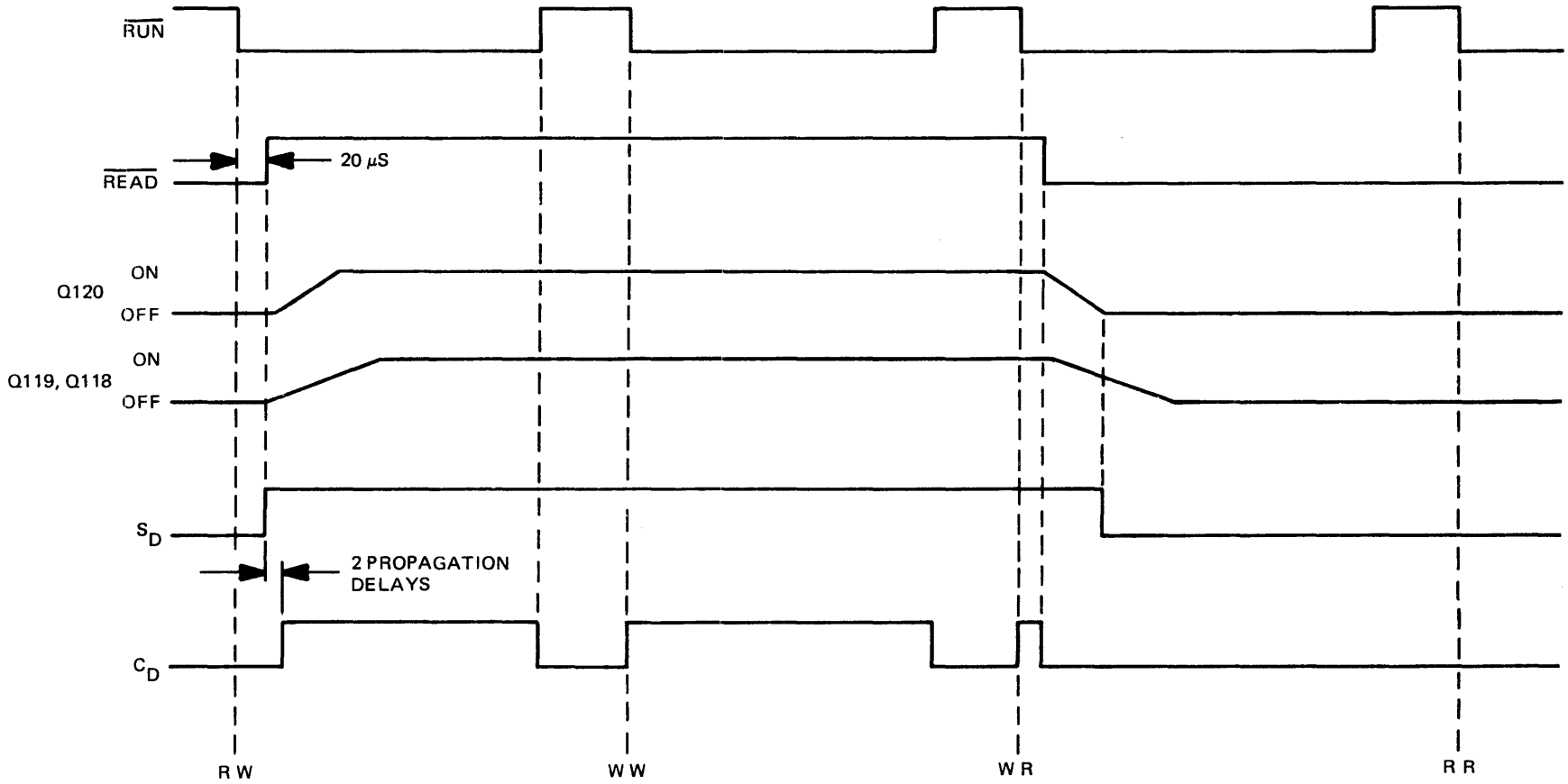


Figure 4-8. Data Recording Timing Diagram



NOTE THAT WHEN SWITCHING FROM READ TO WRITE C_D GOES HIGH AFTER S_D HAS GONE HIGH, AND WHEN GOING FROM WRITE TO READ C_D GOES LOW BEFORE S_D.

Figure 4-9. Direct Clear/Direct Set Timing Diagram

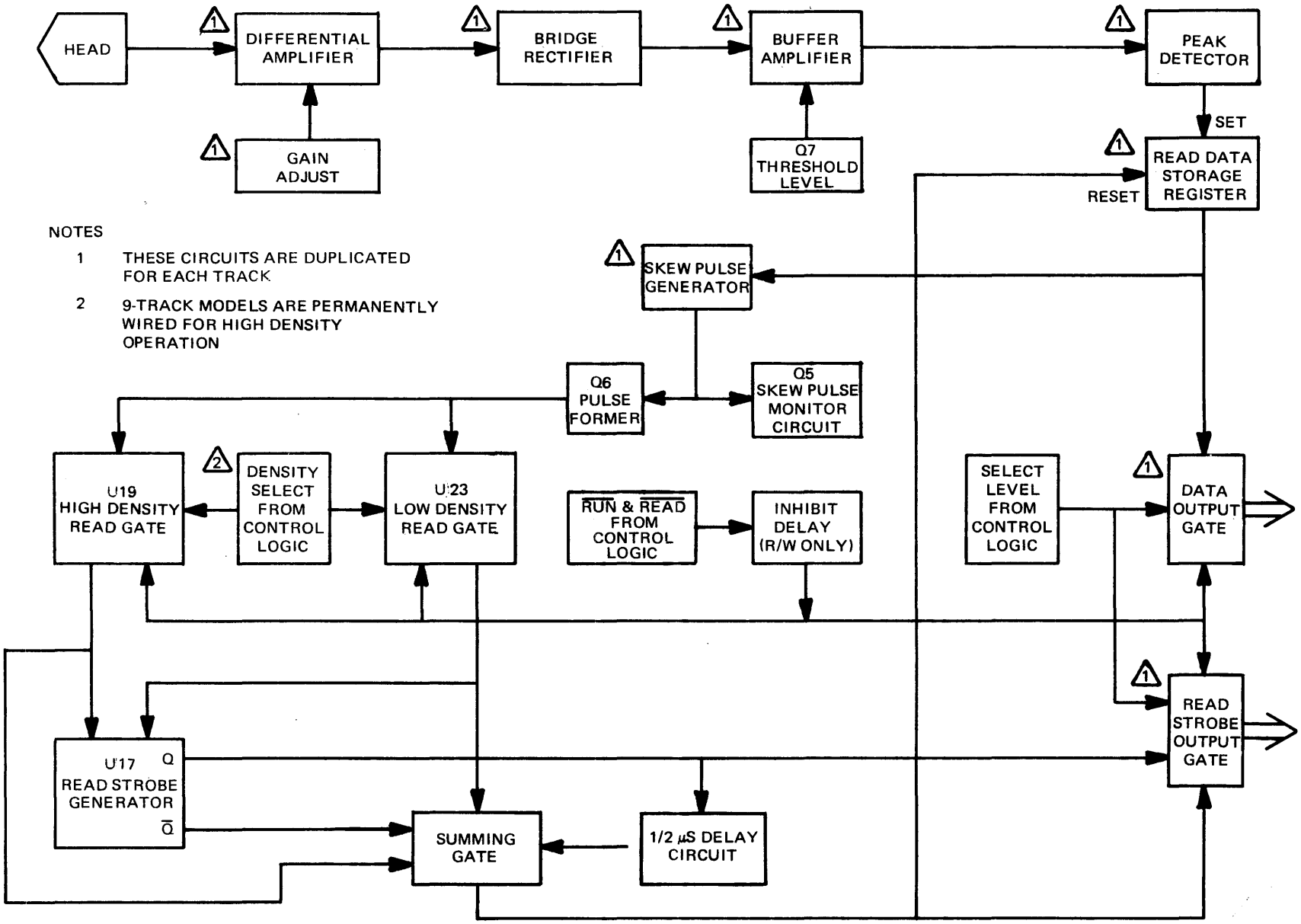
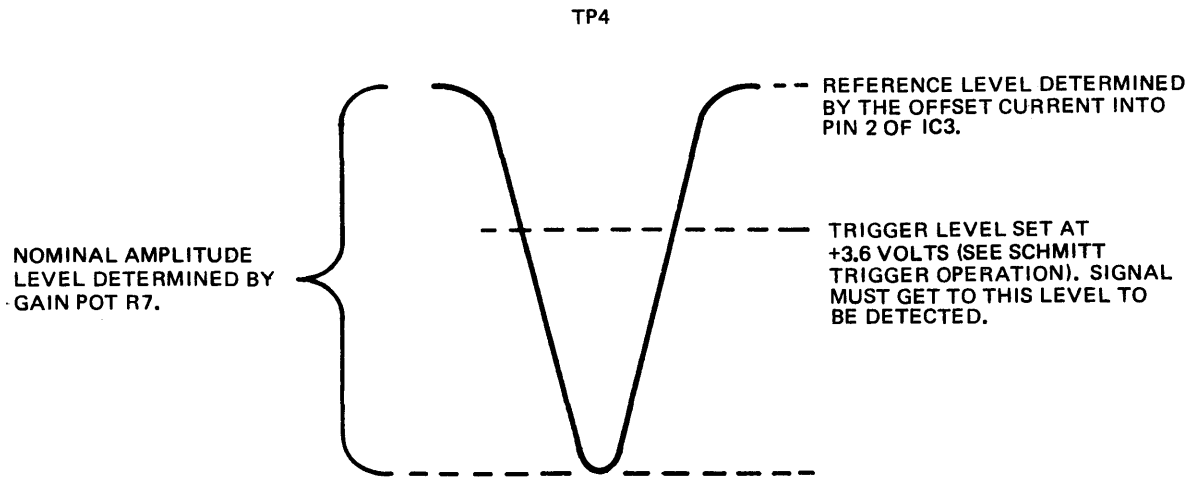


Figure 4-10. Data Recovery Block Diagram



$$\% \text{ THRESHOLD} = \frac{\text{REFERENCE LEVEL - TRIGGER LEVEL}}{\text{AMPLITUDE}}$$

$$\text{i.e. } 20\% \text{ THRESHOLD} = \frac{6.5V - 3.6V}{X}$$

$$X = \frac{2.9}{.2} = 14.5V$$

With the reference level at +6.5 volts and a total required amplitude of 14.5 volts, gain would be adjusted so that the negative peak would become - 8 volts.

Figure 4-11. Threshold Data

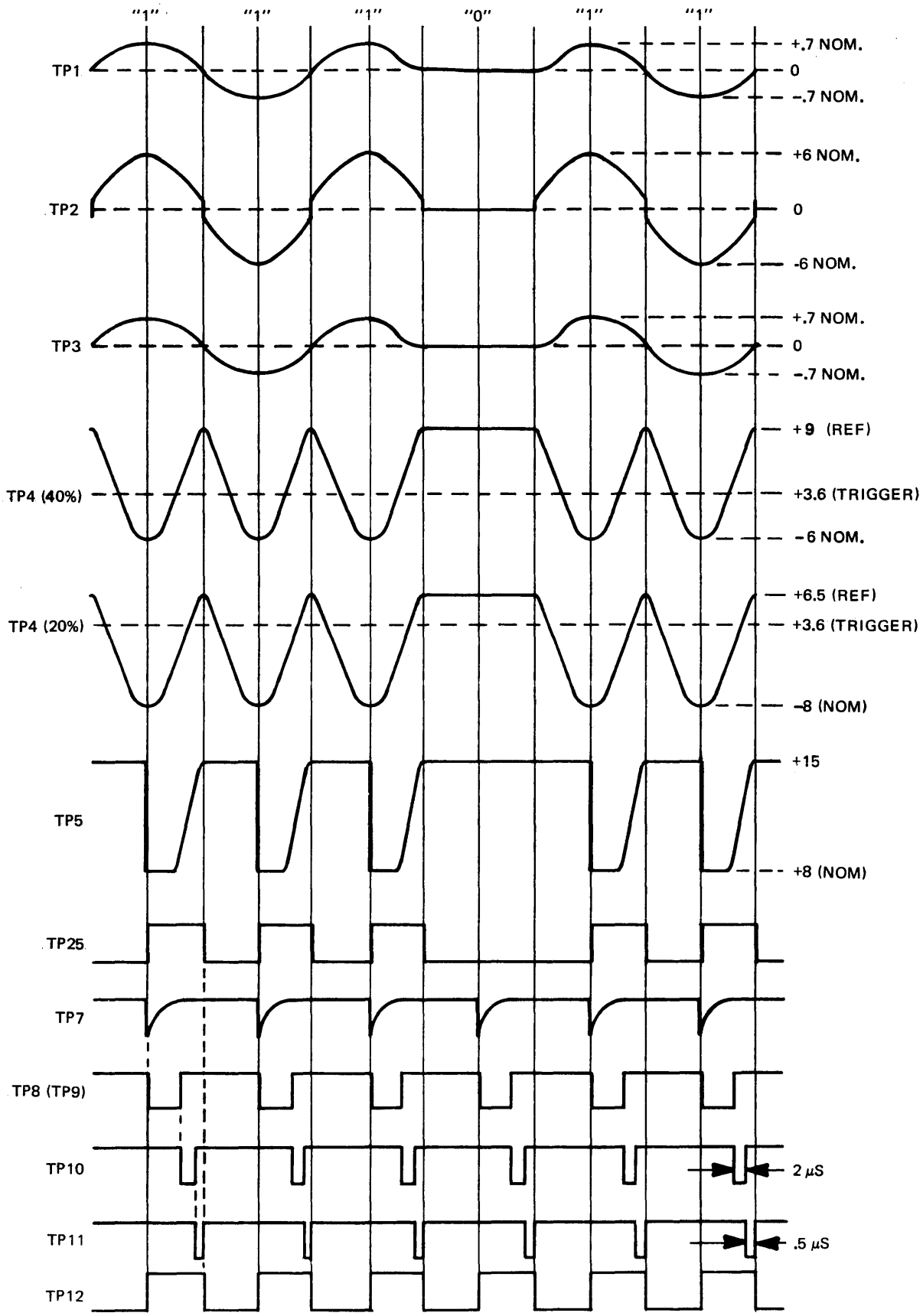


Figure 4-12. Data Recovery Timing Diagram

go positive. Q2 is now turned off, and capacitor C14 is charged through Q1. Q1 and CR13 now supply base current to the enabled Q3, turning it on. Q3 then supplies base current to Q4, which generates a negative pulse through C15 to set the read data storage register (U18A and B). The register will remain set until the reset pulse generated by U14A in the read gate network is received. When the output of Q1 (TP4) goes above +3.6 volts, Q3 is turned off through CR14, which, in turn, removes the base current from Q4. When the output of Q1 reaches its highest point, Q1 will turn off. The cycle is now ready to repeat for the next bit of data.

4-50. The negative pulse from the Schmitt trigger is capacitively coupled to the read data storage register through C15. R28 and R30 form a voltage divider which holds the quiescent voltage high on the input to U18A when data is not present. The negative data pulse to the read data storage register makes its output high. This high level is applied to the input of U7A. If the Select level from the control logic and the Run level from U14B are both high, the data output gate, U7A, is enabled and transfers the data bit out.

4-51. The output from the read data storage register is also inverted by U16F and applied through C17 to the skew pulse generator (CR15, CR16). The outputs of the skew pulse generators of all channels are tied together and applied to the bases of both Q5 and Q6. Q5 is an emitter follower which provides the skew pulses at TP7 to be used for deskew alignment of the head read gap. Q6 is a pulse former with its output inverted by U22A to become the read gate trigger. The negative-going edge of this trigger agrees with the peak of the Read signal.

4-52. READ GATES. Seven-track models with the dual-density capability have two read gates, one each for low and high-density operation. Nine-track models are permanently wired in a high-density configuration, using read gate U19. Read gate U19 is enabled by the High Density input from U22C and the Run input from U14B. In read/write models, jumper L-M is installed to delay the enabling inputs to the read gates. This allows the first-stage amplifier time to recover from saturation during the write-to-read transition. The delay is created by U10 and varies in time relative to the start/stop time of the recorder. Duration of the delay must be less than that of the start/stop time.

4-53. The read gate output is adjusted by means of R40 or R42 to a time that is 50% minus 2.5 microseconds of the normal byte-to-byte time. The trailing edge of the read gate output triggers the read strobe generator, U17, which is set for 2 microseconds. The read gate output is also coupled back to the input, to prevent retriggering by subsequent skew pulses, and routed to the summing gate, U14A. The Q output of the read strobe generator is fed to the Read Strobe output gate, U8B, and to a delay monostable, U20, which is set for 0.5 microsecond. The $\overline{Q}$ outputs of both U17 and U20 are routed to the summing gate. The summing gate output is routed to the Read Strobe output driver, U8B, and to the Reset input of all read data registers.

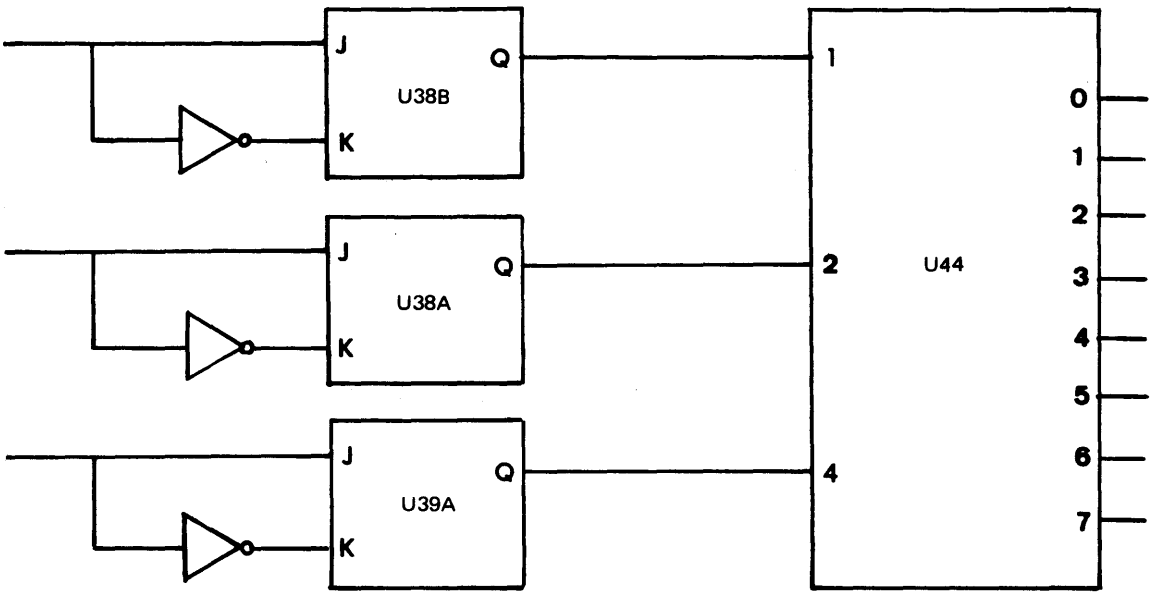
4-54. CONTROL LOGIC STATE DECODER

4-55. The state decoder, U44, on the control/servo board, is a 3 to 8-bit decoder which provides recorder status data to the various command control circuits in the control logic. These recorder configuration levels are used to enable and disable gates in the recorder's control logic, thus maintaining the proper sequence of commands and preventing improper commands.

4-56. There are eight outputs, representing eight possible logic configurations, one of which must be low at all times (Figure 4-13). Three inputs to the decoder determine its output state. These inputs are received from the Q outputs of three J-K flip-flops: U38B, U38A, and U39A. These low or high values are the same as those present on the J inputs of the flip-flops immediately before the clock pulse is received from U46B. The transfer of these values is triggered by the low-going edge of the clock pulse. The decoder maintains each state until the next one is clocked in.

4-57. STATE 0, STANDBY. This is the initial state that follows the application of power to the recorder as well as the Reset state. The power-on reset circuit of Q12 and Q13 works in conjunction with C5 and R5 on the power supply board to delay the resetting of the J-K flip-flops until all other logic circuits are stable. The power-on Reset line to U43B goes low, causing a low to be supplied via U37E to the Direct Clear inputs on the three J-K flip-flops, U38B, U38A, and U39A. This causes their Q outputs to go low, which sets the decoder to the Standby state. U43B can also be triggered to produce a RESET command by a broken tape or by tripping of the compliance arm limit switches.

4-58. STATE 1, STOP. This state results from the first action of the LOAD control (A2) on the front panel. The servo system and drive motors are energized, causing the tape to be tensioned, but motion commands are not enabled. See Figure 4-14.



INPUTS			OUTPUT STATE	NAME
4	2	1		
0	0	0	0	STANDBY
0	0	1	1	STOP
0	1	0	2	LOAD
0	1	1	3	READY
1	0	0	4	REWIND
1	0	1	5	DELAY
1	1	0	6	UNLOAD
1	1	1	7	RESET

Figure 4-13. State Decoder

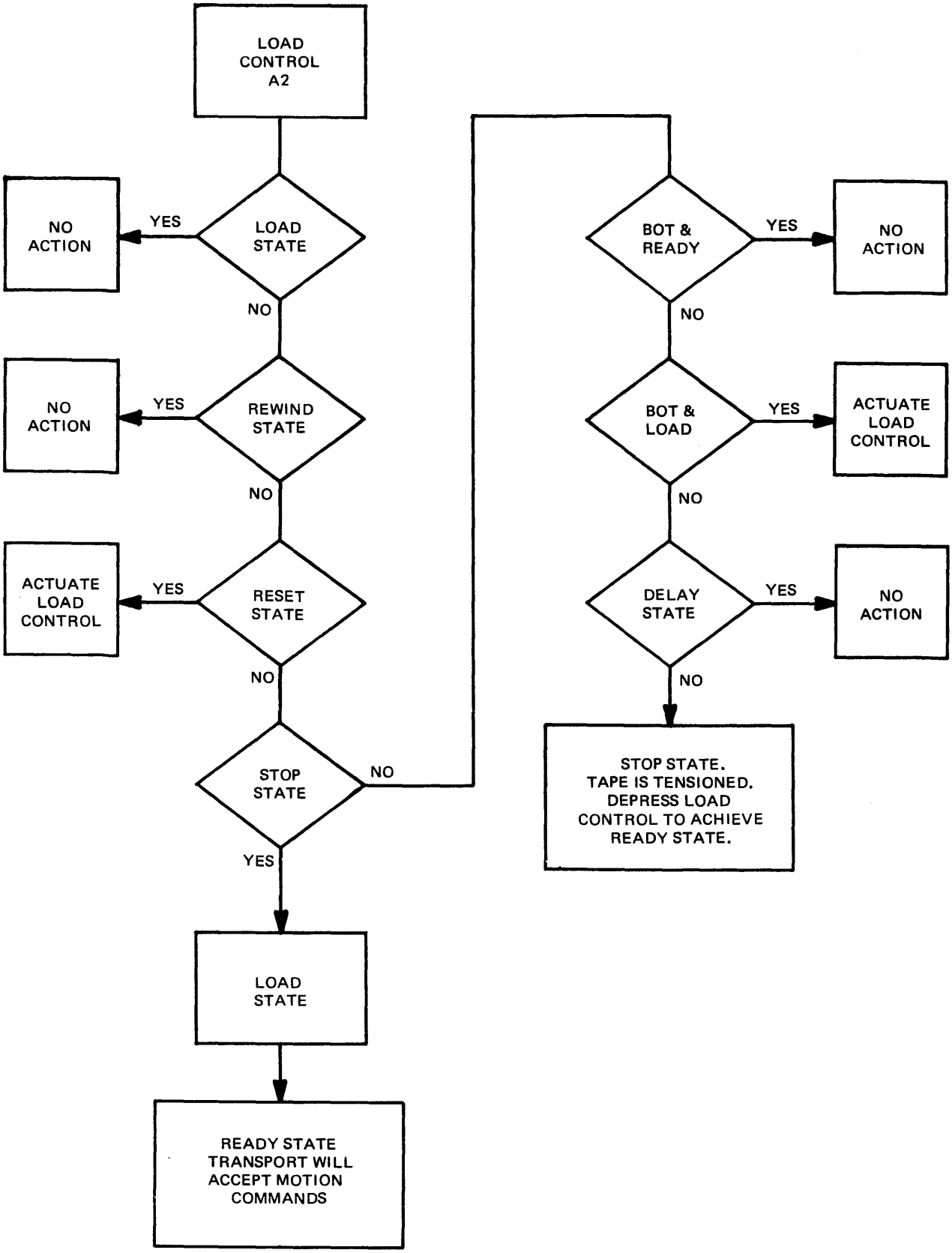


Figure 4-14. Load Sequence Flow Chart

4-59. The state decoder's digital 4 and 2 inputs remain at 0, as originally set in the Standby state. All inputs to U29C and U43A remain high.

4-60. Since the BOT and Load inputs to U23C are not true, the level of U23C into U29A is high. The Rewind level into U29A is also high. Since the logic is in the Standby state, the Standby level is true, or low. This low input to U29A causes its output to be high and makes the J input of U38B high. Actuation of the LOAD control (A2) triggers the internal logic clock pulse generator (U46B), causing the high to be transferred from the J input to the Q output of U38B. In this manner, the digital 1 input of the state decoder is set to 1. This binary code (001) is the Stop state and causes the Stop line to become true. U46A is triggered and provides an inhibit pulse, allowing the retractor time to get to the down position.

4-61. STATE 2, LOAD. Actuation of the LOAD control a second time starts the tape moving forward to the load point. When the BOT tab is sensed by the photosensor assembly, tape motion ceases and the recorder enters the Ready state.

4-62. The state decoder's digital 4 input remains at 0 as originally set in the Standby state. Actuation of the LOAD control while the recorder is in the Stop state causes the LOAD control input to U43A to go low. Since the other three inputs remain high, the output of U43A goes high. This is applied to the J input of U38A, where it is stored as a binary 1 until the flip-flop is clocked. This will become the digital 2 input to the state decoder.

4-63. The three inputs to U29A are high, causing its output to be low. This low is applied to the J input of U38B, where it is stored as a binary 0 until clocking. This will be the digital 1 input to the state decoder. Actuation of the LOAD control also triggers the internal logic clock pulse generator, which introduces a slight delay to allow for loading of the J-K flip-flops. The clock pulse transfers the binary code stored at the J inputs to the Q outputs of the J-K flip-flops, where they serve to set the state decoder. This binary code (010) is the load state, which causes the Load line to become true.

4-64. STATE 3, READY. Sensing of the BOT tab during the load sequence places the recorder in the ready state. The logic circuitry can now accept both local and remote motion commands when other criteria are met. (See paragraphs 4-80 through 4-105.)

4-65. When the BOT tab is sensed during the load sequence, the BOT line becomes true and is applied to U23C as a high level. The load level is inverted by U23D and is also applied to U23C as a high level. With these two inputs high, the output of U23C goes low and is applied to U29A. Because the recorder is not in the standby or rewind state, the remaining inputs are high. Thus, the output of U29A goes high and is applied to the J input of U38B to await clocking. This is the digital 1 input to the state decoder. The digital 2 and 4 inputs remain the same as in the load state.

4-66. The internal logic clock pulse generator is triggered by the output of U40C, which goes low when the BOT tab is sensed. The state decoder is now in the ready state (binary code 011).

4-67. STATE 4, REWIND. Either a remote or local REWIND command rewinds the tape onto the supply reel until the BOT tab is sensed. At this point, the decoder cycles through the delay and load states to the ready state. Actuation of the local REWIND control (A4) will then unload the tape.

4-68. The remote REWIND command gate, U6C, requires the recorder to be on line, selected, in the ready state, and not at BOT. The low output of U6C is used to actuate U30D, which triggers the internal logic clock pulse generator, U46B. This, in turn, clocks the J-K flip-flops controlling the state decoder, U44.

4-69. The local rewind control gate, U20C, requires the recorder to be off line and in either the stop, ready, or load state. The low output of U20C also actuates U30D and clocks the J-K flip-flops, as in the remote sequence.

4-70. The state decoder's digital 4 input is a binary 1 during rewind, since two of the inputs to U29C are held high and the Rewind input is switched low. All inputs to U43A and U29A are held high, resulting in presentation of a binary 0 to the state decoder's digital 2 and digital 1 inputs. This binary code (100) represents the rewind state.

4-71. STATE 5, DELAY. The transport continues to rewind tape onto the supply reel until the BOT tab is sensed. At this point, the BOT lines go true, changing the state decoder input to binary 101, the delay state. This delay allows the transport to come to a complete stop before a new motion command is accepted.

4-72. With the Delay lines true, the state decoder input becomes binary 010, the load state. With the Load lines true the binary code becomes 011, the ready state. The transport will now accept motion commands. Actuation of the REWIND control at this time unloads the tape.

4-73. STATE 6, UNLOAD. With the transport in the ready state, actuation of the REWIND control changes the state decoder's binary input to 110, the Unload state. When the last of the leader has passed through the photosensor, both the BOT and EOT sensors are activated. These two signals are ANDed at U22C and used to actuate the reset gate, U43B. This Reset pulse is applied to the Direct Clear inputs of the three state decoder flip-flops, setting their Q outputs low. This forms the binary code 000, returning the recorder to the standby state.

4-74. STATE 7, RESET. A logic error creating an undefined state in which the binary code III is presented to the state decoder results in the reset state. The $\overline{\text{Reset}}$ line goes low, actuating the reset gate, U43B. The high output of U43B is inverted by U37E and routed to the Direct Clear inputs of the three state decoder flip-flops, U39A, U38A, and U38B. This makes their Q outputs low, forming a binary 000 input to the decoder and returning the logic to the standby state.

4-75. The high output of U43B is also inverted by U37F and used to disable transistor Q16. When Q16 is turned off, the ground normally supplied to the reel motor relay, K2 (on the reel servo portion of the control/servo board), is removed. When K2 is deenergized, both reel motors are placed in their dynamic braking states, and the motors are maintained in a deenergized condition until a new command is issued. In addition, if the recorder is in the on-line mode, effectuation of the reset state will return it to the off-line mode.

4-76. COMMAND LOGIC

4-77. There are two methods of commanding transport operation: manually, by means of the front panel controls, when the recorder is in the off-line mode; and remotely, when the recorder is in the on-line mode and is being controlled by computer-generated signals. A J-K flip-flop, U39B, determines the on line status of the recorder. See Figure 4-15.

4-78. The external OFF LINE command, applied at J101-L and enabled by the Select and Ready levels at NAND gate UJ2D, sets the on-line/off-line flip-flop, U39B, to the off-line state. This OFF LINE command is applied to U39B as a Direct Clear reset. When low, U39B is effectively locked in the off-line mode, and the front panel control (A3) will have no effect.

4-79. The ON LINE control/indicator (A3) provides a clock pulse to U39B, which is gated through U12A when the system is not in the standby mode. In switching from the off-line to the on-line mode, the high level appearing on the off-line circuit and connected to the J input of U39B is transferred across to the Q output when the clock pulse is received, thus making the on-line circuit high. In switching from on-line to off-line, the low level appearing on the off-line circuit is transferred from the J input to the Q output when U39B is clocked, thus making the on-line circuit low.

4-80. FORWARD COMMAND CIRCUIT

4-81. Forward tape motion may be commanded by the FORWARD pushbutton on the local control panel when the recorder is in the off-line status. Forward tape motion may also be commanded remotely, through the interface, when the recorder is on line. NOR gate U41B is the link between these two control sources (Figure 4-16).

4-82. REMOTE FORWARD COMMAND. The remote FORWARD command is a low level applied to pin C of J101. U1, pin 9, and U2, pin 6, supply a positive collector voltage to this line for the user's output device. Inverter U4B inverts the negative logic input to provide a high true to the two-input NAND gate, U14B. The second high input required by U14B is the Command Gate Enable level derived from the three-input NAND gate, U6A. U6A requires all three inputs to be high: the On-Line level from U39B, the Ready level from state decoder U44, and the Select level from U21C. When these conditions are met, the output of U6A goes low. This low level is inverted by U4A and fed to U14B, thus enabling it. The low true output of U14B is routed to the two-input NOR gates, U41B and U8D.

4-83. The low input to U8D causes its output to go high and trigger the monostable multivibrator, U48. U48 is used to clock the overwrite and write enable flip-flops, U16A and B. The low input to NOR gate U41B causes its output to be high. This high is the true condition of the FORWARD command level and is discussed further following the description of local FORWARD command.

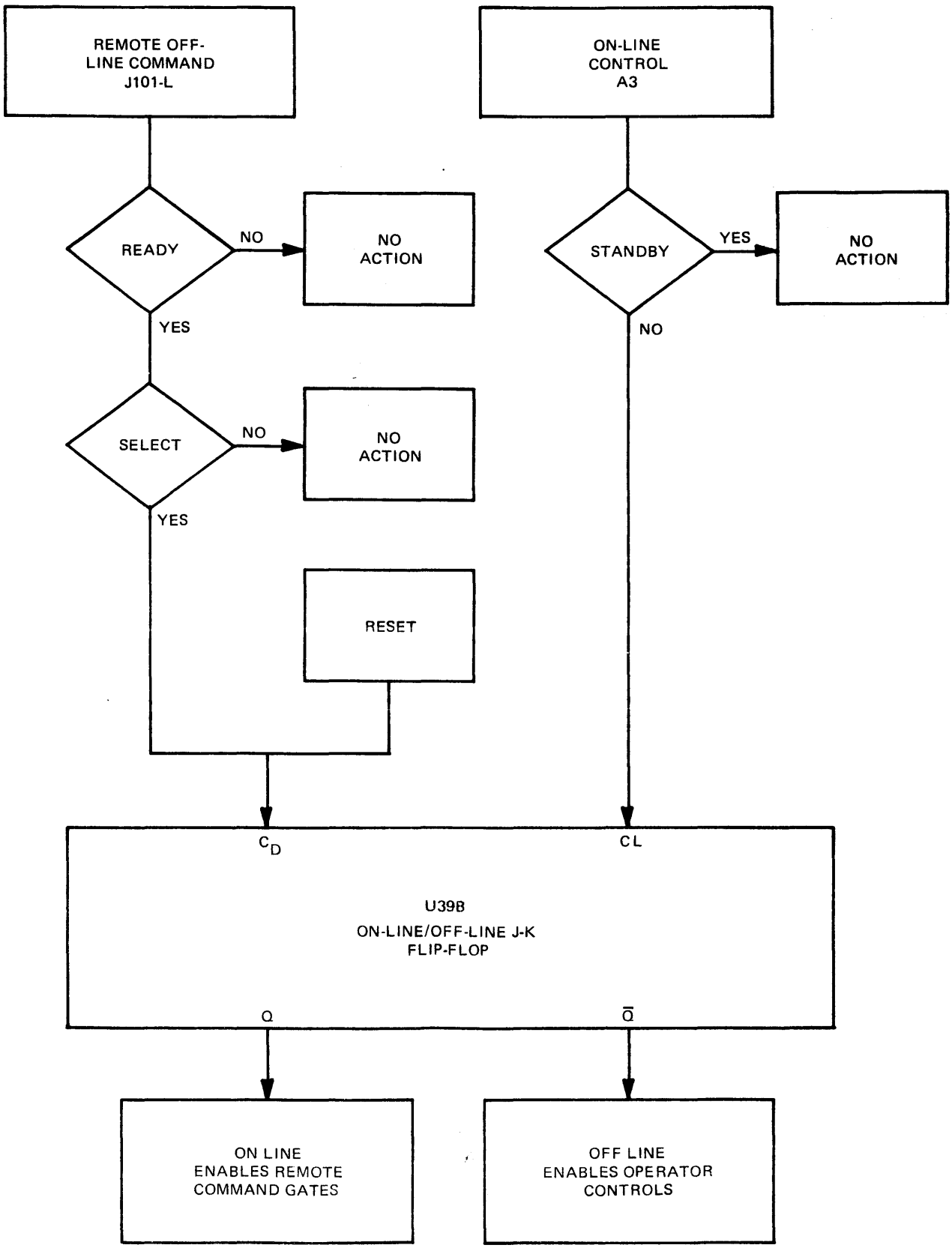


Figure 4-15. Local/Remote Operation Flow Chart

4-84. LOCAL FORWARD COMMAND. The switch portion of alternate-action pushbutton/indicator A7 applies a high, when actuated, to NAND gate U25B. U25B requires two additional inputs to be high: the Ready level from the state decoder (U44) and the Off-Line level from J-K flip-flop U39B. When these conditions are met, the output of U25B goes low, the true state. U31F inverts this level and applies it as a true high input to the two-input NAND gate, U41A. If the EOT output of U22D is also high, the output of U41A becomes true and is applied to NOR gate U41B as a low, thus enabling it.

4-85. The true output of U41B is high. This high level is applied to NAND gate U50A. If the reverse level applied to inverter U49A is low (false), its output becomes high and enables U50A. This command redundancy prevents issuance of simultaneous commands for both FORWARD and REVERSE. The low output of U50A or U50B generates the Forward (Reverse) and Run signals, respectively, that control the capstan drive logic.

4-86. CAPSTAN DRIVER. The Forward and Run signals are ANDed at U303B on the capstan driver portion of the circuitry. The low (true) output of U303B is inverted by U304A and used to activate the forward switch driver, Q309. This, in turn, activates the forward switch, Q301. A positive reference voltage is provided by zener diode CR301. This reference is stabilized at 6.2 volts by the amplifier circuit of U301A. The positive 6.2-volt output of U301A is routed to the inverting input of U301B to provide the negative reference level for the reverse and rewind circuits. This positive output is also routed through the forward speed adjust potentiometer, R312, and the forward switch, Q301, to the inverting input of U305A. (See Figure 4-17.) Amplifier U305A serves to isolate the forward/reverse command circuit from the ramp-shaping circuit. Its output is a negative voltage level for the forward mode and is routed through the ramp adjust potentiometer, R333, to switch Q312. Q311, the rewind switch, is off during forward and reverse operation.

4-87. Switch Q312 is controlled by the flip-flop circuit of U302C and D. With the Run input true (high) and the $\overline{\text{Rewind}}$ input false (high), the output of the flip-flop at U302D is low. This low is inverted by U304B and used to activate switch driver Q307, which, in turn, activates switch Q312. The output of Q312 is applied to the inverting input of gain-determining amplifier U305B. The output of U305B is then applied to the inverting input of amplifier U306B. U306B and its associated circuitry form the ramp generator. Feedback capacitor C315, together with ramp adjust potentiometer R333, determine ramp time. The output of U306B (TP302) is negative for the forward mode. This ramp generator output is routed to the reel servo loops to initiate the response of the supply and takeup reels.

4-88. The ramp level is summed with the output of the tachometer (TP301), and the resulting error voltage is applied to the inverting input of amplifier U306A. The output of U306A is fed through a notch filter network to U307B, where it is again inverted. Feedback from the power driver is routed through a compensation network consisting of R353, R382, and C314 and summed with the notch filter input to U307B. The enable switch, Q319, determines whether or not the capstan motor can be driven. Q319 is a FET switch controlled by the Enable line from the control logic circuitry. When the Enable line is at 0 volts the switch is on, and the input to the motor driver from U307B is shunted to ground. When the Enable line is at -15 volts, the switch is off and the motor driver can be activated.

4-89. The output of U307B is a negative voltage level for forward motion. This negative level activates the capstan motor forward driver circuitry consisting of Q316, Q317, and Q318, which applies negative power through J9 to the capstan motor, resulting in forward tape motion. The power driver output is also routed through an amplifier, U307A, and a bridge rectifier with a 6.8-volt zener diode to provide current-limiting feedback.

4-90. REEL SERVOS. Both the supply and takeup reel servos use similar circuitry and operate in the same manner (Figure 4-18). The following circuit description pertains to the supply servo but can be applied to the takeup servo as well. The last two digits of the reference designators are the same for each servo. The first digit, however, is a 2 (i.e., 2xx) for the supply servo and a 4 (i.e., 4xx) for the takeup servo.

4-91. Compliance Arm Position Sensor. The reel motor is controlled by the photosensor assembly (Figure 4-19), which varies the current input to U201A as a function of compliance arm position. The photosensor assembly consists of a lamp, a solar cell, and a slotted disc. The disc is attached to the compliance arm spindle and rotates with it, acting as a rotary shutter to vary the amount of light falling on the solar cell. This changes the current flow through the photo diode, which changes the input to amplifier U201A.

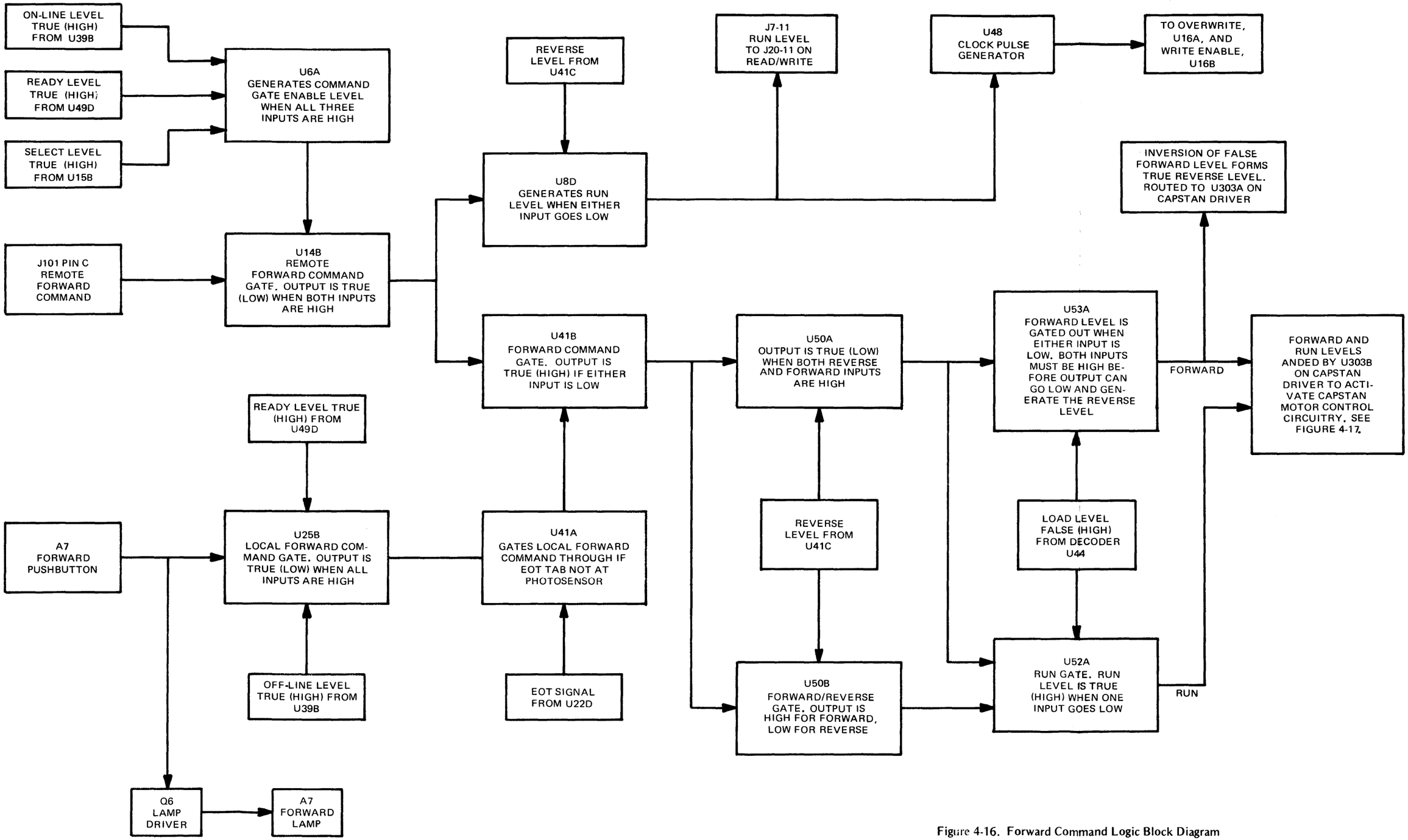


Figure 4-16. Forward Command Logic Block Diagram

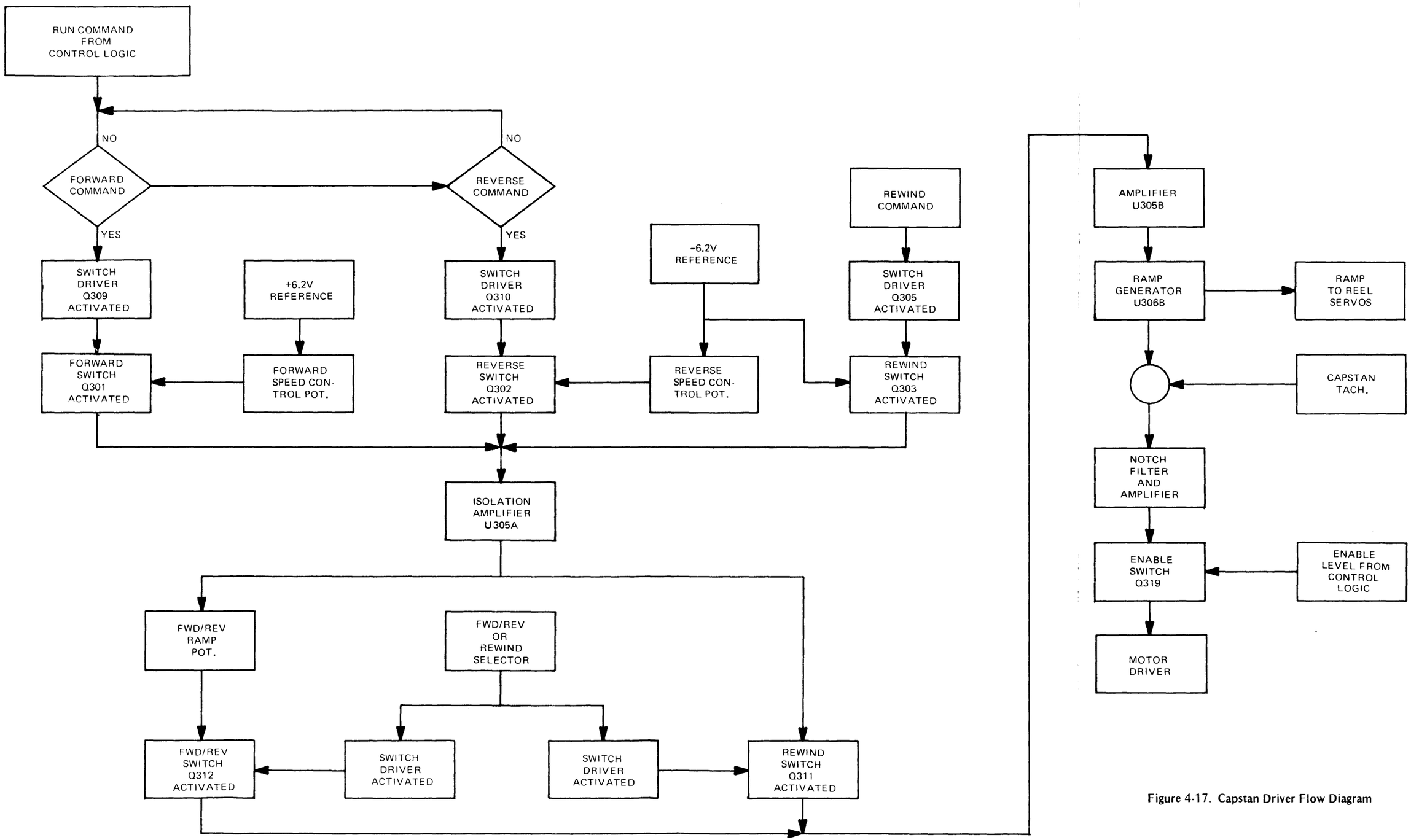


Figure 4-17. Capstan Driver Flow Diagram

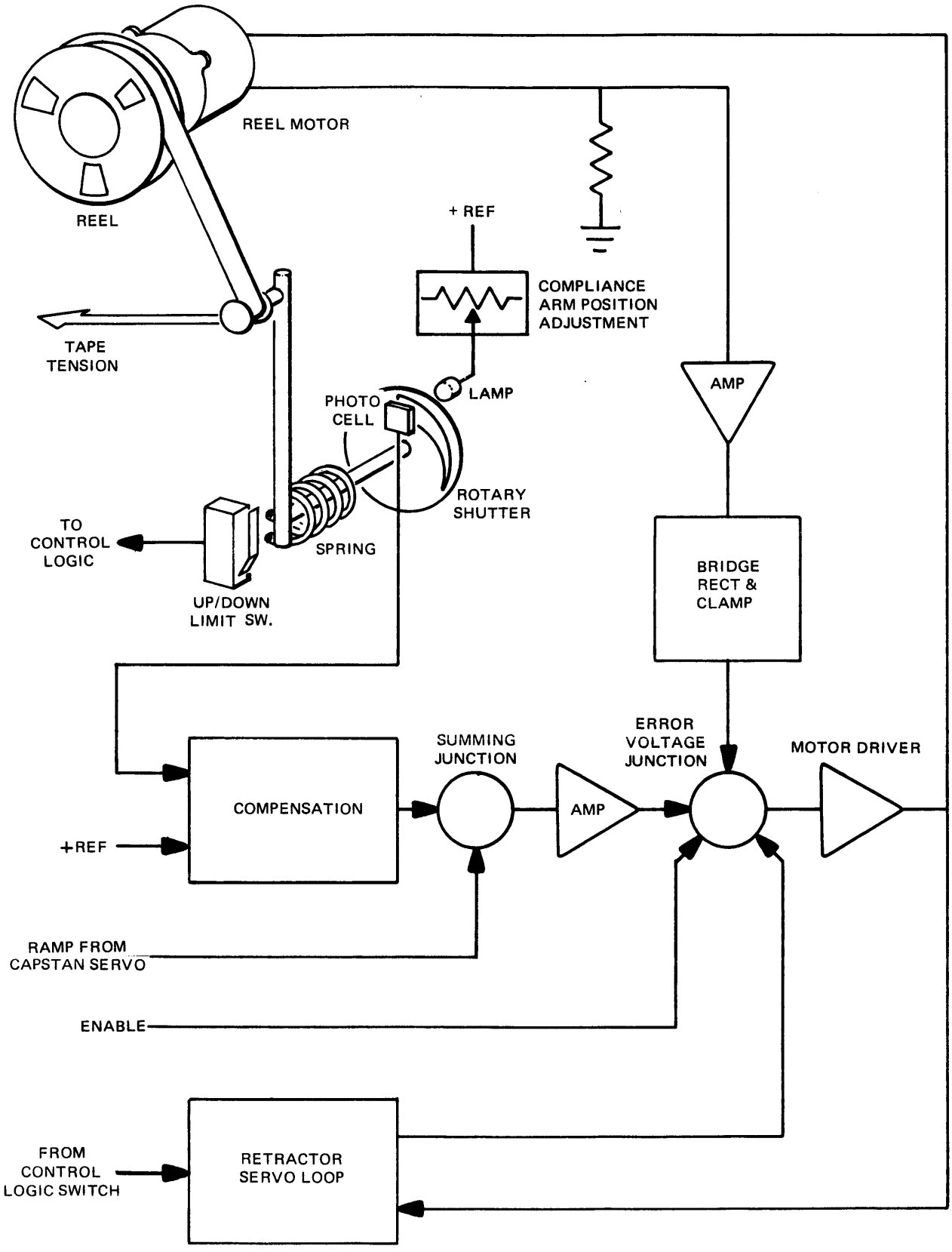
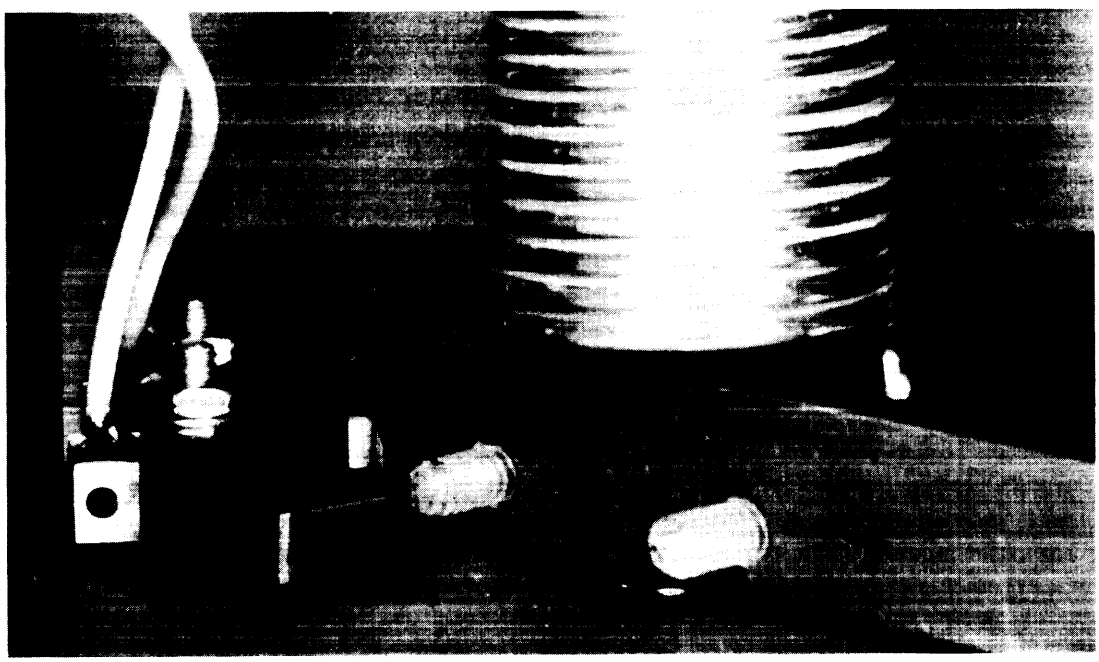


Figure 4-18. Reel Servo Block Diagram

MOTION SENSOR



LIMIT SWITCH

Figure 4-19. Compliance Arm Motion Sensor Assembly and Limit Switch

4-92. The photosensor lamp is supplied with positive current through lamp driver Q201. Q201 is controlled by the base current applied by amplifier U201B. The output of U201B is controlled by the negative voltage level set by the compliance arm position adjust potentiometer, R202. The source of this voltage level is the negative reference voltage supplied by U301B on the capstan driver portion of the circuitry. Adjustment of R202 varies lamp intensity, which changes the solar cell current input to U201A and causes the servo system to change the compliance arm position. This adjustment is used to center the arm in its arc of travel. (See Section V.)

4-93. As tape is taken from or added to the compliance system by the capstan drive, the compliance arms move to maintain tape tension. This movement is detected by the photosensor assembly, resulting in a change of the current input to U201A. The output of U201A is applied to the inverting input of amplifier U202B. The ramp level from U306B on the capstan driver is applied to the positive input of U202B. This input is negative for the forward mode and positive for reverse. The ramp serves as a prestart signal to initiate reel motion in the required direction prior to the compliance arm motion sensor's command, during stop and start operations. This prestart increases the amount of effective compliance provided by the system.

4-94. The Enable level from the control logic circuitry is required to be at -15 volts for the FET switch, Q208, to be off and not ground the motor driver input. This requires that the system not be in standby and that the retraction arm be in its down position (down switch closed). The output of U202B is a negative voltage for forward motion and positive for reverse. When negative, transistors Q205, Q206, and Q207 are turned on, supplying a negative voltage to the motor and resulting in clockwise reel motion (forward mode). When positive, transistors Q204, Q202, and Q203 are turned on, supplying a positive voltage to the motor and resulting in counterclockwise reel motion (reverse mode). Power for the supply and takeup reel motors is supplied through the contacts of relay K2. Relay K2 is energized when the ground side of the coil circuit is completed through transistor Q16 in the control logic circuit. Q16 is on when the logic is not in a standby mode.

4-95. A limit switch, actuated by two nylon screws on the compliance arm, determines the maximum travel of the arm. When the switch is actuated, the output of U52B of the control logic is routed to the reset gate, U43B. If the system is not in the stop or standby mode, the control logic will be reset. The reset condition turns Q16 off, deenergizing K2. In the deenergized state, the supply reel motor inputs are connected directly together, while the takeup reel motor inputs are connected through a current-limiting resistor, R436. This arrangement provides the transport with a dynamic braking action whenever power is lost or a reset occurs for some other reason. (See description of reset state, paragraph 4-74.)

4-96. Current-limiting feedback is provided through amplifier U202A and the bridge rectifier and zener diode network, CR204 through CR208. This feedback is taken from the motor power return line and is inserted at the input to the motor driver circuit (bases of Q204 and Q205).

4-97. RETRACTOR OPERATION (Figure 4-20). With power on and tape under the EOT/BOT sensor, a high level appears at the output of U22C. This output is applied at the input of U53D. If the down limit switch is energized, no action will result. If the down limit switch is not energized, the retractor arm will be driven up.

4-98. If the tape is not under the EOT/BOT sensor and the up limit switch is closed, there will be no action. If the up limit switch is not closed, the retractor arm will be driven up. Figure 4-21 is a timing diagram of retractor operation.

4-99. REVERSE COMMAND CIRCUIT. Reverse tape motion may be commanded by the REVERSE pushbutton on the local control panel when the recorder is in the off-line mode or remotely when the recorder is on line. U41C functions as the link between these two control sources in the same manner as U41B operates in the FORWARD command circuitry (Figure 4-16). The control logic used for the Reverse mode is similar to that previously described for the FORWARD command path. The true (high) output of U41C is inverted by U49A and applied to NAND gate U50A. This low input to U50A drives its output high, providing the high Reverse level required by the capstan driver.

4-100. The Reverse and Run signals are ANDed at U303A in the capstan driver, inverted by U304D, and used to activate switch driver Q310. Q310, in turn, turns on the reverse switch, Q302. This applies the negative reference level from U301B, as set by the reverse speed adjust potentiometer, R307, to U305A. The remaining circuitry functions in the same manner as in the forward mode, with the exception that the voltage output of each stage is of opposite polarity. The input to the motor driver from U307B is a positive

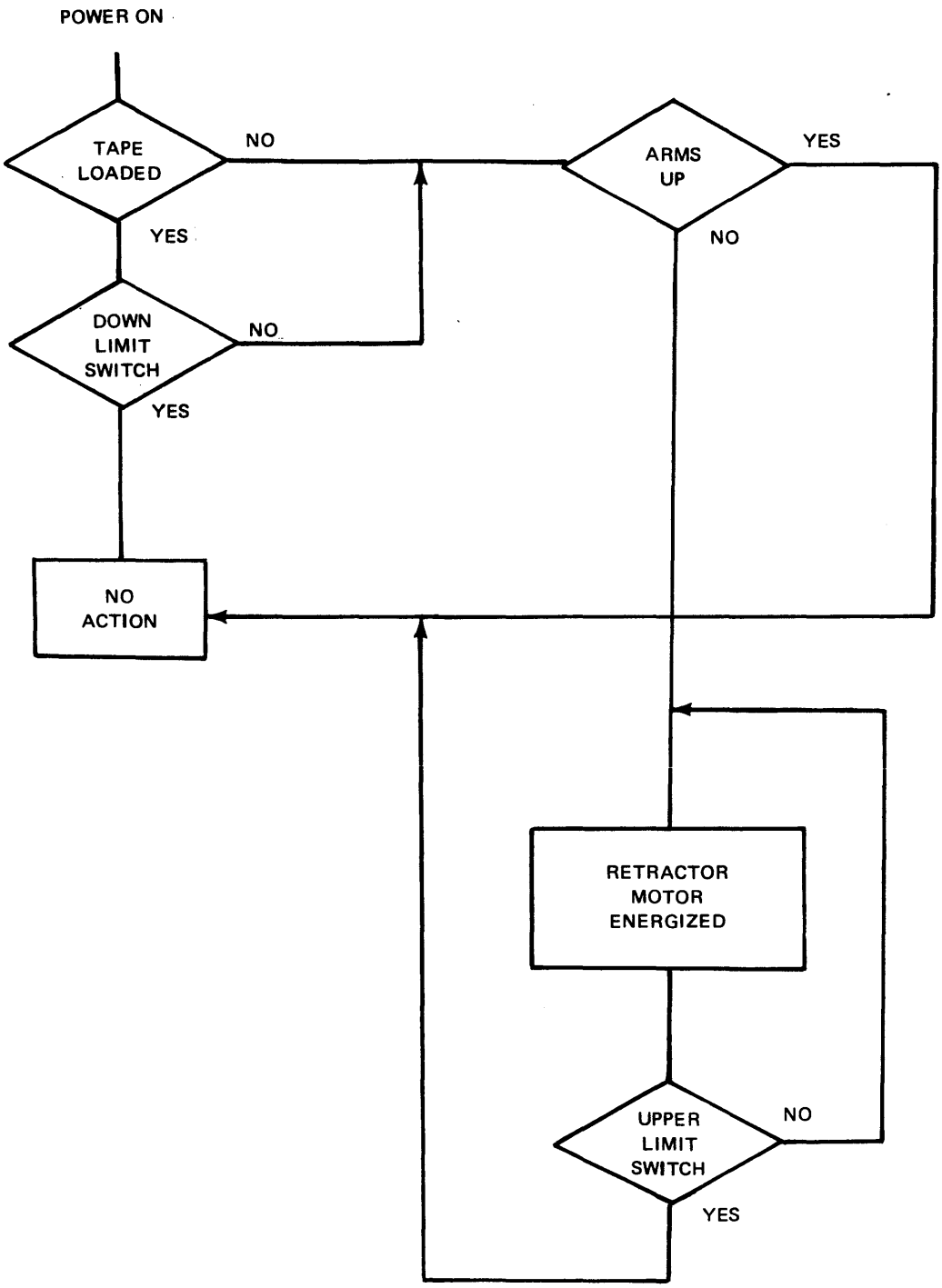


Figure 4-20. Retractor Flow Chart

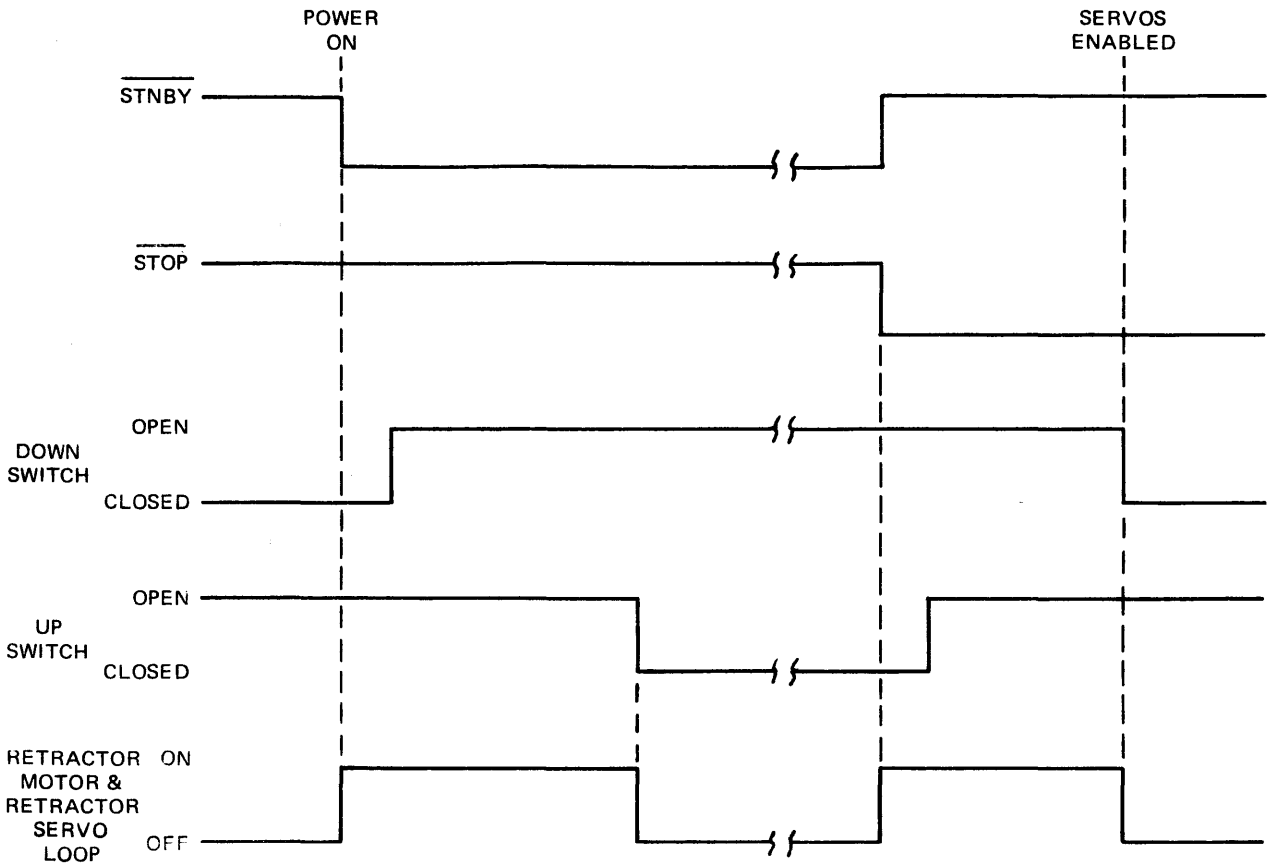


Figure 4-21. Retractor Motor Timing Diagram

voltage level for reverse operation. This activates the reverse motor driver circuitry of Q315, Q313, and Q314, which applies positive power through J9 to the capstan motor, resulting in reverse tape motion.

