DIGI-DATA CORPORATION
8580 Dorsey Run Rd., Jessup, Md. 20794

SYNCHRONOUS TRANSPORT

OPERATION AND MAINTENANCE MANUAL

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OPERATION
AND
MAINTENANCE MANUAL

RECORD OF REVISIONS

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1 - GENERAL INFORMATION

1.1 SCOPE OF MANUAL. This manual, in the first four sections, describes the operation, installation, and interfacing of Digi-Data Corporation's series 1130, 1630, and 1730 synchronous magnetic tape transports in the NRZI, Phase Encoded, and Dual Density (NRZI/PE) modes. Sections 5 through 10 describe circuit operation, troubleshooting techniques, component replacement, and adjustment procedures.

1.2 DESCRIPTION OF EQUIPMENT.

1.2.1 FUNCTIONAL DESCRIPTION. The Digi-Data line of synchronous magnetic tape transports described herein is designed to record and read digital data on seven or nine track magnetic tape at synchronous tape speeds from 12.5 to 45 inches per second (IPS). Two basic tasks are performed by the 1130, 1630 and 1730 series transports,

1) the accurately controlled movement of 0.5 inch magnetic tape across a magnetic head,

2) the writing and reading of NRZI and/or PE data to and from magnetic tape.

When properly interfaced the transports perform these two tasks in such a manner that complete IBM/ANSI compatibility is achieved.

1.2.1.1 TAPE MOVEMENT. Tape movement is controlled by a single capstan mounted on the shaft of a DC permanent magnet motor. The tape is in contact with 180 degrees of the capstan surface. Constant tape velocity and linear acceleration are achieved through feedback from the capstan motor's integral tachometer. Tape buffering is accomplished by two tension arms whose movements control the take-up and supply reel motors via differential photocell servomechanisms. Four different tape speed are available across the line of three models as indicated in Figure 1-1. Beginning of tape (BOT) and end of tape (EOT) detection, high speed rewind and low speed unload are incorporated in all three models.

Tape Speed	Model 1130 7" dia. reels (600')	Model 1630 8.5" dia. reels (1200')	Model 1730 10.5" dia. reels (2400')
12.5 IPS	OPTIONAL	-	-
25 IPS	STANDARD	STANDARD	OPTIONAL
37.5 IPS	-	OPTIONAL	OPTIONAL
45 IPS	-	-	STANDARD

Figure 1-1, AVAILABLE TAPE SPEEDS

1.2.1.2 DATA TRANSFER. Data to be recorded must be provided with an external clock. NRZI data is encoded by the transport, phase-encoded data must be already encoded when presented to the transport.

NRZI data recovered from tape is amplified, decoded, and deskewed, and provided at the I/O with a clock developed from data. Phase encoded data is provided as read, except that supressed by data discrimination circuitry.

Each unit has three read thresholds: high for read-after-write error checking, normal, and low for the recovery of severly degraded data. Each unit also incorporates file protection to prevent inadvertant erasure, and edit capability which allows the user to rewrite a single record/block in the midst of other records/blocks. Both dual and single gap head configurations are available.

1.2.1.3 TAPE PROTECTION. Of special interest is Digi-Data's exclusive power fail protection scheme which employs energy stored in over-sized filter capacitors to stop the reel motors completely under servo control. Under no circumstance does tape ever spill or move backwards over the head and thereby destroy previously recorded data.

1.2.2 PHYSICAL DESCRIPTION. The 1130, 1630, and 1730 transport are each built on a single machined aluminum plate; all tape handling components are mounted directly on this precision surface to assure the flattest possible tape path. The tension arms are light and short to provide low inertia, and mounted in double ball-bearings to maintain perpendicularity.

The electronics consist of two or three printed circuit boards housed in a hinged sub-chassis. The first board, MC-17, contains power supplies and motion control circuitry; the second board, RC-11, contains write amplifiers, read amplifiers, several logic functions, and the 100 pin I/O connector. In the phase encoded or dual density (NRZI/PE) versions the RC-11 board is replaced by two boards, the RA-16 and PA-16. Since all transport inputs and outputs are gated by the SELECT input, up to four transports may be bussed (daisy-chained) on a single formatter/controller.

Ease of maintenance was designed into the 1130, 1630 and 1730 series synchronous transports. All major components are connected via plugs and sockets to speed replacement. Over twenty labelled test stakes are readily accessible to the maintenance engineer.

1.2.3 OPTIONS.

Integral NRZI Formatter. A third and fourth printed circuit board containing the NRZI formatter may be provided as an option. This arrangement precludes daisy-chaining additional transports as the integral formatter is dedicated solely to the transport in which it is housed.

Automatic Restart. When power is restored following an outage the automatic restart option allows the selected transport to come back on line automatically without operator assistance. This option is desirable when the transport is used in conjunction with a computer incorporating the same feature.

Industry Standard I/O Adaptor. Digi-Data transports normally provide all I/O signals on a single 2 x 50 pin connector. When cabling designed for a competitor's transport is already available to the customer the Digi-Data transport is supplied with an adaptor to provide three edge connectors.

Input Power. The transports operate directly from 117 VAC or 230 VAC, 48 to 400 Hz. Two steps are provided in the lower input voltage range of 95 to 125 VAC; three

steps are provided in the upper range of 195 to 255 VAC. All input power changes may be conveniently effected with a screwdriver.

1.3 MODEL NUMBERING SCHEME. The Digi-Data transport model number completely describes the series, number of tracks, data packing density, tape speed, head configuration, and options of a transport. Figure 1-2 delineates the model numbering scheme.

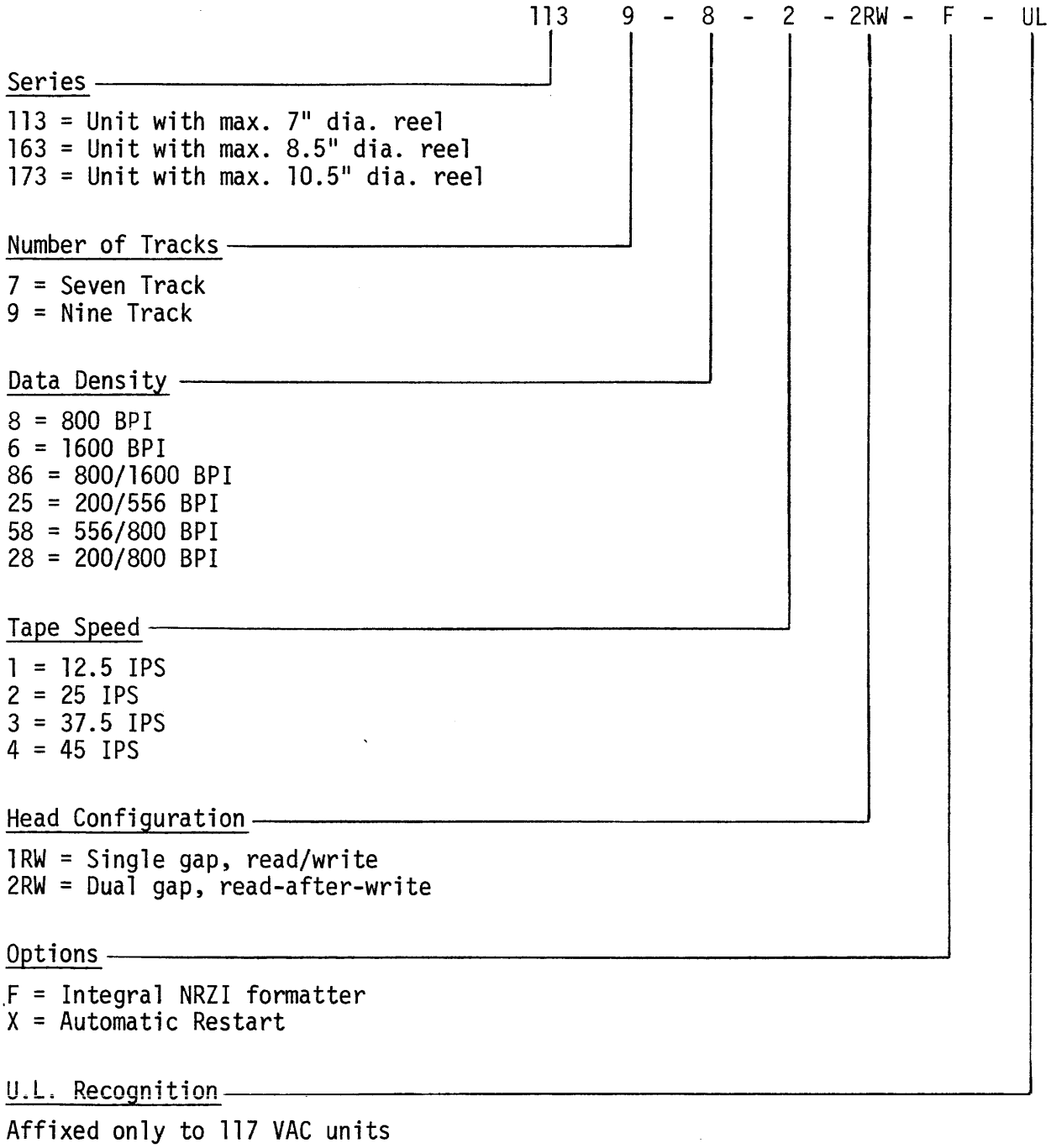


Figure 1-2, MODEL NUMBERING SCHEME

1.4 SPECIFICATIONS

CHARACTERISTIC	VALUE		
Recording Mode	NRZI, Phase Encoded, or both		
Number of Tracks	7 or 9, IBM compatible		
Data Packing Density	200, 556, 800, or 1600 BPI		
Head	Dual or single gap		
Start/Stop Distance	0.19 inch ± 0.02		
Start/Stop Time	8.4 msec ± 0.9 @ 45 ips 10.1 msec ± 1.1 @ 37.5 ips 15.2 msec ± 1.6 @ 25 ips 30.4 msec ± 3.2 @12.5 ips		
Instantaneous Speed Variation	± 3% maximum		
Long Term Speed Variation	± 1% maximum		
Interchannel Displacement	150 microinches max. at 800 BPI		
Tape Specifications	0.5 inch width, 1.5 mil, computer grade		
Tape Tension	7 oz. ± 1		
Tape Buffering	Tension arm, 40 to 60 degree arc		
BOT/EOT Sensing	Photoelectric		
Head and Tape Guide Spacing	IBM compatible		
Power Fail Protection	Dynamic electrical braking, servo control maintained to rest.		
Read Thresholds	NRZI: Normal 20%, High 50%, Low 10% PE: Normal 10%, High 30%, Low 5%		
	1130	1630	1730
Maximum Reel Size	7" dia. (600')	8.5" dia. (1200')	10.5" dia. (2400')
Synchronous Tape Speed	25 ips std. (12.5 ips opt)	25 ips std. (37.5 ips opt)	45 ips std. (37.5 & 25 ips opt)
Rewind Velocity (Nominal)	75 ips	100 ips	150 ips

CHARACTERISTIC	VALUE		
Electronics	Solid State Silicon		
Electrical Interface	Line Drivers: DTL 844/944 power gates open collector, 25 ma sink Line Receivers: DTL 936/946		
Line Voltage	95-115 VAC 105-125 VAC 195-235 VAC 205-245 VAC 215-255 VAC		
Line Frequency	50 to 400 Hz ± 4%		
Power	200 watts		
Operating Environment	0 to 20,000 feet (6,000 m.) 35 to 122 degrees F (2 to 50 degrees C) to 95% RH without condensation		
Non-operating Environment	0 to 50,000 feet (15,000 m.) -40 to 160 degrees F (-40 to 70 degrees C)		
	1130	1630	1730
Weight	39 lbs. (17.7 kg.)	46 lbs (20.9 kg.)	70 lbs. (31.8 kg.)
Height	8.75 inches	12.25 inches	24.5 inches
Depth, Overall	13.15 inches	13.15 inches	13.15 inches
Depth, Behind Front Panel	10.8 inches	10.8 inches	10.8 inches
Width	19.0 inches	19.0 inches	19.0 inches
Mounting in EIA Cabinet	On Slides	On Slides	On Hinges

2 - OPERATOR'S INFORMATION

2.1 INTRODUCTION. This section contains a description of each manual control and indicator light, detailed explanations of how to load and unload tape on the transports, and operator precautions and cleaning procedures.

2.2 CONTROLS AND INDICATORS. Four operator pushbutton controls and three indicator lights are located on the front control panel of all three models.

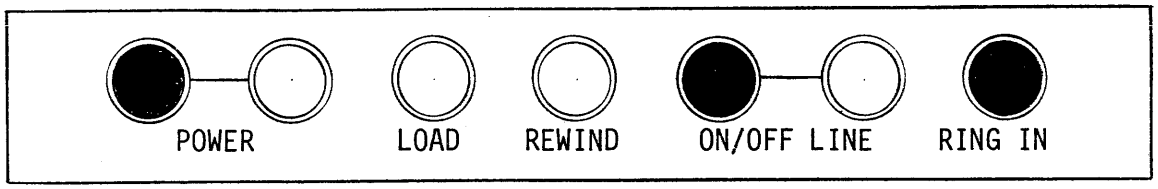


Figure 2-1, CONTROLS AND INDICATORS (MODELS 1630 AND 1730)

2.2.1 POWER. The power pushbutton switch applies power to the transport; the associated indicator light glows when power is on.

2.2.2 LOAD. The load pushbutton switch activates the servos, thereby applying tension to the tape, and advances the tape to the load point marker.

2.2.3 REWIND. The rewind pushbutton switch rewinds the tape to the load point and places the transport "off line". Pressing this switch at load point unloads the tape at low speed.

2.2.4 ON/OFF LINE. The On/Off Line pushbutton switch alternately places the transport "on line" enabling remote control, and "off line" disabling remote control. The associated indicator light glows only when the transport is "on line".

2.2.5 RING IN. The Ring In indicator light glows when a reel equipped with a write ring is mounted on the supply hub warning that the transport is not "file protected" and writing/erasing are therefore permitted.

2.2.6 HIGH DENSITY (1130 Series Only). The High Density pushbutton switch and associated indicator light are normally inoperable.

2.3 LOADING TAPE. The procedure for loading tape on the 1130, 1630 and 1730 transports is discussed in three separate paragraphs since the tape path of each series is unique to that series.

When mounting a reel of tape on a transport care should be taken that pressure is applied by the fingertips only in the center of the tape reel; pressing on the flanges will damage the tape edges resulting in unreliable performance.

Before loading a reel of tape on any transport look at the back of the reel to determine whether the "write ring" is present or has been removed. The "write ring" is a simple, but effective, safety feature. When a reel of tape with the ring removed is mounted on the transport, writing and erasing are impossible; the transport's condition is known

as "file protected", and only reading is permitted. When a reel of tape with the write ring inserted is mounted on the transport the RING IN indicator light on the operator's control panel will be illuminated cautioning that writing and erasing are allowed.

2.3.1 LOADING TAPE ON THE 1130 TRANSPORT. To load tape on the 1130 series transport follow these step-by-step instructions while referring to Figure 2-2. The maximum size reel which may be mounted on the 1130 has a 7 inch diameter.

1) Open the transport dust cover.

2) Press the POWER pushbutton switch applying power to the transport. The POWER indicator light should glow steadily.

3) Press the reel of tape onto the supply hub which is located on the left. Insure that the reel is firmly seated behind all three catches.

4) Thread the tape from the reel around the left of the supply tension arm. Continue under the left tape guide post, over the tape cleaner, between the two elements of the BOT/EOT sensor assembly, over the head (but under the flux gate), under the right tape guide post, under the capstan and up onto the take-up hub. The 1130 transport does not require a reel on the take-up hub. Tape should be wound onto the take-up hub in the counter-clockwise direction.

5) After winding four or five feet of tape onto the take-up hub, place your right index finger against the tape between the capstan and the take-up hub and pull the tape to the left, looping it over the take-up tension arm.

6) Remove any slackness in the tape by turning either hub. Verify that the tape is threaded as shown on the decal affixed to the transport front plate, or as shown in Figure 2-2.

7) Close the transport dust cover.

8) Press the LOAD pushbutton switch. The arms and reel motors will apply tension to the tape, and the tape will move forward. When the BOT (beginning of tape) reflective marker reaches the BOT/EOT sensor tape motion will stop. This location is referred to as the "load point".

9) Press the ON/OFF LINE pushbutton switch. The associated indicator light glows only when the transport is ON LINE, i.e. under remote control. The unit may now be operated by the computer or other controller. (Note: Transports equipped with the automatic restart option will come on line automatically.)

2.3.2 LOADING TAPE ON THE 1630 TRANSPORT. To load tape on a 1630 series transport, follow these step-by-step instructions while referring to Figure 2-3. The maximum size reel which may be mounted on the 1630 has an 8.5 inch diameter.

1) Open the transport dust cover.

2) Press the POWER pushbutton switch applying power to the transport. The POWER indicator light should glow steadily.

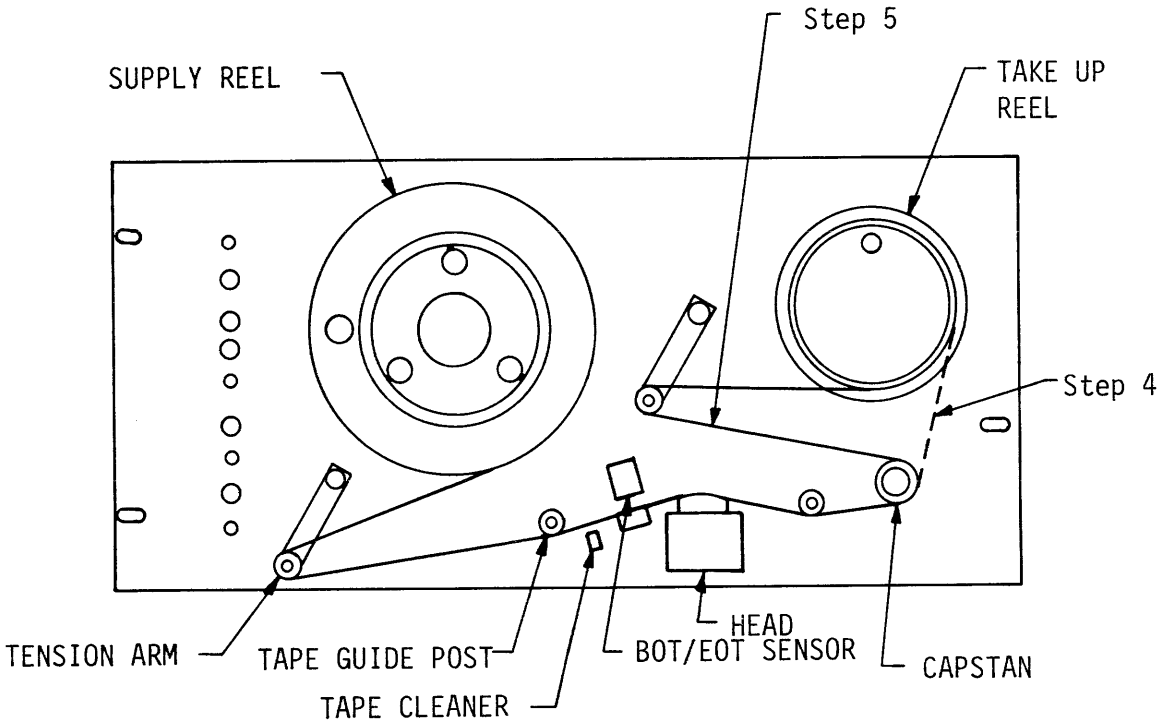


FIG. 2 - 2 MODEL 1130 TAPE TRANSPORT

3) Pull outward on the reel-locking knob located in the center of the supply hub which is on the left. Place the reel of tape on the supply hub, then press inward on the reel-locking knob to lock the reel in place.

4) Thread the tape from the reel around the right of the stationary roller located below the supply reel, then around the left of the supply tension arm. Return under the left tape guide post, above the tape cleaner, between the two elements of the BOT/EOT sensor assembly, over the tape head (but under the flux gate), under the right tape guide post, under the capstan, to the right of the stationary roller, and up onto the hub so that the tape will wind onto the hub in the counter-clockwise direction. A reel is not required on the take-up hub of the 1630 transport.

5) After winding four or five feet of tape onto the take-up hub place your right index finger against the tape between the capstan and the stationary roller and pull the tape to the left, looping it over the take-up tension arm.

6) Remove any slackness in the tape by turning either hub. Verify that the tape is threaded as shown on the decal affixed to the transport front plate, or as shown in Figure 2-3.

7) Close the transport dust cover and perform steps 8) and 9) as indicated in paragraph 2.3.1.

2.3.3 LOADING TAPE ON THE 1730 TRANSPORT. To load tape on the 1730 transport, follow these step-by-step instructions while referring to figure 2-4. The maximum size reel which may be mounted on the 1730 transport has a 10.5 inch diameter.

1) Open the transport dust cover.

2) Press the POWER pushbutton switch applying power to the transport. The POWER indicator light should glow steadily.

3) Pull outward on the reel-locking knob located in the center of the supply hub. The supply hub is at the bottom. Place the reel of tape on the supply hub, then press inward on the reel-locking knob to lock the reel in place.

4) Thread the tape from the bottom (supply) reel over the stationary roller to the right of the reel, then down around the bottom tension arm roller. Return upward to the right of the bottom tape guide post, left of the tape cleaner, between the two elements of the BOT/EOT sensor assembly, between the tape head and its attached flux gate and to the right of the top tape guide post. Continue over the top of the capstan directly onto the top (take-up) reel. Tape should be wound onto the take-up reel in the clockwise direction.

5) After winding five or six feet of tape onto the take-up reel, pull the tape down between the capstan and the top stationary roller onto the top tension arm roller.

6) Remove any slackness in the tape by turning either reel. Verify that the tape is now threaded as shown in the decal affixed to the transport front plate, or as shown in figure 2-4.

7) Close the transport dust cover and perform steps 8) and 9) as indicated in paragraph 2.3.1.

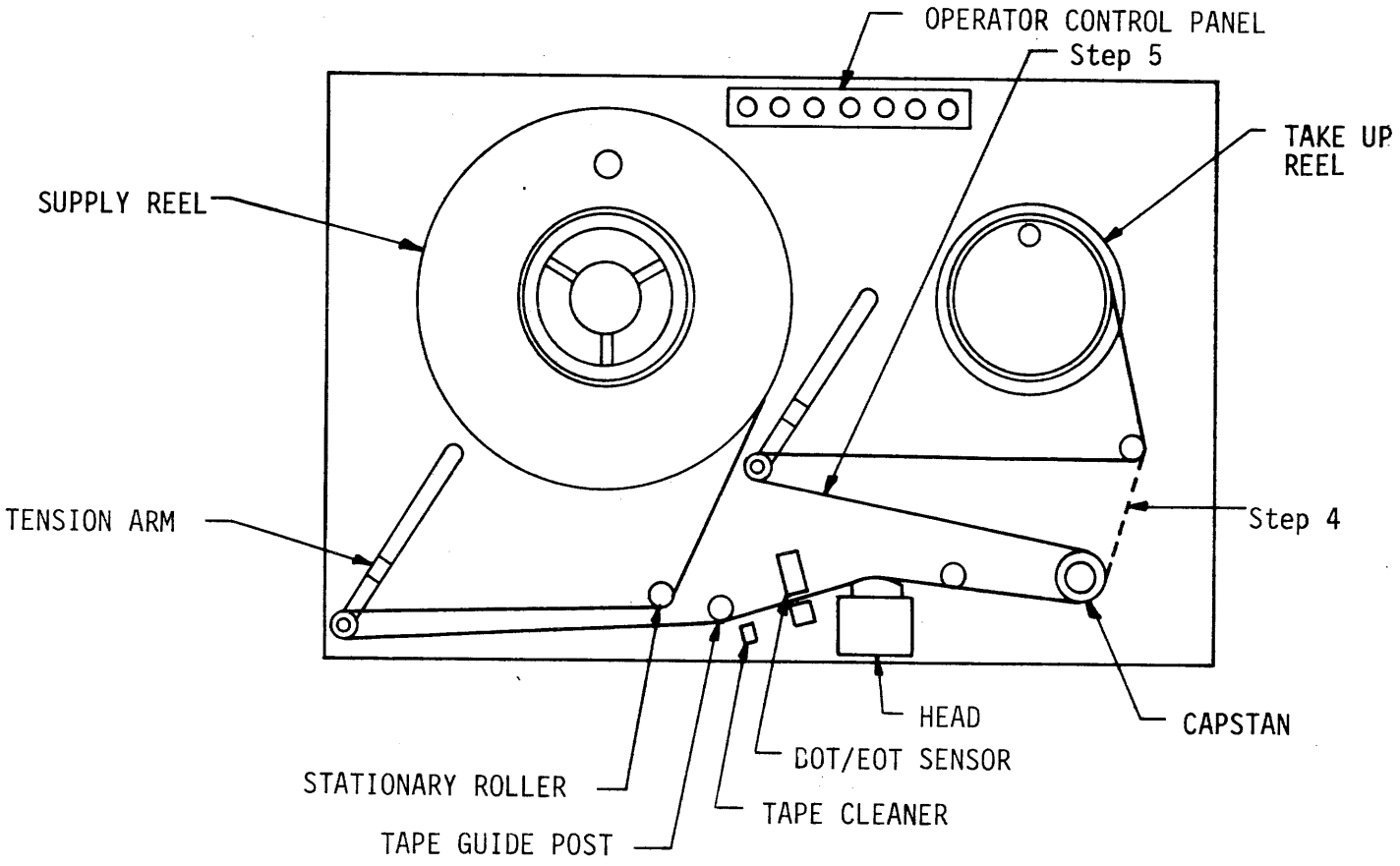


FIG. 2 - 3 MODEL 1630 TAPE TRANSPORT

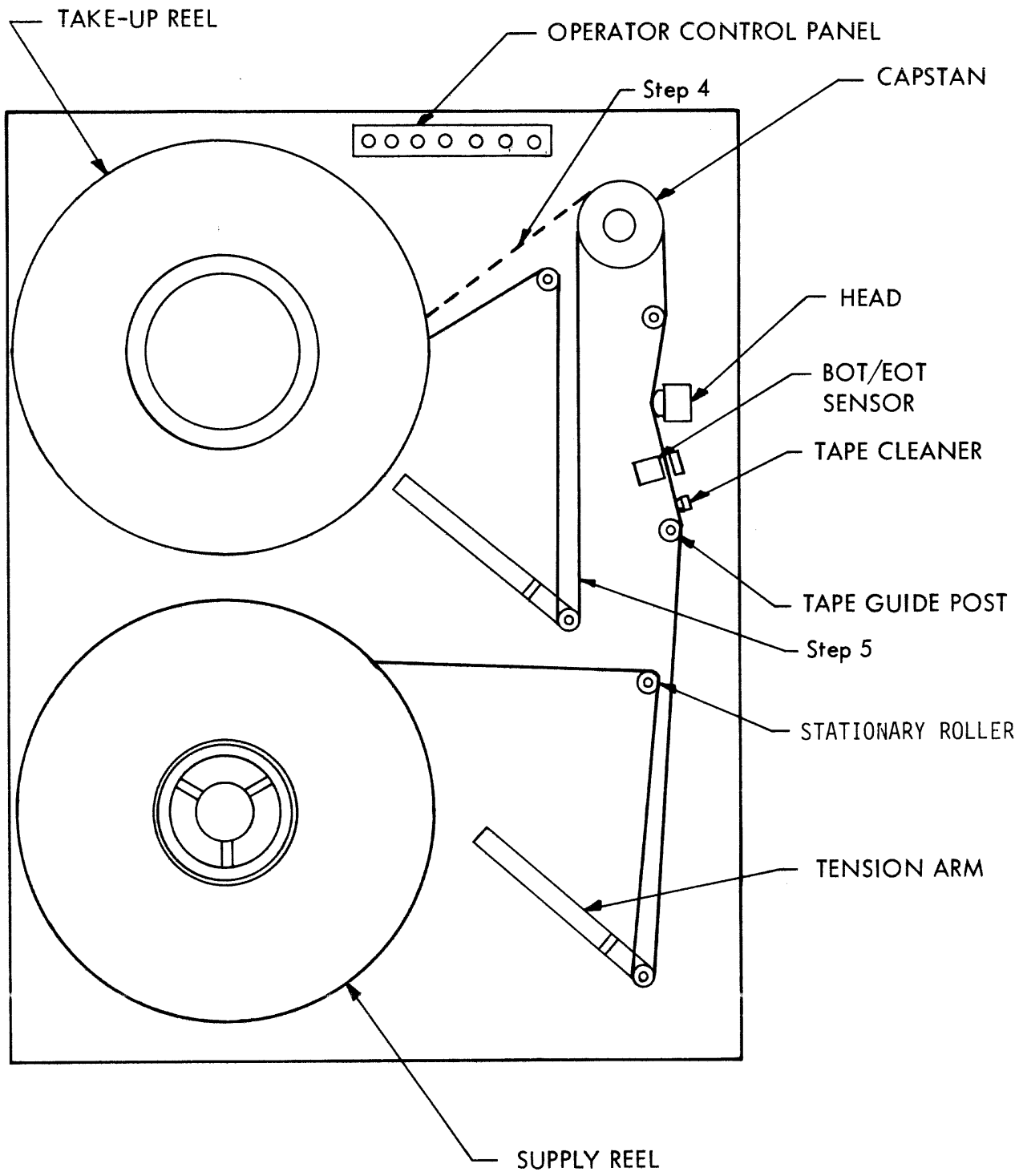


FIG. 2 - 4 MODEL 1730 TAPE TRANSPORT

2.4 UNLOADING TAPE. To unload a reel of tape from any of the 1130, 1630 or 1730 transports follow this step-by-step procedure. It is assumed that power is on; if power is off refer to paragraph 2.5.1 first.

1) Press the REWIND pushbutton switch and release it. The tape will rewind and return to the load point. Pressing REWIND automatically places the transport OFF LINE.

2) After the tape motion has ceased press the REWIND pushbutton switch a second time and release it. The tape will unload at low speed.

3) After tape tension is lost, open the dust cover and wind the tape completely onto the supply reel.

4) Pull up on the reel-locking knob at the center of the supply hub. Remove the reel. Press down on the reel-locking knob and close the dust cover.

2.5 RECOVERING FROM PROBLEM CONDITIONS

2.5.1 RECOVERING FROM A POWER OUTAGE. In the event of power failure the 1130, 1630, and 1730 transports will employ energy stored in filter capacitors to stop the reel motors completely under servo control, even when rewinding, and then relax the tension arms to their stops. Tape will never spill or be damaged in any way. To rewind the tape after restoration of power press the LOAD and REWIND pushbutton switches simultaneously and keep them depressed until the transport starts to rewind the tape.

2.5.2 RECOVERING AFTER RUNNING TAPE ENTIRELY OFF THE SUPPLY REEL. Should the tape be accidently wound entirely from the supply reel the transport will halt when tape tension is lost. To reload the tape follow these instructions.

1) Thread the tape from the take-up hub to the supply reel as shown on the tape threading decal affixed to the front plate.

2) Turn the supply reel counter-clockwise until the EOT (end of tape) reflective marker is encountered - approximately ten feet. If no EOT marker is present apply one along the edge of the tape which is nearest the plate.

3) Remove slackness from the tape and verify that the tape is threaded properly. Close the dust cover.

4) Press the LOAD and REWIND pushbutton switches simultaneously and hold them down until the tape begins rewinding.

2.6 CLEANING. Careful attention should be given to the performance of the daily cleaning instructions provided below. Small particles of dust and oxide from the tape will cause data errors and possibly permanent damage to the magnetic tape.

2.6.1 DAILY CLEANING OF HEAD AND GUIDES. Perform the following procedure after <u>every eight hours</u> of system use, or after every reel of tape if system use is infrequent.

1) Remove tape from the transport as described in paragraph 2.4.

2) Moisten a cotton swab, or any lint-free clean cloth,with isopropyl alcohol or commercial head cleaning solvent.

3) Lifting the flux gate clean the head(s), then the two tape guides.

4) Clean the tape cleaner, the tension arm rollers, and the stationary rollers. (Excessive liquid is not required!)

2.6.2 WEEKLY CLEANING OF CAPSTAN. Clean the capstan outer surface weekly following this procedure.

1) Moisten cotton swab or cloth with water.

2) Rotate the capstan with one hand on the center shaft (not the outer surface, as it may be accidently deformed), while holding cleaning implement with the other hand against the outer surface.

3) Dry in a similar fashion.

4) If the capstan outer surface shows signs of cracking or polish advise the maintenance engineer.

3 - INSTALLATION AND INITIAL CHECKOUT

3.1 INTRODUCTION. This section describes the unpacking, inspection, initial check-out, rack-mounting, and cabling of series 1130, 1630 and 1730 synchronous magnetic tape transports.

3.2 UNPACKING THE TRANSPORT. Digi-Data transports are shipped in two fiberboard cartons with three inches of free space between the inner and outer cartons on all sides. These cartons, and all spacers, sleeves, and corner blocks should be retained if the transport is to be reshipped. Refer to drawings 4550000-0000, 4550001-0000 and 4550002-0000.

3.2.1 UNPACKING PROCEDURE.

1) Slit the top of the outer carton and raise the flaps. Remove the four top corner blocks.

WARNING!
DO NOT CUT TOO DEEPLY OR THE PLEXIGLAS OF THE TRANSPORT DOOR WILL BE MARRED.

2) Carefully slit the top of the inner carton.

3) Raise the inner flaps. Two hand holes should appear along the longer sides of the carton.

4) Grasp the transport behind the front plate and lift the transport straight up and out of the carton.

5) Locate and remove the accessories from the packing materials. They are packed between the inner and outer cartons.

6) Remove the adhesive tape from the transport dust cover and power cord.

3.2.2 IN CASE OF DAMAGE. If any any point during the unpacking procedure it becomes obvious that the transport has been damaged, unpack no further. Advise Digi-Data Corporation of the loss, and file a claim with the carrier. Since the carrier's claim agent may wish to inspect the packing materials these should be retained.