4-101. REWIND COMMAND CIRCUIT. The rewind mode may be commanded by the REWIND pushbutton on the local control panel when the recorder is off line. Rewind may also be commanded remotely when the recorder is on line. U30D in the control logic is the link between these two control sources. The output of U30D is used to trigger the internal control logic clock pulse generator, U46B, which clocks the rewind state into the decoder, U44. See the description of the rewind state under paragraph 4-67.

4-102. The true $\overline{\text{Rewind}}$ input to U50C causes its output to go high. This high is inverted by U49F and routed to the capstan driver as the $\overline{\text{RWD}}$ level. The low output of U49F is also applied to U52C, causing its output to go high and activate switch Q15. Q15 then turns on switch driver Q104, on the power supply, which activates switch Q103. Q103 applies +36 volts to the reel motor power input line, which provides the high rewind speed.

4-103. The low $\overline{\text{RWD}}$ input into the capstan driver is inverted by U304E and turns on switch driver Q305, which activates the rewind switch, Q303. Q303 then passes the negative reference voltage from U301B to the input of U305A. Fixed resistor R309 determines the rewind speed. The output of U305A is a positive level for rewind operation and is routed through Q311 when it is activated by switch driver Q308.

4-104. The low $\overline{\text{RWD}}$ input from the control logic circuit is applied to U302A and inverted by U304F to turn off the stop mode offset switch, Q304. $\overline{\text{RWD}}$ is also applied to U302D, making its output high. When inverted by U304B, this output turns off the forward/reverse switch, Q312. The high output of U302D is applied as an input to U302C. The low Run level from the control logic is inverted by U302B and becomes the second high input into U302C. With both inputs high, the output of U302C becomes low and activates switch driver Q308 after inversion by U304C.

4-105. With rewind switch Q311 turned on, the positive Rewind level is transferred to the inverting input of U305B. The ramp generator, notch filter, and motor driver circuits operate in the same manner for rewind as they do in forward. The takeup and supply reel servos also operate in the same manner as they do in the forward mode. The reel motor supply voltage is increased to 36 volts, however, to provide a faster rewind speed. See the description of these circuits under paragraph 4-80.

4-106. **POWER SUPPLY**

4-107. If power source voltage is other than 115 Vac, transformer T1 is to be connected in accordance with Table 2-1. Referring to Section VII, Drawing No. 331530-300, the input power to the power supply is filtered by filter F1. The ac voltage is then routed through J18 to the POWER switch on the front panel and then through J19 to the primary of transformer T1.

4-108. The four secondary outputs of T1 are rectified by fullwave diode bridges CR1, CR2; CR3 through CR6; CR7 through CR10; and CR11. The +36 and -36-volt supplies are rectified by CR1, the +36-volt output being filtered by C4 and C1 and the -36-volt output by C3 and C2. The +14*-volt and -14*-volt supplies are rectified by CR2, the +14*-volt output being filtered by C1 and the -14*-volt output by C2. The +15-volt supply is rectified by CR3 through CR6 and filtered by C6, and the -15-volt supply is rectified by CR7 through CR10 and filtered by C7. The 5-volt unregulated supply is rectified by CR11 and filtered by C8. CR21 and C5 provide the power-on RESET command to the control/servo board.

4-109. The circuit consisting of CR15 through CR19 and K1 controls the voltage applied to the compliance arm retractor motor. To ensure proper voltage, terminals on the power supply PWB designated 5 and 6 are connected to terminals 8 and 5, respectively, of transformer T1. This provides 125 Vac at pins 2 and 3 of J17 when pin 11 of J15 is grounded, even when T1 is wired for other than 125 Vac.

4-110. The regulators for the power supply are contained on the control/servo board.

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* For 45-ips recorders, these voltages are +23 and -23, respectively.

SECTION V

MAINTENANCE

5-1. GENERAL

5-2. This section contains periodic maintenance information, removal and replacement instructions, and adjustment procedures. Table 5-1 presents the preventive maintenance schedule. Refer to Section VII for schematic diagrams, assembly drawings, and parts lists.

CAUTION

If recorder is to be swung out from equipment rack on hinges for maintenance operations, ensure that rack is mounted securely. Weight of recorder in open position could upset an inadequately mounted equipment rack.

5-3. CLEANING

5-4. CAPSTAN. For routine capstan cleaning use Freon degreaser, Type TF. (Do not use Freon flux remover.) Wipe the capstan gently, using a lint-free, nonabrasive wipe saturated with Freon. If the capstan is excessively dirty with tape oxide/binder deposits, it may be cleaned with a Q-tip slightly moistened with Inhibisol, manufactured by Amerace Corporation, Penetone Division, Tenafly, New Jersey 07670.

CAUTION

Do not clean capstan with motor running. If Inhibisol is used, do not touch capstan surface or put tape on capstan for 5 minutes after cleaning, as Inhibisol softens capstan coating temporarily. Do not use head cleaner, Freon flux remover, alcohol, or other solvents to clean capstan sleeves.

5-5. HEAD AND GUIDES. Clean the head, its associated guides, and the roller guides with a lint-free, nonabrasive wipe or a cotton swab moistened with isopropyl alcohol or head cleaner.

CAUTION

Use only isopropyl alcohol or commercial head cleaner to clean head and guides. Rough or abrasive materials can scratch metal parts; other solvents, such as carbon tetrachloride, may dissolve head lamination adhesive. Do not soak guides with cleaner, as excess solvent may break down bearing lubricant.

5-6. TAPE CLEANER. Clean the tape cleaner as follows:

a. Remove single mounting screw.

b. Remove four screws holding blade to housing.

c. Blow out accumulated debris, and clean blade and housing with isopropyl alcohol. Ensure that blade is free of lint.

d. Assemble blade in housing, and reinstall tape cleaner. Adjust tape cleaner so that tape will be wrapped symmetrically around cleaning surface, i.e., so that entry and exit angles are equal.

MAINTENANCE OPERATION	FREQUENCY (hours)	QUANTITY TO MAINTAIN	PROCEDURE PARAGRAPH
Clean Head, Guides, Roller Guides, and Capstan	daily	–	5-4, 5-5
Clean Tape Cleaner	500	1	5-6
Check Skew, Tape Tracking and Speed	500	–	5-26 through 5-34, 5-39 through 5-44
Check Head Wear	2,500	1	5-40
Replace Reel Motors and Capstan Motor	10,000	3	Drawing No. 131000-0XX, Section VII

Table 5-1. Preventive Maintenance Schedule

5-7. HOUSING. The dust door and control panel may be cleaned, as necessary, with Miller-Stephenson Chemical Co. MS-260, Windex, or an equivalent commercial grade plastic cleaner.

CAUTION

Do not use rough or abrasive material to clean the plastic dust door, as permanent scratches may result.

5-8. REMOVAL, REPLACEMENT, AND MECHANICAL ADJUSTMENTS

5-9. Cipher recorders are designed to operate for long periods of time without requiring adjustment. In the event that a mechanical adjustment is required, it is recommended that the unit be returned to the Cipher factory for that purpose. Procedures for removal and replacement of damaged or defective mechanical parts, together with any needed adjustments following replacement, are discussed in the following subparagraphs.

5-10. FUSE REPLACEMENT. The fuse, a slow-blow Type 3AG, is located on the back of the power bracket adjacent to the line cord. For a 105- to 125-Vac power source, a 6.25-ampere fuse is used; for a 210- to 250-Vac source, a 3-ampere fuse is provided.

5-11. PUSHBUTTON/INDICATOR LAMP REPLACEMENT. To replace a burned out indicator or pushbutton/indicator lamp, proceed as follows:

a. Remove plastic indicator plate by grasping with fingers and pulling.

b. If lamp socket is in center of copper clip which latches behind small shoulder on each side of pushbutton/indicator body, proceed as follows:

(1) Unlatch one or both ends of copper clip with screwdriver or other small instrument, and remove clip with defective lamp.

(2) Replace defective lamp in clip.

(3) Push clip into place in body.

c. If lamp socket is in plastic switch/indicator body, with only small copper contact strip on one side of socket, proceed as follows:

(1) Insert narrow screwdriver (3/16 inch, maximum) into small notch at side of socket opposite copper contact strip.

(2) Apply pressure to screwdriver, releasing lamp.

(3) Remove defective lamp and install replacement.

d. Replace indicator plate.

5-12. SINGLE-EDGE TAPE GUIDE. To replace a damaged or worn single-edge tape guide (Figure 5-1) or one of its parts, proceed as follows:

a. Remove mounting screw from base plate and disassemble tape guide parts as required.

b. Replace defective part, reassemble parts in accordance with Figure 5-1, and secure to base plate with mounting screw. No adjustment is required.

WARNING

Before performing any maintenance procedure requiring access to interior of recorder, disconnect power cord to eliminate possibility of severe electric shock.

5-13. ROLLER TAPE GUIDE. Remove and replace a damaged or noisy roller tape guide as follows:

a. Holding guide assembly with one hand, remove mounting screw from back of base plate. Remove guide assembly, being careful to save any shims removed from between roller tape guide and base plate as well as mounting screw for reassembly. (If guide is mounted on compliance arm, remove screw and washer from back of compliance arm, saving any shims and attaching parts.)

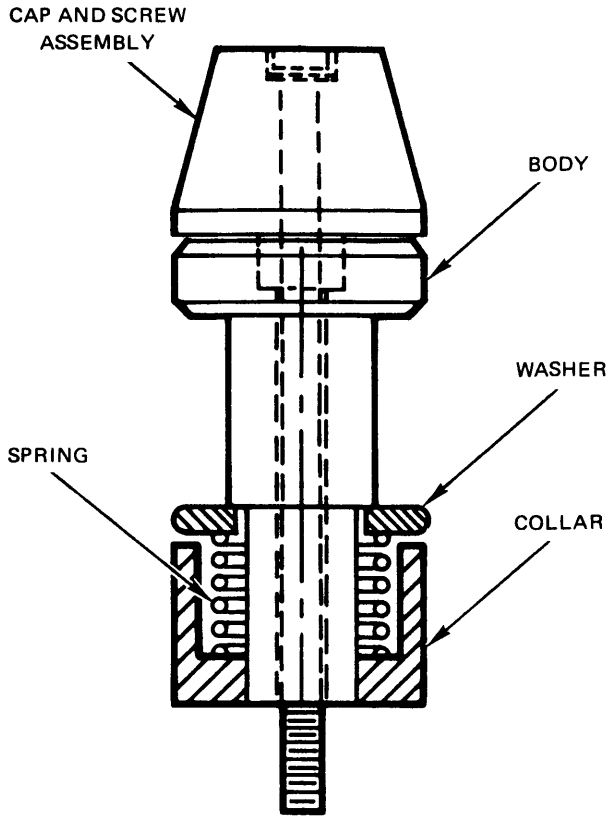


Figure 5-1. Single-Edge Tape Guide

NOTE

Roller tape guide cannot be disassembled. If defective, it must be replaced as single unit.

b. Coat mounting screw lightly with red Loctite and, using previously removed shims and attaching parts, install new roller tape guide.

CAUTION

When mounting guide on compliance arm, be careful not to crush arm by overtightening mounting screw.

5-14. TAPE SENSOR. The complete EOT/BOT sensor assembly is built and tested as a single unit and must be replaced as such. Removal and replacement procedures are as follows:

a. Unplug electrical connector from control/servo PWB.

b. Pull off cover over tape sensor.

c. Remove three screws securing sensor brackets and cable clamp to front of base plate.

d. Pulling wires and connector carefully through hole provided, remove sensor from base plate.

e. Install replacement sensor in reverse order of removal, being careful to mount sensor at correct distance from tape. On read-after-write recorders (dual gap), sensor should be as far from tape as bracket will allow; on read/write recorders (single gap), sensor should be as close to tape as bracket will allow.

f. Following installation, perform electrical adjustments in accordance with paragraph 5-22.

5-15. REEL-HUB GRIP RING. Removal and replacement procedures for the reel-hub grip ring are as follows:

a. Lift reel lock lever to unclamp grip ring.

b. Pull old grip ring out of hub groove and remove.

c. Install new grip ring by stretching over reel hub into proper position.

CAUTION

Clean grip ring only with Freon degreaser, Type TF. Alcohol, head cleaner, and other solvents will damage grip ring.

5-16. REEL HUB. Replace and adjust the supply or takeup reel hub as follows (Figure 5-2):

a. Loosen socket-head screws and remove hub.

b. Install replacement hub on shaft to obtain dimension shown in Figure 5-2, and tighten socket-head screws.

c. Mount reel of tape on recorder, thread tape, and place recorder in load mode.

d. Run tape forward and reverse, noting tape position on reel for which replacement hub was intalled. If necessary, readjust hub height to center tape on reel.

e. Using right-angle Allen wrench capable of applying 30 inch-pounds of torque, tighten

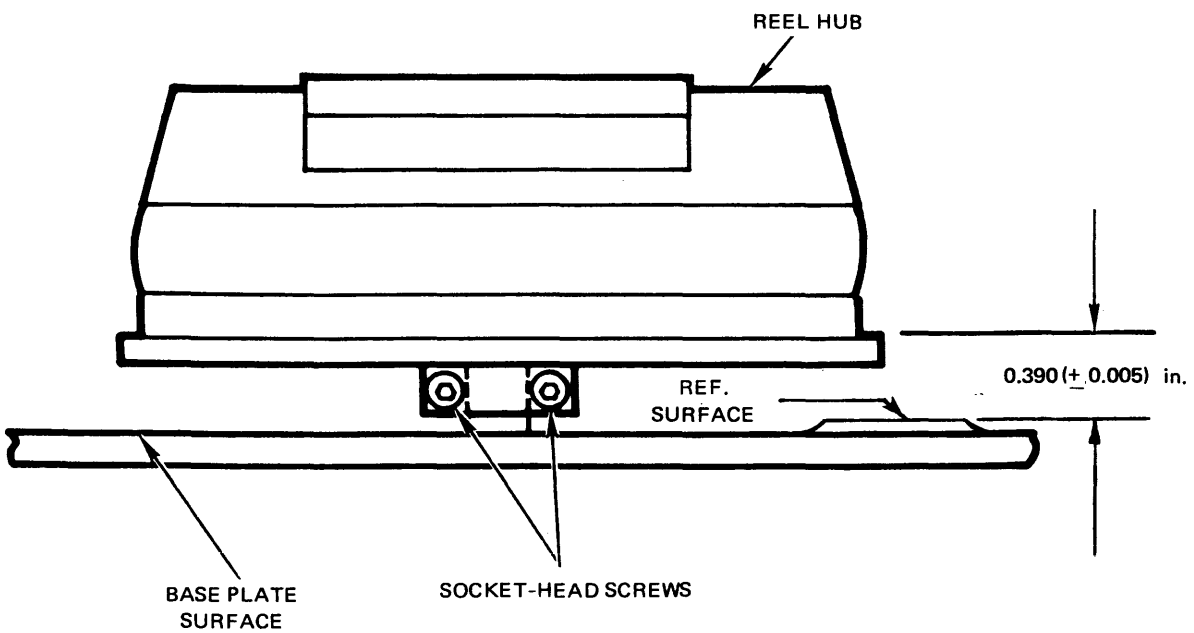


Figure 5-2. Reel Hub, Showing Adjustment Dimension

socket-head screws securing hub as tightly as possible.

5-17. HEAD ASSEMBLY. Replace the head assembly in accordance with the following procedures (Figure (Figure 5-3):

a. Remove two screws securing head cover and lift off head and sensor covers.

b. Unplug head electrical connectors from read/write PWB.

c. Remove four screws securing head assembly to base plate, and remove outer azimuth screw.

NOTE

One of four mounting screws is small screw inside azimuth screw.

d. Withdraw head assembly, carefully feeding wires and connectors through hole in base plate.

e. Feed wires and connectors of replacement head assembly carefully through hole, and secure head assembly to base plate with three socket-head screws not used for azimuth adjustment. Thread outer azimuth adjustment screw into head assembly mount (Figure 5-3), and thread inner azimuth adjustment screw loosely into it.

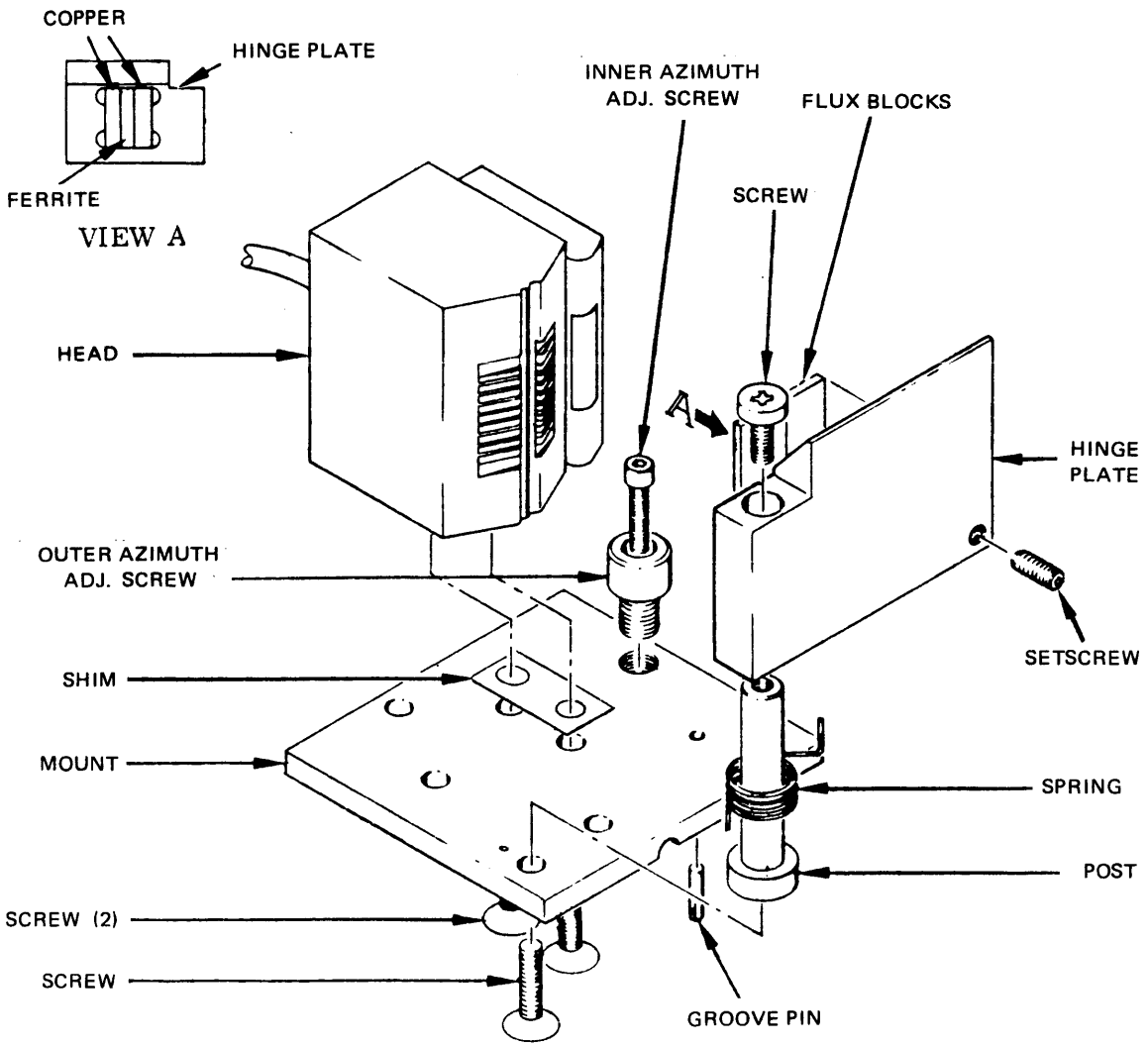


Figure 5-3. Head Assembly Adjustments

f. Make skew adjustment in accordance with paragraphs 5-40 through 5-43.

g. Replace head and tape sensor covers, securing head cover with two screws removed in step a.

5-18. CAPSTAN. To replace a damaged or defective capstan, proceed as follows:

a. Remove socket-head screw in end of capstan shaft, and take off capstan cap and sleeve.

b. Install replacement capstan over capstan motor shaft, place capstan cap in place, and secure with screw.

CAUTION

Avoid contact with sensitive tape-driving surface of capstan sleeve. Damage to this surface will cause erratic performance and render capstan sleeve useless.

c. Mount reel of tape on recorder, thread tape, and place in load mode. Check overall capstan performance and adjust if necessary in accordance with paragraph 5-45, step m.

5-19. POWER SUPPLY CHECKS AND ADJUSTMENTS

5-20. UNREGULATED VOLTAGE CHECKS. Check unregulated voltages at plug P-14 on the power regulator portion of the control/servo printed circuit board. Required values and tolerances, as well as plug pin numbers, are presented in Table 5-2. In checking, ensure that the input line voltage is set to the correct value.

VOLTAGE PIN NO.	RETURN PIN NO.	REQUIRED READING (volts)
2	13 or 14	+ 40 (± 4)
4	13 or 14	- 40 (± 4)
10	13 or 14	+ 16 (± 2) *
7	13 or 14	- 16 (± 2) **
12	15	+ 10 (± 1)
3	5 or 6	+ 22 (± 2)
9	8	+ 22 (+2)

* For 45-ips recorders, +23 (± 2) volts.
**For 45-ips recorders, - 23 (± 2) volts.

Table 5-2. Power Supply Unregulated Voltages

5-21. REGULATED POWER SUPPLY ADJUSTMENTS. The potentiometers used for these adjustments are located on the power regulator portion of the control/servo board. Test point locations are shown in Figure 5-4. Referring to Table 5-3, for each of the three power supplies listed measure voltage across the test points shown and adjust the designated potentiometer until the required voltage is obtained.

NOTE

Check tape speed and adjust, if necessary, following power supply adjustments. (See paragraphs 5-27 through 5-35.)

SUPPLY	TEST POINT	RET. TEST POINT	ADJUSTMENT POT.	REQ. READING (volts)
+5-volt	TP105	TP102	R124	+5 (± 0.05)
+15-volt	TP101	TP102	R114	+15 (± 0.15)
-15-volt	TP104	TP102	R119	-15 (± 0.15)

Table 5-3. Power Supply Regulated Voltage Adjustments

5-22. TAPE SENSOR ADJUSTMENT

5-23. If either the end-of-tape (EOT) or beginning-of-tape (BOT) system is not functioning properly, or if a new tape sensor assembly has been installed, the complete tape sensor system must be readjusted in accordance with the procedure presented in paragraph 5-24. The potentiometers and test points used for these adjustments are located on the control/servo board. A chart of the test point and potentiometer locations on the control/servo board is presented in Figure 5-4.

5-24. Adjust the tape sensor system as follows:

a. Turn on recorder power, load tape, and position BOT reflector strip in front of sensor.

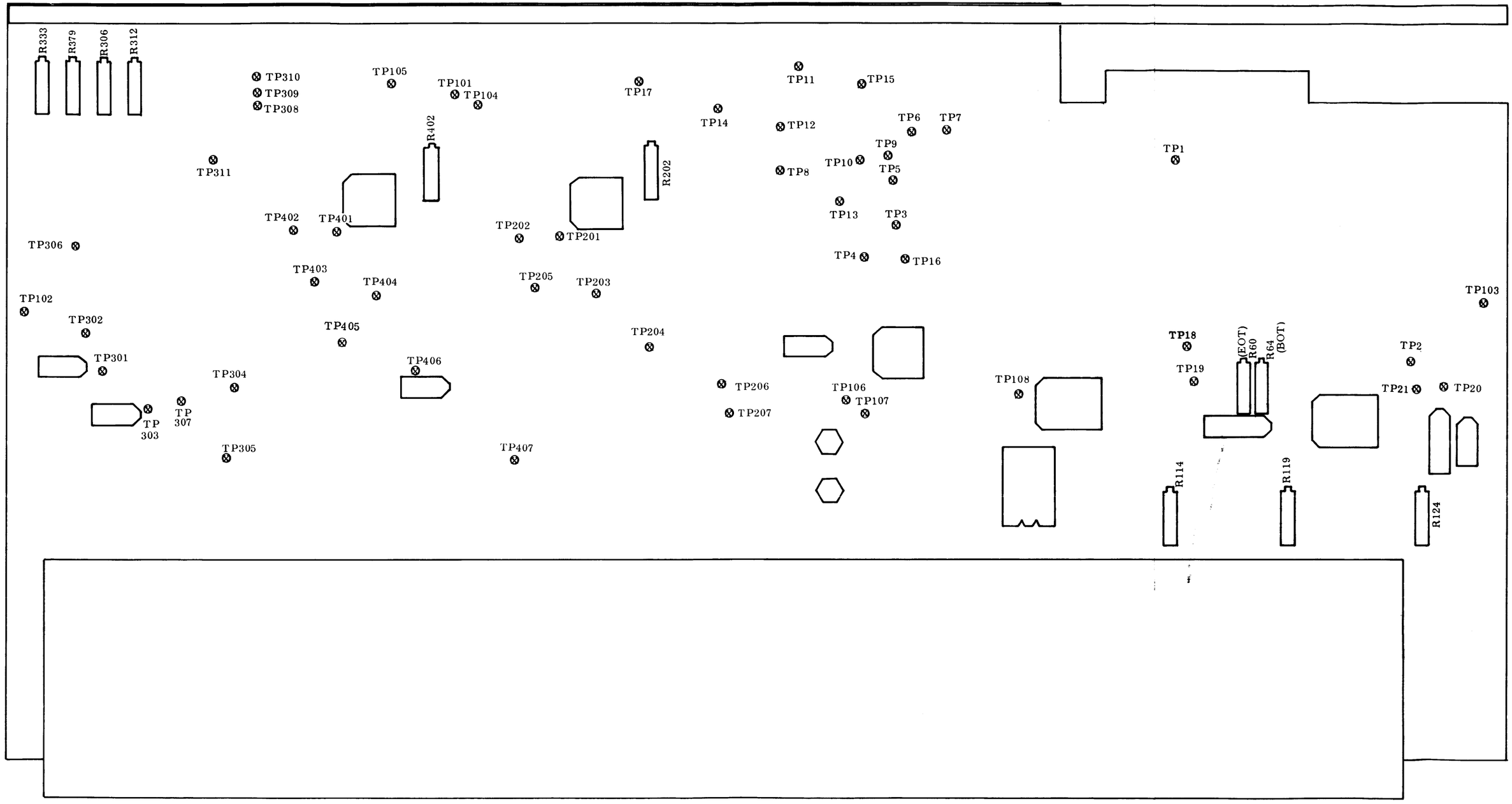


Figure 5-4. Control/Servo Board Test Point Chart

b. Connect oscilloscope to test point TP18, and adjust potentiometer R64 until voltage at TP18 goes high. Measure and record voltage at TP21.

c. Readjust R64 until voltage measured at TP21 is one-half reading of step b.

d. Position EOT reflector strip in front of sensor.

e. Connect oscilloscope to test point TP19, and adjust potentiometer R60 until voltage at TP19 goes high. Measure and record voltage at TP20.

f. Readjust R60 until voltage measured at TP20 is one-half reading of step e.

5-25. COMPLIANCE ARM ADJUSTMENTS

5-26. Load and tension a tape on the recorder. Adjust each compliance arm so that it is centered in its arc of travel. The center of the arc is indicated by a hole in the casting, 1/4 inch from the arm slot, which is clearly visible from the back of the transport. To center the supply arm, adjust potentiometer R202 on the control/servo board (clockwise or counterclockwise, as required to center the arm). To center the takeup arm, adjust potentiometer R402.

5-27. CAPSTAN SERVO ADJUSTMENTS

5-28. DC OFFSET ADJUSTMENT. With power applied (POWER indicator illuminated) and tape loaded but not running, measure the voltage at TP303 with respect to TP305 on the control/servo board. Adjust offset potentiometer R379 to obtain 0($\pm$0.05) volts at TP303.

5-29. COARSE SPEED ADJUSTMENT. Make a coarse adjustment of speed in accordance with the following procedure:

a. Monitor tachometer output voltage at TP301, located on capstan servo portion of control/servo board. (See Figure 5-4 for location of test points.)

b. With recorder in off-line mode (ON LINE indicator not illuminated), depress FORWARD pushbutton.

c. Adjust forward potentiometer R312 until voltage at TP301 is as specified in Table 5-4.

d. Depress FORWARD pushbutton to stop tape motion, then depress REVERSE pushbutton.

e. Adjust reverse potentiometer R306 until voltage at TP301 is as specified in Table 5-4.

f. Depress REVERSE pushbutton to stop tape motion.

5-30. FINE SPEED ADJUSTMENT. Measure and make a fine adjustment of tape speed as follows:

a. Load known-density master skew tape on recorder. Connect counter to TP23 (nine-track) or TP21 (seven-track) on read/write board. (See Figure 5-5 for test point locations.)

b. With recorder in off-line mode (ON LINE indicator not illuminated) depress FORWARD pushbutton and adjust counter to trigger on positive-going edge of data pulse.

c. Adjust forward speed control potentiometer R312 on capstan servo portion of control/servo board to obtain appropriate data rate, as listed in Table 5-4. (For densities other than 800 bpi, compute frequency by multiplying density and tape speed and adding 1 percent tolerance: f = bpi x ips $\pm$ 1%.)

d. Depress FORWARD pushbutton to stop tape motion.

e. Depress REVERSE pushbutton.

f. Adjust reverse speed control potentiometer R306 to obtain appropriate data rate listed in Table 5-4.

g. Depress REVERSE pushbutton to stop tape motion.

h. Readjust ramp time in accordance with paragraph 5-36.

5-31. SUBSTITUTE ADJUSTMENT PROCEDURE. If desired, a speed adjustment with an accuracy of 2% can be obtained with the use of the strobe disc (Figure 5-6) mounted on the capstan. (If not included on the recorder, order Cipher Part No. 731015-700 for a 12.5,

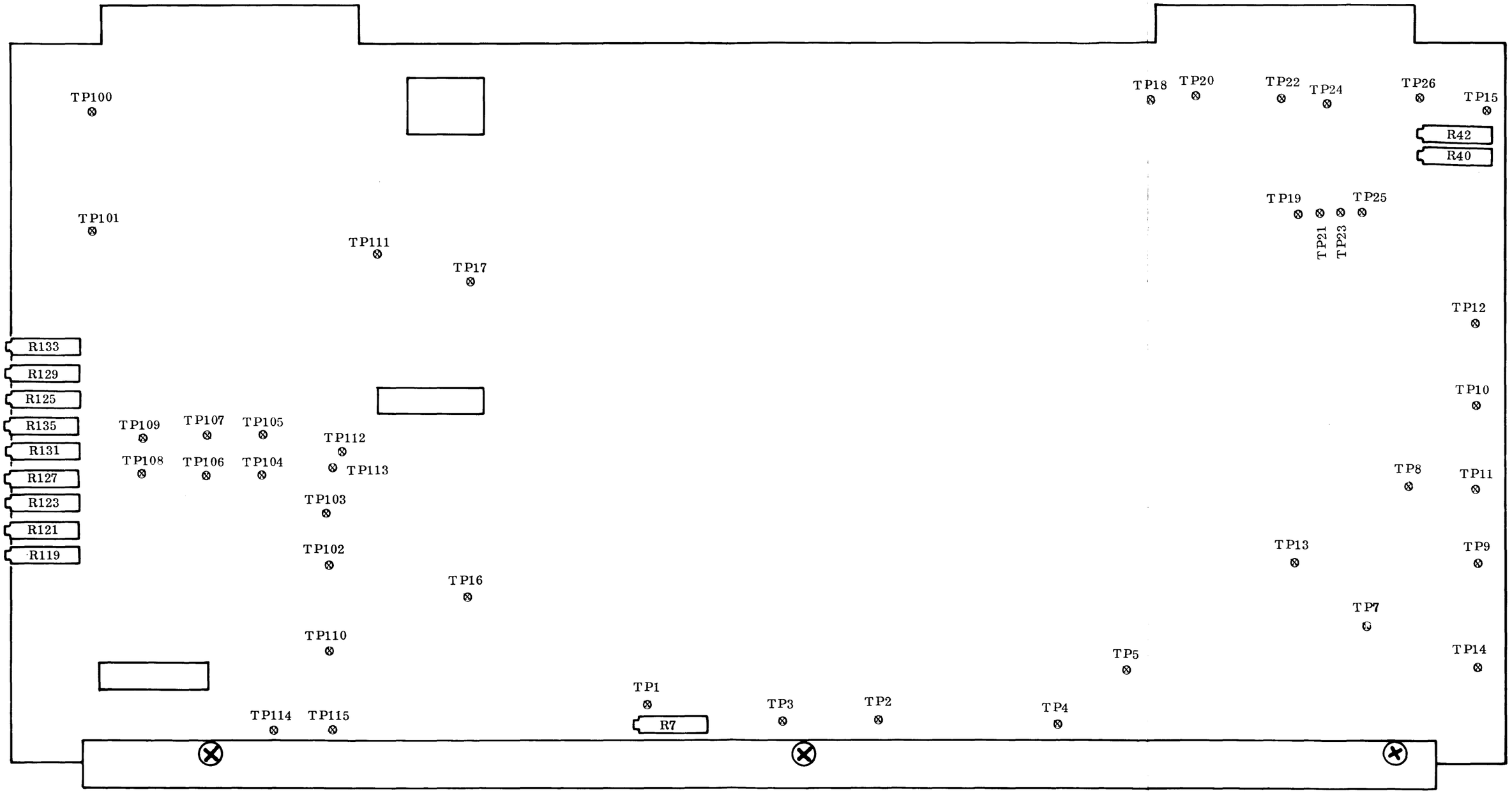


Figure 5-5. Read/Write Board Test Point Chart

25, or 37.5-ips recorder; Part No. 731024-800 for a 45-ips recorder; or Part No. 731024-820 for a 75-ips recorder.) With the recorder in off-line mode, depress the FORWARD pushbutton. Adjust forward potentiometer R312 until the strobe disc appears to be motionless (outside lines for 60 Hz, inside lines for 50 Hz). To adjust reverse speed, use the same procedure, but depress the REVERSE pushbutton and adjust using reverse potentiometer R306.

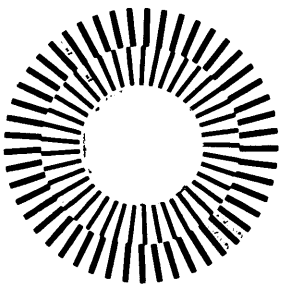


Figure 5-6. Strobe Disc

5-32. ALTERNATE FINE SPEED ADJUSTMENT. In the absence of equipment required for the adjustments described in paragraphs 5-30 and 5-31, the alternate procedure described in the following subparagraphs may be employed.

5-33. Forward Speed Adjustment. Adjust forward speed in accordance with the following procedure:

a. Set up recorder to write all 1's, as follows:

(1) Ground data input terminals L through V on J102 for nine-track recorders. On seven-track recorders, ground terminals L and R through V.

(2) Ground terminals J and K on J101 to make Select and Write Enable lines true.

(3) Supply a negative-going, 2-microsecond (+5 to 0 volts) pulse from signal generator at 50-Hz pulse rate to WDS input, J102-A. A 50-Hz pulse rate produces a low density on tape for speed adjustment. For pulse rates to produce specified densities, refer to Table 5-5.

(4) With recorder in on-line mode, ground J101-C (FORWARD command).

TAPE SPEED (ips)	TP301 VOLTS	RAMP TIME (ms)	DATA RATE (ch/s at 800 bpi)			R-A-W DELAY (ms)
			NOMINAL	MINIMUM	MAXIMUM	
12.5	0.44	30	10K	0.90K	1.10K	12.0
18.75	0.66	20	15K	14.85K	15.15K	8.00
25	0.88	15	20K	19.80K	20.20K	6.00
37.5	1.32	10	30K	29.70K	30.30K	4.00
45	1.58	8.33	36K	35.64K	36.36K	3.33
75	2.64	5	60K	59.40K	60.60K	2.00
REWIND 150	5.26	500 (appr.)				

NOTE: Ramp times given in this table are for specified start/stop distance (0.19 inch) and are measured from 0 to 100% of ramp. If different start/stop distances are required or if 10% and 90% points are to be measured, times may be scaled linearly. To maintain specified tolerance, these time settings should be within ± 10%.

Table 5-4. Capstan Servo Adjustment Parameters

DENSITY (bpi)	SPEED (bpi)	DATA RATE (ch/s)	BYTE-TO-BYTE PERIOD (μs)	READ GATE (μs)	READ GATE TOLERANCE (μs)
800	75	60K	16.7	5.8	± 0.06
	45	36K	27.8	11.4	± 0.1
	37.5	30K	33.3	14.1	± 0.1
	25	20K	50	22.5	± 0.2
	18.75	15K	66.6	30.8	± 0.3
	12.5	10K	100	47.5	± 0.5
556	75	41.7K	24.5	9.7	± 0.1
	45	25K	40	17.5	± 0.2
	37.5	20.85K	48.7	21.8	± 0.2
	25	13.9K	72	33.5	± 0.3
	18.75	10.4K	96.2	45.6	± 0.5
	12.5	6.95K	143.6	69.3	± 0.7
200	75	15K	66.6	30.8	± 0.3
	45	9K	111.1	53.1	± 0.5
	37.5	7.5K	133.3	64.1	± 0.6
	25	5K	200	97.5	± 1.0
	18.75	3.75K	266.7	130.8	± 1.0
	12.5	2.5K	400	197.5	± 2.0

Table 5-5. Read Amplifier Parameters

b. Using dual-trace oscilloscope, trigger trace A on positive-going (0 to +5-volt) pulse at TP110 (track P write monostable) on read/write board (Figure 5-5).

c. Observe positive-going read timing pulse at TP12 on trace B. This pulse should occur following write pulse on trace A by some delay determined by speed. See Figure 5-7 and Table 5-4. If not, adjust potentiometer R312 to obtain proper delay time.

NOTE

It may be necessary to adjust read levels before speed can be adjusted properly in this manner. Check TP4 of each read channel as described under READ AMPLIFIER ADJUSTMENTS, paragraph 5-37. Be sure read levels are rechecked after any speed changes are made.

5-34. Reverse Speed Adjustment. After the forward speed is adjusted to its final setting, reverse speed may be adjusted as follows:

a. Take recorder off line and rewind to BOT.

b. Put recorder back on line and continue to write all 1's, as described in step a, paragraph 5-33, for about 2 to 3 minutes.

c. Take recorder off line and rewind to BOT.

d. Remove ground from J101-K (write enable).

e. Put recorder back on line.

f. Monitor TP12 on read/write board (Figure 5-5) with trace A of oscilloscope and note data rate (period).

g. Remove ground from J101-C (FWD command) and apply a ground to J101-E (REV command).

h. Adjust R306 (REV SPEED ADJ.) for data rate noted in step f.

5-35. This same method of speed adjustment can be performed by programming the CPU to write short blocks of data with a 10-millisecond (minimum) time delay between blocks. While writing short blocks of data, observe the signals as described in paragraphs 5-33b and c.

5-36. RAMP ADJUSTMENT. This adjustment is to be made while starting and stopping the tape motion and observing the ramp in both forward and reverse modes. This can be done with the recorder on line while writing blocks of data or off line by using the FORWARD and REVERSE pushbuttons.

a. Use oscilloscope to monitor TP301 (Figure 5-4), on control/servo board, with respect to TP102.

b. Alternately start and stop recorder at a rate which is convenient for observing ramp.

c. Trigger oscilloscope with run command at TP309.

d. Adjust potentiometer R333 to obtain applicable ramp time specified in Table 5-4. (See Figure 5-8.)

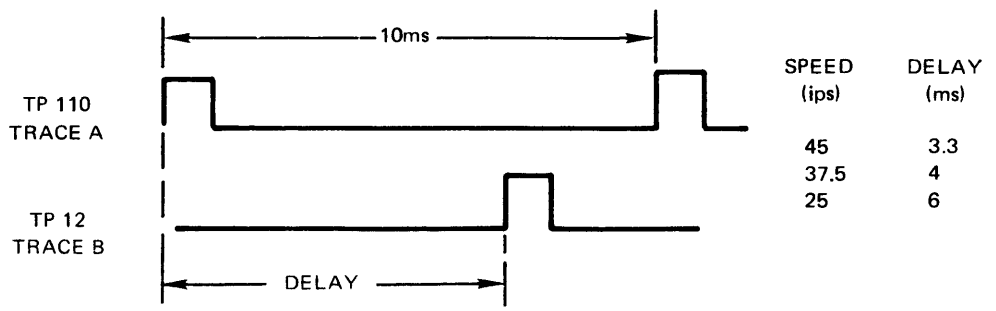


Figure 5-7. Read-After-Write Delay Time

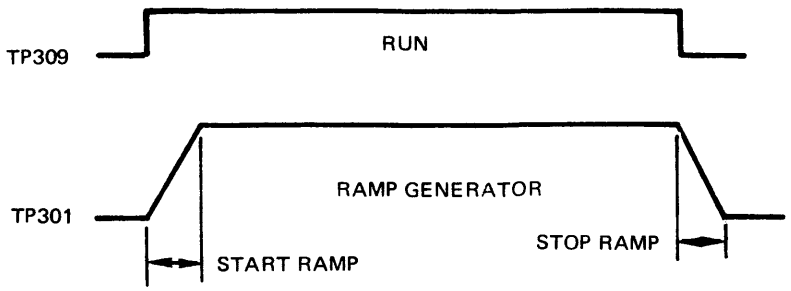


Figure 5-8. Ramp Adjustment Traces

5-37. READ AMPLIFIER ADJUSTMENTS

5-38. NRZI READ LEVELS. On read-after-write recorders, adjust NRZI read levels in a read-after-write mode of operation. On read/write recorders, adjust NRZI read levels in the read mode. Proceed as follows:

a. Write data records using one of the following methods:

(1) If possible, write repeated all-1's data record of fixed record length. This provides for most easily read level adjustment.

(2) If all-1's record of fixed length cannot be written, write record consisting of random data, varying record length as convenient. This procedure is effective, but oscilloscope trace is not as easy to read as that of step 1.

b. On read/write recorders, adjust read level on first read pass after writing. On all recorders, each channel is provided with gain adjustment potentiometer (R-7, Figure 5-5). Monitor TP4 of each channel and adjust corresponding potentiometer R-7 for negative-going peak level, as shown in Figure 5-9.

5-39. NRZI READ GATE. Two adjustments, one for low density and one for high density, are required. Make these adjustments as follows:

a. High density

(1) With tape drive on line and writing data, preferably all 1's, monitor TP8 on read/write board.

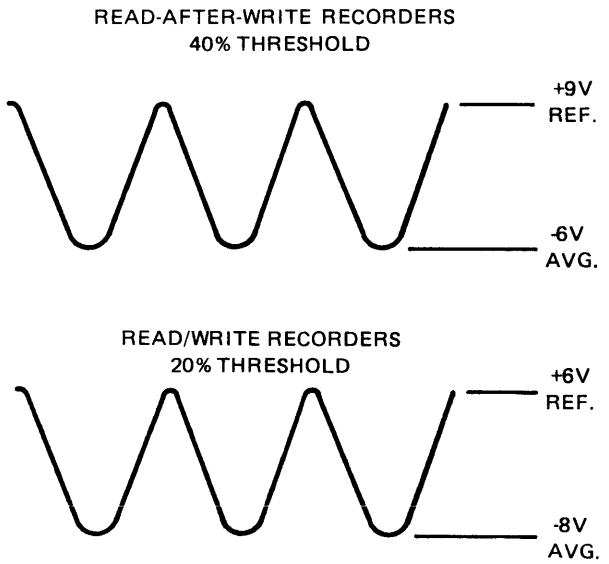


Figure 5-9. NRZI Read Level Gain Adjustment Trace

(2) Adjust R40 on read/write board to applicable low-going pulse width listed in Table 5-5.

b. Low density

(1) With tape drive on line and writing data, preferably all 1's, monitor TP9 on read/write board.

(2) Adjust R42 on read/write board to obtain applicable low-going pulse width per Table 5-5.

NOTE

For local-remote density control options, refer to jumper options listed in Table 4-2.

5-40. **SKEW ADJUSTMENT**

5-41. Prior to making adjustments, visually check the head assembly for secure mounting and wear. Check the head crown to ensure that it is not worn down to the depth of the gutter, and ensure that the head is clean.

5-42. NRZI HEAD AZIMUTH ADJUSTMENT. Adjust read skew as follows (for both read-after-write and read/write heads):

a. Load and tension 800-bpi master skew tape.

b. Connect oscilloscope to TP7 and ground on read/write board (Figure 5-5).

c. With recorder in off-line mode (ON LINE indicator not illuminated), depress FORWARD pushbutton.

d. Adjust azimuth screws (Figure 5-3) on head mounting plate so that outputs of all tracks, as monitored at TP7, fall with 10% or less of byte-to-byte period listed in Table 5-5. (See Figure 5-10.) Outer azimuth screw bears against recorder mounting plate and pivots head assembly outward. Inner azimuth screw threads into recorder mounting plate and pulls head assembly inward. Inner screw also serves to lock adjustment.

NOTE

Head azimuth adjustment serves to minimize skew in both read and write modes for single-gap, read/write heads. Dual-gap, read-after-write heads require additional write deskew adjustment, as described in paragraph 5-43.

5-43. NRZI WRITE SKEW ADJUSTMENT. Dual-gap, read-after-write heads require an electrical deskewing of the write tracks following the mechanical azimuth adjustment. To make this adjustment, proceed as follows:

a. Load and tension blank tape with write enable ring installed.

b. Connect oscilloscope to write deskew test point on write portion of read/write board corresponding to track undergoing adjustment. (See Table 5-6.)

NOTE

For following adjustments, set up recorder to write all 1's on each track, using procedure presented in step a, paragraph 5-33.

c. Adjust potentiometer corresponding to track undergoing adjustment (Table 5-6) for 10-microsecond pulse display on oscilloscope.

d. Repeat for each track. This will set all potentiometers close to midrange of adjustment.

e. Connect oscilloscope to TP7 on read portion of read/write board.

f. With recorder still writing 1's, adjust one of skew adjust potentiometers to move its pulse slightly ahead of others (Figure 5-11). Now adjust each of other potentiometers to bring remaining tracks into alignment with isolated one.

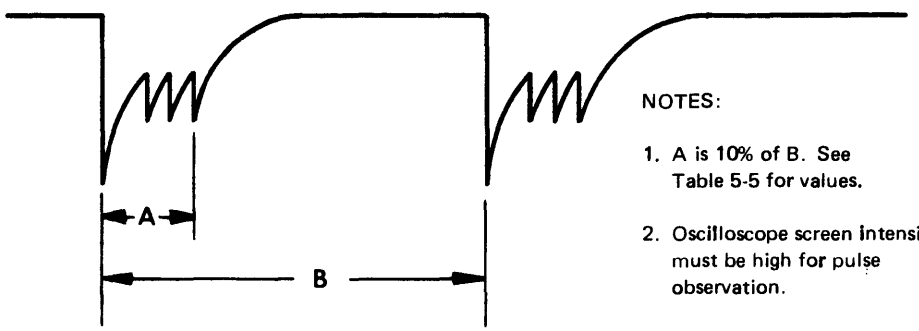


Figure 5-10. Skew Pulse at Test Point TP7

7-CHANNEL MODEL TRACK	9-CHANNEL MODEL TRACK	WRITE DESKEW POTENTIOMETER	WRITE DESKEW TEST POINT
–	0	R119	TP102
–	1	R121	TP103
B	2	R123	TP104
A	3	R125	TP105
8	4	R127	TP106
4	5	R129	TP107
2	6	R131	TP108
1	7	R133	TP109
C	P	R135	TP110

Table 5-6. Write Deskew Potentiometer and Test Point Identification

Figure 5-11. Isolated-Track Pulse at TP7

5-44. MECHANICAL ADJUSTMENTS

5-45. TAPE PATH ALIGNMENT. Referring to Figure 5-12, align the tape path in accordance with the following procedure:

a. Remove two head covers and facade.

b. Remove single-edge spring guide nearest capstan.

c. Remove roller tape guides No. 1 and 2. Save any shims removed.

d. Remove roller tape guides from upper and lower compliance arms. Save any shims removed.

e. Position lower compliance arm directly under hole where roller guide No. 1 is normally mounted. Using vernier caliper, measure depth from No. 1 roller guide mounting surface to near side surface of compliance arm. Subtract this dimension from 0.545 inch to determine thickness of shim to be used between lower compliance arm roller guide and compliance arm.

f. Select shim of proper thickness and mount roller guide to compliance arm with this mounting screw.

NOTE

Mounting screw should be coated lightly with red Loctite before assembly. Take care not to crush compliance arm by over-tightening mounting screw.

g. Position upper compliance arm directly under mounting hole for roller guide No. 2. Repeat steps e and f for upper compliance arm roller guide.

h. Install roller guides No. 1 and 2, using 0.010-inch shim between guide base and top plate. Secure roller guides lightly, but do not use Loctite on mounting screws at this time.

i. Mount reel of tape, thread recorder, and load.

j. Before running tape, adjust angle of tape cleaner so that it is tangent to tape path. Make sure tape contacts only curved face and does not touch either edge of cleaner. Check that BOT/EOT reflector does not touch tape.

k. Run tape forward and reverse, and adjust reel hub height to center tape on reels, if necessary.

l. Hold tape guide, Cipher Part No. 710008-500, in position 1, so that tape wraps slightly around small diameter of guide. Run tape forward and observe position of tape on capstan sleeve. Stop tape and remove tape guide.

m. Again, run tape forward and determine if tape position on capstan sleeve moves toward or away from top plate. If tape moves

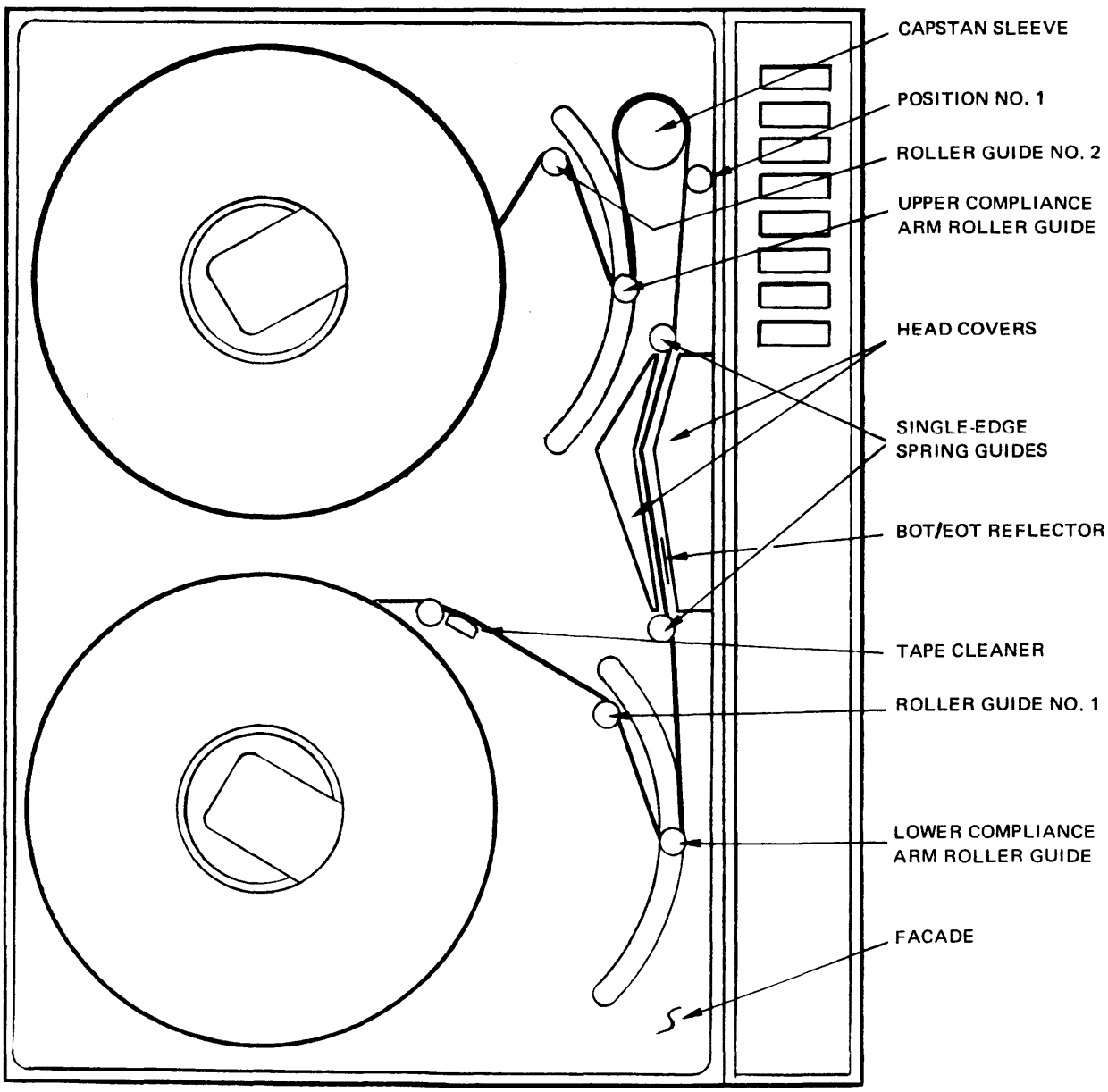


Figure 5-12. Tape Path and Related Parts

away from top plate when tape guide is removed, capstan sleeve must be tilted upward. If tape moves toward top plate when tape guide is removed, capstan sleeve must be tilted downward. (To tilt capstan sleeve, tilt capstan motor by inserting shims between capstan motor standoff and back surface of top plate.) Shim capstan motor until tape position on capstan sleeve does not shift when tape guide is removed from position 1. Reinstall single-edge spring guide removed in step b.

n. Run tape forward and note position of tape on capstan sleeve. Run tape in reverse and again note position of tape on capstan sleeve. If tape moves away from top plate in reverse direction, reduce thickness of shim under roller guide No. 2. If tape moves toward top plate in reverse direction, add shims under roller guide No. 2. When roller guide No. 2 is properly adjusted, tape position on capstan sleeve will be same in forward and reverse directions.

o. Mount prerecorded master skew tape on tape recorder. Adjust head azimuth as outlined in paragraph 5-42. Total skew, as measured at test point, must be less than 10% of a byte space in both forward and reverse directions of tape travel.

p. With master skew tape running forward, alternately depress spring-loaded washers on single-edge guides. Skew should increase some but not more than 25% of a byte space. If no increase is noted when incoming guide washer is depressed, remove some shims from roller guide No. 1, nearest supply compliance arm. If excess skew is observed, add some shims to roller guide No. 1. If no skew increase is noted when outgoing guide washer is depressed, capstan motor must be tilted slightly away from guide. If excess skew is observed when outgoing guide washer is depressed, tilt capstan motor slightly toward guide.

q. Run master tape in reverse, and depress washer of single-edge guide nearest capstan. Observe skew. It should increase some but not more than 25% of byte space. If no increase in skew is noted, remove some shims from roller guide No. 2. If excess skew is observed, add some shims under roller guide No. 2.

r. Secure all mounting screws with red Loctite. Take care not to misplace any of adjustment shims when reassembling.

s. Run tape in forward and reverse directions. Check all rollers and guides for excessive tape walk, shifting, or edge curl. Verify that head azimuth is still correct in both forward and reverse directions. Skew must not exceed 10% of a byte space when measured with master skew tape.

t. Replace facade and head covers.

5-46. REEL HUB ADJUSTMENT. Referring to Figure 5-13, adjust the reel hub as follows:

a. Remove tape reel and leave lock open.

b. If lock has free play in open position, loosen locknut on adjustment setscrew. Turn adjustment setscrew into spacer until free play is removed, and tighten down locknut.

c. Close lock and note whether face of lock is parallel to top of cap. If not, open lock and turn buttonhead screw in or out as necessary to hold lock parallel to top of cap in closed position.

d. Place reel on hub, close lock, and check reel for tightness. If reel slips on hub, open lock and remove reel.

e. Loosen hex locknut on adjustment setscrew, turn adjustment setscrew slightly into spacer (depending upon looseness of reel), and retighten locknut.

f. Perform steps c and d.

g. Perform steps e, c, and d as necessary until reel does not slip.

NOTE

Hub compression ring contains oily preservative which tends to ooze out through pores and make surface oily. Ring should be cleaned periodically with isopropyl alcohol to prevent tape reel from slipping.

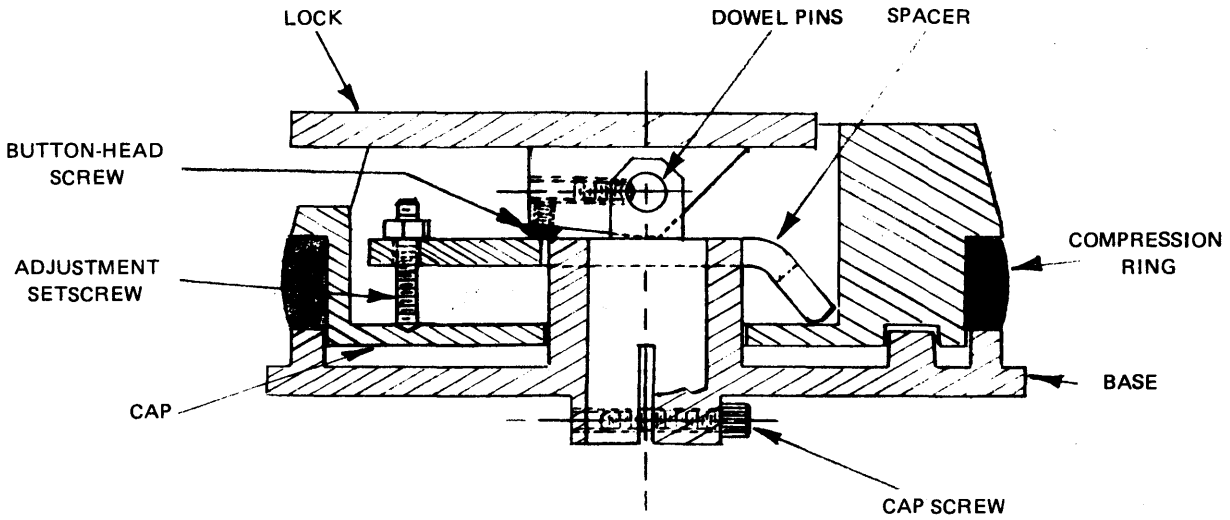


Figure 5-13. Reel Hub Assembly

5-47. COMPLIANCE ARM LIMIT SWITCH ADJUSTMENT. Two nylon screws, one threaded through each compliance arm, are used to adjust the upper and lower switch points of the microswitches in the arm assemblies. Both compliance arms are adjusted in the same manner.

a. Adjust right-hand screw in or out, as necessary, to cause microswitch to actuate when compliance arm is approximately 5 degrees from its full-down position.

b. Adjust left-hand screw to actuate microswitch with compliance arm approximately 20 degrees from its full-up position.

5-48. COMPLIANCE ARM RETRACTOR MOTOR SWITCH ADJUSTMENT. Adjust each of the two cam-actuated retractor motor switches by bending the actuating lever carefully until the switch is actuated by the cam pin. Adjust the up-position switch to close when the retractor arm is in its full-up position, the down-position switch to close when the arm is in its full-down position.

5-49. REPLACEMENT OF ASSEMBLIES

5-50. These instructions are designed to guide the service engineer in a logical, step-by-step procedure for replacing assemblies.

5-51. CONTROL/SERVO BOARD. Replace the control/servo board in accordance with the following procedure:

a. Disconnect all cables from board.

b. Remove screws from corners of mounting bracket as shown in Figure 5-14.

c. Slide board out of top and bottom mounting brackets.

d. Slide in replacement board, and screw bracket back together at corners.

e. Connect power supply cable to connector P14, and connect control panel connectors to P2 and P3.

f. Turn on power and check power supply voltages according to instructions in paragraphs 5-20 and 5-21.

g. Connect BOT/EOT cable to connector P5, and adjust BOT/EOT sensors according to instructions in paragraphs 5-22 through 5-24.

h. Connect supply reel motor cable to connector P10, supply compliance arm cable to connector P11, and retractor motor switch cable to connector P6.

i. Thread 6-inch piece of tape over head and past BOT/EOT assembly as if loading tape drive. Do not mount tape reel on hub at this time.

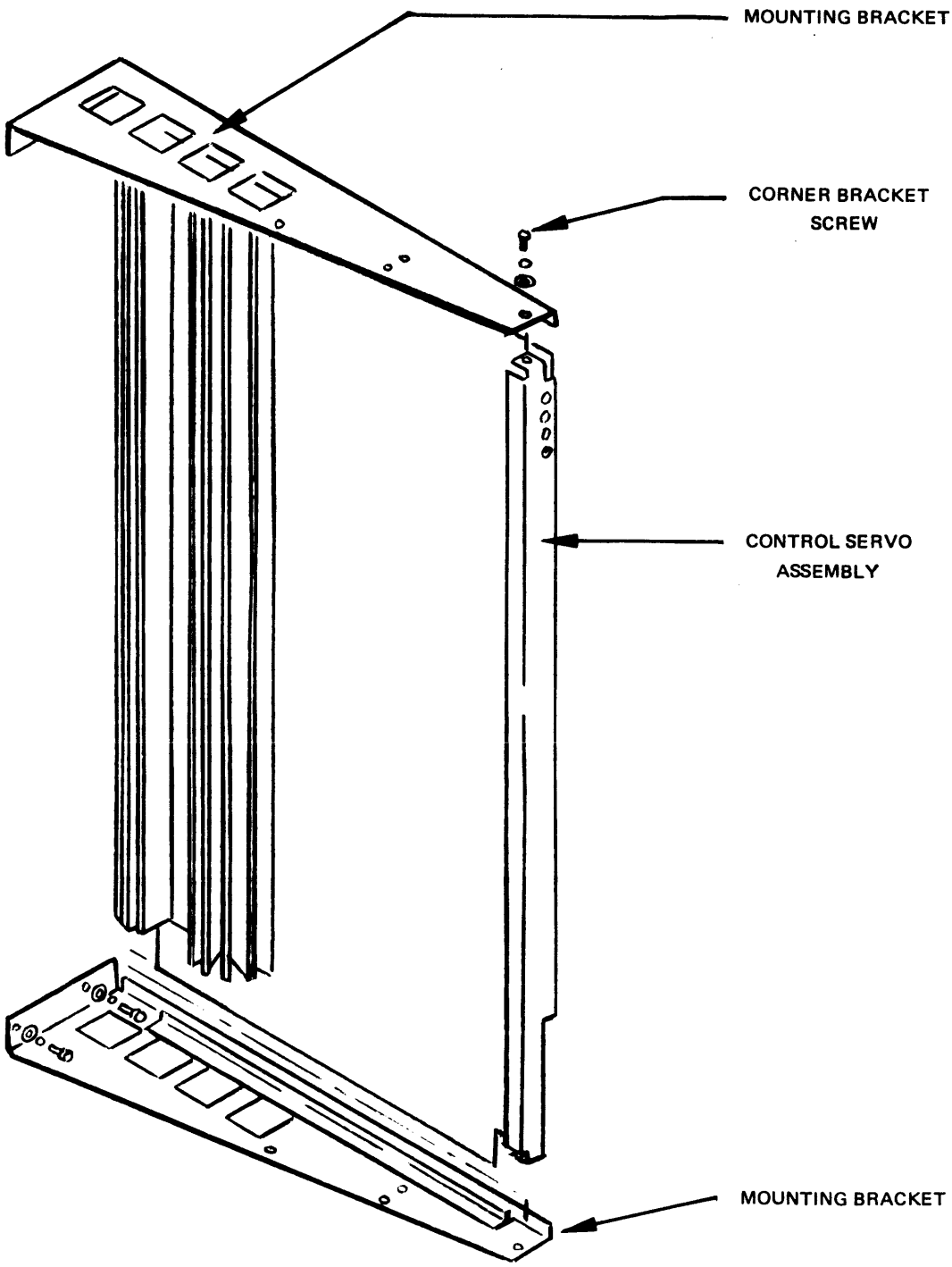


Figure 5-14. Control/Servo Board Removal

j. Depress LOAD pushbutton and hold supply compliance arm at center of arc of travel with hand or piece of scotch tape, or prop it in place with piece of cardboard.

k. Adjust potentiometer R202 (Figure 5-4) until supply reel motor stops turning, with supply arm held still at center of its arc.

l. Release supply arm and disconnect supply arm cable from connector P11.

m. Connect takeup arm and reel motor cables to connectors P12 and P13.

n. Repeat steps i through k for takeup servo.

o. Release takeup arm and reconnect supply arm cable to connector P11.

p. Connect all remaining cables: capstan motor (red and black leads) to connector P9, capstan motor dc tachometer to connector P8, and file protect switch to connector P4.

q. Mount reel of tape on recorder. Thread tape and depress LOAD pushbutton one time. Compliance arms should position near centers of arcs, and capstan motor should be enabled but not running.

r. Adjust supply and takeup arms for proper center positions according to instructions in paragraphs 5-25 and 5-26.

s. Adjust capstan servo in accordance with instructions in paragraphs 5-27 through 5-36.

5-52. REMOVAL AND REPLACEMENT OF PARTS AND COMPONENTS

5-53. Replacement parts and components should be selected from the parts list in Section VII. Use standard tools and procedures in removing and installing parts, with the assistance of the drawings in Section VII. Observe the following special procedures in removing parts from and installing them on printed circuit boards:

CAUTION

To prevent excessive heat from damaging printed circuit boards and components, especially semiconductors, use a soldering iron rated at not more than 40 watts or 600° F, and do not heat solder for more than 10 seconds. When soldering, always use heat sink (alligator clip, long-nose pliers, etc).

a. Use only 60-40 tin-lead solder with noncorrosive, nonconducting flux. Use alcohol or commercial flux-removing solvent to remove flux residue.

b. After component has been removed from board, clean all solder from connections (plated-through holes) with commercial solder sucker (Soldapullt desoldering tool, Edsyn Co., or equivalent).

c. Use only exact replacement parts. (Refer to Section VII.)

d. Do not alter wiring or layout.

5-54. MULTIPLE-LEAD COMPONENTS. Follow instructions presented in paragraph 5-53 for removal of a defective two- or three-lead component. Bend the leads on the replacement component to the proper shape and install. Heat may be applied to either side of the printed circuit board, as necessary.

5-55. MULTIPLE-PIN COMPONENTS. The following special instructions apply to the removal and replacement of multiple-pin components, including integrated circuits.

CAUTION

Exercise great care in the removal of multiple-pin components from printed circuit boards to avoid damage to boards.

a. Remove defective component by carefully cutting each lead close to component, using jeweler-type diagonal cutter.

b. Remove lead ends and solder from holes in board in accordance with instructions in paragraph 5-53.

c. Straighten leads in replacement component for insertion in board and install.

SECTION VI

TROUBLESHOOTING

6-1. GENERAL

6-2. This section presents probable causes and remedies for the more common types of tape recorder malfunctions. For malfunctions not covered by these instructions, proceed in accordance with standard troubleshooting practices, referring to the schematic diagrams and drawings presented in Section VII.

6-3. TROUBLESHOOTING

6-4. Before performing any troubleshooting operation, the technician must have a good understanding of the theory of operation of the recorder and any associated equipment. He should check carefully to ensure that all equipment is connected properly and that all associated equipment is in good operating condition. He should be thoroughly familiar with operating instructions and follow them carefully in performing the troubleshooting procedure.

6-5. PROCEDURE. While it is recognized that each individual malfunction will require its own specific troubleshooting procedure, the following steps will serve as guidelines in the performance of any such operation:

a. As first step, inspect entire unit visually for any signs of damaged or overheated components. Also, listen for unusual noises, while recorder is operating, which may indicate mechanical malfunctions.

b. When a defective component is located, identify it by referring to Section VII for part number and/or value.

c. If replacement part is available, substitute it for suspected defective part.

NOTE

If correction of any malfunction involves major realignment of recorder, it is recommended that unit be returned to Cipher Data Products for factory repair and adjustment.

6-6. COMMON PROBLEMS. Table 6-1 lists common problems associated with operation of a tape recorder, together with the probable cause and remedy for each.

6-7. SYSTEM TROUBLESHOOTING. Table 6-2, used in conjunction with the schematic diagrams in Section VII, provides an aid in the isolation of electrical/electronic system faults and their remedies.

TROUBLE	PROBABLE CAUSE	REMEDY
Reel flanges scrape tape	Reels improperly mounted	Reinstall reel evenly (see Section III)
BOT and EOT markers not sensed	Dirt covering reflective strip or sensor	Clean sensor or reflective strip
Reels continue to rotate after tape leaves photosensor	Upper compliance arm limit switch out of adjustment or faulty	Readjust or replace limit switch
Tape fails to pull properly through machine or spills	Improper tape threading	Rethread tape (see Section III)
Excessive data dropout	Dirt on head or damaged tape	Clean head (Section V) and/or install new certified computer tape
Recorder will not function at all	Defective fuse	Replace fuse
POWER switch-light does not illuminate	No primary power	Check for primary power
	Defective indicator lamp	Replace control/ indicator A1
Machine does not accept commands	Improper interface	Check interface with DTL logic and correct as necessary
	More than one command true simultaneously	Enable only desired command; hold other inputs high
Tape continues to advance during Load mode	No BOT marker on tape	Affix marker to tape approximately 12 ft. from physical beginning of tape; place marker near reference edge on backing side of tape
Tape tensioned but does not advance when capstan turns	Tape not threaded over capstan properly	Rethread tape (See Section III)
Tape tensioned but slips	Dirty capstan	Clean capstan in accordance with Section V

Table 6-1. Common Problems

TROUBLE	PROBABLE CAUSE	REMEDY
Tape moves during a stop condition	Defective capstan assembly	Replace capstan assembly and realign servo
	Motor voltage not zero	Check capstan servo and adjust for zero offset; repair if adjustment does not correct
Tape not tensioned or tape is spilled when Ready mode is set	Improper tape threading	See Section III
	Reel servo or motor malfunctioning	Replace motor or repair reel servo
Transport responds to write commands but tape is not written	Write current not enabled	Check for write enable ring on reel; check write current command path to tape head; check that read is not enabled
Computer does not read tapes correctly	Data format incorrect	Use correct format
	Record length exceeds computer memory capability	Use correct record length

Table 6-1. Common Problems (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Tape does not tension, and capstan shaft rotates freely when LOAD control is depressed for first time after tape is threaded	LOAD control not operative	Check operation of LOAD control A2; replace if necessary
Tape is tensioned when LOAD control is depressed, but tension is lost when control is released	Limit switch not operative	Adjust as described in Section V; possibly replace limit switch assembly
Tape unwinds or tension arm hits stop when LOAD control is depressed for first time	Tape improperly threaded	Rethread tape (see Section III)
	+5 volts missing from tension arm sensor	Check tension arm sensor lamps; isolate problem if lamp is extinguished
	Fault in reel servoamplifier	Troubleshoot reel servo and repair as necessary
Tape "runs away" or rewinds when LOAD control depressed second time	Fault in control logic or capstan motor assembly	Repair control/servo board or capstan motor assembly
Tape runs past BOT marker	BOT tab dirty or tarnished	Replace tab or increase sensitivity of photosensor amplifier (see Section V)
	Photosensor not properly adjusted	Adjust photosensor amplifier (Section V)
	Photosensor or amplifier defective	Replace or repair photosensor assembly
	Logic fault (load flip-flop does not reset)	Repair control/servo board

Table 6-2. System Troubleshooting

	PROBABLE CAUSE	REMEDY
Transport does not move tape in response to FORWARD or REVERSE commands	Interface cable fault or receiver fault	Check levels at outputs and inputs of receivers on control/servo board; replace or repair cable or repair control/servo board
	Transport not in Ready mode	Bring tape to load point (Section III)
	Fault in ramp generator or capstan servo-amplifier	Repair control/servo or power board
Transport responds to remote FORWARD command, but tape is not written	Write current is not enabled	Check presence of write enable ring on supply reel; WRT EN indicator should be illuminated. Check for +5V at TP111 on write board while writing; if not present, check for +5V at J20, pin 1. Also check J7, pin 1, on control/servo board and TP105 on power board
	Write Enable signal not correct	Check receiver on control/servo board; check for RUN signal on read/write board; repair read/write or control/servo board if faulty
	Write data or write data strobe not received correctly from interface	Check presence of correct levels on write portion of read/write board; repair write portion of read/write board or interface cable if faulty
	Heads not plugged in correctly	Check J21 on read/write board
Data are incorrectly written	Incorrect data format	Use correct format (see Section IV)
	Fault on one track due to failure in write circuits	Check receiver and write amplifier on write portion of read/write board; repair if faulty

Table 6-2. System Troubleshooting (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Data are incorrectly written (Continued)	Intermittent +5, RUN, or WRS	Examine signals and repair control/servo or read/write board, as required
	Write deskew circuit faulty	Check skew adjustments (see Section V)
	Head and guides need cleaning	Clean head and guides
	Tape cleaner needs emptying	Remove tape cleaner and clean
Tape cannot be read	Interface cable or transmitter faulty	Replace or repair interface cable or transmitter on read/write board
	Head not plugged in	Check J22 on read/write board
	Read skew out of adjustment	Readjust in accordance with Section V
	Head and guides need cleaning	Clean head and guides
	Tape cleaner needs emptying	Remove tape cleaner and clean
	Read amplifier gains incorrectly adjusted	Check and adjust amplifier gains
	On read/write model, faulty write amplifier may cause current to be passed through head while reading	Check write amplifier output test points and repair read/write board as necessary
	Read data storage register faulty	Check TP6 on read/write board; check that duration of positive section of waveform is one-half bit time
	Other component fault in read channel	Check test point data; repair read/write board

Table 6-2. System Troubleshooting (Continued)

SECTION VII

PARTS LISTS, SCHEMATICS, AND ASSEMBLY DRAWINGS

7-1. GENERAL

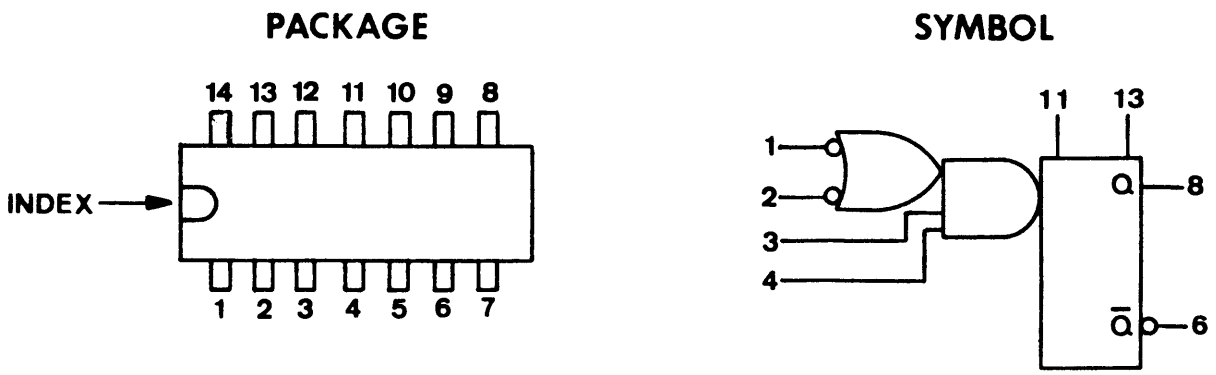
7-2. This section contains a list of the replaceable parts and associated schematic and assembly drawings for the Model 100X recorder.

7-3. The parts list is provided to aid the user in obtaining replacement parts. For this purpose, reference designators, part descriptions, and part numbers are included. When ordering parts, the above information is to be included.

7-4. The schematics and drawings are provided to aid the troubleshooter in locating and analyzing circuitry problems. The assembly drawings are used to locate and identify components physically by their reference designators.

7-5. The symbols used in the schematics are illustrated and identified in Figure 7-1. Integrated circuit packages (U) containing more than one functional element are treated separately, each element being identified by a letter suffix. All gates are two-, three-, and four-input NAND gates; however, an individual gate may be represented on the schematics by either the NAND or NOR gate symbol, depending on its function in the circuit. See Section IV for details of device operation.

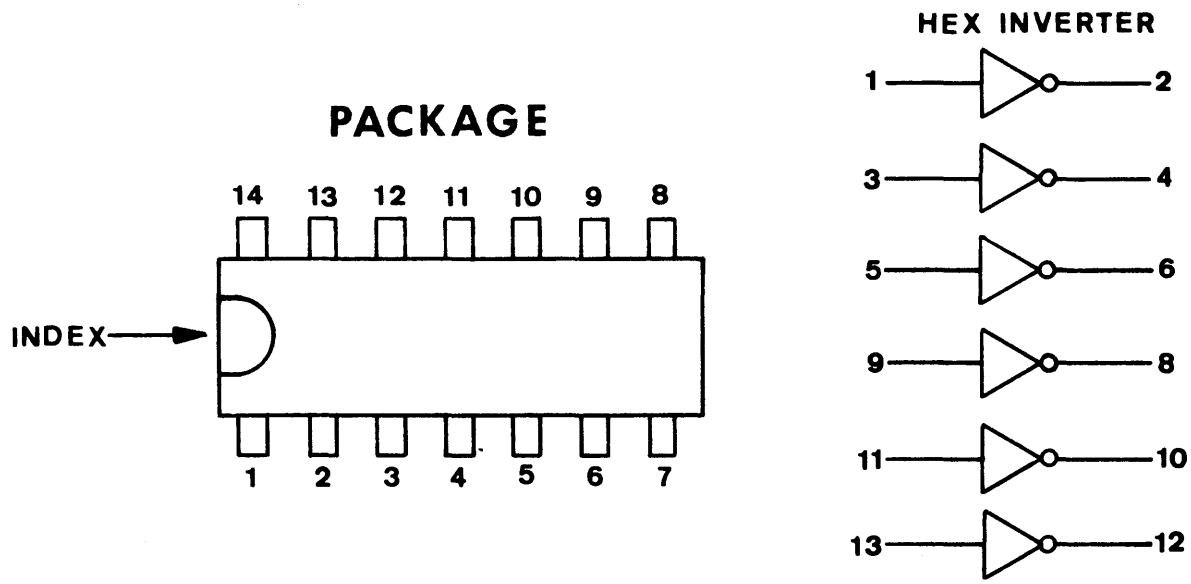
RETRIGGERABLE MONOSTABLE MULTIVIBRATOR

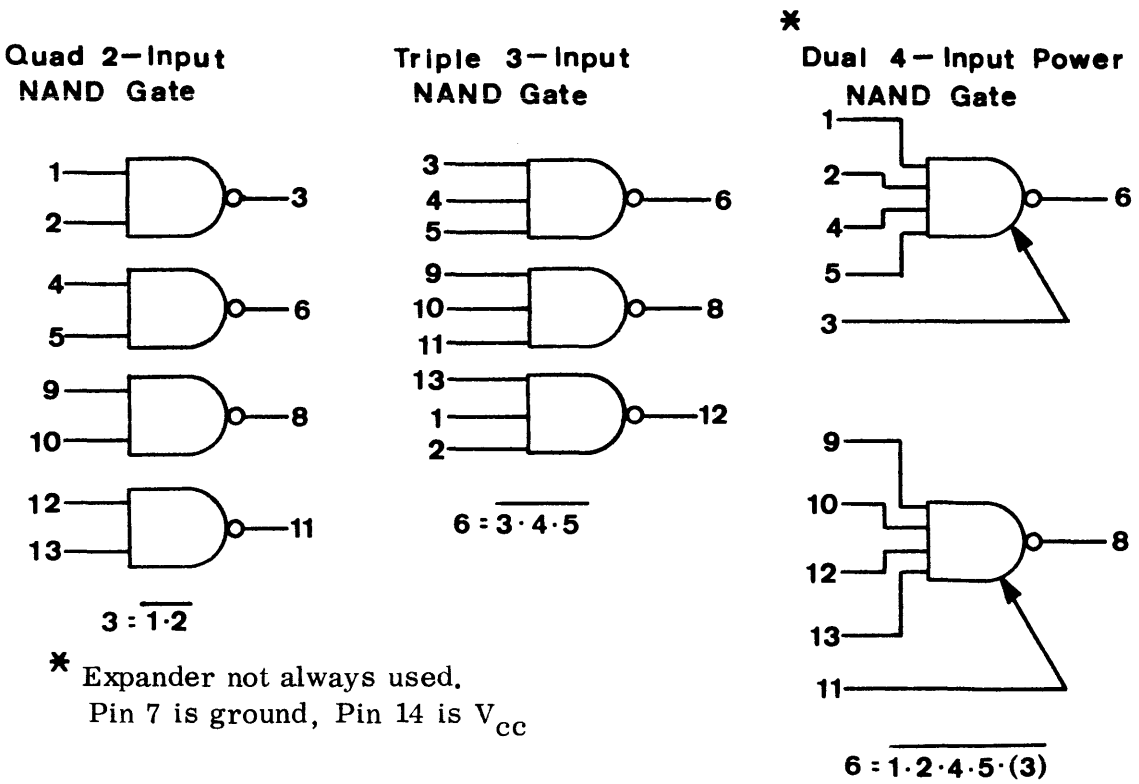


NOTE: Pin 7 is ground, pin 14 is V_{CC}.

Figure 7-1. Integrated Circuit Data and Connections

GATES & INVERTERS



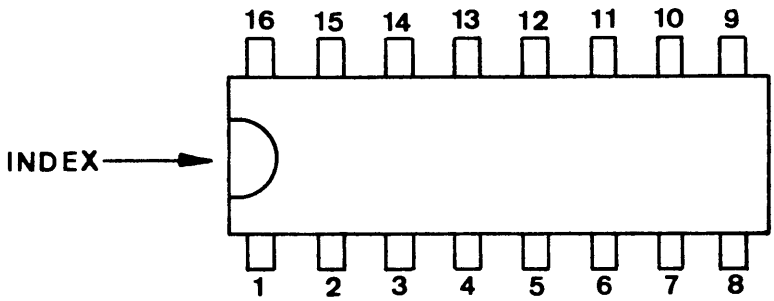


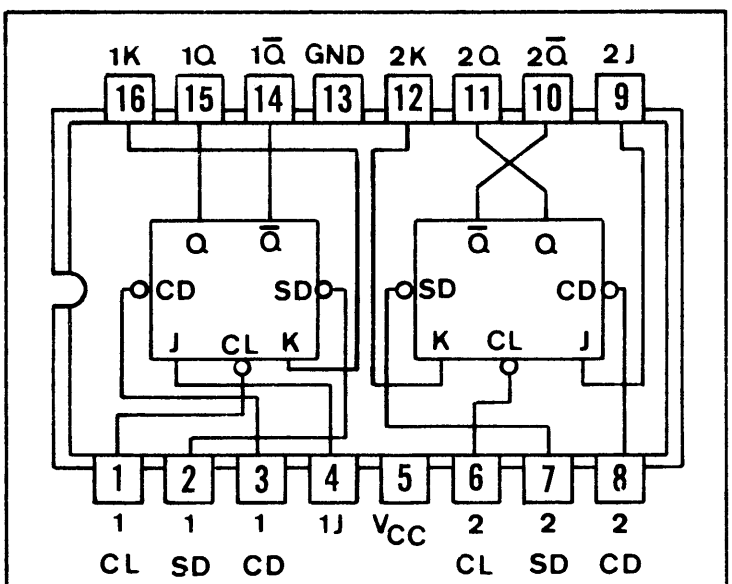
* Expander not always used.
Pin 7 is ground, Pin 14 is V_{cc}

Figure 7-1. Integrated Circuit Data and Connections (Continued)

J–K FLIP–FLOPS

PACKAGE





positive logic: Low input to preset sets Q to logical 1

Low input to clear sets Q to logical 0

Clear and preset are independent from clock

Truth Table (Each Flip–Flop		
t_n		t_n+1
J	K	Q
0	0	Q_n
0	1	0
1	0	1
1	1	$\overline{Q}_n$

NOTES:

t_n = Bit time before clock pulse.

t_n+1 = Bit time after clock pulse.

Figure 7-1. Integrated Circuit Data and Connections (Continued)

DOCUMENTATION LIST

Drawing No. 331500-100, Model 100X Block Diagram
Drawing No. 131000-000, Model 100X, Top Assembly
Parts List PL131000-000,011–031, Model 100X Top Assy.
Parts List PL113008-0XX, 7-Track Head Assembly
Parts List PL131013-700, Connector Mod-24-Pin
Parts List PL118008-002, 9-Track Head Assembly
Parts List PL124005-000, Tape Cleaner Assembly
Parts List PL131001-001, Rack Mounting Hardware Package
Parts List PL131013-000,001, Hinge Block Assembly, Standard
Parts List PL131003-800, Reflector Assembly
Parts List PL131004-001, Compliance Arm Assembly
Parts List PL131005-001,002,003, Switch Panel Assembly
Parts List PL131502-000, Switch Cable Assembly
Parts List PL131503-000, Switch Lamps Cable Assembly
Parts List PL131504-000, Power Switch Cable Assembly
Parts List PL131006-000, File Protect Switch Assembly
Parts List PL131006-400, Actuator Modification
Parts List PL131006-500, Solenoid Plunger Modification
Parts List PL131007-001,002,003, Head Assembly, 7 and 9-Track, and 9-Track P.E.
Parts List PL131017-500, Hinge Plate Assembly
Parts List PL131008-000, Compliance Arm Retractor Assembly
Parts List PL131010-001,002, Reel Hub Assembly
Parts List PL131012-900, Door Stay Assembly
Parts List PL131014-000, Reel Motor Assembly
Parts List PL131014-501,502, Plastic Dust Door Assembly
Parts List PL131015-800, Capstan Motor Assembly (Interchange)
Parts List PL131015-001,002,003, Capstan Motor Assembly
Parts List PL131014-700, Tachometer Harness Assembly
Parts List PL131014-800, Motor Harness Assembly
Parts List PL131016-400, File Protect Pin Assembly
Parts List PL131024-001,002, Mounting Bracket Assembly
Parts List PL131028-000, Arm Retraction Push Bar Assembly
Parts List PL131037-400, Bumper Assembly
Parts List PL131038-001, Head Assembly, 9-Track
Parts List PL131100-000, Model 100X, Option List
Parts List PL131505-000, Power-to-Control/Servo Board Cable Assembly
Parts List PL131506-000, R/W-to-Control/Servo Board Cable Assembly
Parts List PL131507-00X, Transformer Assembly
Parts List PL131508-001, Power and Filter Bracket Assembly
Parts List PL131013-300, Jumper Assembly
Parts List PL131509-001–-008, Transformer Assembly
Drawing No. 131540-000, Single-Gap, 9-Track, Adapter Assembly
Parts List PL131540-000, Single-Gap, 9-Track Adapter Assembly
Parts List PL131910-700, Hinged Standoff Assembly
Parts List PL131622-000, EOT/BOT Assembly
Parts List PL131920-300, Modified Latch Assembly
Drawing No. 131530-000,-001, Power Supply PWB Assembly
Drawing No. 331530-300, Power Supply PWB Schematic Diagram
Parts List PL131530-000,-001, Power Supply PWB Assembly
Drawing No. 799600-100, Elect. Capacitor
Drawing No. 799600-300, Elect. Capacitor
Drawing No. 131524-000, Control/Servo Assembly
Drawing No. 331524-300, Control/Servo Schematic Diagram
Parts List PL131524-000,-001, Control/Servo Assembly
Drawing No. 131512-0XX, Read/Write Assembly
Drawing No. 331512-300, Read/Write Schematic
Parts List PL131512-0XX, Read/Write Assembly
Parts List PL131511-0XX, 7-Track Speed Kit (Selected)
Parts List PL131512-9XX, 9-Track Speed Kit (Selected)

3/4/71	A	CHG PER DSR #7
5/19/71	B	UPDATE DSR 87
9/19/71	C	ECR 1167
1-4-72	D	ECO 1548

P102

WRITE DATA STROBE A 1
WRITE RESET C 3
THRESHOLD E 5
WRITE DATA P/C L 10
WRITE DATA Ø M 11
WRITE DATA 1 N 12
WRITE DATA 2/B P 13
WRITE DATA 3/A R 14
WRITE DATA 4/8 S 15
WRITE DATA 5/4 T 16
WRITE DATA 6/2 U 17
WRITE DATA 7/1 V 18

9TK / 7TK

WRITE SCHEMATIC SH1 331510-300 OR 331512-300 (P21 / J21)

TAPE HEAD

P20 J20

WRITE: +5V, B.S., GRD, GRD
READ: GRD, -15V, +5V, +15V
HI DEN
SELECT
RUN
READ

J22 / P22 READ SCHEMATIC SH2 331510-300 OR 331512-300

P103

READ DATA P/C 1 A
READ STROBE 2 B
READ DATA Ø 3 C
READ DATA 1 4 D
READ DATA 2/B 8 J
READ DATA 3/A 9 K
READ DATA 4/8 14 R
READ DATA 5/4 15 S
READ DATA 6/2 17 U
READ DATA 7/1 18 V

PWB ASSY READ-WRITE 131510-00X OR 131512-00X

P19 / J19 — PWR SW PNL — P18 / J18

BLK, BLK, WHT, WHT

TO PWR BD 6
TO PWR BD 5

FL1 — POWER & FILTER BKT 131508-001

F1 — BLK, GRN, WHT

FILE PROTECT SWITCH ASSY S9 — 131006-000

E.O.T. / B.O.T. ASSY 131622-000 — E.O.T., B.O.T.

COMP. ARM RETRACTOR SWITCHES S10 S11 — DN, UP — 131008-000

REEL MOTOR (SUPPLY) — 131014-000 — BLK, RED — B2

COMPLIANCE ARM 131004-001 (MOTION SENSOR & LIMIT) — S12 — P, C, RED, BLK

REEL MOTOR (TAKE-UP) — 131014-000 — BLK, RED — B1

COMPLIANCE ARM 131004-001 (MOTION SENSOR & LIMIT) — S13 — P, C, RED, BLK

CAPSTAN ASSY 131015-800 — TACH, MOTOR — B4, B3 — RED, BLK, BLK, RED

P1 / J1 — P2 / J2 — P3 / J3 — P14 / J14

J4 / P4: +12, GRD
J5 / P5: -15, +5, GRD
J6 / P6: DOWN, UP
J7 / P7: +15, +5, -15, GRD, GRD, GRD, R.S., +5 — READ, WRITE
J10 / P10, J11 / P11, J12 / P12, J13 / P13, J8 / P8, J9 / P9

P101

FORWARD COMMAND C 3
DATA DEN. SELECT D 4
REVERSE COMMAND E 5
DATA DEN. INDICATOR F 6
REWIND COMMAND H 7
SELECT J 8
SET WRITE STATUS K 9
OFF-LINE COMMAND L 10
ON-LINE M 11
REWINDING N 12
FILE PROTECT P 13
LOAD POINT R 14
READY T 16
END OF TAPE U 17

CONTROL LOGIC SCHEMATIC 331520-300 SH1 OR 331524-300 SH1

POWER SUPPLY SCHEMATIC 331520-300 SH2 OR 331524-300 SH2

REEL SERVO SUPPLY SCHEMATIC 331520-300 SH4 OR 331524-300 SH4

REEL SERVO TAKE-UP SCHEMATIC 331520-300 SH4 OR 331524-300 SH4

CAPSTAN DRIVER SCHEMATIC 331520-300 SH3 OR 331524-300 SH3

PWB ASSEMBLY CONTROL/SERVO 131520-00X OR 131524-00X

REWIND LAMP, +10V, REVERSE LAMP, HI DEN LAMP, LOAD LAMP, FORWARD LAMP, WRT EN LAMP, ON LINE LAMP
HI DEN SW, REVERSE SW, FORWARD SW, REWIND SW (N.O.), LOAD SW (N.C.), GROUND, LOAD SW (N.O.), ON LINE SW (N.O.), ON LINE SW (N.C.), REWIND SW (N.C.)

LAMPS — SWITCHES

SWITCH PANEL ASSY 131005-001

S16 — DUST DOOR INTERLOCK (OPTIONAL)

PWR — LAMP — OFF, ON

ASSY POWER PW BOARD 131530-000 SCHEMATIC 331530-300

P15 / J15, P16 / J16, P17 / J17

COMP ARM RETRACTOR MOTOR (85) 331520-300 SH2

TRANSFORMER 131507-0XX T1 — (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) — (1) (5) (4) (8)

P19 / J19, P18 / J18

F1 — BLK, GRN, WHT

A.C. POWER BRACKET 131501-000

SEE ALSO 131508-001 PWR & FILTER BRKT

J23 / P23, J24 / P24

CKT BD ASSY - 150 IPS OPTION 131522-000 SCHEM - 331522-300

Cipher Data Products — CODE IDENT. NO. 02276

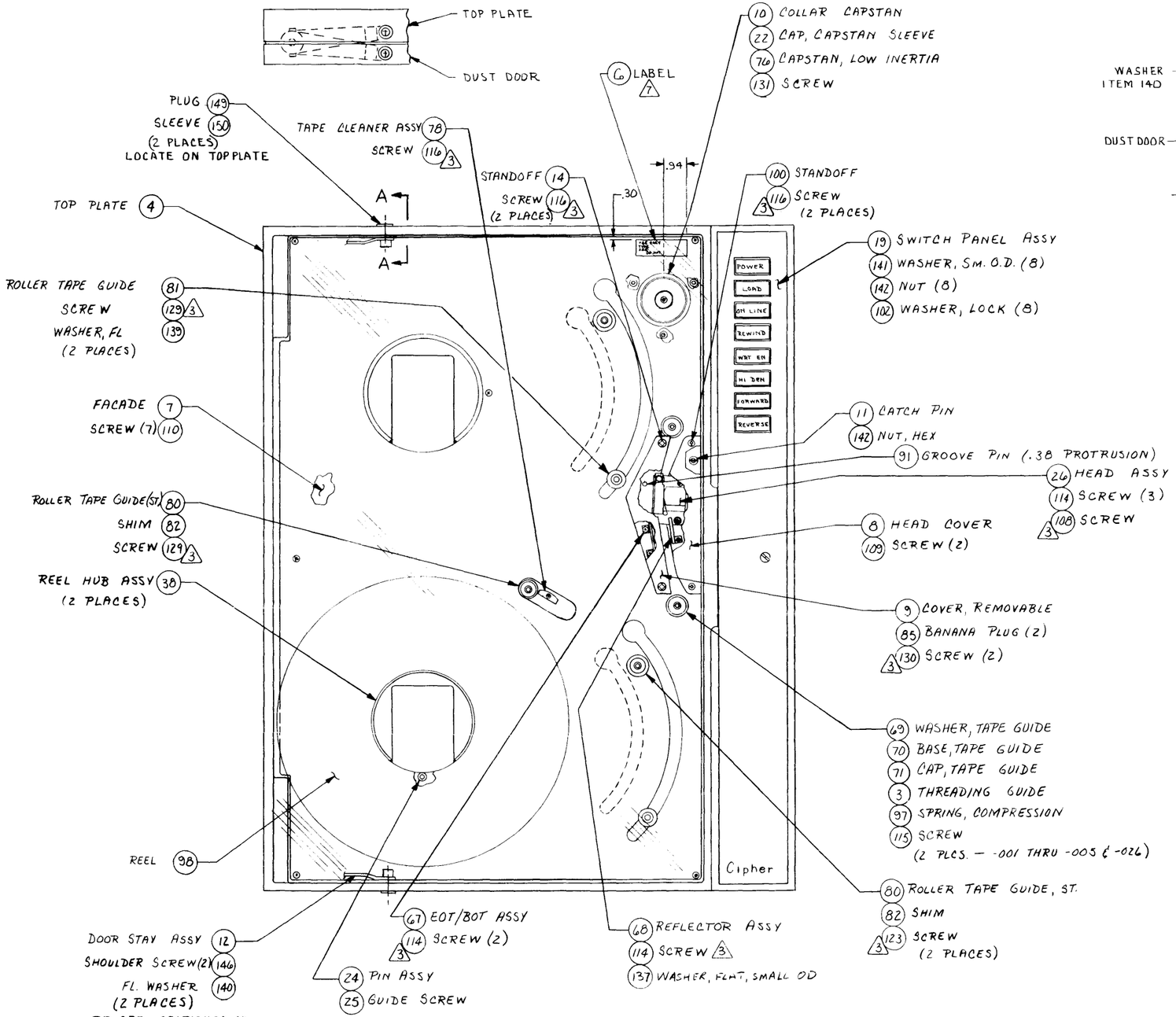
Scale
Date 12/3/71
Drn by RAD
APVD

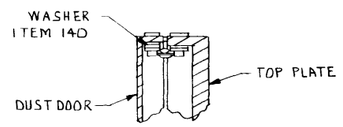
RELEASED — 1-4-72

BLOCK DIAGRAM — 331500-100 D

331500/100

DATE	BY	REVISION RECORD	DR.	CK.
9-29-75	AA	SEE ECR 1174 - [illegible]	[illegible]	PJ
10-24-75	AB	SEE ECO 1259 & 1264	[illegible]	HJ
10-27-75	AC	SEE ECO 1313	[illegible]	HJ
10-27-75	AD	SEE ECO 1357 & 1368	[illegible]	HJ
10-29-75	AE	SEE ECO 1394	[illegible]	HJ
11-10-75	AF	SEE ECO 1400	[illegible]	HJ
11-20-75	AG	SEE ECO 1423	[illegible]	HJ
11-25-75	AH	SEE ECO 1425	[illegible]	HJ
11-10-75	AJ	SEE ECO 1450	HJ	HJ
11-18-75	AK	SEE ECO 1468	HJ	HJ
1-5-76	AL	ECO 1598	HJ	HJ
3-5-76	AM	ECO 1708	HJ	HJ
3-16-76	AN	ECO 1726	HJ	HJ
5-5-76	AP	ECO 1792	HJ	HJ
5-5-76	AR	ECO 1793	HJ	HJ
7-8-76	AS	ECO 2038	DS	[illegible]





SECTION A-A

NOTES:

1. ITEMS NOT SHOWN; ITEM 2 - RACK MTG. HDWR PKG., ITEM 43 - STEEL FRAME, ITEMS 103, 134, 140 QTY. 4, SHIPPING HARDWARE.
2. FOR BLOCK DIAGRAM SEE 331500-100, REF ITEM G.
3. △3 APPLY SCREWLOC LOCTITE, ITEM 152 AT INSTALLATION.
4. △4 IDENTIFY CONNECTORS WITH COLOR DOT PER CONNECTOR COLOR CODE TABLE.
5. PWB EDGE CONNECTOR MUST BE CLEANED BEFORE INSTALLING CABLES.
6. FOR OPTIONAL EQUIPMENT SEE OPTION LIST 131100-000, REF ITEM 15.
7. △7 TOP OF LABEL TO BE PARALLEL WITH TOP OF FACADE
8. FOR DASH NO. INDEX LIST SEE DRAWING 431000-000

△4 CONNECTOR COLOR CODE

FROM		TO	
CONNECTOR	COLOR	CONNECTOR	COLOR
J1	RED	—	—
J2	YELLOW	CONTROL/SW'S.	—
J3	RED	CONTROL/SW'S.	—
J4	RED	S9	—
J5	RED	EOT/BOT	—
J6	GREEN	S10 & S11	—
J7	YELLOW	J20	GREEN
J8	RED	B4	—
J9	YELLOW	B3	—
J10	BLACK	B2	—
J11	GREEN	S12	—
J12	BLUE	B1	—
J13	BLACK	S13	—
J14	YELLOW	J15	RED
J16	YELLOW	T1	—
J17	ORANGE	B5	—
J18	BROWN	CONTROL/SW'S.	—
J19	RED	T1	—
J21	RED	TAPE HEAD	—
J22	YELLOW	TAPE HEAD	—

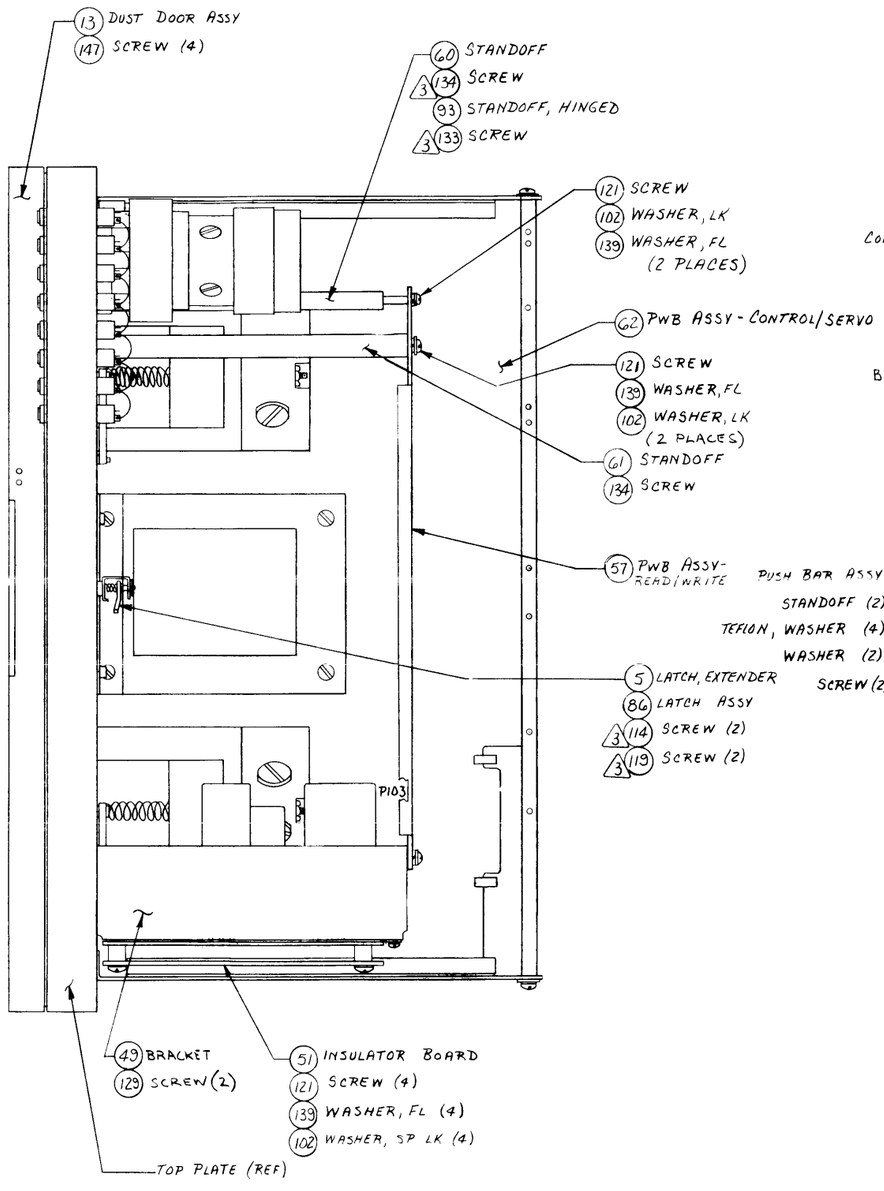
THIS DRAWING FOR REF ONLY. FOR DASH NO. INDEX SEE 431000-000 REFER TO DASH NUMBERED PARTS LISTS FOR SPECIFIC CONFIGURATIONS AND ASSY REVISION LETTERS.

TOLERANCES (EXCEPT AS NOTED)	Cipher Data Products SAN DIEGO, CALIF.			
DECIMAL ± —	MODEL 100X	SCALE 1/2	DRAWN BY K. Wilson	
FRACTIONAL ± —	TITLE MAGNETIC TAPE TRANSPORT		APPROVED BY	
ANGULAR ± —	DATE 9-25-75	DRAWING NUMBER 131000-000	SH 1	OF 2

4/3/76 Edwin Spack

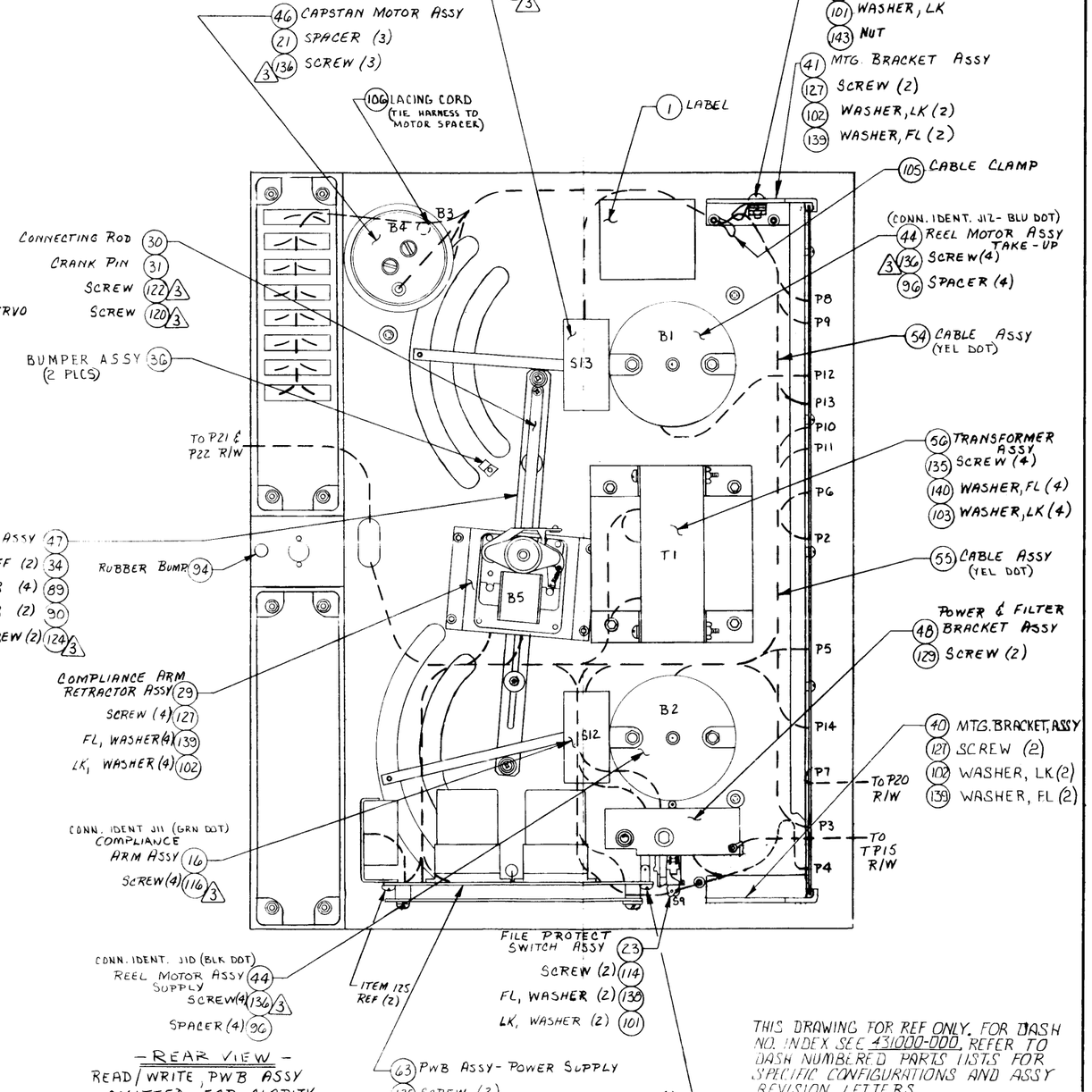
BRUNING 40-21

DATE	SYM	REVISION RECORD	DR.	CK.
9/2/75	AE	REDRAWN - SEE SH. 1 FOR REVISIONS		



— SIDE VIEW —

RETRACTOR ASSY OMITTED FOR CLARITY



— REAR VIEW —

READ/WRITE, PWB ASSY OMITTED FOR CLARITY

THIS DRAWING FOR REF ONLY. FOR DASH NO. INDEX SEE 131000-000, REFER TO DASH NUMBERED PARTS LISTS FOR SPECIFIC CONFIGURATIONS AND ASSY REVISION LETTERS.

TOLERANCES (EXCEPT AS NOTED)	Cipher Data Products SAN DIEGO CALIF.			
DECIMAL ± —	MODEL 100X	SCALE 1/2	DRAWN BY [illegible] APPROVED BY [illegible]	
FRACTIONAL ± —	TITLE MAGNETIC TAPE TRANSPORT			
ANGULAR ± —	DATE 8-21-75	DRAWING NUMBER 131000-000	SH 2	OF 2 REV AE

BRUNING 40-21

Cipher Data Products	DASH NO INDEX	CODE IDENT 32274	431000-000	
	TITLE MTT - 100X DASH NUMBER INDEX		SH. 1 OF 3	REV A

DASH NO OF ASSY 131000-000	DESCRIPTION	MODEL	DATE DRAWN
001	MTT-7 TK, RAW, NRZI (OBSOLETE)		9/75
002	MTT-9 TK, RAW, NRZI (NAVELEX DOCUMENTATION)		9/75
003	MTT-7 TK, R/W, NRZI (OBSOLETE)		9/75
004	MTT-9 TK, R/W, NRZI (OBSOLETE)		9/75
005	MTT-9 TK, RAW, NRZI (OBSOLETE)		9/75
006	MTT-9 TK, RAW, 25 IPS, NRZI, DC (PRELIMINARY)		
007	MTT-9 TK, R/W, 75 IPS, NRZI	100860-9-800-7500-R/W	10/75
008	MTT-9 TK, RAW, 75 IPS, NRZI	100840-9-800-7500-RAW	10/75
009			
010			
011	MTT-7 TK, R/W, 12.5 IPS, NRZI	100860-7-800-1250-R/W	
012	MTT-7 TK, R/W, 25 IPS, NRZI	100860-7-800-2500-R/W	
013	MTT-7 TK, R/W, 37.5 IPS, NRZI	100860-7-800-3750-R/W	
014	MTT-7 TK, R/W, 45 IPS, NRZI	100860-7-800-4500-R/W	
015	MTT-9 TK, R/W, 12.5 IPS, NRZI	100860-9-800-1250-R/W	
016	MTT-9 TK, R/W, 25 IPS, NRZI	100860-9-800-2500-R/W	
017	MTT-9 TK, R/W, 37.5 IPS, NRZI	100860-9-800-3750-R/W	
018	MTT-9 TK, R/W, 45 IPS, NRZI	100860-9-800-4500-R/W	
019	MTT-7 TK, RAW, 12.5 IPS, NRZI	100840-7-800-1250-RAW	
020	MTT-7 TK, RAW, 25 IPS, NRZI	100840-7-800-2500-RAW	
021	MTT-7 TK, RAW, 37.5 IPS, NRZI	100840-7-800-3750-RAW	
022	MTT-7 TK, RAW, 45 IPS, NRZI	100840-7-800-4500-RAW	
023	MTT-9 TK, RAW, 12.5 IPS, NRZI	100840-9-800-1250-RAW	
024	MTT-9 TK, RAW, 25 IPS, NRZI	100840-9-800-2500-RAW	
025	MTT-9 TK, RAW, 37.5 IPS, NRZI	100840-9-800-3750-RAW	
026	MTT-9 TK, RAW, 45 IPS, NRZI	100840-9-800-4500-RAW	
027	MTT-9 TK, RAW, 12.5 IPS, PE	100640-9-1600-1250-RAW-PE	

STANDARD UNITS

Cipher Data Products

DASH NO INDEX

CODE IDENT 32274

431000-000

TITLE MTT - 100X DASH NUMBER INDEX

SH. 2 OF 3

REV A

DASH NO OF ASSY 131000-000	DESCRIPTION	MODEL	DATE DRAWN
028	MTT-9 TK, RAW 18.75 IPS, PE	100640-9-1600-1875-RAW-PE	
029	MTT-9 TK, RAW, 25 IPS, PE	100640-9-1600-2500-RAW-PE	
030	MTT-9 TK, RAW, 37.5 IPS, PE	100640-9-1600-3750-RAW-PE	
031	MTT-9 TK, RAW, 45 IPS, PE	100640-9-1600-4500-RAW-PE	
032			
033			
034			
035			
036			
037			
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041			
042			
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052			
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054			

STANDARD UNITS

USED BY MATERIAL CONTROL FOR COMPUTER STRUCTURES

5053 CRP REV A

Cipher Data Products

DASH NO INDEX

CODE IDENT 32274

431000-000

TITLE MTT - 100X DASH NUMBER INDEX

SH. 3 OF 3

REV A

DASH NO OF ASSY 131000-000	DESCRIPTION	MODEL	DATE DRAWN
055	USED BY MATERIAL CONTROL FOR COMPUTER STRUCTURES		
056	" " " " " " "		
057			
058			
059			
060			
061	MTT-SPECIAL, S.O. 92670, LME SPEC 10562-KDR111	100840-9-800-2500-RAW-220V-48/64HZ	
062	MTT-SPECIAL, S.O. 93068	100840-7-556/800-3750-RAW-230/50	
063	MTT-SPECIAL, S.O. 93069	100840-9-800-3750-RAW-230/50	
064	MTT-SPECIAL, S.O. 93070	100640-9-1600-3750-RAW-PE-230/50	
065	MTT-SPECIAL, S.O. 93071	100640-9-1600-2500-RAW-PE-230/50	
066			
067	MTT-SPECIAL, S.O. 93476	100840-7-556-7500-RAW	4/76
068	MTT-SPECIAL, S.O. 92736	100840-9-800-2500-RAW-230/50	4/76
069	MTT-SPECIAL, S.O. 93564	100840-7-800-7500-RAW	5/76
070	MTT-SPECIAL, S.O. 93519	100640-9-1600-3750/4500-RAW-PE	5/76
071	MTT-SPECIAL, S.O. 93925	100840-9-800-4500-RAW	7/76
072	MTT-SPECIAL, S.O. 93925	100840-7-800-4500-RAW	8/76
073	MTT-7TK, RAW, 25IPS, 556/800, NRZ1, 220V/50HZ	100840-7-556/800-2500-RAW-220/50	8/76
074	MTT-9TK, RAW, 25IPS, 800NRZ1, 220V/50HZ	100840-9-800-2500-RAW-220/50	8/76
075	MTT-9TK, RAW, 25IPS, 1600, PE, 220V/50HZ	100640-9-1600-2500-RAW-PE-220/50	8/76
076	MTT-7TK, RAW, 25IPS, 560/800, NRZ1, 240V/50HZ	100840-7-556/800-2500-RAW-240/50	8/76
077	MTT-9TK, RAW, 25IPS, 800,NRZ1,240V/50HZ	100840-9-800-2500-RAW-240/50	8/76
078	MTT-9TK, RAW, 25IPS, 1600, PE, 220V/50HZ	100640-9-1600-2500-RAW-PE, 240/50	8/76

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE: MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL 100X

SH 1 OF 9

REV AU

		DATE
DWN	V. Lyase	
CHK	H. Berling	11-24-75
N/C	M.D. Chelewski	11-25-75
APP		
APP		

PRODUCTION RELEASE

SEE ECO 1588

NEXT ASSY

LTR	DESCRIPTION	DWN	DATE	APP	DATE
AL	PROD. REL ECO 1588	V.P.	12-22-75	[illegible]	12/22/75
AM	ECO 1601	HJ	1-30-76	HFJ	1-30-76
AN	ECO 1651	HJ	2-9-76	[illegible]	2-9-76
AP	ECO 1707	HJ	3-4-76	[illegible]	3-4-76
AR	ECO 1796	HJ	5-6-76	[illegible]	5-6-76
AS	ECO 1865	HJ	5-25-76	[illegible]	5-25-76
AT	ECO 1877	HJ	6-7-76	[illegible]	6-7-76
AU	ECO 1909	HJ	8/18/76	[illegible]	8-18-76

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
REF.	X	131000-000	MAGNETIC TAPE TRANSPORT (ASSY. REFERENCE DRAWING)		CIPHER	
REF.	X	331500-100	BLOCK DIA - MTT		CIPHER	
1	1	731000-100	LABEL		CIPHER	
2	1	131001-001	RACK MOUNTING HARDWARE PKG.		CIPHER	
3	2	731001-700	THREADING GUIDE		CIPHER	
4	1	731001-500	TOP PLATE		CIPHER	
5	1	731002-400	EXTENDER, TOP PLATE LATCH		CIPHER	
6	1	731042-000	LABEL, CAPSTAN		CIPHER	
7	1	731002-501	FACADE		CIPHER	
8	1	731002-600	HEAD COVER		CIPHER	
9	1	731022-700	COVER, REMOVABLE		CIPHER	
10	1	731902-900	COLLAR, CAPSTAN		CIPHER	
11	1	731003-600	CATCH PIN		CIPHER	
12	2	131012-900	DOOR STAY ASSEMBLY		CIPHER	
13	1	131014-501	DUST DOOR ASSEMBLY, PLASTIC		CIPHER	
14	2	740004-401	STANDOFF, COVER		CIPHER	
15						

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL 100X

SH 2 OF 9

REV AU

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
16	2	131004-001	COMPLIANCE ARM ASSEMBLY		CIPHER	
17						
18						
19	1	131005-001	SWITCH PANEL ASSEMBLY		CIPHER	
20						
21	3	731005-700	SPACER, CAPSTAN MOTOR		CIPHER	
22	1	731005-900	CAP, CAPSTAN SLEEVE		CIPHER	
23	1	131006-000	FILE PROTECT SWITCH ASSEMBLY		CIPHER	
24	1	131016-400	PIN ASSEMBLY - FILE PROTECT		CIPHER	
25	1	731006-300	GUIDE SCREW, FILE PROTECT SW.		CIPHER	
26	A	SEE SH. 7	HEAD ASSEMBLY -		CIPHER	
27	E	SEE SH. 7	ADAPTOR ASSY - SINGLE GAP, 9 TK		CIPHER	
28						
29	1	131008-000	COMPLIANCE ARM RETRACTOR ASSY.		CIPHER	
30	1	731008-300	CONNECTING ROD, ARM, RETRACTOR		CIPHER	
31	1	731008-400	CRANK PIN, ARM, RETRACTOR		CIPHER	
32						
33						
34	2	731008-700	STANDOFF, ARM, RETRACTOR		CIPHER	
35						
36	2	131037-400	BUMPER ASSEMBLY		CIPHER	
37						
38	2	131010-001	REEL HUB ASSEMBLY		CIPHER	
39						
40	1	131024-001	MOUNTING BRACKET ASSEMBLY		CIPHER	
41	1	131024-002	MOUNTING BRACKET ASSEMBLY		CIPHER	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL 100X

SH 3 OF 9

REV A()

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
42						
43	1	731011-100	SHIPPING FRAME, STEEL		CIPHER	
44	2	131014-000	REEL MOTOR ASSEMBLY		CIPHER	
45						
46	1	131015-800	CAPSTAN MOTOR ASSEMBLY (INT.)		CIPHER	
47	1	131028-000	PUSH BAR ASSEMBLY, RETRACTOR		CIPHER	
48	1	131508-001	POWER & FILTER BRACKET ASSEMBLY		CIPHER	
49	1	731501-200	BRACKET		CIPHER	
50						
51	1	731530-400	BOARD, INSULATOR		CIPHER	
52						
53						
54	1	131505-000	CABLE ASSY-PWR BD TO CONT/SERVO		CIPHER	
55	1	131506-000	CABLE ASSY-R/W TO CONT/SERVO		CIPHER	
56	△B	SEE SH. 7	TRANSFORMER ASSEMBLY		CIPHER	
57	△C	SEE SH. 8 & 9	PWB ASSEMBLY - READ WRITE		CIPHER	
58						
59						
60	1	731510-703	STANDOFF		CIPHER	
61	1	731510-704	STANDOFF		CIPHER	
62	△D	SEE SH. 9	PWB ASSEMBLY - CONTROL/SERVO		CIPHER	
63	1	131530-000	PWB ASSEMBLY - POWER SUPPLY		CIPHER	
64						
65						
66						
67	1	131622-000	EOT/BOT ASSEMBLY		CIPHER	

Cipher Data Products

PARTS LIST

CODE IDENT	PL
32274	131000-011 Thru - 031

TITLE: MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL: 100X

REV: AU

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
68	1	131003-800	REFELECTOR ASSEMBLY		CIPHER	
69	2*	710008-300	WASHER - SINGLE EDGE TAPE GUIDE		CIPHER	
70	2	710012-100	BASE - SINGLE EDGE GUIDE		CIPHER	
71	2*	710012-200	CAP - SINGLE EDGE GUIDE		CIPHER	
72						
73						
74						
75						
76	1	726010-100	CAPSTAN, LOW INERTIA		CIPHER	
77						
78	1	124005-000	TAPE CLEANER ASSEMBLY		CIPHER	
79						
80	3	716017-001	ROLLER TAPE GUIDE, SHORT		CIPHER	
81	2	799003-200	ROLLER TAPE GUIDE, CROWNED		CIPHER	
82	3	731911-105	SHIM, 3/8 OD x 1/4 ID (.010NOM)		CIPHER	
83						
84						
85	2	210188	PLUG, BANANA	100	H.H. SMITH	
86	1	131920-300	LATCH ASSEMBLY		CIPHER	
87						
88						
89	4	210027	WASHER, TEFLON	2264-T194	AMATOM	
90	2	211124	WASHER, STEEL	5702-58-48	SEASTROM	
91	1	210223	GROOV-PIN	GP4-093750-12	GROOV-PIN CO.	
92						
93	1	131910-700	STANDOFF, HINGED		CIPHER	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL 100X

SH 5 OF 9

REV AU

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
94	1	210837	BUMPER, RUBBER	SJ5112	3M	
95						
96	8	210040-085	SPACER, ALUM.	9257-A-194	AMATOM	
97	2*	799001-500	SPRING, COMPRESSION		CIPHER	
98	1	210201	10" REEL, 3 APERATURE, WHT.BACK CLEAR FRONT	5198GS	E.D.P.	
99	1	210229-400	CABLE CLAMP 5/16	3325	HEYCO	
100	2	210030-197	STANDOFF ALUM., BLK.	8227-A-0440-2	AMATOM	
101	5	207403-011	WASHER, LOCK, SPLIT	# 4		
102	28	207602-011	WASHER, LOCK, SPLIT	# 6		
103	8	207102-011	WASHER, LOCK, SPLIT	# 10		
104						
105	1	210229-500	CABLE CLAMP 7/16	3327	HEYCO	
106	4"	210229-545	LACING CORD	LC134-1	ALPHA	
107						
108	1	206210-032	SCREW, SOC, HD, CAP, BLK.	2-56 x 5/8		
109	2	206404-022	SCREW, FL HD, PHIL, 100° BLK.	4-40 x 1/4		
110	7	206404-011	SCREW, PAN HD, PHIL. CAD.	4-40 x 1/4		
111						
112	3	206406-011	SCREW, PAN HD, PHIL. CAD.	4-40 x 3/8		
113						
114	10	206406-031	SCREW, SOC HD, CAP, CAD.	4-40 x 3/8		
115	2 *	206428-031	SCREW, SOC HD, CAP, CAD:	4-40 x 1 3/4		
116	13	206410-031	SCREW, SOC HD, CAP, CAD.	4-40 x 5/8		
117						
118						
119	2	206402-041	SCREW, SOC SET, CUP PT, CAD.	4-40 x 1/8		

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL 100X

SH 6 OF 9

REV AU

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
120	1	206604-011	SCREW, PAN HD, PHIL, CAD.	6-32 x 1/4		
121	10	206605-011	SCREW, PAN HD, PHIL, CAD.	6-32 x 5/16		
122	1	206609-011	SCREW, PAN HD, PHIL, CAD.	6-32 x 9/16		
123	2	206610-011	SCREW, PAN HD, PHIL, CAD.	6-32 x 5/8		
124	2	206616-011	SCREW, PAN HD, PHIL, CAD.	6-32 x 1"		
125	2	206606-011	SCREW, PAN HD, PHIL, CAD.	6-32 x 3/8		
126						
127	8	206608-031	SCREW, SOC HD, CAP, CAD.	6-32 x 1/2		
128						
129	7	206610-031	SCREW, SOC HD, CAP, CAD.	6-32 x 5/8		
130	2	206604-022	SCREW, FL HD, PHIL, 100°, BLK.	6-32 x 1/4		
131	1	206618-092	SCREW, SOC HD, FL, 82°, BLK.	6-32 x 1 1/8		
132						
133	1	206608-041	SCREW, SOC SET, CUP PT, CAD.	6-32 x 1/2		
134	7	206110-032	SCREW, SOC HD, CAP, BLK.	10-32 x 5/8		
135	4	206108-031	SCREW, SOC HD, CAP, CAD.	10-32 x 1/2		
136	11	206120-031	SCREW, SOC HD, CAP, CAD.	10-32 x 1 1/4		
137	1	207408-021	WASHER, FLAT, SMALL OD.	# 4		
138	5	207402-021	WASHER, FLAT	# 4		
139	22	207605-021	WASHER, FLAT	# 6		
140	12	207104-021	WASHER, FLAT	# 10		
141	8	207608-021	WASHER, FLAT, SMALL OD.	# 6		
142	9	207604-081	NUT, HEX, RADIO PATTERN	6-32		
143	1	207406-081	NUT, HEX, RADIO PATTERN	4-40		
144						
145						
146	4	211076	SCREW, SHOULDER	7456-SS-0832	AMATOM	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE
MAGNETIC TAPE TRANSPORT - STANDARD UNITS

SH 7 OF 9

REV A U

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
147	4	206604-062	SCREW, BTN HD, SOC, BLK.	6-32 x 1/4		
148						
149	2	205262	PLUG, LOCKING FASTENER	P104F832-Q4ABK	DELRON	
150	2	205264	SLEEVE, LOCKING FASTENER	S104F8-2ABK	DELRON	
151						
152	AR	209990-072	SCREWLOCK	222	LOCTITE CORP.	
26	A 1	131038-001 (REQUIRED FOR	HEAD ASSY. -9TK ASSY -018)		CIPHER	
26	A 1	113008-004 (REQUIRED FOR	HEAD ASSY -7 TK ASSY -011 THRU -014)		CIPHER	
26	A 1	118008-002 (REQUIRED FOR	HEAD ASSY -9 TK ASSY -015 THRU -017)		CIPHER	
26	A 1	131007-001 (REQUIRED FOR	HEAD ASSY -7 TK, DUAL GAP ASSY -019 THRU -022)		CIPHER	
26	A 1	131007-002 (REQUIRED FOR	HEAD ASSY -9 TK, DUAL GAP ASSY -023 THRU -031)		CIPHER	
27	E 1	131540-000 (REQUIRED FOR	ADAPTOR ASSY - SINGLE GAP 9 TK ASSY -013 THRU -018)		CIPHER	
56	B 1	131507-002 (REQUIRED FOR -017,-019,-020 -029 & -030)	TRANSFORMER ASSY. ASSY -011,-012,-013,-015,-016, ,-021,-023,-024,-025,-027,-028,		CIPHER	
56	B 1	131509-002 (REQUIRED FOR	TRANSFORMER ASSY. ASSY -014,-018,-022,-026 & -031)		CIPHER	
27	E 1	131540-001 (REQUIRED FOR	ADAPTER ASSY - SINGLE GAP - 7TK ASSY -011 & -012)		CIPHER	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE: MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL: 100X

SH 8 OF 9

REV AU

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
57	C 1	131512-015	PWB ASSY -7 TK, R/W, 12.5-25 (REQUIRED FOR ASSY -011)		CIPHER	
57	C 1	131512-016	PWB ASSY -7 TK, R/W, 25-45 (REQUIRED FOR ASSY -012,-013 & -014)		CIPHER	
57	C 1	131512-017	PWB ASSY -9 TK, R/W, 12.5-25 (REQUIRED FOR ASSY -015)		CIPHER	
57	C 1	131512-018	PWB ASSY -9 TK, R/W, 25-37.5 (REQUIRED FOR ASSY -016 & -017)		CIPHER	
57	C 1	131512-021	PWB ASSY -9 TK, R/W, 45 (REQUIRED FOR ASSY -018)		CIPHER	
57	C 1	131512-011	PWB ASSY -7 TK, RAW, 12.5-25 (REQUIRED FOR ASSY -019)		CIPHER	
57	C 1	131512-012	PWB ASSY -7 TK, RAW, 25-45 (REQUIRED FOR ASSY -020,-021 & -022)		CIPHER	
57	C 1	131512-013	PWB ASSY -9 TK, RAW, 12.5-25 (REQUIRED FOR ASSY -023)		CIPHER	
57	C 1	131512-014	PWB ASSY -9 TK, RAW, 25-45 (REQUIRED FOR ASSY -024,-025 & -026)		CIPHER	
57	C 1	131552-011	PWB ASSY -9 TK, RAW, 12.5IPS PE (REQUIRED FOR ASSY -027)		CIPHER	
57	C 1	131552-012	PWB ASSY -9 TK, RAW,18.75IPS PE (REQUIRED FOR ASSY -028)		CIPHER	
57	C 1	131552-013	PWB ASSY -9 TK,RAW, 25 IPS PE (REQUIRED FOR ASSY -029)		CIPHER	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131000-011 Thru -031

TITLE
MAGNETIC TAPE TRANSPORT - STANDARD UNITS

MODEL 100X

SH 9 OF 9

REV A0

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
57	/C 1	131552-014	PWB ASSY -9 TK, RAW, 37.5IPS,PE (REQUIRED FOR ASSY -030)		CIPHER	
57	/C 1	131552-015	PWB ASSY -9 TK,RAW, 45 IPS, PE (REQUIRED FOR ASSY -031)		CIPHER	
62	△D 1	131524-000	PWB ASSY - CONTROL SERVO (REQUIRED FOR ASSY -011,-012,-013,-015,-016, -017,-019,-020,-021,-023,-024,-025,-027,-028, -029 & -030)		CIPHER	
62	△D 1	131524-001	PWB ASSY - CONTROL SERVO (REQUIRED FOR ASSY -014,-018,-022,-026 & -031)		CIPHER	

* FOR SPARE PARTS REQUIREMENT, ITEMS 69,71,97,115 MUST BE SUPPLIED AS A GROUP.