3.2.3 VERIFY THE SHIPMENT AGAINST THE PACKING LIST. A packing list is contained in the plastic envelope attached to the top of the outer carton. Check the transport model number and serial number against that indicated on the packing list. Check that all accessories (connector, manual, mounting hardware, etc.) indicated on the packing list are present. Advise Digi-Data of any discrepancies.

3.2.4 RESHIPMENT. It is suggested that the original packing material be used for reshipment. Refer to the packing drawings at the end of this manual for the proper placement of all corner block, sleeves, and spacers. Note: It is easier to place the inner carton into the outer carton before placing the transport in the inner carton rather than vice-versa. Seal all flaps well with paper tape or vinyl tape.

3.3 INITIAL CHECKOUT. To check for proper operation of the transport before placing it in the system perform the following procedure. Additional operational information is contained in Section 2 of this manual.

1) Check that the input voltage noted on the transport's model number tag and the actual line voltage at the intended installation agree. If not, refer to Figure 3-1 to rearrange the transformer taps. The transport is supplied with a standard U.S. power cord and polarized 3-prong plug. In other countries it may be necessary to remove this plug and install the locally required power plug.

	HIGH SIDE	GROUND	LOW SIDE			
VOLTAGE RANGE	TB1-1	TB1-2	TB1-3	TB1-4	TB1-5	TB1-6
95-115 VAC	BRN,YEL	-	RED,GRN	(ORN)	(BLU)	-
105-125 VAC	BRN,YEL	-	ORN,BLU	(RED)	(GRN)	-
195-235 VAC	BRN	-	GREEN	RED,YEL	(ORN)	(BLU)
205-245 VAC	BRN	-	GREEN	ORN,YEL	(RED)	(BLU)
215-255 VAC	BRN	-	BLU	ORN,YEL	(RED)	(GRN)

Figure 3-1, TRANSFORMER PRIMARY CONNECTIONS ON TB1.

2) Check all three fuses visually.

3) Load tape on the transport as described in paragraph 2.3.

4) After the tape has reached load point check the ON/OFF LINE pushbutton switch by pressing it repeatedly and verify that the associated indicator light alternately glows and is extinguished.

5) Locate the three-position service switch. With the transport ON LINE, verify that the service switch is inoperable.

6) With the transport OFF LINE, move the service switch to the FORWARD position. After several feet of tape have run onto the take-up reel return the service switch to the NORMAL position; tape motion should cease.

7) Move the service switch to the REVERSE position. After several feet of tape have run onto the supply reel, return the switch to the NORMAL position; tape motion will again cease. NOTE: The service switch ignores the BOT and EOT markers.

8) Use the service switch to run the tape forward again. Visually check all the tape path components for smooth operation.

9) After stopping the tape, place the transport ON LINE, then press the REWIND pushbutton switch. The transport will go OFF LINE and the tape will rewind until the BOT reflective marker is sensed. When rewinding, the tape will overshoot the load point by several inches, and then return forward to the exact load point location.

10) Use the service switch to again run fifty to a hundred feet of tape onto the take-up reel. Return the service switch to the NORMAL position. Press the REWIND switch. After the tape has reached the full rewind speed, press the POWER switch off. The transport should stop smoothly without spilling tape.

11) Press the POWER switch on again. Press LOAD and REWIND simultaneously; continue to hold them down until the transport begins to rewind.

12) After the tape has returned to the load point, press REWIND again. The tape should unload at slow speed.

13) Remove the tape from the transport.

14) Important!! Since the service switch must be in the NORMAL position for normal on-line operation make sure that that is where you left it.

Additional checks may be performed with the use of the Digi-Data transport exerciser card if available. Refer to the manual supplied with this card for a discussion of its proper utilization.

3.4 RACK-MOUNTING THE TRANSPORT. Digi-Data synchronous magnetic tape transports may be mounted in any standard 19-inch EIA rack or cabinet. Models 1130 and 1630 mount on slides supplied with the transport to accomodate rack depths between 22 and 28 inches. Model 1730 is mounted on hinges, also supplied with the transport.

3.4.1 RACK-MOUNTING THE 1130 and 1630. The 1130 transport requires 8.75 inches of panel height in a standard 19 inch EIA rack or cabinet; the 1630 transport requires 12.5 inches of panel height. The top and bottom edge of the transport front plate should be centered on the 0.5 inch hole spacing. The slides are centered on the 0.5 inch spaced holes 3.5 inches above the transport bottom edge.

Refer to installation drawings 0550020 and 0550021 with regard to the following rack-mounting procedure.

1) Remove the inner rail of the left slide from the outer rail and mount it on the left side panel of the transport chassis with the #8-32 bolts provided.

2) Attach a shorter slide holder behind the rack's left front mounting rail using two #10-32 bolts and a bar nut.

3) Attach a longer slide holder in front of the rack's left rear mounting rail using two #10-32 bolts and a bar nut.

4) Place the outer slide rail into the front and rear slide holders and attach it to them with three #8-32 bolts and nuts.

5) Repeat steps 1) through 4) for the right side.

6) Place the transport into the rack, carefully guiding the inner slide rail into the outer slide rail on each side.

3.4.2 RACK-MOUNTING THE 1730. The 1730 transport requires 24.5 inches of panel height in a standard 19 inch EIA rack or cabinet. The top and bottom edges of the front plate should be centered on the 0.5 inch hole spacing. Refer to installation drawing 05-4-50019-0000 with regard to the following procedure.

1) Using the six #10-32 bolts and two bar nuts provided fasten the two hinge blocks to the left mounting surface of the rack. Notice that the pins in the mounting blocks are of different heights; the tallest should go on the top. The top bolt of the top hinge block goes through the hole which is 1.50 inches from the top edge of the transport's front plate; the top bolt of the bottom hinge plate goes through the hole which is 21.25 inches from the top edge, or 3.25 inches from the bottom edge, of the transport front plate.

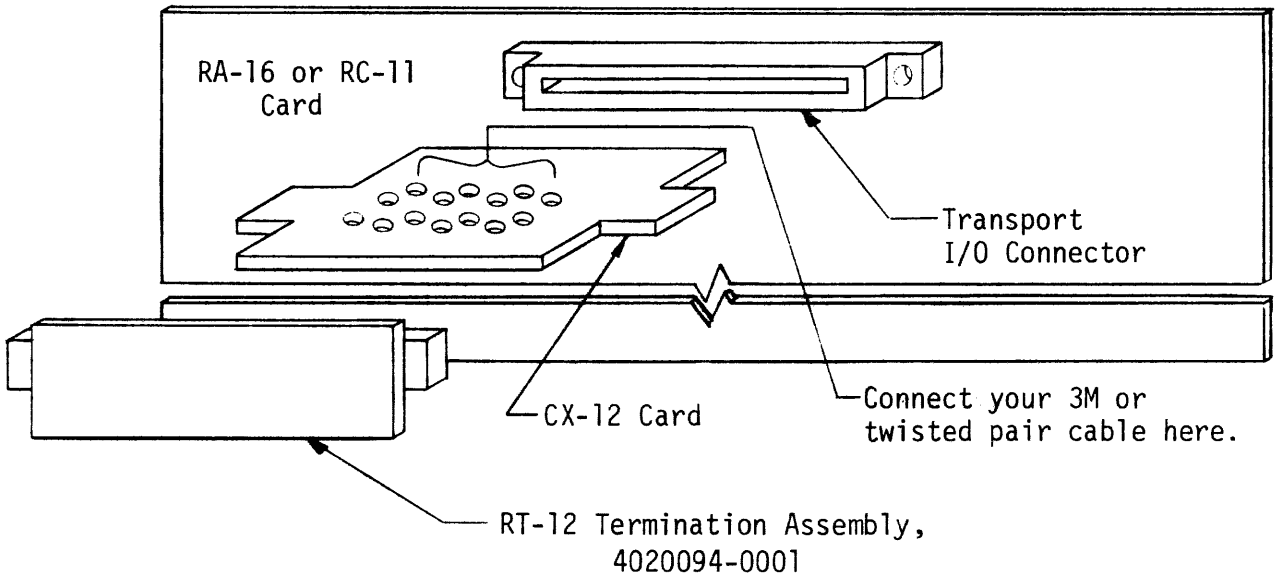


Figure 3-2, TRANSPORT INPUT/OUTPUT CONNECTOR

2) Locate the holes in the transport which are to receive the hinge pins, and mark their location with a pencil on the side of the dust cover. Lift the transport and holding it perpendicular to the mounting surface approach the hinge blocks with the left side of the dust cover. Maneuver the longer top pin into its hole first, then the shorter bottom pin. NOTE: Handling the transport is this step normally requires two persons.

3) Swing the transport inside the rack and turn the twist-lock fastener clockwise to secure the right side of the transport.

4) Insert a keeper below each hinge and attach with hardware provided. The keepers prevent the transport from inadvertantly being lifted up and off the hinge pins.

5) Unlock the transport and swing it out of the rack. Attach the retaining chain assembly to the transport and to the rack. Adjust length as necessary. Close and lock the transport again.

3.5 CABLING. The transport input/output signals are on a single 100-pin connector (J101) which is mounted on the top center of the second printed circuit card (RC-11 or RA-16) in the transport. Digi-Data provides a small double-edged printed circuit card, CX-12, to plug into this connector. In building his I/O cable the customer may attach either 3M Scotchflex cable or twisted pair cable to this CX-12 card. The opposite edge of the CX-12 card receives the RT-12 termination resistor assembly (4020094-0001) also supplied by Digi-Data. The RT-12 assembly consists of a small printed circuit card containing collector pull-ups for each input line driver and a 100-pin connector identical to that on the RC-11 or RA-16 card in the transport. Refer to diagram 3-2.

If a Digi-Data formatter/controller is provided a cable incorporating the double-edged CX-12 card will be supplied in place of the CX-12 card. This cable is designated LC-0126-2.

Up to four transports may be bussed, or "daisy-chained", on a single formatter/controller. Each transport's address (0, 1, 2, or 3) is determined by the position of a sleeved jumper wire on the particular CX-12 card plugged into its I/O connector as follows:

Pin 30 (SELECT) jumpered to pin 12	TAD 0
Pin 30 (SELECT) jumpered to pin 10	TAD 1
Pin 30 (SELECT) jumpered to pin 16	TAD 2
Pin 30 (SELECT) jumpered to pin 14	TAD 3

The cable provided to connect transport to transport is similar to that provided to connect transport to formatter, that is, a 100-pin female connector at one end and the CX-12 double-edged card at the other. This daisy-chaining cable is designated LB-0030-X (where "X" designates the tape address chosen by the SELECT jumper). The RT-12 termination resistor assembly plugs into the CX-12 at the very end of the daisy-chain. Refer to diagram 3-3.

Electrical interface requirements and signal descriptions are provided in Section 4 of this manual.

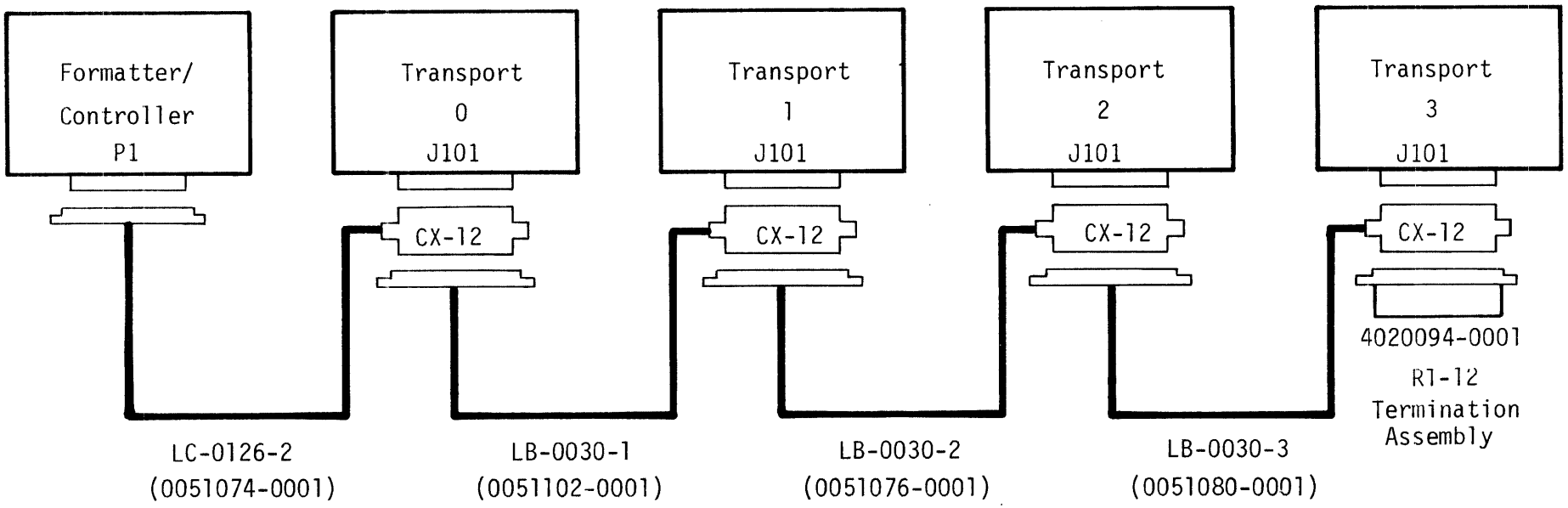


FIGURE 3- 3 CABLING OF MULTIPLE TRANSPORTS

4 - INTERFACING AND CONTROL

4.1 INTRODUCTION. This section describes the electrical interface of the Digi-Data synchronous magnetic tape transports, series 1130, 1630, and 1730. Signal requirements, signal descriptions, and instructions for controlling read, write, read-after- write, edit, erase operations are included.

4.2 ELECTRICAL INTERFACE REQUIREMENTS. The circuits that interface the transport with the external formatter/controller will operate with twisted pair or Scotch-flex cabling over distances of up to twenty feet. All line drivers in the transport are open-collector DTL 844/944 power gates. Terminating resistors to serve as collector pull-ups for these drivers must be employed at the formatter/controller. This arrangement elminiates high frequency reflections and ringing. Figure 4-1 depicts a typical transmitter/receiver pair.

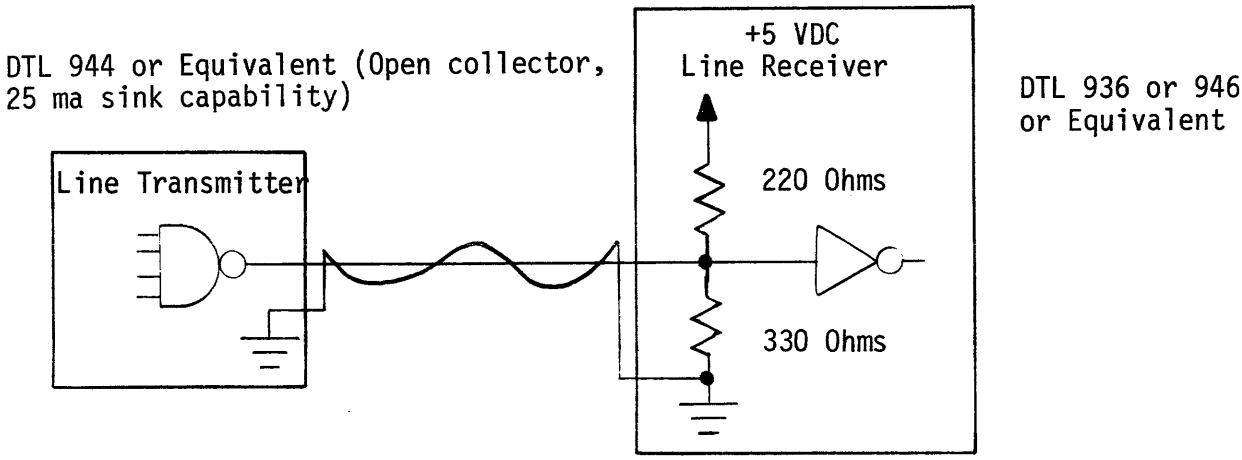


Figure 4-a, TRANSPORT/CONTROLLER INTERFACE CIRCUIT

Terminating resistors which load the formatter/controller are installed on a special assembly which plugs onto the interfacing cable at the transport I/O connector. (Refer to paragraph 3.5 for a physical description of these items.) The formatter/controller should drive all transport inputs with open collector circuits capable of sinking at least 25 milliamps. These output driver circuits, especially the WRITE DATA outputs, should be located as close as possible to the interface cable and be heavily grounded to it.

The minimum recommended pulse width on the interface lines is two microseconds. Transport inputs which elicit immediate confirming responses from the transport may be narrower if they go false upon detecting the transport's response.

All signals to and from the transport are "low true" and DTL/TTL compatible.

TRUE	=	LOW	=	0 to 0.4 VDC
FALSE	=	HIGH	=	+2.5 to 5.5 VDC

All signals to and from the transport are available on a single 2 x 50 connector. Odd-numbered pins are ground connections, even-numbered pins are live signals. Figure 4-2 indicates transport interface connector pin assignments and signal mnemonics.

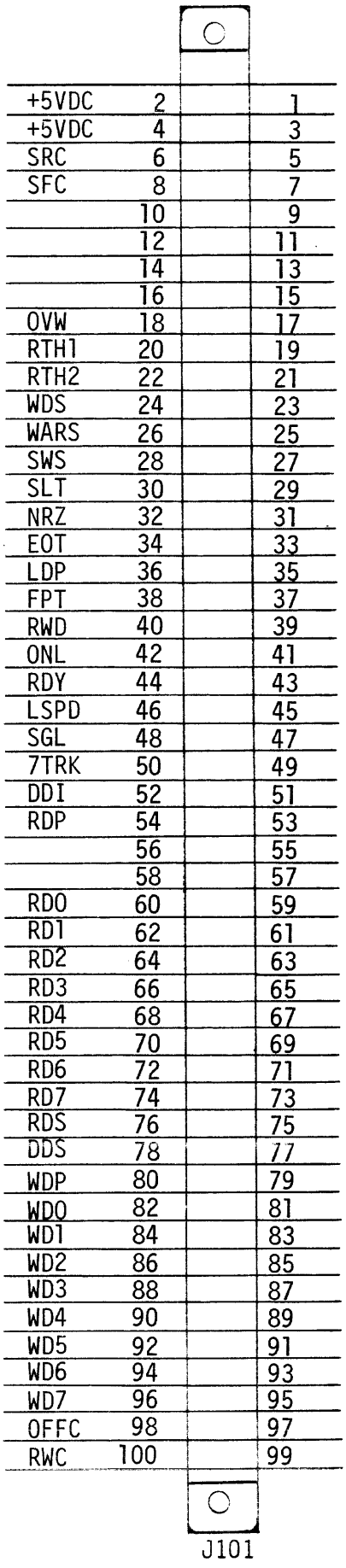


Figure 4-2,
UNFORMATTED TRANSPORT
INTERFACE CONNECTOR

4.3 TRANSPORT INTERFACE SIGNALS

4.3.1 TRANSPORT COMMAND INPUT SIGNALS

Select (SLT). Input level gates all transport inputs and outputs. A false level immediately terminates any tape motion except rewind.

Synchronous Forward Command (SFC). True level causes forward tape motion. This command is blocked if the transport is not in READY status.

Synchronous Reverse Command (SRC). True level causes reverse tape motion. This command is blocked if the transport is not in READY status. If the BOT marker is sensed while in reverse, the transport will stop with the marker approximately 0.6" closer to the head than the normal load point.

Rewind Command (RWC). A true pluse causes the transport to move in the reverse direction at high speed until reaching the BOT marker. At the completion of a rewind the transport will advance the tape to the BOT marker and stop. Write current is inhibited. RWC is ignored if the transport is already at BOT.

Off-Line Command (OFFC). A true pulse places the transport off line, disabling remote control and extinguishing the front panel ON LINE indicator. The transport remains off line until the operator presses the ON LINE pushbutton. This input is gated only by SLT, permitting the transport to accept an OFFC while rewinding.

Set Write Status (SWS). Level or pulse, must go true concurrent with the forward command and remain true for at least 20 microseconds after initiation of SFC or SRC to energize write and erase circuitry. After being set the write circuitry will remain energized, except in the overwrite mode, until initiation of another SFC or SRC with SWS held false or until receipt of RWC or OFFC. NOTE: The transport will not write unless a write ring is installed on the tape reel.

Data Density Select (DDS). This input is available only on units equipped with the dual density capability. On 7 track units a true level selects the higher density (required only when reading). On 9 track NRZI/PE units a true level selects the NRZI mode (required for both read and write operations). This input must be held at the desired level for the duration of the reading or recording operation.

Overwrite (OVW). True level or pulse places the transport in the overwrite mode if it and SWS are true for at least 20 microseconds after initiation of SFC or SRC. In the overwrite mode the write and erase heads are turned off immediately after the WARS pulse input while the tape is still at speed to avoid writing a glitch on tape.

Read Threshold 1 (RTH1). True level raises the read amplifier threshold so that marginal recording may be detected in read-after-write checks. Dual gap transports perform threshold switching automatically in read-after-write.

Read Threshold 2 (RTH2). True level lowers the read amplifier threshold increasing sensitivity to aid in the recovery of severely degraded data. Normal threshold is selected when both RTH1 and RTH 2 are held false.

4.3.2 TRANSPORT STATUS OUTPUT SIGNALS

On Line (ONL). True level indicates that the operator has placed the transport under remote control.

Ready (RDY). True level indicates the transport is on line, selected, loaded with tape, and not rewinding. Motion commands will be ignored if READY is false.

Load Point (LDP). True level indicates that the tape is positioned at the BOT marker.

End Of Tape (EOT). True level indicates that the EOT marker is being sensed. This signal may be noisy if the transport stops exactly on the edge of the EOT marker, it will be false again if the EOT marker is passed.

File Protect (FPT). True level indicates that the write ring is removed from the tape reel. The transport will not write or erase when this level is true, even though SWS is asserted.

Rewinding (RWD). True level indicates that the transport is in the rewind mode or in the advance to load point after rewind mode.

Data Density Indicator (DDI). On units equipped with the 7 track dual density option, this level will be true when the unit is in the higher of the two possible densities. On 9 track NRZI/PE units this level is true in the NRZI mode. EOT

Low Speed (LSPD). May be connected with an internal jumper to show true level when the transport is selected.

Single Gap (SGL). True level indicates a single gap transport is selected; false indicates a dual gap transport.

NRZI (NRZ). True level indicates that the selected transport is conditioned to read and write NRZI tape.

Seven Track (7 TRK). True level indicates that the selected transport is a 7 track unit; false level indicates 9 track unit.

4.3.3 DATA INPUT SIGNALS

Write Data Strobe (WDS). True pulse strobes information on the WRITE DATA lines into the transport write circuitry. In the NRZI mode, one WDS should be supplied for each data character, and, in the case of 9 track tape, also for the CRCC. In the PE mode, two WDS pulses are required per character, one for the "phase bit" and one for the "data bit". The frequency at which the formatter/controller must supply WDS's is a function of transport tape speed and desired data packing density.

Write Amplifier Reset (WARS). True pulse resets the transport's write amplifiers to the direction of tape erasure, which is the normal state at the beginning and end of every write operation. During an overwrite (edit) operation, in both the NRZI and PE modes, WARS is utilized to initiate a gradual turn-off of the write and erase head currents. In the NRZI mode only, WARS writes the longitudinal record check character (LRCC) on tape, and must be supplied in the eighth character position (9 track units) or fourth character position (7 track units) after the last data character of a record. No WDS should be supplied when writing the LRCC.

Write Data Inputs (WDP, WDO-WD7). Levels which must be present before the leading edge of WDS and remain stable until the trailing edge. In NRZI mode a true level causes the direction of tape magnetization to be reversed in the associated track, resulting in a logical "one" on tape. A false level makes no change in the direction of tape magnetization, resulting in a logical "zero" on tape. In PE mode, a true level causes the direction of the tape magnetization to be opposite to the direction of erasure. A false level aligns the magnetization with that of erased tape. The formatter/controller is responsible for generating these lines as a function of the data to accomplish phase encoding.

4.3.4 DATA OUTPUT SIGNALS

Read Data Strobe (RDS). A true pulse of two microseconds duration which occurs in NRZI mode only when a data character or check character has been assembled in the read register. RDS should be used to clock data from the READ DATA outputs. RDS remains false during a phase-encoded operation.

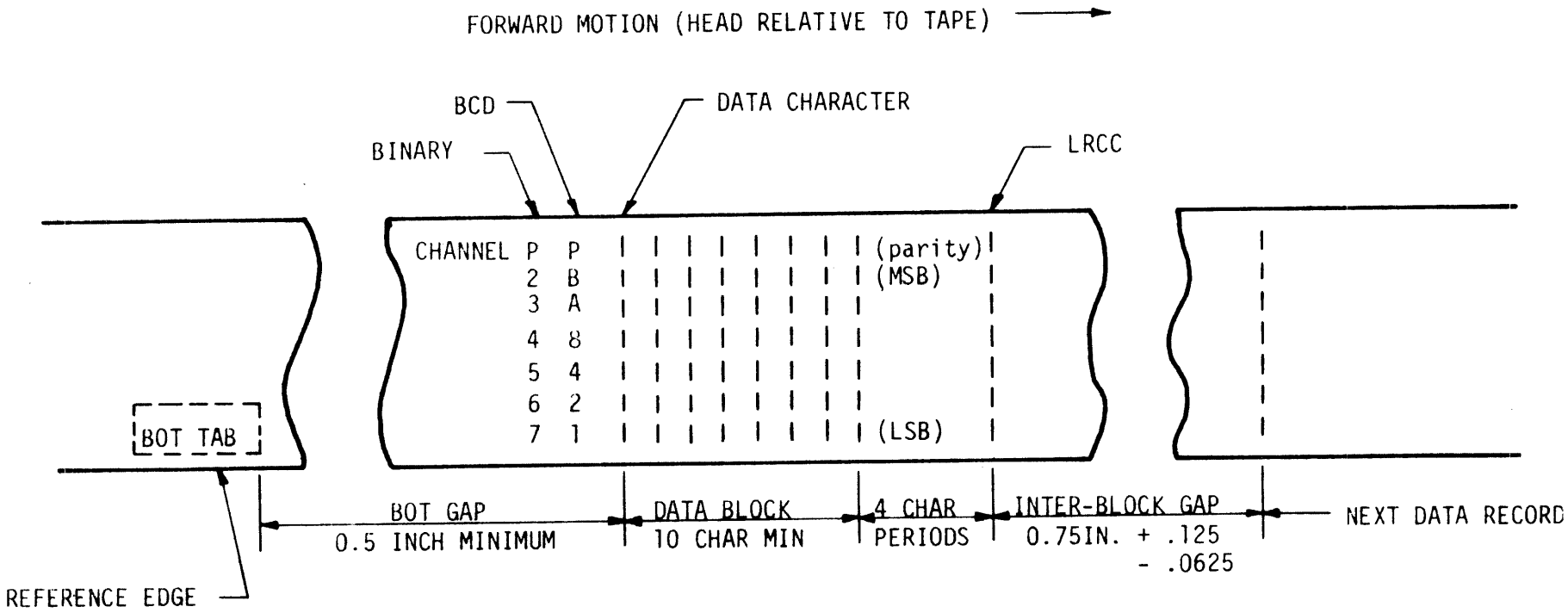
Read Data Outputs (RDP, RDO-RD7). In the NRZI mode a true level during the READ DATA STROBE indicates that a logical "one" was read in the associated track. The READ DATA outputs appear prior to the leading edge of the RDS pulse, and remain present until after its trailing edge. In the PE mode, phase-encoded data is presented at these outputs; PE data is not deskewed, so that transitions reflect each track in real-time.

4.4 NRZI TAPE FORMAT. The formatter/controller must control the transport in such a manner so as to produce tapes formatted in accordance with IBM and ANSI specifications. These specifications for nine track and seven track NRZI tape are illustrated in figures 4-4 and 4-3.

Two reflective markers affixed to the non-oxide side of the tape and detectable by the transport determine the usable bounds of the tape. The "beginning of tape" marker is located along the edge of the tape farthest away from the transport front plate, at least fourteen feet from the physical beginning of the tape. All tape before the BOT marker is considered leader. The "end of tape" marker is located at least ten feet before the physical end of the tape, along the edge of the tape nearest the front plate. The logical functions of the transport make it impossible to record or read before the BOT marker; however, data may be written and read beyond the EOT marker. The formatter/controller or computer is responsible for terminating forward tape motion after the receipt of the EOT status indication, before the physical limit of the tape is reached.

Data is recorded on magnetic tape in blocks or records separated by inter-record gaps (IRG). These erased gaps in the data provide space for the transport to stop and start tape motion. The IRG on seven track tape is 0.75 inches; the IRG on nine track tape is 0.6 inches.

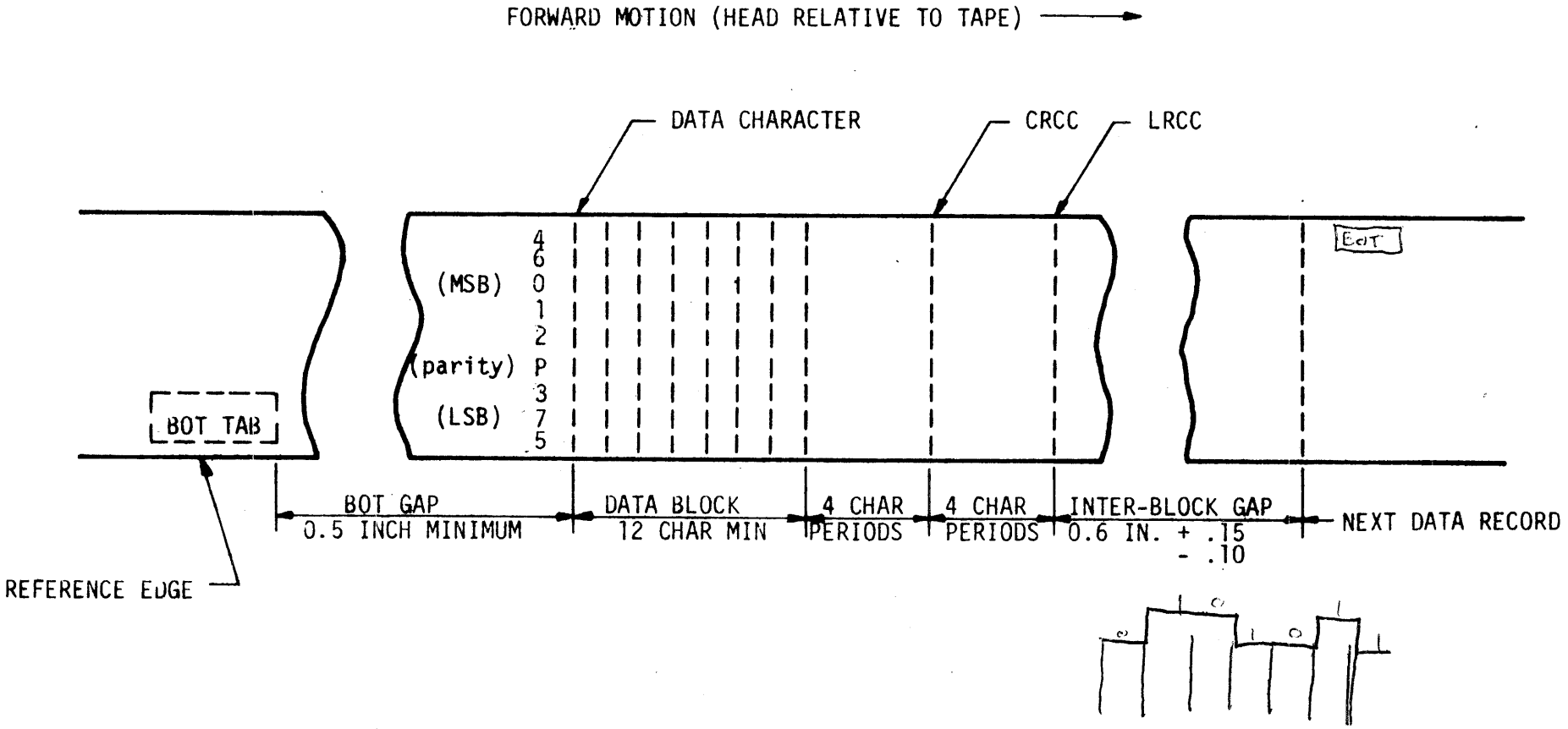
Each data block or record may contain an unspecified number of data characters; the number is normally determined only by the customer's application. Data is recorded in seven or nine tracks (also called channels) which run parallel the length of the tape. A data character consists of one bit in each of the seven or nine tracks perpendicular across the tape. Characters are written either 200, 556, or 800 to the inch on seven track tape. The data packing density on nine track NRZI tapes is always 800 characters per inch. A data character on seven-track tape is comprised of six data bits and one vertical parity bit. When seven track tapes employ odd parity they are referred to as



NOTES:

1. TAPE SHOWN WITH OXIDE SIDE UP.
2. CHANNELS 2 THROUGH 7 CONTAIN DATA BITS IN DESCENDING ORDER OF SIGNIFICANCE.
3. DATA PACKING DENSITY MAY BE 200, 556 or 800 CHARACTERS PER INCH.

FIGURE 4-3 7 TRACK NRZI FORMAT



NOTES:

1. TAPE SHOWN WITH OXIDE SIDE UP.
2. CHANNELS 0 THROUGH 7 CONTAIN DATA BITS IN DESCENDING ORDER OF SIGNIFICANCE.
3. DATA PACKING DENSITY IS FIXED AT 800 CHARACTERS PER INCH.

FIGURE 4-4 9 TRACK NRZI FORMAT

binary tapes, when they use even parity they are BCD tapes. A nine track data character consists of eight data bits, together commonly called a byte, and one parity bit. Nine track parity is always odd.