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL113008-0XX | REV. L

TITLE: 7 TRACK HEAD ASSEMBLY

DWNG BODDY | DATE 1-13-75 | APPROVAL | E.C.O. NO. 2028 | DATE 9-2-76 | SHEET 1 OF 2 SHEETS

ITEM	QUANTITY -001	QUANTITY -002		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			799001-001	RECORD HEAD - 7 TRACK		CIPHER	
2		1		799001-002	RECORD HEAD - 7TRACK WITH ERASE		CIPHER	
3	1	1		710006-200	HEAD SHIM		CIPHER	
4	1	1		713008-600	HEAD MOUNT		CIPHER	
5	1	1		713003-600	SCREW, AZIMUTH ADJUST		CIPHER	
6	1	1		710500-501	CLAMP - CONNECTOR (NATURAL)		CIPHER	
7	1	1		710500-503	CLAMP - CONNECTOR (WHT)		CIPHER	
8								
9								
10	21	23		205027	TERMINAL, CRIMP RECPT.	85967-1	AMP	
11	1	1		131013-700	CONNECTOR MOD - 24 PIN		CIPHER	
12								
13	16"	16"		209100-302	TUBING, PVC, BLACK	PVC-105-5/16-2	ALPHA	UL SURFACE MARKING REQD
14	2'	2'		208420-012	WIRE, STRD, 24AWG, PVC, BLK, UL	7150-2	ALPHA	
15	AR	AR		209990-071	SUPER BONDER	04E	LOCTITE CORP	
16	2	2		206404-021	SCREW, FLAT HD PHIL 100°	4-40 x 1/4		
17	1	1		206210-031	SCREW, SOC HD CAP CAD	2-56 x 5/8		
18	AR	AR		209990-072	SCREWLOCK	222	LOCTITE CORP	
19				USE -001 & -002 ON				
20					STANDARD MACHINES ONLY			

5043 CDP

Cipher Data Products

PARTS LIST

MODEL 100X

CODE IDENT. 32274 | PL113008-0XX | REV. L

TITLE: 7 TRACK HEAD ASSEMBLY

DWNG BODDY | DATE 1-13-75 | APPROVAL | E.C.O. NO. 2028 | DATE 9-2-76 | SHEET 2 OF 2 SHEETS

ITEM	QUANTITY -003	-004		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			799001-001	RECORD HEAD - 7 TRACK		CIPHER	
2		1		799001-002	RECORD HEAD - 7TRACK WITH ERASE		CIPHER	
3	1	1		710006-200	HEAD SHIM		CIPHER	
4	1	1		713008-600	HEAD MOUNT		CIPHER	
5	1	1		713003-600	SCREW, AZIMUTH ADJUST		CIPHER	
6	1	1		710500-501	CLAMP - CONNECTOR (NATURAL)		CIPHER	
7	1	1		710500-503	CLAMP - CONNECTOR (WHT)		CIPHER	
8								
9								
10	21	23		205027	CRIMP RECEPTACLE	85967-1	AMP	
11	1	1		205120	CONNECTOR HOUSING 30 PIN	1-86262-1	AMP	
12								
13	16"	16"		209100-302	TUBING, PVC; BLACK	PVC-105-5/16-2	ALPHA	(UL SURFACE MARKING REQ'D)
14	2'	2'		208420-012	WIRE, STRD, 24AWG, PVC, BLK, IR	7150-2	ALPHA	
15	AR	AR		209990-071	SUPER BONDER	04E	LOCTITE CORP	
16	2	2		206404-021	SCREW, FLAT HD PHIL 100°	4-40 x 1/4		
17	1	1		206210-031	SCREW, SOC HD CAP CAD	2-56 x 5/8		
18	AR	AR		209990-072	SCREWLOCK	222	LOCTITE CORP	
19				USE -003 & -004 ON H,M &		X		
20					MACHINES ONLY			

5043 CDP

Cipher

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131013-700 | REV. A

TITLE: CONNECTOR MOD - 24 PIN

DWNG BODDY | DATE 1-24-75 | APPROVAL | E.C.O. NO. ECR 1021 | DATE 1-24-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	205120	CONNECTOR BLOCK, 30 PIN	1-86262-1	AMP	

5043 CDR

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 118008-001/002 | REV. G

TITLE: HEAD ASSEMBLY - 9 TRACK

DWN K. Dilley DATE 9-23-75 | APPROVAL | E.C.O. NO. 2034 | DATE 9-7-76 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -1	QUANTITY -2		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			799000-901	RECORD HD, 9TK, SINGLE GAP		CIPHER	
2		1		799000-902	RECORD HD, 9TK, SINGLE GAP W/ERASE		CIPHER	
3	1	1		710006-200	HEAD SHIM		CIPHER	
4	1	1		713008-600	HEAD MOUNT		CIPHER	
5	1	1		713003-600	SCREW, AZIMUTH ADJUST		CIPHER	
6	1	1		710500-501	CLAMP - CONNECTOR (NATURAL)		CIPHER	
7	1	1		710500-503	CLAMP - CONNECTOR (WHT)		CIPHER	
8								
9								
10	27	29		205027	TERMINAL, RECEPT, CRIMP	85967-1	AMP	
11	1	1		205120	CONNECTOR HOUSING 30 PIN	1-86262-1	AMP	
12								
13	16"	16"		209100-302	TUBING, PVC, BLK	PVC-105-5/16-2	ALPHA	(UL SURFACE MARKING REQD)
14	1'	1'		208420-012	WIRE, STRD, 24AWG,IR PVC, BLK.	7150-2	ALPHA	
15	ar	ar		209990-071	SUPERBONDER	04E	LOCTITE CORP	
16	2	2		206404-021	SCREW, FLAT HD, PHIL 100°, CAD.	4-40 x 1/4		
17								
18	ar	ar		209990-072	LOCTITE, SCREWLOCK	59	LOCTITE CORP	
19								
20								

Cipher Data Products

MODEL 100X PARTS LIST

CODE IDENT. 32274 | PL124005-000 | REV. B

TITLE: TAPE CLEANER ASSY

DWN N Johnson | DATE 2-13-75 | APPROVAL | E.C.O. NO. ECR 1049 | DATE 2-13-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731911-300	HOUSING - TAPE CLEANER		CIPHER	
2	1	724005-400	BLADE - TAPE CLEANER		CIPHER	
3	4	206202-011	SCREW, PAN HD, PHILLIPS, CAD.	2-56 x 1/8		

5043 C

Cipher Data Products

PARTS LIST

COLL IDENT. 32274 | PL 131001-001 | REV. D

TITLE: RACK MOUNTING HARDWARE PACKAGE

DWN H. F. J. | DATE 2-7-75 | APPROVAL AB | E.C.R. NO. 1002 | DATE 2-7-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY 001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1								
2	1			731002-300	SAFETY BLOCK		CIPHER	
3	1			131013-000	HINGE BLOCK ASSY		CIPHER	
4	6			206112-121	SCREW, BINDER HD SLT. CAP	10-32 x 3/4		
5	1			206408-031	SCREW SOCKET HD CAP CAD	4-40 x 1/2		
6	1			131013-001	HINGE BLOCK ASSY		CIPHER	

5043 COP

Cipher

PARTS LIST

CODE IDENT. 32274 | PL131013 -000 -001 | REV. C

TITLE: HINGE BLOCK ASSY - STD

DWN S. Johnson | DATE 2-7-75 | APPROVAL | E.C.R. NO. 1003 | DATE 2-7-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY 000	QUANTITY 001		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731002-800	HINGE BLOCK		CIPHER	
2								
3	1			205037	DOWEL PIN	3/16 DIA x 7/8 LG	ALLEN	
4		1		205038	DOWEL PIN	3/16 DIA x 1.00 LG	ALLEN	
5	AR	AR		209990-076	RETAINING COMPOUND	75	LOCTITE CORP	
6								
7	1	1		210028	WASHER, NYLON, .062 THK, .343 O.D., .194 I.D	2319-N194	AMATOM	

5043-CP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL/31003-800 | REV. B

TITLE: REFLECTOR ASSY

DWNG BOODY | DATE 1-22-75 | APPROVAL | E.C.O. NO. ECR 1048 | DATE 2-13-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731013-800	BRACKET - REFLECTOR		CIPHER	
2	1½"	209999-015	TAPE, REFLECTIVE (3/4 x 1 1/2)	530	3M	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131004-001 | REV. M

TITLE: COMPLIANCE ARM ASSEMBLY

DWN G BODDY | DATE 2-5-75 | APPROVAL | E.C.O. NO. 1719 | DATE 3-11-76 | SHEET 1 OF 4 SHEETS

ITEM	QUANTITY -001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			731904-100	BRACKET - COMPLIANCE		CIPHER	
2	1			731004-200	COMPLIANCE ARM		CIPHER	
3	1			731004-300	SHAFT		CIPHER	
4	1			731004-400	SPRING ARBOR		CIPHER	
5	1			731004-500	SPRING ADJUSTOR		CIPHER	
6								
7	1			731902-700	COVER - COMPLIANCE		CIPHER	
8								
9	1			731005-100	SHUTTER, DISC		CIPHER	
10	1			731005-200	HUB, SHUTTER DISC		CIPHER	
11	1			731005-300	TORSION SPRING		CIPHER	
12	1			731903-000	MOUNT - SENSOR & SOLAR		CIPHER	
13	1			210156-500	BASE - LAMP	BEC	SHELLY	
14	1			210163-500	LAMP "AGED SELECTED"	OL7ISAS15	OSHINO	
15	1			210157	CAP - LAMP	CLP	SHELLY	

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131004-001 | REV. M

TITLE: COMPLIANCE ARM ASSEMBLY

DWN G BODDY | DATE 2-5-75 | APPROVAL | E.C.O. NO. 1719 | DATE 3-11-76 | SHEET 2 OF SHEETS

ITEM	QUANTITY -001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
16	1			211016	SWITCH	E62-36-HB	CHERRY	
17	1			210105	SOLAR CELL	SS-21LC-12"	SOLAR SYS	
18	2			210067	BALL BEARING 1/4 x 3/8	SFR1683PPEEK28/8	NH BB	
19								
20	2			211100	TERMINAL. TEFLON PRESS FIT	FTSM-74	SEALECTRO	
21	1			210132	GROMMET	2146	H.H. SMITH	
22	7			205015	TERMINAL, PIN F (REEL)	02-09-1116	MOLEX	
22a	ALT			205016	TERMINAL, PIN F (LOOSE)	02-09-1118	MOLEX	
23								
24	1			205067	CONNECTOR 9 POS	03-09-1093	MOLEX	
25								

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL131004-001 | REV. M

TITLE: COMPLIANCE ARM ASSEMBLY | DWNG BODDY | DATE 2-5-75 | APPROVAL | E.C.O. NO. 1719 | DATE 3-11-76 | SHEET 3 OF SHEETS

ITEM	QUANTITY -001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
26	2			206208-021	SCREW FLAT HD PHIL 100° CAD	2-56 x 1/2		
27	2			207205-051	NUT, HEX	2-56		
28	2			207203-031	WASHER, LOCK INT TOOTH	#2		
29	2			207202-021	WASHER, FLAT	#2		
30								
31								
32	1			206403-041	SCREW, SOC SET CUP PT, CAD	4-40 x 3/16		
33	2			206404-031	SCREW, SOC HD, CAP, CAD	4-40 x 1/4		
34	2			206604-121	SCREW, BINDER HD, SLOT, CAD	6-32 x 1/4		
35	2			206412-140	SCREW, SLOTTED SET, NYLON	4-40 x 3/4		
36								
37								
38	1			210008	WAVE SPRING	5806-74-1	SEASTROM	
39	7			210229-523	TY-RAP	TYB-23M	T & B	

Cipher Data Products

MODEL 100X PARTS LIST

CODE IDENT. 32274 | PL 131004-001 | REV. M

TITLE: COMPLIANCE ARM ASSEMBLY | DWN G BODDY | DATE 2-5-75 | APPROVAL | E.C.O. NO. 1719 | DATE 3-11-76 | SHEET 4 OF 4 SHEETS

ITEM	QUANTITY -001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
40	AR			209990-084	CONTACT CEMENT	ELMERS	BORDENS	
41	4"			210460	TUBING, SHRINK UL	HIX - 1/16-UL	ICO RALLY	
42	10'			208415-011	WIRE, STRD, 22AWG I.R. PVC WHT	7151-1	ALPHA	
43	5'			208500-035	WIRE, 2 LEAD, SHLD, 22 AWG	EXE-22-1934	SONIC OR THERMAX	
44								
45	AR			209999-031	STP OIL TREATMENT		STP CORP	
46								
47	REF				PROCEDURE	P10-001	CIPHER	
48	1			731911-101	SHIM .004 THICK			
49	1			-102	.005 THICK			
50	1			-103	.006 THICK			
51	1			-104	.008 THICK			
52	1			731911-105	SHIM .010 THICK		CIPHER	

Cipher Data Products

MODEL 100 X

PARTS LIST

CODE IDENT. 32274

PL 131005-001 / 002 / 003

REV. C

TITLE: SWITCH PANEL ASSY

DWNG Boddy

DATE 1-9-75

APPROVAL

E.C.R.NO. 1009

DATE 2-8-75

SHEET 1 OF 2 SHEETS

ITEM	QUANTITY 001	002	003	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1		1	731009-101	PANEL - CONTROL SWITCHES		CIPHER	
2	1	1	1	731500-700	NAMEPLATE		CIPHER	
3	1	1		211051	SWITCH "POWER"	SEE CAT	MOLEX	
4	1	1		211047	SWITCH "LOAD"	SEE CAT	MOLEX	
5	1	1		211048	SWITCH "ON LINE"	SEE CAT	MOLEX	
6	1	1		211050	SWITCH "REWIND"	SEE CAT	MOLEX	
7	1	1		211049	SWITCH "WRT EN"	SEE CAT	MOLEX	
8	1	1		211046	SWITCH "HI DEN"	SEE CAT	MOLEX	
9	1	1		211045	SWITCH "FORWARD"	SEE CAT	MOLEX	
10	1	1		211044	SWITCH "REVERSE"	SEE CAT	MOLEX	
11								
12	1	1	1	131502-000	CABLE ASSY-SWITCHES		CIPHER	
13	1	1	1	131503-000	CABLE ASSY-SWITCH LAMPS		CIPHER	
14	1	1	1	131504-000	CABLE ASSY-POWER SWITCH		CIPHER	
15								
16								
17		1		731009-102	PANEL - CONTROL SWITCH		CIPHER	
18								
19								
20								

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274

PL 131005 -001 -002 -003

REV. C

TITLE: SWITCH PANEL ASSY

DWNG BODDY DATE 1-9-75

APPROVAL

E.C.R. NO. 1009

DATE 2-8-75

SHEET 2 OF SHEETS

ITEM	QUANTITY 001	002	003	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
21								
22								
23			1	211043	SWITCH "POWER"	SEE CAT	MOLEX	
24			1	211039	SWITCH "LOAD"	SEE CAT	MOLEX	
25			1	211040	SWITCH "ON LINE"	SEE CAT	MOLEX	
26			1	211041	SWITCH "REWIND"	SEE CAT	MOLEX	
27			1	211042	SWITCH "WRT EN"	SEE CAT	MOLEX	
28			1	211038	SWITCH "HI DEN"	SEE CAT	MOLEX	
29			1	211037	SWITCH "FORWARD"	SEE CAT	MOLEX	
30			1	211036	SWITCH "REVERSE"	SEE CAT	MOLEX	
31								

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131502-000 | REV. E

TITLE: CABLE ASSEMBLY - SWITCH

DWNG BODDY | DATE 1-10-75 | APPROVAL MB | E.C.O. NO. 1703 | DATE 3-3-76 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	205069	CONNECTOR, RECEPTACLE (12 PIN)	03-09-1122	MOLEX	J3
2	10	205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
2a	ALT	205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
3						
4	15	210555-022	TERMINAL, CRIMP .187	S09624	HOLLINGSWORTH	
5						
6	10	209999-000	MARKER 1-50	VMM-D-49	BRADY	
7						
8	40'	208415-011	WIRE, STRD, 22AWG, IR, PVC WHT	7151-1	ALPHA	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131503-000 | REV. F

TITLE: CABLE ASSEMBLY - SWITCH LAMPS

DWNG BODDY | DATE 1-10-75 | APPROVAL | E.C.O. NO. 1704 | DATE 3-3-76 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	205067	CONNECTOR, RECEPTICAL (9 PIN)	03-09-1093	MOLEX	J2
2	8	205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
2a	ALT	205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
3						
4	14	210555-022	TERMINAL, CRIMP, .187	S09624	HOLLINGSWORTH	
5						
6	8	209999-000	MARKER 1-50	VMM-D-49	BRADY	
7						
8	40'	208415-011	WIRE, STRD, 22AWG, IR, PVC, WHT	7151-1	ALPHA	

5043 CDP

Cipher Data Products

MODEL 100 X

PARTS LIST

CODE IDENT. 32274 | PL 131504-000 | REV. C

TITLE: CABLE ASSEMBLY - POWER SWITCH

DWNG Boddy | DATE 1-10-75 | APPROVAL MB | E.C.O. NO. ECR 1012 | DATE 2-8-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	205072	CONNECTOR, PLUG (3 PIN)	03-09-2032	MOLEX	
2						
3	3	205014	TERMINAL, PIN .093 DIA. M (REEL)	02-09-2116	MOLEX	
3a	ALT	210531	TERMINAL, PIN .093 DIA. M (LOOSE)	02-09-2118	MOLEX	
4						
5	1	211101	TERMINAL, CRIMP .187	S08152	HOLLINGSWORTH	
6	3	210555-022	TERMINAL, CRIMP .187	S09624	HOLLINGSWORTH	
7	4'	208405-012	WIRE, STRD, 18AWG, IR, PVC, BLK	7155-2	ALPHA	
8	7'	208405-011	WIRE, STRD, 18AWG, IR, PVC, WHT	7155-1	ALPHA	
9						
10	3	209999-000	MARKER 1-50	VMM-D-49	BRADY	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131006-000 | REV. H

TITLE: FILE PROTECT SWITCH ASSEMBLY

DWN G BODDY | DATE 1-10-75 | APPROVAL HB | E.C.O. NO. 1800 | DATE 5-5-76 | SHEET 1 OF 2 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731006-100	BRACKET		CIPHER	
2						
3	1	131006-400	ACTUATOR MOD.		CIPHER	
4	1	799008-500	SOLENOID - FILE PROTECT		CIPHER	
5	1	799001-500	SPRING		CIPHER	
6	1	731027-400	CLEVIS - SOLENOID		CIPHER	
7	1	211030	SWITCH	V3-119	MICRO SWITCH	
8						
9	2	210040-062	SPACER	397	KEYSTONE	
10						
11	1	205034-001	PIN, ROLL	52-012-062-0250	ESNA	
12						
13	2	206403-031	SCREW, SOC. HD. CAP CAD	4-40 × 3/16		
14	2	206412-031	SCREW, SOC HD. CAP CAD	4-40 × 3/4		
15	1	206204-032	SCREW, SOC HD, CAP, BLK	2-56 × 1/4		
16						
17						
18	1	205076	CONNECTOR (5 PIN)	03-09-1052	MOLEX	J4
19	4	205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
19a	ALT	205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131006-000 | REV. H

TITLE: FILE PROTECT SWITCH ASSEMBLY | DWN G BODDY | DATE 1-10-75 | APPROVAL | E.C.O. NO. 1800 | DATE 5-5-76 | SHEET 2 OF SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
20	40"	208415-011	WIRE, STRD, 22AWG, IR, PVC, WHT	7151-1	ALPHA	
21	1½"	210409	SHRINK TUBING, BLK, POLYOLEFIN	HIX-1/8 UL	ICO/RALLY	
22						
23	AR	209990-072	ADHESIVE, SCREW LOCK	222	LOCTITE	
24		P30-18	PROCEDURE		CIPHER	
25						

5043 CD.

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131006-400 | REV. C

TITLE: ACTUATOR MOD.

DWN G. BOODY | DATE 1-10-75 | APPROVAL GB | E.C.O. NO. ECR 1014 | DATE 2-10-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	210214	ACTUATOR, SWITCH	JV-26	MICRO-SWITCH	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131006-500 | REV. B

TITLE: SOLENOID PLUNGER MOD.

DWNG BODDY | DATE 1-13-75 | APPROVAL MB | E.C.O. NO. ECR 1015 | DATE 2-10-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	211061	SOLENOID	22-INT-24 D.C.	MICRO SWITCH	
2						
3						
4	2"	208500-501	WIRE, STAINLESS STEEL, HD DWN	8 MWG (.020)	DUCOMMUN	
5						
6	AR	209999-026	SOLDER, SILVER - SOFT	430	ALLSTATE	
7	AR	209999-027	DUZALL FLUX		ALLSTATE	
8						

5043 CDP

CIPHER Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131007-001 -002 -003 | REV. H

TITLE HEAD ASSEMBLY = 1 (7TK) 2 (9TK) 3 (9TK PE)

DWN R. Kruse | DATE 8/16/74 | APPROVAL CAK | E.C.O. NO. ECR 1017 | DATE 8/23/74 | SHEET 1 OF 2 SHEETS

ITEM	QUANTITY -1	-2	-3	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	731007-100	MOUNT-HEAD		CIPHER	
2	1	1	1	731902-800	POST- HEAD SHIELD		CIPHER	
3	1	1	1	131017-500	PLATE ASSY- HINGE		CIPHER	
4								
5	1	1	1	731007-500	SPRING-HEAD SHIELD		CIPHER	
6	1	1	1	710006-200	SHIM- HEAD		CIPHER	
7	1	1	1	713003-600	SCREW-AZIMUTH ADJUST		CIPHER	
8	1			799001-200	HEAD-7TK DUAL GAP		CIPHER	
9								
10								
11								
12	2	2	2	206404-021	SCREW-FLAT HEAD, PHIL, 100°	4-40 X 1/4		
13	1	1	1	206406-021	SCREW-FLAT HEAD, PHIL, 100°	4-40 X 3/8		
14	1	1	1	210199	RING- RETAINING	5103-18MD	TRUARC	
15	1	1	1	206403-042	SCREW-SOCKET SET	4-40 X 3/16		
16								
17	1	1	1	205002	PIN-GROOVE 1/16 DIA. X 3/8	GP2-062-375-12	G.P. CORP.	
18								

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274

PL131007-001 -002 -003

REV. H

TITLE HEAD ASSEMBLY -1 (7TK) -2 (9TK) -3 (9TK P.E.)

DWN M. Kimes

DATE 7/16/74

APPROVAL

E.C.O. NO. ECR 1017

DATE 8/13/74

SHEET 2 OF 2 SHEETS

ITEM	QUANTITY -1	QUANTITY -2	QUANTITY -3	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
19		1	1	799001-700	HEAD-9TK DUAL GAP P.E.		CIPHER	
20								
21								
22	AR	AR	AR	209990-072	SCREW LOCK	222	LOCTITE CORP.	

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131017-500 | REV. D

TITLE: PLATE ASSY - HINGE

DWNG BODDY | DATE 1-13-75 | APPROVAL | E.C.O. NO. ECR 1008 | DATE 2-10-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731920-400	HINGE PLATE		CIPHER	
2						
3						
4	1	799004-000	CROSS FEED SHIELD		CIPHER	
5	AR	209990-084	CONTACT CEMENT	ELMERS	BORDENS	
6						

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131008-000 | REV. G

TITLE: COMPLIANCE ARM RETRACTOR ASSY

DWNG BODDY | DATE 1-14-75 | APPROVAL MD | E.C.O. NO. ECR 1026 | DATE 2-10-75 | SHEET 1 OF 2 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731008-100	BRACKET		CIPHER	
2	1	731008-200	CRANK		CIPHER	
3	1	731008-600	CAM DISC		CIPHER	
4						
5						
6	1	799001-600	A.C. GEARMOTOR - 18RPM		CIPHER	
7						
8	2	211016	SWITCH SPDT 2 1/4" ARM	E62-36-HB	CHERRY	S10 & S11
9						
10	2	205034	ROLL PIN	.093 D. x .5 LG	ESNA	
11						
12	4	206206-011	SCREW PAN HD PHILLIPS	2-56 x 3/8		
13						
14	4	207203-031	WASHER LOCK INTERNAL	#2		
15	2	206603-041	SCREW, SOC, SET, CUP POINT	6-32 x 3/16	PREMIER	
16	4	206106-121	SCREW, BINDER HD SLOTTED	10-32 x 3/8		
17						
18	5	205015	TERMINAL PIN .093 DIA. F (REEL)	02-09-1116	MOLEX	
18a	ALT	205016	TERMINAL PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
19	2	205073	CONNECTOR, BLOCK 3 PIN	03-09-1032	MOLEX	J6 & J17

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131008-000 | REV. G

TITLE: COMPLIANCE ARM RETRACTOR ASSY

DWN G BODDY | DATE 1-14-75 | APPROVAL MB | E.C.O. NO. ECR 1026 | DATE 2-10-75 | SHEET 2 OF SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
20	1	210229-200	CLIP, CABLE, BLACK	3303	HEYCO	
21	6"	208415-011	WIRE, STRD, 22AWG, IR, PVC, WHT	7151-1	ALPHA	
22	6"	210461	TUBING SHRINK	HIX-3/32-UL	ICO RALLY	
23	6	210229-523	TY-RAP	TYB-23M	T&B	
24	AR	209990-072	SCREW LOCK	222	LOCTITE CORP	
25						
26						
27	REF	P30-017	ASSY PROCEDURE, SETTING SW		CIPHER	
28	AR	210444	LUBRIPLATE	23-02-S	WALSCO	

Cipher Data Products

PARTS LIST

MODEL 85X & 100X | CODE IDENT. 32274 | PL 131010-001 -002 | REV. G

TITLE: REEL HUB ASSEMBLY

DWN L BROWN | DATE 3-30-76 | APPROVAL 7-20-76 | E.C.O. NO. 1959 1960 | DATE 7-20-76 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -001	QUANTITY -002		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	-		731910-101	BASE, REEL HUB		CIPHER	
1	-	1		731910-102	BASE, REEL HUB		CIPHER	
2	1	1		731910-200	CAP, REEL HUB		CIPHER	
3	1	1		731922-500	LOCK, REEL HUB		CIPHER	
4	1	1		731922-200	ADJUSTABLE SPACER, REEL HUB		CIPHER	
5	1	1		710010-400	COMPRESSION RING		CIPHER	
6								
7	2	2		731013-400	PIN, REEL HUB		CIPHER	
8								
9	1	1		206604-062	SCREW, SOC HD, BTN, BLK	6-32 x 1/4		
10	1	1		206610-072	SCREW, SOC SET, KNRL CUP PT, BLK	6-32 x 5/8		
11	1	1		207604-081	NUT, RADIO PATTERN, HEX	# 6-32		
12								
13								
14	2	2		206612-032	SCREW, SOC HD, CAP, BLK.	6-32 x 3/4		
15	2	2		206604-042	SCREW, SOC HD, SET, BLK.	6-32 x 1/4		
16								
17	AR	AR		209999-031	STP LUBRICANT			
18	AR	AR		209990-075	VIBRA-TITE	VC 3	NY-LOK	
DWG	REF	REF		600103-100	PROCEDURE		CIPHER	

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131012-900 | REV. A

TITLE DOOR STAY ASSY

DWNG BODDY | DATE 11-21-74 | APPROVAL [illegible] | E.C.O. NO. — | DATE 11/25/74 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -1			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			731012-701	ARM - DOOR STAY		CIPHER	
2	1			731012-702	ARM - DOOR STAY		CIPHER	
3	1			731012-800	WASHER - FRICTION		CIPHER	
4								
5								
6								
7								
8	1			210709	RIVET - SEMI TUBULAR	H-100X 5/16	STIMPSON	
9								
10	1			207402-021	WASHER, FLAT	#4		

5043 CDP

Cipher Data Products

PARTS LIST

CODE IDENT. 32274 | PL 131014-000 | REV. E

TITLE: REEL MOTOR ASSEMBLY

DWNG BODDY | DATE 2-5-75 | APPROVAL | E.C.O. NO. ECR 1028 | DATE 2-11-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	799001-900	MOTOR, 24 VDC, PERM. MAG. 4"		CIPHER	
2						
3						
4	1	205073	CONNECTOR BLOCK, 3 PIN	03-09-1032	MOLEX	(J10, J12)
5						
6	2	205015	TERMINAL PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
6a	ALT	205016	TERMINAL PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
7						
8	3	210229-523	TY-RAP	TYB-23M	T & B	
9						
10						

5043 CDP

Cipher Data Products

MODEL 100 X **PARTS LIST**

CODE IDENT. 32274 | PL/31014 -501 -502 | REV. H

TITLE: DUST DOOR ASSEMBLY, PLASTIC

DWNG BODY | DATE 1-9-75 | APPROVAL | E.C.O. NO. 1699 | DATE 3-3-76 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -501	QUANTITY -502		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			731001-301	DUST DOOR, SMOKE		CIPHER	
2		1		731001-302	DUST DOOR, CLEAR		CIPHER	
3								
4	2	2		799003-800	HINGE		CIPHER	
5	7'	7'		211113-SDD	FOAM TAPE, POLY	5A-1/8 x 3/16	ARLON	
6								
7	2	2		206408-062	SCREW, BUTTON HD, SOC, BLK	4-40 x 1/2		
8	2	2		210210	HELI-COIL	1185-04CN 0224	HELI-COIL	
9								
10	2	2		731014-600	PLATE, NUT		CIPHER	
11	2	2		207408-021	WASHER, FLAT, CAD, SM. O.D	#4		
12	4	4		206608-062	SCREW, BUTTON HD SOC BLK	6-32 x 1/2		
13	1	1		731920-900	LATCH		CIPHER	
14	2	2		205061-003	WASHER, FIBER	2167	H.H. SMITH	
15	2	2		205262	PLUG, LOCKING FASTENER	P104F832-04ABK	DELRON	
16	2	2		205263	SLEEVE, LOCKING FASTENER	S104F8-0ABK	DELRON	

Cipher Data Products

MODEL 100 X **PARTS LIST**

CODE IDENT. 32274 | PL 131015-800 | REV. A

TITLE CAPSTAN MOTOR ASSY (INTERCHANGEABLE)

DWNG BODDY | DATE 2-3-75 | APPROVAL | E.C.O. NO. ECA 1000 | DATE 2-19-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
			NOTE: USE EITHER ITEM 1 OR ITEM 2			
			AT ASSEMBLY (INTERCHANGEABLE ASSEMBLIES)			
1	1	131015-001	CAPSTAN MOTOR ASSY		CIPHER	
2	1	131015-003	CAPSTAN MOTOR ASSY		CIPHER	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL131015-001 -002 -003 | REV. H

TITLE: CAPSTAN MOTOR ASSEMBLY
-1 STD ASST
-2 75 IPS OPT
-3 STD ASST

DWNG BODDY | DATE 1-15-75 | APPROVAL JB | E.C.O. NO. ECR 1029 | DATE 2-18-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY 001	002	003	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			799002-400	MOTOR		CIPHER	
2		1		799002-200	MOTOR		CIPHER	
3	2	2		205073	CONNECTOR BLOCK, 3 PIN	03-09-1032	MOLEX	J8, J9
4								
5								
6	5	5		205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
6a	ALT	ALT		205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
7								
8	16	16		210229-523	TY-RAP	TYB-23M	T&B	
9	4"	4"		210417	TUBING, SHRINK	HIX - 3/16 UL	ICO RALLY	
10								
11			1	799007-200	MOTOR		CIPHER	
12								
13			1	131014-700	TACH HARNESS ASSY		CIPHER	
14			1	131014-800	MOTOR HARNESS ASSY		CIPHER	

5043 CDP

Cipher Data Products

MODEL 100X PARTS LIST

CODE IDENT. 32274 | PL 131014-700 | REV. C

TITLE: TACH HARNESS ASSY

DWN RRM | DATE 11-22-74 | APPROVAL -/bw | E.C.O. NO. 1311 | DATE 15-6-74 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	27"	208500-040	WIRE, JAC, TWIST SHLD 22GA	2401	ALPHA	
2	1	205073	CONNECTOR	03-09-1032	MOLEX	J8
3	3	205015	TERMINAL .093DIA CHAIN	02-09-1116	MOLEX	
3A	X	205016	TERMINAL .093DIA LOOSE	02-09-1118	MOLEX	
4	4"	210417	TUBING, SHRINK 3/16 I.D.	HIX-3/16"UL	ICO RALLY	
5	1¼"	209100-022	PVC TUBING, 22 AWG	PVC-105/22	ALPHA	
6	2	210555-022	TERMINAL, 18-22 GA	S09624N-T2	HOLLINGSWORTH	
7						

* ALTERNATE PART

5043 CMR

Cipher Data Products

MODEL 100 X **PARTS LIST**

CODE IDENT. 32274 | PL131014-800 | REV. B

TITLE: MOTOR HARNESS ASSY | DWN: RRM | DATE: 11-22-74 | APPROVAL: [signature] | E.C.R. NO. 1091 | DATE 12-31-74 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	205073	CONNECTOR	03-09-1032	MOLEX	J9
2	2	205015	TERMINAL, .093 DIA, CHAIN	02-09-1116	MOLEX	
2A	*	205016	TERMINAL, .093 DIA, LOOSE	02-09-1118	MOLEX	
3	29"	208405-013	WIRE, STRANDED, I.R.PVC, 18AWG, RED	7155-3	ALPHA	
4	29"	208405-012	WIRE, STRANDED, I.R.PVC, 18AWG, BLK	7155-2	ALPHA	
5	2	210555-022	TERMINAL 18-22 GA	S09624N-T2	HOLLINGSWORTH	
6	2"	210417	TUBING, SHRINK 3/16 I.D.	HIX-3/16-4L	ICO RALLY	

* ALTERNATE PART

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL131016-400 | REV. A

TITLE: PIN ASSEMBLY - FILE PROTECT

DWN: [illegible] DATE: 1-3-75 | APPROVAL: [illegible] | E.C.O. NO. 1048 | DATE 2-14-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731006-200	PIN		CIPHER	
2						
3						
4						
5						
6	2	210200	PUSH RING	5105-9	WALDES TRUARC	
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274

PL 131024-001 -002

REV. B

TITLE: MOUNTING BRACKET ASSY

DWNG BOODY

DATE 2-6-75

APPROVAL

E.C.O. NO. ECR 1078

DATE 2-15-75

SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -001	QUANTITY -002		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			731015-401	MOUNTING BRACKET, LOWER		CIPHER	
2	1	1		731024-100	GUIDE - CONT/SERVO		CIPHER	
3		1		731015-402	MOUNTING BRACKET UPPER		CIPHER	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274

PL 131028-000

REV. A

TITLE: PUSH BAR ASSEMBLY - ARM RETRACT

DWNG BODDY

DATE 1-16-75

APPROVAL

E.C.O. NO. per 1030

DATE 2-11-75

SHEET 1 OF 1 SHEETS

ITEM	QUANTITY			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			731008-500	PUSH BAR - ARM RETRACT		CIPHER	
2								
3	2			731007-900	ROLLER PIN, ARM RETRACTOR		CIPHER	
4								
5	2			210041-045	SPACER, NYLON	9255-N-194	AMATOM	
6								
7	1			731008-800	PUSH PIN, ARM RETRACTOR		CIPHER	
8								
9	2			206604-011	SCREW, PAN HD, PHIL	6-32 x 1/4		
10	3			206605-011	SCREW, PAN HD, PHIL	6-32 x 5/16		
11								
12	4			207605-021	WASHER, FLAT	#6		
13	5			207602-011	WASHER, SPLIT LOCK	#6		

5043 CQ

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131037-400

TITLE COMPLIANCE ARM BUMPER ASSEMBLY

SH 1 OF 1

REV A

DWN K. MILLER	DATE 4/76	NEXT ASSY	LTR	DESCRIPTION	DWN	DATE	APP	DATE
CHK								
N/C								
APP								
APP								
PRODUCTION RELEASE								

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
1	1	731037-300	BUMPER BLOCK - MACHINING		CIPHER	
2						
3						
4	1	731037-100	BUMPER PAD		CIPHER	
5						
6						
7						
8	1	206412-011	SCREW, PAN HD, PHIL, CAD.	4-40 x 3/4		
9						
10						
11	1	207403-011	WASHER, SPLIT LOCK, CAD.	# 4		
12						
13						
14						
15						
16						
17						

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131038-001

TITLE: HEAD ASSEMBLY - 9 TRACK

SH 1 OF 1

REV D

		DATE
DWN	K. MILLER	10-17-75
CHK	[illegible]	[illegible]
N/C	M.D. [illegible]	[illegible]
APP		
APP		

PRODUCTION RELEASE

[illegible] 10-22-75

NEXT ASSY	LTR	DESCRIPTION	DWN	DATE	APP	DATE
131000-007	A	PRODUCTION RELEASE	K.M.	10/22/75	[illegible]	10/22/75
	B	ECO 1486	H J	10/29/75	[illegible]	10/29/75
	C	ECO 1946	[illegible]	7-21-76	[illegible]	7/21/76
	D	ECO 2029	OS	9-2-76	[illegible]	9-13-76

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
1	1	799008-301	RECORD HEAD, 9TK, SINGLE GAP		CIPHER	
2						
3	1	710006-200	HEAD SHIM		CIPHER	
4	1	713008-600	HEAD MOUNT		CIPHER	
5	1	713003-600	SCREW, AZIMUTH ADJUST		CIPHER	
6	1	710500-501	CLAMP - CONNECTOR (NATURAL)		CIPHER	
7	1	710500-503	CLAMP - CONNECTOR (WHT)		CIPHER	
8						
9						
10	29	205027	TERMINAL, RECEPT, CRIMP	85967-1	AMP	
11	1	205120	CONNECTOR HOUSING 30 PIN	1-86262-1	AMP	
12						
13	16"	209100-302	TUBING, PVC, BLACK	PVC-105-5/16-2	ALPHA	(UL SURFACE MARKING REQUIRED)
14						
15	AR	209990-071	SUPERBONDER	04E	LOCTITE CORP	
16	2	206404-021	SCREW, FLAT HD, PHIL 100°, CAD	4-40 x1/4		
17						
18	AR	209990-072	LOCTITE, SCREWLOCK	222	LOCTITE CORP	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131100-000

TITLE OPTION LIST - MODEL 100X

SH 1 OF 1

REV K

DWN G BODDY	DATE 2-25-75	NEXT ASSY	LTR	DESCRIPTION	DWN	DATE	APP	DATE
CHK			K	ECO 1979 (RE-DRN)	MH	8/16/76	[illegible]	8-17-76
N/C								
APP								
APP								
PRODUCTION RELEASE								
C E B		P/L ONLY						

ITEM	QTY	CIPHER NO.	DESCRIPTION	VENDOR NO.	VENDOR	REFERENCE DESIG.
			OPTIONS AVAILABLE FOR MODEL 100X			
1		131522-000	SUBSTITUTION P/L 150 IPS		CIPHER	
2		131001-100	HINGE BLOCK ASSY RH HINGE		CIPHER	
3		131001-200	HDWR PKG, R.H. HINGING		CIPHER	
4		131002-000	SUBSTITUTION P/L R.H. HINGING		CIPHER	
5		131003-000	DUST DOOR ASSY		CIPHER	
6		731001-900	FILLER STRIP		CIPHER	
7		131022-500	SUBSTITUTION P/L, FIXED COVER		CIPHER	
8		131019-100	100X MTG EXTENDER KIT		CIPHER	
9		131009-001	DUST DOOR INTERLOCK ASSY		CIPHER	
10		131009-002	DUST DOOR INTERLOCK ASSY WITH/ SERVICE OVERRIDE SWITCH		CIPHER	

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131505-000 | REV. F

TITLE: CABLE ASSY - POWER BOARD TO CONTROL/SERVO BOARD, J15 TO J14

DWNG B0004 | DATE 1-20-75 | APPROVAL MB | E.C.O. NO. ECR 1037 | DATE 2-12-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	2	205071	CONNECTOR PLUG 15 PIN	03-09-1151	MOLEX	J14, J15
2						
3	30	205015	TERMINAL .093 DIA F (REEL)	02-09-1116	MOLEX	
3a	ALT	205016	TERMINAL .093 DIA F (LOOSE)	02-09-1118	MOLEX	
4						
5	24'	208405-011	WIRE, STRD, 18AWG, IR, PVC, WHT	7155-1	ALPHA	
6						
7	6	210229-523	TY-RAP	TYB-23M	T&B	

5043 C

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131506-000 | REV. F

TITLE CABLE ASSY - READ-WRITE BOARD TO CONTROL SERVO BOARD J7 TO J20

DWNG BODDY | DATE 1-20-75 | APPROVAL | E.C.O. NO. ECR 1038 | DATE 2-12-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	2	205069	CONNECTOR PLUG (12 PIN)	03-09-1122	MOLEX	J7, J20
2						
3	24	205015	TERMINAL .093 DIA F (REEL)	02-09-1116	MOLEX	
3a	ALT	205016	TERMINAL .093 DIA F (LOOSE)	02-09-1118	MOLEX	
4						
5	14'	208405-011	WIRE, STRD, 18AWG, IR, PVC, WHT	7155-1	ALPHA	
6						
7	5	210229-523	TY-RAP	TYB-23M	T & B	

5043 CDP

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131507-001/002/003 | REV. F

TITLE: TRANSFORMER ASSY (115V) | DWN G BODDY | DATE 1-21-75 | APPROVAL HB | E.C.O. NO. ECR 1039 | DATE 2-13-75 | SHEET 1 OF 3 SHEETS

ITEM	QUANTITY 001	002	003	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	731507-100	TRANSFORMER		CIPHER	
2								
3								
4	1	1	1	205071	CONNECTOR RECEPT. 15 PIN	03-09-1151	MOLEX	J16
5	1	1	1	205065	CONNECTOR PLUG 6 PIN	03-09-2062	MOLEX	P19
6	15	15	15	205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
6a	ALT	ALT	ALT	205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
7	6	6	6	205014	TERMINAL, PIN .093 DIA M (REEL)	02-09-2116	MOLEX	
7a	ALT	ALT	ALT	210531	TERMINAL, PIN .093 DIA M (LOOSE)	02-09-2118	MOLEX	
8								
9	2'	2'	2'	210417	TUBING, SHRINK	HIX-3/16UL	ICO/RALLY	

5043 CDP

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131507-004/005/006 | REV. F

TITLE: TRANSFORMER ASSY (115V) | DWN G BODDY | DATE 1-21-75 | APPROVAL | E.C.O. NO. ECR 1039 | DATE 2-13-75 | SHEET 2 OF SHEETS

ITEM	QUANTITY 004	005	006	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	731507-100	TRANSFORMER		CIPHER	
2								
3								
4	1	1	1	205071	CONNECTOR RECEPT. 15 PIN	03-09-1151	MOLEX	J16
5	1	1	1	205065	CONNECTOR PLUG 6 PIN	03-09-2062	MOLEX	P19
6	15	15	15	205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
6a	ALT	ALT	ALT	205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
7	6	6	6	205014	TERMINAL, PIN .093 DIA M (REEL)	02-09-2116	MOLEX	
7a	ALT	ALT	ALT	210531	TERMINAL, PIN .093 DIA M (LOOSE)	02-09-2118	MOLEX	
8								
9	2'	2'	2'	210417	TUBING, SHRINK	HIX-3/16UL	ICO/RALLY	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274

PL 131507-007-008

REV. F

TITLE: TRANSFORMER ASSY (115V)

DWN G BODDY

DATE 1-21-75

APPROVAL JB

E.C.O. NO. ECR 1039

DATE 2-13-75

SHEET 3 OF SHEETS

ITEM	QUANTITY 007	QUANTITY 008		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731507-100	TRANSFORMER		CIPHER	
2								
3								
4	1	1		205071	CONNECTOR RECEPT. 15 PIN	03-09-1151	MOLEX	J16
5	1	1		205065	CONNECTOR PLUG 6 PIN	03-09-2062	MOLEX	P19
6	15	15		205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
6a	ALT	ALT		205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
7	6	6		205014	TERMINAL, PIN .093 DIA M (REEL)	02-09-2116	MOLEX	
7a	ALT	ALT		210531	TERMINAL, PIN .093 DIA M (LOOSE)	02-09-2118	MOLEX	
8								
9	2'	2'		210417	TUBING, SHRINK	HIX-3/16UL	ICO/RALLY	

5043 CD

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131508-001 | REV. D

TITLE: POWER & FILTER BRACKET ASSY

DWNG BODDY | DATE 1-17-75 | APPROVAL | E.C.O. NO. 1546 | DATE 2-12-75 | SHEET 1 OF 2 SHEETS

ITEM	QUANTITY 001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1			731508-101	BRACKET		CIPHER	
2	1			731024-200	LABEL		CIPHER	
3	1			799005-101	FILTER-EMI 5 AMP		CIPHER	FL1
4	1			205074	CONNECTOR, RECEPT. 3 PIN	03-09-1031	MOLEX	J18
5	1			205066	CONNECTOR, RECEPT. 6 PIN	03-09-1061	MOLEX	J19
6	9			205015	TERMINAL PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
6a	ALT			205016	TERMINAL PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
7	1			211152-062	FUSE, SLO-BLO, 6.25 A	3136.25	LITTELFUSE	F1
8	1			210227	FUSEHOLDER	342012	LITTELFUSE	XF1
9	1			210208	POWER CORD	17405	BELDEN	
10	1			211026	STRAIN RELIEF	SR-6P3-4	HEYCO	
11	1			206609-031	SCREW, SOC HD CAP, STL, CAD	6-32 x 9/16		
12	5			206604-031	SCREW, SOC HD CAP, STL, CAD	6-32 x 1/4		
13	3			131910-700	STANDOFF, HINGED		CIPHER	
14								
15	3			210555-032	TERMINAL, FULL INSUL	S05300F	HOLLINGSWORTH	
16	2			210555-025	TERMINAL, RING	R1881S	HOLLINGSWORTH	E1
17	2			207605-021	WASHER, FLAT	#6		
18	1			202004	DIODE RECTIFIER	MDA-980-1	MOTOROLA	CR2
19								

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131508-001 | REV. D

TITLE: POWER & FILTER BRACKET ASSY

DWN G BODDY | DATE 1-17-75 | APPROVAL | E.C.O. NO. 1546 | DATE 2-12-75 | SHEET 2 OF SHEETS

ITEM	QUANTITY 001			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
20	16"			208405-011	WIRE, STRD, 18AWG, IR, PVC, WHT	7155-1	ALPHA	
21	23"			208405-012	WIRE, STRD, 18AWG, IR, PVC, BLK	7155-2	ALPHA	
22	1			131013-300	JUMPER ASSY		CIPHER	
23	1			206605-011	SCREW, PAN HD, PHIL, CAD	6-32 x 5/16		
24	1			206608-011	SCREW, PAN HD, PHIL, CAD	6-32 x 1/2		
25	8			207602-011	WASHER, SPLIT LOCK	#6		
26	1			207608-021	WASHER, FLAT, SMALL PATTERN	#6		
27	2"			208905-014	WIRE, STRD, 18 AWG, IR, PVC, GRN	7155-4	ALPHA	
28	REF			331530-300	SCHEMATIC, PWB ASST, PWR SUP		CIPHER	
29								
30	6"			210417	TUBING, SHRINK	HIX - 3/16 UL	ICO/RALLY	

Cipher Data Products

MODEL 100X PARTS LIST

CODE IDENT. 32274 | PL 131013-300 | REV. B

TITLE: JUMPER ASSEMBLY

DWN G BODDY | DATE 2-4-75 | APPROVAL JB | E.C.O. NO. ECR 1101 | DATE 2-17-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	210575	PIN, RECEPTACLE (LOOSE)	61513-1	AMP	
1a	ALT	205023	PIN, RECEPTACLE (REEL)	350189-1	AMP	
2						
3	1	210555-025	TERMINAL LUG	R1881S	HOLLINGSWORTH	
4						
5	4½	208415-012	WIRE, STRD 22AWG, IR. PVC BLK	7151-2	ALPHA	

5063 CDP

Cipher Data Products

MODEL 100 X

PARTS LIST

CODE IDENT. 32274

PL131509 - 001 - 002 - 003

REV. A

TITLE: TRANSFORMER ASSY - 100X, 45 IPS

DWN: J. Johnson

DATE: 8-22-75

APPROVAL: A. Cedrone

E.C.O. NO.

DATE

SHEET 1 OF 3 SHEETS

ITEM	QUANTITY 1	2	3	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	799008-200	TRANSFORMER		CIPHER	
2								
3								
4	1	1	1	205071	CONNECTOR RECEPT. 15 PIN	03-09-1151	MOLEX	J16
5	1	1	1	205065	CONNECTOR PLUG 6 PIN	03-09-2062		P19
6	15	15	15	205015	TERM. PIN .093 DIA F (REEL)	02-09-1116		
6a	ALT	ALT	ALT	205016	TERM. PIN .093 DIA F (LOOSE)	02-09-1118		
7	6	6	6	205014	TERM. PIN .093 DIA M (REEL)	02-09-2116		
7a	ALT	ALT	ALT	210531	TERM. PIN .093 DIA M (LOOSE)	02-09-2118	MOLEX	
8								
9	2'	2'	2'	210417	TUBING, SHRINK	HIX - 3/16 UL	ICO / RALLY	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274

PL 131509 - 004 - 005 - 006

REV. A

TITLE: TRANSFORMER ASSY - 100X, 45 IPS

DWN J. Johnson DATE 8-22-75

APPROVAL A.C. Wood

E.C.O. NO.

DATE

SHEET 2 OF 3 SHEETS

ITEM	QUANTITY 4	5	6	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	799008-200	TRANSFORMER		CIPHER	
2								
3								
4	1	1	1	205071	CONNECT RECEPT. 15 PIN	03-09-1151	MOLEX	J16
5	1	1	1	205065	CONNECT PLUG 6 PIN	03-09-2062		P19
6	15	15	15	205015	TERM, PIN .093 DIA F (REEL)	02-09-1116		
6a	ALT	ALT	ALT	205016	TERM, PIN .093 DIA F (LOOSE)	02-09-1118		
7	6	6	6	205014	TERM, PIN .093 DIA M (REEL)	02-09-2116		
7a	ALT	ALT	ALT	210531	TERM, PIN .093 DIA M (LOOSE)	02-09-2118	MOLEX	
8								
9	2'	2'	2'	210417	TUBING, SHRINK	HIX-3/16 UL	ICO/RALLY	

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131509-007 008 | REV. A

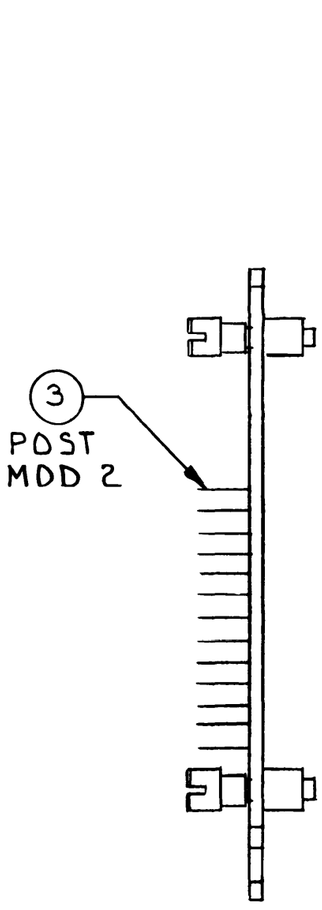
TITLE: TRANSFORMER ASSY - 100X, 45 IPS

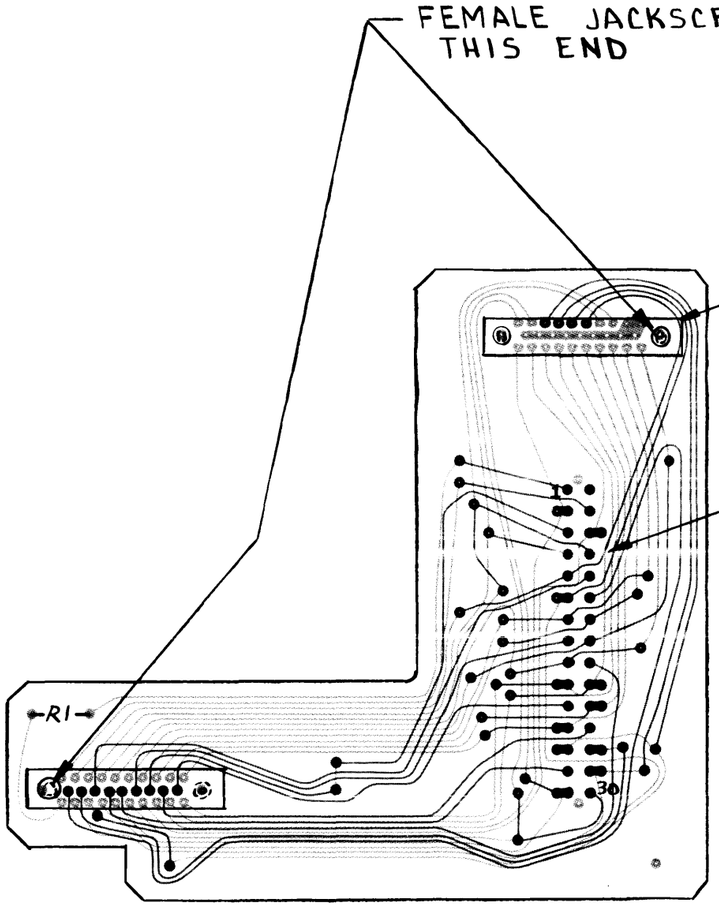
DWN: J. Johnson | DATE: 8-22-75 | APPROVAL: A.C. Wood | E.C.O. NO. | DATE | SHEET 3 OF 3 SHEETS

ITEM	QUANTITY 7	QUANTITY 8		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		79900B-200	TRANSFORMER		CIPHER	
2								
3								
4	1	1		205071	CONNECTOR RECEPT 15 PIN	03-09-1151	MOLEX	J16
5	1	1		205065	CONNECTOR PLUG 6 PIN	03-09-2062		P19
6	15	15		205015	TERM. PIN .093 DIA F REEL	02-09-1116		
6a	ALT	ALT		205016	TERM PIN .093 DIA F LOOSE	02-09-1118		
7	6	6		205019	TERM PIN .093 DIA M REEL	02-09-2116		
7a	ALT	ALT		210531	TERM PIN .093 DIA M LOOSE	02-09-2118	MOLEX	
8								
9	2'	2'		210417	TUBING SHRINK	HIX-3/16 UL	ICO/RALLY	

5043 CDP

DATE	SYM	REVISION RECORD	DR.	CK.
4/17/74	A	REVISED	KBO	
3/75	B	ECR 1046	HJ	
10-8-75	C	ECO 1428	HJ	HJ
11-19-75	D	ECO 1537	HJ	HJ





RELEASED
2-18-75

TOLERANCES (EXCEPT AS NOTED)	Cipher Data Products SAN DIEGO CALIF.		
DECIMAL	MODEL 100X	SCALE FULL	DRAWN BY SYD APPROVED BY
FRACTIONAL	TITLE ADAPTER ASSY- SINGLE GAP 9 TK		
ANGULAR	DATE	DRAWING NUMBER 131540-000	REV. D.

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131540-000 | REV. D

TITLE: ADAPTOR ASSY - SINGLE GAP 9TK

DWN G BODDY | DATE 1-21-75 | APPROVAL | E.C.O. NO. 1537 | DATE 10-8-15 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731540-100	PWB ADAPTOR		CIPHER	
2	2	205061-500	CONNECTOR	SRE-29-SD4JT	AMPHENOL	
3	30	205030-600	POST, MOD 2 (REEL)	86091-2	AMP	
4						
5	1	200071-680	RES, FIX COMP, 680HM, 1/4W, 5%	RCR07G680JM	MIL-R-39008	R1
6						

5043 CDP

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131622-000 | REV. G

TITLE: EOT / BOT ASSY | DWNG BODDY | DATE 1-21-75 | APPROVAL OK | E.C.O. NO. 1978 | DATE 8-16-76 | SHEET 1 OF 2 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731622-100	PWB EOT/BOT		CIPHER	
2						
3	1	731012-100	LIGHT SHIELD, TAPE SENSOR		CIPHER	
4	2	211131	PHOTO TRANSISTOR	TIL 78	T. I.	
5	1	210156	CAP, LAMP	CBP	SHELLY ASSOC	
6	1	210163-500	LAMP "AGED SELECTED"	OL715AS15	OSHINO LAMP	
7	2	731017-800	BRACKET, EOT/BOT MTG		CIPHER	
8	1	210156-500	BASE, LAMP	BEC	SHELLY ASSOC	
9	1	210229-523	TY-RAP	TY-B-23M	T & B	
10						
11	2	206404-011	SCREW, PAN HD PHIL CAD	4-40 x 1/4		
12	2	207403-011	WASHER LOCK SPLIT CAD	#4		
13	2	207402-021	WASHER, FLAT	#4		
14	12"	208415-011	WIRE, STRD 22AWG IR PVC WHT	7151-1	ALPHA	
15	4"	210461	TUBING, SHRINK	HIX-3/32-UL	ICO RALLY	
16	4"	210413	TUBING, SHRINK	HIX-1/4-UL	ICO RALLY	
17						
18	4		RES, FIX COMP, (*SELECTED) 1/4W, 5%	RCR07		R1, R2, R3, R4
		*	TO BE DETERMINED AT TIME OF ASSY & TESTING			

5043 CDP

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131622-000 | REV. G

TITLE: EOT/BOT ASSY | DWNG BODDY | DATE 1-21-75 | APPROVAL | E.C.O. NO. 1978 | DATE 7-29-76 | SHEET 2 OF 2 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
19	5	205015	TERMINAL, PIN .093 DIA F (REEL)	02-09-1116	MOLEX	
19a	ALT	205016	TERMINAL, PIN .093 DIA F (LOOSE)	02-09-1118	MOLEX	
20	1	205076	CONNECTOR BLOCK 5 PIN	03-09-1052	MOLEX	J5
21	4"	208500-298	WIRE, SOLID 22 AWG	298	ALPHA	
22	AR	209990-084	CEMENT, CONTACT	ELMER'S	BORDEN'S	
23						
24	REF	600010-024	ASSY PROCEDURE EOT/BOT		CIPHER	
DWG	REF	600103-800	ADJUSTMENT PROCEDURE		CIPHER	

5043 CD

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131910-700 | REV. A

TITLE: STANDOFF ASST - HINGED

DWN G BODDY | DATE 1-20-75 | APPROVAL HB | E.C.O. NO. ECR 1033 | DATE 2-12-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	731910-900	HINGE - STANDOFF CLEVIS		CIPHER	
2	1	731910-800	HINGE - STANDOFF SLOTTED		CIPHER	
3	1	210569	GROOV-PIN	GP24-062x250-14	GROOV-PIN	
3a	ALT	205008-001	ROLL PIN	52-012-062-0250	ESNA	

5043 CDP

Cipher Data Products

PARTS LIST

CODE IDENT. 32274 | PL 131920-300 | REV. A

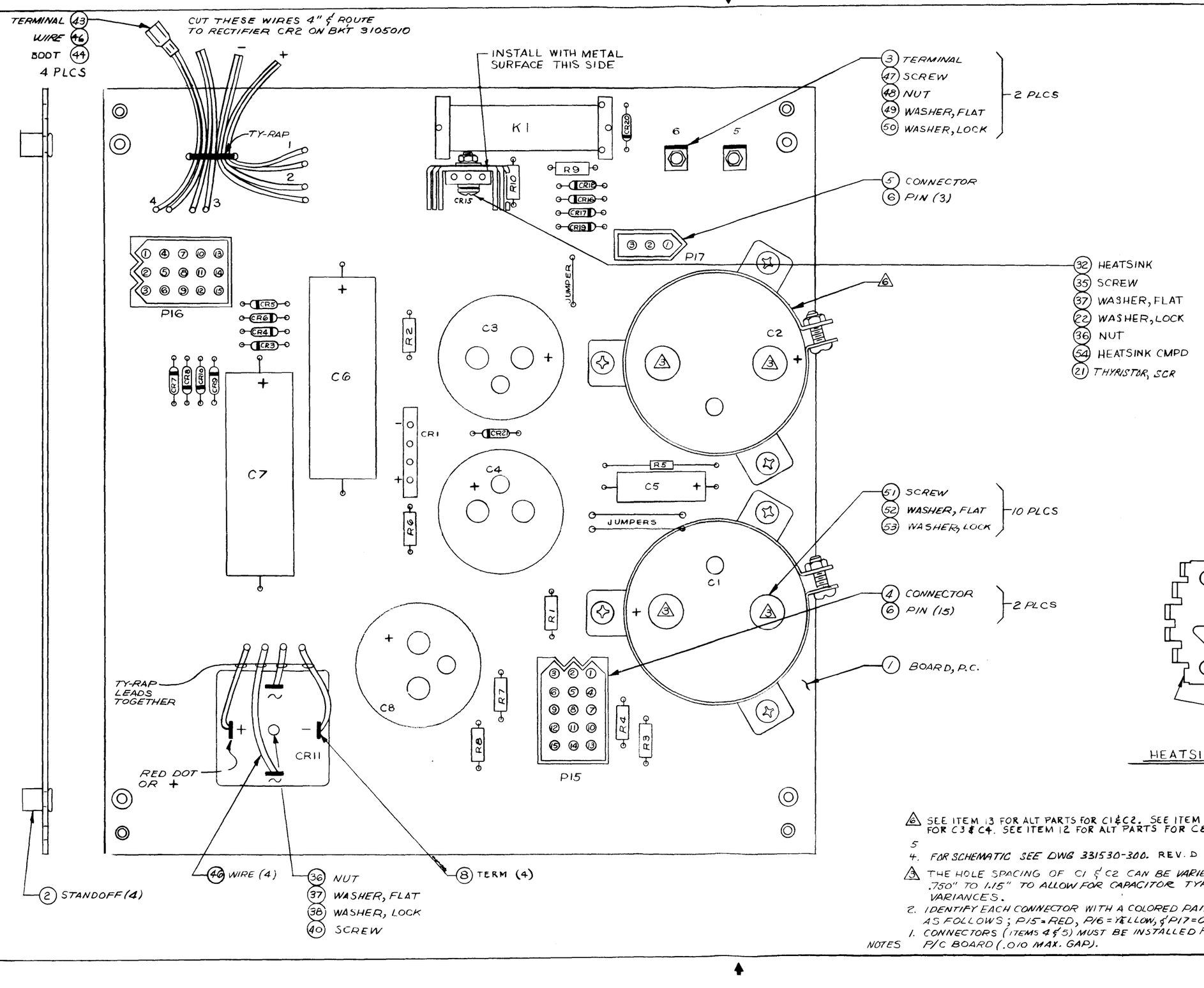
TITLE: LATCH ASSY-MODIFIED

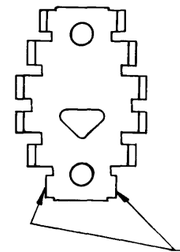
DWN JJ Johnson | DATE 2-13-75 | APPROVAL MP | E.C.O. NO. ECR 1094 1050 | DATE 2-13-75 | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	210123	FASTENER, LATCH, GRIP, ADJ	43-1-1-0	SOUTHCO	
2	1	731910-600	PAWL		CIPHER	

5043 CDP

DATE	SYM	REVISION RECORD	DR'N	CK'D
9/4/72	E	CHG'D PER ECR # 277	J-C	
10/6/72	F	ECR # 361	JR	
11/3/72	G	ECR # 389	JR	
4/27/73	H	ECR 576	KM	CS
7/25/73	J	ECR 937, 957	HJ	HJ
2-12-75	K	ECR 1045, 1097	HJ	HJ
5/5/75	L	ECR 1140	GB	GB
5/15/75	M	ECR 1057	GB	GB
9-18-75	N	ECR 1204	HJ	HJ
4/16/76	P	ECO 1369	HJ	HJ
2-24-76	R	ECO 1963	HJ	HJ





HEATSINK MODIFICATION (FOR CR15)

NOTES

6. SEE ITEM 13 FOR ALT PARTS FOR C1 & C2. SEE ITEM 11 FOR ALT PARTS FOR C3 & C4. SEE ITEM 12 FOR ALT PARTS FOR C8.
5.
4. FOR SCHEMATIC SEE DWG 331530-300. REV. D
3. THE HOLE SPACING OF C1 & C2 CAN BE VARIED FROM .750" TO 1.15" TO ALLOW FOR CAPACITOR TYPE VARIANCES.
2. IDENTIFY EACH CONNECTOR WITH A COLORED PAINT DOT AS FOLLOWS; P15 = RED, P16 = YELLOW, & P17 = ORANGE.
1. CONNECTORS (ITEMS 4 & 5) MUST BE INSTALLED FLUSH TO P/C BOARD (.010 MAX. GAP).

RELEASED

Cipher SAN DIEGO CALIF		CODE IDENT NO. 31278	
MODEL 100X	SCALE 2X	DRAWN BY J-C	
		APPROVED BY CEB	
TITLE: PWB ASSY-POWER SUPPLY			
DATE 6AUG73	DRAWING NUMBER 131530-000, -001		R

131530-000

DATE	SYM	REVISION + ECORD	DR	CK
1/14	A	REL FOR PROD	KM	
2/19	B	ECR 1141	CB	
3/14	C	ECR 1033	CB	
5/14	D	ECO 1298	PL	
1/23	E	ECO 2033	PL	KM

POWER SUPPLY ASSY 131530-000

POWER SW LOCATED ON FRONT PANEL

P18 3 2 1
J18 3 2 1

BLK F1 BLK
GRN FL1
WHT

POWER & FILTER BKT ASSY 131508-000

J19 P19
BLK 2 2
BLK 3 3
G G
WHT 4 4
WHT 5 5

115 V AC CONNECTION SHOWN, SEE VOLTAGE SELECT; TABLE A

T1

J16 P16

9 — 16.2 VRMS 2.3 ADC — 10 10
10 — 11.3 VRMS 8 ADC — 4 4 / 5 5
11 — 11.3 VRMS 8 ADC — 1 1 / 2 2
12 — 16.2 VRMS 2.3 ADC — 7 7 / 8 8
13 — 13 13
14 — 18 VRMS 0.5 ADC — 15 15
15 — 14 14
16 — 18 VRMS 0.5 ADC — 9 9
17 — 12 12
18 — 8.8 VRMS 5 ADC — 3 3
19 — G G

CR1 MDA970-2 — R1 1.8K 1/2 W — C4 ⚠ 3000 μF 40V ± 20%
−36V
R2 1.8K 1/2 W
CR2 MDA980-1 — R3 1.8K 1/2W — C3 ⚠ 3000 μF 40V ± 20% — +14V
C2 ⚠ 27000 μF 25V, ± 20% — R4 1.8K 1/2W — C1 ⚠ 27000 μF 25V, ± 20% — −14V
±14V RTN
R5 12K 1/4W ± 5% — C5 5 μF 50V ± 20%
CR21 IN4001

CR3 CR4 CR5 CR6 IN4001 — C6 1000 μF 25V, ± 20% — R6 10K 1/2W
±15V RTN

CR7 CR8 CR9 CR10 IN4001 — C7 1000 μF 25V, ± 20% — R7 10K 1/2W

CR11 MDA980-1 — C8 ⚠ 26000 μF 15V, ± 20% — R8 1.8K 1/2W

CR15 2N4443 — R9 1.8K 1/2W
CR18 CR16 — K1 — CR20 IN4001 — +14V
CR19 IN4004 TYP 4 PLS CR17
R10 82Ω 1/2W

BLK → 6
WHT → 5

P15 J15 REF
2 2
4 4
10 10
7 7
13 13
14 14
1 1
3 3
5 5
6 6
9 9
8 8
12 12
15 15
11 11
P17 J17 REF
3 3
1 1
2 2

POWER SUPPLY ASSY 131530-000

TABLE A		
VOLTAGE SELECT		
INPUT VOLTAGE	INPUT LINE	ON XMFR CONNECT
105	3 & 4	4-8 & 3-7
115	2 & 4	4-8 & 2-6
125	1 & 4	4-8 & 1-5
210	3 & 8	4-7
220	2 & 8	4-7
230	2 & 8	4-6
240	1 & 8	4-6
250	1 & 8	4-5

NOTES:
⚠ SEE PARTS LIST FOR ALLOWABLE COMPONENT VALUE VARIATION.

RELEASED 2-26-75

TOLERANCES (EXCEPT AS NOTED)	Cipher Data Products SAN DIEGO CALIF.		CODE IDENT NO. 32674
DECIMAL —	MODEL 100 X	SCALE NONE	DRAWN BY
FRACTIONAL —	TITLE SCHEMATIC - PWB ASSY POWER SUPPLY		APPROVED BY
ANGULAR —	DATE 1-22-75	DRAWING NUMBER 331530-300	E

33/530-300

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131530-000-001 | REV. R

TITLE: PWB ASSEMBLY - POWER SUPPLY

DWNG BODDY | DATE 1-16-75 | APPROVAL OK | E.C.O. NO. 1963 | DATE 7-29-76 | SHEET 1 OF 3 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		131530-100	PWB, POWER SUPPLY		CIPHER	
2	4	4		210032-236	STANDOFF, THREADED	1546 B	KEYSTONE	
3	2			210114	TERMINAL (KWIK DISCONNECT)	1256	KEYSTONE	
3		2		210578-003	TERMINAL	KT48	KULKA	
4	2	2		205070	CONNECTOR, RECPT. (15PIN)	03-09-2151	MOLEX	P15, 16
5	1	1		205072	CONNECTOR RECPT (3 PIN)	03-09-2032	MOLEX	P17
6	33	33		205012	TERMINAL PIN MALE .093 DIA	02-09-2134	MOLEX	
8	4	4		210555-032	TERM. SLIP ON, FEMALE	SD53006	HOLLINGSWORTH	
9	1	1		201170-500	CAP. ELECT, 5 MFD, 50V	30D505G050BB2	SPRAGUE	C5
10	2	2		201173-100	CAP. ELECT, 1000 MFD, 25V	39D108G025GL4	SPRAGUE	C6, 7
11	2	2		799600-100	CAP. ELECT, 3,000 MFD 40V (NOM)		CIPHER	C3, 4
12	1	1		799600-200	CAP. ELECT, 26,000 MFD, 15V (NOM)		CIPHER	C8
13	2	2		799600-300	CAP. ELECT, 27,000 MFD, 25V (NOM)		CIPHER	C1, 2
14								
15	10	10		202009	DIODE, RECTIFIER	1N4001	MOTOROLA	CR3-10, 20, 21
16	4	4		202011	DIODE, RECTIFIER	1N4004	MOTOROLA	CR16-19
17	1	1		202004	RECTIFIER, BRIDGE	MDA980-1	MOTOROLA	CR11
18	1	1		202003	RECTIFIER, BRIDGE	MDA970-2	MOTOROLA	CR1
19								
20								

Cipher Data Products	MODEL 100X **PARTS LIST**	CODE IDENT. 32274	PL 131530-000-001	REV. R

TITLE	DWNG BODDY	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - POWER SUPPLY	DATE 1-16-75	CAL	1963	7-29-76	2 OF 3 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
21	1	1		204021	THYRISTOR, SCR	2N4443	MOTOROLA	CR15
22	1	1		210260-001	WASHER, SPRING	WD19522	MOTOROLA	
23	1	1		210196	RELAY	JRA1012	POTTER & BRUMFIELD	K1
24								
25								
26								
27	1	1		200081-820	RES., FIX COMP, 82 OHMS, 1/2W, 5%	RCR20		R10
28	6	6		200083-180	RES., FIX COMP, 1.8K, 1/2W 5%	RCR20		R1,2,3,4,8,9
29	2	2		200084-100	RES., FIX COMP, 10K, 1/2W 5%	RCR20		R6, 7
30	1	1		200074-120	RES., FIX COMP, 12K, 1/4W 5%	RCR07		R5
31								
32	1	1		210144	HEATSINK	LAD66-A-2CB	IERC	
33								
34								
35	1	1		206606-011	SCREW, PAN HD PHIL CAD	6-32 x 3/8		
36	1	1		207604-081	NUT, HEX, RADIO PAT, CAD	6-32		
37	2	2		207605-021	WASHER, FLAT, CAD	#6		
38	1	1		207602-011	WASHER, SPLIT LOCK, CAD	#6		
39								
40	1	1		206610-031	SCREW, SOC HD, CAP, CAD	6-32 x 5/8		

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131530-000-001 | REV. R

TITLE: PWB ASSEMBLY - POWER

DWN G BODDY | DATE 1-16-75 | APPROVAL | E.C.O. NO. | DATE 7-20-76 | SHEET 3 OF 3 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
41								
42								
43	4	4		210115	TERMINAL-QUICK DISCONNECT)	4470	KEYSTONE	
44	4	4		210077	BOOT PLASTIC (YELLOW)	4474	KEYSTONE	
45	6"	6"		208500-297	WIRE, SOLID, BUSS, 20 GA	297	ALPHA	
46	5'	5'		208405-011	WIRE, STRD, 18GA, PVC, WHT, UL	7155-1	ALPHA	
47	2	2		206406-011	SCREW, PAN HD, PHIL - CAD	4-40 x 3/8		
48	2	2		207406-081	NUT, HEX, RADIO PAT. CAD	4-40		
49	2	2		207402-021	WASHER, FLAT CAD	#4		
50	2	2		207403-011	WASHER, SPLIT LOCK CAD	#4		
51	10	10		206108-011	SCREW, PAN HD PHIL CAD	10-32 x 1/2		
52	10	10		207104-021	WASHER, FLAT	#10		
53	10	10		207102-011	WASHER, SPLIT LOCK	#10		
54	AR	AR		209993-120	HEATSINK COMPOUND	340	DOW	
55								

5043 CDP

NOTES	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION
1 2 3	201173-290	CAP. ELECT, 2900MFD, 40V	91M40HA292L	STM
1 2	201173-280	CAP. ELECT, 2800MFD, 75V	28-75	COLLINS
1 2	201173-360	CAP. ELECT, 3600MFD, 40V	91C40HB362L	STM
1 2	201173-400	CAP. ELECT, 4000MFD, 40V	86F156M	GE
1 2	201173-430	CAP. ELECT, 4300MFD, 40V	CG432U050R4C	SPRAGUE

1. THE ABOVE COMPONENTS ARE APPROVED ALTERNATES FOR THIS APPLICATION.
2. WHERE 2 OR MORE ARE USED IN AN ASSY, USE THE SAME SIZE, VALUE, AND/OR COLOR.
3. PREFERRED

CODE IDENT. NO. 32274

DRN	TITLE	SIZE	DWG NO	REV
G Boddy	CAPACITOR, ELECT 3000 MFD, 40 V (NOM)	A	799600-100	B
CK'D				
APP'D				
REL'D		Cipher Data Products SAN DIEGO CALIF		SH 1 OF 1

NOTES	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION
1 2 3 4	201174-270	CAP. ELECT, 27,000 MFD, 25V	91C25JC273L	STM
1 3 4	201174-280	CAP. ELECT, 28,000 MFD 25V	36D283G025BF2A	SPRAGUE
1 3	201174-320	CAP. ELECT, 32,000 MFD 25V	36D323G025CC2A	SPRAGUE
1 3 4	201174-323	CAP. ELECT, 32000 MFD, 25V	DCM323U025BC2B	SANGAMO
1 3 4	201174-350	CAP. ELECT 35000 MFD, 25V	FAH3532-25-B6	CDE
1 3 4	201174-325	CAP. ELECT, 32,500 MFD, 25V	FAH3252-30-B3	CDE
1 3 4	201174-300	CAP. ELECT, 30,000 MFD, 25V	86F541M	GE

1. THE ABOVE COMPONENTS ARE APPROVED ALTERNATES FOR THIS APPLICATION.
2. PREFERRED
3. WHERE 2 OR MORE ARE USED IN AN ASSY, USE THE SAME SIZE, VALUE, AND/OR COLOR.
4. WHEN THIS COMPONENT IS USED, THE FOLLOWING HARDWARE MUST ALSO BE USED PER F/D VIEW, DWG 131530-000:
   1. QTY 1, P/N 210089 CAPACITOR CLAMP, FJMR-3, STM
   2. QTY 1, P/N 206608-011, SCREW, PAN HD PHIL, CAD, 6-32 x 1/2
   3. QTY 3, P/N 206606-011, SCREW, PAN HD PHIL, CAD, 6-32 x 3/8
   4. QTY 4, P/N 207604-081, NUT, HEX, RADIO PAT, CAD, 6-32
   5. QTY 4, P/N 207605-021, WASHER, FLAT, CAD, #6
   6. QTY 4, P/N 207602-011, WASHER, SPLIT LOCK, CAD #6

CODE IDENT. NO. 32274

DRN	TITLE	SIZE	DWG NO	REV
G BOUDY	CAPACITOR, ELECT 27,000 MFD, 25V (NOM)	A	799600-300	A
CHK'D				
APP'D				
REL'D				

Cipher Tape & Products SAN DIEGO CALIF

SH 1 OF 1

DATE	SYM	REVISION RECORD	BY	CK
5-7-73	A	PRODUCTION RELEASE	MJ	
5-22-73	B	ECR 1203	MJ	
6-5-73	C	ECO 1211	MJ	
7-23-73	D	ECO 1227	MJ	MJ
8-6-73	E	ECO 1244	MJ	MJ
8-29-73	F	ECO 1255, ADDED CALLOUT FOR ITEM 17 (SOCK)	MJ	MJ
11-15-73	G	ECO 1270	MJ	MJ
1-15-74	H	ECO 1296	MJ	MJ
3-5-74	J	ECO 1350	MJ	MJ
3-25-74	K	ECO 1366	MJ	MJ
8-12-74	L	ECO 1724	MJ	MJ
8-13-74	M	ECO 1750	MJ	MJ
9-16-74	N	ECO 1759	MJ	MJ
9-16-74	P	ECO 1765	MJ	MJ
7-16-76	R	ECO 1919	GB	GB
8-18-76	S	ECO 1994	GB	GB
7-16-76	T	ECO 2027	GB	

ADD R385 1.8K, WW

ADD R386 1K, WW INSULATE LEADS

VIEW A-A

THIS MODIFICATION IS FOR PWB 731526-100 REV "R"

SEE VIEW A-A

SEE VIEW B-B

SEE VIEW C-C

SEE VIEW D-D

(3) LABEL (6)

(6) RETAINER
(175) SCREW
(177) WASHER, SPLIT LK
(179) NUT, SM PAT (2 PLACES)

(1) PWB

(17) SOCKET

(9) TEST POINT (54 PLACES)

(2) HEATSINK (2)
(175) SCREW (2)
(176) WASHER FL. (2)
(177) WASHER LK. (2)
(179) NUT (2)

(173) HEATSINK (9 PLACES)

STRUT (4)
SPACER (5)
SCREW (4) (175)
WASHER FL. (4) (176)
WASHER LK. (4) (177)

DIODE (54)
WIRE (184)
SLEEVING (185)
TYP 2 PLACES CR103 & CR104

(183) NUT

(178) WASHER LK. INT. STAR (2)

BUSHING (2) (170)

INSULATOR (168)
INSULATOR (169)

(182) WASHER LK. INT. STAR (2)
(181) NUT (2)

TRANSISTOR REF
SCREW (2) (180)

TYP TRANSISTOR INSTALLATION SEE NOTE (3)

JUMPER

VIEW B-B (SOLDER SIDE)

WHEN USING PWB 731526-100 REV "A"

REWORK - ADD 22AWG BUSS WIRE
JUMPER U37-8 TO U37-10 &
U37-9 TO U37-11

VIEW C-C (COMP SIDE)

WHEN USING PWB 731526-100 REV "A"

REWORK: DRILL .031 DIA HOLE
INSTALL C17 AS SHOWN
INSULATE C17 LEAD FARSIDE &
CONNECT TO C35

VIEW D-D (COMP SIDE)

WHEN USING PWB 731526-100 REV A"

REWORK. AS SHOWN
CUT LANDS TWO PLACES
ADD TWO JUMPERS, 22 AWG
BUSS INSULATED
ONE NEARSIDE, ONE FARSIDE

(6) MARK ASSY PART NO. & REV LETTER ON (ITEM 3) LABEL

5. INSTALL SLEEVED JUMPER, 22 AWG, 3 PLACES, [illegible]

4. FOR SCHEMATIC SEE 331524-300 C

(3) USE MIN AMOUNT OF ITEM 171 COMPOUND ON TRANSISTOR AND INSULATOR WHEN INSTALLING ON HEAT SINK

(2) MOUNT HEATSINK TO PWB WITH ITEM 175 SCREWS, BEING CAREFUL TO ALIGN HOLES IN PWB TO HOLES IN HEATSINK

(1) AFTER CHECKOUT OF +5 AND ±15 REGULATORS - ADD THESE JUMPERS, ITEM 184 WIRE

NOTES: UNLESS OTHERWISE SPECIFIED

-000, 12.5 - 37.5 IPS
-001, 45 IPS

RELEASED

TOLERANCES EXCEPT AS NOTED	Cipher Data Products, San Diego, Calif.	
DECIMAL	MODEL 100X	SCALE 1/1
FRACTIONAL	TITLE PWB ASSY - CONTROL/SERVO	
ANGULAR	DATE 3-12-75	DRAWING NUMBER 131524-0XX
		SH 1 OF 1
	DRAWN BY R.D.C.	APPROVED BY W.E. Tam
		REV T

131524-0XX

REV	DESCRIPTION	DATE	APPROVED
A	PRODUCTION RELEASE SEE SH 1 & 4		

CAPSTAN RAMP (TO SHT 1) (U)

+REF

RAMP

+15V R301 1.2K 6.2V 301A C301 4.7 35V CR301 IN827 R302 1K R303 1K 301B C302 4.7 35V R304 511 R385 1.8K

+REF (SH1 & 4) (P)

-REF (SH1 & 4) (J)

R386 1K -15V

R313 1.47K FWD R312 2K CW R315 1K R314 1K R311 261 R316 1K Q301 2N4303 R317 10K R318 1K R309 12.8K 1% R307 1.47K R306 2K REV CW R308 1K Q302 2N4303 R305 261 R310 10K -15V Q303 2N4303 -REF R323 10K -15V R322 10K -15V R376 3.65K CW R379 2K OFFSET R378 3.65K R377 10K R324 1K Q304 2N4303 R325 10K -15V

R319 1.2M 305A -15V R321 511 CR302 R320 4.7Ω CR303 TP306 RAMP R339 5.6K Q311 2N4303 R338 330K R335 1K R337 10K -15V R340 10K R333 2K RAMP CW R334 10K R332 47 Q312 2N4303 R336 10K -15V 305B R341 5.1K R342 24K C315 .47 PC 306 R343 24K REV TP302 FWD

-15V C311 4.7 35V +15V C312 4.7 35V +5V C313 47 6V COM.

+14V (+36V Δ) C305 3.9 75V R359 470 Q313 2N5323 C306 .001 Q314 2N3055 H.S. CR311 IN4001 R358 1K ½W R361 100 R362 1.2Ω 6.5W Q315 2N3053 C307 .047 PC. R363 470, ½W R360 3K Q316 2N4036 R364 1K ½W C308 .001 R365 47 Q317 2N5321 CR312 IN4001 Q318 2N3055 H.S. R366 1K R367 100 R368 .1Ω 6.5W TP303 P9 J9 3 2 BLK 2 B3 1 RED CAPSTAN MOTOR

C310 3.9 75V -14V (-36V Δ) TP304

R369 18K R370 27K C309 .47 PC R372 1.2K R371 18K R373 .1Ω 6.5W TP305 R374 1.2K + 36V RETURN + 14V

CR313 CR314 CR315 CR316 CR317, IN957B

307A -15V

RAMP (SH9) (N)

REV. (SH1) (C)

RUN (SH1) (E)

FWD (SH1) (D)

RWD + LOAD (SH1) (B)

LOAD (SH1) (R)

ENABLE (SH1 & 4) (H)

TP308 TP309 TP310 TP311

303A 303B 302A 302B 302C 302D 304A 304B 304C 304D 304E 304F

+5V R331 470 Q310 2N3702 CR309 R330 470 Q309 2N3702 CR308 R326 470 Q305 2N3702 CR304 R327 470 Q306 2N3702 CR305 R329 470 Q308 2N3702 CR307 R328 470 Q307 2N3702 CR306

TP301 R346 22AWG P8 3 1 2 J8 B4 RED BLK CAPSTAN TACH

R347 3.01K R345 3.01K

R348 16K R349 16K R350 910 C304 .022 P.C. R380 590 C317 .22 P.C. C316 .12 P.C. R381 162Ω R351 10K 306A -15V R383 62K R352 1.47K CR318

C319 100PF R384 4.7K TP307 +15V C318 47PF 307B R356 10K R357 10K R355 10K Q319 2N4303 R354 1M CR310 R353 150K R382 15K C314 680pf

REFERENCE DESIGNATORS USED	NOT USED
C319	C303
CR318	
U303	
Q319	
R386	
TP311	

NOTES: UNLESS OTHERWISE SPECIFIED.

1. Δ +36V & -36V FOR BLOCK 03 MACH. ONLY. USING 2400072 CAPSTAN MOTOR.
6. CIRCLED LETTERS, i.e. (A) CORRESPOND TO LIKE LETTERS ON SHEETS INDICATED.
5. ALL CAPACITORS ARE IN μf, 20%
4. ALL DIODES ARE IN914.
3. ALL RESISTORS ARE IN OHMS, 1/4W, 5%.
2. P.C. INDICATES POLYCARBONATE CAPACITOR, 5%.
Δ METAL FILM RESISTOR 1%.

RELEASED 3/12/75

CAPSTAN DRIVER

Cipher Data Products

Scale:	
Date:	2-26-75
Drn.	R.D.C.
Appd.	W.R.T.ARR
Title	SCHEMATIC – CONTROL/SERVO
	331524-300 SHT 3 K

PART OF CONTROL / SERVO ASSY 140002-001

REV		
A	PRODUCTION RELEASE	
	SEE SH 1 & 4	

J14 P14

TO DC POWER SUPPLY

+36V
-36V
+14V
-14V
+10V

R100 .25Ω 3W
R101 100
R102 2.2K
R103 4.7K
R104 .25Ω 3W
R105 100
R106 2.2K
R107 4.7K
R108 1.5K
R109 1K
R110 3.3K
R111 100
R112 1.2Ω, 3W
R113 16.9K 1%
R114 500
R115 2.0K 1%
R116 100
R117 1.2Ω, 3W
R118 16.9K 1%
R119 500
R120 2.0K 1%
R121 100
R122 1.2Ω, 3W
R123 6.49K 1%
R124 500
R125 3.32K 1%
R126 .25Ω, 3W

Q100 2N3055 H.S.
Q101 2N3053
Q102 2N4036
Q103 2N3055 H.S.
Q104 2N4036
Q106 2N3054 H.S.
Q107 2N4036
Q108 2N4036
Q109 2N3054 H.S.
Q110 2N4036
Q111 2N3055 H.S.

CR100 CR101 CR102
CR103 IN1612
CR104 IN1612
CR105 CR106
CR107
CR108 IN4001
CR109 IN4001
CR110 IN4001
CR111 IN4001
CR112 IN4001
CR113 IN4001
CR114 IN4001
CR115 IN4001

C100 47pf
C101 4.7 35V
C102 47pf
C103 47 35V
C104 47pf
C105 47 6V
C106 330 PF
C107 330 PF
C108 330 PF
C109 .01 MF
C110 .01 MF
C111 .01 MF

U 100
U 101
U 102

CW

TP106 TP101 TP102 TP103 TP107 TP104 TP108 TP105

+36V CONTROL (SH 1)
+14V/+36V
-14V/-36V RTN.
+14V
-14V
±36V/±14V RTN.
POWER ON RESET (SH 1)
+15V
+15V REG.
±15V. COM. RETURN
-15V REG.
-15V
+5V
+5V REG.
+10V RETRACTOR MTR RELAY (SH 1 & 4)

RELEASED 3/12/75

4. ALL CAPS ARE IN μf ±20%
3. CIRCLED LETTERS, i.e. Ⓐ, CORRESPOND TO LIKE LETTERS ON SHEETS INDICATED.
2. ALL DIODES ARE IN914.
1. ALL RESISTORS ARE IN OHMS 1/4W, 5%

NOTE: UNLESS OTHERWISE SPECIFIED

POWER SUPPLY

TOLERANCES UNLESS OTHERWISE NOTED	Cipher		
DECIMAL ±		SCALE —	DRAWN BY R.D.C. APPROVED BY R.B. Tull
FRACTIONAL ±	TITLE SCHEMATIC - CONTROL/SERVO		
ANGULAR ±	DATE 2-26-75	DRAWING NUMBER 331524-300 SH 2	K

TAKE - UP

SUPPLY

P13 TAKE-UP

P11 SUPPLY

+15V
-15V
+5V
COMN

C401 4.7@35V
C402 4.7@35V
C403 47@6V

C201 4.7@35V
C202 4.7@35V
C203 47@6V

TO CONTROL LOGIC (SHT 1) T

TO CONTROL LOGIC (SHT 1) S

Q401 2N3053
Q402 2N5323
Q403 2N3771 H.S.
Q404 2N3053
Q405 2N6036
Q406 2N5321
Q407 2N3771 H.S.
Q408 2N4303
Q409 2N3704
Q201 2N3053
Q210 2N3702

401A
401B
402A
402B
201A
201B

R405 470
R406 470
R407 560
R408 1 3W
R409 330Ω
R410 330Ω
R411 51K
R412 1K
R413 1K
R414 56K
R416 10K
R417 470K
R418 10K
R419 1M
R420 10K
R421 10K
R422 47Ω
R423 1K 1/2W
R424 100
R425 .1Ω 6.5W
R426 470
R427 100
R428 1K 1/2W
R429 1K
R430 100
R431 .1Ω 6.5W
R432 1MR
R433 5.1K
R434 18K
R435 1.5K
R436 .1Ω 6.5W
R437 1.5K
R439 3K
R440 100K
R441 8.2K
R443 27K
R444 8.2K
R442 4.3K
R402 2K
R403 3.9K
R404 10K
R401 180
R205 470
R206 470
R207 560
R208 1 3W
R209 330Ω
R210 330Ω
R211 51K
R212 1K
R213 1K
R214 56K
R264 10K
R202 2K
R203 3.9K
R201 180
R241 27K
R246 4.7K
R247 200K
R240 100K

C404 47 6V
C405 .01
C406 .01
C407 .001
C408 .1
C409 .33 P.C.
C410 3.9 75V
C411 .001
C412 5000pf
C413 .001
C414 3.9 75V
C415 .47 P.C.
C204 47 6V
C205 .01
C206 .01
C207 .001
C208 .1 P.C.

CR401
CR402 1N4001
CR403 1N4001
CR404
CR405
CR406 1N957B
CR407
CR408
CR410
CR411

TP401
TP402
TP403
TP404
TP405
TP406
TP407
TP201
TP202
TP203

COMPLIANCE ARM J13
COMPLIANCE ARM J11

NC
CW

RETRACTOR MOTOR RELAY (SH1 & SH2) L

+14V & +36V RETURN

TO SH3 J - REF
TO SH1 G COMPLIANCE SWITCHES
TO SH3 P + REF
TO SH1 M1 COMPLIANCE SWITCHES
TO SH3 N RAMP
TO SH1 H ENABLE
& SH2

- REF
COMPLIANCE SWITCHES
+ REF
COMPLIANCE SWITCHES
RAMP
ENABLE

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN OHMS 1/4W, 5%
2. ALL DIODES ARE IN914
3. ALL CAPACITORS ARE IN μF ±20%
4. CIRCLED LETTERS, ie. (A), CORRESPOND TO LIKE LETTERS ON SHEETS INDICATED.
5. P.C. INDICATES POLYCARBONATE

DATE	LTR	REVISION RECORD	DRN	APD
3-7	A	PRODUCTION RELEASE SEE SH 2 & 4	RJ	RJ
3-11	E	ECO 1732	RJ	RJ
3-14	F	ECO 1751	RJ	RJ
3-24	G	ECO 1758	RJ	RJ
4-4	H	ECO 1770	RJ	RJ
4-8	J	ECO 1925	RJ	RJ
7-24	K	ECO 2026	D	

SUPPLY

P11 SUPPLY

+14V

-14V/-36V

+14V/+36V RETURN

TO CONTROL LOGIC (SHT 1) S

RETRACTOR MOTOR RELAY (SHT 1 & SH 2) L

REEL MOTOR RELAY (SH 1) F

+15V, -15V, +5V, COMN

C201 4.7 @35V, C202 4.7 @35V, C203 47@6V

Q201 2N3053, Q202 2N5323, Q203 2N3771 H.S., Q204 2N3053, Q205 2N4036, Q206 2N5321, Q207 2N3771 H.S., Q208 2N4303, Q209 BN374, Q210 2N3702

CR201, CR202 IN4001, CR203 IN4001, CR204, CR205, CR206 IN957B, CR207, CR208, CR209, CR210, CR211

TP201, TP202, TP203, TP204, TP205, TP206, TP207, TP401, TP405, TP406

J10 P10, J11, J12 P12

K2

COMPLIANCE SWITCH

CW

NC

201B, 201A, 202B, 202A, 402A

+14 V & ±36 V RETURN

- REF COMPLIANCE SWITCHES

+ REF COMPLIANCE SWITCHES

RAMP

ENABLE

REFERENCE DESIGNATORS

USED	NOT USED	USED	NOT USED
C216		C216	
CR411		CR211	
U 402		U 202	
Q 409		Q 210	
R 446		R 247	
TP 407		TP 207	

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE IN OHMS 1/4 W, 5%
2. ALL DIODES ARE IN 914
3. ALL CAPACITORS ARE IN µF ±20%
4. CIRCLED LETTERS, ie. (A), CORRESPOND TO LIKE LETTERS ON SHEETS INDICATED.
5. P.C. INDICATES POLYCARBONATE

REEL SERVO

TOLERANCES (EXCEPT AS NOTED)	Cipher Data Products		
DECIMAL ±		SCALE	DRAWN BY R.D.C.
FRACTIONAL ±	TITLE SCHEMATIC - CONTROL SERVO		APPROVED BY R.K.R.
ANGULAR ±	DATE 2-26-75	DRAWING NUMBER 331524-300	SH 4 K

Cipher Data Products

MODEL 100X

PARTS LIST -000, 12.5-37.5IPS -001, 45IPS

CODE IDENT. 32274

PL 131524-00X

REV. T

TITLE: PWB ASSY-CONTROL/SERVO

DWN R.D.C. DATE 2-24-75

APPROVAL W.R.TARR

E.C.O. NO. 2027

DATE 9-2-76

SHEET 1 OF 13 SHEETS

ITEM	QUANTITY 000	QUANTITY 001		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731527-100	PWB, CONTROL/SERVO		CIPHER	
2	1	1		731520-400	HEATSINK		CIPHER	
3	1	1		731006-800	LABEL ASSY		CIPHER	
4	1	1		731524-600	STRUT		CIPHER	
5	4	4		735000-403	SPACER		CIPHER	
6	2	2		731501-300	RETAINER P.C. CONN		CIPHER	
7								
8								
9	54	54		205026	TEST POINT (ROLLED PIN)	61181-2	AMP	
10	3	3		205133-060	CONN 9 PIN	09-18-5992	MOLEX	P2,11,13
11	1	1		205068	CONN 12 PIN	03-09-2121		P7
12	1	1		205133-080	CONN 12 PIN	09-18-5924		P3
13	1	1		205070	CONN 15 PIN	03-09-2151		P14
14	6	6		205133-001	CONN 3 PIN	09-18-5032		P1,6,8,9,10,12
15	2	2		205133-030	CONN 5 PIN	09-18-5503		P4,5
16	27	27		205012	PIN, TERM, MALE, .093 DIA	02-09-2134	MOLEX	P7,14
17	2	2		211002	SOCKET, 14 PIN, DIP	CA-14S-105D	CKT ASSY CORP	XU1, 2

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE: PWB ASSY - CONTROL / SERVO

DWN P.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 2 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
18	28	28		201105-010	CAP. CER .01 UF, 50V	5HKS-S10	SPRAGUE	C20-44, 109, 110, 111
19	11	11		201158-001	CAP. MYLAR .001 UF, 100V, 10%	WMF1D1	CDE	C1, 6, 13, 207, 211,
								213, 306, 308,
								407, 411, 413
20								
21								
22	1	1		201159-680	CAP. MYLAR .068 UF, 100V, 10%	WMF 1568	CDE	C 14
23	4	4		201159-100	CAP. MYLAR .01 UF, 100V, 10%	WMF 1S1	CDE	C205, 206, 405, 406
24								
25	2	2		201158-100	CAP. MYLAR .1 UF, 100V, 10%	WMF 1P1	CDE	C9, 10
26	6	6		201121-470	CAP DIP MICA 47 PF, 300V, 5%	D153E470JO	SANGAMO	C11, 100, 102,
								104, 318, 7
27	2	2		201122-100	100 PF	D153E101JO		C3, 319
28								
29	3	3		201122-300	300 PF	D153E301JO		C12, 16, 17
30	3	3		201122-330	330 PF	D153E331JO		C106, 107, 108
31	2	2		201123-500	5000 PF, 500V, 5%	D195E502JO		C212, C412
32	1	1		201122-680	CAP. DIP MICA 680 PF, 300V, 5%	D153E681JO	SANGAMO	C314
33	1	1		201149-330	CAP P-CARB .033 UF, 50V, 5%	RA2A333J	IMB	C2

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE: PWB ASSY-CONTROL/SERVO

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 3 OF 13 SHEETS

ITEM	QUANTITY -00	-01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
34	1	1		201149-220	CAP. P-CARB .022UF 50V, 5%	RA2A223J	IMB	C304
35	1	1		201149-470	.047 UF	RA2A473J		C307
36	1	1		201148-120	.12 UF	RA2A124J		C316
37	1	1		201148-220	.22 UF	RA2A224J		C317
38	2	2		201148-330	.33 UF	RA2A334J		C216,416
39	5	5		201148-470	.47 UF	RA2A474J		C8,215,309,
								315,415
40	2	2		201140-100	CAP P-CARB 1.0 UF 50V, 5%	RA2A105J	IMB	C208,408
41								
42								
43	10	10		201160-470	CAP TANTALUM 4.7UF, 35V, 10%	CS13BF475K	MIL-C-26655	C101,103,201,202,
								301,302,311,312,
								401,402
44	6	6		201161-039	3.9 UF, 75V	CS13BG395K		C210,C214,C305, C310,C410,C414
								410,414
45								
46	1	1		201161-120	12 UF, 20V,	CS13BE126K		C15
47	1	1		201160-680	6.8 UF, 35V,	CS13BF685K		C5
48	7	7		201161-470	CAP TANTALUM 47 UF, 6V, 10%	CS13BB476K	MIL-C 26655	C4,105,203,204,
								313,403,404

Cipher Data Products

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PARTS LIST

CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE: PWB ASSY- CONTROL / SERVO

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R. TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 4 OF 13 SHEETS

ITEM	QUANTITY -00	-01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
49	1	1		202017	DIODE ZENER TC	IN827A		CR301
50	48	48		202018		IN914		CR2-14,100-102,
								105-107, 201, 204,
								205, 207-211, 302
								-310, 313-316, 318,
								401, 404, 405, 407,
								408, 410, 411
51								
52	3	3		202019	ZENER	IN957B		CR206, 317, 406
53	14	14		202009	RECTIFIER	IN4001		CR108-115, 202, 203,
								311, 312, 402, 403
54	2	2		202007	DIODE POWER	IN1612		CR103, 104
55	2	2		202023	DIODE	5082-2835	HEWLETT-PACKARD	CR15, 16
56	7	7		204008	TRANSISTOR	2N3053		Q15, 101, 201, 204,
								315, 401, 404
57	2	2		204009		2N3054		Q106, 109
58	5	5		204010		2N3055		Q100, 103, 111, 314,
								318
59	8	8		204012		2N3702		Q17, 210 305-310
60	11	11		204013	TRANSISTOR	2N3704		Q8-11, 13, 14, 16, 18, 19,
								209, 409

5043 CDR

Cipher Data Products	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131524-00X	REV. T

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSY - CONTROL / SERVO	R.D.C.	W.R. TARR	2027	9-2-76	5 OF 13 SHEETS
	DATE 2-24-74				

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
61	4	4		204015	TRANSISTOR	2N3771		Q203,207,403,407
62	8	8		204017		2N4036		Q102,104,107,108,
								110,205,316,405
63	10	10		204018		2N4303		Q12,208,301-304,
								311,312,319,408
64	3	3		204025		2N5321		Q206,317,406
65	3	3		204026	TRANSISTOR	2N5323		Q202,313,402
66								
67	1"	1"		208500-298	WIRE, SOLID, 22GA, COPPER	298	ALPHA WIRE	R346
68	2	2		200071-470	RES, FIX COMP, 47Ω, 1/4 W, 5 %	RCR07G470JM	MIL-R-39008	R332, 365
69	13	13		200072-100	100Ω,	RCR07G101JM		R101, 105, 111, 116,
								121, 224, 227, 230
								361, 367, 424,
								427, 430
70	1	1		200072-160	160Ω,	RCR07G161JM		R38
71	2	2		200072-180	180Ω,	RCR07G181JM		R201, 401
72	5	5		200072-330	RES FIX COMP, 330Ω, 1/4W, 5 %	RCR07G331JM	MIL-R-39008	R73, 209, 210, 409, 410
73	1	1		200075-120	RES FIX COMP, 120K, 1/4 W, 5 %	RCR07G124JM	MIL-R-39008	R42
73A	3	3		200072-220	RES FIX COMP 220Ω 1/4W 5%	RCR07G221JM	MIL-R-39008	R12, 15, 25

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TITLE: PWB ASSY - CONTROL / SERVO

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 6 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
74	21	21		200072-470	RES, FIX COMP 470Ω, 1/4 W, 5 %	RCR07G471JM	MIL-R-39008	R37, 44, 52, 5,
								55, 205, 206, 222,
								226, 320, 326-331,
								359, 405, 406, 422,
								426
75	2	2		200072-560	560Ω,	RCR07G561JM		R207, 407
76	25	25		200073-100	1K,	RCR07G102JM		R34, 6, 11, , 24,
								, 36, 39, 48, 51, 53,
								54, 57, 61, 67, 68, 109,
								212, 213, 229,
								335, 366, 412,
								413, 429, 386
77	3	3		200073-120	1.2K,	RCR07G122JM		R301, 372, 374
78	5	5		200073-150	1.5K,	RCR07G152JM		R108, 235, 237,
								435, 437
79	5	5		200073-220	2.2K,	RCR07G222JM		R56, 102, 106,
								215, 415
80	3	3		200073-300	3K,	RCR07G302JM		R239, 360, 439
81	1	1		200073-330	3.3K,	RCR07G332JM		R110
82	2	2		200073-390	RES, FIX COMP, 3.9K, 1/4W, 5%	RCR07G392JM	MIL-R-39008	R203, 403

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CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE: PWB ASSY- CONTROL/SERVO

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 7 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
83	2	2		200073-430	RES. FIX COMP, 4.3 K, 1/4 W, 5 %	RCR07G432JM	MIL-R-39008	R242 442
84	1	1		200072-910	910Ω,	RCR07G911JM		R350
85	5	5		200073-470	4.7K,	RCR07G472JM		R50, 103, 107,
								246, 384
86	1	1		200073-510	5.1K,	RCR07G512JM		R341
87	1	1		200073-560	5.6K,	RCR07G562JM		R339
88	4	4		200073-820	8.2K,	RCR07G822JM		R244, 245, 444, 445
89	27	27		200074-100	10K	RCR07G103JM		R33, 47, 49, 59, 63,
								69, 70, 204, 216, 218,
								220, 221, 310, 322,
								323, 325, 334, 336,
								337, 340, 356, 357,
								404, 416, 418, 420,
								421
90	2	2		200074-160	16K,	RCR07G163JM		R348, 349
91	1	1		200074-150	15K,	RCR07G153JM		R382
92	6	6		200074-180	18K,	RCR07G183JM		R232, 234, 369,
								371, 432, 434
93	3	3		200074-240	24K	RCR07G243JM		R342, 343, 66
94	6	6		200074-270	RES FIX COMP 27K 1/4W 5%	RCR07G273JM	MIL-R-39008	R233, 241, 243,
								370, 433, 443

Cipher Data Products

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CODE IDENT. 32274 | PL 131524-00X | REV. F

TITLE PWB ASSY - CONTROL/SIGNAL

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 8 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
95	2	2		200074-360	RES, FIX COMP, 36 K, 1/4 W, 5 %	RCR07G363JM	MIL-R-39009	R41 65
96	1	1		[illegible]13-620	6.2 K,	RCR07-622JM		R383
97	2	2		200074-470	47 K,	RCR07G473JM		R35,45
98	2	2		200074-510	51 K,	RCR07G513JM		R211,411
99	2	2		200074-560	56 K,	RCR07G563JM		R214,414
00	1	1		200074-820	82 K,	RCR07G823JM		R72
01	2	2		200075-100	100 K,	RCR07G104JM		R240,440
102	1	1		200075-160	160 K,	RCR07G164JM		R71
103	1	1		200075-180	180 K,	RCR07G184JM		R446
104	1	1		200075-200	200 K,	RCR07G204JM		R247
105	2	2		200075-330	330 K,	RCR07G334JM		R34,338
106	2	2		200075-470	470 K,	RCR07G474JM		R217,417
107	2	2		200075-680	680 K,	RCR07G684JM		R58,62
108	3	3		200076-100	1 MEG,	RCR07G105JM		R219 354 419
109	1	1		200076-120	1.2 MEG,	RCR07G125JM		R319
110	1	1		200076-470	4.7 MEG,	RCR07G475JM		R46
111	1	1		200082-470	RES, FIX COMP, 470 Ω, 1/2 W, 5 %	RCR20G471JM		R363
112	6	6		200083-100	RES, FIX COMP 1K, 1/2 W, 5 %	RCR20G102JM	MIL-R-39008	R223,228,358, 364,423,428
113	1	1		200022-162	RES, METAL FILM, 162 Ω, 1/8 W, 1 %	RN60D1620F	MIL-R-10509	R381

Cipher Data Products

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CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE: PWB ASSY-CONTROL/SERVO | DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 9 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
114	2	2		200022-261	RES, METAL FILM 261Ω, 1/8 W, 1 %	RN60D2610F	MIL-R-10509	R305 311
115	1	1		200022-590	590Ω,	RN60D5900F		R380
116	2	2		200023-200	2.00 K,	RN60D2001F		R115, 120
117	2	2		200023-301	3.01 K,	RN60D3011F		R345, 347
118	1	1		200023-332	3.32K,	RN60D3321F		R125
119	2	2		200023-365	3.65K,	RN60D3651F		R376, 378
120	2	2		200022-511	511Ω,	RN60D5110F		R304, 321
121	1	1		200023-649	6.49K,	RN60D6491F		R123
122	4	4		200024-100	10.0 K,	RN60D1002F		R317, 351, 355, 377
123	1	1		200024-121	12.1 K,	RN60D1212F		R309
124	3	3		200023-147	1.47 K,	RN60D1471F		R307, 313, 352
125	2	2		200024-169	16.9 K,	RN60D1692F		R113 118
126	8	8		200023-100	1K,	RN60D1001F		R302, 303, 308, 314,
								315, 316, 318, 324
127	1	1		200025-150	RES, METAL FILM, 150 K, 1/8 W, 1 %	RN60D1503F	MIL-R-10509	R353
128	9	9		200148-100	RES, W.W., .1Ω, 6.5 W, 5 %,	CW5	DALE	R225, 231, 236, 362,
								368, 373, 425, 431,
								436
129	3	3		200128-250	RES, W.W., .25Ω 3.75W, 5 %	CW-2B	DALE	R100, 104, 126
130	1	1		200128-100	RES. W.W., .1Ω, 3.75W, 5 %	CW-2B	DALE	R122

Cipher Data Products

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CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE PWB ASSY - CONTROL / SERVO | DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 10 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
131	4	4		200120-100	RES, W.W., 1Ω, 2.5W, 5%	CW2B	DALE	R112,117,208,408
132	3	3		200202-500	POTENTIOMETER 500Ω	ET34P501	MEPCO/ELECTRA	R114, 119, 124
133	8	8		200203-200	POTENTIOMETER 2K	ET34P202	MEPCO/ELECTRA	R60 64 202 306
								312, 333, 379, 402
134	3	3		200072-390	RES FIX COMP 390Ω ¼W 5%	RCR07G391JM	MIL-R-39008	R74, 75, 76
135	1	1		200073-180	RES, FIX COMP 1.8K, ¼W, 5%	RCR07G182JM	MIL-R-39008	R385
136	1	1		205250-500	RESISTOR PACK, 220Ω	899-1-R220	BECKMAN	U1
137	1	1		205250-600	RESISTOR PACK, 330Ω	899-1-R330	BECKMAN	U2
138								
139	9	9		203017	I.C. PLASTIC, HEX INVERTER	SN15836N	T.I.	U4,9,11,13,19,31,
								37,49, 304
140	17	17		203021	I.C. PLASTIC, QUAD 2 INPUT	SN15846N	T.I.	U8,10,12,14,21-24,
								26,30,41,45,51,50
								53, 302, 303
141	7	7		203022	I.C. PLASTIC, TRIPLE 3 INPUT	SN15862N	T.I.	U6,20,25,28,29,40,52
142	1	1		203016	I.C. PLASTIC, DUAL 4 INPUT	SN15830N	T.I.	U43
143	5	5		203019	I.C. PLASTIC, DUAL 4 INPUT	SN15844N	T.I.	U15,17,27,36,42
144	2	2		203002	I C PLASTIC, MONO STABLE	9601PC	FAIRCHILD	U7,48
145	1	1		203037	I.C. PLASTIC, BCD TO DECIMAL	SN7442N	T.I.	U44
146	3	3		203041	I.C. PLASTIC, DUAL J-K FLIP-FLOP	SN7476N	T.I.	U16,38,39

Cipher Data Products

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PARTS LIST

CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE: PWB ASSY-CONTROL / SERVO | DWN R.D.C. DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 11 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
147	4	4		203055	I.C. PLASTIC, DUAL PERIPHERAL DRIVER	SN75451BP	T.I.	U32,33,34,35
148	9	9		203010	I.C PLASTIC DUAL OP-AMP	N5558V	SIGNETICS	U18,201,202,
								301,305,306,
								307,401,402
149	2	2		203102-001	I.C. PLASTIC, DUAL ONE SHOT	SN74221N	T.I.	U46,47
150	3	3		203006	I.C. VOLTAGE REGULATOR	LM300H	N.S.	U100,101,102
151								
152								
153	1	1		20DD73-270	RES, FIX COMP, 2.7K, 1/4W, 5%	RCRD7G272JM	MIL-R-39008	R43
154	1	1		20DD73-6B0	RES, FIX COMP, 6.8K, 1/4W, 5%	RCRD7G6B2JM	MIL-R-39008	R40
155								
156								
158		1		210197-200	RELAY 2 PDT 24V	RID-E1-W2-V700	POTTER BRUMFIELD	K2
158	1			210197	RELAY 2 PDT.	RID-E1-W2-V185	POTTER BRUMFIELD	K2
159	1	1		211078	SOCKET, RELAY	27E128	POTTER BRUMFIELD	
160	1	1		211077	CLIP, RELAY	20C259	POTTER BRUMFIELD	
161								
162								

Cipher Data Products

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PARTS LIST

CODE IDENT. 32274 | PL 131524-00X | REV. T

TITLE PWB ASSY-CENTRAL/STAND

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R.TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 12 OF 13 SHEETS

ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
163								
164								
165								
167								
168	2	2		210617	INSULATOR - MYLAR - TO66	4366-2	THERMALOY	
169	9	9		210613	INSULATOR - MYLAR - TO3	4303-2	THERMALOY	
170	22	22		120580-502	BUSHING, NYLON		CIPHER	
171	AR	AR		209993-120	HEATSINK COMPOUND	340	DOW	
172	24	24		211116	TRANSIPAD, TO5	7717-4417	THERMALOY	
173	9	9		210147	HEATSINK, TOP HAT	TXBF-032-025B	IERC	
174								
175	8	8		206408-011	SCREW, PAN HD. PHIL - CAD 1	4-40 X 1/2		
176	6	6		207402-021	WASHER, FLAT - CAD 1	#4		
177	8	8		207403-011	WASHER, SPLIT-LOCK - CAD 1	#4		
178	2	2		207105-031	WASHER, INT. STAR LOCK CAD 1	10-32		
179	4	4		207406-081	NUT, HEX, RADIO PAT. CAD 1	#4		
180	22	22		206601-011	SCREW, PAN HD. PHIL - CAD 1	6-32 X 9/16		
181	22	22		207604-081	NUT, HEX, RADIO PAT. CAD 1	6-32		
182	22	22		207606-031	WASHER, INT. STAR LOCK CAD 1	#6		
183	2	2		207106-051	NUT, HEX. CAD 1	10-32		

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131524-00X | REV. T

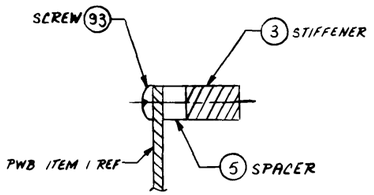
TITLE: PWB ASSY-CONTROL/SERVO

DWN R.D.C. | DATE 2-24-75 | APPROVAL W.R. TARR | E.C.O. NO. 2027 | DATE 9-2-76 | SHEET 13 OF 13 SHEETS

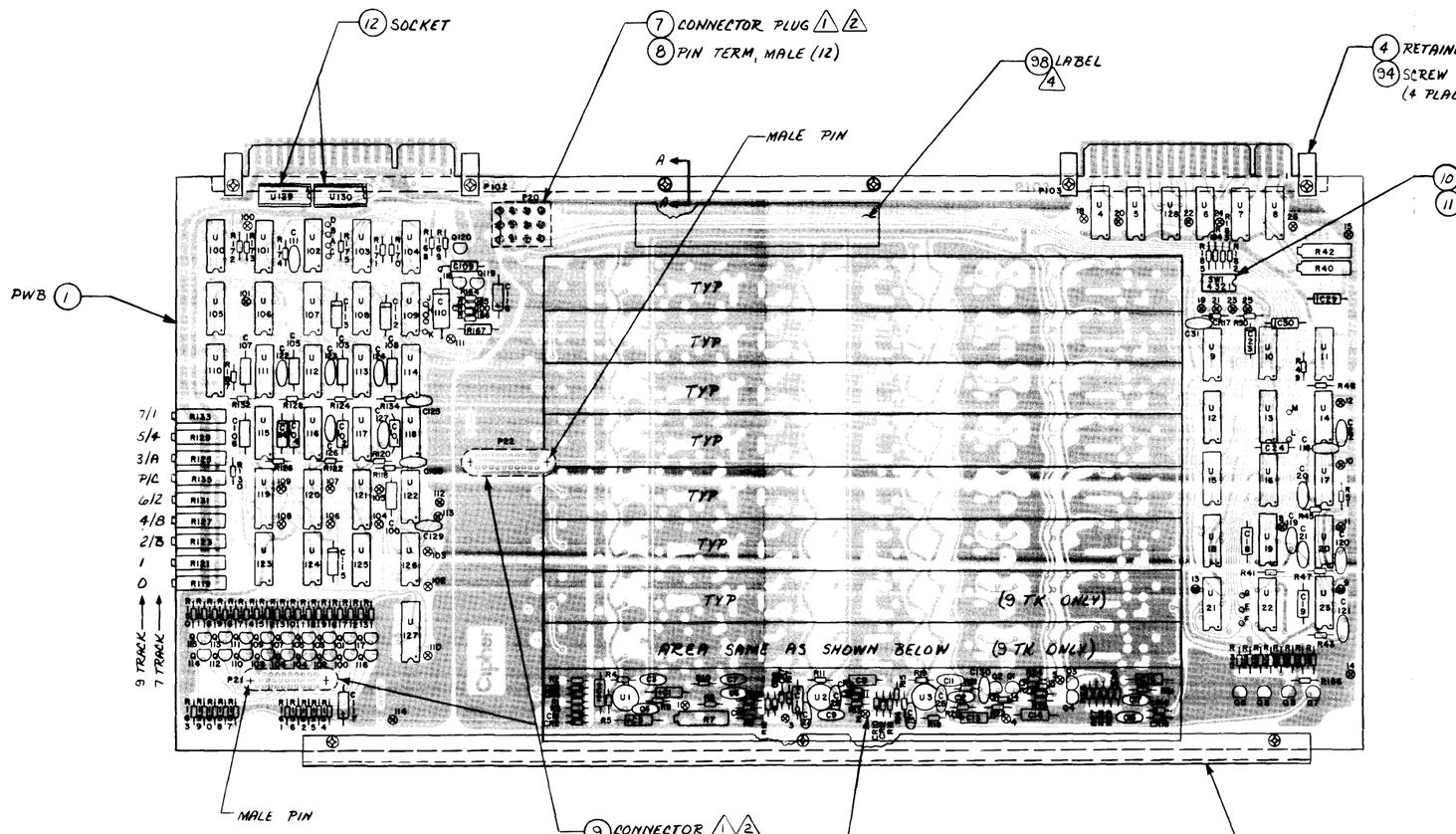
ITEM	QUANTITY -00	QUANTITY -01		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
184	10"	10"		208500-298	WIRE, SOLID BUS, 22GA	298	ALPHA	
185	10"	10"		210413	TUBING, SHRINK	HIX-1/4-UL-[illegible]	IRC RALLY	
186								

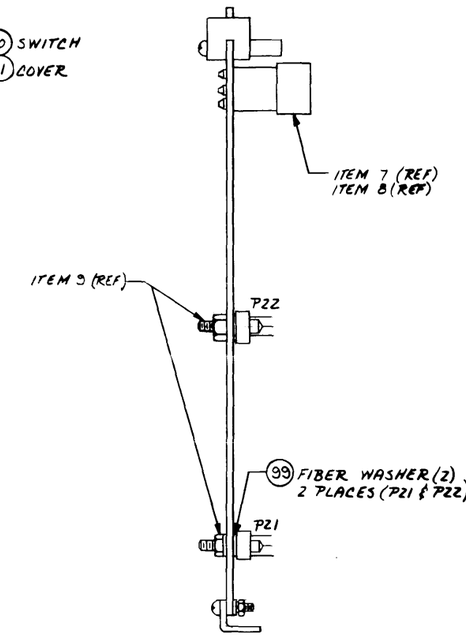
5043 EDP

DATE	SYM	REVISION RECORD	DR	CHK
4/73	S	REDRAWN & ECO 1747	JJ	JJ
5/73	T	ECO 1748	JJ	JJ
6/73	U	ECO 1766	JJ	JJ
6/73	V	ECO 1806	JJ	JJ
7/73	W	ECO 1961	JJ	JJ



SECTION A-A
(2 PLACES)





REF DWG ONLY – SEE P/L
FOR ASSY DASH NO. & REV LTR.

4 ON LABEL MARK ASSY PART NO., DASH NO. & REVISION LETTER FROM PARTS LIST.

3. ASSY SHOWN IS A FULLY LOADED PWB, FOR SPECIFIC CONFIGURATIONS SEE THE APPROPRIATE PARTS LIST DASH NUMBER. PARTS NOT NEEDED WILL BE OMITTED DURING FABRICATION OF ASSY.

2 INSTALL CONNECTORS ON FARSIDE OF BD. DISCARD NUT FURNISHED WITH CONNECTOR & REPLACE WITH WASHER (ITEM 90) & NUT (ITEM 91)

1 MARK EACH CONNECTOR WITH A COLORED PAINT DOT AS FOLLOWS:
P20 = GREEN ; P21 = RED ; P22 = YELLOW.

NOTES:

TOLERANCES (EXCEPT AS NOTED)	Cipher SAN DIEGO CALIF.		
DECIMAL ±	MODEL 100X	SCALE FULL	DRAWN BY R.CAVANESS 8-15-74 KFB
FRACTIONAL ±	TITLE PWB ASSY- READ/WRITE OR READ AFTER WRITE		
ANGULAR ±	DATE 8-3-73	DRAWING NUMBER 131512-000	SH 1 OF 1 REV W

P102

TK 0 — N 17 — TP100 — IC100-B — U129 220Ω — U130 330Ω
TK 1 — N 12 — TP101 — IC100-A — U129 220Ω — U130 330Ω
TK 2/B — P 13 — IC100-D — U129 220Ω — U130 330Ω
TK 3/A — R 14 — IC100-E — U129 220Ω — U130 330Ω
TK 4/8 — S 15 — IC100-F — U129 220Ω — U130 330Ω
TK 5/4 — T 16 — IC105-D — U129 220Ω — U130 330Ω
TK 6/2 — U 17 — IC105-E — U129 220Ω — U130 330Ω
TK 7/1 — V 18 — IC105-F — U129 220Ω — U130 330Ω
TK P/C — L 10 — IC100-C — U129 220Ω — U130 330Ω
9TK/7TK

+5V

108-D 108-C 108-A 108-B 107-D 107-C 107-A 107-B 106-D 106-C 106-A 106-B 110-A 110-B 110-D 110-C 109-D 109-C

122 — C100 .0022mfd P.C. — R118 10K — R119 10K — TP102 — 126-A
118 — C101 — R120 — R121 — TP103 — 126-B
117 — C102 — R122 — R123 — TP104 — 121-A
113 — C103 — R124 — R125 — TP105 — 121-B
116 — C104 — R126 — R127 — TP106 — 120-A
112 — C105 — R128 — R129 — TP107 — 120-B
115 — C106 — R130 — R131 — TP108 — 119-A
111 — C107 — R132 — R133 — TP109 — 119-B
114 — C108 — R134 — R135 — TP110 — 127-A

+5V — R187 1K

125-F 125-C 125-D 125-E 124-B 124-A 124-F 124-C 124-D 124-E 123-B 123-A 123-F 123-C 123-D 123-E 125-B 125-A

R136 680Ω R137 680Ω — Q100 2N3704 — Q107 2N3704
R138 680Ω R139 680Ω — Q102 2N3704 — Q103 2N3704
R140 680Ω R141 680Ω — Q104 2N3704 — Q105 2N3704
R142 680Ω R143 680Ω — Q106 2N3704 — Q107 2N3704
R144 680Ω R145 680Ω — Q108 2N3704 — Q109 2N3704
R146 680Ω R147 680Ω — Q110 2N3704 — Q111 2N3704
R148 680Ω R149 680Ω — Q112 2N3704 — Q113 2N3704
R150 680Ω R151 680Ω — Q114 2N3704 — Q115 2N3704
R152 680Ω R153 680Ω — Q116 2N3704 — Q117 2N3704

TP111

P21

TK 0 — F RED (−) — B WHITE — C BLUE (+)
TK 1 — A RED (−) — E WHITE — D BLUE (+)
TK 2/B — H RED (−) — M WHITE — L BLUE (+)
TK 3/A — T RED (−) — U WHITE — P BLUE (+)
TK 4/8 — Z RED (−) — X WHITE — W BLUE (+)
TK 5/4 — e RED (−) — d WHITE — c BLUE (+)
TK 6/2 — Y RED (−) — a WHITE — b BLUE (+)
TK 7/1 — V RED (−) — R WHITE — S BLUE (+)
TK P/C — N RED (−) — J WHITE — K BLUE (+) 9TK/7TK

R154 120Ω — R155 120Ω — R156 120Ω — R157 120Ω — R158 120Ω — R159 120Ω — R160 120Ω — R161 120Ω — R162 120Ω

C117 1 MFD @ 35V

g BLACK — ERASE BAR — h WHITE

R163 12Ω — R164 1K — R169 1K — R168 1K — R167 51Ω 1/2W

Q118 MPS6562 — Q119 2N3702 — Q120 2N3704

C109 .47 mfd. R.C. — C110 .047 mfd.