In addition to the vertical parity bit associated with each character other means of data verification are employed. At the end of each block of data one check character, in the case of seven track tape, and two check characters, in the case of nine-track tape, are recorded. The longitudinal redundancy check character (LRCC) is formed by calculating the even parity of each track. It is written either four (7 track) or eight (9 track) character positions beyond the last data character in order to be distinguished from it by the read circuitry.

The LRCC is generated in the transport during record operations, but must be verified in the formatter/controller during read operations.

Nine track NRZI tapes also use the cyclic redundancy check character (CRCC) which may be developed in the formatter/controller during write operations and checked during read operations. The CRCC is written four character periods after the last data character of a record.

The abbreviation NRZI stands for non-return-to-zero, change on "ones". In the NRZI recording mode, a "one" in a particular track is recorded as a magnetic flux change on tape; the direction of the change carries no significance, only the existence of the change itself. A "zero" is indicated by no magnetic flux change in that bit position.

Each character must contain at least one "one" to permit detection of the character's existence during read. Odd parity tapes automatically fulfill this requirement since an all "zeros" data character would result in a "one" parity bit. Even parity 7 track tape conventions dictate that an all "zeros" data character be converted and recorded as a binary ten (001010). This "zero to ten conversion" for 7 track even parity BCD tapes must be performed in the formatter/controller.

Several records or blocks of data on tape are usually grouped together as a "file" and are separated from other files by a "file mark", or "tape mark", which is a record consisting of a special file character, and its associated LRCC. The special file character is 001111 for 7 track or 00010011 for 9 track, and is always written with a false parity bit. (No CRCC is present in a 9 track file mark.)

4.5 PHASE ENCODED TAPE FORMAT. The format specifications for nine-track phase encoded tape are illustrated in Figure 4-5. The data packing density is always 1600 CPI. Characters consisting of eight data bits and one odd parity bit are recorded across the tape, with each of the nine bits in a defined track. The tracks are numbered 0 through 7 and P and are arranged in the same sequence as nine-track 800 CPI standards, and with the same physical locations and dimensions.

In the PE recording mode "ones" and "zeros" are signified by the direction of the change of magnetic flux in the bit position on tape. At the transport I/O a "one" is defined as a change from true to false, and a "zero" is a transition from false to true. In between two data transitions in a track there may or may not be a phase transition. The phase transition is utilized to establish the proper flux polarity so that the upcomming data transition may occur in the desired direction. By referring to Figure 4-6 it may be seen that a stream of all "ones" or all "zeros" in a track would require 3200 flux reversals per inch, i.e. a phase transition preceding every data transition;

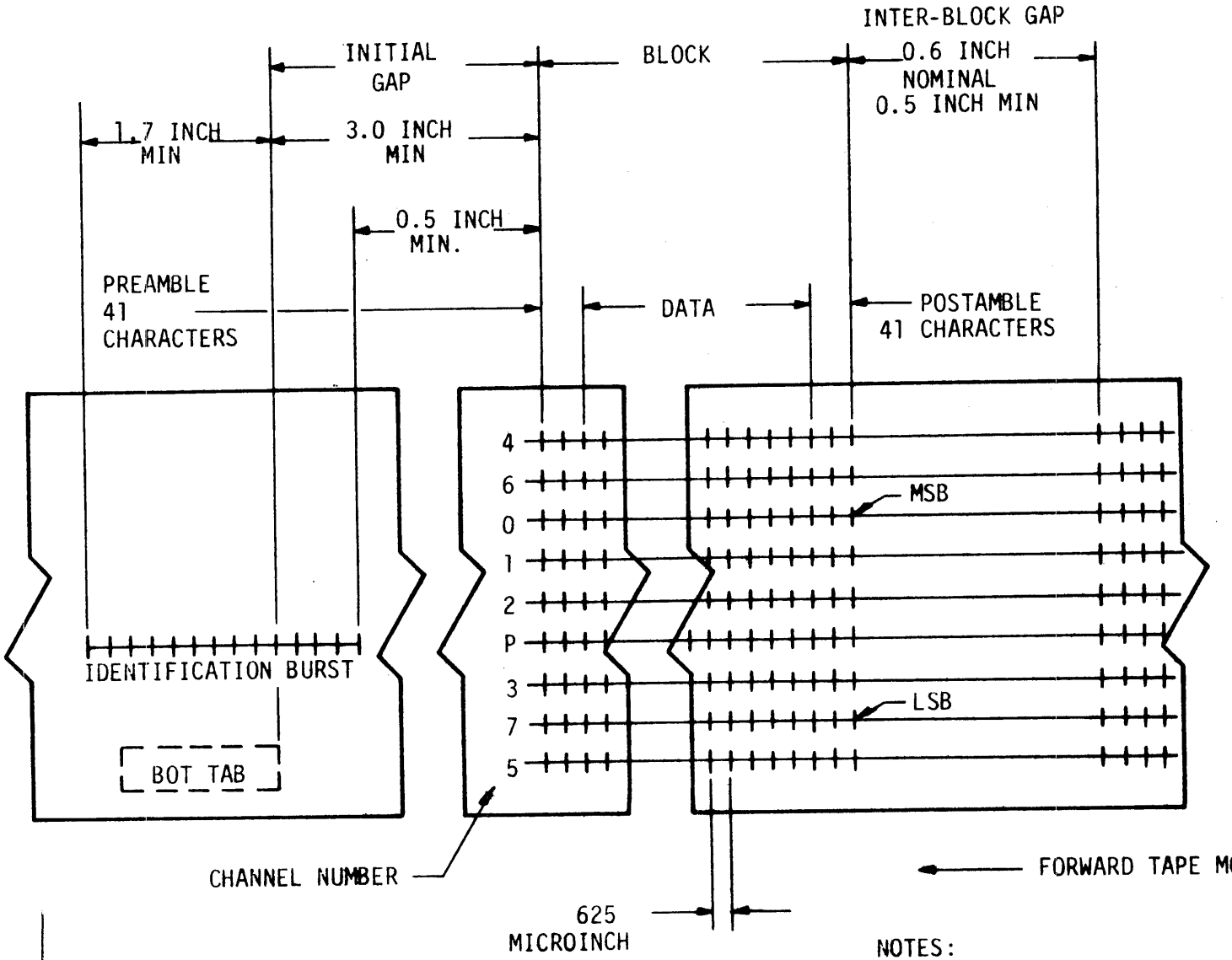
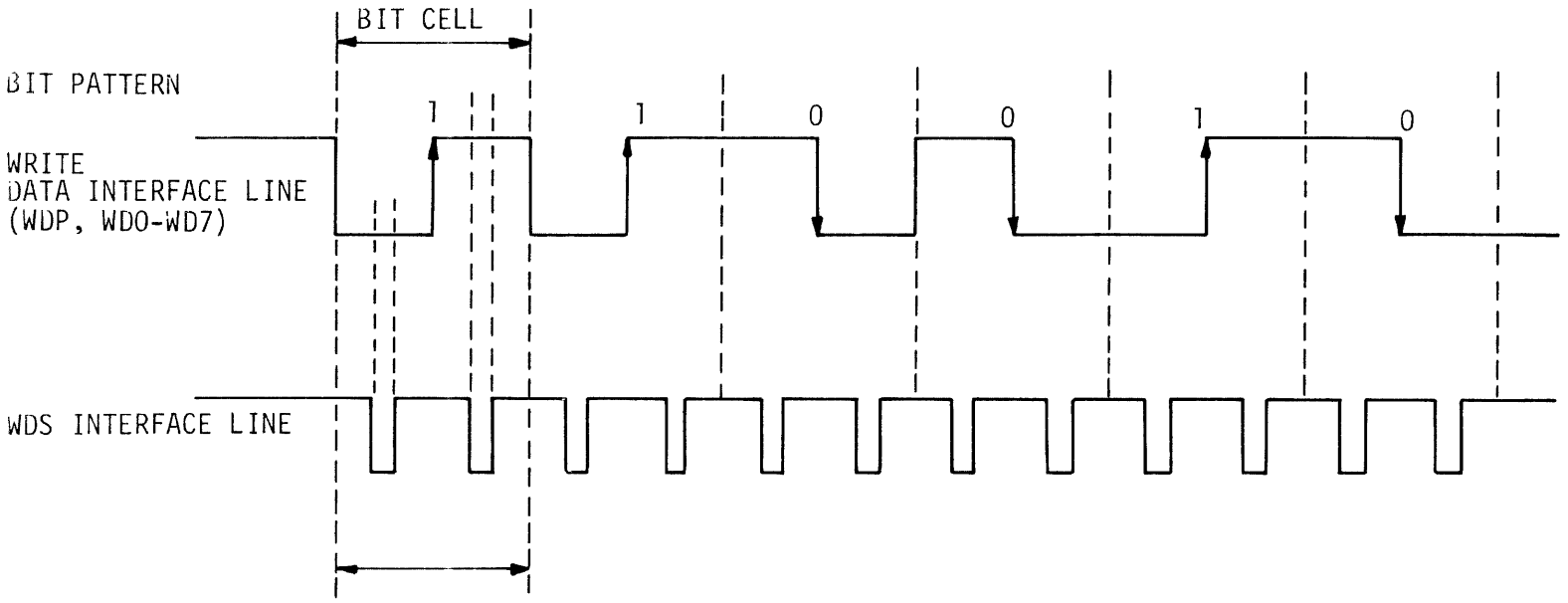


FIGURE 4-5, 9 TRACK PHASE ENCODED TAPE FORMAT

NOTES:

1. TAPE IS SHOWN WITH OXIDE SIDE UP.
2. TAPE IS TO BE FULLY SATURATED IN THE ERASED DIRECTION IN THE INTER-BLOCK GAP AND THE INITIAL GAP.
3. THE IDENTIFICATION BURST MUST EXTEND PAST THE END OF THE BOT MARKER.



25 IPS 25 μSEC
37.5 IPS 16.6 μSEC
45 IPS 13.9 μSEC

FIGURE 4-6 PHASE ENCODED INTERFACE SIGNALS
WRITE DATA

whereas a stream of alternating "one" and "zero" characters would require no phase transitions.

Whenever a phase encoded tape is written it must be identified as such with an ID Burst. The ID Burst is a stream of alternating "ones" and "zeros" written alongside the BOT marker in track P only with all other tracks DC erased. The ID Burst enables dual density transports with automatic mode selection to condition themselves to read PE data.

Each data block on tape is comprised of three elements; a preamble, the actual data, and a postamble. The preamble consists of 40 characters of all "zeros" followed by an all "ones" character. The preamble is utilized by the formatter/controller when reading to achieve synchronization upon the data transitions. The all "ones" character signals the end of the preamble and the beginning of the actual data. The postamble consists of one all "ones" character followed by 40 characters of all "zeros". The postamble signals the end of data and also permits synchronization when reading reverse.

The phase encoded file mark consists of 40 "zeros" in tracks P, 0, 2, 5, 6, and 7 with tracks 1, 3, and 4 DC erased. The file mark must be preceded by 3.5 inches of erased tape.

4.6 NRZI TRANSPORT CONTROL. Functions which are to be performed by the transport's formatter/controller are:

1) The generation of various timing delays which allow for transport acceleration and deceleration, and which dictate IRG length and the head position during specific operations.

2) The generation of WRITE DATA STROBES at the frequency required by tape speed and desired packing density.

3) The generation of vertical parity for each character; and the detection of parity errors during read.

4) The generation of a WRITE AMPLIFIER RESET (WARS) pulse to record the LRCC at the proper location; and the verification of the LRCC during read.

5) The generation of the CRCC and the appropriate timing to record it on tape, and the verification of the CRCC during read (9 track only).

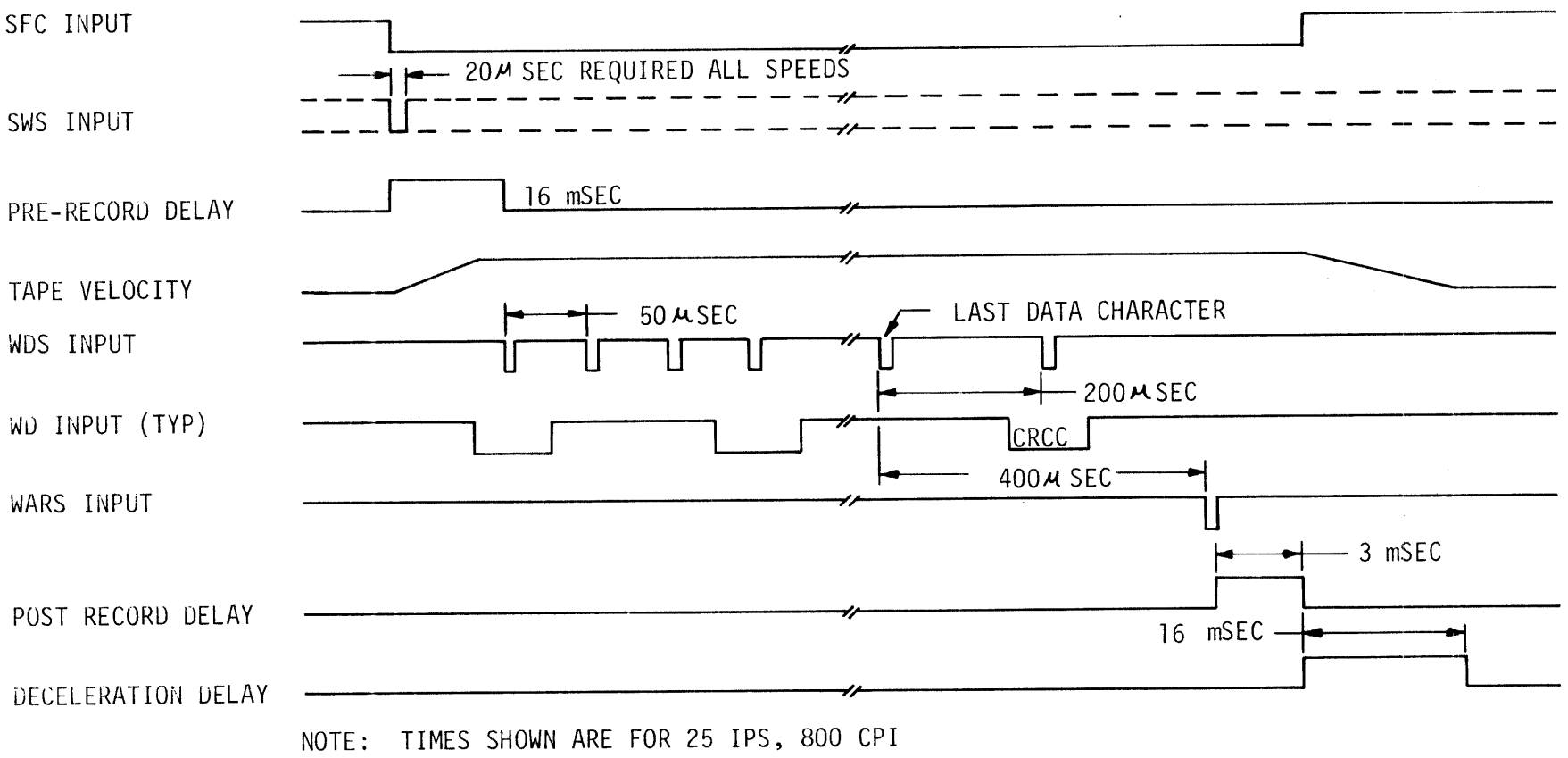
6) The detection of the end of block and the detection and segregation of the check characters from the data.

7) The generation of file marks, and their detection as such during read.

4.6.1 MOTION CONTROL AND TIMING. The signals employed to control tape motion are,

SYNCHRONOUS FORWARD COMMAND (SFC)	Pin 8
SYNCHRONOUS REVERSE COMMAND (SRC)	Pin 6
REWIND COMMAND (RWC)	Pin 100
SELECT (SLT)	Pin 30

The transport READY (RDY) status output must be true or else motion commands will be ignored. READY indicates that the transport is SELECTED (command pin 30 true), ON LINE (pushbutton switch and associated indicator light), not REWINDING (status pin 40 false), and loaded with tape (determined within the transport by means of photoelectric sensors.)



NOTE: TIMES SHOWN ARE FOR 25 IPS, 800 CPI

FIGURE 4-7 NRZI WRITE OPERATION TIMING DIAGRAM

Should SELECT go false all tape motion except rewinding is terminated.

When either SFC or SRC is set true the transport's capstan will accelerate the tape to the specified synchronous speed of the transport. The tape distance traversed during acceleration from rest to full velocity is always .19 inch ±0.02 regardless of the transport's specified tape speed. Acceleration is linear so that the time required to reach synchronous tape speed is always .19 inches divided by one-half the specified synchronous tape speed.

Deceleration occurs whenever the SFC or SRC command is removed. Deceleration from full speed to rest requires the same distance and time as acceleration. Acceleration and deceleration ramp times for the more common synchronous tape speeds are,

SYNCH. SPEED	DISTANCE TRAVERSED	TIME TO ACCELERATE
12.5 inch/sec	0.19 inches ± 0.02	30.4 msec.
25 inch/sec	0.19 inches ± 0.02	15.2 msec.
37.5 inch/sec	0.19 inches ± 0.02	10.1 msec.
45 inch/sec	0.19 inches ± 0.02	8.4 msec.

The tape formatter must be aware of the time required to accelerate and decelerate and must not attempt to read or write during these times.

4.6.2 WRITE OPERATIONS. The choice of a read or write operation is made via the SET WRITE STATUS (SWS) line. To perform a write operation SWS must go true concurrent with the motion command (SFC or SRC) and remain true for at least 20 microseconds. Assertion of this input energizes the write and erase circuitry in the transport; this circuitry will remain energized until a subsequent motion command with SWS held false is received, or until REWIND command or OFF LINE command is received, or until WARS is received in OVERWRITE mode. An electromechanical interlock in the transport prevents the energizing of the write and erase circuitry when a write ring is not installed in the supply tape reel.

The formatter must be able to control essentially five types of write operations,

WRITE DATA
WRITE DATA WITH EXTENDED GAP
WRITE FILE MARKS
EDIT
ERASE

4.6.2.1 WRITE DATA OPERATIONS. To write a data record on tape the formatter/controller must perform the following sequence,

1) Select a transport, and set DDS as necessary.

2) Receive, and utilize as necessary, the various status information revealed by the transport.

3) Issue the SYNCHRONOUS FORWARD (SFC) motion command with SET WRITE STATUS (SWS) set true for at least 20 microseconds.

4) Wait an appropriate, calculated delay to allow the tape to accelerate to synchronous speed before attempting to write data.

5) Issue WRITE DATA STROBES (WDS) at the appropriate frequency (the product of synch. speed and desired packing density). Place a data character on the WRITE

DATA lines (WD0 - WD7) for the duration of each WDS. Also place the correct parity bit for each data character on the WRITE DATA PARITY line (WDP) coincident with that data character. WD0-WD7 must remain stable for the duration of each associated WDS.

6) Calculate and write the CRCC (cyclic redundancy check character) in the fourth character position following the last data character of the record. Writing the CRCC is accomplished by setting the character on the WRITE DATA lines and pulsing WDS.

7) Write the LRCC (longitudinal redundancy check character) in the eight character position following the last data character of the record. The formatter/controller need not calculate the LRCC: the LRCC may be obtained by resetting the write flip-flops in the transport. A special input, WRITE AMPLIFIER RESET (WARS) is used to accomplish this. No WDS or write data should be supplied when writing the LRCC.

8) Wait an appropriate, calculated delay to allow a portion of the inter-record gap to be traversed at full speed and/or the read head in a read-after-write unit to pass all the data before decelerating the tape. The distance between read and write gaps of a dual gap head is 0.15 inches for 9 track units, and 0.3 inches for 7 track units.

9) Remove the SYNCHRONOUS FORWARD (SFC) motion command, thereby initiating deceleration.

10) A motion command of the same direction may be applied at anytime, before, during, or after deceleration. A motion command of the opposite direction should not be applied until tape motion has ceased; an appropriate delay should be calculated by the formatter/controller to determine when tape motion has ceased. When a new motion command of the same direction is applied either before or during deceleration the same acceleration (prerecord) delay as normally required when accelerating from rest must be maintained to ensure that an interrecord gap of sufficent length is created.

4.6.2.2 WRITE WITH EXTENDED GAP OPERATIONS. To write a data record with an extended interrecord gap preceding, i.e. a skip-write operation, the controller/formatter should perform the sequence indicated in paragraph 4.6.2.1 except that the delay between the issuance of the motion command and the commencement of data recording must be extended to traverse the desired distance on tape. An extended interrecord gap is required preceding the first data record when starting from load point; this extended gap is sometimes referred to as the "BOT jump". An extended gap is also useful in skipping over defective error-prone portions of tape.

4.6.2.3 WRITE FILE MARK OPERATIONS. A file mark, or tape mark, is a one character record with LRCC which is utilized to separate the tape into logical divisions. To write a file mark on tape the formatter/controller must perform the following operations in contra distinction to the writing of a data record.

1) The prerecord delay, following the assertion of the motion command, must be extended to provide for a preceding gap of at least 3.5 inches.

2) Place the file mark character on the WRITE DATA lines and issue a single WRITE DATA STROBE (WDS). The nine track file mark character is "ones" in tracks 3, 6, and 7; the seven track file mark character is "ones" in tracks 1, 2, 4, and 8.

3) No CRCC is written.

4) The LRCC is written eight character spaces (four character spaces on 7-track tapes) after the file mark character, and is identical to it since longitudinal parity is even. The LRCC may be generated and recorded by pulsing the WARS line, as previously described in the case of data records.

5) Wait a calculated delay before decelerating the tape, as in the case of data records.

4.6.2.4 EDIT OPERATIONS. The edit operation consists of replacing an existing record on tape with a new record of equal length in the same physical position so as not to disturb data previously written before and after the to-be-editted record. The edit operation is identical to the normal write data operation described in paragraph 4.6.2.1 expect in the following points,

1) When the SYNCHRONOUS FORWARD (SFC) motion command is set true, the OVERWRITE (OVW) command, as well as the SET WRITE STATUS (SWS) must be set true for least 20 microseconds. When OVW is asserted at the start of a record the write current slowly decays following the issuance of the WARS pulse at the end of the record so that extraneous recording does not occur in the gap, as is the case when the write current is turned off abruptly.

2) The formatter/controller must devise a scheme for positioning the write head in almost exactly the same location on tape as formerly when the record to be editted was originally written. This is normally accomplished by performing a read reverse operation over the to-be-editted record with a longer than normal post record delay.

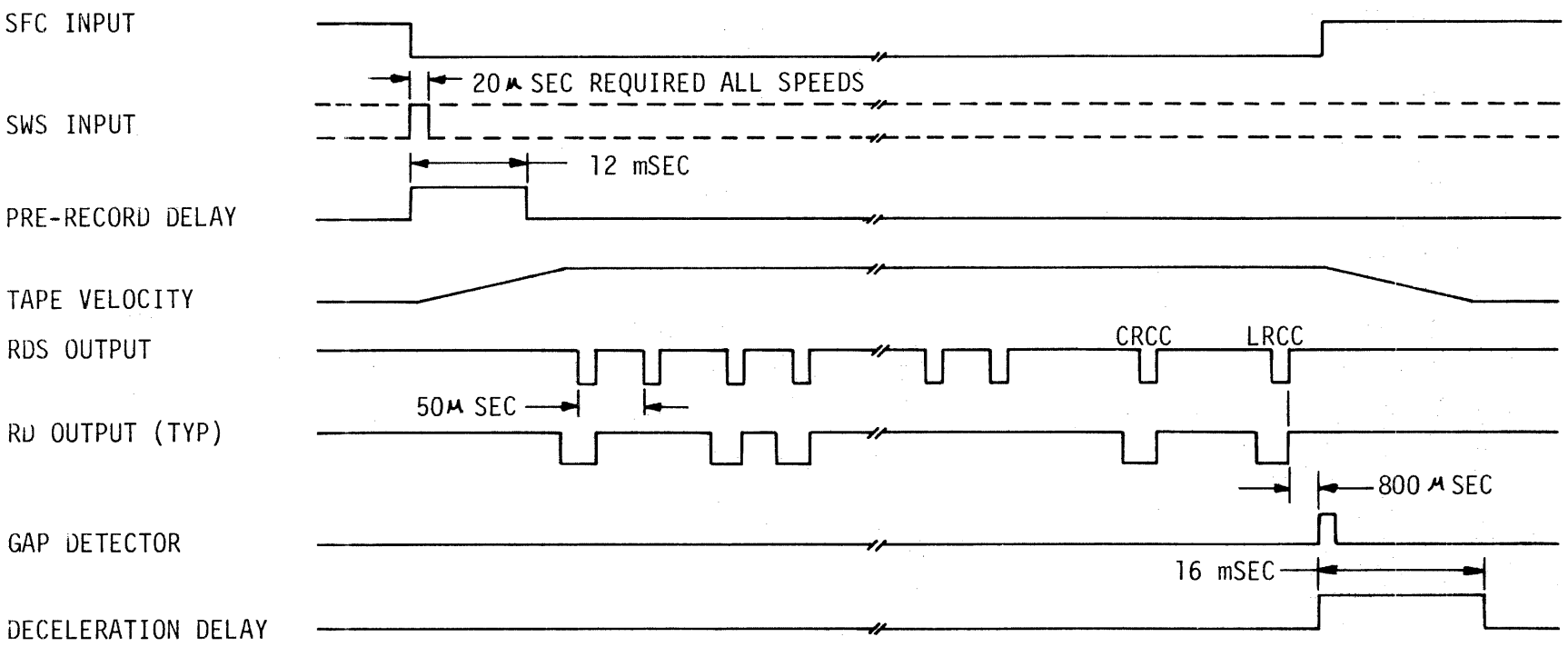
4.6.2.5 ERASE OPERATIONS. To erase an unusable portion of tape of variable length perform the following sequence,

1) Issue the SYNCHRONOUS FORWARD (SFC) motion command with SET WRITE STATUS (SWS) set true for at least 20 microseconds.

2) Supress WRITE DATA STROBES (WDS).

3) After an appropriate delay, representing a desired amount of tape travel, remove the motion command. The tape motion will cease in 0.19 inches $\pm$0.02. NOTE: The controller/formatter may employ the prerecord delays required for the "BOT jump", "skip-write", or "write EOF" operations (described in paragraph 4.6.2.2 and 4.6.2.3) to create fixed length erasures. The edit operation with no WDS supplied to the transport could be employed to erase a record in the midst of other records.

4.6.3 READ OPERATIONS. The formatter/controller should provide the capability to receive read data at a synchronous rate, detect parity errors, isolate check characters from the data, and also recognize the special file mark record as such.



NOTE: TIMES SHOWN ARE FOR 25 IPS, 800 CPI

FIGURE 4-8. READ OPERATION TIMING DIAGRAM

Inasmuch as the formatter/controller initiates and terminates tape motion it must be able to determine the absence of data, that is, the interrecord gap.

4.6.3.1 READ DATA OPERATIONS. To recover a normal data record from tape the formatter/controller must perform the following functions,

1) Select a tape transport and set DDS as necessary.

2) Utilize, as necessary, the various status indications.

3) Issue the SYNCHRONOUS FORWARD (SFC) or SYNCHRONOUS REVERSE (SRC) motion command with SET WRITE STATUS (SWS) held false.

4) Generate a delay during which the tape is accelerating to synchronous speed, and during this delay suppress the invalid read data resulting from possible gap noise.

5) Receive and utilize each READ DATA STROBE (RDS) supplied by the transport to sample the READ DATA lines (RD0-RD7, RDP).

6) Verify that the vertical parity of each character is correct.

7) Monitor the RDS with a missing pulse detector or similar scheme, in order to distinguish the CRCC and LRCC (each preceded by three empty character spaces) from the data.

8) Verify the correctness of the CRCC and LRCC as deemed necessary.

9) Recognize the presence of the interrecord gap by the continued absence of data.

10) After an appropriate postrecord delay, remove the motion command, thereby initiating deceleration. A new command to read or write in the same direction may be issued at any time before, during, or after deceleration. A new motion command in the opposite direction should not be issued until the tape is at rest.

4.6.3.2 READ THRESHOLDS. Two input levels, READ THRESHOLD 1 and READ THRESHOLD 2, are provided to select three different read threshold levels. These commands are not latched by the transport and should therefore be held true for the entire operation during which they are desired.

When both RTH1 and RTH2 are false a normal threshold level of 20% of nominal signal amplitude is employed to discriminate between "ones" and "zeros".

READ THRESHOLD 1 should be employed during read-after-write error checking. A true level on the RTH1 line increases the read threshold to approximately 50% of nominal signal amplitude. RTH1 is available at the I/O only on transports equipped with a single gap head; dual gap units automatically select high threshold whenever the transport's write status flip-flop is set.

READ THRESHOLD 2 may be employed to recover severely degraded data from tape. The discrimination level is decreased to only about 10% nominal signal amplitude with RTH2 held true. RTH1 must be false in order to assert RTH2.

4.6.3.3 FILE MARK RECOGNITION. The procedure for reading the special file mark record is no different than that for reading a data record. Since the file mark character and its LRCC are identical, the file mark record appears the same in both the forward and reverse directions. The formatter/controller should incorporate some sort of decoding circuit to recognize file marks as such.

4.7 PHASE ENCODED TRANSPORT CONTROL. Functions to be performed by the phase encoded transport's controller are,

1) The generation of various timing delays which allow for transport acceleration and deceleration, and which dictate IRG length and the head position during specific operations.

2) The encoding of data to be written and the generation of two WRITE DATA STROBES per character period.

3) The generation of preamble, postamble, vertical odd parity, the ID Burst, and EOF records, and their proper placement on tape.

4) During read operations, the discrimination of preamble and postamble from data.

5) The deskewing and decoding of read data and the development of a read strobe.

6) The detection of format errors, dropouts, and data parity errors. The correction of single channel dropouts.

7) The detection of ID Burst and EOF records as such.

4.7.1 MOTION CONTROL AND TIMING. Motion control of the phase encoded transport is identical to that of the NRZI transport so that reference should be made to paragraph 4.6.1.

4.7.2 WRITE OPERATIONS. The assertion of SWS (SET WRITE STATUS) concurrent with the motion command (SFC or SRC) energizes the write and erase circuitry in the transport. The SWS line is sampled within 20 microseconds of SRC or SRC going true so that SWS may go false any time thereafter if so desired. The "file protect" circuitry in the transport which senses the presence of a write ring in the supply reel disables the write current when the ring is absent.

4.7.2.1 WRITE DATA OPERATIONS. To write a data record on tape the formatter/controller must perform the following sequence,

1) Select a transport and set DDS as necessary.

2) Receive and utilize, as necessary the status information, e.g. tape speed, revealed by the selected transport.

3) Issue the SYNCHRONOUS FORWARD COMMAND (SFC) with SET WRITE STATUS (SWS) true for at least 20 microseconds.

4) Wait an appropriate delay before presenting data to allow the transport to reach synchronous speed.

5) Issue WRITE DATA STROBES to record forty phase encoded "zeros". Two WDS pulses are required for each character. WRITE DATA lines must remain stable for the duration of each WDS. See figure 4-6.

6) Issue the preamble all "ones" character and associated WDS's.

7) Issue phase encoded data with accompanying odd parity and WDS's.

8) Issue postamble all "ones" character followed by forty all "zero" characters, with associated strobes.

9) After an appropriate delay which allows a portion of the subsequent inter-record gap to be traversed at full speed remove the SFC thereby initiating deceleration. When writing data on units equipped with a dual gap head the read stack must pass the block before removing the motion command. The distance between read and write gaps is 0.15 inches.

10) A new motion command of the same direction may be applied at any time, before, during, or after deceleration. The formatter should calculate a delay to determine when tape motion has ceased before applying a motion command of the opposite direction.

4.7.2.2 WRITE FROM LOAD POINT. When writing from load point the ID Burst must be recorded alongside the BOT marker, and an extended gap must appear before the first record. The following sequence is required.

1) Assert SFC and SWS.

2) Wait a calculated delay to allow the transport to reach synchronous speed.

3) Begin writing the ID Burst while the trailing edge of the BOT marker is still at least 1.7 inches to the supply reel side of the head. (The distance from the trailing edge of BOT to the write gap, with the machine at load point, is 2.317 inches $\pm$0.3 inches for dual gap machines, and 2.392 inches $\pm$0.3 inches for single gap machines.) The ID Burst consists of alternating phase-encoded "one" and "zero" bits on WDP only, with the associated WDS's and all other WRITE DATA INPUTS false. The ID Burst must continue for a sufficient length of tape to pass the trailing edge of the BOT marker.

4) Wait an appropriate delay before issuing the first data record, so that the following two conditions are met,

a) The first record is at least 0.5 inches beyond the ID Burst,
b) The first record is at least 3 inches, and at most 25 feet, beyond the BOT marker.

5) Write the first record as described in paragraph 4.7.2.1

4.7.2.3 WRITE FILE MARK OPERATIONS. The phase-encoded EOF (end-of-file) record consists of 40 "zeros" in tracks P, 0, 2, 5, 6, and 7 with track 1, 3, and 4 erased. The following sequence is required,

1) Assert SFC and SWS.

2) Wait a sufficiently long delay to traverse 3.5 inches of tape before presenting the EOF record on the WRITE DATA lines.

3) The formatter/controller may utilize its preamble generating circuit to provide 40 "zeros" at WDP, WD0, WD2, WD5, WD6, and WD7 while holding WD1, WD3, and WD4 false.

5) After an appropriate delay remove the motion command, as in a write data operation.

4.7.3 READ OPERATIONS. The formatter/controller must provide the capability of detecting transitions at each READ DATA input independent of the other READ DATA inputs. It must decode and deskew the data, detect parity and format errors, and recognize the special EOF record as such. And it must initiate and terminate tape motion in the inter-record gaps. When reading from load point the controller may wish to test for the presence of the ID Burst.

4.7.3.1 READ DATA OPERATIONS. To recover a normal data record from tape perform the following sequence.

1) Select a transport and set DDS as necessary.

2) Utilize, as necessary, the various status indications (e.g. tape speed) revealed by the selected transport.

3) Issue the SYNCHRONOUS FORWARD COMMAND (SFC) or SYNCHRONOUS REVERSE COMMAND (SRC) with SET WRITE STATUS (SWS) held false.

4) Generate a delay during which the transport is accelerating to synchronous speed.

5) Detect the preamble in each track and achieve synchronization upon the data transition. Detect any drop-outs.

6) Upon receipt of the all "one" character, read, decode, and deskew the data and verify that vertical parity is correct.

7) Detect the initiation of the postamble as distinct from data.

8) Detect the end of the record.

9) Generate a delay to allow a portion of the inter-record gap to be traversed at synchronous speed.

10) Remove the motion command and generate another delay to determine when the transport is at rest.

11) When reading the controller may wish to maintain the transport at synchronous speed rather than stop in each gap.

4.7.3.2 READ THRESHOLDS. As in the NRZI transport a total of three read clipping levels is provided. High threshold (30%) may be asserted by holding RTH1 true for the duration of the record being read. Low threshold of 5% nominal signal amplitude is available with the assertion of RTH2. The normal PE read threshold is 10%. A transport equipped with a dual gap (read-after-write) head forces high threshold whenever the write current is energized.

5 - PREVENTIVE MAINTENANCE

5.1 INTRODUCTION. The Digi-Data synchronous transports, models 1130, 1630, and 1730, are manufactured to well-conceived and proven designs in an environment of strict quality-control. With regular preventive maintenance, primarily cleaning, each transport should provide years of trouble-free service in your system.

Figure 5-1 lists recommended preventive maintenance tasks with a schedule for their performance. The head and other surfaces in contact with the magnetic tape should be cleaned daily by the system operator as described in paragraph 5.2. Tasks scheduled quarterly may be performed by either operator or maintenance engineer. All tasks scheduled annually must be performed by a qualified maintenance engineer.

5.2 CLEANING. Periodic cleaning of the tape head, tape guides, tape cleaner, arm rollers, stationary rollers, and capstan outer surface is absolutely necessary. Dust and/or accumulated oxide particles will cause 'drop-outs' resulting in tape recording and reading errors.

The most convenient cleaning implement is a cotton swab soaked in isopropyl alcohol or other commercial cleaning solvent. Do not use carbon tetrachloride, and do not use an abrasive cloth. Rotate the rollers and capstan as you clean them to assure the complete removal of all contaminants. Once cleaned, a surface should not be touched with the fingers. Allow a few seconds for the alcohol to evaporate before loading tape on the transport.

Quarterly the entire transport front plate and dust cover should be cleaned with glass cleaner and a soft, lint-free cloth.

5.3 INSPECTING FOR WEAR

5.3.1 TAPE GUIDES. The bottom flange of the tape guides is spring-loaded and is normally inadvertantly rotated in the daily cleaning process so that it should last indefinitely. The upper flange is fixed and should be loosened with an allen wrench and rotated to present a new wear surface yearly. Loosening or removing the top flange also provides an opportunity for a more thorough cleaning of the tape guides.

5.3.2 CAPSTAN. Inspect the capstan outer surface for cracking or polish quarterly. Since the 37.5 ips/45 ips capstan (part no. 1050012-0001) is manufactured from magnesium, a soft metal, it should be inspected for possible deformity resulting from abuse. See paragraph 9.4.1 to replace if required.

5.3.3 HEAD. Inspect the magnetic tape head for wear quarterly. The head has a flat gutter on either side of the tape contact area. When the crown wears down to the depth of the gutters the head should be replaced. Worn heads have a trade-in value; contact the factory for details.

PREVENTIVE MAINTENANCE SCHEDULE		DAILY	QUARTERLY	YEARLY
Refer to	Task			
2.6, 5.2	Clean head, other tape surfaces	X	X	X
5.2	Clean entire transport		X	X
5.3.2, 3	Inspect head wear and capstan		X	X
5.3.1	Rotate tape guides			X
10.2	Check Start/Stop ramps			X
10.3	Check tension arm positions			X
10.4	Check BOT/EOT adjustment			X
10.5	Check read amplifier gain			X
10.8	Check read skew			X

Figure 5-1, PREVENTIVE MAINTENANCE SCHEDULE

6 - REMEDIAL MAINTENANCE OVERVIEW

6.1 INTRODUCTION. This section provides general information required to service Digi-Data synchronous transports, models 1130, 1630 and 1730. Included are an explanation of transport configurations and versions, figures illustrating card connector locations, and lists of recommended spare parts and required tools.

For isolating a problem to a faulty component or improper adjustment the trouble-shooting procedure indicated in section 8 of this manual is suggested. Detailed component removal and replacement instructions are provided in section 9. When a component has been replaced several adjustments are usually required; section 10 indicates which adjustments are necessary in each situation and how to perform these adjustments.

6.2 TWO TRANSPORT CONFIGURATIONS. All Digi-Data synchronous transport models employ generally the same electronics. Two basic configurations are manufactured. These are, 1) the NRZI unit, and 2) the dual density NRZI/PE unit. The PE only unit is simply a version of the basic dual density configuration.

NRZI units contain two p.c. cards, the MC-17 and the RC-11; or in the case of NRZI formatted units, four p.c. cards, the last two being the formatter. Dual density units contain three p.c. cards, the MC-17, the RA-16, and the PA-16. The card complement of the various configurations and the card locations within a transport are indicated in figures 6-1, 6-2, and 6-3.

	J1,J2	J3,J4	J5,J6	J7,J8
NRZI ONLY TRANSPORT	MC-17	RC-11	-	-
FORMATTED NRZI TRANSPORT	MC-17	RC-11	NF*	NFTB*
PE ONLY OR PE/NRZI TRANSPORT	MC-17	RA-16	PA-16	-

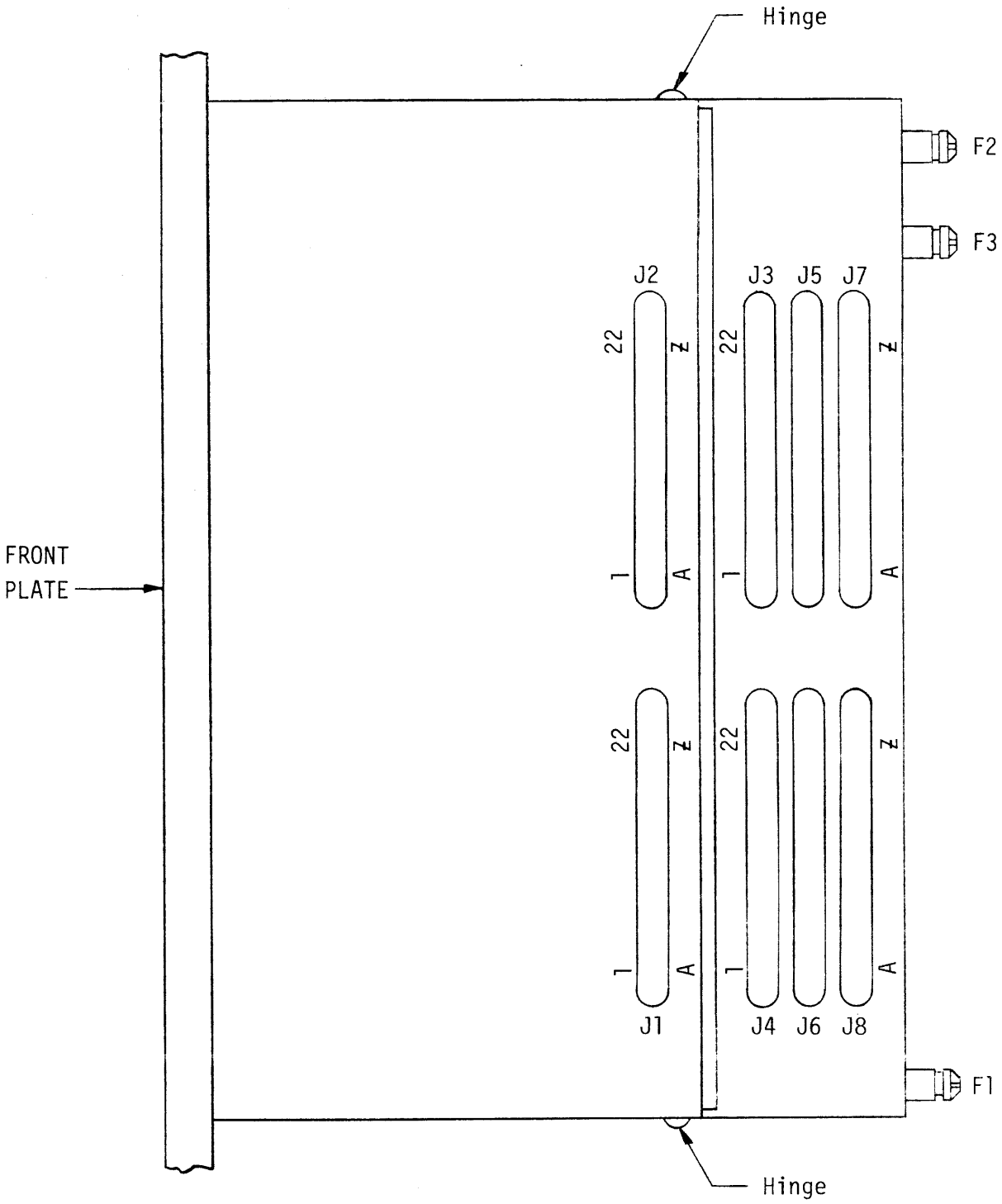
*A description of these cards is provided in the NRZI Formatter Manual.

Figure 6-1, CARD COMPLEMENT AND LOCATION

6.3 VERSION IMPORTANT IN CARD REPLACEMENT. The two Digi-Data synchronous transport configurations are offered in several versions. Briefly the variables are,

Model: 1130, 1630 or 1730
Number of Tracks: 7 or 9
Tape Speed: 12.5, 25, 37.5, or 45 ips
Data Packing Densities: Combinations of 200, 556, 800 and 1600 BPI
Type of Head: Single gap or dual gap
Speed Status Indications: Strapped "high" or "low"

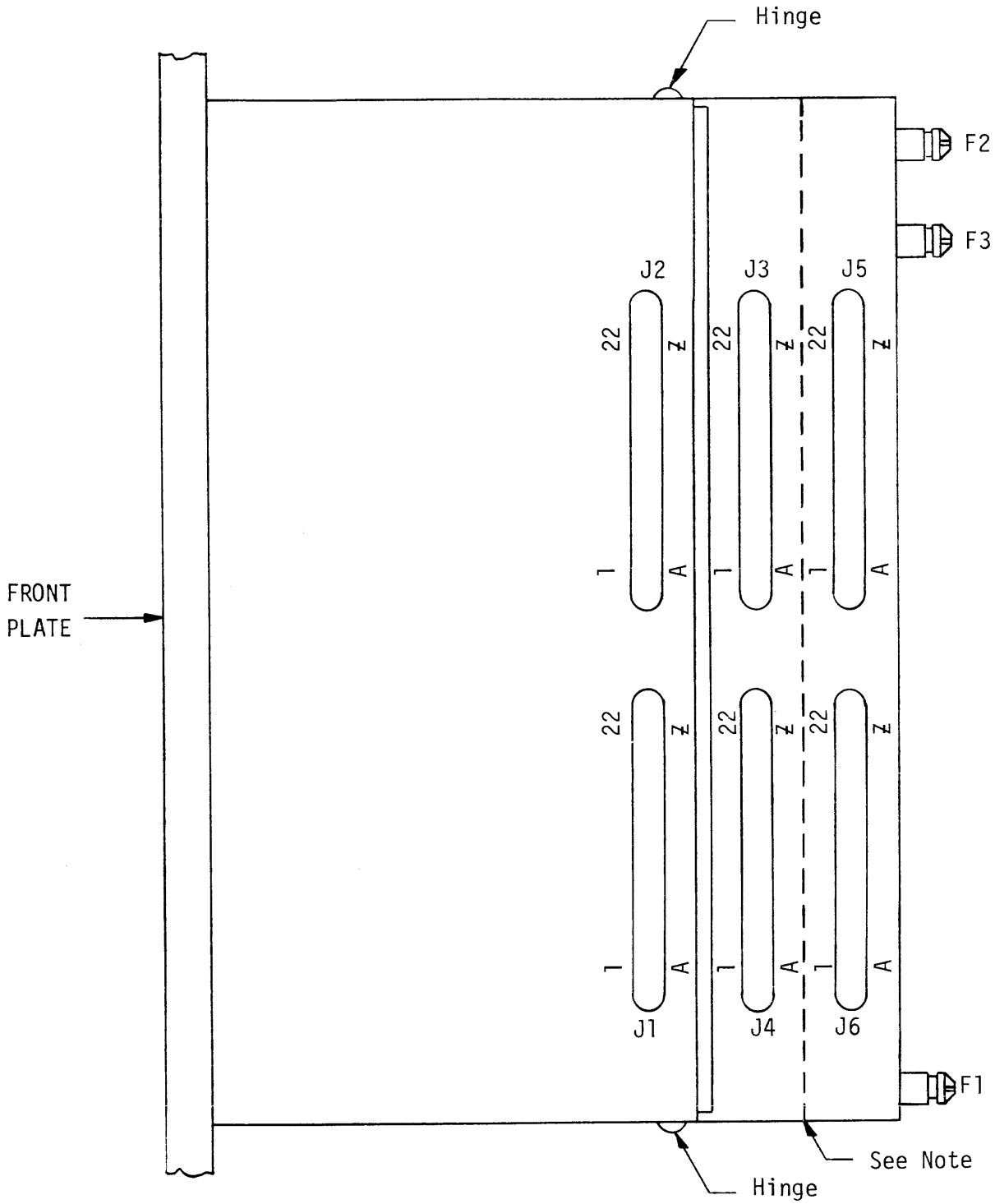
All this information, except speed strap, may be determined from the model number tag. Paragraph 1.3 explains the model numbering scheme. The printed circuit cards in each transport are manufactured to suit a particular set of these variables. The implication for field service is that only a card of the same version as that presently installed may be used as a replacement.



Model 1730, Right Side View
Model 1630, 1130, Bottom View

NOTE: Connectors J5 through J8 installed only in formatted units.

Figure 6-2, NRZI TRANSPORT CARD CONNECTOR LOCATIONS



Note: Shield installed between J3/4 and J5/6.

Model 1730, Right Side View
Model 1630, 1130 Bottom View

Figure 6-3, PE ONLY AND PE/NRZI TRANSPORT CARD CONNECTOR LOCATIONS

The variables affecting each card are indicated in figure 6-4. The "dash number" which indicates a p.c. card's version is indelibly stamped on each card at time of manufacture. Complete parts lists for each card are provided in the last section of this manual.

	MC-17	RC-11	RA-16	PA-16
MODEL	X			
NUMBER OF TRACKS		X		
TAPE SPEED	X	X	X	X
DATA PACKING DENSITIES		X	X	X
TYPE OF HEAD		X	X	X
SPEED STATUS INDICATION		X	X	

Figure 6-4, VARIABLES IN P.C. CARD VERSIONS

When replacing a p.c. board the assembly and version numbers, and therefore the variables indicated above, must be identical.

6.4 RECOMMENDED SPARE PARTS INVENTORY. Each of the components appearing on any of the following six spare parts lists is field-replaceable. Complete instructions are provided in sections 9 and 10 of this manual. Figure 6-5 is a list of tools and equipment required to replace and adjust any field-replaceable component.

ITEM	QUANTITY	ITEM	QUANTITY
Oscilloscope w/dual trace	1	Solder-wick	1
Probe, 1:1	1	Solder, Rosin core	1
Probe, 10:1	2	Cotton swabs	1
Screwdriver set, blade	1	Isopropyl alcohol	1
Nutdriver set	1	Mulitmeter	1
Allen driver set	1	Chip-clip	3
Diagonal cutter	1	Scrub Mag Tape, 600'	1
Long-nose pliers	1	Master skew tape	1
Scale, 6-inch	1	Transport exerciser card, Digi-Data TC-12 or TC-15	1
Soldering iron and tips	1		

Figure 6-5, LIST OF TOOLS AND EQUIPMENT

Item	Qty Per Units	Part Number	Description	Note	Recommended Inventory to Support		
					1-25	25-100	100+
1	2	2060002-0001	Fuse 3A Slo-Blo	See Nbte #2	10	20	20
2	1	2060001-0001	Fuse 7A AGC		5	10	10
3	2	2060007-0001	Relay 12 VDC		1	2	3
4	3	2950016-0001	Lamp, Flanged Base		3	6	20
5	2	2550000-0001	Rectifier		--	1	3
6	1	1010494-0001	Capstan	12.5 IPS Only	1	3	10
7	1	1050010-0002	Capstan	25 IPS Only	--	2	7
8	2	0051095-0001	Reel Motor Assembly		--	1	4
9	1	2050027-0001	Motor-Tachometer		--	1	5
10	1	0050012	MC-17 PC Board	See Note #1	1	2	4
11	1	0050017	RC-11 PC Board	See Note #1	1	2	4
12	1	4950001-0001	BOT/EOT Sensor Assy.		--	2	5
13	1	4000693-0001	BEC (BOT/EOT) Assy.		--	2	5
14	2	4150034-0001	Tension Arm Roller Assy		2	6	14
15	2	4110045-0001	Servo Assy.		1	5	10
16							
17							
18	REF	4350001	Top Assembly	See Note #1			
19							
20							

Notes:

1. See Model Matrix No. 0950002 to determine correct dash number for part to be spared .
2. For standard line voltage (117 VAC).

Rev.	Chg. No.	Date	Appr.
B	ECO-125	10-17-77	JPK
A	ORIG ISSUE		

SIGNATURE	DATE
DR- M.J.Q.	
CHK- W.E.F.	10-17-77
ENG- JP KING	10-17-77

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SPARE PARTS LIST

1130 Tape Drive, NRZI

dwg no 0050090-0000 rev B

Form No. 04-1-50020

Item	Qty Per Units	Part Number	Description	Note	Recommended Inventory to Support		
					1-25	25-100	100+
1	2	2060002-0001	Fuse 3A Slo-Blo	See Note #2	10	20	20
2	1	2060001-0001	Fuse 7A AGC		5	10	10
3	2	2060007-0001	Relay 12 VDC		1	2	3
4	3	2950016-0001	Lamp, Flanged Base		3	6	20
5	2	2550000-0001	Rectifier		--	1	3
6	1	1050010-0002	Capstan		--	2	7
7	2	0051095-0001	Reel Motor Assembly		--	1	4
8	1	2050027-0001	Motor Tachometer		--	1	5
9	1	0050012	MC-17 PC Board	See Note #1	1	2	4
10	1	0050020	RA-16 PC Board	See Note #1	1	2	4
11	1	0050021	PA-16 PC Board	See Note #1	1	2	4
12	1	4950001-0001	BOT/EOT Sensor Assy.		--	2	5
13	1	4000693-0001	BEC (BOT/EOT) Assy.		--	2	5
14	2	4150034-0001	Tension Arm Roller Assy.		2	6	14
15	2	4110045-0001	Servo Assy.		1	5	10
16							
17							
18	REF	4350004	Top Assembly	See Note #1			
19							
20							

Notes:
1. See Model Matrix No. 0950003 to determine correct dash number for part to be spared.
2. For standard line voltage (117 VAC).

Rev.	Chg. No.	Date	Appr.
B	ECO-125	10-17-77	JPK
A	0816.188.		

SIGNATURE	DATE
DR- M.J.Q.	
CHK- W.E.F.	10-17-77
ENG- JPKING	10-17-77

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SPARE PARTS LIST

1130 Tape Drive, PE

dwg no 0050091-0000 rev B

Form No. 04-1-50020

Item	Qty Per Units	Part Number	Description	Note	Recommended Inventory to Support		
					1-25	25-100	100+
1	2	2060002-0001	Fuse 3A Slo-Blo	See Note #2	10	20	20
2	1	2060001-0001	Fuse 7A AGC		5	10	10
3	1	2060007-0001	Relay 12 VDC		--	1	2
4	3	2950016-0001	Lamp, Flanged Base		3	6	20
5	2	2550000-0001	Rectifier		--	1	3
6	1	1050010	Capstan	See Note #1	--	2	7
7	1	2050035-0002	Permanent Mag. Motor	37.5 IPS Only	--	--	1
8	1	0051095-0001	Reel Motor Assembly	37.5 IPS Only	--	1	2
9	2	0051095-0001	Reel Motor Assembly	25 IPS Only	--	1	2
10	1	2050027-0001	Motor Tachometer		--	1	5
11	1	0050012	MC-17 PC Board	See Note #1	1	2	4
12	1	0050017	RC-11 PC Board	See Note #1	1	2	4
13	1	4950001-0001	BOT/EOT Sensor Assy.		--	2	5
14	1	4000693-0001	BEC (BOT/EOT) Assy.		--	2	5
15	2	4150033-0001	Tension Arm Roller Assy.		2	6	14
16	2	4150031-0001	Stationary Roller Assy.		2	6	14
17	2	4110045-0001	Servo Assy.		1	5	10
18							
19	REF	4350002	Top Assembly	See Note #1			
20							

Notes:

1. See Model Matrix No. 0950004 to determine correct dash number for part to be spared.
2. For standard line voltage (117 VAC).

Rev.	Chg. No.	Date	Appr.
B	ECO-125	10-17-77	JPK
A	ORIG. ISS.		

SIGNATURE	DATE
DR- M.J.Q.	
CHK- W.E.F.	10-17-77
ENG- JPKING	10-17-77

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8580 DORSEY RUN ROAD
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SPARE PARTS LIST

1630 Tape Drive, NRZI

dwg no 0050092-0000

rev B

Item	Qty Per Units	Part Number	Description	Note	Recommended Inventory to Support		
					1-25	25-100	100+
1	2	2060002-0001	Fuse 3A Slo-Blo	See Note #2	10	20	20
2	1	2060001-0001	Fuse 7A AGC		5	10	10
3	1	2060007-0001	Relay 12 VDC		--	1	2
4	3	2950016-0001	Lamp, Flanged Base		3	6	20
5	2	2550000-0001	Rectifier		--	1	3
6	1	1050010	Capstan	See Note #1	--	2	7
7	1	2050035-0002	Permanent Magnet Motor	37.5 IPS Only	--	--	1
8	1	0051095-0001	Reel Motor Assembly	37.5 IPS Only	--	1	2
9	2	0051095-0001	Reel Motor Assembly	25 IPS Only	--	1	2
10	1	2050027-0001	Motor-Tachometer		--	1	5
11	1	0050012	MC-17 PC Board	See Note #1	1	2	4
12	1	0050020	RA-16 PC Board	See Note #1	1	2	4
13	1	0050021	PA-16 PC Board	See Note #1	1	2	4
14	1	4950001-0001	BOT/EOT Sensor Assy.		--	2	5
15	1	4000693-0001	BEC (BOT/EOT) Assy.		--	2	5
16	2	4150033-0001	Tension Arm Roller Assy.		2	6	14
17	2	4150031-0001	Stationary Roller Assy.		2	6	14
18	2	4110045-0001	Servo Assy.		1	5	10
19							
20	REF	4350003	Top Assembly	See Note #1			

Notes:
1. See Model Matrix No. 0950005 to determine correct dash number for part to be spared.
2. For standard line voltage (117 VAC).

Rev.	Chg. No.	Date	Appr.
B	ECO 125	10-17-77	JPK
A	ORIG ISSUE		

SIGNATURE	DATE
DR- MJQ	
CHK- [signature]	10-17-77
ENG- JPKING	10-17-77

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SPARE PARTS LIST

1630 Tape Drive, PE

dwg no 0050093-0000 rev B

Form No. 04-1-50020

Item	Qty Per Units	Part Number	Description	Note	Recommended Inventory to Support		
					1-25	25-100	100+
1	2	20-1-60002-0001	Fuse 3A Slo-Blo	See Note #2	10	20	20
2	1	20-1-60001-0001	Fuse 7A AGC		5	10	10
3	2	20-1-60007-0001	Relay 12VDC		1	2	3
4	3	29-2-50016-0001	Lamp Flanged Base		3	6	20
5	2	25-1-50000-0001	Rectifier		--	1	3
6	1	10-2-50012-0001	Capstan	37.5 or 45 IPS	1	3	10
7	1	10-2-50010-0001	Capstan	25 IPS	--	2	7
8	2	20-4-50035-0002	Permanent Magnetic Motor		--	1	4
9	1	20-3-50027-0001	Motor-Tachometer		--	1	5
10	1	00-1-50012	MC-17 PC Board	See Note #1	1	2	4
11	1	00-1-50017	RC-11 PC Board	See Note #1	1	2	4
12	1	49-2-50001-0001	BOT/EOT Sensor Assy.		--	2	5
13	1	40-2-00693-0001	BEC (BOT/EOT) Assy.		--	2	5
14	2	41-2-50032-0001	Tension Arm Roller Assy.		2	6	14
15	2	41-2-50031-0001	Stationary Roller Assy.		2	6	14
16	2	41-1-10045-0001	Servo Assy.		1	5	10
17							
18							
19	REF	43-4-40006	Top Assembly	See Note #1			
20							

Notes:

Note 1 See Model Matrix No. 09-2-50006 to determine correct dash number for part to be spared.

Note 2 For standard line voltage (117 VAC)

Rev.	Chg. No.	Date	Appr.
A	ORIG. ISSUE		

SIGNATURE	DATE
DR-	
CHK-	
ENG-	

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SPARE PARTS LIST
1730 Tape Drive, NRZI

dwg no 00-1-50094- rev A

Item	Qty Per Units	Part Number	Description	Note	Recommended Inventory to Support		
					1-25	25-100	100+
1	2	20-1-60002-0001	Fuse 3A Slo-Blo	See Note #2	10	20	20
2	1	20-1-60001-0001	Fuse 7A AGC		5	10	10
3	2	20-1-60007-0001	Relay 12VDC		1	2	3
4	3	29-2-50016-0001	Lamp Flanged Base		3	6	20
5	2	25-1-50000-0001	Rectifier		--	1	3
6	1	10-2-50012-0001	Capstan	37.5 or 45 IPS	1	3	10
7	1	10-2-50010-0001	Capstan	25 IPS	--	2	7
8	2	20-4-50035-0002	Permanent Magnetic Motor		--	1	4
9	1	20-3-50027-0001	Motor-Tachometer		--	1	5
10	1	00-1-50012	MC-17 PC Board	See Note #1	1	2	4
11	1	00-1-50020	RA-16 PC Board	See Note #1	1	2	4
12	1	00-1-50021	PA-16 PC Board	See Note #1	1	2	4
13	1	49-2-50001-0001	BOT/EOT Sensor Assy.		--	2	5
14	1	40-2-00693-0001	BEC (BOT/EOT) Assy.		--	2	5
15	2	41-2-50032-0001	Tension Arm Roller Assy.		2	6	14
16	2	41-2-50031-0001	Stationary Roller Assy.		2	6	14
17	2	41-1-10045-0001	Servo Assy.		1	5	10
18							
19	REF	43-4-50005	Top Assembly	See Note #1			
20							

Notes:

Note 1 See Model Matrix No. 09-2-50007 to determine correct dash number for part to be spared.

Note 2 For standard line voltage (117 VAC)

Rev.	Chg. No.	Date	Appr.
A	ORIG. ISSUE		

SIGNATURE	DATE
DR-	
CHK-	
ENG-	

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SPARE PARTS LIST
1730 Tape Drive, PE

dwg no 00-1-50095- rev A

Form No. 04-1-50020

7 - CIRCUIT DESCRIPTIONS

7.1 TRANSPORT BLOCK DIAGRAM. A familiarity with the general principles of operation of the transport's major circuits will significantly aid the maintenance engineer in his isolation and correction of transport malfunctions.

Figure 7-9 is a simplified block diagram of the 1130, 1630 and 1730 transports indicating basic relationships between the functional blocks by means of interconnecting arrows. A brief introduction to each block follows.

All transport I/O signals are available at connector J101. All inputs and outputs are directly or indirectly gated by SELECT so that several transports may be bussed on a single controller.

Controller commands, operator pushbutton commands, and various status data derived within the transport are processed in the CONTROL LOGIC, which in turn, directs the motor circuits, enables the write and read amplifiers, and provides status indications to the controller.

A WRITE command is latched within the control logic, and write power is routed through the RING IN (file protect) switch. The erase head is energized at the same time as the write head. Data, write strobes, and a write reset pulse are inputs to the write circuitry.

READ data is amplified (and in the NRZI mode, decoded and deskewed) and provided at J101. Threshold and density selections are decoded in the control logic.

The POWER SUPPLY provides the regulated and unregulated voltage levels required throughout the logic, amplification, and motor controlling circuits.

All three motors (for capstan, supply reel, and take-up reel) are connected to their respective d.c. servo amplifiers via a relay which opens after a power loss occurs or when a tape-buffering arm moves outside its normal operating limits. The RELAY CONTROL circuit also generates the power fail sequencing which stops all motors completely under control, keeping the tape properly threaded. A signal to reset all control logic circuits is also generated in this circuit.

The CAPSTAN SERVO accelerates and decelerates the capstan motor in a controlled and precise fashion in response to motion commands from the control logic. The capstan motor speed is servo'ed by feedback from an integral tachometer.

The motion controlling signals generated in the capstan circuit are fed to the REEL SERVO's for the purpose of optimally positioning the tape-buffering arms during each particular operation. The actual position of each arm is fed back to each reel servo amplifier as a varying photocell output voltage.

The BOT/EOT SENSOR detects the presence of the BOT and EOT markers, and also the absence of tape.

The remaining paragraphs in this section describe each functional block in greater detail.

7.2 POWER SUPPLY. Figure 7-10 is a block diagram of the transport power supply. Relevant schematic drawings in the final section of this manual are 0250002, sheets 1 and 2.

AC power is fused by F1 and connected to terminal block TB1. The transformer primary taps are connected to TB1 in an arrangement appropriate to the anticipated line voltage. Full-wave rectifiers and filters mounted on the chassis develop three raw DC voltages from the transformer secondaries, (+20V, -20V, +8V). The +20 and -20 unregulated voltages are utilized in the motor circuits. Three voltage regulators, on the MC-17 card, each consisting of a series pass transistor controlled by a differential amplifier, provide a regulated voltage from each of the raw DC voltages.

In the +12 volt regulator, a 5.6 volt zener diode (CR126) is compared at the bases of Q26 and Q27 to a portion of the regulated output. The potentiometer (R163) is the only adjustment in the power supply circuits. The +12 volt regulator is used as a reference in the +5 volt and -12 volt regulators, so that their outputs will be within 5% of their nominal levels when the +12 volt output is correctly adjusted. All outputs are routed through removable jumper wires so that the regulators may be isolated from their loads for troubleshooting.

Two emitter followers referenced to the 5.6V zener diode provide a supplementary +5 volt supply used exclusively on the MC-17 card, and a +5.6 volt supply for the arm photocells.

Figure 7-1 indicates the utilization of each voltage within the transport.

Unregulated	Use	Adjustment
+20 VDC	all three motors, +12 VDC regulator	None
-20 VDC	all three motors, -12 VDC regulator	None
+8 VDC	+5 VDC regulator	None
Voltage-Regulated	Use	Adjustment
+12 VDC	all lamps, op amps	potentiometer
-12 VDC	op amps	tracks + 12 VDC
+5 VDC	all DTL and TTL ckts	tracks + 12 VDC
+5.6 VDC	arm position sensing photocells	None
+5(s) VDC	capstan & reel servo ckts	None

Figure 7-1, POWER SUPPLY OUTPUTS

7.3 CAPSTAN SERVO SYSTEM. The capstan servo block diagram, figure 7-11, indicates the major components of this system. Also refer to schematic drawing 0250002, sheet 3.

Reverse and forward motion commands are converted to bi-polar signals by op amp U5. The circuit including U3 and U1 is a unity gain inverter with an adjustable linear rise and fall time. The ramps added to the command signals in this circuit will force the capstan to accelerate to synchronous speed and decelerate to rest at the precise rate required to traverse a fixed distance to tape (0.19 inches).

The waveform at TP2 is applied to the input of the summing amplifier U4 through an inverting polarity splitter (U2, CR117, CR118) in order to permit independent adjustment of the forward and reverse speeds (R126, R125).

The rewind and unload inputs to the summing amplifier are derived through the ramp generator consisting of the gates U7, transistor Q18, and an RC network. Capacitor C101 charges to approximately +5 volts through R120 during a rewind operation creating an exponential ramp at the base of Q18. At the conclusion of the rewind operation the discharge of C101 creates an exponential delay to stop the capstan. During an unload operation C101 can charge only to 2.8 volts since U7 pin 8 goes low. The voltage to TP6 is approximately 3.6 volts during rewinding and 1.4 volts during unloading.

In response to a forward motion command the DC servo amplifier applies some portion of the +20 volt supply to the capstan motor winding through relay K1. This signal, at TP21, goes negative during a reverse, rewind, or unload operation.

The tachometer built into the capstan motor generates a voltage proportional to the motor's speed. This voltage is fed back to the summing point and is opposite polarity to the command signal being asserted. The zero adjust input to the summing point provides correction for D.C. offsets, to assure a tape stop condition when no motion commands are asserted.

7.4 REEL SERVO SYSTEM. The reel servo system controls the motion of the supply reel and the take-up reel in response to the movements of the tape-buffering tension arms. The magnetic tape is accelerated to synchronous speed by the capstan in a few milliseconds; but the reel motors require a much longer time than the capstan to reach synchronous speed, and therefore the tension arms must buffer the supply to tape. For the duration of each particular motion command the arms are moved by the reel servo's to an optimum position in order that the full arc of each arm is available when that motion is terminated. The desired position of each arm during the various operations is illustrated in figure 7-2.

The operation of the supply side and take-up side of this system is identical so that only the supply reel servo amplifier is discussed below. Refer to figure 7-12, or schematic drawing 0250002, sheet 4.