+5V — R172 470Ω — R171 1K

103-A — 109-A — 105-A — 101-A

DATE	SYM	REVISION RECORD	DRN	CKD
1-7-74	A	ECR #416	KBO	
7-24-74	B	UPDATED DWG		[illegible]
7-24-74	—	CONVERTED DWG #		[illegible]
1-16-75	C	ECR 844	WT	[illegible]
2/12/75	D	UPDATE ECR 1044	WT	[illegible]
1-23-76	E	ECO 1463	MJ	MJ

P21

TP111

TP112

TP113

+5V

R136 680Ω R137 680Ω Q100 2N3704 Q101 2N3704 125-F 125-C 126-A TP102 R118 10K R119 10K

R138 680Ω R139 680Ω Q102 2N3704 Q103 2N3704 125-D 125-E 126-B TP103 R120 R121

R140 680Ω R141 680Ω Q104 2N3704 Q105 2N3704 124-B 124-A 121-A TP104 R122 R123

R142 680Ω R143 680Ω Q106 2N3704 Q107 2N3704 124-F 124-C 121-B TP105 R124 R125

R144 680Ω R145 680Ω Q108 2N3704 Q109 2N3704 124-D 124-E 120-A TP106 R126 R127

R146 680Ω R147 680Ω Q110 2N3704 Q111 2N3704 123-B 123-A 120-B TP107 R128 R129

R148 680Ω R149 680Ω Q112 2N3704 Q113 2N3704 123-F 123-C 119-A TP108 R130 R131

R150 680Ω R151 680Ω Q114 2N3704 Q115 2N3704 123-D 123-E 119-B TP109 R132 R133

R152 680Ω R153 680Ω Q116 2N3704 Q117 2N3704 125-B 125-A 127-A TP110 R134 R135

F	RED (-)	R154 120Ω	TK 0
B	WHITE		
C	BLUE (+)		
A	RED (-)	R155 120Ω	TK 1
E	WHITE		
D	BLUE (+)		
H	RED (-)	R156 120Ω	TK 2/B
M	WHITE		
L	BLUE (+)		
T	RED (-)	R157 120Ω	TK 3/A
U	WHITE		
P	BLUE (+)		
Z	RED (-)	R158 120Ω	TK 4/B
X	WHITE		
W	BLUE (+)		
e	RED (-)	R159 120Ω	TK 5/4
d	WHITE		
c	BLUE (+)		
Y	RED (-)	R160 120Ω	TK 6/2
a	WHITE		
b	BLUE (+)		
V	RED (-)	R161 120Ω	TK 7/1
R	WHITE		
S	BLUE (+)		
N	RED (-)	R162 120Ω	TK P/C
J	WHITE		
K	BLUE (+)		9TK / 7TK

C117 1MFD @ 35V

F BLACK ERASE BAR

h WHITE

R163 12Ω

Q118 MPS6562

R164 1K

+5V

CR100

R166 470Ω

C116 47mfd 6V

Q119 2N3702

R165 2.2K

C109 .47mfd RC.

R168 1K

R169 1K

C110 .047 mfd.

R167 51Ω 1/2W

Q120 2N3704

103-A 103-B 103-C 103-F 104-B 104-A 109-A 105-A

R170 1K R171 1K

READ

RUN

RESET

C118 THRU C129 .01

C112 .01 C113 .01 C114 .01 C115 .01

TP114 TP115

P20

1	+5V
2	RESET
3	GRD
4	GRD
5	GRD
6	-15V
7	+5V
8	HI DEN
9	+15V
10	SELECT
11	RUN
12	READ

U129 220Ω U130 330Ω

P102-(CONT'D)

E	THLD
5	
A	WDS
1	
J	SELECT LINE
8	
K	SELECT LINE
9	
C	WRS
3	

R174 8.2K C111 22pf

R172 470Ω

R175 1K

102 101-A 105-B 105-C 103-E

R173 1K

101-B 109-B 103-D

SELECT

RESET

1. INSTALL JUMPER H-J FOR WRS INPUT.
6. INSTALL JUMPER H-K FOR RESET FROM CONTROL.
5. INSTALL JUMPERS C-D & A-B FOR LEADING EDGE TRIGGERING.
4. INSTALL JUMPER A-C FOR TRAILING EDGE TRIGGERING.

3 CIRCLED LETTERS ON THIS SHEET ARE COMMON TO LIKE LETTERS ON SH 2.

2. ALL DIODES ARE 1N914

1 CIRCUIT SHOWN IS FOR R.A.W. MACHINES, FOR R/W OMIT ALL COMPONENTS IN BLOCK & ADD JUMPER FROM PIN 2 TO PIN 8 ON IC.

NOTES: (CONT SH 2)

RELEASED

"WRITE"

Cipher Data Products

	SCALE NONE	DR'N BY: RAD
		APP'D BY:
TITLE: SCHEMATIC, READ - WRITE		
DATE 6/3/71	DRAWING NO: 331512-300	E

SH 1 OF 2

TRACK 0

TRACK 1

TRACK 2 B

TRACK 3 A

TRACK 4 8

TRACK 5 4

TRACK 6

TRACK 7 1

TRACK P C

P22

TP15

+15 V

-15 V

+5V

TP1 TP2 TP3 TP4 TP5

TP7 TP8 TP9 TP11

C1 1mfd @ 35V

C2 1mfd @ 35V

C3 510 pf

C4 5pf

C5 1mfd

C6 680pf

C7 300pf

C8 .001mfd

C9 5pf

C10 1mfd @ 35V

C11 680pf

C12 22pf

C13 .01mfd

C14 P.C.

C15 510pf

C25 .01mfd

C26 .01mfd

C27 .01mfd

C28 .01mfd

R1 10K

R2 10K

R3 47K

R4 1.5K

R5 43K

R6 1K

R7 20K CW

R8 4.3K

R9 5.62K

R10 5.62K

R11 1.5K

R12 100K

R13 680Ω

R14 10.00K

R15 18.20K

R16 10.00K

R17 100Ω

R18 43.20K

R19 1.5K

R20 330K

R21 47Ω

R22 33.20K

R23 56K

R24 100Ω

R25 10K

R26 1K

R27 1K

R28 1K

R29 4.7K

R30 10K

CR1 CR2 CR3 CR4 CR5 CR6 CR7 CR8 CR9 CR10 CR11 CR12 CR13 CR14

Q1 2N3704

Q2 2N3702

Q3 2N3702

Q4 2N3704

Q5 2N3704

Q6 2N3704

Q7 2N3702

Q8 2N3702

R32 220Ω

R33 15K

R34 4.7K

R35 4.7K

R36 2.2K

R37 1.00K

R38 2.21K

R39 470Ω

R40 20K

R41 5.11K

R42 20K

R43 5.11K

R45 27K

R47 27K

R51 1K

C18 8 P.C.

C19 8 P.C.

C20 220pf

C21 47pf

HI DEN

HI DEN ADJ

LO DEN ADJ

18-A 18-B 18-C 18-D 18-E 18-F

16-A 16-B 16-D 16-E

15-A 15-B 15-C 15-D 15-E 15-F

13-A 13-B 13-C 13-D 13-E 13-F

12-A 12-B 12-C 12-D

9-A 9-B 9-C 9-D

22-A 22-B 22-C

19 23 17 20

+15V +5V GRD -15V

I.C.10, C23, R50 & C

OMIT PARTS IN TRACK "0" & "1", OMIT I.C. 18 & INSTALL JUMPER FROM PIN 3 TO 11 & PIN 7 TO 10, OMIT Q100-Q103, R118-121, R136-139, R154, R155, C100, C101, I.C. 122 & 126 ON -001 & -003 ASSY'S.

INSTALL JUMPE

SELECTED VALU

NOTES: CONT FROM SH 1

SEE SH1 FOR REVISIONS

7867

+15V
+5V
GND
-15V
TP 1
TP 2
TP 3
TP4 TP5
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP19
TP20
TP21
TP22
TP23
TP24
TP25
TP26
C1 510 pf
C2 .01mfd
C3 510 pf
C4 5pf
C5 1mfd
C6 680pf
C7 300pf
C8 .001mfd
C9 5pf
C10 1mfd @ 35V
C11 680pf
C12 22pf
C13 .01mfd
C14 P.C.
C15 510pf
C16 47mfd @ 6V
C17 220 pf
C18 P.C.
C19 P.C.
C20 220 pf
C21 47 pf
C22 47 pf
C23 1mfd
C24 .001mfd
C25 .01mfd
C26 .01mfd
C27 .01mfd
C28 .01mfd
C29 .01 mfd
C30 .01 mfd
C31 .01 mfd
C130 5pf
R5 4.2K
R7 20K CW
R8 4.3K
R9 5.62K
R10 5.62K
R11 1.5K
R12 100K
R13 680Ω
R14 10.00K
R15 18.20K
R16 10.00K
R17 100Ω
R18 43.20K
R19 1.5K
R20 330K
R21 47Ω
R22 33.20K
R23 56K
R24 100Ω
R25 10K
R26 1K
R27 1K
R28 1K
R29 4.7K
R30 10K
R31 470Ω
R32 220Ω
R33 15K
R34 4.7K
R35 4.7K
R36 2.2K
R37 1.00K
R38 2.21K
R39 470Ω
R40 20K
R41 5.11K
R42 20K
R43 5.11K
R45 27K
R47 27K
R48 1K
R49 1K
R50 16K
R51 1K
R86 21.50K
R182 1K
R183 1K
R184 1K
R185 1K
CR5 CR6 CR7 CR8 CR9 CR10 CR11 CR12 CR13 CR14 CR15 CR16 CR17
Q1 2N3704
Q2 2N3702
Q3 2N3702
Q4 2N3704
Q5 2N3704
Q6 2N3704
Q7 2N3702
Q8 2N3702
PE
9TR SW-1
DUAL
HI SPEED
HI DEN
HI DEN ADJ
LO DEN ADJ
P103
10 NRZ
11 7TR
12 SGL
13 SPD
3 RD 0
4 RD 1
8 RD 2/B
9 RD 3/A
14 RD 4/B
15 RD 5/4
17 RD 6/2
18 RD 7/1
1 RD P/C
2 READ STROBE
A SELECT
C HI DEN
E READ
B RUN
D THRESHOLD
K +5V
G GND
H
J -15V
L +15V
F103
R SELECT LINE
S SELECT LINE
"READ"

△10 I.C.10, C23, R50 & CR17 OMITTED ON READ AFTER WRITE UNITS -001 & -002.

△11 OMIT PARTS IN TRACK "0" & "1", OMIT I.C.18 & INSTALL JUMPER FROM PIN 3 TO 11 & PIN 7 TO 10, OMIT Q100-Q103, R118-121, R136-139, R154, R155, C100, C101, I.C. 122 & 126 ON -001 & -003 ASSY'S.

△9 INSTALL JUMPER L-M FOR READ WITH WRITE UNITS, -003 & -004.

△8 SELECTED VALUES DEPENDING ON DATA RATE.

NOTES: CONT FROM SH1

RELEASED

Cipher Data Products

SCHEMATIC — READ-WRITE

DWN: KBO
CKD:
APPD:

331512-300 SH 2 OF 3 E

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131512-000

TITLE PWB ASSY - R/W or RAW MODEL 100X

SH. 1 OF 1

REV W

DASH NO.	DESCRIPTION	DATE DRAWN
011	7 TRACK, READ AFTER WRITE, 12.5 - 25 IPS	
012	7 TRACK, READ AFTER WRITE, 25 - 45 IPS	
013	9 TRACK, READ AFTER WRITE, 12.5 - 25 IPS	
014	9 TRACK, READ AFTER WRITE, 25 - 45 IPS	
015	7 TRACK, READ/WRITE, 12.5 - 25 IPS	
016	7 TRACK, READ/WRITE, 25 - 45 IPS	
017	9 TRACK, READ/WRITE, 12.5 - 25 IPS	
018	9 TRACK, READ/WRITE, 25 - 37.5 IPS	
019	9 TRACK, READ/WRITE, 75 IPS	
020	9 TRACK, READ AFTER WRITE, 75 IPS	
021	9 TRACK, READ/WRITE, 45 IPS	
022	7 TRACK, READ AFTER WRITE 75 IPS	

Cipher Data Products

PARTS LIST

CODE IDENT 32274

PL 131512-0XX

TITLE PWB ASSEMBLY - READ/WRITE OR READ AFTER WRITE

MODEL 100X

SH 1 OF 22

REV AB

DWN H.F. JOHNSON	DATE 8-4-73	NEXT ASSY	LTR	DESCRIPTION	DWN	DATE	APP	DATE
CHK			S	ECO 1652	KFM	2-3-76		2-23-76
N/C			T	ECO 1745	HJ	3-23 76		3-23 76
APP K.F. BERLING			U	ECO 1766	HJ	4-15 76		4-15 76
APP			V	ECO 1784	HJ	4-29-76		4-29 76
			W	ECO 1917	HJ	7-8 76		7-8 76
			Z	ECO 1938	GB	7-15 76		7-15 76
PRODUCTION RELEASE			AA	ECO 1954	KFM	7-20-76		7-26 76
			AB	ECO 1980	DS	8-18 76		8-18-76

DASH NO.	JUMPER TABLE
-011 & -012	A-B, C-D, E-G, H-J, PIN 3 TO PIN 11 AND PIN 7 TO PIN 10 OF I.C. 18
-013 & -014	A-B, C-D, E-G, H-J
-015 & -016	A-B, C-D, E-G, H-J, L-M, PIN 3 TO PIN 11 AND PIN 7 TO PIN 10 OF I.C. 18
-017 & -018	A-B, C-D, E-G, H-J, L-M
-019	A-B, C-D, E-G, H-J, L-M, PIN 1 TO PIN 2 OF R119, 121, 123, 125, 127, 129, 131, 133, 135, PIN 6 TO PIN 14 OF I.C. 23
-020	A-B, C-D, E-G, H-J, PIN 6 TO 14 OF I.C. 23 LOC.

5051 CD

NOTE: UNDERLINED REFERENCE DESIGNATORS INDICATE MULTIPLE USAGE PARTS FOR TRACKS

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - READ - AFTER - WRITE -011 & -012, 7 TRACK	DATE 8 4 75		1980	8-17-76	2 OF 22 SHEETS

ITEM	QUANTITY 011	QUANTITY 012		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731512-100	PW BOARD-READ/WRITE		CIPHER	
2	1	1		731510-500	STIFFENER, LONG		CIPHER	
3	1	1		731510-400	STIFFENER BAR		CIPHER	
4	4	4		731501-300	RETAINER, P/C CONNECTOR		CIPHER	
5	2	2		735000-402	SPACER		CIPHER	
6	67	67		205026	TEST POINT, .058 DIA	61181-2	AMP	
7	1	1		205068	CONNECTOR, PLUG (12PIN)	03-09-2121	MOLEX	P20
8	12	12		205012	PIN TERMINALS, MALE, .093 DIA	02-09-2134	MOLEX	(P20)
9	2	2		205061	CONNECTOR, DIP SOLDER PINS	SRE-29-PD4J	WINCHESTER	P21,22
10	1	1		210807	SWITCH, DUAL-IN-LINE	435166-2	AMP	SW1
11	1	1		205201	SWITCH, COVER	435489-1	AMP	(SW1)
12	2	2		211002	SOCKET, 14 PIN, DIP	CA-14S-10SD	CKT ASSY CORP	XU129,130
13	1			131511-002	SPEED KIT - 7TK, 12.5-25 IPS		CIPHER	
13		1		131511-001	SPEED KIT - 7TK, 25-45 IPS		CIPHER	
14								
15	41	41		201105-010	CAP, DISC, .01UF, 500V	5HKS-S10	SPRAGUE	C25-28,31,118 -129
16	21	21		201120-500	CAP, DIP MICA, 5PF,300V,±½PF	D153C050D0	SANGAMO	C4,9,130
17	8	8		201121-220	CAP, DIP MICA, 22PF, 300V, 5%	D153E220J0	SANGAMO	C12,111
18	2	2		201121-470	CAP, DIP MICA, 47PF, 300V, 5%	D153E470J0	SANGAMO	C21,22
19	8	8		201122-220	CAP, DIP MICA, 220PF, 300V, 5%	D153E221J0	SANGAMO	C17,20
20	7	7		201122-300	CAP, DIP MICA, 300PF, 300V, 5%	D153E301J0	SANGAMO	C7
21	14	14		201122-510	CAP, DIP MICA, 510PF, 300V, 5%	D153E511J0	SANGAMO	C3,15
22	14	14		201122-680	CAP, DIP MICA, 680PF, 300V, 5%	D153E681J0	SANGAMO	C6,11
23	1	1		201148-001	CAP, POLYCARB, .001UF, 50V, 5%	625B1A102J	ELECTROCUBE	C24
24								
25	1	1		201148-470	CAP, POLYCARB, .47UF, 50V, 5%	625B1A474J	ELECTROCUBE	C109
26								
27								
28								
29								
30	7	7		201158-001	CAP, MYLAR, .001UF, 100V, 10%	WMF1D1	CDE	C8
31	13	13		201159-100	CAP, MYLAR, .01UF, 100V, 10%	WMF1S1	CDE	C13,29,30,112-115
32	1	1		201159-470	CAP, MYLAR, .047UF, 100V, 10%	WMF1S47	CDE	C110

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - READ - AFTER - WRITE -011 &-012, 7 TRACK

DWN [illegible] | DATE 8-4-76 | APPROVAL [illegible] | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 3 OF 22 SHEETS

ITEM	QUANTITY 011	QUANTITY 012		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
33	29	29		201160-100	CAP, TANT, 1UF, 35V, 10%	CS13BF105K	MIL-C-26655	C1,2,5,10,117
34	8	8		201161-470	CAP, TANT, 47UF, 6V, 10%	CS13BB476K	MIL-C-26655	C16,116
35								
36								
37	113	113		202018	DIODE	1N914		CR1-16,100
38								
39								
40	17	17		204012	TRANSISTOR, PNP	2N3702		Q3,2,7,8,119
41	31	31		204013	TRANSISTOR, NPN	2N3704		Q1,4,5,6,104 -117,120
42	1	1		204004	TRANSISTOR, PNP, AUDIO	MPS6562	MOTOROLA	Q118
43								
44								
45	1	1		200013-100	RES, MF, 1.00K, 1/10W, 1%	RN55D1001F	MIL-R-10509	R37
46	1	1		200013-221	RES, MF, 2.21K, 1/10W, 1%	RN55D2211F	MIL-R-10509	R38
47	1	1		200014-215	RES, MF, 21.50K, 1/10W, 1%	RN55D2152F	MIL-R-10509	R186
48	2	2		200013-511	RES, MF, 5.11K, 1/10W, 1%	RN55D5111F	MIL-R-10509	R41,43
49	14	14		200013-562	RES, MF, 5.62K, 1/10W, 1%	RN55D5621F	MIL-R-10509	R9,10
50	14	14		200014-100	RES, MF, 10.00K, 1/10W, 1%	RN55D1002F	MIL-R-10509	R14,16,
51	7	7		200014-182	RES, MF, 18.20K, 1/10W, 1%	RN55D1822F	MIL-R-10509	R15
52	7	7		200014-332	RES, MF, 33.20K, 1/10W, 1%	RN55D3322F	MIL-R-10509	R22
53	7	7		200014-432	RES, MF, 43.20K, 1/10W, 1%	RN55D4322F	MIL-R-10509	R18
54								
55	1	1		200071-120	RES, FIX, COMP, 12OHM, 1/4W, 5%	RCR07G120JM	MIL-R-39008	R163
56	7	7		200071-470	RES, FIX, COMP, 47OHM, 1/4W, 5%	RCR07G470JM	MIL-R-39008	R21
57	14	14		200072-100	RES, FIX, COMP, 100OHM,1/4W, 5%	RCR07G101JM	MIL-R-39008	R17,24
58	7	7		200072-120	RES, FIX, COMP, 120OHM,1/4W, 5%	RCR07G121JM	MIL-R-39008	R156-162
59	1	1		200072-220	RES, FIX, COMP, 220OHM,1/4W, 5%	RCR07G221JM	MIL-R-39008	R32
60	10	10		200072-470	RES, FIX, COMP, 470OHM,1/4W, 5%	RCR07G471JM	MIL-R-39008	R31,39,166,172
61	21	21		200072-680	RES, FIX, COMP, 680OHM,1/4W, 5%	RCR07G681JM	MIL-R-39008	R13,140-153
62	43	43		200073-100	RES, FIX, COMP, 1K, 1/4W, 5%	RCR07G102JM	MIL-R-39008	R6,26,27,28,48 49,51,164,

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - READ - AFTER - WRITE -011 &-012, 7 TRACK

DWN | DATE 8-4-75 | APPROVAL | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 4 OF 22 SHEETS

ITEM	QUANTITY 011	QUANTITY 012		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
62					ITEM 62 CONTINUED FROM SH. 3			R168-171,173, 175,182-185 187
63	21	21		200073-150	RES, FIX, COMP, 1.5K, 1/4W, 5%	RCR07G152JM	MIL-R-39008	R4,11,19
64	2	2		200073-220	RES, FIX, COMP, 2.2K, 1/4W, 5%	RCR07G222JM	MIL-R-39008	R36,165
65	9	9		200073-470	RES, FIX, COMP, 4.7K, 1/4W, 5%	RCR07G472JM	MIL-R-39008	R29,34,35
66	1	1		200073-820	RES, FIX, COMP, 8.2K, 1/4W, 5%	RCR07G822JM	MIL-R-39008	R174
67	21	21		200074-100	RES, FIX, COMP, 10K, 1/4W, 5%	RCR07G103JM	MIL-R-39008	R25,30,122,124 126,128,130, 132,134
68	1	1		200074-150	RES, FIX, COMP, 15K, 1/4W, 5%	RCR07G153JM	MIL-R-39008	R33
69								
70	2	2		200074-270	RES, FIX, COMP, 27K, 1/4W, 5%	RCR07G273JM	MIL-R-39008	R45,47
71	14	14		200074-430	RES, FIX, COMP, 43K, 1/4W, 5%	RCR07G433JM	MIL-R-39008	R5,8
72	7	7		200074-470	RES, FIX, COMP, 47K, 1/4W, 5%	RCR07G473JM	MIL-R-39008	R3
73	7	7		200074-560	RES, FIX, COMP, 56K, 1/4W, 5%	RCR07G563JM	MIL-R-39008	R23
74	7	7		200075-100	RES, FIX, COMP, 100K,1/4W, 5%	RCR07G104JM	MIL-R-39008	R12
75	7	7		200075-330	RES, FIX, COMP, 330K,1/4W, 5%	RCR07G334JM	MIL-R-39008	R20
76	1	1		200081-510	RES, FIX, COMP, 51OHM,1/2W,5%	RCR20G510JM	MIL-R-39008	R167
77	7	7		200204-100	RES, VARIABLE, 10K, 5%	ET34P103J	ELECTRA MIDLAND	R123,125,127 129,131,133 135
78	9	9		200204-200	RES, VARIABLE, 20K, 5%	ET34P203J	ELECTRA MIDLAND	R7,40,42
79	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-220	BECKMAN	U129
80	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-330	BECKMAN	U130
81								
82								
83	9	9		203017	I.C., HEX INVERTER, DIP	SN15836N	TEXAS INST.	U11,13,16,100 103,105,123 124,125

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE: PWB ASSEMBLY - READ - AFTER - WRITE
-011 & -012, 7 TRACK

DWN | DATE | APPROVAL | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 5 OF 22 SHEETS

ITEM	QUANTITY 011	012		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
84	9	9		203021	I.C., QUAD 2 INPUT, DIP	SN15846N	TEXAS INST.	U9,12,15,21, 22,106,107,109 110
85	1	1		203036	I.C., QUAD 2 INPUT, DIP	SN7438	TEXAS INST.	U128
86	4	4		203041	I.C., DUAL J-K FLIP-FLOP DIP	SN7476N	TEXAS INST.	U119,120,121 127
87	8	8		203019	I.C., DUAL BUFFER, DIP	SN15844N	TEXAS INST.	U4-8,14,101, 104
88	12	12		203002	I.C., MONOSTABLE, DIP	F9601PC	FAIRCHILD	U17,19,20,23, 102,111-117
89	21	21		203008	I.C., OP-AMP	709 HC 2191	FAIRCHILD H.H. SMITH	U1-3
90	8	8		205061-004	WASHER, FLAT - FIBRE	8100-B-0256	AMATOM	
91	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	4-40 x 5/16		
92	3	3		206405-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 1/2		
93	2	2		206408-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/8		
94	4	4		206410-011	SCREW, PAN, PHIL, STL, CAD.	# 4		
95	3	3		207406-081	NUT, HEX, RADIO, STL, CAD.	# 4		
96	3	3		207408-021	WASHER, FLAT, STL, CAD. SM. PAT .260 MAX O.D.	# 4		
97	3	3		207403-011	WASHER, SPLIT LOCK, STL, CAD.		CIPHER	
98	1	1		731006-800	LABEL ASSY.	2161	H. H. SMITH	
99	4	4		205061-001	WASHER, FIBER			
REF	DWG	DWG		331512-300	SCHEMATIC, READ/WRITE, RAW		CIPHER	
REF	DWG	DWG		131512-000	PWB ASSY, READ/WRITE, RAW		CIPHER	

NOTE: UNDERLINED REFERENCE DESIGNATORS INDICATE MULTIPLE USAGE PARTS FOR TRACKS

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - READ - AFTER - WRITE -013 & -014, 9 TRACK	DATE		1980	8-17-76	6 OF 22 SHEETS

ITEM	QUANTITY 013	QUANTITY 014	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	731512-100	PW BOARD-READ/WRITE		CIPHER	
2	1	1	731510-500	STIFFENER, LONG		CIPHER	
3	1	1	731510-400	STIFFENER BAR		CIPHER	
4	4	4	731501-300	RETAINER, P/C CONNECTOR		CIPHER	
5	2	2	735000-402	SPACER		CIPHER	
6	77	77	205026	TEST POINT, .058 DIA.	61181-2	AMP	
7	1	1	205068	CONNECTOR, PLUG (12 PIN)	03-09-2121	MOLEX	P20
8	12	12	205012	PIN TERMINALS, MALE, .093 DIA.	02-09-2134	MOLEX	(P20)
9	2	2	205061	CONNECTOR, DIP SOLDER PINS	SRE-29-PD4J	WINCHESTER	P21,22
10	1	1	210807	SWITCH, DUAL-IN-LINE	435166-2	AMP	SW1
11	1	1	205201	SWITCH, COVER	435489-1	AMP	(SW1)
12	2	2	211002	SOCKET, 14 PIN, DIP	CA-14S-10SD	CKT ASSY CORP	XU129,130
13							
14	1		131512-902	SPEED KIT -9TK, 12.5-25 IPS		CIPHER	
14		1	131512-901	SPEED KIT -9TK, 25 - 45 IPS		CIPHER	
15	49	49	201105-010	CAP, DISC, .01UF, 500V,	5HKS-S10	SPRAGUE	C25-28,31,118 -129
16	27	27	201120-500	CAP, DIP MICA, 5PF, 300V, ±½PF	D153C050D0	SANGAMO	C4,9,130
17	10	10	201121-220	CAP, DIP MICA, 22PF, 300V, 5%	D153E220J0	SANGAMO	C12,111
18	2	2	201121-470	CAP, DIP MICA, 47PF, 300V, 5%	D153E470J0	SANGAMO	C21,22
19	10	10	201122-220	CAP, DIP MICA, 220PF, 300V, 5%	D153E221J0	SANGAMO	C17,20
20	9	9	201122-300	CAP, DIP MICA, 300PF, 300V, 5%	D153E301J0	SANGAMO	C7
21	18	18	201122-510	CAP, DIP MICA, 510PF, 300V, 5%	D153E511J0	SANGAMO	C3,15
22	18	18	201122-680	CAP, DIP MICA, 680PF, 300V, 5%	D153E681J0	SANGAMO	C6,11
23	1	1	201148,001	CAP, POLYCARB, .001UF, 50V, 5%	625B1A102J	ELECTROCUBE	C24
24							
25	1	1	201148-470	CAP, POLYCARB, .47UF, 50V, 5%	625B1A474J	ELECTROCUBE	C109
26							
27							
28							
29							
30	9	9	201158-001	CAP, MYLAR, .001UF, 100V, 10%	WMF1D1	CDE	C8
31	15	15	201159-100	CAP, MYLAR, .01UF, 100V, 10%	WMF1S1	CDE	C13,29,30,112-115
32	1	1	201159-470	CAP, MYLAR, .047UF, 100V, 10%	WMF1S47	CDE	C110

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AE

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - READ - AFTER - WRITE -013 &-014, 9 TRACK	DATE		1980	8-17-76	7 OF SHEETS

ITEM	QUANTITY 013	QUANTITY 014		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
33	37	37		201160-100	CAP, TANT, 1UF, 35V, 10%	CS13BF105K	MIL-C-26655	C1,2,5,10,117
34	10	10		201161-470	CAP, TANT, 47UF, 6V, 10%	CS13BB476K	MIL-C-26655	C16,116
35								
36								
37	145	145		202018	DIODE	1N914		CR1-16,100
38								
39								
40	21	21		204012	TRANSISTOR, PNP	2N3702		Q3,2,7,8,119
41	39	39		204013	TRANSISTOR, NPN	2N3704		Q1,4,5,6,100-117,120
42	1	1		204004	TRANSISTOR, PNP, AUDIO	MPS6562	MOTOROLA	Q118
43								
44								
45	1	1		200013-100	RES, MF, 1.00K, 1/10W, 1%	RN55D1001F	MIL-R-10509	R37
46	1	1		200013-221	RES, MF, 2.21K, 1/10W, 1%	RN55D2211F	MIL-R-10509	R38
47	1	1		200014-215	RES, MF, 21.50K, 1/10W, 1%	RN55D2152F	MIL-R-10509	R186
48	2	2		200013-511	RES, MF, 5.11K, 1/10W, 1%	RN55D5111F	MIL-R-10509	R41,43
49	18	18		200013-562	RES, MF, 5.62K, 1/10W, 1%	RN55D5621F	MIL-R-10509	R9,10
50	18	18		200014-100	RES, MF, 10.00K, 1/10W, 1%	RN55D1002F	MIL-R-10509	R14,16
51	9	9		200014-182	RES, MF, 18.20K, 1/10W, 1%	RN55D1822F	MIL-R-10509	R15
52	9	9		200014-332	RES, MF, 33.20K, 1/10W, 1%	RN55D3322F	MIL-R-10509	R22
53	9	9		200014-432	RES, MF, 43.20K, 1/10W, 1%	RN55D4322F	MIL-R-10509	R18
54								
55	1	1		200071-120	RES, FIX, COMP, 12 OHM, 1/4W,5%	RCR07G120JM	MIL-R-39008	R163
56	9	9		200071-470	RES, FIX, COMP, 47 OHM, 1/4W,5%	RCR07G470JM	MIL-R-39008	R21
57	18	18		200072-100	RES, FIX, COMP, 100 OHM,1/4W,5%	RCR07G101JM	MIL-R-39008	R17,24
58	9	9		200072-120	RES, FIX, COMP, 120 OHM,1/4W,5%	RCR07G121JM	MIL-R-39008	R154-162
59	1	1		200072-220	RES, FIX, COMP, 220 OHM,1/4W,5%	RCR07G221JM	MIL-R-39008	R32
60	12	12		200072-470	RES, FIX, COMP, 470 OHM,1/4W,5%	RCR07G471JM	MIL-R-39008	R31,39,166,172
61	27	27		200072-680	RES, FIX, COMP, 680 OHM,1/4W,5%	RCR07G681JM	MIL-R-39008	R13,136-153
62	51	51		200073-100	RES, FIX, COMP, 1K, 1/4W, 5%	RCR07G102JM	MIL-R-39008	R6,26,27,28,48,49,51,164,168-171,173,175,182-185,187

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - READ - AFTER - WRITE -013 &-014, 9 TRACK

DWN | DATE | APPROVAL | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 8 OF 22 SHEETS

ITEM	QUANTITY 013	014		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
63	27	27		200073-150	RES, FIX, COMP, 1.5K, 1/4W, 5%	RCR07G152JM	MIL-R-39008	R4,11,19
64	2	2		200073-220	RES, FIX, COMP, 2.2K, 1/4W, 5%	RCR07G222JM	MIL-R-39008	R36,165
65	11	11		200073-470	RES, FIX, COMP, 4.7K, 1/4W, 5%	RCR07G472JM	MIL-R-39008	R29,34,35
66	1	1		200073-820	RES, FIX, COMP, 8.2K, 1/4W, 5%	RCR07G822JM	MIL-R-39008	R174
67	27	27		200074-100	RES, FIX, COMP, 10K, 1/4W, 5%	RCR07G103JM	MIL-R-39008	R25,30,122,124 126,128,130, 132,134,118,120
68	1	1		200074-150	RES, FIX, COMP, 15K, 1/4W, 5%	RCR07G153JM	MIL-R-39008	R33
69								
70	2	2		200074-270	RES, FIX, COMP, 27K, 1/4W, 5%	RCR07G273JM	MIL-R-39008	R45,47
71	18	18		200074-430	RES, FIX, COMP, 43K, 1/4W, 5%	RCR07G433JM	MIL-R-39008	R5,8,
72	9	9		200074-470	RES, FIX, COMP, 47K, 1/4W, 5%	RCR07G473JM	MIL-R-39008	R3
73	9	9		200074-560	RES, FIX, COMP, 56K, 1/4W, 5%	RCR07G563JM	MIL-R-39008	R23
74	9	9		200075-100	RES, FIX, COMP, 100K, 1/4W,5%	RCR07G104JM	MIL-R-39008	R12
75	9	9		200075-330	RES, FIX, COMP, 330K, 1/4W,5%	RCR07G334JM	MIL-R-39008	R20
76	1	1		200081-510	RES, FIX, COMP, 510HM,1/2W,5%	RCR20G510JM	MIL-R-39008	R167
77	9	9		200204-100	RES, VARIABLE, 10K, 5%	ET34P103J	ELECTRA MIDLAND	R123,125,127 129,131,133, 135,119,121
78	11	11		200204-200	RES, VARIABLE, 20K,5%	ET34P203J	E/M	R7,40,42
79	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-220	BECKMAN	U129
80	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-330	BECKMAN	U130
81								
82								
83	9	9		203017	I.C., HEX INVERTER, DIP	SN15836N	TEXAS INST.	U11,13,16,100 103,105,123, 124,125
84	11	11		203021	I.C., QUAD 2 INPUT, DIP	SN15846N	TEXAS INST.	U9,12,15,21, 22,106,107,109 110,108,18

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | **PL** 131512-0XX | REV AB

TITLE PWB ASSEMBLY - READ - AFTER - WRITE -013 & -014, 9 TRACK

DWN | DATE 8-4-76 | APPROVAL | E.C.O. NO. 1980 | DATE 8/17/76 | SHEET 9 OF 22 SHEETS

ITEM	QUANTITY 013	014		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
85	1	1		203036	I.C., QUAD 2 INPUT, DIP	SN7438	TEXAS INST.	U128
86	5	5		203041	I.C., DUAL J-K FLIP-FLOP DIP	SN7476N	TEXAS INST.	U119,120,121 127, 126
87	8	8		203019	I.C., DUAL BUFFER, DIP	SN15844N	TEXAS INST.	U4-8,14,101, 104
88	14	14		203002	I.C., MONOSTABLE, DIP	F9601PC	FAIRCHILD	U17,19,20,23 102,111-117 U118,122
89	27	27		203008	I.C., OP-AMP	709 HC	FAIRCHILD	U1-3
90	8	8		205061-004	WASHER, FLAT - FIBRE	2191	H.H. SMITH	
91	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
92	3	3		206405-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/16		
93	2	2		206408-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 1/2		
94	4	4		206410-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/8		
95	3	3		207406-081	NUT, HEX, RADIO,STL, CAD.	# 4		
96	3	3		207408-021	WASHER, FLAT, STL, CAD. SM. PAT. .260 MAX O.D.	# 4		
97	3	3		207403-011	WASHER, SPLIT LOCK, STL, CAD	# 4		
98	1	1		731006-800	LABEL ASSY.		CIPHER	
99	4	4		205061-001	WASHER, FIBER	2161	H. H. SMITH	
REF	DWG	DWG		331512-300	SCHEMATIC, READ/WRITE, RAW		CIPHER	
REF	DWG	DWG		131512-000	PWB ASSY, READ/WRITE, RAW		CIPHER	

NOTE: UNDERLINED REFERENCE DESIGNATORS INDICATE MULTIPLE USAGE PARTS FOR TRACKS

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - READ/WRITE -015 & -016, 7 TRACK	DATE		1980	8-17-76	10 OF 22 SHEETS

ITEM	QUANTITY 015	QUANTITY 016		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731512-100	PW BOARD-READ/WRITE		CIPHER	
2	1	1		731510-500	STIFFINER, LONG		CIPHER	
3	1	1		731510-400	STIFFINER BAR		CIPHER	
4	4	4		731501-300	RETAINER, P/C CONNECTOR		CIPHER	
5	2	2		735000-402	SPACER		CIPHER	
6	67	67		205026	TEST POINT, .058 DIA	61181-2	AMP	
7	1	1		205068	CONNECTOR, PLUG (12PIN)	03-09-2121	MOLEX	P20
8	12	12		205012	PIN TERMINALS, MALE .093 DIA	02-09-2134	MOLEX	(P20)
9	2	2		205061	CONNECTOR, DIP SOLDER PINS	SRE-29-PD4J	WINCHESTER	P21,22
10	1	1		210807	SWITCH, DUAL-IN-LINE	435166-2	AMP	SW1
11	1	1		205201	SWITCH, COVER	435489-1	AMP	(SW1)
12	2	2		211002	SOCKET, 14 PIN, DIP	CA-14S-10SD	CKT ASSY CORP	XU129,130
13	1			131511-002	SPEED KIT 7TK, 12.5-25 IPS		CIPHER	
13		1		131511-001	SPEED KIT 7TK, 25-45 IPS		CIPHER	
14								
15	41	41		201105-010	CAP, DISC, .01UF, 500V,	5HKS-S10	SPRAGUE	C25-28,31,118 -129
16	21	21		201120-500	CAP, DIP MICA, 5PF, 300V,±1/2PF	D153C050D0	SANGAMO	C4,9,130
17	8	8		201121-220	CAP, DIP MICA, 22PF, 300V, 5%	D153E220J0	SANGAMO	C12,111
18	2	2		201121-470	CAP, DIP MICA, 47PF, 300V, 5%	D153E470J0	SANGAMO	C21,22
19	8	8		201122-220	CAP, DIP MICA, 220PF, 300V,5%	D153E221J0	SANGAMO	C17,20
20	7	7		201122-300	CAP, DIP MICA, 300PF, 300V,5%	D153E301J0	SANGAMO	C7
21	14	14		201122-510	CAP, DIP MICA, 510PF, 300V,5%	D153E511J0	SANGAMO	C3,15
22	14	14		201122-680	CAP, DIP MICA, 680PF, 300V,5%	D153E681J0	SANGAMO	C6,11
23	1	1		201148-001	CAP, POLYCARB, .001UF, 50V, 5%	625B1A102J	ELECTROCUBE	C24
24								
25	1	1		201148-470	CAP, POLYCARB, .47UF, 50V, 5%	625B1A474J	ELECTROCUBE	C109
26								
27								
28								
29								
30	7	7		201158-001	CAP, MYLAR, .001UF, 100V, 10%	WMF1D1	CDE	C8
31	13	13		201159-100	CAP, MYLAR, .01UF, 100V, 10%	WMF1S1	CDE	C13,29,30,112-115

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET 11
PWB ASSEMBLY - READ/WRITE -015 & -016, 7 TRACK	DATE	RTG	1980	8-17-76	OF 12 SHEETS

ITEM	QUANTITY 015	016		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
32	1	1		201159-470	CAP, MYLAR, .047UF, 100V, 10%	WMF1S47	CDE	C110
33	30	30		201160-100	CAP, TANT, 1UF, 35V, 10%	CS13BF105K	MIL-C-26655	C1,2,5,10,23, 117
34	8	8		201161-470	CAP, TANT, 47UF, 6V, 10%	CS13BB476K	MIL-C-26655	C16,116
35								
36								
37	114	114		202018	DIODE	1N914		CR1-16,17,100
38								
39								
40	17	17		204012	TRANSISTOR, PNP	2N3702		Q2,3,7,8,119
41	31	31		204013	TRANSISTOR, NPN	2N3704		Q1,4,5,6,104 -117,120
42	1	1		204004	TRANSISTOR, PNP, AUDIO	MPS6562	MOTOROLA	Q118
43								
44								
45	1	1		200013-100	RES, MF, 1.00K, 1/10W, 1%	RN55D1001F	MIL-R-10509	R37
46	1	1		200013-221	RES, MF, 2.21k, 1/10W, 1%	RN55D2211F	MIL-R-10509	R38
47	1	1		200014-215	RES, MF, 21.50K, 1/10W, 1%	RN55D2152F	MIL-R-10509	R186
48	2	2		200013-511	RES, MF, 5.11K, 1/10W, 1%	RN55D5111F	MIL-R-10509	R41,43
49	14	14		200013-562	RES, MF, 5.62K, 1/10W, 1%	RN55D5621F	MIL-R-10509	R9,10
50	14	14		200014-100	RES, MF, 10.00K, 1/10W, 1%	RN55D1002F	MIL-R-10509	R14,16
51	7	7		200014-182	RES, MF, 18.20K, 1/10W, 1%	RN55D1822F	MIL-R-10509	R15
52	7	7		200014-332	RES, MF, 33.20K, 1/10W, 1%	RN55D3322F	MIL-R-10509	R22
53	7	7		200014-432	RES, MF, 43.20K, 1/10W, 1%	RN55D4322F	MIL-R-10509	R18
54								
55	1	1		200071-120	RES, FIX COMP, 12 OHM, 1/4W, 5%	RCR07G120JM	MIL-R-39008	R163
56	7	7		200071-470	RES, FIX COMP, 47 OHM, 1/4W, 5%	RCR07G470JM	MIL-R-39008	R21
57	14	14		200072-100	RES, FIX COMP, 100OHM, 1/4W, 5%	RCR07G101JM	MIL-R-39008	R17,24
58	7	7		200072-120	RES, FIX COMP, 120OHM, 1/4W, 5%	RCR07G121JM	MIL-R-39008	R156-162
59	1	1		200072-220	RES, FIX COMP, 220OHM, 1/4W, 5%	RCR07G221JM	MIL-R-39008	R32
60	10	10		200072-470	RES, FIX COMP, 470OHM, 1/4W, 5%	RCR07G471JM	MIL-R-39008	R31,39,166,172
61	21	21		200072-680	RES, FIX COMP, 680OHM, 1/4W, 5%	RCR07G681JM	MIL-R-39008	R13,140-153
62	43	43		200073-100	RES, FIX COMP, 1 K, 1/4W, 5%	RCR07G102JM	MIL-R-39008	R6,26,27,28,48 49,51,164,168-171,173,175.

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - READ/WRITE -015 &-016, 7 TRACK

DWN [illegible] DATE 8-14-75 | APPROVAL [illegible] | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 12 OF 22 SHEETS

ITEM	QUANTITY 015	016		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
62					ITEM 62 CONTINUED FROM SH. 11			R182-185,187
63	21	21		200073-150	RES, FIX COMP, 1.5K, 1/4W, 5%	RCR07G152JM	MIL-R-39008	R4,11,19
64	2	2		200073-220	RES, FIX COMP, 2.2K, 1/4W, 5%	RCR07G222JM	MIL-R-39008	R36,165
65	9	9		200073-470	RES, FIX COMP, 4.7K, 1/4W, 5%	RCR07G472JM	MIL-R-39008	R29,34,35
66	1	1		200073-820	RES, FIX COMP, 8.2K, 1/4W, 5%	RCR07G822JM	MIL-R-39008	R174
67	21	21		200074-100	RES, FIX COMP, 10K, 1/4W, 5%	RCR07G103JM	MIL-R-39008	R25,30,122,124 126,128,130, 132,134
68	1	1		200074-150	RES, FIX COMP, 15K, 1/4W, 5%	RCR07G153JM	MIL-R-39008	R33
69	1	1		200074-240	RES, FIX COMP, 24K, 1/4W, 5%	RCR07G243JM	MIL-R-39008	R50
70	2	2		200074-270	RES, FIX COMP, 27K, 1/4W, 5%	RCR07G273JM	MIL-R-39008	R45,47
71	14	14		200074-430	RES, FIX COMP, 43K, 1/4W, 5%	RCR07G433JM	MIL-R-39008	R5,8
72	7	7		200074-470	RES, FIX COMP, 47K, 1/4W, 5%	RCR07G473JM	MIL-R-39008	R3
73	7	7		200074-560	RES, FIX COMP, 56K, 1/4W, 5%	RCR07G563JM	MIL-R-39008	R23
74	7	7		200075-100	RES, FIX COMP, 100K,1/4W, 5%	RCR07G104JM	MIL-R-39008	R12
75	7	7		200075-330	RES, FIX COMP, 330K,1/4W, 5%	RCR07G334JM	MIL-R-39008	R20
76	1	1		200081-510	RES, FIX COMP, 510HM, 1/2W, 5%	RCR20G510JM	MIL-R-39008	R167
77	7	7		200204-100	RES, VARIABLE, 10K, 5%	ET34P103J	ELECTRA MIDLAND	R123,125,127, 129,131,133, 135
78	9	9		200204-200	RES, VARIABLE, 20K, 5%	ET34P203J	ELECTRA MIDLAND	R7,40,42
79	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-220	BECKMAN	U129
80	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-330	BECKMAN	U130
81								
82								
83	9	9		203017	I.C., HEX INVERTER, DIP	SN15836N	TEXAS INST.	U11,13,16,100 103,105,123, 124,125
84	9	9		203021	I.C., QUAD 2 INPUT, DIP	SN15846N	TEXAS INST.	U9,12,15,21, 22,106,107, 109,110
85								
86	4	4		203041	I.C., DUAL J-K FLIP-FLOP DIP	SN7476N	TEXAS INST.	U119,120,121,127

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - READ/WRITE -015 &-016, 7 TRACK

DWN | DATE | APPROVAL | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 13 OF 23 SHEETS

ITEM	QUANTITY 015	QUANTITY 016		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
87	8	8		203019	I.C., DUAL BUFFER, DIP	SN15844N	TEXAS INST.	U4-8,14,101, 104
88	13	13		203002	I.C., MONOSTABLE, DIP	F9601PC	FAIRCHILD	U10,17,19,20, 23,102,111-117
89	21	21		203008	I.C., OP-AMP	709 HC	FAIRCHILD	U1-3
90	8	8		205061-004	WASHER, FLAT - FIBRE	2191	H.H. SMITH	
91	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
92	3	3		206405-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/16		
93	2	2		206408-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 1/2		
94	4	4		206410-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/8		
95	3	3		207406-081	NUT, HEX, RADIO, STL, CAD.	# 4		
96	3	3		207408-021	WASHER, FLAT, STL, CAD. SM. PAT .260 MAX O.D.	# 4		
97	3	3		207403-011	WASHER, SPLIT LOCK, STL, CAD.	# 4		
98	1	1		731006-800	LABEL, ASSY.		CIPHER	
99	4	4		205061-001	WASHER, FIBER	2161	H. H. SMITH	
REF	DWG	DWG		331512-300	SCHEMATIC, READ/WRITE, RAW		CIPHER	
REF	DWG	DWG		131512-000	PWB ASSY, READ/WRITE, RAW		CIPHER	

NOTE: UNDERLINED REFERENCE DESIGNATORS INDICATE MULTIPLE USAGE PARTS FOR TRACKS

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - READ/WRITE -017 &-018, 9 TRACK	DATE		1980	8-17-76	14 OF 22 SHEETS

ITEM	QUANTITY 017	018		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731512-100	PW BOARD-READ/WRITE		CIPHER	
2	1	1		731510-500	STIFFINER, LONG		CIPHER	
3	1	1		731510-400	STIFFINER BAR		CIPHER	
4	4	4		731501-300	RETAINER, P/C CONNECTOR		CIPHER	
5	2	2		735000-402	SPACER		CIPHER	
6	77	77		205026	TEST POINT, .058 DIA	61181-2	AMP	
7	1	1		205068	CONNECTOR, PLUG (12 PIN)	03-09-2121	MOLEX	P20
8	12	12		205012	PIN TERMINALS, MALE .093 DIA	02-09-2134	MOLEX	(P20)
9	2	2		205061	CONNECTOR, DIP SOLDER PINS	SRE-29-PD4J	WINCHESTER	P21,22
10	1	1		210807	SWITCH, DUAL-IN-LINE	435166-2	AMP	SW1
11	1	1		205201	SWITCH, COVER	435489-1	AMP	(SW1)
12	2	2		211002	SOCKET, 14 PIN, DIP	CA-14S-10SD	CKT ASSY CORP	XU129,130
13								
14	1			131512-902	SPEED KIT, 9 TK,12.5-25 IPS		CIPHER	
14		1		131512-901	SPEED KIT, 9 TK, 25-45 IPS		CIPHER	
15	49	49		201105-010	CAP, DISC, .01UF. 500V	5HKS-S10	SPRAGUE	C25-28,31,118 -129
16	27	27		201120-500	CAP, DIP MICA, 5PF, 300V,±1/2PF	D153C050D0	SANGAMO	C4,9,130
17	10	10		201121-220	CAP, DIP MICA, 22PF, 300V, 5%	D153E220J0	SANGAMO	C12,111
18	2	2		201121-470	CAP, DIP MICA, 47PF, 300V, 5%	D153E470J0	SANGAMO	C21,22
19	10	10		201122-220	CAP, DIP MICA, 220PF, 300V, 5%	D153E221J0	SANGAMO	C17,20
20	9	9		201122-300	CAP, DIP MICA, 300PF 300V, 5%	D153E301J0	SANGAMO	C7
21	18	18		201122-510	CAP, DIP MICA, 510PF, 300V, 5%	D153E511J0	SANGAMO	C3,15
22	18	18		201122-680	CAP, DIP MICA, 680PF, 300V, 5%	D153E681J0	SANGAMO	C6,11
23	1	1		201148-001	CAP, POLYCARB, .001UF, 50V, 5%	625F1A102J	ELECTROCUBE	C24
24								
25	1	1		201148-470	CAP, POLYCARB, .47UF, 50V, 5%	625B1A474J	ELECTROCUBE	C109
26								
27								
28								
29								
30	9	9		201158-001	CAP, MYLAR, .001UF, 100V, 10%	WMF1D1	CDE	C8
31	15	15		201159-100	CAP, MYLAR, .01UF, 100V, 10%	WMF1S1	CDE	C13,29,30,112 -115

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - READ/WRITE -017 &-018, 9 TRACK	DATE		1980	8-17-76	15 OF 22 SHEETS

ITEM	QUANTITY 017	QUANTITY 018		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
32	1	1		201159-470	CAP, MYLAR, .047UF, 100V, 10%	WMF1S47	CDE	C110
33	38	38		201160-100	CAP, TANT, 1UF, 35V, 10%	CS13BF105K	MIL-C-26655	C1,2,5,10,23, 117
34	10	10		201161-470	CAP, TANT, 47UF, 6V, 10%	CS13BB476K	MIL-C-26655	C16,116
35								
36								
37	146	146		202018	DIODE	1N914	CR1-16,17,100	
38								
39								
40	21	21		204012	TRANSISTOR, PNP	2N3702		Q2,3,7,8,119
41	39	39		204013	TRANSISTOR, NPN	2N3704		Q1,4,5,6,100 -117,120
42	1	1		204004	TRANSISTOR, PNP, AUDIO	MPS6562	MOTOROLA	Q118
43								
44								
45	1	1		200013-100	RES, MF, 1.00K, 1/10W, 1%	RN55D1001F	MIL-R-10509	R37
46	1	1		200013-221	RES, MF, 2.21K, 1/10W, 1%	RN55D2211F	MIL-R-10509	R38
47	1	1		200014-215	RES, MF, 21.50K, 1/10W,1%	RN55D2152F	MIL-R-10509	R186
48	2	2		200013-511	RES, MF, 5.11K, 1/10W, 1%	RN55D5111F	MIL-R-10509	R41,43
49	18	18		200013-562	RES, MF, 5.62K, 1/10W, 1%	RN55D5621F	MIL-R-10509	R9,10
50	18	18		200014-100	RES, MF, 10.00K, 1/10W, 1%	RN55D1002F	MIL-R-10509	R14,16
51	9	9		200014-182	RES, MF, 18.20K, 1/10W, 1%	RN55D1822F	MIL-R-10509	R15
52	9	9		200014-332	RES, MF, 33.20K, 1/10W, 1%	RN55D3322F	MIL-R-10509	R22
53	9	9		200014-432	RES, MF, 43.20K, 1/10W, 1%	RN55D4322F	MIL-R-10509	R18
54								
55	1	1		200071-120	RES, FIX COMP, 12 OHM, 1/4W, 5%	RCR07G120JM	MIL-R-39008	R163
56	9	9		200071-470	RES, FIX COMP, 47 OHM, 1/4W, 5%	RCR07G470JM	MIL-R-39008	R21
57	18	18		200072-100	RES, FIX COMP, 100 OHM,1/4W, 5%	RCR07G101JM	MIL-R-39008	R17,24
58	9	9		200072-120	RES, FIX COMP, 120 OHM,1/4W, 5%	RCR07G121JM	MIL-R-39008	R154-162
59	1	1		200072-220	RES, FIX COMP, 220 OHM,1/4W, 5%	RCR07G221JM	MIL-R-39008	R32
60	12	12		200072-470	RES, FIX COMP, 470 OHM,1/4W, 5%	RCR07G471JM	MIL-R-39008	R31,39,166,172
61	27	27		200072-680	RES, FIX COMP, 680 OHM,1/4W, 5%	RCR07G681JM	MIL-R-39008	R13,136-153
62	51	51		200073-100	RES, FIX COMP, 1K, 1/4W, 5%	RCR07G102JM	MIL-R-39008	R6,26,27,28,48 49,51,164,168-

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. PB

TITLE PWB ASSEMBLY - READ/WRITE -017 & -018, 9 TRACK

DWN | DATE 8-4-75 | APPROVAL | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 16 OF 22 SHEETS

ITEM	QUANTITY 017	QUANTITY 018		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
62					ITEM 62 CONTINUED FROM SH. 15			171,173,175, 182-185,187
63	27	27		200073-150	RES, FIX COMP, 1.5K, 1/4W, 5%	RCR07G152JM	MIL-R-39008	R4,11,19
64	2	2		200073-220	RES, FIX COMP, 2.2K, 1/4W, 5%	RCR07G222JM	MIL-R-39008	R36,165
65	11	11		200073-470	RES, FIX COMP, 4.7K, 1/4W, 5%	RCR07G472JM	MIL-R-39008	R29,34,35
66	1	1		200073-820	RES, FIX COMP, 8.2K, 1/4W, 5%	RCR07G822JM	MIL-R-39008	R174
67	27	27		200074-100	RES, FIX COMP, 10K, 1/4W, 5%	RCR07G103JM	MIL-R-39008	R25,30,122,124 126,128,130 132,134,118. 120
68	1	1		200074-150	RES, FIX COMP, 15K, 1/4W, 5%	RCR07G153JM	MIL-R-39008	R33
69	1	1		200074-240	RES, FIX COMP, 24K, 1/4W, 5%	RCR07G243JM	MIL-R-39008	R50
70	2	2		200074-270	RES, FIX COMP, 27K, 1/4W, 5%	RCR07G273JM	MIL-R-39008	R45,47
71	18	18		200074-430	RES, FIX COMP, 43K, 1/4W, 5%	RCR07G433JM	MIL-R-39008	R5,8
72	9	9		200074-470	RES, FIX COMP, 47K, 1/4W, 5%	RCR07G473JM	MIL-R-39008	R3
73	9	9		200074-560	RES, FIX COMP, 56K, 1/4W, 5%	RCR07G563JM	MIL-R-39008	R23
74	9	9		200075-100	RES, FIX COMP, 100K,1/4W, 5%	RCR07G104JM	MIL-R-39008	R12
75	9	9		200075-330	RES, FIX COMP, 330K,1/4W, 5%	RCR07G334JM	MIL-R-39008	R20
76	1	1		200081-510	RES, FIX COMP, 510HM, 1/2W, 5%	RCR20G510JM	MIL-R-39008	R167
77	9	9		200204-100	RES, VARIABLE, 10K, 5%	ET34P103J	ELECTRA MIDLAND	R123,125,127, 129,131,133, 135,119,121
78	11	11		200204-200	RES, VARIABLE, 20K, 5%	ET34P203J	E/M	R7,40,42
79	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-220	BECKMAN	U129
80	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-330	BECKMAN	U130
81								
82								
83	9	9		203017	I.C., HEX INVERTER, DIP	SN15836N	TEXAS INST.	U11,13,16,100 103,105,123, 124,125
84	11	11		203021	I.C., QUAD 2 INPUT, DIP	SN15846	TEXAS INST.	U9,12,15,21,22 106,107,109,110

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MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - READ/WRITE -017 & -018, 9 TRACK

DWN | DATE 8-4-75 | APPROVAL | E.C.O. NO. 1180 | DATE 8-17-76 | SHEET 17 OF 22 SHEETS

ITEM	QUANTITY 017	QUANTITY 018		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
84					ITEM 84 CONTINUED FROM SH. 16			U108,18
85	1	1		203036	I.C., QUAD 2 INPUT, DIP	SN7438	TEXAS INST.	U123
86	5	5		203041	I.C., DUAL J-K FLIP-FLOP DIP	SN7476N	TEXAS INST.	U119,120,121 127, 126
87	8	8		203019	I.C., DUAL BUFFER, DIP	SN15844N	TEXAS INST.	U4-8,14,101, 104
88	15	15		203002	I.C., MONOSTABLE, DIP	F9601 PC	FAIRCHILD	U17,19,20,23, 102,111-118, 122,10.
89	27	27		203008	I.C., OP-AMP	709 HC	FAIRCHILD	U1-3
90	8	8		205061-004	WASHER, FLAT - FIBRE	2191	H. H. SMITH	
91	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
92	3	3		206405-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/16		
93	2	2		206408-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 1/2		
94	4	4		206410-011	SCREW, PAN, PHIL, STL, CAD.	4-40 x 5/8		
95	3	3		207406-081	NUT, HEX, RADIO, STL, CAD	#4		
96	3	3		207408-021	WASHER, FLAT, STL, CAD. SM. PAT .260 MAX O.D.	#4		
97	3	3		207403-011	WASHER, SPLIT LOCK, STL, CAD.	#4		
98	1	1		731006-800	LABEL, ASSY.		CIPHER	
99	4	4		205061-001	WASHER, FIBER	2161	H. H. SMITH	
REF	DWG	DWG		331512-300	SCHEMATIC, READ/WRITE, RAW		CIPHER	
REF	DWG	DWG		131512-000	PWB ASSY, READ/WRITE, RAW		CIPHER	

NOTE: UNDERLINED REFERENCE DESIGNATORS INDICATE MULTIPLE USAGE PARTS FOR TRACKS

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - (-019) 9 TK, R/W, 75 IPS (-020) 9 TK, RAW, 75 IPS	V.P. DATE 9-24-75	9/15/75	1980	8-17-76	18 OF 22 SHEETS

ITEM	QUANTITY 019	QUANTITY 020	QUANTITY	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		731512-100	PWB - READ/WRITE		CIPHER	
2	1	1		731510-500	STIFFENER, LONG		CIPHER	
3	1	1		731510-400	STIFFENER, BAR		CIPHER	
4	4	4		731501-300	RETAINER, P/C CONNECTOR		CIPHER	
5	2	2		735000-402	SPACER		CIPHER	
6	77	77		205026	TEST POINT, .058 DIA	61181-2	AMP	
7	1	1		205068	CONNECTOR, PLUG (12 PIN)	03-09-2121	MOLEX	P20
8	12	12		205012	PIN TERMINALS, MALE .093 DIA	02-09-2134	MOLEX	(P20)
9	2	2		205061	CONNECTOR, DIP SOLDER PINS	SRE-29-PD4J	WINCHESTER	P21,22
10								
11								
12								
13								
14								
15	48	48		201105-010	CAP, DISC, .01UF, 500V	5HKS-S10	SPRAGUE	C25-28,31,118-120,122-129
16	9	9		201120-500	CAP, DIP MICA, 5PF, 300V, ±1/2PF	D153C050D0	SANGAMO	C130
17	1	1		201121-220	CAP, DIP MICA, 22PF, 300V, 5%	D153E220JO	SANGAMO	C111
18	11			201121-470	CAP, DIP MICA, 47PF, 300V, 5%	D153E470JO	SANGAMO	C21,22,100-108
19	19	19		201122-220	CAP, DIP MICA, 220PF, 300V, 5%	D153E221JO	SANGAMO	C17,20,7
20		2		201121-470	CAP, DIP MICA, 47PF, 300V, 5%	D153E470JO	SANGAMO	C21,22
21	9	9		201122-510	CAP, DIP MICA, 510PF, 300V, 5%	D153E511JO	SANGAMO	C15
22		10		201149-022	CAP, DIP MICA, .0022UF, 50V, 5%	RA2A222J	IMB	C18,100-108
23	10	10		201148-001	CAP, POLYCARB, .001UF, 50V, 5%	625F1A102J	ELECTROCUBE	C24,14

Cipher Data Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - (-019) 9 TK, R/W, 75 IPS (-020) 9 TK, RAW, 75 IPS	V.P. DATE 9-24-75	9/15/75	1980	8-17-76	19 OF SHEETS

ITEM	QUANTITY 019	QUANTITY 020		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
24	1			201149-022	CAP, POLYCARB, .0022UF, 50V, 5%	RA2A222J	IMB	C18
25	1	1		201148-470	CAP, POLYCARB, .47UF, 50V, 5%	625B1A474J	ELECTROCUBE	C109
26	9	9		201122-470	CAP, DIP MICA, 470PF, 300V 5%	D153E471JO	SANGAMO	C6
27	9	9		201148-100	CAP, POLYCARB, .1UF, 50V, 5%	650B1A104J	ELECTROCUBE	C10
28								
29								
30	-	19		201160-100	CAP, TANT, 1 UF, 35V, 10%	CS13BF105F	MIL-C-26655	C1,2,117
31	15	15		201159-100	CAP, MYLAR, .01UF, 100V, 10%	WMF1S1	CDE	C13,29,30,112-115
32	1	1		201159-470	CAP, MYLAR, .047UF, 100V, 10%	WMF1S47	CDE	C110
33	20	-		201160-100	CAP, TANT, 1UF, 35V, 10%	CS13BF105K	MIL-C-26655	C1.2, ,23,117
34	10	10		201161-470	CAP, TANT, 47UF, 6V, 10%	CS13BB476K	MIL-C-26655	C16,116
35	9	9		201168-330	CAP, TANT, .33UF, 35V, 10%	CS13BF334K	MIL-C-26655	C5
36	-	145		202018	DIODE	IN914		CR1-16,100
37	146	-		202018	DIODE	1N914		CR1-16,17,100
38	20	20		204007-500	TRANSISTOR - NPN	2N2222		Q1,4,5,6
39	18	18		204026-010	TRANSISTOR - PNP	2N5355		Q2,3
40	3	3		204012	TRANSISTOR, PNP	2N3702		Q7,8,119
41	19	19		204013	TRANSISTOR, NPN	2N3704		Q100-117,120
42	1	1		204004	TRANSISTOR, PNP, AUDIO	MPS6562	MOTOROLA	Q118
43	9			200014-158	RES, MF, 15.8K, 1/10W, 1%	RN55D1582F	MIL-R-10509	R118,120,122 124,126,128, 130,132,134
44	-	9		200013-511	RES, FF, 5.11K, 1/10W, 1%	RN55D5111F	MIL-R-10509	R118,120,122, 124,126,128, 130,132,134

Cipher Data Products	MODEL 100X **PARTS LIST**	CODE IDENT. 32274	PL 131512-0XX	REV. AB

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSEMBLY - (-019) 9 TK, R/W, 75 IPS (-020) 9 TK, RAW, 75 IPS	V.P. DATE 9-24-75	9/25/75	1980	8-17-76	20 OF 22 SHEETS