Four inputs are applied to the summing amplifier (U12, etc.). The "desired arm position" input is derived from the capstan servo circuit through ramp generator U14. The percentage of this signal which is applied to the summing amplifier determines the width of the arm's operating arc, and is adjustable with the ARC potentiometer. When the REELS ON signal is false, as during the unload operation, Q55 conducts and both arms are moved near their stops in anticipation of tape tension loss.

When no motion command is being asserted the arms move to a center position determined with the center adjustment potentiometer.

DESIRED ARM POSITION DURING VARIOUS

OPERATIONS, MODEL 1730

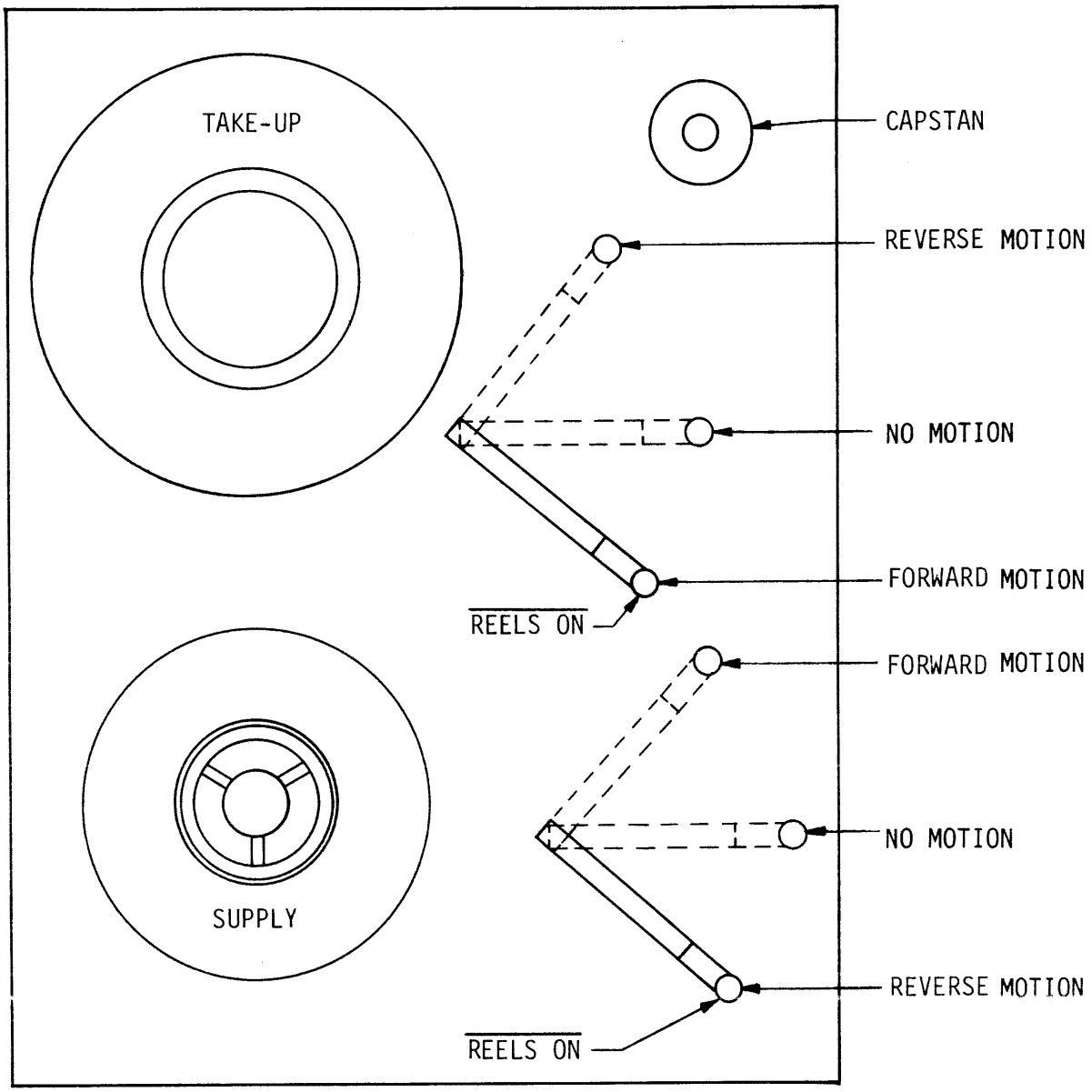


Figure 7-2, DESIRED ARM POSITIONS

The "actual arm position" input is applied to the summing amplifier in two forms. Attached to the shaft of each arm is a disk containing an eccentric slit. Mounted on one side of the disk is a lamp; on the other side is a photocell. The movement of the arm through its operating arc varies the amount of light upon the photocell. The resulting voltage is applied to the summing point through a differentiating capacitor in parallel with an input resistance so that arm velocity, as well as position, is a factor in driving the reel motor.

The fourth input provides current limiting protection for the amplifier components and improves motor efficiency during acceleration. Current through the reel motor is routed through an 0.1 ohm resistor (R201) to ground. The drop across this resistor is amplified by U13, and, when of sufficient amplitude to cause CR129 or 130 to conduct, is applied to the summing amplifier.

The motor is connected to this bi-polar d.c. amplifier through relay K1 which is discussed in paragraph 7.5.

7.5 RELAY CONTROL. The balance of the circuitry on the MC-17 card is primarily concerned with protecting the magnetic tape during a power loss, servo failure, or other catastrophic event. Refer to figure 7-13 or schematic drawing 02-4-50002, sheet 5.

Upon detecting a power failure the transport locks out external commands and brings the tape to a halt under servo control at the REELS OFF position. When the tape has been halted the tension arms are gently moved to the stops. The tape tension is gradually reduced until the tension arms have been relaxed, thus keeping the tape properly threaded and ready to resume operations when power is available.

The AC power line is monitored by the circuit including Q44. The power transformer secondary is coupled through a 10 volt zener diode to a rectifier. The zener diode makes line voltage 25% below nominal look like a total power failure to the circuit. Each cycle of line voltage deposits a charge on Q44's base capacitor, holding Q44 on. If this charge is not renewed within approximately 3 cycles, Q44 will turn off, initiating the power failure sequence.

When Q44 turns off its collector rises to approximately +20 volts. This causes SET BT to go high, clearing all flip flops in the control logic. Q44 also causes the circuit comprised of Q42 and Q43 to generate a 300 millisecond pulse. This pulse holds the servo relay on to permit the reels and capstan to be stopped. Sufficient energy is stored in the power supply filter capacitors to stop any motion within 300 milliseconds. Q42 also clamps to ground all motion commands and the REELS ON command. When REELS ON is pulled low Q54 and Q55 turn on, causing the reel servo ramp generators to move the tension arms to the operating position nearest the mechanical stop. Thus at the end of the 300 millisecond pulse all motion has stopped and the arms are very near the rest positions. At the conclusion of the pulse the servo relay is released.

The circuit containing Q51, Q52, Q53 and Q59 is an exponential ramp generator which is connected to the reel motors through the servo relay any time the motors are disconnected from the servo amplifiers. During the 300 millisecond power failure pulse this ramp generator is charged via Q51. At the conclusion of the pulse, when the servo relay is released, the motors are connected to the "relaxer" ramp generator. All energy remaining in the main filter capcaitors is employed by the relaxer to gradually move the tension arms to the mechanical stops while maintaining sufficient tape tension to keep the tape threaded.

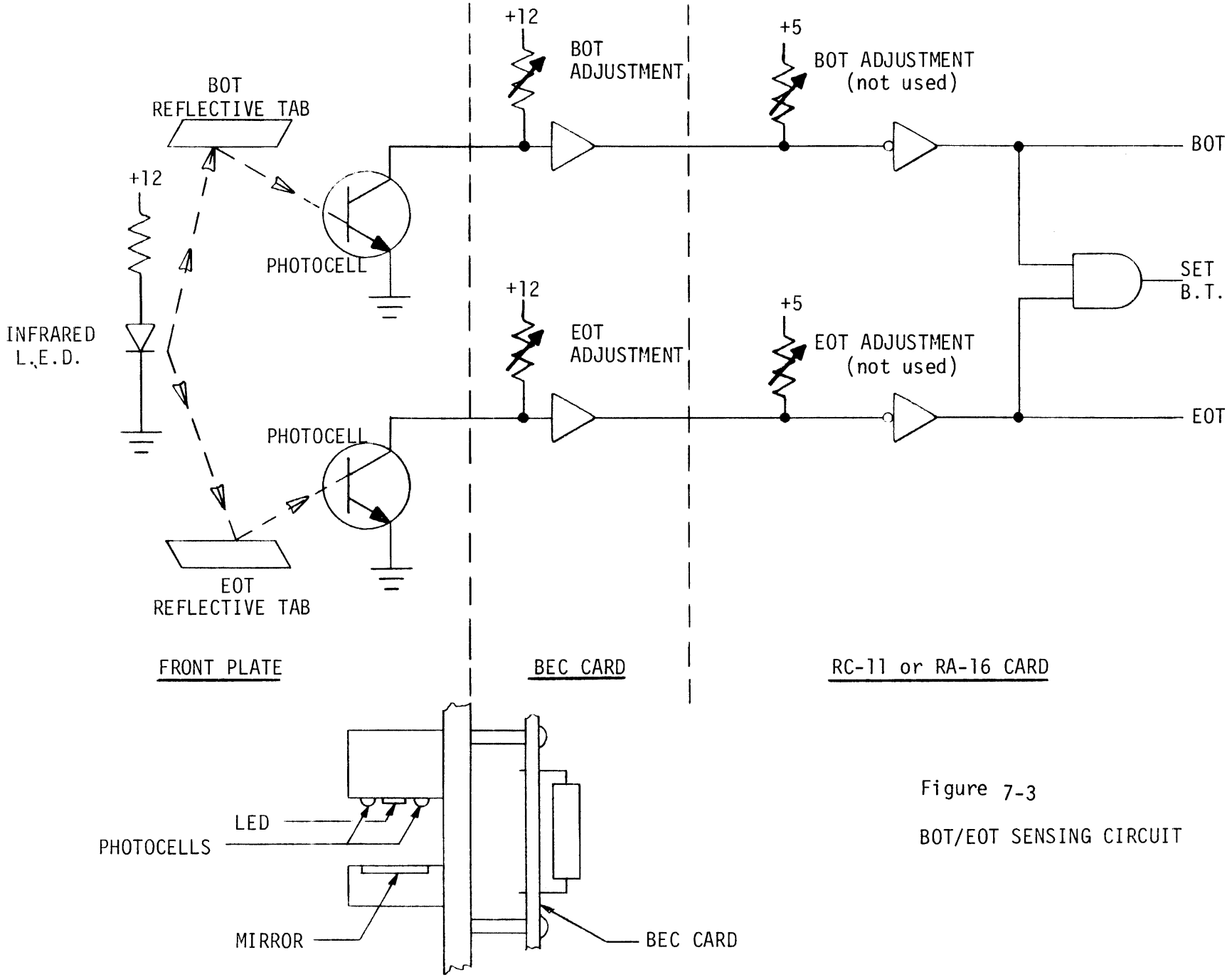


Figure 7-3

BOT/EOT SENSING CIRCUIT

The rewind relay K2 is installed only in the 1730 transport. When actuated by a rewind motion command through Q38 and Q39 the relay connects the motor returns to the opposite raw D.C. supply from that being applied by the servo amplifiers. Therefore during rewind up to 40 volts may be applied across each of the reel motors. During normal motion the reel motor returns are routed through the current sensing resistors to ground, and only 20 volts is available.

To ensure that during a power failure the tape never moves backwards over the head (which might result in the destruction of previously recorded data), a brief forward motion command is applied to the capstan servo circuit (TP 14). This command is the 300 millisecond pulse through R273. If the power failure should occur during rewind the forward motion command is prevented. Q50 holds TP14 to ground since C142 was able to charge to approximately 9 volts through Q46 when REWIND was true.

The tape protection system also includes a microswitch which monitors the position of the tension arms. Should a servo or motor failure occur, the reel will generally lose all tension or attempt to apply excessive tension. In either case the tension arm will move outside of its normal operating area, activating the microswitch via a cam. If this occurs the tape protection circuitry immediately disconnects the motors from the servo amplifiers by opening servo relay K1. The SET BT signal is also activated, placing the transport off line and clearing all flip-flops in the control logic.

7.6 BOT/EOT SENSORS. The circuitry associated with "beginning-of-tape" and "end-of-tape" detection is located partly on a small p.c. board, designated BEC, which is bolted to the front plate behind the BOT/EOT sensor assembly. Refer to figure 7-3 or drawings SB-0028 and PCB-00693.

Light from the infared LED is reflected toward either the BOT photoelectric sensor or EOT photoelectric sensor by the respective marker on tape. When no tape is loaded light is reflected to both photocells by the reflective surface of the lower post; since BOT and EOT are both indicated the BROKEN TAPE flip-flop is set.

7.7 MOTION CONTROL LOGIC. A generalized schematic of the transport control logic is presented in figure 7-14. For specific details refer to schematic drawing 0250001, sheet 1 (RC-11 card) or 0250004, sheet 1 (RA-16 card), as appropriate.

When the transport is powered up the SET BT signal is generated which sets the BROKEN TAPE flip-flop. BT clears all control filp-flops and makes REELS ON false.

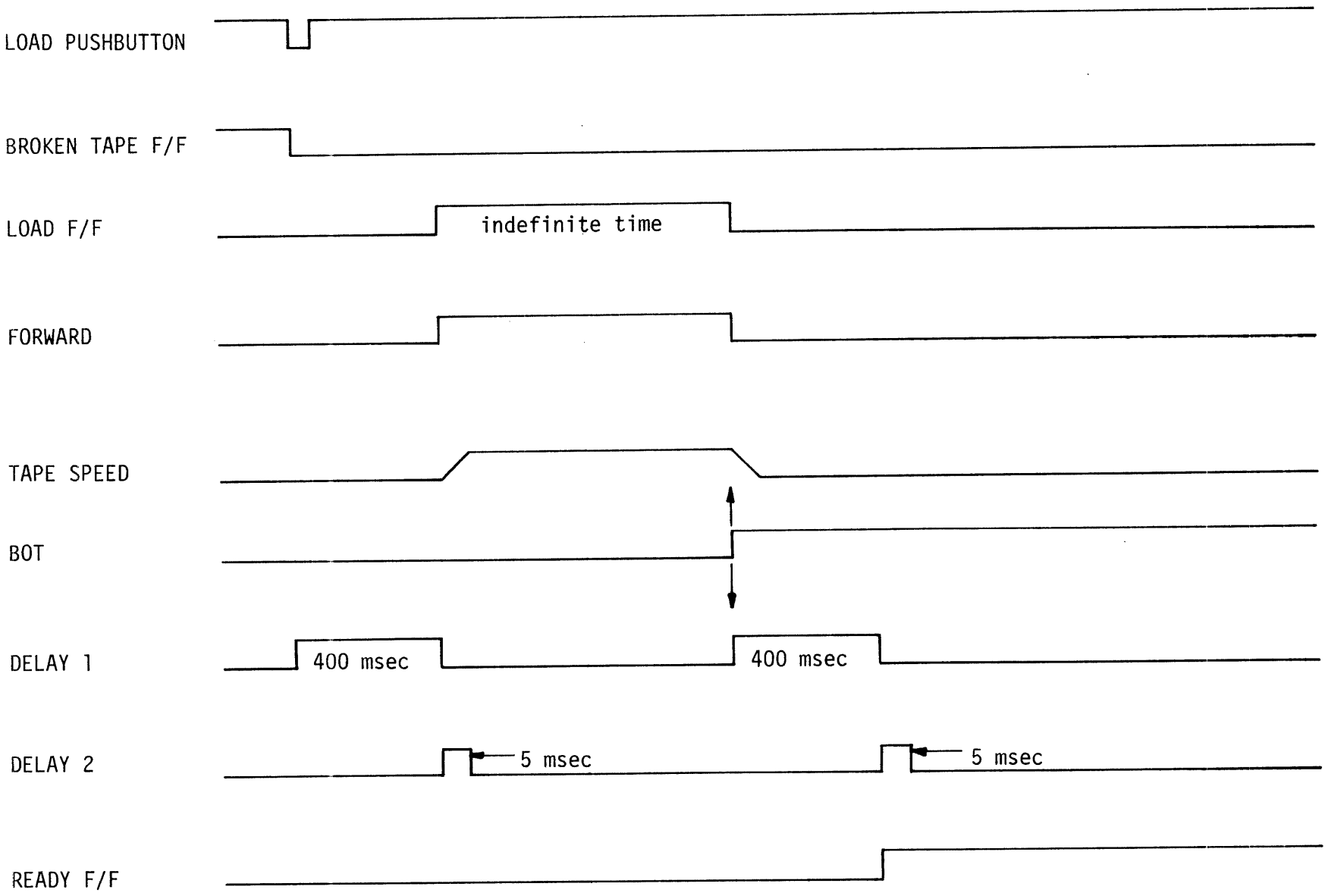
7.7.1 LOAD SEQUENCE. When the LOAD pushbutton switch is depressed BT is cleared and REELS ON comes true moving the arms to the center position. The LOAD pushbutton switch overrides the arm limit switch so that the servo relay K1 can be activated.

After a 400 msec delay the LOAD flip-flop is set. LOAD forces the FORWARD motion command. When BOT is eventually sensed it clears the LOAD F/F and forward motion ceases. After a 400 msec delay the READY flip-flop is set, and the transport may be placed under remote control. Refer to the timing diagram, figure 7-4.

7.7.2 ON LINE OPERATION. Each time the ON/OFF LINE pushbutton switch is depressed the ON LINE flip-flop is toggled, alternately placing the transport ON LINE, enabling remote control, and OFF LINE, disabling remote control. This flip-flop may be directly cleared with a controller off-line command (OFFC) or by depressing the REWIND pushbutton switch. The associated indicator lamp is illuminated only when the transport is ON LINE.

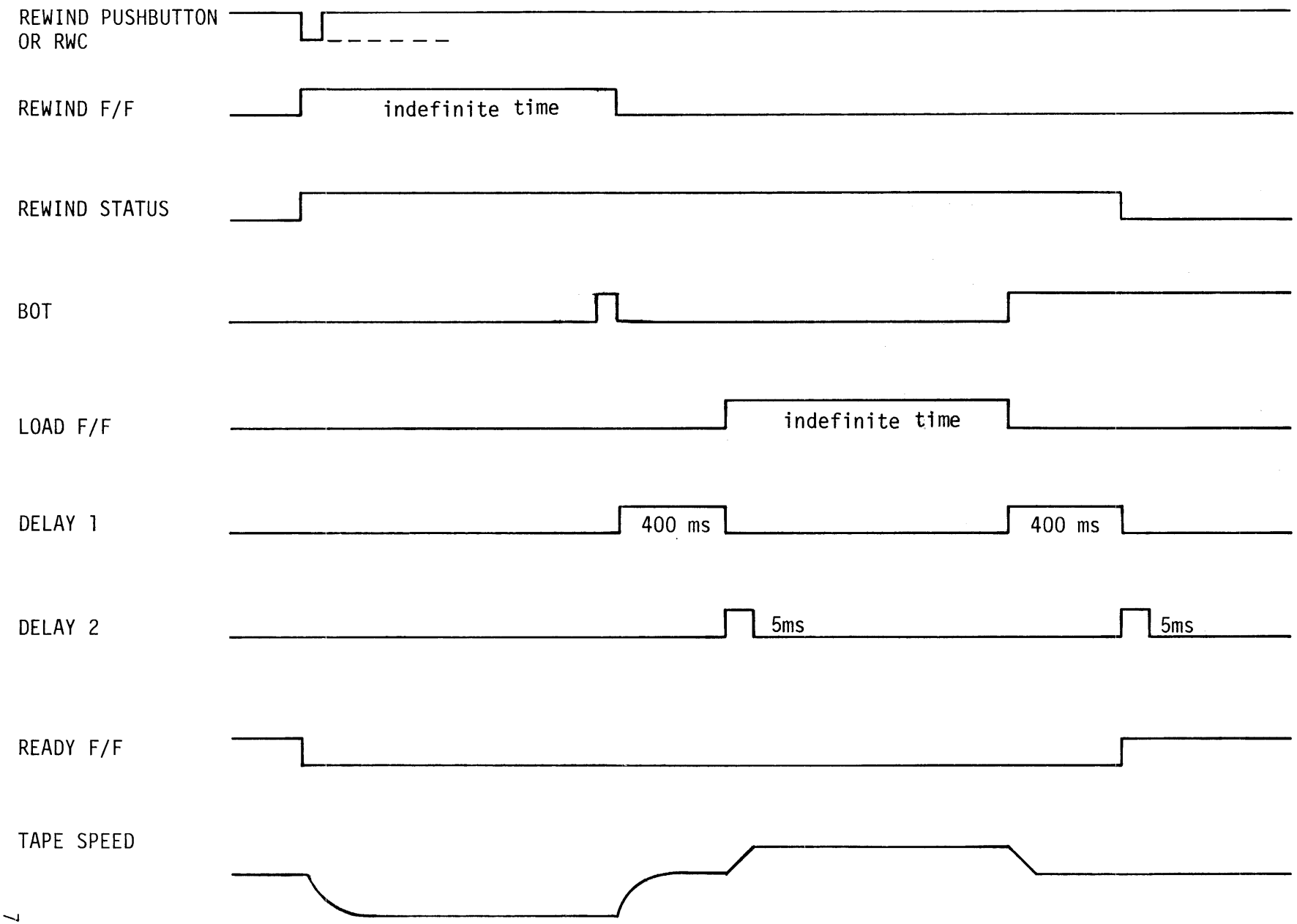
LOAD SEQUENCE TIMING DIAGRAM

Figure 7-4



REWIND SEQUENCE TIMING DIAGRAM

Figure 7-5



With the transport OFF LINE the three-position SERVICE SWITCH, located on the chassis, is enabled. The center "normal" position is off; the "forward" or "reverse" positions force the corresponding motion command to the motor servo circuits.

With the transport ON LINE and the READY flip-flop set the ARM I/O signal comes true, provided the transport is not rewinding. ARM I/O gates all the motion commands (SFC, SRC, and RWC), as well as the tape position indications (LDP and EOT). ARM I/O also gates all the READ DATA outputs, the WRITE DATA STROBE input, and the file protect indication.

At the I/O the ARM I/O signal is called READY. When READY is true the controller may assert a motion command. The condition of the SET WRITE STATUS line is sampled within 20 μsec after the leading edge of the motion command. SFC and SRC are not latched in the transport; when either is asserted the capstan immediately accelerates the tape, and when that command goes false deceleration occurs immediately.

7.7.3 REWIND SEQUENCE. A rewind operation may be initiated either by depressing the REWIND pushbutton switch or by pulsing the rewind command line (RWC). In either case the REWIND F/F is set, and this in turn causes the capstan motor to start rewinding at high speed and the REWIND STATUS F/F to be set. See figure 7-5.

When BOT is eventually passed the REWIND F/F is cleared and the tape decelerates. After a 400 millisecond delay the LOAD F/F is set initiating a return to load point. Briefly, and by way of review, the load sequence is: forward motion until BOT clears the LOAD F/F, then a 400 millisecond delay after which the READY F/F is set. The signal which sets READY also clears the REWIND STATUS F/F. If the transport is still ON LINE the ARM I/O signal is now true.

7.7.4 UNLOAD SEQUENCE. The operator may initiate the unload sequence by depressing the REWIND pushbutton switch when the tape is positioned at load point (BOT marker being sensed). Note that the unload sequence cannot be initiated with the controller command, RWC. When the UNLOAD F/F is set the REWIND signal to the MC-17 card will be false. UNLOAD also forces REELS ON low, which causes the arms to be moved near their rest positions, and it forces REVERSE high. REVERSE holds the servo relay K1 on and it gates the REELS ON signal to the exponential ramp generator in the capstan motor circuit. This ramp generator now outputs a low speed rewind signal to the capstan servo amplifier. Tape motion terminates when tension is lost; the arm limit switch releases K1, disconnecting the motors, and sets the BT F/F, clearing the control logic.

7.8 WRITE CIRCUITS. Refer to figure 7-6 or schematic drawings 0250001, sheets 1 and 3, or 0250004, sheets 1 and 2. The controller initiates a write operation by holding the SWS (set write status) line true for at least 20 microseconds after the false-to-true transition of either the forward (SFC) or reverse (SRC) motion command. The condition of the SWS line is held in the WRITE flip-flop.

In order for the transport to write on magnetic tape a reel containing a "write enable ring" must be mounted on the supply hub. This ring depresses a plunger protruding through the front plate, which in turn activates the RING IN microswitch. When the operator presses the LOAD pushbutton, resetting BT, a solenoid is energized which

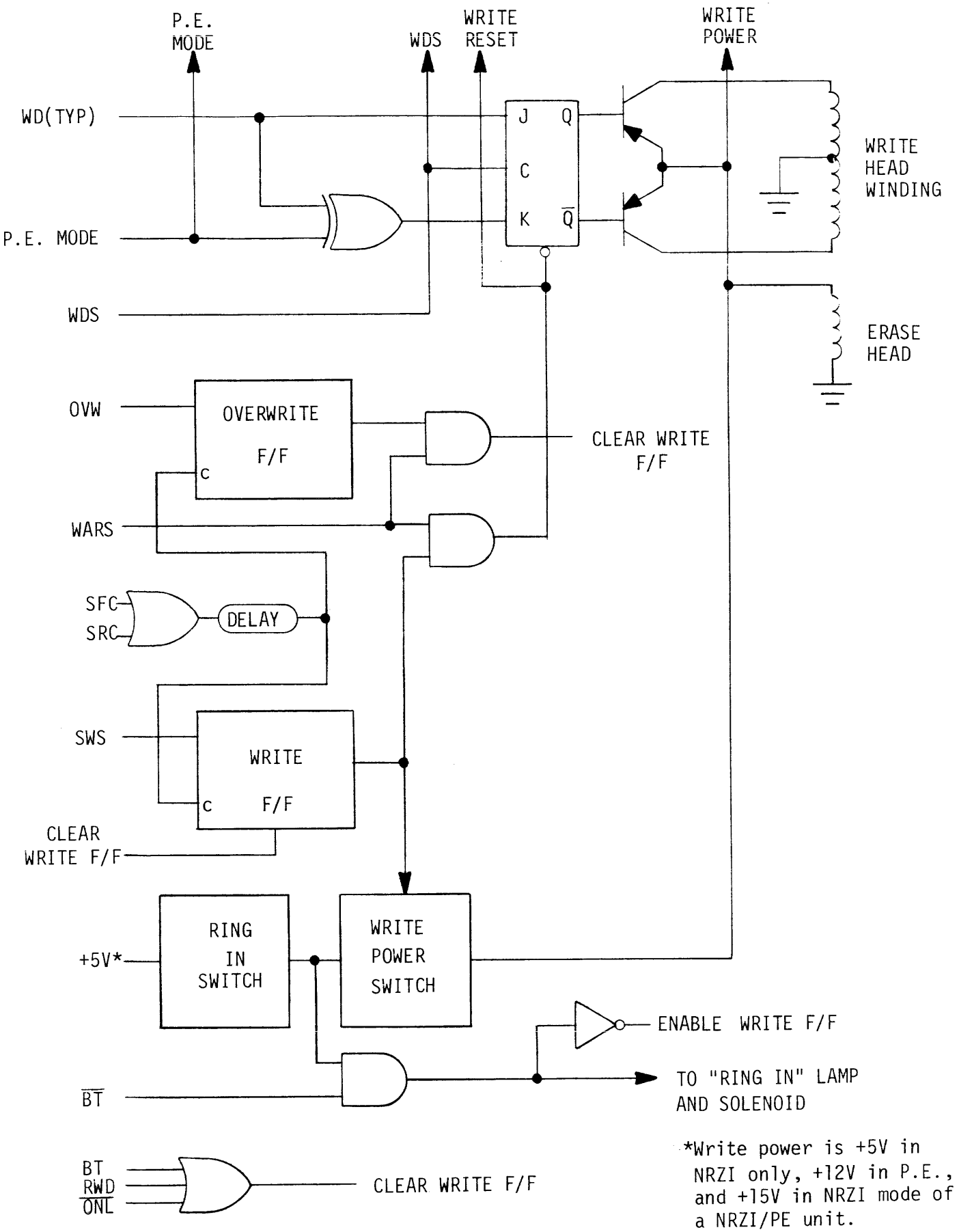


Figure 7 - 6 , WRITE BLOCK DIAGRAM

fully retracts the plunger if the RING IN switch is closed.

If no "write enable ring" is installed in the supply reel the WRITE POWER is disabled, since it is routed directly through the RING IN switch. Absence of the ring also holds the WRITE F/F clear. The FPT (file protected) signal will come true at the I/O with the ARM I/O signal.

WRITE DATA inputs are clocked into a register of J-K flip-flops by the WRITE DATA STROBE. In the NRZI mode the register is operated in a "toggle-no toggle" fashion; in the PE mode it is used in a "set-reset" fashion. The output states of the register control the direction of current through the head windings. Note that the erase head is active anytime WRITE POWER is available.

In the NRZI only transport WRITE POWER is +5 volts; in the dual density NRZI/PE transport or PE only transport WRITE POWER is +15 volts for NRZI recording and +12 volts for PE recording. The +15 volt regulator is located on the RA-16 card.

At the conclusion of each data block the controller issues the WARS pulse (write amplifier reset) which resets the write register to the direction of erased tape, and in so doing records the NRZI LRCC on tape. If the OVERWRITE F/F is set the WARS pulse also clears the WRITE F/F. The overwrite command is sampled at the same time as the "set write status" line.

7.9 READ CIRCUITS. The recovery of NRZI data and phase encoded data from tape require different techniques so that the following paragraphs discuss these circuits separately. The read block diagram, figure 7-15, is based on the dual density PA-16 card.

7.9.1 NRZI READ CIRCUITS (RC-11 CARD). As magnetic tape is moved across the read head a small current is induced in each head winding. These currents correspond to the magnetic flux direction and changes in each track. The signal across each winding is applied to the input of a differential amplifier. The amplifiers (U22-38, even) have a controlled bandwidth for maximum noise immunity and individual gain adjustments to compensate for track-to-track variations in the head windings.

The amplified head signal is full-wave rectified and then inputed to a peak detecting circuit. Peaks correspond to changes in the direction of magnetic flux on tape. The peak detector output is a pulse of fixed duration and is independent of input signal amplitude.

The threshold circuit adds a d.c. component to the amplified, rectified head signal so that the peak detector rejects signals below a corresponding level as invalid.

THRESHOLD	NORMAL	HIGH	LOW
% NOMINAL SIGNAL	20%	50%	10%
COMMANDS	$\overline{\text{RTHT}}$, $\overline{\text{RTH2}}$	RTH 1	RTH2, $\overline{\text{RTHT}}$
VOLTAGE, $Q63_E$	0 V	+1 V	-2.2 V

Figure 7-7, NRZI THRESHOLD CONDITIONS, RC-11 CARD

Dual gap transports force high read threshold during write operations, thereby verifying the fidelity of new recording.

The first flux reversal, or logical "one" to be detected pulls down the SKEW BUSS through an isolating diode. The skew buss triggers the SKEW GATE one-shot, Q34 and Q36. The width of the skew gate is nominally one-half the character period. In seven track dual density units Q40 and Q35 decrease the width of the skew gate when high density is selected by the assertion of DDS.

The conclusion of the skew gate triggers the RDS one-shot, Q37, which provides a two microsecond READ DATA STROBE at the I/O. It is assumed that a logical "0" exists in tracks in which a "one" has not been set in the deskewing register during the skew gate. All bits in a character generally arrive within 15% of the character period. Shortly after the RDS the deskewing register is cleared (Q38, Q39) to await the next character.

In single gap transports the READ DATA outputs and the read strobe are gated by the absence of WRITE POWER.

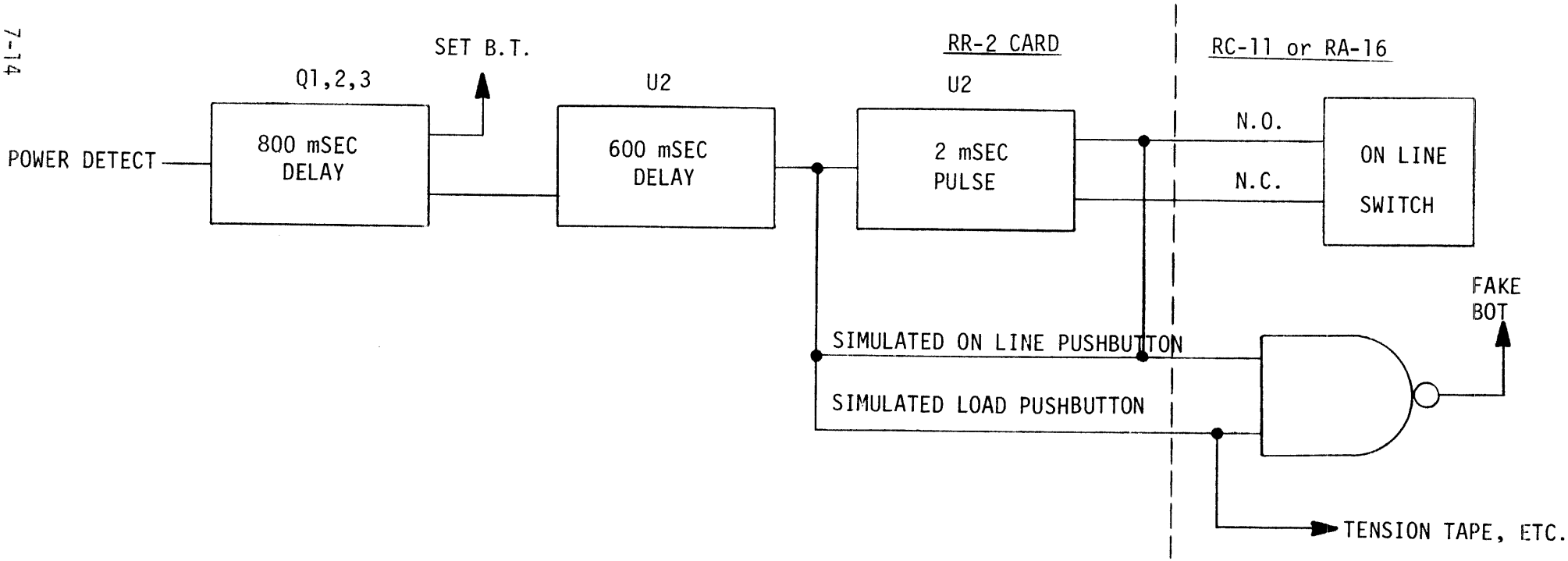
7.9.2 NRZI READ CIRCUITS (PA-16 CARD). The circuitry located on the dual-density PA-16 card which is associated with the recovery of NRZI data from tape is very similar to that on the RC-11 card discussed in the preceding paragraph. Some functions are implemented with different hardware, some component values have changed, and, of course, all component designations are different. The maintenance engineer should read paragraph 7.9.1 while referring to schematic drawing 0250005 or figure 7-15.

The data density select line (DDS) enables the NRZI read circuits when true; a false level selects PE. Likewise, the data density indicator (DDI) is true for NRZI and false for PE.

7.9.3 PHASE ENCODED READ CIRCUIT. In the PE mode, the read head signal is amplified by the same controlled bandwidth differential amplifier as is utilized in the NRZI mode. The distance between flux reversals on phase encoded tape will vary between 312 and 625 microinches as a function of the data pattern. A reversal preceded by the longer distance will result in an induced signal of greater amplitude than one preceded by the shorter distance. Equalization of the amplified head signal is achieved in a differentiating circuit. A ninety degree phase shift is also effected. A Schmitt trigger circuit, used as a zero crossing detector, squares up the differentiator output. The signal is now identical in time to the actual bit pattern on tape in each track.

The differentiator output is also applied to a level monitoring circuit which assures that only signals which represent genuine recording are transferred to the controller. The first stage is a Schmitt trigger circuit referred to a switching level developed by the PE threshold circuit. The greater the threshold voltage or the weaker the head signal the shorter the negative portion of the square wave output. The negative cycle of the comparator output places a -4 volt charge on Q26's base capacitor, holding Q26 off. During the positive cycle the capacitor charges toward +12 volts. When the base of Q26 rises above ground Q26 turns on biasing Q36 off, thereby disabling data through the PE data gate. Approximately two missing negative pulses are sufficient to activate this drop-out detection circuitry.

When the head signal returns to adequate amplitude the monitoring circuit functions as an envelope detector. After three or four valid characters the base capacitor



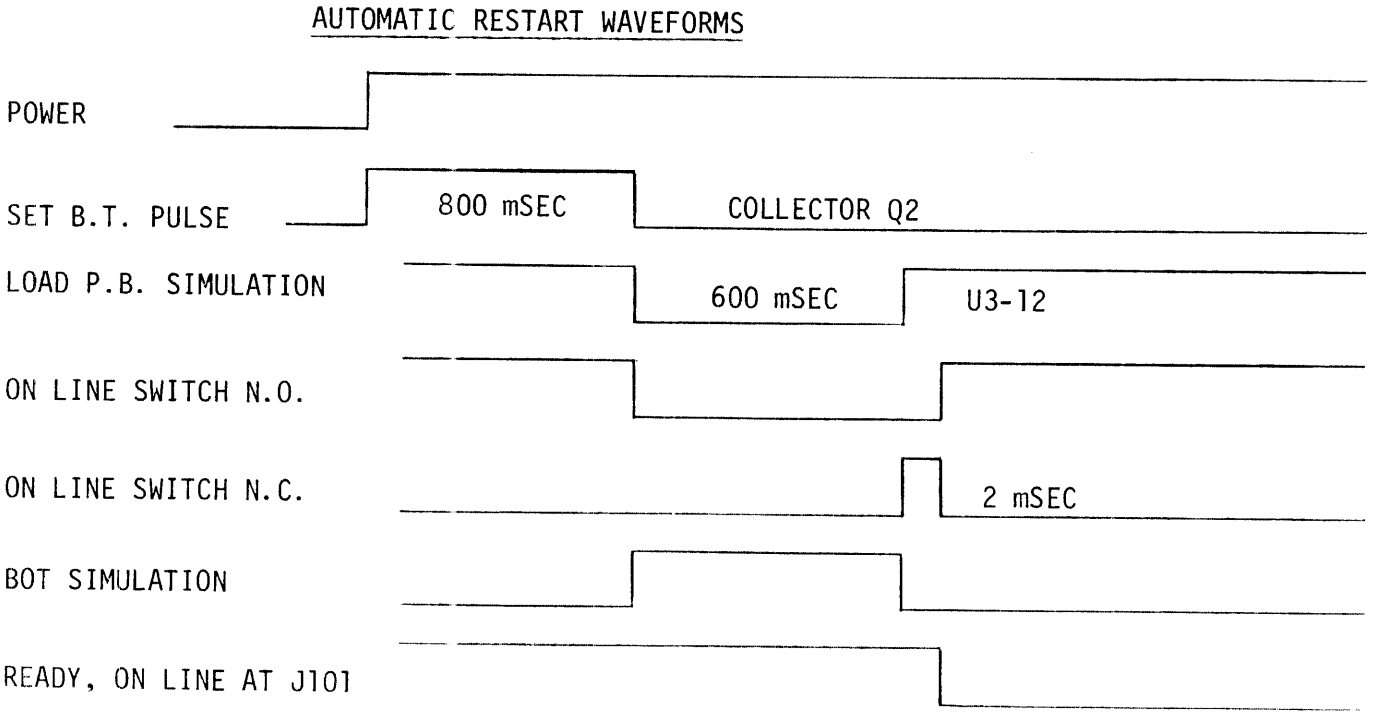


Figure 7-7,

AUTOMATIC RESTART BLOCK DIAGRAM

of Q36 will be sufficiently charged to turn Q36 on thereby allowing PE data to be gated to the I/O. This scheme ensures the suppression of gap noise. At the start of a data block the few characters not transferred to the controller are the beginning of the preamble.

7.10 AUTOMATIC RESTART OPTION. The automatic restart option automatically brings a transport back on line without operator assistance when power is restored following an outage. Digi-Data is able to offer this option because of the transport's unique tape protection system which guarantees complete control in the event of power loss.

When an outage occurs the transport immediately goes off line, and energy stored in the over-sized filter capacitors is used to stop the reel motors entirely under servo control and to then gently relax the arms to their stops. The tape remains threaded without any excessive slack. The tape may move forward up to two inches, but will not move reverse unless a rewind was in process.

After the power is restored the automatic restart circuitry generates a sequence of signals simulating an operator pressing the front panel switches. The reel motors tension the tape, arms move to their center positions, and READY and ON LINE come true. The circuitry associated with this option is on a small p.c. board, designated RR-2, mounted in an connector in front of the filter capacitors on the chassis.

Figure 7-8 is a simplified block diagram explaining the operation of this circuit. When a power loss is detected the collector of Q44 on the MC-17 card goes to +20 volts. On the RR-2 card Q1 immediately discharges C1, however brief the power loss. When power is restored Q44's collector goes low and Q1 is off. The charging of C1 turns Q2 on for approximately 800 milliseconds thereby indicating SET BT. When Q2 turns off Q3 is biased off and its collector rises to +5 volts triggering a 600 millisecond pulse (U2,pin 5) which simulates the pressing of the LOAD pushbutton and ON LINE pushbutton simultaneously. This condition is AND'd on the RC-11 or RA-16 cards to create a "fake" BOT indication. The tape is tensioned and, after the normal 400 millisecond delay, the READY F/F (rather than the LOAD F/F) is set since BOT is seemingly true. The timing out of the 600 millisecond pulse triggers a 2 millisecond pulse which simulates the make-break switch action required to toggle the ON LINE F/F. At the end of this pulse the ON LINE and READY indications are true at the I/O.

N O T E

Normal loading of tape on a transport equipped with the automatic restart option should be done <u>after</u> the POWER switch is turned on in order to avoid false indications to the controller.

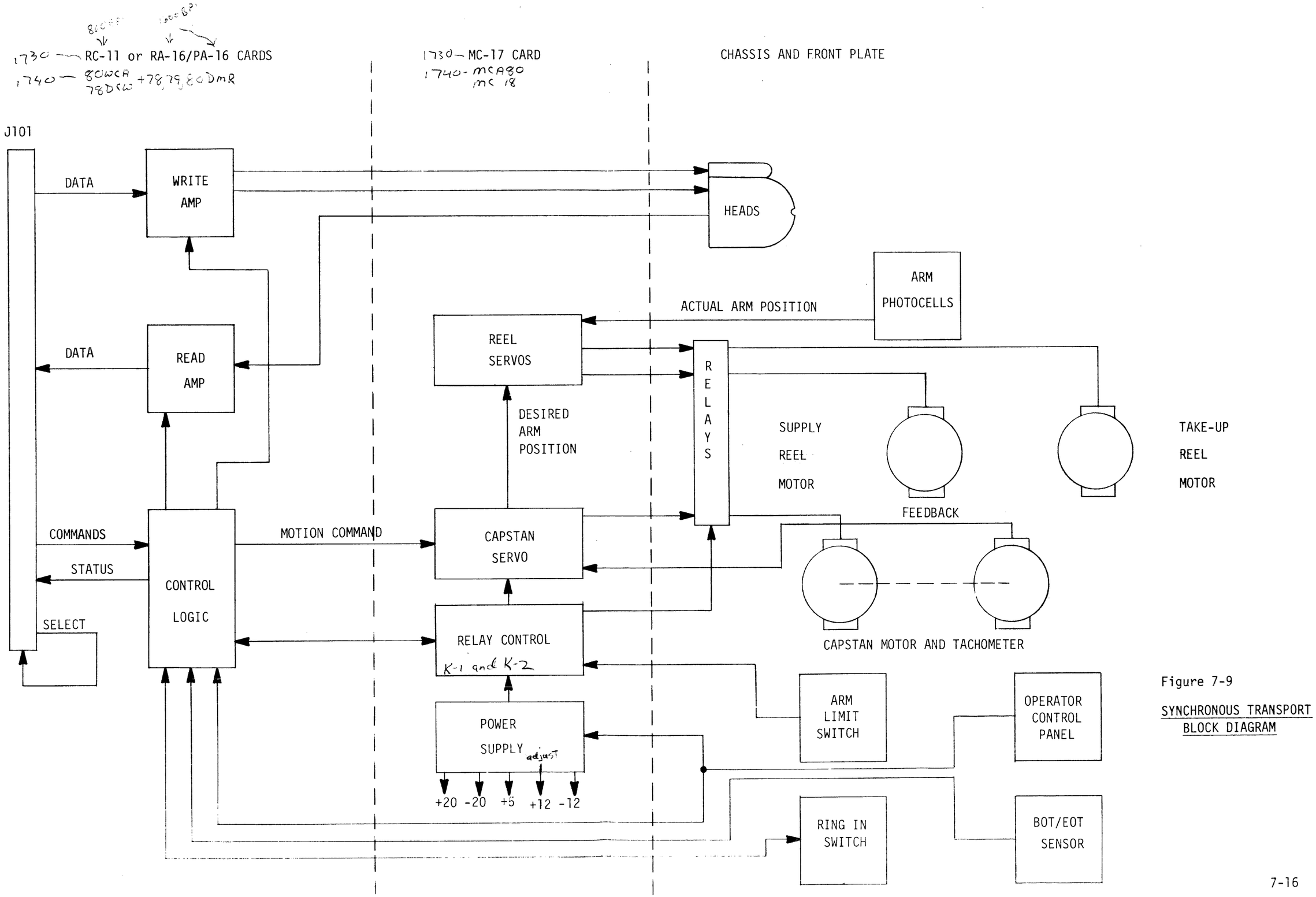


Figure 7-9

SYNCHRONOUS TRANSPORT BLOCK DIAGRAM

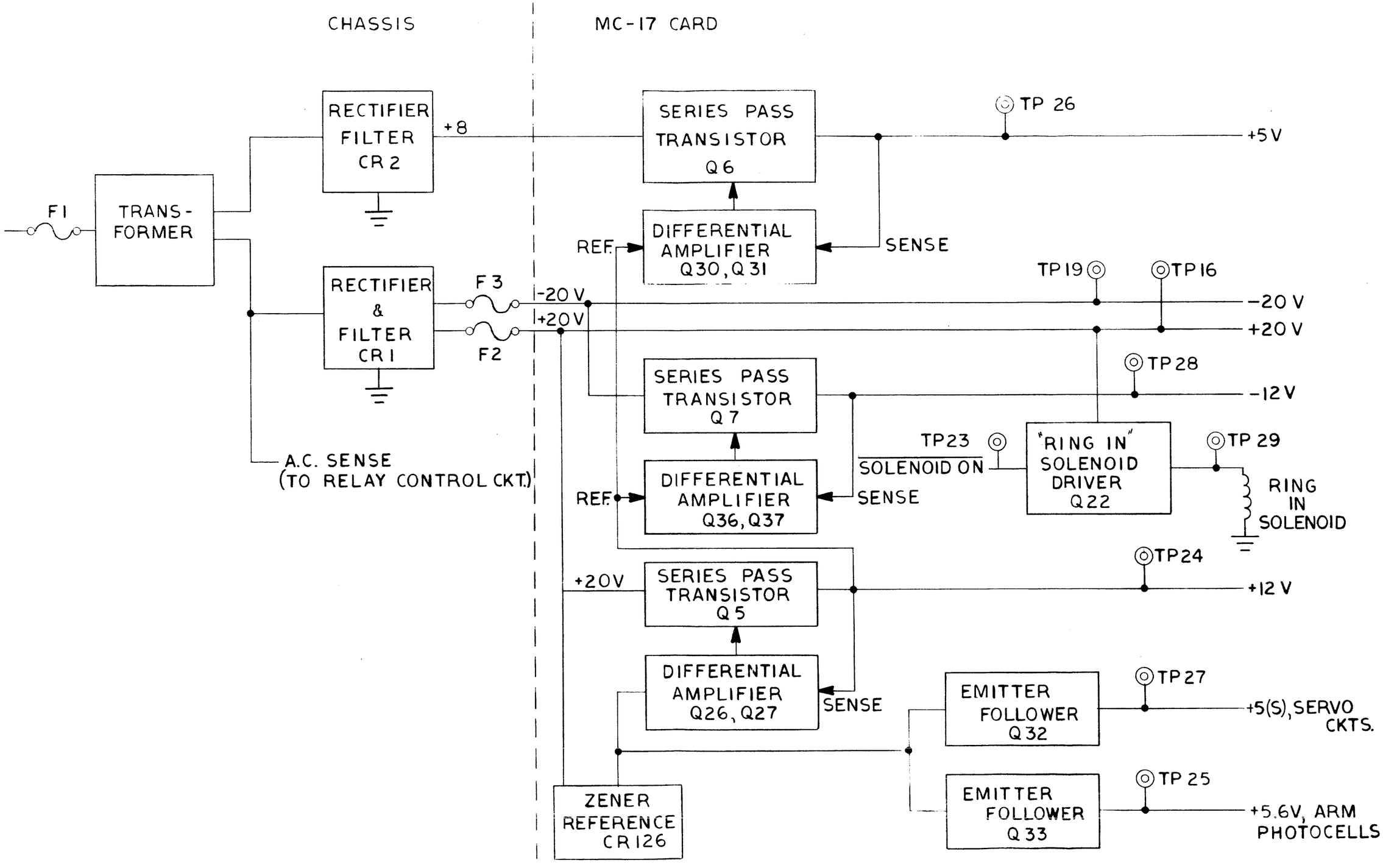
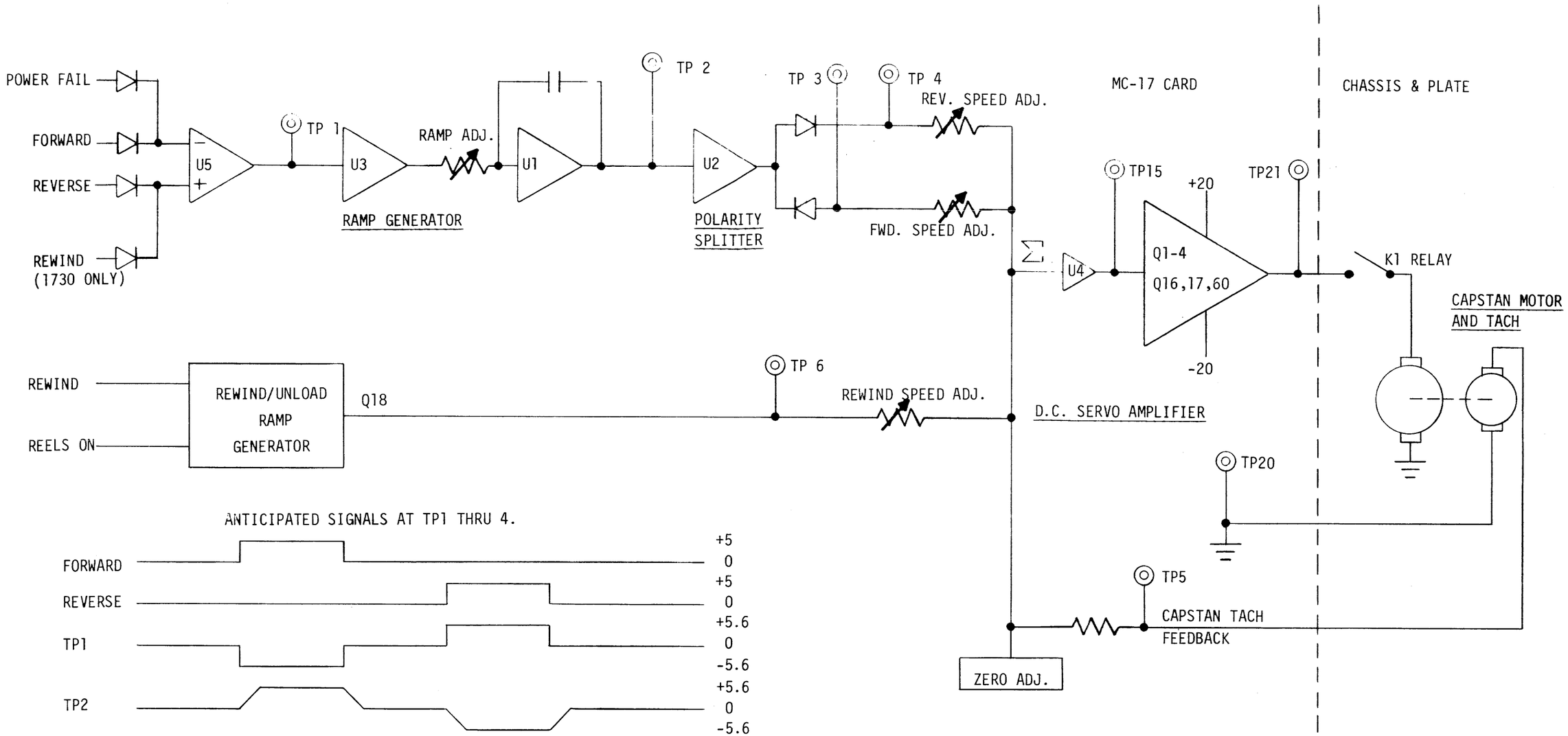
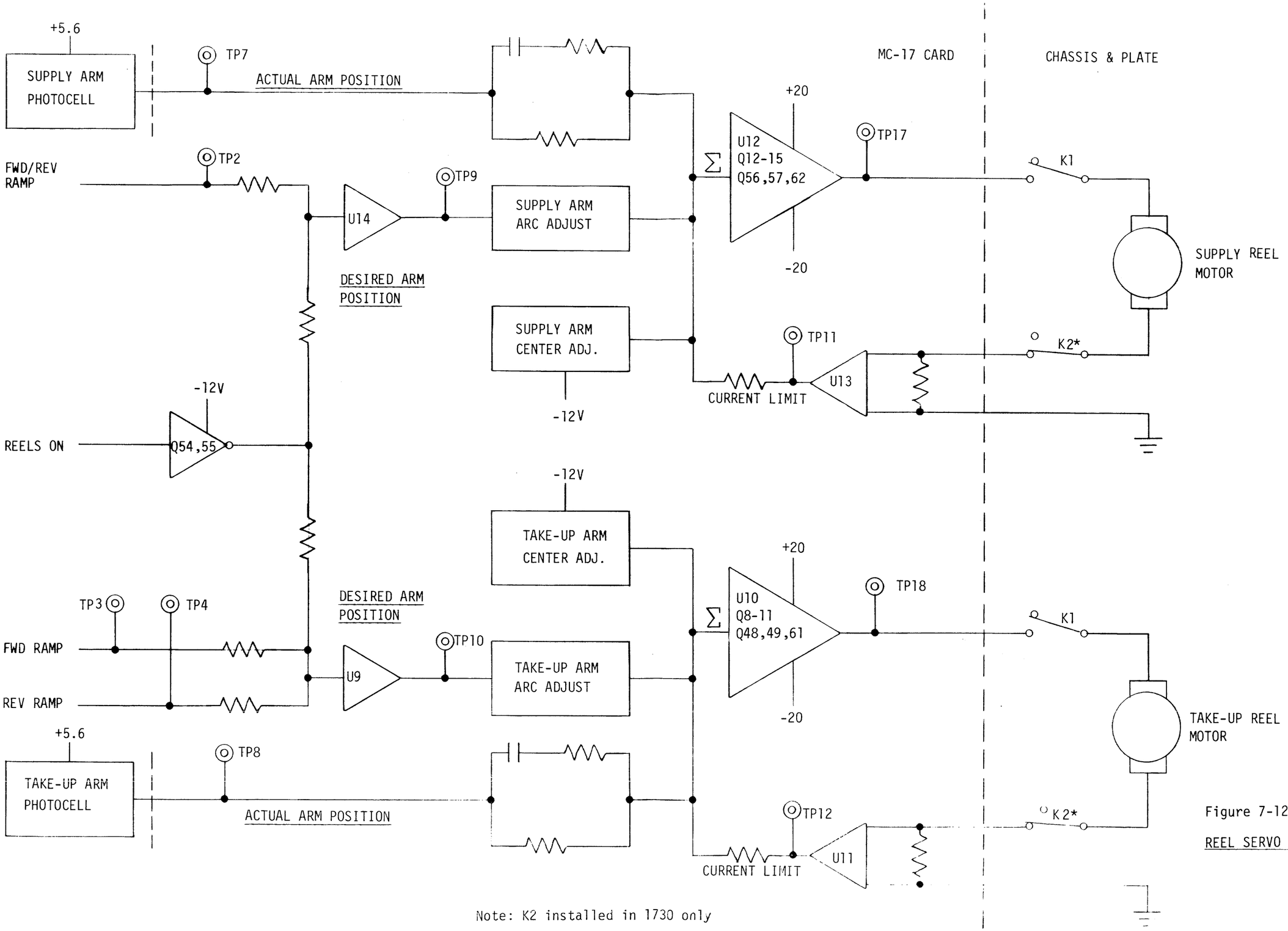


FIGURE 7-10, POWER SUPPLY BLOCK DIAGRAM



ANTICIPATED SIGNALS AT TP1 THRU 4.

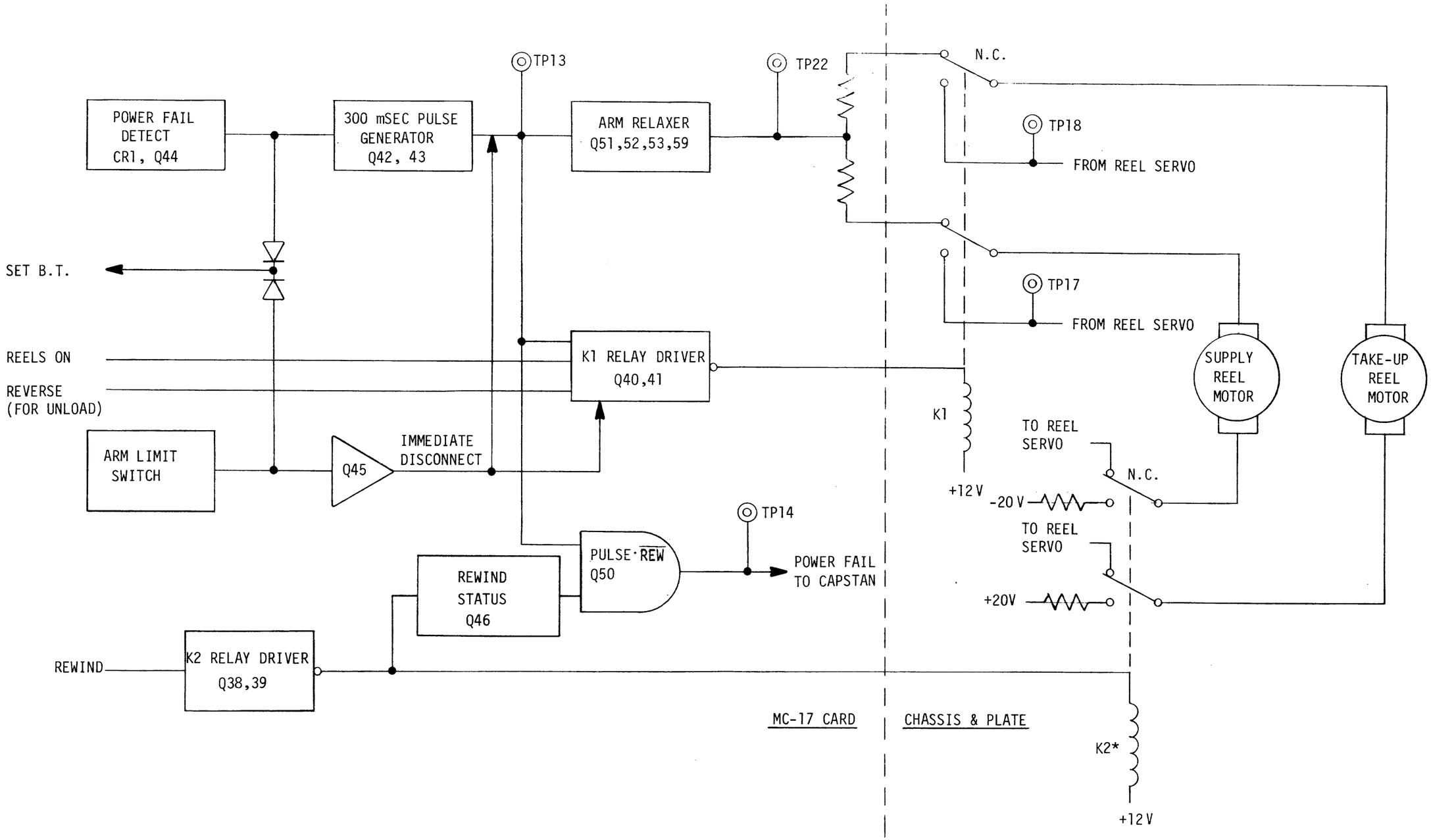
Figure 7-11,
CAPSTAN SERVO BLOCK DIAGRAM



Note: K2 installed in 1730 only

Figure 7-12,

REEL SERVO BLOCK DIAGRAM



NOTE: K2 installed only in 1730.
Reel motor returns go directly to reel servo in 1130 and 1630.

Figure 7-13, RELAY CONTROL BLOCK DIAGRAM

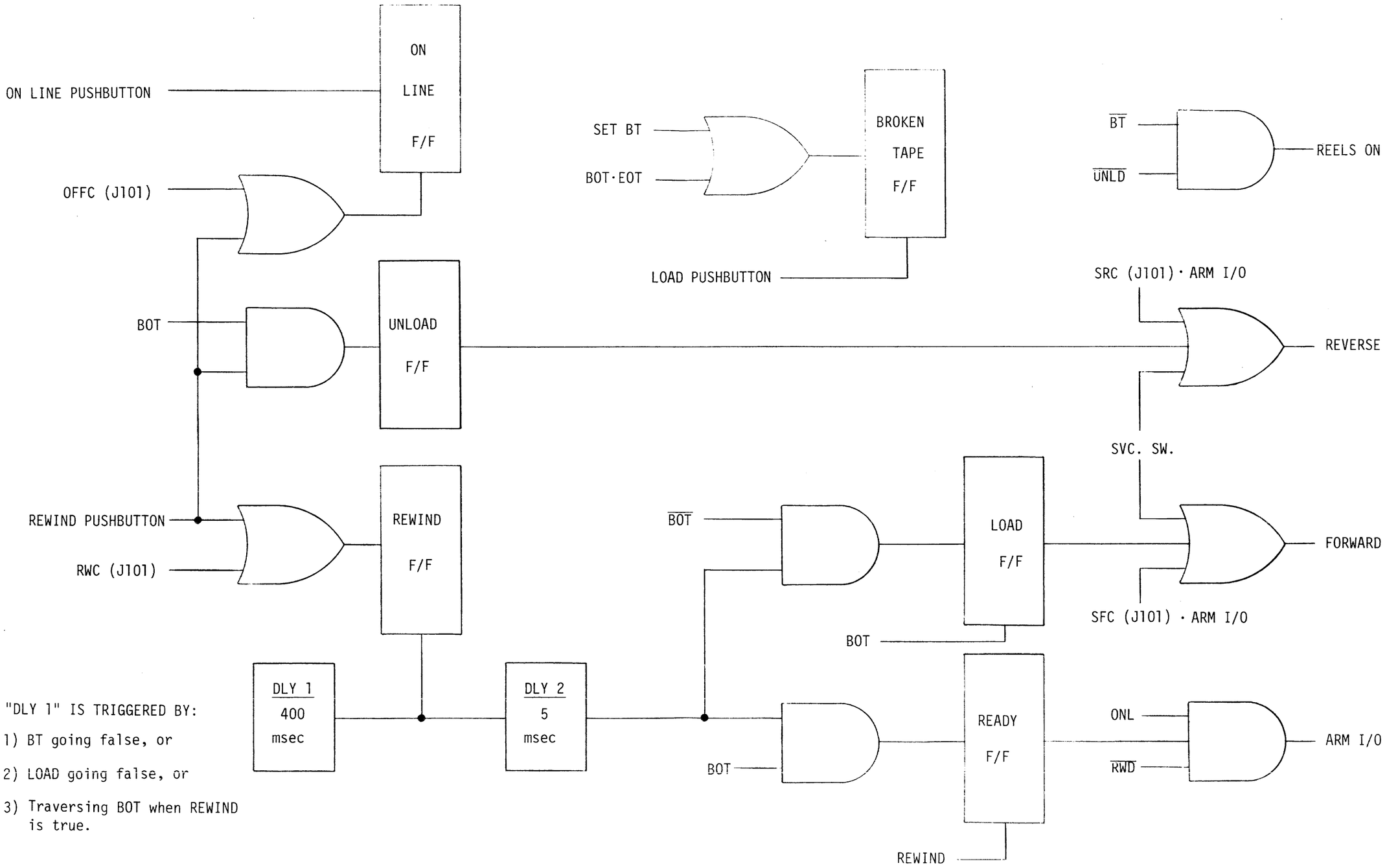
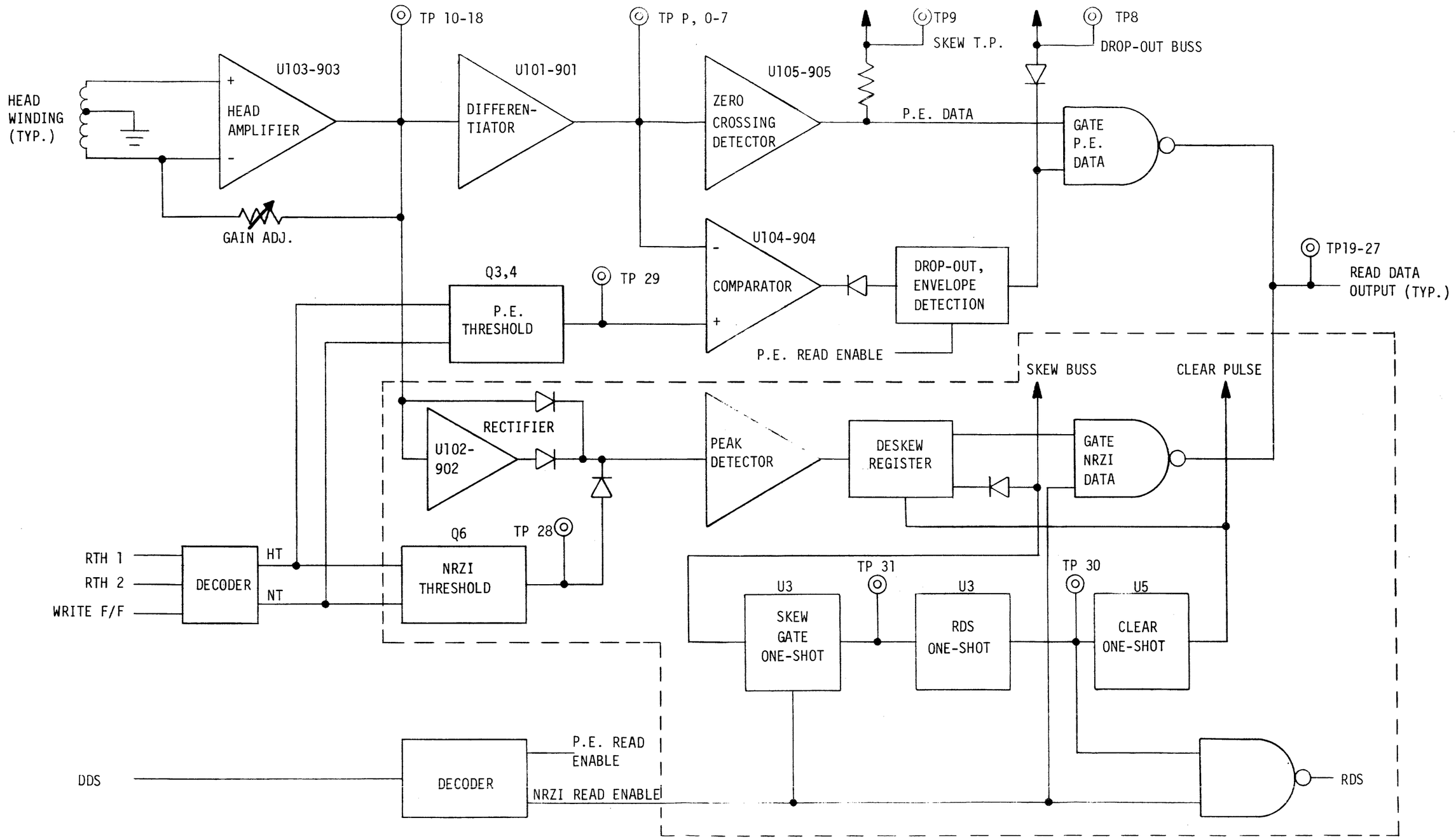


Figure 7-14, SIMPLIFIED CONTROL LOGIC DIAGRAM

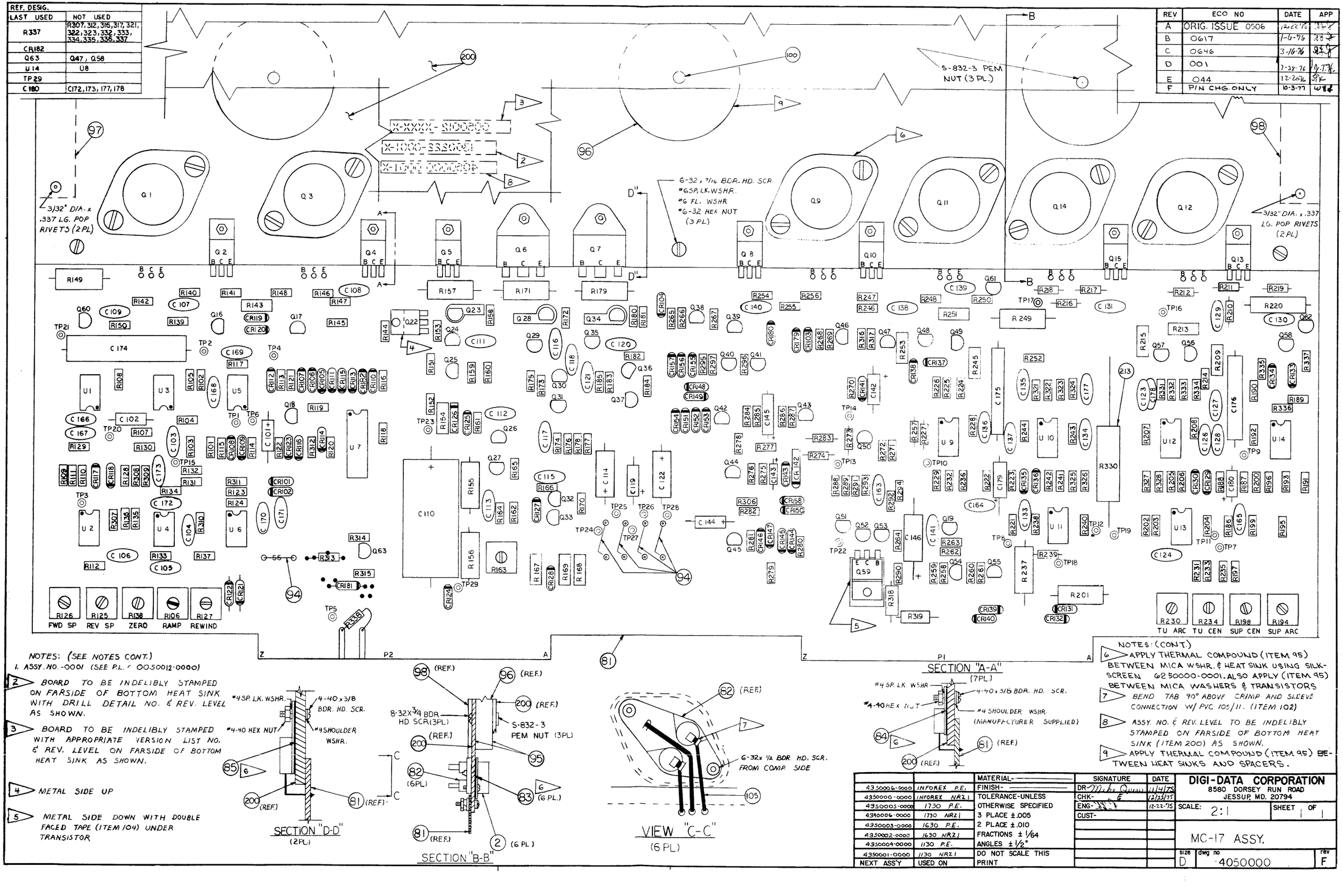


NOTE: In P.E. only transports the circuits within the dashed line are absent.