ITEM	QUANTITY 019	QUANTITY 020		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
45	1	1		200013-100	RES, MF, 1.0K, 1/10W, 1%	RN55D1001F	MIL-R-10509	R37
46	1	1		200013-221	RES, MF, 2.21K, 1/10W, 1%	RN55D2211F	MIL-R-10509	R38
47	1	1		200014-215	RES, MF, 21.5K, 1/10W, 1%	RN55D2152F	MIL-R-10509	R186
48	1	1		200013-511	RES, MF, 5.11K, 1/10W, 1%	RN55D5111F	MIL-R-10509	R41
49	18	18		200013-562	RES, MF, 5.62K, 1/10W, 1%	RN55D5621F	MIL-R-10509	R9,10
50	18	18		200014-100	RES, MF, 10.0K, 1/10W, 1%	RN55D1002F	MIL-R-10509	R14,16
51	9	9		200014-182	RES, MF, 18.2K, 1/10W, 1%	RN55D1822F	MIL-R-10509	R15
52	9	9		200014-332	RES, MF, 33.2K, 1/10W, 1%	RN55D3322F	MIL-R-10509	R22
53	9	9		200014-432	RES, MF, 43.2K, 1/10W, 1%	RN55D4322F	MIL-R-10509	R18
54	1	1		200073-910	RES, FIX COMP, 9.1K, 1/4W, 5%	RCR07G912JM	MIL-R-39008	R45
55	1	1		200071-120	RES, FIX COMP, 12OHM, 1/4W, 5%	RCR07G120JM	MIL-R-39008	R163
56	9	9		200071-470	RES, FIX COMP, 47OHM, 1/4W, 5%	RCR07G470JM	MIL-R039008	R21
57	18	18		200072-100	RES, FIX COMP, 100OHM, 1/4W, 5%	RCR07G101JM	MIL-R-39008	R17,24
58	9	9		200072-120	RES, FIX COMP, 120OHM, 1/4W, 5%	RCR07G121JM	MIL-R-39008	R154-162
59	1	1		200072-220	RES, FIX COMP, 220OHM, 1/4W, 5%	RCR07G221JM	MIL-R-39008	R32
60	12	12		200072-470	RES, FIX COMP, 470OHM, 1/4W, 5%	RCR07G471JM	MIL-R-39008	R31,39,166,172
61	27	27		200072-680	RES, FIX COMP, 680OHM, 1/4W, 5%	RCR07G681JM	MIL-R-39008	R13,136-153
62	38	38		200073-100	RES, FIX COMP, 1K, 1/4W, 5%	RCR07G102JM	MIL-R-39008	R6,26, 28, 48,49,51,164, 168-171,173, 175,187
63	9	9		200072-180	RES, FIX COMP, 180 OHM, 1/4W,5%	RCR07G181JM	MIL-R-39008	R27
64	2	2		200073-220	RES, FIX COMP, 2.2K, 1/4W, 5%	RCR07G222JM	MIL-R-39008	R36,165
65	11	11		200073-470	RES, FIX COMP, 4.7K, 1/4W, 5%	RCR07G472JM	MIL-R-39008	R29,34,35

Cipher Data Products

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131512-0XX | REV. AB

TITLE PWB ASSEMBLY - (-019) 9 TK, R/W, 75 IPS
(-020) 9 TK, RAW, 75 IPS

DWN V.P. | DATE 9-24-75 | APPROVAL 9/25/75 | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 21 OF 22 SHEETS

ITEM	QUANTITY 019	QUANTITY 020		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
66	1	1		200073-820	RES, FIX COMP. 8.2K, 1/4W, 5%	RCR07G822JM	MIL-R-39008	R174
67	36	36		200074-100	RES, FIX COMP, 10K, 1/4W, 5%	RCR07G103JM	MIL-R-39008	R25,30,1,2
68	1	1		200074-150	RES, FIX COMP, 15K, 1/4W, 5%	RCR07G153JM	MIL-R-39008	R33
69	1	-		200074-180	RES, FIX COMP, 18K, 1/4W, 5%	RCR07G183JM	MIL-R-39008	R50
70	1	1		200074-270	RES, FIX COMP, 27K, 1/4W, 5%	RCR07G273JM	MIL-R-39008	R47
71	18	18		200074-430	RES, FIX COMP, 43K, 1/4W, 5%	RCR07G433JM	MIL-R-39008	R5,8
72	9	9		200074-470	RES, FIX COMP, 47K, 1/4W, 5%	RCR07G473JM	MIL-R-39008	R3
73	9	9		200074-560	RES, FIX COMP, 56K, 1/4W, 5%	RCR07G563JM	MIL-R-39008	R23
74	9	9		200075-100	RES, FIX COMP, 100K, 1/4W, 5%	RCR07G104JM	MIL-R-39008	R12
75	9	9		200075-330	RES, FIX COMP, 330K, 1/4W, 5%	RCR07G334JM	MIL-R-39008	R20
76	1	1		200081-510	RES, FIX COMP 51 OHM, 1/2W, 5%	RCR20G510JM	MIL-R-39008	R167
77								
78	10	10		200204-200	RES, VARIABLE, 20K, 5%	ET34P203J	E/M	R7,40
79	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-220	BECKMAN	U129
80	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-330	BECKMAN	U130
81	-	9		200204-100	POT, 10K, CERMET	ET34P103	ELECTRA/MID.	R119,121,123, 125,127,129, 131,133,135
82								
83	9	9		203017	I.C. HEX INVERTER, DIP	SN15836N	TEXAS INST.	U11,13,16,100 103,105,123, 124,125
84	11	11		203021	I.C. QUAD 2 INPUT, DIP	SN15846	TEXAS INST.	U9,12,15,21,22 106,107,109, 110,108,18
85								

Cipher Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131512-0XX | REV AB

TITLE PWB ASSEMBLY - (-019) 9 TK, R/W, 75 IPS
(-020) 9 TK, RAW, 75 IPS

DWN V.P. | DATE 9-24-75 | APPROVAL 9/25 | E.C.O. NO. 1980 | DATE 8-17-76 | SHEET 22 OF 72 SHEETS

ITEM	QUANTITY 019	QUANTITY 020		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
86	5	5		203041	I.C. DUAL J-K FLIP-FLOP DIP	SN7476N	TEXAS INST.	U119,120,121, 127,126
87	8	8		203019	I.C, DUAL BUFFER, DIP	SN15844N	TEXAS INST.	U4-8,14,101, 104
88	14	-		203002	I.C., MONOSTABLE, DIP	F9601 PC	FAIRCHILD	U10,17,19,20, 102,111-118, 122.
89	27	27		203007-300	I.C. OP-AMP	LM318H	NATIONAL	U1-3
*88	-	13		203002	I.C., MONOSTABLE, DIP	F9601 PC	FAIRCHILD	U17,19,20,102, 111-118,122
92	3	3		206405-011	SCREW, PAN HD, PHIL, ST. CAD.	4-40 x 5/16		
93	2	2		206408-011	SCREW, PAN HD, PHIL, ST. CAD.	4-40 x 1/2		
94	4	4		206410-011	SCREW, PAN HD, PHIL, STL, CAD.	4-40 x 5/8		
95	3	3		207406-081	NUT, HEX, RADIO, STL, CAD.	# 4		
96	3	3		207408-021	WASHER, FLAT, STL. CAD, SM. PAT. .260 MAX OD	# 4		
97	3	3		207403-011	WASHER, SPLIT LOCK, STL, CAD.	# 4		
98	1	1		731006-800	LABEL, ASSY		CIPHER	
99	4	4		205061-001	WASHER, FIBER	2161	H.H. SMITH	
100	6"	6"		208500-298	WIRE-BUS, TINNED COPPER 22 AWG.	298	ALPHA	
101	5"	5"		209100-052	TUBING TEFLON	TFT-200/22-1	ALPHA	
**90	8	8		205061-004	WASHER, FLAT - FIBRE	2191	H. H. SMITH	
*91	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
REF	DWG	DWG		131512-000	PWB ASSY READ/WRITE RAW		CIPHER	
REF	✓			331512-319	SCHEMATIC-READ/WRITE		CIPHER	
REF		✓		331512-320	SCHEMATIC- READ AFTER WRITE		CIPHER	

* ITEM NO's OUT OF SEQUENCE

Cipher

PARTS LIST

CODE IDENT. 32274 | PL 131511-0XX | REV. A

TITLE: SPEED KIT - 7 TRACK (-01 FOR 25-45 IPS, -02 FOR 12.5-25 IPS)

DWNG BODY | DATE 2-18-75 | APPROVAL | E.C.O. NO. | DATE | SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -01	QUANTITY -02	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
				THIS SPEED OPTION LIST RELATES DIRECTLY			
				TO REF DESIGNATORS & QTY'S ON DWGS:			
				131510-001 & 003			
				131512-001 & -003			
1	7	-	201149-022	CAP, POLYCARB, .0022 Mfd, 50V, 5%	RA2A222J	IMB	C14
2	-	7	201149-068	CAP, POLYCARB, .0068 Mfd, 50V, 5%	RA2A682J	IMB	C14
3							
4	1	-	201149-047	CAP, POLYCARB, .0047 Mfd, 50V, 5%	RA2A472J	IMB	C18
5	-	1	201149-100	CAP, POLYCARB, .01 Mfd, 50V, 5%	RA2A103J	IMB	C18
6							
7	1	-	201149-068	CAP, POLYCARB, .0068 Mfd, 50V, 5%	RA2A682J	IMB	C19
8	-	1	201149-330	CAP, POLYCARB, .033 Mfd, 50V, 5%	RA2A333J	IMB	C19
9							
10	7	-	201149-022	CAP, POLYCARB, .0022 Mfd, 50V, 5%	RA2A222J	IMB	C102-C108
11	-	7	201149-100	CAP, POLYCARB, .01 Mfd, 50V, 5%	RA2A103J	IMB	C102-C108
12							
13	14	-	200074-100	RES, FIX COMP, 10K, 1/4W, 5%	RCR07		R1 R2
14	-	14	200073-510	RES, FIX COMP, 5.1K, 1/4W, 5%	RCR07		R1 R2

1245 CF

Cipher	PARTS LIST	CODE IDENT 32274	PL 131512-9XX	REV. A

TITLE: SPEED KIT- 9 TRACK (-01 FOR 25-45 IPS / -02 FOR 12.5-25 IPS)
DWNG BODDY DATE 2-18-75 APPROVAL
E.C.O. NO. DATE SHEET 1 OF 1 SHEETS

ITEM	QUANTITY -01	QUANTITY -02		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
	1				THIS SPEED OPTION LIST RELATES DIRECTLY			
					TO REF DESIGNATORS & QTY'S ON DWGS:			
					131510-002 & 004			
					131512-002 & -004			
1	9	-		201149-022	CAP, POLYCARB .0022 Mfd 50V 5%	RA2A222J	IMB	C14
2	-	9		201149-068	CAP, POLYCARB .0068 Mfd 50V 5%	RA2A682J	IMB	C14
3								
4	1	-		201149-047	CAP, POLYCARB .0047 Mfd 50V 5%	RA2A472J	IMB	C18
5	-	1		201149-100	CAP, POLYCARB .01 Mfd 50V 5%	RA2A103J	IMB	C18
6								
7	1	-		201149-068	CAP, POLYCARB .0068 Mfd 50V 5%	RA2A682J	IMB	C19
8	-	1		201149-330	CAP, POLYCARB .033 Mfd 50V 5%	RA2A333J	IMB	C19
9								
10	9	-		201149-022	CAP, POLYCARB .0022 Mfd 50V 5%	RA2A222J	IMB	C100-C108
11	-	9		201149-100	CAP, POLYCARB .01 Mfd 50V 5%	RA2A103J	IMB	C100-C108
12								
13	18	-		200074-100	RES, FIX COMP 10K 1/4W 5%	RCR07		R1 R2
14	-	18		200073-510	RES, FIX COMP 5.1K 1/4W 5%	RCR07		R1 R2

5043 CDP

ADDENDUM A

PHASE-ENCODED RECORDERS

This addendum presents operation and maintenance information on Cipher Model 100X phase-encoded recorders, Series 100640 and 100660, covering areas in which such information differs from that presented in the basic manual covering NRZI models. Sections of the basic manual which are applicable to phase-encoded recorders are omitted in this addendum.

ADDENDUM A

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

SECTION AI

DESCRIPTION AND SPECIFICATIONS

A1-1. GENERAL

A1-2. The Model 100X Phase-Encoded Recorder is a high-performance, digital, magnetic tape recorder manufactured by Cipher Data Products, Inc., San Diego, California. The recorder is available with a dual-gap head, which provides read-after-write capability, or a single-gap head for applications in which simultaneous read and write operations are not required. Various tape speed capabilities are available. The recorder is designed to operate on 105 to 250-Vac, single-phase, 48 to 63-Hz line power. If the compliance arm retraction feature is not required, the recorder may be operated on line power frequencies up to 420 Hz. Available optional features are as follows:

a. Operation in the following modes:

   (1) Read-after-write

   (2) Read/write

   (3) Write only

   (4) Read only

b. Overwrite

c. Tape speeds:

   (1) Standard: 45, 37.5, 25, 18.75, or 12.5 ips

   (2) Nonstandard: any fixed speed within the range of 2 to 45 ips

d. Power: 400-Hz operation (without compliance arm retraction system)

e. Logic options (see paragraph 4-29, basic manual)

f. Facade color (white is standard)

A1-3. PURPOSE

A1-4. The recorder is designed to be used in data acquisition and computer processing systems in which data must be acquired and stored on magnetic tape. Writing and reading of digital data are performed in IBM-compatible, phase-encoded format. Data recorded by a Model 100X recorder is completely recoverable by IBM or similar equipment.

A1-5. MECHANICAL AND ELECTRICAL SPECIFICATIONS

A1-6. The mechanical and electrical specifications for the recorder are presented in Table A1-1.

Net Weight	80 pounds (36.29 kg)
Shipping Weight	100 pounds (45.36 kg)
Dimensions:	
Height	24.0 inches (62.2 cm)
Width	19.0 inches (48.3 cm)
Depth (from mounting surface)	12.5 inches (31.8 cm)
Depth (total)	15.1 inches (38.4 cm)
Mounting (standard 19 - in,RETMA rack)	EIA specifications
Power	115/230 Vac 48 to 63 Hz (400-Hz model available without compliance arm retraction system.) 275 watts, max.
Fuse	6.25-ampere, 3AG, quick-acting
Tape (computer grade):	
Width	0.5 inch (1.27 cm)
Thickness	1.5 mil (0.04 mm)
Reel Diameter	10.5 inch (26.67 cm)
Tape Tension	8 ounces (226.8 grams)
Recording Mode & Density:	
9 - Track: IBM - compatible PE	1600 bpi

Table A1-1. Mechanical and Electrical Specifications

Tape Speed: Standard Nonstandard available	45/ 37.5/ 25/ 18.75/ 12.5 ips 2 to 45 ips
Speed Variation:	
Instantaneous Long term	± 3% (max., byte-to-byte) ± 1% (max.)
Rewind Speed	150 ips (nom.)
Start/Stop Time (inversely proportional to tape speed)	8.0 (± 0.55) ms at 45 ips
Start/Stop Distance	0.19 (± 0.02) inch (0.48 (± 0.05) cm)
Interchannel Displacement Error:	
1600 bpi	150 microinches (0.004 mm), max.
Beginning-of-Tape (BOT) and End-of-Tape (EOT) Detectors	Photoelectric (IBM-compatible)
Interface	DTL (Low True)
Electronics	All Silicon
Operating Temperature	2° to 50° C
Relative Humidity	15 to 95%, noncondensing
Altitude	20,000 feet (6096 meters) max.

Table A1-1. Mechanical and Electrical Specifications (Continued)

SECTION AII

UNPACKING, INSPECTION, AND INSTALLATION

A2-1. INTERFACE CONNECTIONS

A2-2. The interface connections for the phase-encoded recorder are the same as those shown in Table 2-2 of the basic manual, with the following additions:

CONNECTOR	LIVE PIN	GROUND PIN	SIGNAL
Write Inputs, J102	E	5	Threshold 1 (TH1) (100660 only)
	F	6	Threshold 2 (TH2)

SECTION AIV

THEORY OF OPERATION

A4-1. BASIC CONCEPTS OF PHASE-ENCODED DIGITAL RECORDING

A4-2. The principles of phase-encoded (PE) writing differ from those of NRZI writing chiefly in presentation and phasing or coding. NRZI writing relies on a single change of polarization on the tape to represent a logical 1, while no change represents a logical 0 within a time frame. PE writing involves a change of polarization for both the logical 1 and 0; however, phasing is the key difference with respect to NRZI. The major advantages of PE over NRZI writing are the reduced possibility of losing data because of inadequate signal strength (making low read thresholds practical) and the fact that each track is self-clocking, reducing skew problems.

A4-3. The following features of PE writing highlight its basic operational differences with respect to the NRZI format:

a. A change from negative to positive polarity is a 1 bit.

b. A change from positive to negative polarity is a 0 bit.

c. Two consecutive 1 bits must be separated by a change from negative to positive polarity.

d. Two consecutive 0 bits must be separated by a change from positive to negative polarity.

e. There must be a change of polarity at each data bit time.

f. There must be a change of polarity between data bits of the same polarity (consecutive 1 or 0 bits). This is termed the phase time.

g. There must not be a change of polarity at the phase time between alternate 1 and 0 bits.

A4-4. For clarification, the term "change of polarity" is also referred to as a flux change or flux reversal. Henceforth, a change from negative to positive polarity will be referred to as a flux reversal; positive to negative, a negative flux reversal. In NRZI writing there is simply a flux reversal of either polarity for each 1 bit; therefore, 800 bpi equates to 800 flux reversals per inch. However, for any given channel there may be from zero to 800 flux reversals per inch of tape. With PE writing, there must be a flux reversal with each data bit, whether it be a 0 or 1. Therefore, 1600 bpi equates to a minimum of 1600 frpi in any given channel. (This would occur in the case of alternate 0 and 1 bits.) The maximum case would occur with consecutive 0 or 1 bits, resulting in 3200 frpi. The flux reversal at each bit time accounts for the self-clocking feature of PE writing. Figure A4-1 indicates the tape magnetization waveforms involved in PE writing.

A4-5. PHASE-ENCODED FORMATTING

A4-6. There are some similarities between PE and NRZI formatting: the inter-record gap (IRG) and the file gap (FG) . The data generation and file mark are coded in a different form, and an identification burst is added. Also, PE writing is limited to nine-track operation, and there are no CRC or LRC characters. A block of PE data is preceded and immediately followed by a burst of bytes designated preamble and postamble, respectively. The sequence for a block of PE data is as follows:

a. Forty bytes of all 0's (including the parity bit).

b. One byte of all 1's (including the parity bit).

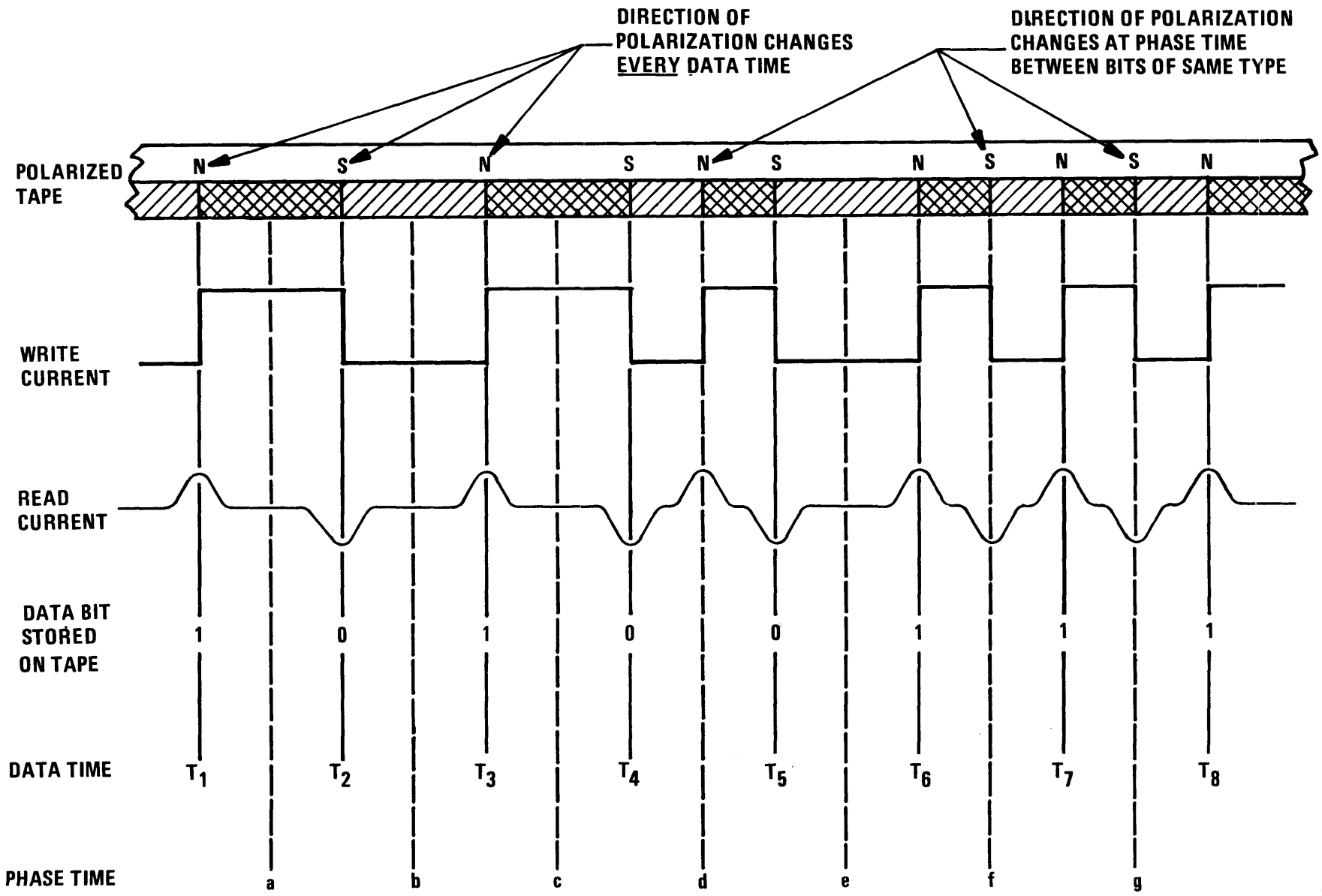


Figure A4-1. Phase-Encoded Tape Magnetization

c. The data bytes.

d. One byte of all 1's.

e. Forty bytes of all 0's.

A4-7. A phase-encoded tape requires an identification burst of all 1's or 0's in the P channel at the beginning of the tape. The burst must begin at least 1.7 inches ahead of the leading edge of the beginning of tape (BOT) marker and extend beyond the trailing edge of the marker. The load gap requirements are the same as those for NRZI, except that the 0.5-inch minimum gap is referenced from the identification burst. The typical distance for a load gap is 3.75 inches.

A4-8. The PE file mark or tape mark consists of about 3.75 inches of erased tape, followed by a 60-byte burst. The burst consists of 0's written in all channels except 1, 3, and 4. Technically, channels 0, 5, and P may contain something other than all 0's or may be erased. These channels are not checked when the file mark is sensed. Channels 1, 3, and 4 must be erased. Figure A4-2 illustrates the PE tape data format.

A4-9. **DATA RECORDING**

A4-10. The description presented in the following subparagraphs applies to read-after-write (RAW) recorders. Read-or-write (R/W) recorders are similar in operation except for the addition of a read inhibit monostable.

A4-11. Five inputs to the write circuitry, in addition to the nine channels, are required for writing (Figure A4-3). The customer supplies the Write Data Strobe (WDS), Write Reset (WRS), and Select inputs. The WDS clocks the data into the type D flip-flop (write register), which, in turn, controls the write drivers. The WRS resets the write registers to a reference condition with the last flux reversal of the postamble during an overwrite operation. (Overwrite is a special option.) Select is routed from the control logic and is required to enable the write register and also to ensure that the register is initialized (reset) to a reference condition at the beginning of the write operation. $\overline{\text{Run}}$ and $\overline{\text{Read}}$ inputs are generated in the control logic. They control the write register direct set (S_D) and direct clear (C_D) circuitry as well as the write current switch.

A4-12. DATA INPUT. The description presented in the following subparagraphs is keyed to track P but is applicable to all tracks. Figure A4-4 presents a write timing diagram.

A4-13. A low pulse or level applied to J102, pin L, in conjunction with the WDS, will cause a positive flux reversal when the following conditions exist: it is the initial WDS of an identification burst, preamble, or file mark, and it is preceded by a high data level or pulse. A high pulse or level applied to J102, pin L, in conjunction with the WDS will cause a negative flux reversal when the following conditions exist: it is preceded by a low data level or pulse, and it is the last WDS of an identification burst, postamble, or file mark. The data is inverted by U2C and presented to the D input of write register U11B.

A4-14. WRITE REGISTER. The write register, U11B, is an edge-triggered, type D flip - flop with Direct Clear (C_D) and Direct Set (S_D) inputs. Assuming that the register is enabled (C_D and S_D high) and the Q output is in its reference (low-level) condition, a high at the D input presented coincidentally with the high-going edge of the clock will transfer the D condition to the Q output. Obviously, the $\overline{\text{Q}}$ output will be opposite that of Q while C_D and S_D are high. Now, a low level would have to be present at the D input with a high-going edge of the clock to return Q to a low level. Presentation of a low level or pulse to the C_D input while S_D is high would also return Q to a low level.

A4-15. WRITE DRIVER. The write driver, U101, is an open-collector dual driver with dual-gated inputs. When the input to U101, pins 6 and 7, is low and the output transistor is turned on, a ground path for head current is provided at U101, pin 5. At the same time, pins 1 and 2 of U101 will be high, shutting off the second output transistor and thus preventing current flow at U101, pin 3.

A4-16. Write current is supplied through a transistor switch, Q1, from a 5-volt source (W5 installed). The alternate 15-volt supply (W6 installed) is for special applications. The $\overline{\text{Read}}$ input from the control logic determines when the write current switch is to be on or off. A false-going (high) $\overline{\text{Read}}$ level enables the current switch driver, Q2, and C2 charges through R16. This, in turn, allows Q1 to become fully saturated. The ramp time in switching from read to write is approximately 1.5 milliseconds. At the same time, Q3 is turned on and the S_D input, followed by the C_D input to the write register, is allowed to go high, ensuring that the register will attain the proper reference condition. When $\overline{\text{Read}}$ becomes true (low), Q2 turns off, in turn shutting off Q1 and Q3. The ramp is approximately 1.2 milliseconds, and the current path for C109 becomes low as the collector of Q3 reaches the threshold of U3, pin 9. The necessary delay is

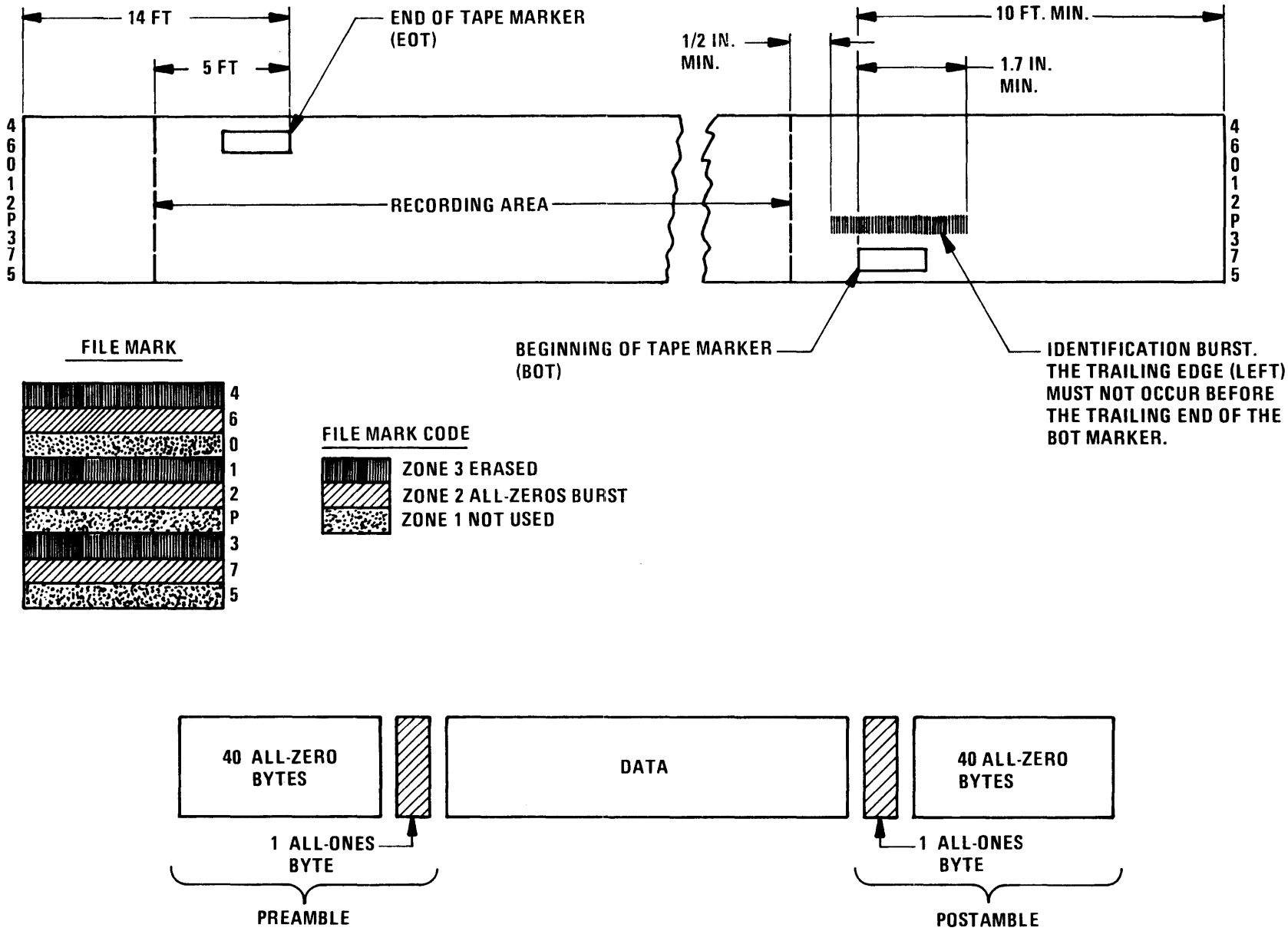


Figure A4-2. Phase-Encoded Tape Block Format

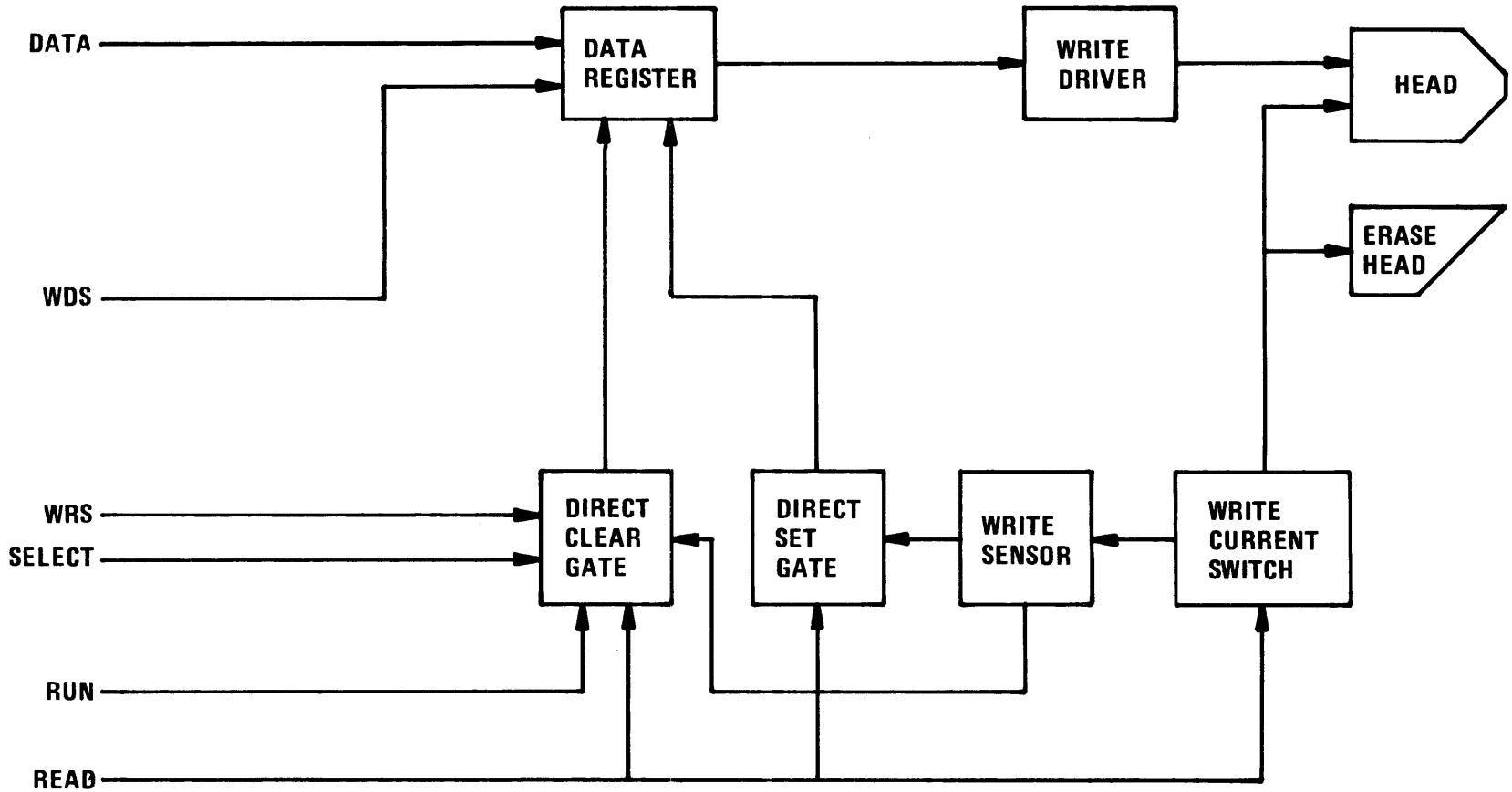


Figure A4-3. Data Recording Block Diagram

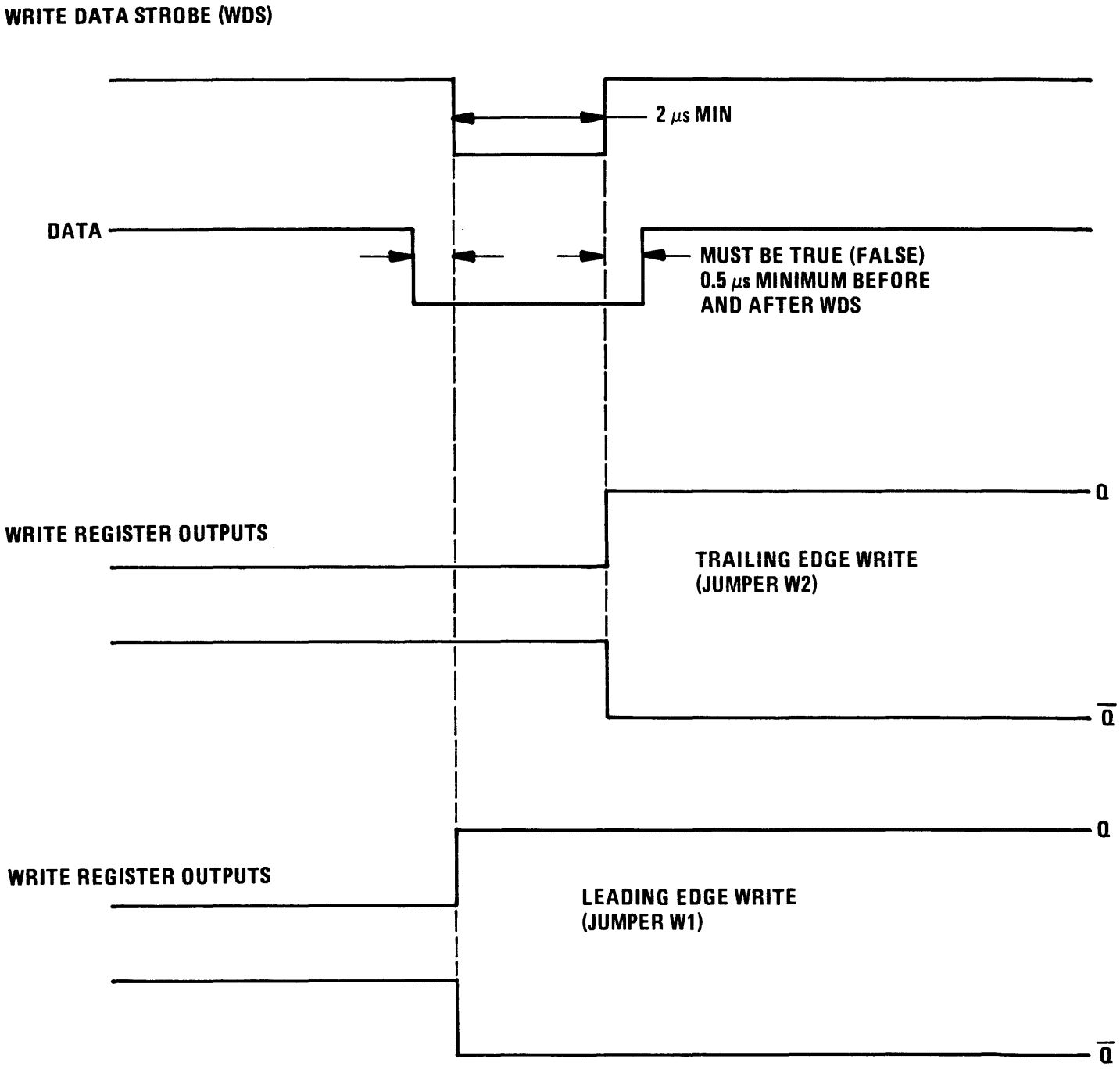


Figure A4-4. Data Recording Timing Diagram

created by C3. The relationship of C_D and S_D as they go high or low is critical to prevention of unwanted switching of the write register while the write current is still sustained and to assurance of the proper reference condition. Figure A4-5 illustrates the timing of the C_D, S_D, and the 5-volt switch. Figure A4-6 illustrates the requirements for data recording of a typical data block.

A4-17. DATA RECOVERY

A4-18. The read circuitry is essentially enabled at all times. Utilization depends upon the option selected, either read-after-write (RAW) or read /write (R/W). The discussions presented in the following subparagraphs are keyed to track P and are based on a RAW application, corresponding references to R/W applications being noted as exceptions.

A4-19. The input to the first-stage differential amplifier, U102, is a low-level, analog signal. The output from the head is 550 microvolts/inch/second ± 20% at 1600 flux reversals per inch (frpi), and 225 microvolts/inch/second, minimum, at 3200 frpi. (At a tape speed of 10 ips, for example, the input to the amplifier would range between 2.25 millivolts and 6.6 millivolts, peak-to-peak.) The gain in the first-stage amplifier is controlled by a shunt feedback potentiometer, R105. The compensation components, C104 and R111, are selected for roll-off, which is dependent upon the maximum data rate required. R105, R106, and C103 determine the low-frequency roll-off. The voltage at TP104 is typically 4 volts, peak-to-peak; however, the actual gain is adjusted to obtain the proper level at TP105.

A4-20. The output of the first-stage amplifier is filtered by a single-pole, low-pass filter consisting of R113, R114, and C108. The 3-dB point is selected at three times the fundamental data rate. Refer to the table on Drawing No. 331552-300, Section VII, for proper values.

A4-21. The output of the filter is differentiated by U103 and associated components. The differentiator output levels are dependent upon the slope of the input analog signal; maximum slope creates maximum output, and zero slope creates zero output. The result is that the input peaks agree with the zero-crossover point at the output. The effective gain will depend in part upon the data rate. Higher data rates tend to exhibit steeper slopes and therefore more output. The output (TP105) is adjusted to a nominal 16 volts, peak-to-peak, for the highest amplitude peaks. This is based on the first pass of data over the read head, using 3M777 computer-grade tape.

A4-22. The read data converter, U104, is a dual-channel, differential comparator. Basically, the device can be considered an AND gate. The threshold circuit sets the bias level of U104B, pin 6, at some negative level, depending on the percentage threshold required. (See paragraph A4-23.) As the analog data is presented at TP105, a rectification process takes place at TP106 to enable U104A of the comparator. The negative peaks at TP105 charge C116 through R121 and CR109. The negative rectified level attained at TP106 is determined by the voltage divider formed by R121 and R122. This level will be more negative than the threshold bias level of U104B, pin 6, and will therefore enable U104A. The value of C116 will vary with different data rates, because the threshold level must be reached within four byte times. After U104A has been enabled, all negative-going peaks at TP105 will be seen as negative levels at the output, TP107, of the comparator. The transitions at the output will agree with the zero-crossover points of the input. Figure A4-7 illustrates the signal levels and timing of the read amplifier and data converter.

A4-23. The threshold circuit, U16 and associated components, determines the minimum-amplitude signal level at TP105 that will be recognized as data. The threshold is defined in terms of percentage, and there are three percentages available: 15%, 25%, and 40%. A 40% threshold means that signal levels below 40% of the nominal at TP105 will not be detected. Due to the storage capacity of C116 in the comparator circuit a single peak may fall below the 40% level and still be detected. The threshold circuit is a differential amplifier with gate-selectable input bias currents that provide a negative bias of varying levels to the read amplifier comparator. With a RAW transport, the 40% threshold is automatically selected in the Write mode, 25% in the Read mode; 15% may be selected by the user in the Read mode. With a R/W transport, all three levels are selectable by the user. Table A4-1 shows the input commands required or the automatic conditions for threshold. For illustration, assume a RAW transport (W8 jumper installed) with the Write mode selected. The $\overline{\text{Read}}$ signal at U13E, pin 11, will be high (false) and U13E, pin 10, will be low. Therefore, U13D, pin 9, and U14A, pin 5, will be low. TP16 and TP17 will be high. The sum of the currents through R28, R30, and R31 multiplied by that of the feedback resistor, R29, then determines the negative portion of the output created by the inverting input at U16, pin 2. This level is summed with the noninverting input, pin 3, contributed by the voltage divider, R33 and R34. The sums of these two levels will result in a preselected negative level at U16, pin 6, or TP18. A comparison of the level at TP18 with that of TP106 (during data transmission) will determine the percentage threshold.

When $\overline{\text{Read}}$ is low (true) the level at TP16 is low, while TP17 remains high (assuming TH2 has not been selected). This will shunt the bias current of R30 through CR3, resulting in a less negative level at TP18. Selection of TH2 will put TP17 low and shunt the bias current of R31 through CR5. Installation of jumper W9 with a R/W transport allows the user to select the three threshold conditions via TH1 and TH2 (Table A4-1).

A4-24. A read inhibit monostable, U15, is provided for R/W transports. The read amplifier is saturated during the Write mode of operation with a single-gap write or read head. When switching from the Write to Read mode, the read-inhibit monostable is used to prevent erroneous or false data bytes from occurring at the data output while the read amplifier is recovering from saturation. U15 is triggered on the high-going input at pins 3 and 4. The low-going output at TP15 is then gated through U22B and U22A to the input of U17A. The pulse width will be approximately three-quarters of the start ramp.

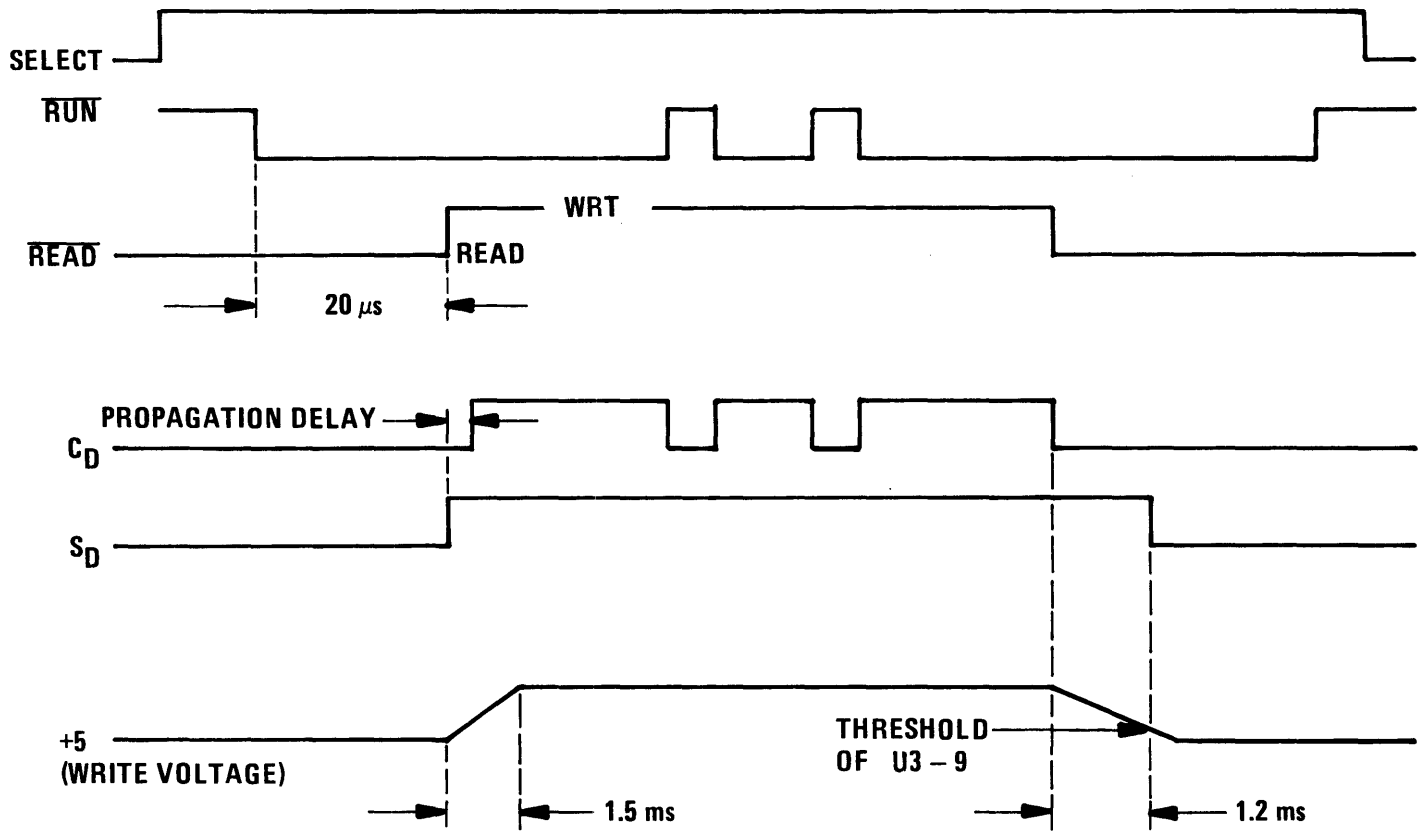


Figure A4-5. C_D, S_D, and +5-Volt Timing Diagram

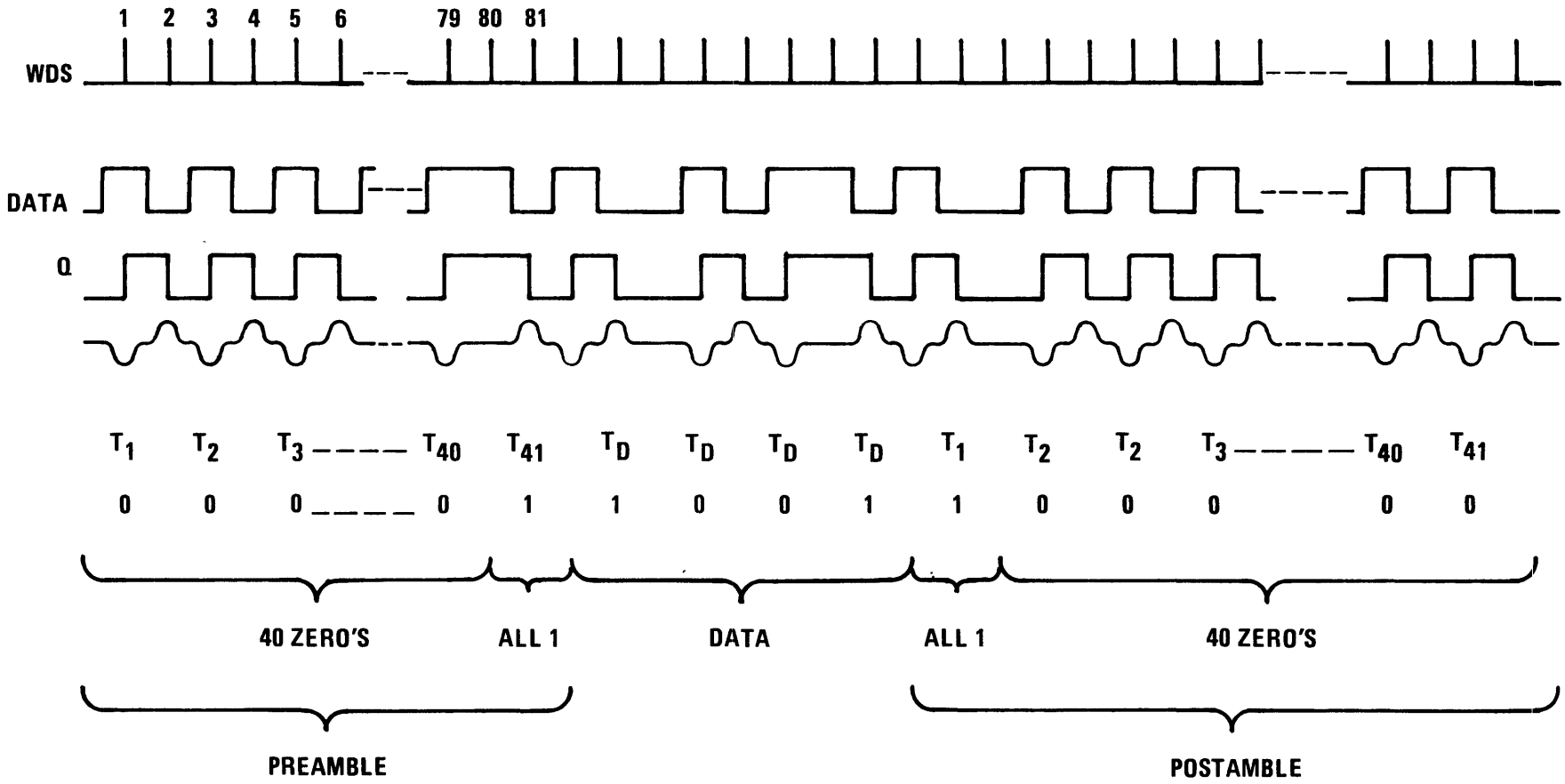


Figure A4-6. Typical Data Block - Writing

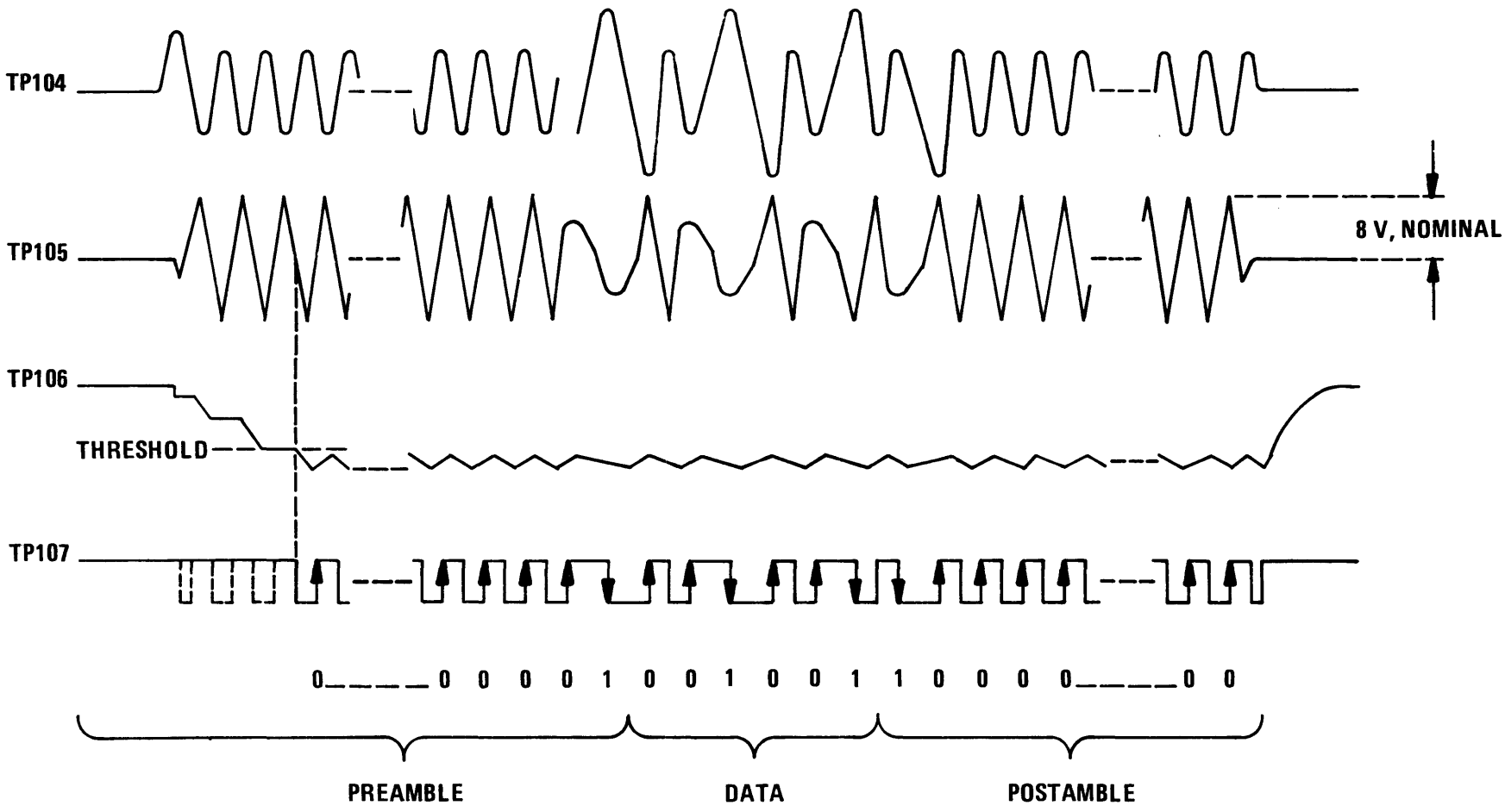


Figure A4-7. Typical Data Block - Reading

TYPE TRANSPORT	JUMPER	OPER. MODE		THRESHOLD SELECT		% THRESHOLD			TP16	TP17
		WRITE	READ	TH1	TH2	15	25	40		
RAW	W8	X		HIGH	HIGH			X	HIGH	HIGH
RAW	W8		X	HIGH	HIGH		X		LOW	HIGH
RAW	W8		X	HIGH	LOW	X			LOW	LOW
R/W	W9	X		N/A	N/A	N/A	N/A	N/A	N/A	N/A
R/W	W9		X	LOW	HIGH			X	HIGH	HIGH
R/W	W9		X	HIGH	HIGH		X		LOW	HIGH
R/W	W9		X	HIGH	LOW	X			LOW	LOW

Table A4-1. Threshold Conditions and Requirements

SECTION AV

MAINTENANCE

A5-1. PHASE-ENCODE READ LEVEL ADJUSTMENT

A5-2. Adjust phase-encode read levels with the transport in a Read-After-Write mode of operation as follows:

a. Write data records using one of the following methods:

(1) If possible, write repeated all-1's data record of fixed record length. This provides for most easily read level adjustment.

(2) If all-1's record of fixed length cannot be written, write record consisting of random data, varying record length as convenient. This procedure is effective, but oscilloscope trace is not as easy to read as that of step 1.

b. Each read channel is provided with a gain adjustment potentiometer (as R105, for channel 1). Monitor TP106 - 906 (for channels 1 through 9) and adjust R105 - 905 of same channel for level of at least -1.5 volts, as shown in Figure A5-1. (See also Figure A5-2.)

Figure A5-1. Read Channel Gain Adjustment Trace

NOTE

Modification of threshold circuit does not affect read level adjustment on phase-encode board.

A5-3. SKEW ADJUSTMENT

A5-4. Deskew requirements for phase-encoded data differ somewhat from those for NRZI data. Since skew may be offset as much as two data times within the same byte, write deskewing is generally not required. Read deskewing is required, however, to guarantee compliance of the total skew while writing or reading.

A5-5. Skew is adjusted mechanically at the factory and should require no readjustment within the life of the head. Skew is monitored at TP19 (Figure A5-2) while a master skew tape is being read. Proper and improper waveforms are shown in Figure A5-3. Mechanical adjustment is performed in accordance with paragraph 5-42 of this manual.

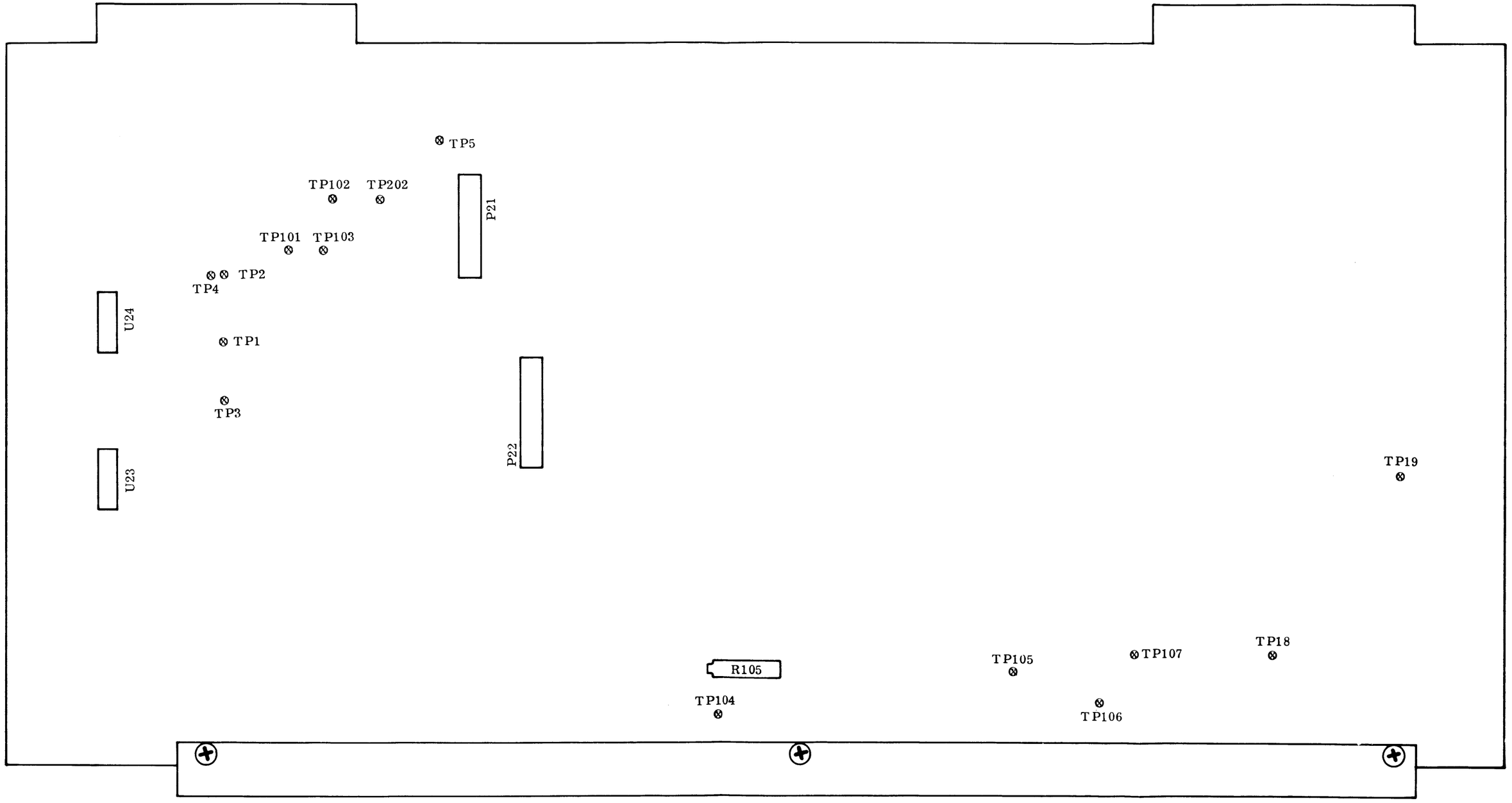


Figure A5-2. Phase-Encoded Read/Write Board Test Point Chart

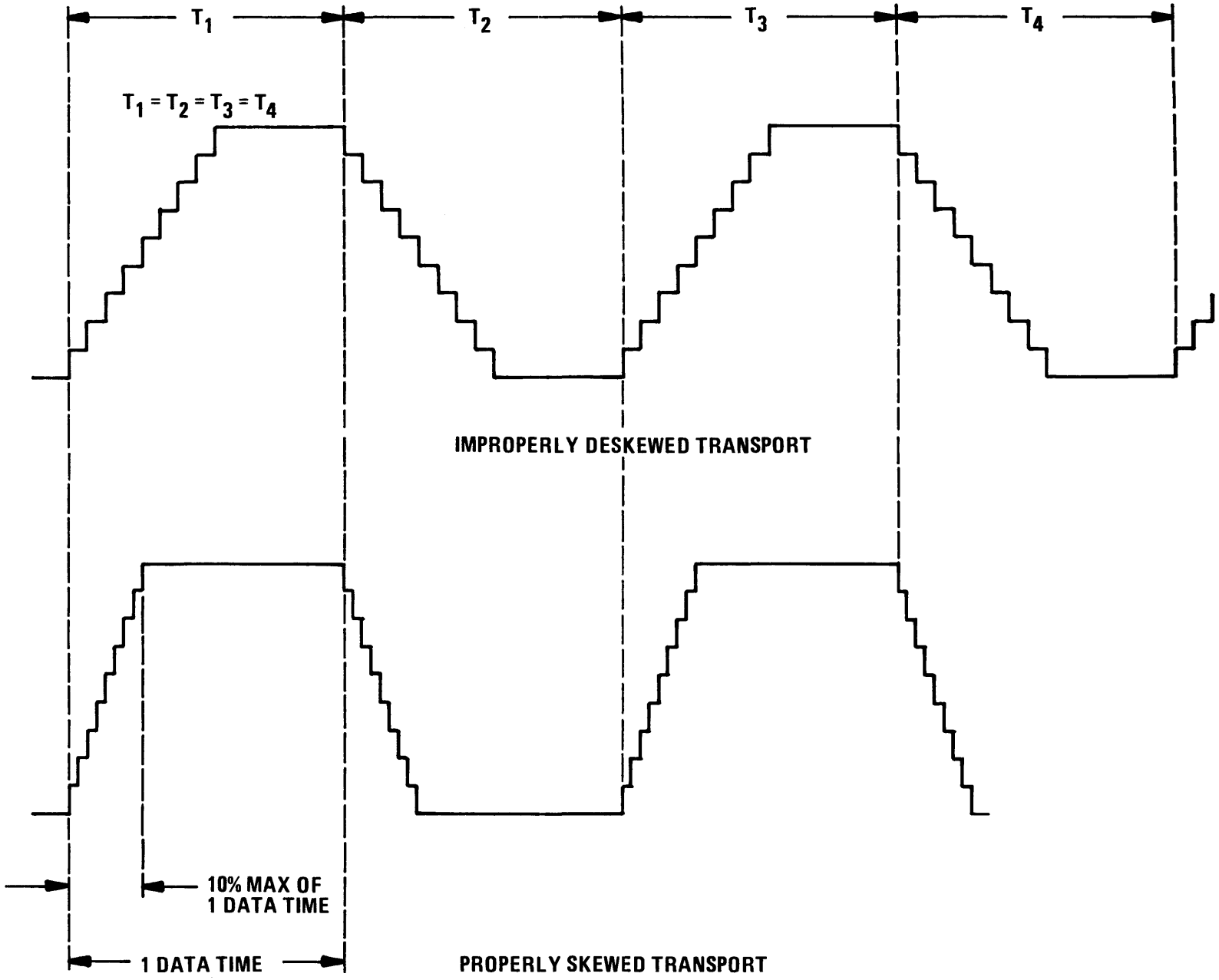


Figure A5-3. Skew Adjust Waveform (TP19) Using Master Skew Tape

SECTION AVII

PARTS LISTS, SCHEMATICS, AND ASSEMBLY DRAWINGS

All parts lists, schematics, and assembly drawings for the phase-encoded Model 100X recorder are presented in the basic manual except for the phase encode printed wiring board assembly, Part No. 131552-0XX. Substitute the drawings and parts lists presented on the following pages of this addendum for the read/write PWB assembly (Part No. 131512-0XX) drawings and parts list presented in the basic manual.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	CHG PER ECR 418		
	B	ECR 612, 692, 1119		
	C	ECR 755		
	D	ECR 1123		
	E	ECR 1114		
	F	ECR 1158		
	G	ECO 1250		
	H	ECO 1277		
	J	ECO 1395		
	K	ECO 1490		
	L	ECO 1648		
	M	ECO 1757		

(11) CONN J2D
(14) PIN (12)

(4) STIFFNER
(6) SPACER (2)
(128) SCREW (2)

(1) BOARD

RETAINER (7)
SCREW (129)
(4 PLCS)

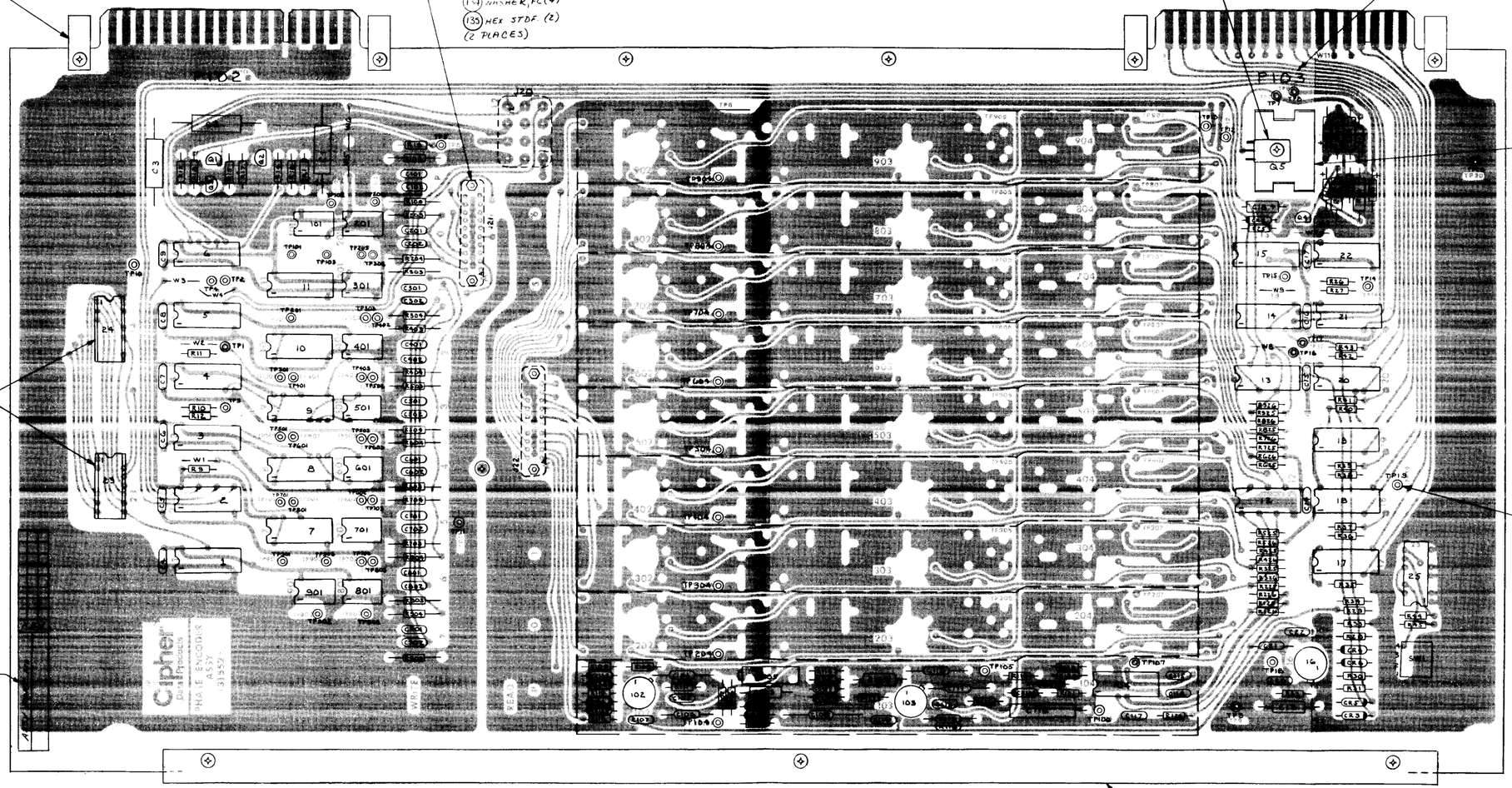
2 (10) CONNECTOR
(134) WASHER, FL (4)
(135) HEX STDF (2)
(2 PLACES)

4 (140) EPOXY INK STAMP WHITE LETTERS 1/4" HIGH TYP (2) PLCS

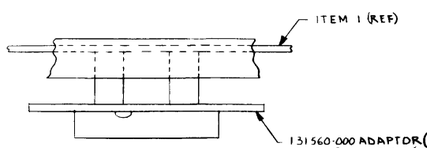
(12) HEATSINK
(129) SCREW
(133) WASH, LK
(136) NUT
(132) WASH, FL (2)

SOCKET (13)

(15) TERM (83)



(5) STIFFNER
(127) SCREW (3)
(152) WASH FL (3)
(153) WASH LK (3)
(134) NUT (3)



CONFIGURATION TABLE	
DASH NO.	DESCRIPTION
-011	9 TK, READ AFTER WRITE, 12.5 IPS
-012	9 TK, READ AFTER WRITE, 18.75 IPS
-013	9 TK, READ AFTER WRITE, 25 IPS
-014	9 TK, READ AFTER WRITE, 37.5 IPS
-015	9 TK, READ AFTER WRITE, 45 IPS
-021	9 TK, READ/WRITE, 12.5 IPS
-022	9 TK, READ/WRITE, 18.75 IPS
-023	9 TK, READ/WRITE, 25 IPS
-024	9 TK, READ/WRITE, 37.5 IPS
-025	9 TK, READ/WRITE, 45 IPS

131552-0XX

4 INSTALL Q5 WITH ITEM 12

6 MARK ASSY PART NO. & REVISION LETTER ON ITEM 2 LABEL

4 ON CONNECTOR J2 (1 & 2) THE FEMALE JACKSCREW IS TO BE INSTALLED AT PIN 'A', MALE JACKSCREW AT OPPOSITE END. DISCARD NUT FURNISHED WITH CONNECTOR, AND REPLACE WITH ITEMS 134 & 135.