Figure 7-15,
READ BLOCK DIAGRAM,
BASED ON PA-16 CARD

REF. DESIG. LAST USED	NOT USED
R337	R307, 312, 316, 317, 321, 322, 323, 332, 333, 334, 335, 336, 337
CR182	
Q63	Q47, Q58
U14	U8
TP29	
C180	C172, 173, 177, 178

REV	ECO NO	DATE	APP
A	ORIG. ISSUE 0506	12-22-75	
B	0617	1-6-76	
C	0646	3-16-76	
D	001	7-28-76	
E	044	12-20-76	
F	P/N CHG ONLY	10-3-77	



NOTES: (SEE NOTES CONT.)

1. ASSY. NO. -0001 (SEE P.L. # 0050012-0000)

2. BOARD TO BE INDELIBLY STAMPED ON FARSIDE OF BOTTOM HEAT SINK WITH DRILL DETAIL NO. & REV. LEVEL AS SHOWN.

3. BOARD TO BE INDELIBLY STAMPED WITH APPROPRIATE VERSION LIST NO. & REV. LEVEL ON FARSIDE OF BOTTOM HEAT SINK AS SHOWN.

4. METAL SIDE UP

5. METAL SIDE DOWN WITH DOUBLE FACED TAPE (ITEM 104) UNDER TRANSISTOR

NOTES: (CONT.)

6. APPLY THERMAL COMPOUND (ITEM 95) BETWEEN MICA WSHR. & HEAT SINK USING SILK-SCREEN 6250000-0001. ALSO APPLY (ITEM 95) BETWEEN MICA WASHERS & TRANSISTORS

7. BEND TAB 90° ABOVE CRIMP AND SLEEVE CONNECTION W/ PVC 105/11. (ITEM 102)

8. ASSY. NO. & REV. LEVEL TO BE INDELIBLY STAMPED ON FARSIDE OF BOTTOM HEAT SINK (ITEM 200) AS SHOWN.

9. APPLY THERMAL COMPOUND (ITEM 95) BETWEEN HEAT SINKS AND SPACERS.

		MATERIAL-	SIGNATURE	DATE
4350006-0000	INFOREX P.E.	FINISH-	DR- Mike Quinn	11/4/75
4350000-0000	INFOREX NR21	TOLERANCE-UNLESS	CHK- E	12/23/75
4350005-0000	1730 P.E.	OTHERWISE SPECIFIED	ENG-	12-22-75
4350006-0000	1730 NR21	3 PLACE ±.005	CUST-	
4350003-0000	1630 P.E.	2 PLACE ±.010		
4350002-0000	1630 NR21	FRACTIONS ± 1/64		
4350004-0000	1130 P.E.	ANGLES ± 1/2°		
4350001-0000	1130 NR21	DO NOT SCALE THIS		
NEXT ASS'Y	USED ON	PRINT		

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SCALE: 2:1 | SHEET 1 OF 1

MC-17 ASSY.

size D | dwg no 4050000 | rev F

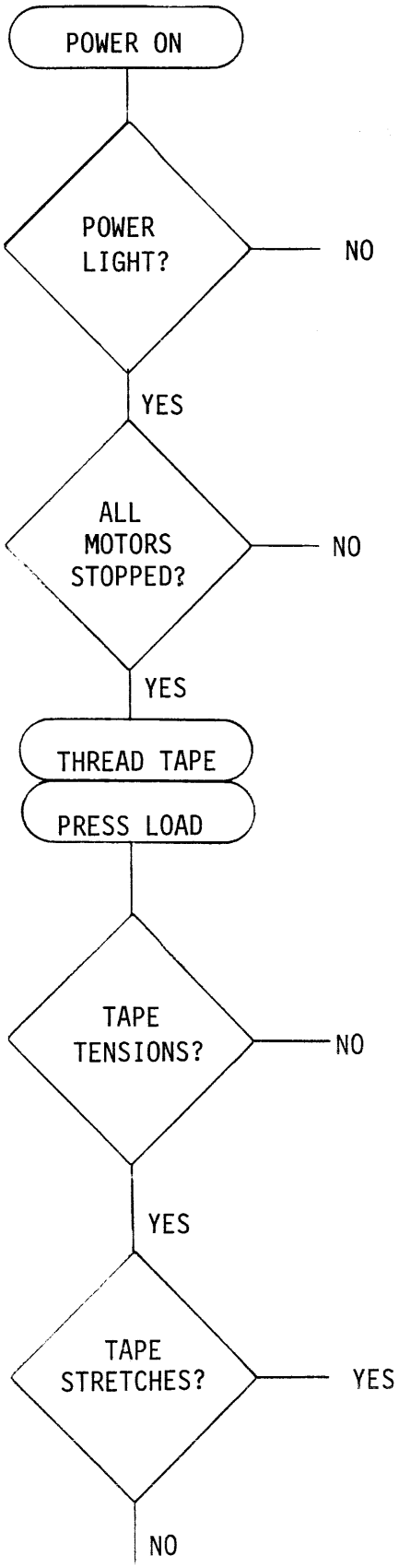
8 - TROUBLESHOOTING

8.1 INTRODUCTION. This section aids the field maintenance engineer in isolating transport malfunctions to a particular component or circuit, and includes a problem isolation flow chart, a description of the service switch, and an explanation of one particularly useful technique for troubleshooting the motor control circuits.

The problems identified in the flow chart are not in strict sequential order, but generally one must correct tape movement problems before tackling write or read errors as is shown. Many seemingly sophisticated problems may be solved by performing the adjustments and alignments described in section 10 of this manual.

Upon isolating a difficulty refer to sections 9 and/or 10 to correct the problem. Refer to section 7, as required, for a description of the operation of any particular circuit in view.

8.2 PROBLEM ISOLATION FLOW CHART



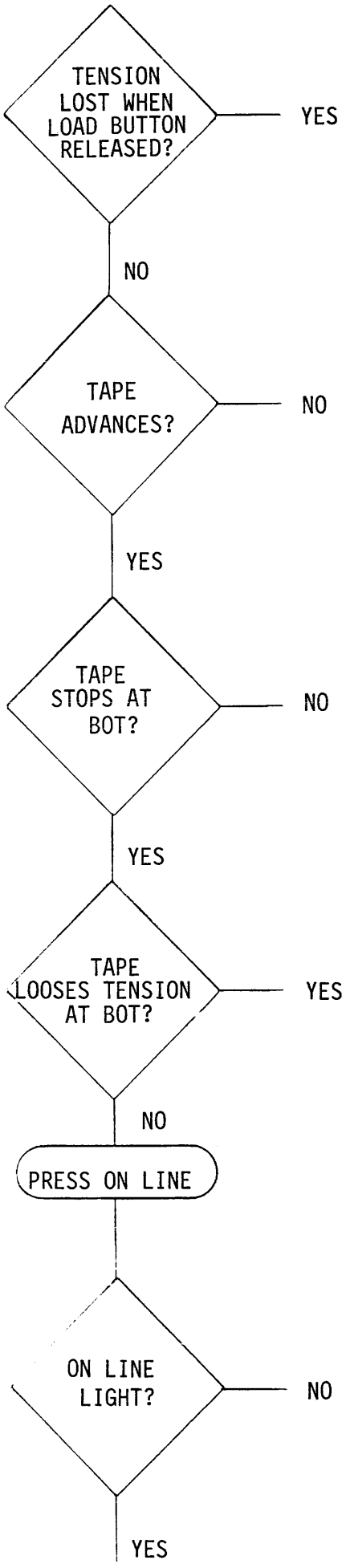
See discussion #1.
Possibilities include:
- Fuses
- Positive supplies

Is K1 activated?
Rewind true (1730 only)

See discussion #2.
Possibilities include:
- BOT/EOT Adjustment
- LOAD button, BT F/F
- K1 Relay

See discussion #3.
Possibilities include:
- Negative power supply
- Arm lamps (in series on +12V)
- Arm photocells (TP7, TP8)
- +5.6V supply
- K2 relay, rewind
- Reel servo amplifiers

TO NEXT PAGE



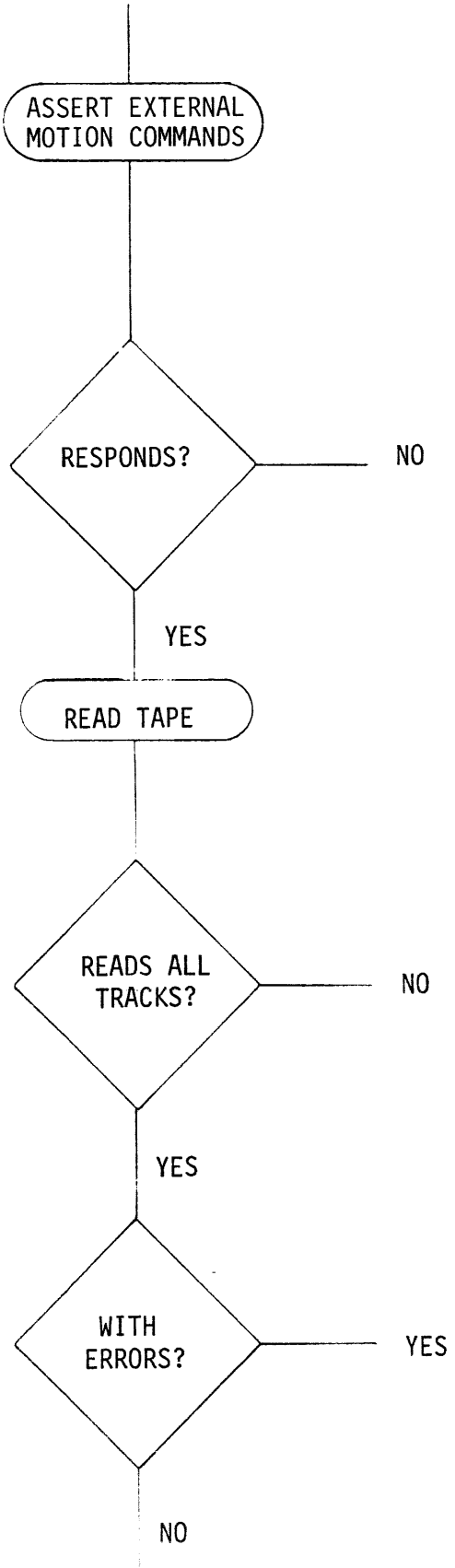
Is BT being set again?
BOT/EOT warm-up.
Arm limit switch
Incorrect arm adjustments

See discussion #4
Possibilities include:
- LOAD F/F
- Forward command
- BOT always sensed
- Capstan servo circuits
- Service switch

Sensing BOT should reset the LOAD F/F.
Service switch.

Is BT set because EOT is always true?

Check lamp drivers,
ONL F/F toggling action.
Is last unit on daisy-chain powered up?

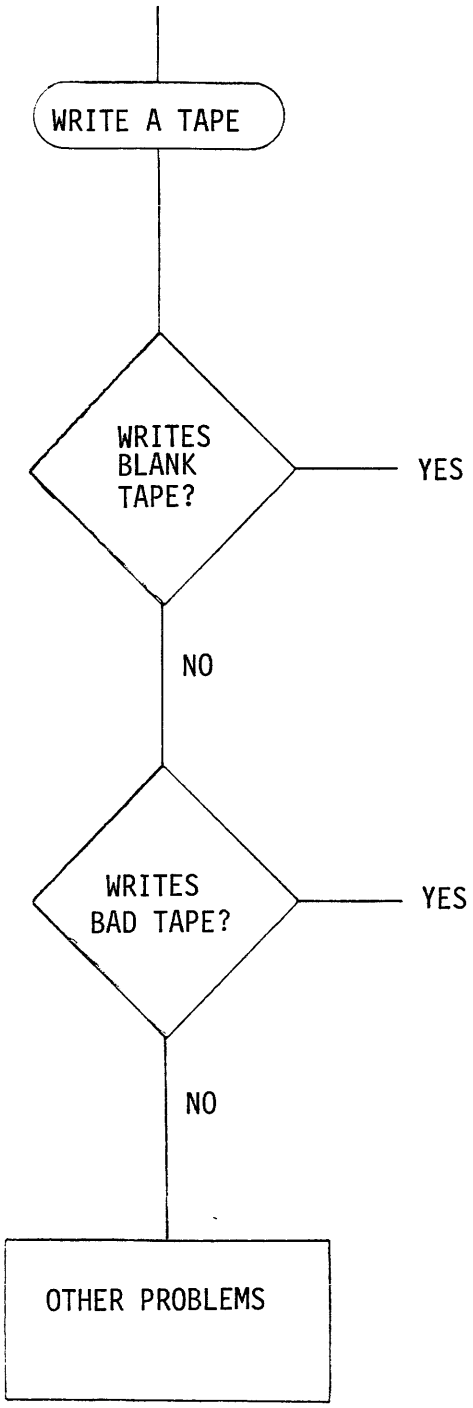


Cables installed properly?
READY true?
Unit SELECTED?
Review interface requirements.
Go OFF LINE, use service switch.

NOTE: When read data is absent most controllers will search to the end of tape.

Discussion #5.
Possibilities include:
- Tape path wrong
- Read channels
- Threshold
- Head continuity.
- RDS chain (NRZI only)
- Density selection and read enables

Discussion #6.
Possibilities include:
- Thresholds
- Capstan speed and ramps
- Excessive skew
- Crossfeed (dual gap only)
- Read gain adjustments
- Motor brush noise
- Dirt



Write enable ring
RING IN switch and solenoid.
Write power present?
WDS input.
Trace signal path.

Discussion #7.
Possibilities include:
- Erase head
- Capstan speed and ramps
- WARS input
- Skew excessive
- WDS frequency wrong

Other problems:

1) Loss of tape tension during normal operations or during rewind indicates probable maladjustment of arm positions.

Discussion #1. The POWER lamp is connected between +12 VDC and ground. Work your way back checking raw +20 V and the fuses. Figure 7-1 indicates the uses of each power supply output. To eliminate loading of the raw supply remove the MC-17 card; to eliminate loading of regulators remove the jumpers.

Discussion #2. The LOAD pushbutton should reset the BT F/F causing the signal REELS ON (P1-W) to go high. REELS ON should activate the K1 relay (P1-18 low) to connect all three motors to their servo amplifiers. Work your way through this sequence. Remember that (BOT·EOT) will prevent the resetting of BT, so check their adjustment. Hold the LOAD pushbutton down when troubleshooting or hold the supply arm within its operating arc, otherwise SET BT will be generated by the arm limit switch.

Discussion #3. The reel motors in all three models are connected to their servo amplifiers in such a way that a positive amplifier output causes the motor to wind tape onto its reel and a negative voltage causes it to unwind tape from its reel. Therefore, when an unrestrained positive voltage is output from an amplifier, tape will attempt to stretch until the supply arm trips the arm limit switch. If the field engineer holds the LOAD pushbutton down, thereby overriding the arm limit switch, the tape will eventually separate. Refer to paragraph 8.4 to operate the transport without tape loaded.

Possible causes of a continual positive voltage being applied to a motor are,

1) No photocell input to the reel servo at TP7 or TP8 because the arm lamp is extinguished, or the photocell is defective, or the +5.6 volt supply is defective.

2) No negative supply voltages.

3)One or the other amplifier is defective. Compare TP17 with U12-6, and TP18 with U10-6. Current flow through the reel motors can be checked at TP11 or TP12. Check the power transistors on the heat sink for emitter-collector shorts. After replacing a defective transistor check all associated transistors with an ohmmeter before applying power again.

Possibilities 1 and 2 affect both reel motors; the third possibility would usually affect only one.

A problem in the rewind circuit can also give the appearance of stretching tape, particularly on the 1730 which employs the K2 relay to switch a greater potential across the motor windings.

SERVO AMP OUTPUT	REEL/TAPE ACTION	1130, 1630 REEL TURNS	1730 REEL TURNS
+	Winding	CCW	CCW
-	Unwinding	CW	CW
+	Winding	CCW	CW
-	Unwinding	CW	CCW

Figure 8-1, EXPECTED REEL ACTION

TAPE DIRECTION	SUPPLY MOTOR TP 17	TAKE-UP MOTOR TP 18	SUPPLY PHOTOCELL TP 7	TAKE-UP PHOTOCELL TP 8
FORWARD	-	+	> +3V	< +3V
REVERSE	+	-	< +3V	> +3V
REWIND	+	-	≤ +3V	≥ +3V
UNLOAD	+	-	< +3V	< +3V
REST	0	0	+3V	+3V

Figure 8-2, EXPECTED REEL SERVO LEVELS

Discussion #4. The resetting of BT starts a 400 msec one-shot which triggers a 5 msec one-shot on its trailing edge, which sets the LOAD F/F, which makes FORWARD true at P1-2. Look for a negative signal at MC-17 TP3, a positive signal at TP15, a positive signal at TP21, and a positive signal at K1-6, to quickly isolate the problem within the capstan servo circuit.

Discussion #5. If the transport fails to read in all tracks check the tape path particularly at the tape guide after the head. In dual density units check the signals NRZI READ ENABLE, PE READ ENABLE, and the DENSITY selection. In NRZI units check the timing chain which generates the RDS; check the threshold against the voltages in figure 7-7.

In individual tracks, check the numerous test points for read data moving back toward the head. With power off, check continuity from ground to each of the eighteen (fourteen) read amplifier inputs.

Discussion #6. Before attempting any other corrective measures ensure that the head and guides are clean and that the tape is of good quality. Check tape speed and start/stop ramps per paragraph 10.2. Check skew per paragraph 10.8. Adjust the read amplifier gain potentiometers per paragraph 10.5. Verify that threshold level is correct. If the problem occurs only during read-after-write (dual gap head) perform the cross-feed minimization procedure in paragraph 10.7. To determine if the problem is a noisy motor brush read a bulk-erased tape while monitoring the RDS or any channel.

Discussion #7. Check the write signal at the head in all tracks while writing "all ones". If the unit writes tapes which it can read but other systems cannot, the problem is most likely excessive skew (paragraph 10.8) or improper tape speed (paragraph 10.2). Other items to check are,

1. WDS input is being provided at proper frequency.
2. Data is stable for duration of each WDS.
3. The WARS is being provided.
4. The erase head is energized. Voltage drop should be 0.5 volts.

8.3 SERVICE SWITCH. Located inside the transport chassis is a three-position slide switch, accessible to the field maintenance engineer through a hole in the sheet metal

right side panel (1130 and 1630) or top panel (1730). With this service switch in the FORWARD position, and the transport OFF LINE, a continual forward motion command is asserted to the capstan servo circuitry. In the REVERSE position a reverse motion command is asserted. This reverse command is not disabled by the detection of BOT, so attention is required to avoid running tape entirely from either reel. When not in use the switch should always be returned to the NORMAL position. This switch is inoperable with the transport ON LINE.

8.4 TROUBLESHOOTING WITHOUT TAPE LOADED. The troubleshooting technique described below allows the field maintenance engineer to rapidly isolate a malfunction using only the operator's control panel and the service switch.

a) Disable the "set BT" conditions. Place a small piece of magnetic tape between the two elements of the BOT/EOT sensor assembly, so that the BROKEN TAPE F/F is not held set. Use a rubber band or write enable ring between the arm roller and stationary roller to hold the supply arm off its stop, so that the arm limit switch does not produce the SET BT signal.

b) Initiate the load sequence. Press and release the LOAD pushbutton. Observe that both reel motors begin to spin and that about half a second later the capstan starts to turn CCW. This indicates that the LOAD pushbutton has reset BT thereby generating the REELS ON signal which activated the K1 relay to connect all three motors to their amplifiers. The movement of the capstan suggests that the one-shot delays, the LOAD F/F, and the capstan servo are all functioning.

c) Check the reel servo's. The LOAD F/F is producing a forward motion command. With your hand move that take-up arm off its stop. As you pass over the first dimple (on the front plate) the take-up reel motor should stop and reverse direction. The null point for the supply arm will be near the second dimple at the opposite end of the arc. These are the desired arm positions for a forward motion command. The successful performance of this check indicates that both reel servo circuits are functioning properly. If one motor spins continually or not at all and fails to vary velocity or direction with arm position its servo amplifier is suspect. If both motors spin an arm photocell lamp problem or a power supply problem is generally indicated.

d) Fake a BOT marker. Press the LOAD and ON LINE pushbuttons simultaneously and release. This action generates an apparent BOT which resets the LOAD F/F so that the capstan halts. The desired arm positions will now be center. You may verify this as in the previous step.

e) Move tape with the service switch. Place the transport OFF LINE and place the service switch in the REVERSE and FORWARD positions. Check capstan direction and desired arm positions. Desired arm positions for reverse motion are take-up arm at second dimple, supply arm at first dimple, (see figure 7-2).

f) Rewind. Press the REWIND pushbutton. The capstan will turn CW at high speed. Desired arm positions cannot be checked in this mode with the technique discussed. Press ON LINE and LOAD simultaneously. The capstan should halt after the buttons are released and then move forward as in the load sequence. Press the ON LINE and LOAD again simultaneously and the capstan will halt.

g) Unload. Press LOAD, ON LINE, and REWIND simultaneously. The capstan will turn reverse at slow speed. The desired take-up and supply arm positions will both be at the first dimple.

9 - COMPONENT REMOVAL AND REPLACEMENT

9.1 INTRODUCTION. This section provides removal and replacement procedures for all field replaceable components, including all items appearing on the recommended spare parts lists in Section 6. When a part is replaced some adjustment or alignment is generally required. The last step of each replacement procedure below refers the maintenance engineer to the appropriate paragraphs in Section 10, Adjustment and Alignment.

9.2 MOTOR CONTROL CARD , MC-17. To remove and replace the MC-17 card perform the following steps,

1) Turn power off and wait at least 60 seconds.

2) Remove the two screws holding the MC-17 card in place, and remove card by pulling firmly out. (Access to the MC-17 may be improved by removing the two screws holding the card cage and swinging it away).

3) Insert the replacement card into the card slot, press firmly to assure a good seat in the connectors, and replace the hold-down screws. The component side of the card should be to the rear.

4) Refer to paragraphs 10.1, 10.2 and 10.3.1 to perform the required power supply, capstan servo, and arm position adjustments.

9.3 DATA CONTROL CARDS, RC-11, RA-16, AND PA-16. To remove or replace the RC-11 card, RA-16 card or PA-16 card perform the following steps,

1) Turn off power.

2) Remove the two screws holding the card in place, and remove the card by pulling firmly out.

3) Insert the replacement card into the card slot, component side to the rear, press firmly to assure a good seat in the connectors, and replace the hold-down screws. NOTE: Refer to paragraph 6.3 to insure that the new card is compatible with the transport.

4) If replacing the RC-11 or RA-16 cards verify that the BOT and EOT potentiometers are set full clockwise.

5) If replacing the RC-11 or PA-16 cards refer to paragraph 10.5 to perform the required read amplifier gain adjustments. The RA-16 requires no further adjustments.

9.4 MOTOR REPLACEMENT

9.4.1 CAPSTAN MOTOR. To remove and replace the capstan motor follow these step-by-step directions,

1) Turn off power and disconnect motor electrically by separating the Molex connector between capstan motor and chassis.

2) Measure and record for future use the distance between the capstan and the front plate. Refer to figure 9-1.

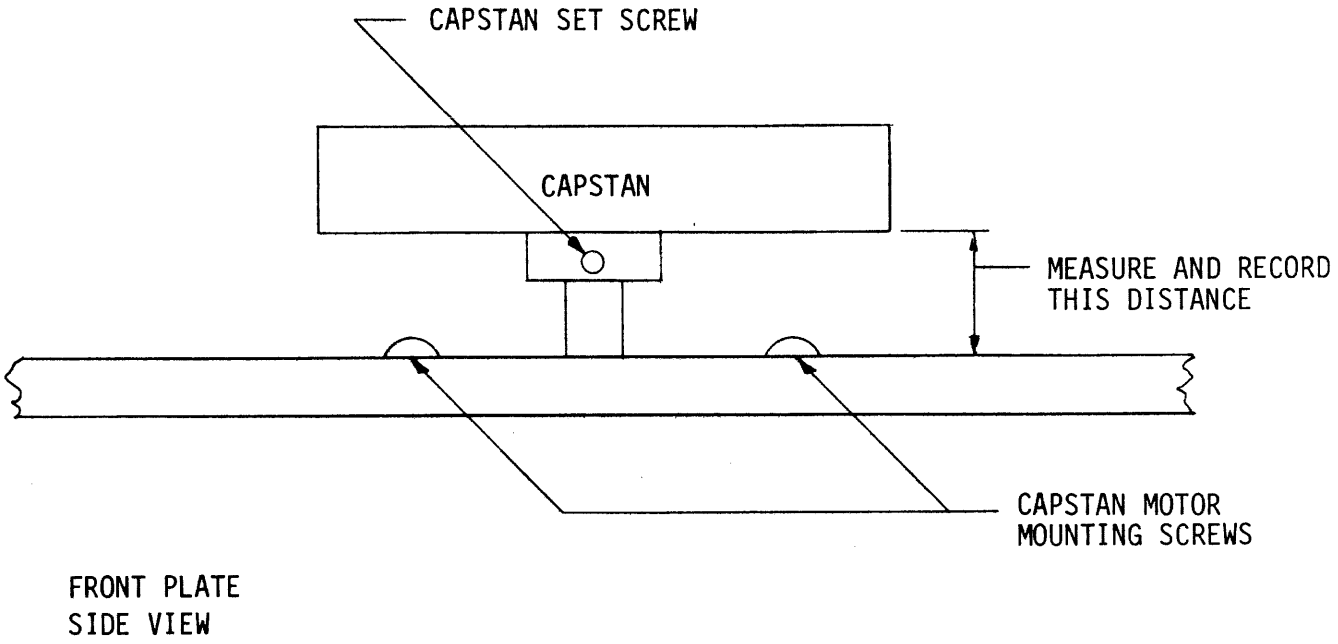


Figure 9-1, CAPSTAN HEIGHT MEASUREMENT

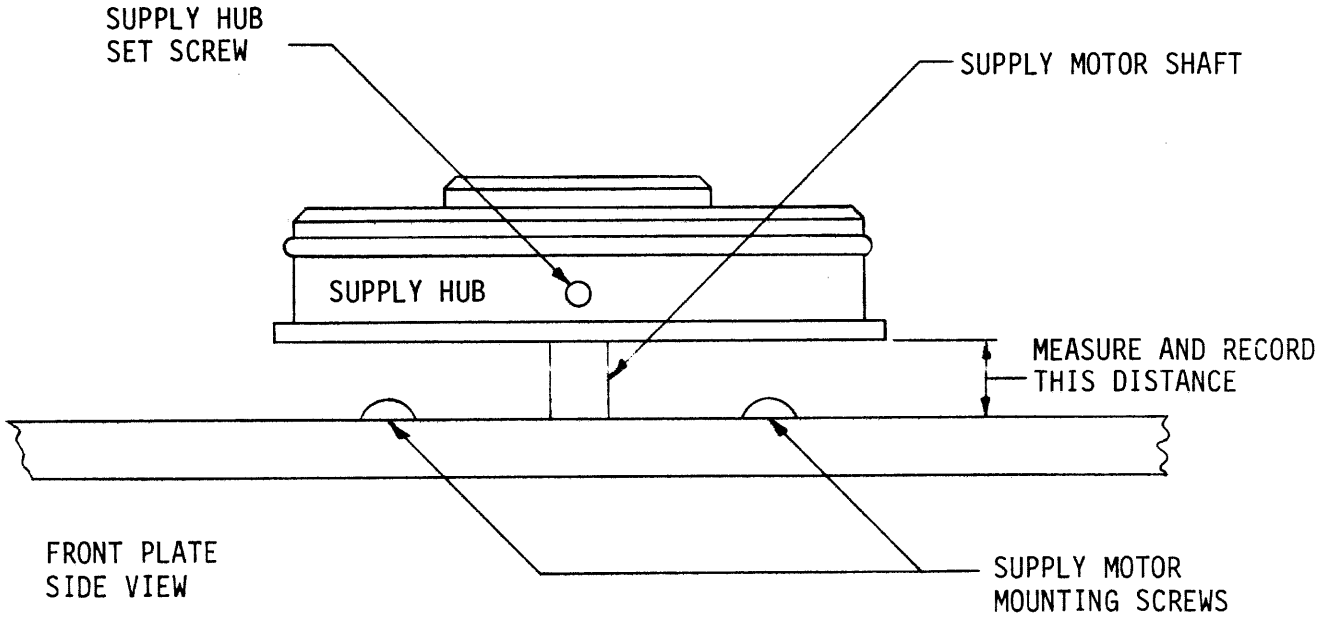


Figure 9-2, REEL HUB HEIGHT MEASUREMENT

3) Loosen set screw in the capstan with a 1/16 inch Allen wrench and remove capstan. Caution: Capstans for 45 ips and 37.5 ips are machined from magnesium and therefore excessive force may cause deformation.

4) Remove the four 6-32 screws holding the motor to the plate, while supporting the motor with your hand. Remove motor.

5) Ensure that the mounting surface of plate and replacement motor are clean to avoid perpendicularity problems.

6) Install new motor with the four 6-32 screws.