NOTES:
1. FOR SCHEMATIC SEE 331552-800 REV E

RELEASED 2/19/74

TOLERANCES (EXCEPT AS NOTED)	Cipher Data Products SAN DIEGO CALIF.		
DECIMAL	MODEL 100 X	SCALE 2/1	DRAWN BY
FRACTIONAL	TITLE PWB ASSY-PHASE ENCODE		APPROVED BY
ANGULAR	DATE	DRAWING NUMBER 131552-0XX	SH 1 OF 1 REV M

J102
J21
J22
J20
REFERENCE DESIGNATOR SERIES 200
300
400
500
600
700
800
900
101
201
301
401
501
601
701
801
901
11B
10B
10A
9B
9A
8B
8A
7B
7A
3A
4B
3B
4A
5A
5B
TP101
TP201
TP301
TP401
TP501
TP601
TP701
TP801
TP901
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP15
TP101
TP102
TP103
TP104
TP105
TP201
TP202
TP203
TP301
TP302
TP303
TP401
TP402
TP403
TP501
TP502
TP503
TP601
TP602
TP603
TP701
TP702
TP703
TP801
TP802
TP803
TP901
TP902
TP903
R103 220
R104 220
R203 220
R204 220
R303 220
R304 220
R403 220
R404 220
R503 220
R504 220
R603 220
R604 220
R703 220
R704 220
R803 220
R804 220
R903 220
R904 220
C101
C102
C201
C202
C301
C302
C401
C402
C501
C502
C601
C602
C701
C702
C801
C802
C901
C902
R105 10K
R106 1K
R107 47K
R108 47K
R109 4.7K
R110 91K
R111 1K
R112 4.7K
R113 1K
R114 1K
R115 43K
R116 1.5K
R117 43K
R121 2.4K
R122 2K
C103 .1
C104 330 pf
C105 .01
C106 22pf
C107 .01
C108
C109
C110 10pf
C111 220pf
C112 .01
C113 10pf
C114 .01
C116
CR101
CR102
CR103
CR104
CR105
CR106
CR107
CR108
CR109
CR110
CR111
CR112
Q1 MPS6562
Q2 2N3702
Q3 2N3704
R14 470
R15 1K
R16 2.2K
R17 62
R18 1K
C1 4.7mfd 35V
C2 .47mfd
C3 .047mfd
R9 15
ERASE
W1
W2
W3
W4
W5
W6
W7
W8
W9
W10
SELECT LINE
SELECT LINE
WDS
WRS
TH1
TH2
TO IC 25 PIN 13
J20
+15
-15
+5
GND
GND
READ
RUN
SELECT
WRS
+5
GND
C4 THRU C9 .01
C10 THRU C17 .01
14A
14B
14C
15
16A
16B
16C
CR2
C18 1 35V
R25 6K

REFERENCE DESIGNATOR SERIES 200

300

400

500

600

700

800

900

TABLE 1

OPTION	JUMPER W1	W2	W3	W4	W5	W6	W7	W8	W9	IC 15	W10	W11
WRS			X									
WRS FROM CONTROL				X								
WRITE ON LEADING EDGE	X											
WRITE ON TRAILING EDGE		X										
READ AFTER WRITE							X					
READ/WRITE						X		X	X			
+5V WRITE					X							
+15V WRITE						X						
SELECT LINE											X	X

TABLE 2

OPTION	SPEED		C101 THRU C901	C102 THRU C902	C108 THRU C908	C109 THRU C909	C116 THRU C916
1	R/W	12.5	–	–	.0022MF	.22MF	.22MF
	RAW		–	–	.0022MF	.22MF	.22MF
2	R/W	18.75	–	–	.0015MF	.15MF	.15MF
	RAW		–	–	.0015MF	.15MF	.15MF
3	R/W	25	–	–	.001 MF	.1 MF	.1 MF
	RAW		–	–	.001 MF	.1 MF	.1 MF
4	R/W	37.5	–	–	680 PF	680 PF	.068MF
	RAW		–	–	680 PF	680 PF	.068MF
5	R/W	45	–	–	560 PF	560 PF	.047MF
	RAW		–	–	560 PF	560 PF	.047MF
6	R/W	75					
	RAW						
7	R/W						
	RAW						

REFERENCE DESIGNATOR

LAST USED	NOT USED
C22	C918
CR6	CR909
IC25	IC904
Q5	
R45	R926
TP20	TP907
W3	

R118 - 918
R1 - 8 R101-301
R102-302

NOTES: UNLESS OTHERWISE SPECIFIED:
1. W- INDICATES WIRE JUMPER.
2. ALL DIODES ARE IN914.
3. ALL CAPACITORS ARE IN MICRO FARADS.
4. ALL RESISTORS ARE IN OHMS, 1/4W 5%.

△1 INSTALL PER TABLE 1.
△6 COMPONENT TO BE SELECTED AS REQUIRED PER TABLE 2.

REVISION	
C	ECR 1120
D	ECR 1124
E	ECR 1159
F	ECO 1247
G	ECO 1296
H	ECO 1629

RELEASED 12-9-71

Cipher Data 1629

DRN:	
DATE: 7-21-71	SCHEMATIC – PHASE ENCODE (1600 MPI)
CKD:	
APPD:	331552-300 B

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	**PL** 131552-0XX	REV. M

TITLE	DWN VLP	APPROVAL	E.C.O. NO.	DATE	SHEET 1
PWB ASSY - PHASE ENCODE	DATE 7-5		1957	7-21-76	OF 28 SHEETS

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	131552-101	PWB - PHASE ENCODE		CIPHER	
2	1	1	1	731006-800	LABEL, ASSY		CIPHER	
3	1			131552-501	SPEED KIT, 12.5 IPS		CIPHER	
3		1		131552-502	SPEED KIT, 18.75 IPS		CIPHER	
3			1	131552-503	SPEED KIT, 25 IPS		CIPHER	
4	1	1	1	731510-400	STIFFNER, BAR		CIPHER	
5	1	1	1	731510-500	STIFFNER, LONG		CIPHER	
6	2	2	2	735000-402	SPACER		CIPHER	
7	4	4	4	731501-300	RETAINER, P/C CONN.		CIPHER	
8								
9	ref	ref	ref	531552-600	JUMPER TABLE		CIPHER	
10	2	2	2	205061	CONN. DIP SOLDER PINS	SRE29PD4J	WINCHESTER	J21,J22
11	1	1	1	205068	CONN. PLUG (12 PIN)	03-09-2121	MOLEX	P20
12	1	1	1	210145	HEATSINK	PA2-1CB	IERC	Q5
13	2	2	2	211002	I.C. SOCKET (14 PIN)	CA-14-S-10SD	CKT.ASSY CORP	I.C.23,24
14	12	12	12	205012	PIN, TERMINAL, MALE	02-09-2134	MOLEX	P20
15	83	83	83	205026	TEST POINT	61181-2	AMP	
16								
17								
18								
19	9	9	9	201103-100	CAP. CERAMIC DISC, .001 uf	5HK-D-10	SPRAGUE	C117-917
20	65	65	65	201105-010	CAP. CER. DISC, .01 uf, 500 V	5HKS-S10	SPRAGUE	C4-9,14-17.20, 22,105-905,107-907,112-912,

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET OF SHEETS
PWB ASSY - PHASE ENCODE	DATE				

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
					ITEM 20 CONTINUED			C114-914,115-915,118-918,
21								
22								
23								
24								
25								
26	9	9	9		CAP. (FACTORY SELECT) T.B.D.			C101-901
27	9	9	9		CAP. (FACTORY SELECT) T.B.D.			C102-902
28	9	9	9		CAP. (FACTORY SELECT) T.B.D.			C106-906
29								
30								
31								
32	1	1	1	201159-470	CAP. MYLAR, .047 uf, 100 V, 5%	WMF1S47	CDE	C3
33	9	9	9	201148-100	CAP. POLYCARB, .1uf, 50 V, 5%	RA2A104J	IMB	C103-903
34								
35	1	1	1	201149-047	CAP. POLYCARB, .0047 uf 50V, 5%	RA2A472J	IMB	C19
36								
37								
38	1	1	1	201148-470	CAP. POLYCARB, .47 uf, 50 V, 5%	RA2A474J	IMB	C2
39								
40	18	18	18	201121-100	CAP. DIPPED MICA, 10pf,300V,±½	D153C100DO	SANGAMO	C113-913,110-910
41								
42	9	9	9	201122-330	CAP. DIPPED MICA, 330pf,300V,5%	D153E331JO	SANGAMO	C104-904

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET 3
PWB ASSY - PHASE ENCODE	DATE		1957	7-7/76	OF SHEETS

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
43	1	1	1	201122-200	CAP. DIPPED MICA, 200pf,300V,5%	D153E201JO	SANGAMO	C21
44	9	9	9	201122-220	CAP. DIPPED MICA, 220pf,300V,5%	D153E221JO	SANGAMO	C111-911
45								
46								
47	5	5	5	201160-100	CAP. TANT, 1 uf, 35 V, 10%	CS13BF105K	MIL-C-26655	C10-13,18
48	1	1	1	201160-470	CAP. TANT, 4.7 uf, 35 V, 10%	CS13BF475K	MIL-C-26655	C1
49	87	87	87	202018	DIODE	IN914		CR1-6,101-109 201-209,301-309,401-409. 501-509,601-609,701-709, 801-809,901-909
50								
51								
52								
53								
54								
55								
56	1	1	1	203036	I.C. QUAD 2 INPUT	SN7438N	T.I.	I.C.25
57								
58	19	19	19	203008	I.C. OPERATIONAL AMPLIFIER	UA709HC	FAIRCHILD	I.C.16,102-902 103-903
59								
60	5	5	5	203013	I.C. DUAL D FLIP FLOP	MC7479P	MOTOROLA	I.C.7-11
61	1	1	1	203016	I.C. DUAL 4 INPUT	SN15830N	T.I.	IC5
62	5	5	5	203017	I.C. HEX INVERTER	SN15836N	T.I.	IC1,2,6,12,13

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131552-0XX | REV.

TITLE: PWB ASSY - PHASE ENCODE | DWN | DATE | APPROVAL | E.C.O. NO. | DATE | SHEET 7 OF SHEETS

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
63	8	8	8	203019	I.C. DUAL 4 INPUT	SN15844N	T.I.	IC3,4,17-22
64	1	1	1	203022	I.C. TRIPLE 3 INPUT	SN15862N	T.I.	IC14
65	9	9	9	203043	I.C. DUAL CHAN DIFF. COMP.	SN72711N	T.I.	IC104-904
66	9	9	9	203055	I.C. DUAL PERIPHERA DRIVER	SN75451N	T.I.	IC101-901
67								
68								
69	9	9	9	200204-100	POTENTIOMETER, 10K	ET34P103J	BOURNS	R105-905
70								
71								
72								
73	1	1	1	205250-500	RESISTOR PACK, 220 OHM	899-1-R-220	BECKMAN	IC23
74	1	1	1	205250-600	RESISTOR PACK, 330 OHM	899-1-R-330	BECKMAN	IC24
75								
76								
77	1	1	1	200071-150	RES, FIX COMP, 15 OHM, ¼ W, 5%	RCR07G150JM	MIL-R-39008	R19
78	1	1	1	200071-330	RES, FIX COMP, 33 OHM, ¼ W, 5%	RCR07G330JM	MIL-R-39008	R21
79	1	1	1	200071-620	RES, FIX COMP, 62 OHM, ¼ W, 5%	RCR07G620JM	MIL-R-39008	R17
80	18	18	18	200072-220	RES, FIX COMP,220 OHM, ¼ W, 5%	RCR07G221JM	MIL-R-39008	R103-903.104-904
81	1	1	1	200072-470	RES, FIX COMP,470 OHM, ¼ W, 5%	RCR07G471JM	MIL-R-39008	R14
82	45	45	45	200073-100	RES, FIX COMP, 1 K, ¼ W, 5%	RCR07G102JM	MIL-R-39008	R9-13,15,18,27, 106-906,111-911 113-913,114-914 44,45
83								

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN LLP	APPROVAL	E.C.O. NO.	DATE	SHEET 5
PWB ASSY - PHASE ENCODE	DATE , ,		957	7-21-76	OF SHEETS

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
84								
85	19	19	19	200073-110	RES, FIX COMP, 1.1 K, ¼ W, 5%	RCR07G112JM	MIL-R-39008	R123-923,32, 124-924
86	9	9	9	200073-150	RES, FIX COMP, 1.5 K, ¼ W, 5%	RCR07G152JM	MIL-R-39008	R116-916
87	18	18	18	200073-200	RES, FIX COMP, 2 K, ¼ W, 5%	RCR07G202JM	MIL-R-39008	R120-920,122-922,
88	1	1	1	200073-220	RES, FIX COMP, 2.2 K, ¼ W, 5%	RCR07G222JM	MIL-R-39008	R16
89	18	18	18	200073-240	RES, FIX COMP, 2.4 K, ¼ W, 5%	RCR07G242JM	MIL-R-39008	R119-919,121-921,
90								
91	18	18	18	200073-470	RES, FIX COMP, 4.7 K, ¼ W, 5%	RCR07G472JM	MIL-R-39008	R109-909,112-912,
92								
93	9	9	9	200073-510	RES, FIX COMP, 5.1 K, ¼ W, 5%	RCR07G512JM	MIL-R-39008	R126-926
94	1	1	1	200073-680	RES, FIX COMP, 6.8 K, ¼ W, 5%	RCR07G682JM	MIL-R-39008	R26
95	1	1	1	200073-910	RES, FIX COMP, 9.1 K, ¼ W, 5%	RCR07G912JM	MIL-R-39008	R33
96	1	1	1	200074-100	RES, FIX COMP, 10 K, ¼ W, 5%	RCR07G103JM	MIL-R-39008	R29
97	1	1	1	200074-160	RES, FIX COMP, 16 K, ¼ W, 5%	RCR07G163JM	MIL-R-39008	R25
98	9	9	9	200074-300	RES, FIX COMP, 30 K, ¼ W, 5%	RCR07G303JM	MIL-R-39008	R125-925
99	18	18	18	200074-430	RES, FIX COMP, 43 K, ¼ W, 5%	RCR07G433JM	MIL-R-39008	R115-915,117-917
100								
101	27	27	27	200074-470	RES, FIX COMP, 47 K, ¼ W, 5%	RCR07G473JM	MIL-R-39008	R35-43,107-907,108-908,
102								
103								
104	9	9	9	200074-910	RES, FIX COMP, 91 K, ¼ W, 5%	RCR07G913JM	MIL-R-39008	R110-910

MODEL 100X

PARTS LIST

CODE IDENT. 32274 | PL 131552-0XX | REV.

TITLE: PWB ASSY - PHASE ENCODE | DWN | APPROVAL | E.C.O. NO. | DATE | SHEET 6 OF SHEETS

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
105								
106	1	1	1	200075-120	RES, FIX COMP, 120 K, ¼ W, 5%	RCR07G124JM	MIL-R-39008	R28
107								
108	1	1	1	200075-150	RES, FIX COMP, 150 K, ¼ W, 5%	RCR07G154JM	MIL-R-39008	R34
109	1	1	1	200075-180	RES, FIX COMP, 180 K, ¼ W, 5%	RCR07G184JM	MIL-R-39008	R30
110								
111	1	1	1	200075-390	RES, FIX COMP, 390 K, ¼ W, 5%	RCR07G394JM	MIL-R-39008	R31
112								
113								
114	1	1	1	200083-100	RES, FIX COMP, 1 K, ½ W, 5%	RCR20G102JM	MIL-R-39008	R23
115	1	1	1	200083-120	RES, FIX COMP, 1.2 K, ½ W, 5%	RCR20G122JM	MIL-R-39008	R24
116	1	1	1	200084-150	RES, FIX COMP, 15 K, ½ W, 5%	RCR20G153JM	MIL-R-39008	R22
117	1	1	1	200082-270	RES, FIX COMP, 270, OHM, ½W, 5%	RCR20G271JM	MIL-R-39008	R20
118								
119								
120								
121	1	1	1	204004	TRANSISTOR	MPS6562	MOTOROLA	Q1
122	1	1	1	204012	TRANSISTOR	2N3702		Q2
123	2	2	2	204013	TRANSISTOR	2N3704		Q3,4
124	1	1	1	204024	TRANSISTOR, PWR PNP	2N5193		Q5
125								
126								
127	3	3	3	206405-011	SCREW, PAN HD, PHIL, CAD	4-40 x 5/16		
128	2	2	2	206406-011	SCREW, PAN HD. PHIL, CAD	4-40 x 3/8		

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN LLP	APPROVAL	E.C.O. NO.	DATE	SHEET 7
PWB ASSY - PHASE ENCODE	DATE 3-8-5		957	7/1/76	OF SHEETS

ITEM	QUANTITY 11	12	13	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
129	5	5	5	206408-011	SCREW, PAN HD, PHIL, CAD.	4-40 x 1/2		
130	1	1	1	205201	COVER, SWITCH	435489-1	AMP	SW1
131	1	1	1	210807	SWITCH, DIP 4 POSITION	435166-2	AMP	SW1
132	5	5	5	207402-021	WASHER, FLAT	# 4		
133	4	4	4	207403-011	WASHER, SPLIT LK,	# 4		
134	8	8	8	205061-004	WASHER, FLAT - FIBRE	2191	H. H. SMITH	
135	4	4	4	210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
136	4	4	4	207405-051	NUT, HEX	4-40		
137								
138								
139								
140	A/R	A/R	A/R	209994-000	INK, EPOXY WHITE	EP 110	TIBBETTS & WESTERFIELD	
141								
142	8"	8"	8"	208500-298	WIRE, SOLID, 22 AWG, COPPER	298	ALPHA	W1-W9

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. N/I

TITLE	DWN VLF	APPROVAL	E.C.O. NO.	DATE	SHEET 8
PWB ASSY - PHASE ENCODE	DATE 3-4-3		1957	7-7-76	OF SHEETS

ITEM	QUANTITY 14	QUANTITY 15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		131552-101	PWB - PHASE ENCODE		CIPHER	
2	1	1		731006-800	LABEL, ASSY		CIPHER	
3	1			131552-504	SPEED KIT, 37.5 IPS		CIPHER	
3		1		131552-505	SPEED KIT, 45 IPS		CIPHER	
4	1	1		731510-400	STIFFNER, BAR		CIPHER	
5	1	1		731510-500	STIFFNER, LONG		CIPHER	
6	2	2		735000-402	SPACER		CIPHER	
7	4	4		731501-300	RETAINER, P/C CONN.		CIPHER	
8								
9	ref	ref		531552-600	JUMPER TABLE		CIPHER	
10	2	2		205061	CONN. DIP SOLDER PINS	SRE29PD4J	WINCHESTER	J21,J22
11	1	1		205068	CONN. PLUG (12 PIN)	03-09-2121	MOLEX	P20
12	1	1		210145	HEATSINK	PA2-1CB	IERC	Q5
13	2	2		211002	I.C. SOCKET (14 PIN)	CA-14-S-10SD	CKT.ASSY CORP	I.C.23,24
14	12	12		205012	PIN, TERMINAL, MALE	02-09-2134	MOLEX	P20
15	83	83		205026	TEST POINT	61181-2	AMP	
16								
17								
18								
19	9	9		201103-100	CAP. CERAMIC DISC, .001 uf	5HK-D-10	SPRAGUE	C117-917
20	65	65		201105-010	CAP. CER. DISC, .01 uf, 500 V	5HKS-S10	SPRAGUE	C4-9,14-17.20, 22,105-905,107-907,112-912,

CIPHER	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN VLP	APPROVAL	E.C.O. NO.	DATE	SHEET 9
PWB ASSY - PHASE ENCODE	DATE 6-4-5		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 14	QUANTITY 15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
					ITEM 20 CONTINUED			C114-914,115-915,118-918,
21								
22								
23								
24								
25								
26	9	9			CAP. (FACTORY SELECT) T.B.D.			C101-901
27	9	9			CAP. (FACTORY SELECT) T.B.D.			C102-902
28	9	9			CAP. (FACTORY SELECT) T.B.D.			C106-906
29								
30								
31								
32	1	1		201159-470	CAP. MYLAR, .047 uf, 100 V, 5%	WMF1S47	CDE	C3
33	9	9		201148-100	CAP. POLYCARB, .1uf, 50 V, 5%	RA2A104J	IMB	C103-903
34								
35	1	1		201149-047	CAP. POLYCARB, .0047 uf 50V, 5%	RA2A472J	IMB	C19
36								
37								
38	1	1		201148-470	CAP. POLYCARB, .47 uf, 50 V, 5%	RA2A474J	IMB	C2
39								
40	18	18		201121-100	CAP. DIPPED MICA, 10pf,300V, ±½	D153C100DO	SANGAMO	C113-913,110-910
41								
42	9	9		201122-330	CAP. DIPPED MICA, 330pf,300V,5%	D153E331JO	SANGAMO	C104-904

Cipher Data Products	MODEL 100X **PARTS LIST**		CODE IDENT. 32274	PL 131552-0XX	REV. M
TITLE PWB ASSY - PHASE ENCODE	DWN VLP DATE 6-4-5	APPROVAL	E.C.O. NO. 1957	DATE 7-21-76	SHEET 1 OF SHEETS

ITEM	QUANTITY 14	15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
43	1	1		201122-200	CAP. DIPPED MICA, 200pf,300V,5%	D153E201JO	SANGAMO	C21
44	9	9		201122-220	CAP. DIPPED MICA, 220pf,300V,5%	D153E221JO	SANGAMO	C111-911
45								
46								
47	5	5		201160-100	CAP. TANT, 1 uf, 35 V, 10%	CS13BF105K	MIL-C-26655	C10-13,18
48	1	1		201160-470	CAP. TANT, 4.7 uf, 35 V, 10%	CS13BF475K	MIL-C-26655	C1
49	87	87		202018	DIODE	IN914		CR1-6,101-109 201-209,301-309,401-409. 501-509,601-609,701-709, 801-809,901-909
50								
51								
52								
53								
54								
55								
56	1	1		203036	I.C. QUAD 2 INPUT	SN7438N	T.I.	I.C.25
57								
58	19	19		203008	I.C. OPERATIONAL AMPLIFIER	UA709HC	FAIRCHILD	I.C.16,102-902 103-903
59								
60	5	5		203013	I.C. DUAL D FLIP FLOP	MC7479P	MOTOROLA	I.C.7-11
61	1	1		203016	I.C. DUAL 4 INPUT	SN15830N	T.I.	IC5
62	5	5		203017	I.C. HEX INVERTER	SN15836N	T.I.	IC1,2,6,12,13

MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M	
TITLE: PWB ASSY - PHASE ENCODE	DWN ULP / DATE 6-4-5	APPROVAL	E.C.O. NO. 1957	DATE 7-21-76	SHEET 11 OF SHEETS

ITEM	QUANTITY 14	QUANTITY 15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
63	8	8		203019	I.C. DUAL 4 INPUT	SN15844N	T.I.	IC3,4,17-22
64	1	1		203022	I.C. TRIPLE 3 INPUT	SN15862N	T.I.	IC14
65	9	9		203043	I.C. DUAL CHAN DIFF. COMP	SN72711N	T.I.	IC104-904
66	9	9		203055	I.C. DUAL PERIPHERA DRIVER	SN75451N	T.I.	IC101-901
67								
68								
69	9	9		200204-100	POTENTIOMETER, 10K	ET34P103J	BOURNS	R105-905
70								
71								
72								
73	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-R-220	BECKMAN	IC23
74	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-R-330	BECKMAN	IC24
75								
76								
77	1	1		200071-150	RES, FIX COMP, 15 OHM, ¼ W, 5%	RCR07G150JM	MIL-R-39008	R19
78	1	1		200071-330	RES, FIX COMP, 33 OHM, ¼ W, 5%	RCR07G330JM	MIL-R-39008	R21
79	1	1		200071-620	RES, FIX COMP, 62 OHM, ¼ W, 5%	RCR07G620JM	MIL-R-39008	R17
80	18	18		200072-220	RES, FIX COMP,220 OHM, ¼ W, 5%	RCR07G221JM	MIL-R-39008	R103-903.104-904
81	1	1		200072-470	RES, FIX COMP,470 OHM, ¼ W, 5%	RCR07G471JM	MIL-R-39008	R14
82	45	45		200073-100	RES, FIX COMP, 1 K, ¼ W, 5%	RCR07G102JM	MIL-R-39008	R9-13,15,18,27, 106-906,111-911 113-913,114-914 44,45
83								

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. A

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET 1 OF SHEETS
PWB ASSY - PHASE ENCODE	DATE 7-7-5		1357	7 21 76	

ITEM	QUANTITY 14	QUANTITY 15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
84								
85	19	19		200073-110	RES, FIX COMP, 1.1 K, ¼ W, 5%	RCR07G112JM	MIL-R-39008	R123-923,32, 124-924
86	9	9		200073-150	RES, FIX COMP, 1.5 K, ¼ W, 5%	RCR07G152JM	MIL-R-39008	R116-916
87	18	18		200073-200	RES, FIX COMP, 2 K, ¼ W, 5%	RCR07G202JM	MIL-R-39008	R120-920,122-922,
88	1	1		200073-220	RES, FIX COMP, 2.2 K, ¼ W, 5%	RCR07G222JM	MIL-R-39008	R16
89	18	18		200073-240	RES, FIX COMP, 2.4 K, ¼ W, 5%	RCR07G242JM	MIL-R-39008	R119-919,121-921,
90								
91	18	18		200073-470	RES, FIX COMP, 4.7 K, ¼ W, 5%	RCR07G472JM	MIL-R-39008	R109-909,112-912,
92								
93	9	9		200073-510	RES, FIX COMP, 5.1 K, ¼ W, 5%	RCR07G512JM	MIL-R-39008	R126-926
94	1	1		200073-680	RES, FIX COMP, 6.8 K, ¼ W, 5%	RCR07G682JM	MIL-R-39008	R26
95	1	1		200073-910	RES, FIX COMP, 9.1 K, ¼ W, 5%	RCR07G912JM	MIL-R-39008	R33
96	1	1		200074-100	RES, FIX COMP, 10 K, ¼ W, 5%	RCR07G103JM	MIL-R-39008	R29
97	1	1		200074-160	RES, FIX COMP, 16 K, ¼ W, 5%	RCR07G163JM	MIL-R-39008	R25
98	9	9		200074-300	RES, FIX COMP, 30 K, ¼ W, 5%	RCR07G303JM	MIL-R-39008	R125-925
99	18	18		200074-430	RES, FIX COMP, 43 K, ¼ W, 5%	RCR07G433JM	MIL-R-39008	R115-915,117-917
100								
101	27	27		200074-470	RES, FIX COMP, 47 K, ¼ W, 5%	RCR07G473JM	MIL-R-39008	R35-43,107-907,108-908,
102								
103								
104	9	9		200074-910	RES, FIX COMP, 91 K, ¼ W, 5%	RCR07G913JM	MIL-R-39008	R110-910

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN ULP	APPROVAL	E.C.O. NO.	DATE	SHEET 13
PWB ASSY - PHASE ENCODE	DATE 6-4-5		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 14	QUANTITY 15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
105								
106	1	1		200075-120	RES, FIX COMP, 120 K, ¼ W, 5%	RCR07G124JM	MIL-R-39008	R28
107								
108	1	1		200075-150	RES, FIX COMP, 150 K, ¼ W, 5%	RCR07G154JM	MIL-R-39008	R34
109	1	1		200075-180	RES, FIX COMP, 180 K, ¼ W, 5%	RCR07G184JM	MIL-R-39008	R30
110								
111	1	1		200075-390	RES, FIX COMP, 390 K, ¼ W, 5%	RCR07G394JM	MIL-R-39008	R31
112								
113								
114	1	1		200083-100	RES, FIX COMP, 1 K, ½ W, 5%	RCR20G102JM	MIL-R-39008	R23
115	1	1		200083-120	RES, FIX COMP, 1.2 K, ½ W, 5%	RCR20G122JM	MIL-R-39008	R24
116	1	1		200084-150	RES, FIX COMP, 15 K, ½ W, 5%	RCR20G153JM	MIL-R-39008	R22
117	1	1		200082-270	RES, FIX COMP, 270, OHM, ½W, 5%	RCR20G271JM	MIL-R-39008	R20
118								
119								
120								
121	1	1		204004	TRANSISTOR	MPS6562	MOTOROLA	Q1
122	1	1		204012	TRANSISTOR	2N3702		Q2
123	2	2		204013	TRANSISTOR	2N3704		Q3,4
124	1	1		204024	TRANSISTOR, PWR PNP	2N5193		Q5
125								
126								
127	3	3		206405-011	SCREW, PAN HD, PHIL, CAD	4-40 x 5/16		
128	2	2		206406-011	SCREW, PAN HD, PHIL, CAD	4-40 x 3/8		

Cipher	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN LLP	APPROVAL	E.C.O. NO.	DATE	SHEET 14
PWB ASSY - PHASE ENCODE	DATE 6-1-76		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 14	QUANTITY 15		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
129	5	5		206408-011	SCREW, PAN HD, PHIL, CAD.	4-40 x 1/2		
130	1	1		205201	COVER, SWITCH	435489-1	AMP	SW1
131	1	1		210807	SWITCH, DIP 4 POSITION	435166-2	AMP	SW1
132	5	5		207402-021	WASHER, FLAT	# 4		
133	4	4		207403-011	WASHER, SPLIT LK,	# 4		
134	8	8		205061-004	WASHER, FLAT - FIBRE	2191	H. H. SMITH	
135	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
136	4	4		207405-051	NUT, HEX	4-40		
137								
138								
139								
140	A/R	A/R		209994-000	INK, EPOXY WHITE	EP 110	TIBBETTS & WESTERFIELD	
141								
142	8"	8"		208500-298	WIRE, SOLID, 22 AWG, COPPER	298	ALPHA	W1-W9

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN UP	APPROVAL	E.C.O. NO.	DATE	SHEET 15
PWB ASSY - PHASE ENCODE	DATE 6-4-5		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1	1	131552-101	PWB - PHASE ENCODE		CIPHER	
2	1	1	1	731006-800	LABEL, ASSY		CIPHER	
3	1			131552-501	SPEED KIT, 12.5 IPS		CIPHER	
3		1		131552-502	SPEED KIT, 18.75 IPS		CIPHER	
3			1	131552-503	SPEED KIT, 25 IPS		CIPHER	
4	1	1	1	731510-400	STIFFNER, BAR		CIPHER	
5	1	1	1	731510-500	STIFFNER, LONG		CIPHER	
6	2	2	2	735000-402	SPACER		CIPHER	
7	4	4	4	731501-300	RETAINER, P/C CONN.		CIPHER	
8								
9	ref	ref	ref	531552-600	JUMPER TABLE		CIPHER	
10	2	2	2	205061	CONN. DIP SOLDER PINS	SRE20PD4J	WINCHESTER	J21,J22
11	1	1	1	205068	CONN. PLUG (12 PIN)	03-09-2121	MOLEX	P20
12	1	1	1	210145	HEATSINK	PA2-1CB	IERC	Q5
13	2	2	2	211002	I.C. SOCKET (14 PIN)	CA-14-S-10SD	CKT.ASSY CORP	I.C.23,24
14	12	12	12	205012	PIN, TERMINAL, MALE	02-09-2134	MOLEX	P20
15	83	83	83	205026	TEST POINT	61181-2	AMP	
16								
17								
18								
19	9	9	9	201103-100	CAP. CERAMIC DISC, .001 uf	5HK-D-10	SPRAGUE	C117-917
20	65	65	65	201105-010	CAP. CER. DISC, .01 uf, 500 V	5HKS-S10	SPRAGUE	C4-9,14-17.20, 22,105-905,107-907,112-912,

CIPHER	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSY - PHASE ENCODE	DATE 6-4-5		1957	7-21-76	16 OF SHEETS

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
					ITEM 20 CONTINUED			C114-914,115-915,118-918,
21								
22								
23								
24								
25								
26	9	9	9		CAP. (FACTORY SELECT) T.B.D.			C101-901
27	9	9	9		CAP. (FACTORY SELECT) T.B.D.			C102-902
28	9	9	9		CAP. (FACTORY SELECT) T.B.D.			C106-906
29								
30								
31								
32	1	1	1	201159-470	CAP. MYLAR, .047 uf, 100 V, 5%	WMF1S47	CDE	C3
33	9	9	9	201148-100	CAP. POLYCARB, .1uf, 50 V, 5%	RA2A104J	IMB	C103-903
34								
35	1	1	1	201149-047	CAP. POLYCARB, .0047 uf 50V, 5%	RA2A472J	IMB	C19
36								
37								
38	1	1	1	201148-470	CAP. POLYCARB, .47 uf, 50 V, 5%	RA2A474J	IMB	C2
39								
40	18	18	18	201121-100	CAP. DIPPED MICA, 10pf,300V, ±½	D153C100DO	SANGAMO	C113-913,110-910
41								
42	9	9	9	201122-330	CAP. DIPPED MICA, 330pf,300V,5%	D153E331JO	SANGAMO	C104-904

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSY - PHASE ENCODE	DATE 6-4-5		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
43	1	1	1	201122-200	CAP. DIPPED MICA, 200pf,300V,5%	D153E201JO	SANGAMO	C21
44	9	9	9	201122-220	CAP. DIPPED MICA, 220pf,300V,5%	D153E221JO	SANGAMO	C111-911
45								
46								
47	5	5	5	201160-100	CAP. TANT, 1 uf, 35 V, 10%	CS13BF105K	MIL-C-26655	C10-13,18
48	1	1	1	201160-470	CAP. TANT, 4.7 uf, 35 V, 10%	CS13BF475K	MIL-C-26655	C1
49	87	87	87	202018	DIODE	IN914		CR1-6,101-109 201-209,301-309,401-409. 501-509,601-609,701-709, 801-809,901-909
50								
51								
52								
53								
54								
55								
56	1	1	1	203036	I.C. QUAD 2 INPUT	SN7438N	T.I.	I.C.25
57	1	1	1	203002	I.C. MONOSTABLE MULTIVIB	DM8850	NATIONAL	I.C.15
58	19	19	19	203008	I.C. OPERATIONAL AMPLIFIER	UA709HC	FAIRCHILD	I.C.16,102-902 103-903
59								
60	5	5	5	203013	I.C. DUAL D FLIP FLOP	MC7479P	MOTOROLA	I.C.7-11
61	1	1	1	203016	I.C. DUAL 4 INPUT	SN15830N	T.I.	IC5
62	5	5	5	203017	I.C. HEX INVERTER	SN15836N	T.I.	IC1,2,6,12,13

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN ULP	APPROVAL	E.C.O. NO.	DATE	SHEET 1 OF SHEETS
PWB ASSY - PHASE ENCODE	DATE 6-5-5		1957	7-1-76	

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
63	8	8	8	203019	I.C. DUAL 4 INPUT	SN15844N	T.I.	IC3,4,17-22
64	1	1	1	203022	I.C. TRIPLE 3 INPUT	SN15862N	T.I.	IC14
65	9	9	9	203043	I.C. DUAL CHAN DIFF. COMP	SN72711N	T.I.	IC104-904
66	9	9	9	203055	I.C. DUAL PERIPHERA DRIVER	SN75451N	T.I.	IC101-901
67								
68								
69	9	9	9	200204-100	POTENTIOMETER, 10K	ET34P103J	BOURNS	R105-905
70								
71								
72								
73	1	1	1	205250-500	RESISTOR PACK, 220 OHM	899-1-R-220	BECKMAN	IC23
74	1	1	1	205250-600	RESISTOR PACK, 330 OHM	899-1-R-330	BECKMAN	IC24
75								
76								
77	1	1	1	200071-150	RES, FIX COMP, 15 OHM, ¼ W, 5%	RCR07G150JM	MIL-R-39008	R19
78	1	1	1	200071-330	RES, FIX COMP, 33 OHM, ¼ W, 5%	RCR07G330JM	MIL-R-39008	R21
79	1	1	1	200071-620	RES, FIX COMP, 62 OHM, ¼ W, 5%	RCR07G620JM	MIL-R-39008	R17
80	18	18	18	200072-220	RES, FIX COMP,220 OHM, ¼ W, 5%	RCR07G221JM	MIL-R-39008	R103-903.104-904
81	1	1	1	200072-470	RES, FIX COMP,470 OHM, ¼ W, 5%	RCR07G471JM	MIL-R-39008	R14
82	45	45	45	200073-100	RES, FIX COMP, 1 K, ¼ W, 5%	RCR07G102JM	MIL-R-39008	R9-13,15,18,27, 106-906,111-911 113-913,114-914 44,45
83								

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN VLP	APPROVAL	E.C.O. NO.	DATE	SHEET 19
PWB ASSY - PHASE ENCODE	DATE 6-4-76		1952	7-1-76	OF SHEETS

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
84								
85	19	19	19	200073-110	RES, FIX COMP, 1.1 K, ¼ W, 5%	RCR07G112JM	MIL-R-39008	R123-923,32, 124-924
86	9	9	9	200073-150	RES, FIX COMP, 1.5 K, ¼ W, 5%	RCR07G152JM	MIL-R-39008	R116-916
87	18	18	18	200073-200	RES, FIX COMP, 2 K, ¼ W, 5%	RCR07G202JM	MIL-R-39008	R120-920,122-922,
88	1	1	1	200073-220	RES, FIX COMP, 2.2 K, ¼ W, 5%	RCR07G222JM	MIL-R-39008	R16
89	18	18	18	200073-240	RES, FIX COMP, 2.4 K, ¼ W, 5%	RCR07G242JM	MIL-R-39008	R119-919,121-921,
90								
91	18	18	18	200073-470	RES, FIX COMP, 4.7 K, ¼ W, 5%	RCR07G472JM	MIL-R-39008	R109-909,112-912,
92								
93	9	9	9	200073-510	RES, FIX COMP, 5.1 K, ¼ W, 5%	RCR07G512JM	MIL-R-39008	R126-926
94	1	1	1	200073-680	RES, FIX COMP, 6.8 K, ¼ W, 5%	RCR07G682JM	MIL-R-39008	R26
95	1	1	1	200073-910	RES, FIX COMP, 9.1 K, ¼ W, 5%	RCR07G912JM	MIL-R-39008	R33
96	1	1	1	200074-100	RES, FIX COMP, 10 K, ¼ W, 5%	RCR07G103JM	MIL-R-39008	R29
97	1	1	1	200074-160	RES, FIX COMP, 16 K, ¼ W, 5%	RCR07G163JM	MIL-R-39008	R25
98	9	9	9	200074-300	RES, FIX COMP, 30 K, ¼ W, 5%	RCR07G303JM	MIL-R-39008	R125-925
99	18	18	18	200074-430	RES, FIX COMP, 43 K, ¼ W, 5%	RCR07G433JM	MIL-R-39008	R115-915,117-917
100								
101	27	27	27	200074-470	RES, FIX COMP, 47 K, ¼ W, 5%	RCR07G473JM	MIL-R-39008	R35-43,107-907,108-908,
102								
103								
104	9	9	9	200074-910	RES, FIX COMP, 91 K, ¼ W, 5%	RCR07G913JM	MIL-R-39008	R110-910

CIPHER Data Products

MODEL 100X **PARTS LIST**

CODE IDENT. 32274 | PL 131552-0XX | REV. M

TITLE: PWB ASSY - PHASE ENCODE

DWN [illegible] DATE 4-9-3 | APPROVAL | E.C.O. NO. 1957 | DATE 7-21-76 | SHEET 2 OF SHEETS

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
105								
106	1	1	1	200075-120	RES, FIX COMP, 120 K, ¼ W, 5%	RCR07G124JM	MIL-R-39008	R28
107								
108	1	1	1	200075-150	RES, FIX COMP, 150 K, ¼ W, 5%	RCR07G154JM	MIL-R-39008	R34
109	1	1	1	200075-180	RES, FIX COMP, 180 K, ¼ W, 5%	RCR07G184JM	MIL-R-39008	R30
110								
111	1	1	1	200075-390	RES, FIX COMP, 390 K, ¼ W, 5%	RCR07G394JM	MIL-R-39008	R31
112								
113								
114	1	1	1	200083-100	RES, FIX COMP, 1 K, ½ W, 5%	RCR20G102JM	MIL-R-39008	R23
115	1	1	1	200083-120	RES, FIX COMP, 1.2 K, ½ W, 5%	RCR20G122JM	MIL-R-39008	R24
116	1	1	1	200084-150	RES, FIX COMP, 15 K, ½ W, 5%	RCR20G153JM	MIL-R-39008	R22
117	1	1	1	200082-270	RES, FIX COMP, 270, OHM, ½ W, 5%	RCR20G271JM	MIL-R-39008	R20
118								
119								
120								
121	1	1	1	204004	TRANSISTOR	MPS6562	MOTOROLA	Q1
122	1	1	1	204012	TRANSISTOR	2N3702		Q2
123	2	2	2	204013	TRANSISTOR	2N3704		Q3,4
124	1	1	1	204024	TRANSISTOR, PWR PNP	2N5193		Q5
125								
126								
127	3	3	3	206405-011	SCREW, PAN HD, PHIL, CAD	4-40 x 5/16		
128	2	2	2	206406-011	SCREW, PAN HD, PHIL, CAD	4-40 x 3/8		

CIPHER Electronic Products	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. A1

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSY - PHASE ENCODE	DATE 6-4-8		1957	7-21-86	1 OF SHEETS

ITEM	QUANTITY 21	22	23	CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
129	5	5	5	206408-011	SCREW, PAN HD, PHIL, CAD.	4-40 x 1/2		
130	1	1	1	205201	COVER, SWITCH	435489-1	AMP	SW1
131	1	1	1	210807	SWITCH, DIP 4 POSITION	435166-2	AMP	SW1
132	5	5	5	207402-021	WASHER, FLAT	# 4		
133	4	4	4	207403-011	WASHER, SPLIT LK,	# 4		
134	8	8	8	205061-004	WASHER, FLAT - FIBRE	2191	H. H. SMITH	
135	4	4	4	210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
136	4	4	4	207405-051	NUT, HEX	4-40		
137								
138								
139								
140	A/R	A/R	A/R	209994-000	INK, EPOXY WHITE	EP 110	TIBBETTS & WESTERFIELD	
141								
142	8"	8"	8"	208500-298	WIRE, SOLID, 22 AWG, COPPER	298	ALPHA	W1-W9

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. A

TITLE	DWN LLP	APPROVAL	E.C.O. NO.	DATE	SHEET 1 OF 2 SHEETS
PWB ASSY - PHASE ENCODE	DATE 6-4-5		[illegible]	7-21-76	

ITEM	QUANTITY 24	QUANTITY 25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
1	1	1		131552-101	PWB - PHASE ENCODE		CIPHER	
2	1	1		731006-800	LABEL, ASSY		CIPHER	
3	1			131552-504	SPEED KIT, 37.5 IPS		CIPHER	
3		1		131552-505	SPEED KIT, 45 IPS		CIPHER	
3								
4	1	1		731510-400	STIFFNER, BAR		CIPHER	
5	1	1		731510-500	STIFFNER, LONG		CIPHER	
6	2	2		735000-402	SPACER		CIPHER	
7	4	4		731501-300	RETAINER, P/C CONN.		CIPHER	
8								
9	ref	ref		531552-600	JUMPER TABLE		CIPHER	
10	2	2		205061	CONN. DIP SOLDER PINS	SRE29PD4J	WINCHESTER	J21,J22
11	1	1		205068	CONN. PLUG (12 PIN)	03-09-2121	MOLEX	P20
12	1	1		210145	HEATSINK	PA2-1CB	IERC	Q5
13	2	2		211002	I.C. SOCKET (14 PIN)	CA-14-S-10SD	CKT.ASSY CORP	I.C.23,24
14	12	12		205012	PIN, TERMINAL, MALE	02-09-2134	MOLEX	P20
15	83	83		205026	TEST POINT	61181-2	AMP	
16								
17								
18								
19	9	9		201103-100	CAP. CERAMIC DISC, .001 uf	5HK-D-10	SPRAGUE	C117-917
20	65	65		201105-010	CAP. CER. DISC, .01 uf, 500 V	5HKS-S10	SPRAGUE	C4-9,14-17.20, 22,105-905,107-907,112-912,

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. A1

TITLE	DWN ULP	APPROVAL	E.C.O. NO.	DATE	SHEET 23
PWB ASSY - PHASE ENCODE	DATE 6 4 5		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 24	QUANTITY 25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
					ITEM 20 CONTINUED			C114-914,115-915,118-918,
21								
22								
23								
24								
25								
26	9	9			CAP. (FACTORY SELECT) T.B.D.			C101-901
27	9	9			CAP. (FACTORY SELECT) T.B.D.			C102-902
28	9	9			CAP. (FACTORY SELECT) T.B.D.			C106-906
29								
30								
31								
32	1	1		201159-470	CAP. MYLAR, .047 uf,100 V, 5%	WMF1S47	CDE	C3
33	9	9		201148-100	CAP. POLYCARB, .1uf, 50 V, 5%	RA2A104J	IMB	C103-903
34								
35	1	1		201149-047	CAP. POLYCARB, .0047 uf 50V, 5%	RA2A472J	IMB	C19
36								
37								
38	1	1		201148-470	CAP. POLYCARB, .47 uf, 50 V, 5%	RA2A474J	IMB	C2
39								
40	18	18		201121-100	CAP. DIPPED MICA, 10pf,300V,±½	D153C100DO	SANGAMO	C113-913,110-910
41								
42	9	9		201122-330	CAP. DIPPED MICA, 330pf,300V,5%	D153E331JO	SANGAMO	C104-904

Gerber Data Systems	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN VLP	APPROVAL	E.C.O. NO.	DATE	SHEET 24
PWB ASSY - PHASE ENCODE	DATE 6-4-5		1957	7-21-76	OF SHEETS

ITEM	QUANTITY 24	QUANTITY 25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
43	1	1		201122-200	CAP. DIPPED MICA, 200pf,300V,5%	D153E201JO	SANGAMO	C21
44	9	9		201122-220	CAP. DIPPED MICA, 220pf,300V,5%	D153E221JO	SANGAMO	C111-911
45								
46								
47	5	5		201160-100	CAP. TANT, 1 uf, 35 V, 10%	CS13BF105K	MIL-C-26655	C10-13,18
48	1	1		201160-470	CAP. TANT, 4.7 uf, 35 V, 10%	CS13BF475K	MIL-C-26655	C1
49	87	87		202018	DIODE	IN914		CR1-6,101-109 201-209,301-309,401-409. 501-509,601-609,701-709, 801-809,901-909
50								
51								
52								
53								
54								
55								
56	1	1		203036	I.C. QUAD 2 INPUT	SN7438N	T.I.	I.C.25
57	1	1		203002	I.C. MONOSTABLE MULTIVIB	DM8850	NATIONAL	I.C.15
58	19	19		203008	I.C. OPERATIONAL AMPLIFIER	UA709HC	FAIRCHILD	I.C.16,102-902 103-903
59								
60	5	5		203013	I.C. DUAL D FLIP FLOP	MC7479P	MOTOROLA	I.C.7-11
61	1	1		203016	I.C. DUAL 4 INPUT	SN15830N	T.I.	IC5
62	5	5		203017	I.C. HEX INVERTER	SN15836N	T.I.	IC1,2,6,12,13

	MODEL 100X	PARTS LIST	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN	APPROVAL	E.C.O. NO.	DATE	SHEET
PWB ASSY - PHASE ENCODE	DATE 6 4 5		1957	7 21 76	OF SHEETS

ITEM	QUANTITY 24	QUANTITY 25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
63	8	8		203019	I.C. DUAL 4 INPUT	SN15844N	T.I.	IC3,4,17-22
64	1	1		203022	I.C. TRIPLE 3 INPUT	SN15862N	T.I.	IC14
65	9	9		203043	I.C. DUAL CHAN DIFF. COMP.	SN72711N	T.I.	IC104-904
66	9	9		203055	I.C. DUAL PERIPHERA DRIVER	SN75451N	T.I.	IC101-901
67								
68								
69	9	9		200204-100	POTENTIOMETER, 10K	ET34P103J	BOURNS	R105-905
70								
71								
72								
73	1	1		205250-500	RESISTOR PACK, 220 OHM	899-1-R-220	BECKMAN	IC23
74	1	1		205250-600	RESISTOR PACK, 330 OHM	899-1-R-330	BECKMAN	IC24
75								
76								
77	1	1		200071-150	RES, FIX COMP, 15 OHM, ¼ W, 5%	RCR07G150JM	MIL-R-39008	R19
78	1	1		200071-330	RES, FIX COMP, 33 OHM, ¼ W, 5%	RCR07G330JM	MIL-R-39008	R21
79	1	1		200071-620	RES, FIX COMP, 62 OHM, ¼ W, 5%	RCR07G620JM	MIL-R-39008	R17
80	18	18		200072-220	RES, FIX COMP,220 OHM, ¼ W, 5%	RCR07G221JM	MIL-R-39008	R103-903.104-904
81	1	1		200072-470	RES, FIX COMP,470 OHM, ¼ W, 5%	RCR07G471JM	MIL-R-39008	R14
82	45	45		200073-100	RES, FIX COMP, 1 K, ¼ W, 5%	RCR07G102JM	MIL-R-39008	R9-13,15,18,27, 106-906,111-911 113-913,114-914 44,45
83								

	MODEL 100X	**PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M

TITLE	DWN LLP	APPROVAL	E.C.O. NO.	DATE	SHEET 5 OF SHEETS
PWB ASSY - PHASE ENCODE	DATE 6 / 5		1957	7-21-76	

ITEM	QUANTITY 24	QUANTITY 25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
84								
85	19	19		200073-110	RES, FIX COMP, 1.1 K, ¼ W, 5%	RCR07G112JM	MIL-R-39008	R123-923,32, 124-924
86	9	9		200073-150	RES, FIX COMP, 1.5 K, ¼ W, 5%	RCR07G152JM	MIL-R-39008	R116-916
87	18	18		200073-200	RES, FIX COMP, 2 K, ¼ W, 5%	RCR07G202JM	MIL-R-39008	R120-920,122-922,
88	1	1		200073-220	RES, FIX COMP, 2.2 K, ¼ W, 5%	RCR07G222JM	MIL-R-39008	R16
89	18	18		200073-240	RES, FIX COMP, 2.4 K, ¼ W, 5%	RCR07G242JM	MIL-R-39008	R119-919,121-921,
90								
91	18	18		200073-470	RES, FIX COMP, 4.7 K, ¼ W, 5%	RCR07G472JM	MIL-R-39008	R109-909,112-912,
92								
93	9	9		200073-510	RES, FIX COMP, 5.1 K, ¼ W, 5%	RCR07G512JM	MIL-R-39008	R126-926
94	1	1		200073-680	RES, FIX COMP, 6.8 K, ¼ W, 5%	RCR07G682JM	MIL-R-39008	R26
95	1	1		200073-910	RES, FIX COMP, 9.1 K, ¼ W, 5%	RCR07G912JM	MIL-R-39008	R33
96	1	1		200074-100	RES, FIX COMP, 10 K, ¼ W, 5%	RCR07G103JM	MIL-R-39008	R29
97	1	1		200074-160	RES, FIX COMP, 16 K, ¼ W, 5%	RCR07G163JM	MIL-R-39008	R25
98	9	9		200074-300	RES, FIX COMP, 30 K, ¼ W, 5%	RCR07G303JM	MIL-R-39008	R125-925
99	18	18		200074-430	RES, FIX COMP, 43 K, ¼ W, 5%	RCR07G433JM	MIL-R-39008	R115-915,117-917
100								
101	27	27		200074-470	RES, FIX COMP, 47 K, ¼ W, 5%	RCR07G473JM	MIL-R-39008	R35-43,107-907,108-908.
102								
103								
104	9	9		200074-910	RES, FIX COMP, 91 K, ¼ W, 5%	RCR07G913JM	MIL-R-39008	R110-910

Cipher Data Products	MODEL 100X **PARTS LIST**		CODE IDENT. 32274	PL 131552-0XX	REV. M	
TITLE PWB ASSY - PHASE ENCODE	DWN VLP DATE 6-4-5	APPROVAL	E.C.O. NO. 1957	DATE 7-21-76	SHEET 27 OF SHEETS	

ITEM	QUANTITY 24	QUANTITY 25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
105								
106	1	1		200075-120	RES, FIX COMP, 120 K, ¼ W, 5%	RCR07G124JM	MIL-R-39008	R28
107								
108	1	1		200075-150	RES, FIX COMP, 150 K, ¼ W, 5%	RCR07G154JM	MIL-R-39008	R34
109	1	1		200075-180	RES, FIX COMP, 180 K, ¼ W, 5%	RCR07G184JM	MIL-R-39008	R30
110								
111	1	1		200075-390	RES, FIX COMP, 390 K, ¼ W, 5%	RCR07G394JM	MIL-R-39008	R31
112								
113								
114	1	1		200083-100	RES, FIX COMP, 1 K, ½ W, 5%	RCR20G102JM	MIL-R-39008	R23
115	1	1		200083-120	RES, FIX COMP, 1.2 K, ½ W, 5%	RCR20G122JM	MIL-R-39008	R24
116	1	1		200084-150	RES, FIX COMP, 15 K, ½ W, 5%	RCR20G153JM	MIL-R-39008	R22
117	1	1		200082-270	RES, FIX COMP, 270, OHM, ½W, 5%	RCR20G271JM	MIL-R-39008	R20
118								
119								
120								
121	1	1		204004	TRANSISTOR	MPS6562	MOTOROLA	Q1
122	1	1		204012	TRANSISTOR	2N3702		Q2
123	2	2		204013	TRANSISTOR	2N3704		Q3,4
124	1	1		204024	TRANSISTOR, PWR PNP	2N5193		Q5
125								
126								
127	3	3		206405-011	SCREW, PAN HD, PHIL, CAD	4-40 x 5/16		
128	2	2		206406-011	SCREW, PAN HD, PHIL, CAD	4-40 x 3/8		

Cipher	MODEL 100X **PARTS LIST**	CODE IDENT. 32274	PL 131552-0XX	REV. M	
TITLE PWB ASSY - PHASE ENCODE	DWN CLD DATE 6-9-5	APPROVAL	E.C.O. NO. 1957	DATE 7-21-76	SHEET 28 OF 28 SHEETS

ITEM	QUANTITY 24	25		CIPHER PART NO.	DESCRIPTION	VENDOR OR SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
129	5	5		206408-011	SCREW, PAN HD, PHIL, CAD.	4-40 x 1/2		
130	1	1		205201	COVER, SWITCH	435489-1	AMP	SW1
131	1	1		210807	SWITCH, DIP 4 POSITION	435166-2	AMP	SW1
132	5	5		207402-021	WASHER, FLAT	# 4		
133	4	4		207403-011	WASHER, SPLIT LK,	# 4		
134	8	8		205061-004	WASHER, FLAT - FIBRE	2191	H. H. SMITH	
135	4	4		210030-171	STANDOFF, HEX - BRASS 1/8	8100-B-0256	AMATOM	
136	4	4		207405-051	NUT, HEX	4-40		
137								
138								
139								
140	A/R	A/R		209994-000	INK, EPOXY WHITE	EP 110	TIBBETTS & WESTERFIELD	
141								
142	8"	8"		208500-298	WIRE, SOLID, 22 AWG, COPPER	298	ALPHA	W1-W9

Cipher Data Products

PARTS LIST

CODE IDENT. 32274 | PL 131552-5XX | REV. A

TITLE: SPEED KIT - PHASE ENCODE (-501, 12.5 IPS / -502, 18.75 IPS) | DWN G BODDY | DATE 3-13-75 | APPROVAL | E.C.O. NO. | DATE | SHEET 1 OF 3 SHEETS

ITEM	QUANTITY -01	QUANTITY -02	QUANTITY -	CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
			SEE SHEET 2 & 3 FOR ADDITIONAL DASH NO'S		THIS SPEED OPTION LIST RELATES DIRECTLY			
					TO REF DESIGNATORS & QTYS ON DWG 131552-0XX			
1	18	-		201149-022	CAP, POLYCARB, .0022μF, 50V, 5%	RA2A222J	IMB	C108-C908, C109-C909
2	-	18		201149-015	CAP, POLYCARB, .0015μF, 50V, 5%	RA2A152J	IMB	C108-C908, C109-C909
3	9	-		201148-220	CAP, POLYCARB, .22 μF, 50V, 5%	RA2A224J	IMB	C116-C916
4	-	9		201148-150	CAP, POLYCARB, .15 μF, 50V, 5%	RA2A154J	IMB	C116-C916

5043 CDP

Cipher Data Products

PARTS LIST

CODE IDENT. 32274 | PL131552-5XX | REV. A

TITLE: SPEED KIT-PHASE ENCODE (-503, 25 IPS / -504, 37.5 IPS)

DWN G BODDY | DATE 3-13-75 | APPROVAL | F.C.O. NO. | DATE | SHEET 2 OF SHEETS

ITEM	QUANTITY -03	QUANTITY -04		CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
			SEE SHEET 1 FOR ADDITIONAL DASH NOS					
5	18	-		201148-001	CAP, POLYCARB, .001 µF, 50V, 5%	RA2A102J	IMB	C108-C908, C109-C909
6	-	18		201122-680	CAP, DIPPED MICA, 680 PF, 300V, 5%	D153E681J0	SANGAMO	C108-C908, C109-C909
7	9	-		201148-100	CAP, POLYCARB, .1 µF, 50V, 5%	RA2A104J	IMB	C116-C916
8	-	9		201149-680	CAP, POLYCARB, .068 µF, 50V, 5%	RA2A683J	IMB	C116-C916

5043 C2

Cipher Data Products

PARTS LIST

CODE IDENT. 32274 | PL 131552-5XX | REV. A

TITLE: SPEED KIT - PHASE ENCODE (-505 45 IPS)

DWNG BODDY | DATE 3-13-75 | APPROVAL | E.C.O. NO. | DATE | SHEET 3 OF SHEETS

ITEM	QUANTITY -05			CIPHER PART NO.	DESCRIPTION	VENDOR NO. SPEC. NO.	VENDOR OR SPECIFICATION	REFERENCE DESIGNATOR
			SEE SHEET 1 FOR ADDITIONAL DASH NO'S					
9	18	-		201122-560	CAP, DIPPED MICA, 560PF, 300V, 5%	D153E561J0	SANGAMO	C108-C908, C109-C909
10								
11	9	-		201149-470	CAP, POLYCARB, .047μF, 50V, 5%	RA2A473J	IMB	C116-C916
12								

5043 CDP