7) Mount capstan on the motor shaft at the previously recorded height. Align the set screw with the flat of the motor shaft and tighten the set screw.

8) Plug together the electrical connection.

9) Use the service switch to run tape forward and reverse, and visually verify that tape tracking across the capstan is proper.

10) Perform capstan servo adjustments per paragraph 10.2. Note that the short-cut method of duplicating voltage readings at TP5 cannot be used since these readings correspond to the old motor. Also check the read skew as explained in paragraph 10.8.1.

9.4.2 SUPPLY REEL MOTOR. To remove and replace the supply reel motor on any 1130, 1630, or 1730 transport follow these step-by-step directions,

1) Turn off power and disconnect the motor electrically at J10 on the chassis next to the service switch.

2) For better access swing the card cage open and remove the MC-17 card.

3) Measure and record for future use the distance between the supply hub and the plate. Refer to figure 9-2.

4) Remove set screw in the supply hub with a 3/32 inch Allen wrench and remove hub.

5) Remove the four 8-32 screws holding the motor to the plate and remove motor. It may be necessary to remove the MC-17 card to gain adequate clearance.

6) Ensure that the mounting surfaces of the plate and new motor are clean.

7) Mount the new motor with the four 8-32 screws.

8) Mount the supply hub on the motor shaft at the previously recorded height. Line up the set screw with the flat of the motor shaft and tighten the set screw with a 3/32 inch Allen wrench.

9) Plug the new motor's electrical connector into J10 on the chassis.

10) Reinstall the MC-17 card, if removed. Apply power, load tape, and use the service switch to run tape forward and reverse. Verify that the tape edge does not ride against the edge of the supply reel. Readjust hub height if necessary.

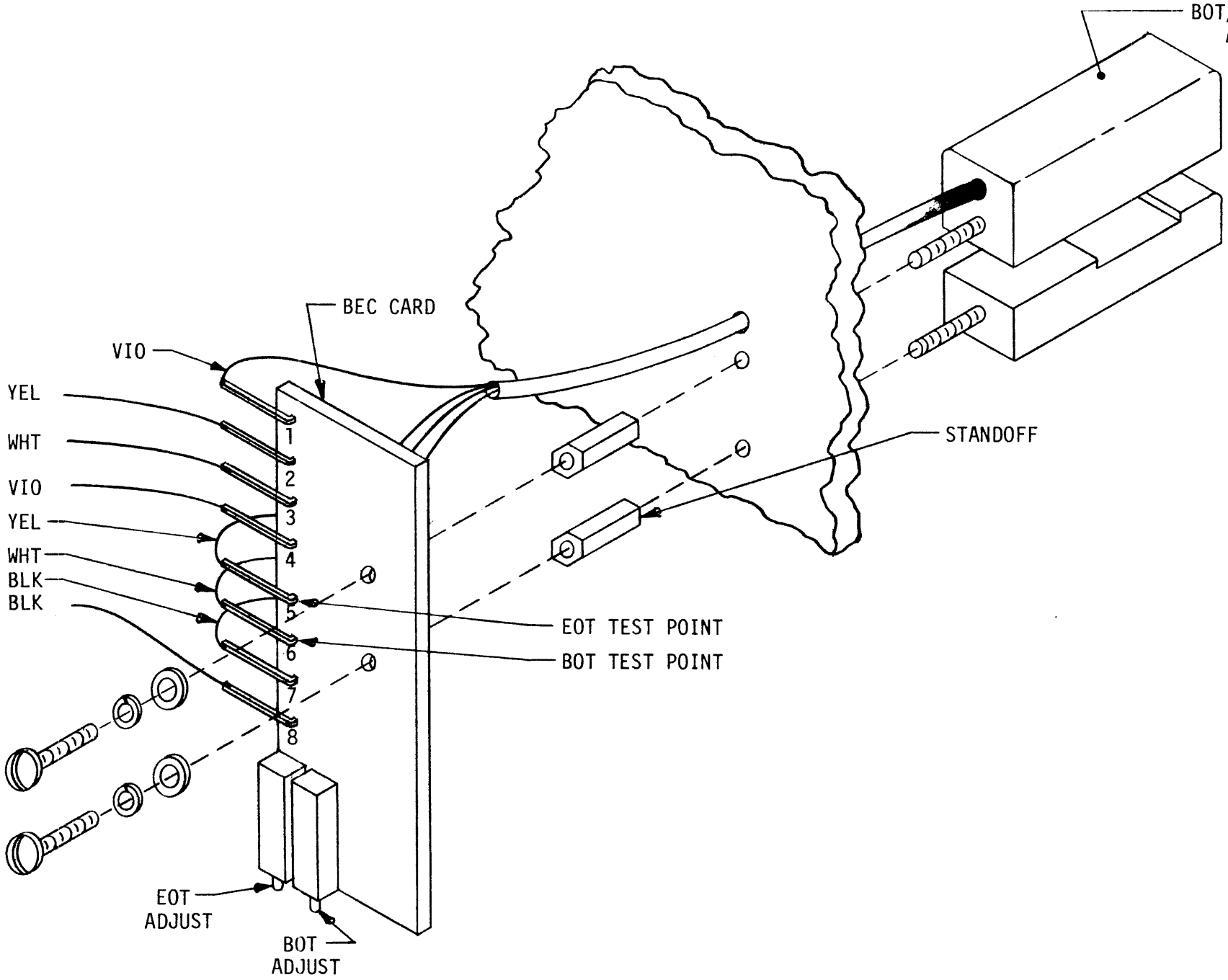


Figure 9-3,
BOT/EOT SENSOR WIRING DIAGRAM

11) Perform arm positioning adjustments for the supply arm per paragraph 10.3.1.

9.4.3 TAKE-UP REEL MOTOR (1130 and 1630). To remove and replace the take-up reel motor on either the 1130 or 1630 transport follow the procedure in paragraph 9.4.2 for the supply reel motor adding the following two steps,

3A) Remove the rubber ring from the take-up hub by pulling it up with your fingers.

8A) Reinstall the rubber ring on the take-up hub.

9.4.4 TAKE-UP REEL MOTOR (1730). To remove and replace the take-up reel motor on the 1730 transport follow the procedure in paragraph 9.4.2 for the supply reel motor adding the following steps,

3A) Remove the three screws from the center of the reel retaining plate. Remove the retaining plate and reel.

8A) Reinstall the plastic reel and metal retaining plate with three screws.

9.5 BOT/EOT SENSING COMPONENT REPLACEMENT

9.5.1 BOT/EOT SENSOR ASSEMBLY. To replace the BOT/EOT sensor assembly perform the following sequence while referring to figure 9-3,

1) From the BEC card pull off these wires,

pin 1	violet
pin 5	yellow
pin 6	white
pin 7	black

2) Remove the two 6-32 screws holding the BEC card.

3) Push the BEC card aside and unscrew the stand-off which holds the sensor assembly to the plate.

4) Remove the sensor assembly pulling the four attached wires through the hole in the plate.

5) Insert the replacement sensor assembly, threading the new wires back through the hole.

6) Screw the stand off down on the protruding threads finger tight.

7) Mount a reel of tape on the transport (power off), and adjust the BOT/EOT sensor assembly so that it is parallel to the tape. Tighten the standoff with a 1/4 inch wrench.

8) Refasten the BEC card to the standoffs with the previously removed screws and washers

9) Push the four wires from the sensor assembly onto the appropriate pins of the BEC card using long-nose pliers.

10) Perform the BOT/EOT adjustment per paragraph 10.4.

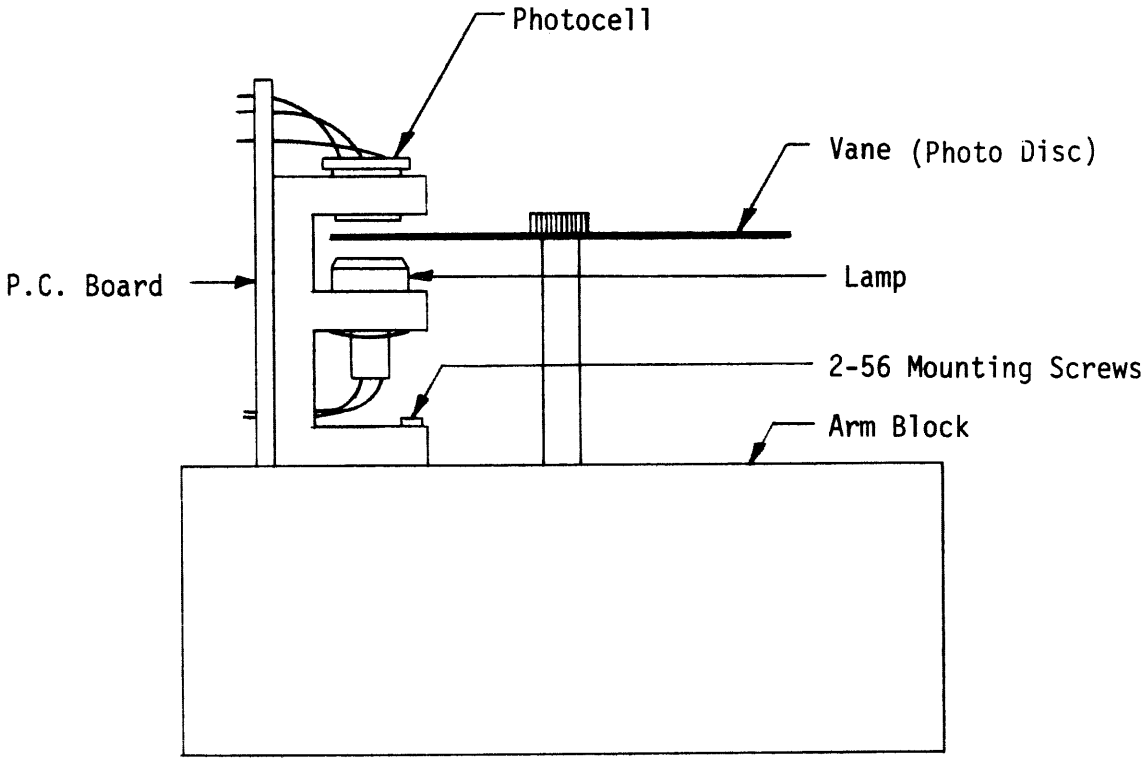


Figure 9-4, ARM PHOTOCELL ASSEMBLY

9.5.2 BEC CARD. To replace the BEC card,

1) Pull off all eight wires from the BEC card.

2) Remove the two 6-32 screws and washers holding the BEC card.

3) Mount the replacement BEC card with the hardware from step 2.

4) Using long-nose pliers push the eight wires onto their connectors, Pin 1 is farthest from the two potentiometers.

Pin 1	voilet wire, sensor	Pin 5	yellow wire, sensor
Pin 2	yellow wire, cable	Pin 6	white wire, sensor
Pin 3	white wire, cable	Pin 7	black wire, sensor
Pin 4	violet wire, cable	Pin 8	black wire, cable

5) Perform the BOT/EOT Sensor adjustment indicated in paragraph 10.4.

9.6 ARM POSITION SENSING COMPONENTS

9.6.1 ARM PHOTOCELL ASSEMBLY. The lamp on the supply arm and the lamp on the take-up arm are connected in series so that if either fails the other will also be extinguished. With power off, use an ohmmeter to determine which lamp has opened. To remove and replace the defective lamp follow these steps,

1) Remove the black arm position vane using a 3/32 inch Allen wrench.

2) Unsolder and label each of the five wires connected to the small p.c. card.

3) Remove the two 2-56 screws which hold the assembly to the arm block, and remove the assembly.

4) Install new photosensor assembly to the arm block with the two 2-56 screws.

5) Strip and reconnect the five wires to the p.c. card in their proper locations.

6) Mount the vane using the 6-32 socket head screw. Move the tension arm with your hand; the slot in the vane should move inward as the arm is moved off the stop. If not, the vane is mounted upside down.

7) Perform the arm photocell alignment procedure in paragraph 10.3.3.

8) If the lamp replaced was in the supply arm photosensor assembly perform the arm limit switch adjustment procedure in paragraph 10.3.2.

9) Adjust the arm positioning potentiometers as indicated in paragraph 10.3.1.

9.6.2 ARM LIMIT SWITCH. To remove and replace the arm limit switch follow these directions,

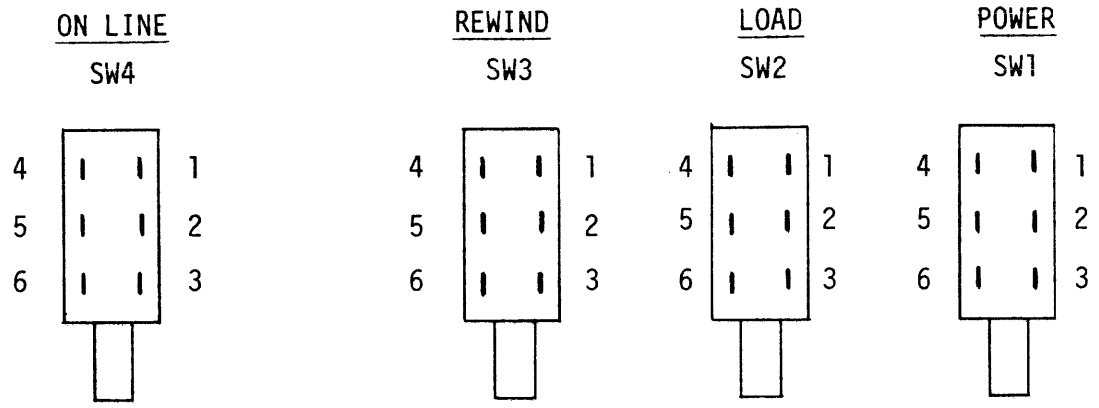
1) Cut the two white wires from the switch.

2) Remove the two 4-40 screws which hold the switch in place and remove the switch.

3) Mount the replacement switch with the two 4-40 screws.

4) Strip and connect the two white wires to the switch.

5) Perform the arm limit switch adjustment procedure in paragraph 10.3.2.



SW1, POWER	PIN 1	Gray	TB1 - 1
	PIN 2	Gray	A.C. High Side
SW2, LOAD	PIN 1	White	J4-3
	PIN 2	Buss	SW3-2
SW3, REWIND	PIN 1	White	J4-F
	PIN 2	Buss	SW4-2
		Buss	SW2-2
		Black	J2-F
		Black	Power Lamp 2
	PIN 4	Orange	J1-V
		Orange	On Line Lamp 2
		Orange	Power Lamp 1
	PIN 6	Yellow	J4-M
		Yellow	On Line Lamp 1
SW4, ON LINE	PIN 1	White	J4-D
	PIN 2	Buss	SW3-2
	PIN 3	Yellow	J4-1
	PIN 4	White	J2-L
		White	Ring In Lamp 2
	PIN 6	White	J2-6
		White	Ring In Lamp 1

Figure 9-5, CONTROL PANEL SWITCHES

9.7 CONTROL PANEL COMPONENTS

9.7.1 CONTROL PANEL LAMPS. To remove and replace the POWER, ON LINE, or RING IN indicator lamps perform these steps,

1) Turn lens counterclockwise to unscrew and remove. The lamp will come out with the lens.

2) Separate the lamp and lens.

3) Insert replacement lamp into lens.

4) Screw lens into control panel.

5) Verify proper operation.

9.7.2 CONTROL PANEL SWITCH ASSEMBLY. If any of the control panel switches (POWER, LOAD, REWIND, ON/OFF LINE) becomes defective the entire assembly must be replaced.

Follow this step-by-step procedure,

1) Unplug line cord from power source to prevent electrical shock.

2) Label and then clip all wires connected to any of the four (or five, in the case of the 1130) switches.

3) Remove the two pan-head screws and lock washers holding the switch assembly to the plate, and remove the switch assembly.

4) Mount the replacement switch assembly with the hardware from the previous step.

5) Strip, tin, and reconnect the previously disconnected wires to the appropriate pins of all four switches. Refer to figure 9-5 in the event of any confusion.

6) Verify the proper operation of each switch and the associated indicator lamps.

9.8 RELAYS. All three synchronous transport models employ a three-pole relay, designated K1, to connect each of the three motors to its respective servo amplifier. The model 1730 only also employs a second relay, designated K2, to connect the reel motor returns to the opposite raw d.c. voltage, rather than to ground, during a rewind operation in order to achieve sufficient rewind speed. To replace either relay perform these steps,

1) Turn off power.

2) Snap off the relay retaining spring by prying it slightly up and pushing it off to the side.

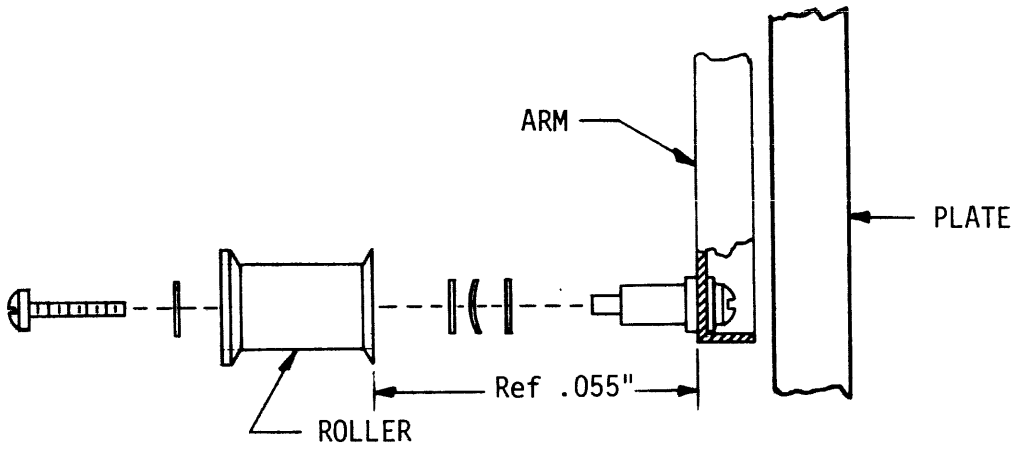
3) Unplug the relay from its socket.

4) Line up the pins of the replacement relay with the socket and plug the relay in.

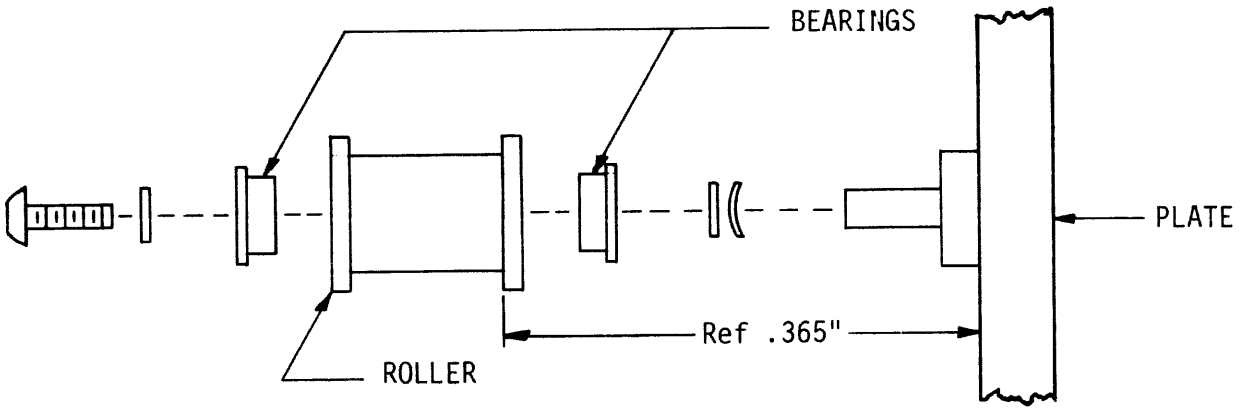
5) Push the retaining spring up into the catch on the top of the relay.

6) No adjustments are required.

ARM ROLLER



STATIONARY ROLLER



TAPE GUIDE

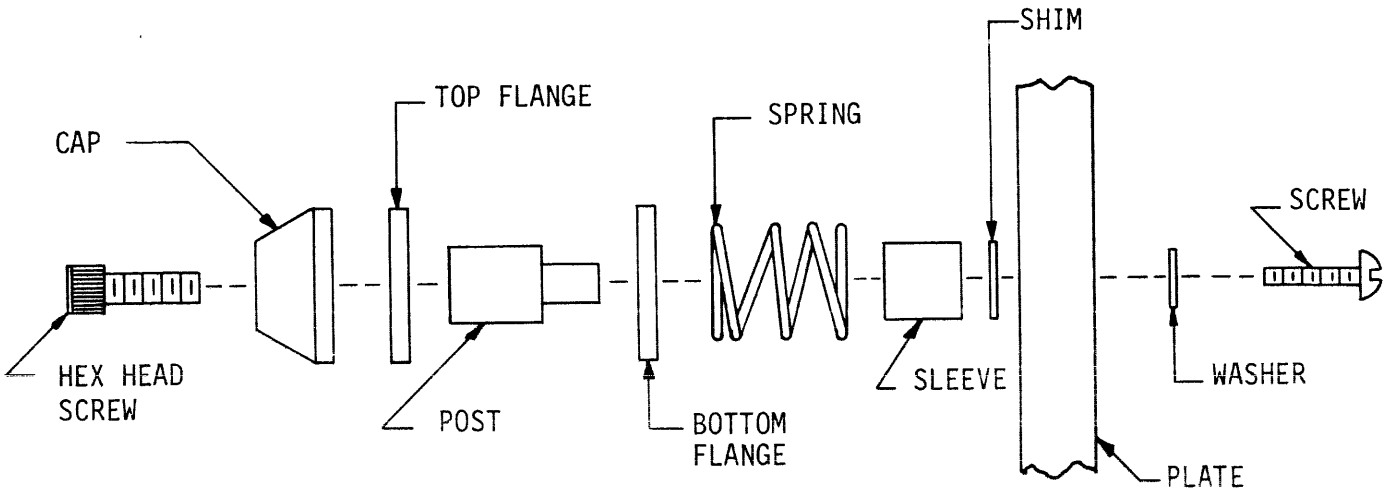


Figure 9-6, ROLLERS AND GUIDES

9.9 ROLLERS AND GUIDES

9.9.1 ARM ROLLERS. To remove or replace a binding or noisy arm roller perform these steps while referring to figure 9-6.

1) Remove the 4-40 screw from the center of the arm roller.

2) Pull off the arm roller; watch for any shims.

3) Slip on the replacement roller. Insert and tighten the screw. Check height.

4) Load the tape and use the service switch to verify proper operation.

9.9.2 STATIONARY ROLLERS. If a stationary roller, fails to rotate freely or generates excessive noise one of the two bearing assemblies in the roller should be replaced. Refer to figure 9-6 with regard to these directions.

1) Remove the 6-32 screw from the center of the roller.

2) Pull the roller off its post.

3) Remove and replace either the top or bottom bearing assembly as required. If the bottom bearing assembly is not found in the roller it has remained on the post and may be found there.

4) After replacing the bearing(s) place the roller on its post, and insert and tighten the 6-32 screw. Do not over torque . Check height.

5) Load tape and use the service switch to verify proper operation.

9.9.3 TAPE GUIDES. To replace or simply rotate the top ceramic flange, remove the center screw with an Allen wrench. The cap and top flange can now be lifted off.

To replace the entire tape guide assembly follow these step-by-step directions, referring to figure 9-6,

1) Loosen the 6-32 screw on the rear of the plate until the tape guide can be lifted off. Shims, if any, should rest on the screw.

2) Replace components in the proper sequence shown in figure 9-6. Tighten screw.

3) Perform skew measurement as indicated in paragraph 10.8.1 to determine if the new guide must be shimmed.

9.10 FILE PROTECT COMPONENTS

9.10.1 RING IN SWITCH. To remove and replace the microswitch which senses the depression of the file protect solenoid plunger perform the following sequence,

1) Turn power off.

2) Label and clip the white and violet wires connected to the switch.

3) Remove the two 4-40 screws, lock washers, flat washers, nuts, and stand-offs with which the switch is mounted.

4) Mount replacement switch with the hardware previously removed.

5) Strip, tin and reconnect the two wires.

6) Perform the file protect solenoid plunger adjustment indicated in paragraph 10.6 to ensure RING IN switch is properly actuated.

9.10.2 SOLENOID. To remove and replace the file protect (ring in) solenoid perform the following sequence,

1) Label and clip the blank and yellow wires connected to the solenoid.

2) Remove the two 6-32 screws, lock washer, and flat washers fastening the solenoid to its bracket, and remove the solenoid winding, spring, and plunger.

3) Remove the spring and plunger from the defective solenoid winding and insert them in the replacement winding.

4) Guide the plunger into the hole in the front plate and fasten the new solenoid in place on the bracket with the screws and washers.

5) Strip, tin and reconnect the two wires to the solenoid (black to rear, yellow to front).

6) Perform the file protect solenoid plunger adjustment per paragraph 10.6 to ensure that the RING IN switch is properly actuated.

9.11 MAGNETIC TAPE HEAD

9.11.1 HEAD (NRZI UNITS ONLY). Replacement heads are supplied by Digi-Data with the transport connector J3 attached. To remove devective head and to install replacement head follow these step-by-step directions,

1) Remove the RC-11 card (paragraph 9.2).

2) Unsolder all the wires connected to J3 which are <u>not</u> associated with the head. These are,

J3, pin 19, black
J3, pin 22, yellow
J3, pin X, green
J3, pin Y, orange
J3, pin Z, violet

3) Remove the two screws holding the head cover in place and remove the head cover.

4) Remove the two screws holding the head in place.

5) Remove the hardware holding connector J3 in place.

6) Clip any tie-wraps between the head and J3.

7) Remove the head, threading the attached cable and connector J3 through the hole in the front plate.

8) Before mounting the replacement head ensure that the mounting surface is entirely clean and free of accumulated debris.

9) Thread the connector and cable attached to the replacement head through the hole in the front plate.

10) Mount the head loosely with two screws.

11) With the power off load tape on the unit and adjust the head position so that the angles of entry and exit are equal, then tighten the screws.

12) Reinstall the head cover with two screws.

13) Install J3 with screws, washers, and nuts.

14) Dress the cable, attaching tie-wraps as deemed necessary.

15) Strip, tin, and connect the wires which were removed in step 2, to the new J3 connector.

16) The following adjustments are required,

Cross talk minimization	Paragraph 10.7
Read Amplifier Gain	Paragraph 10.5
Skew Measurement and Correction	Paragraph 10.8

9.11.2 HEAD (PHASE ENCODED OR DUAL DENSITY UNITS). Replacement heads are supplied by Digi-Data with the transport connectors J3 and J5 attached. The procedure for removing and replacing the head assembly is the same as that in paragraph 9.11.1 except that two connectors are involved. The wires to be removed from the old J3 and J5 and later attached to the new J3 and J5 are,

J3, pin 19	black	J5, pins 1 and 2	orange (2 ea.)
J3, pin 21	violet	J5, pins 3 and 4	green
J3, pin Y	orange (2 ea.)	J5, pin 21	braid
J3, pin Z	red	J5, pin Z	black (2 ea.)

10 - ADJUSTMENT AND ALIGNMENT

10.1 POWER SUPPLY. With an accurate voltmeter connected between TP20 (ground) and TP24 (+12V) adjust the one-turn potentiometer R163 (+12V ADJ.) to obtain a reading of 12.00 volts ±0.05. Other regulator outputs should be within 5% of nominal with the +12V regulator properly adjusted. Verify the potential at TP26 to be from +4.75 to +5.25 volts, and that at TP28 to be from -12.6 to -11.4 volts.

10.2 CAPSTAN SERVO. The adjustments in this section must be performed whenever the MC-17 card or capstan motor is replaced, or whenever the +12 volt regulator output is readjusted.

10.2.1 ZERO ADJUSTMENT. Load a scrub tape to BOT. With the transport OFF LINE, adjust the ZERO potentiometer (R138) for a voltmeter reading of 0.00 volts at TP15.

10.2.2 SPEED ADJUSTMENTS. This paragraph provides three different procedures which may be employed to adjust the FORWARD, REVERSE, and REWIND speeds. Procedure B cannot be used if the capstan motor has been replaced.

Procedure A. This procedure for adjusting speeds requires an 800 BPI "master alignment tape", a voltmeter, and a frequency counter (or an oscilloscope with an accurate time base). A TC-12 or TC-15 maintenance card may be used, if available.

1) Load an 800 BPI "master alignment tape" without a write enable ring to BOT.

2) Monitor the READ DATA STROBE on the maintenance card with an oscilloscope or frequency counter. If no maintenance card is available, monitor the data in track P at the cathodes of CR105 and CR106 (RC-11) or the cathodes of CR101, CR102, and CR103 (PA-16). If adjusting a 1600 BPI only transport monitor TP P for a sine wave of half the frequency.

3) Generate a continuous forward motion command and adjust the FWD SP potentiometer (R126) for the data rate desired. A forward motion command is generated with the service switch in the FORWARD position and the transport OFF LINE, or with the maintenance card in the DC FWD mode and the transport ON LINE.

TAPE SPEED	FREQUENCY	PERIOD
12.5 ips	10 KHz	100 μsec
25 ips	20 KHz	50 μsec
37.5 ips	30 KHz	33.3 μsec
45 ips	36 KHz	27.8 μsec

4) Generate a reverse motion command by means of either the service switch or maintenance card, and adjust the REV SP potentiometer (R125) to obtain the desired data rate as in step 3.

NOTE: With the service switch in the REVERSE position tape motion does not cease at BOT.

5) After adjusting the reverse speed, measure and record the voltage at TP5 (tachometer feedback). Since the capstan servo amplifier is linear the rewind speed may be set by adjusting the REW SP potentiometer (R127) to obtain a voltage at TP5 determined by the following proportion,

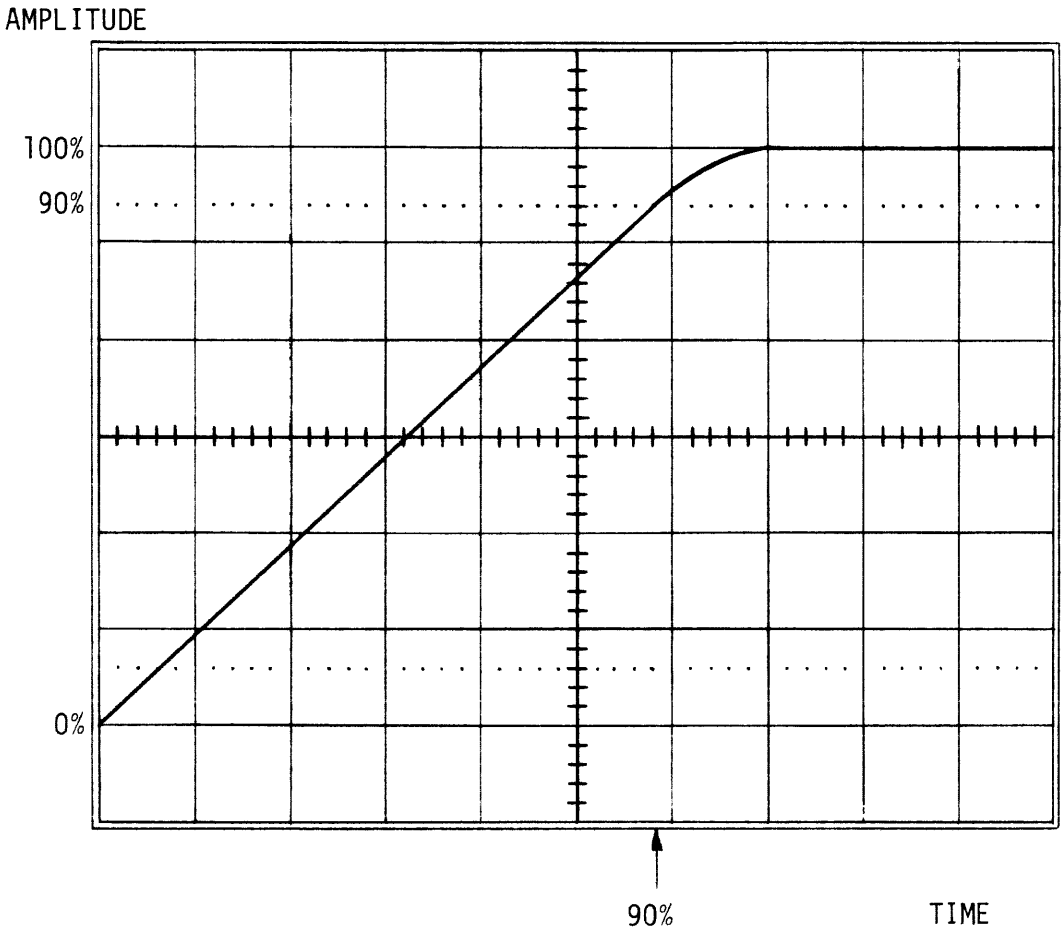


Figure 10-1, RAMP ADJUST SCOPE DISPLAY

$$\frac{\text{REWIND SPEED}}{\text{SYNCHRONOUS SPEED}} : \frac{\text{VOLTAGE AT TP5, REWINDING}}{\text{VOLTAGE AT TP5, REVERSE}}$$

A 25 ips model 1630 is provided as an example,

$$\frac{\text{100 IPS}}{\text{25 IPS}} = \frac{\text{TP5, REWINDING}}{\text{-1.14 V}}$$

TP5, REWINDING = 4(-1.14) = -4.56 volts.

Procedure B. This short-cut procedure requires only a voltmeter.

1) Locate the round label affixed to the capstan tachometer. This label indicates the voltage readings at TP5 (tachometer feedback) when the factory technician adjusted the forward, reverse, and rewind speeds at time of manufacture. These voltage readings are valid only for that particular motor/tachometer to which the label is attached.

2) Load a scrub tape to BOT.

3) Connect an accurate voltmeter between TP20 (ground) and TP5 (tachometer feedback).

4) With the transport OFF LINE move the service switch to the FORWARD position. Adjust the FWD SP potentiometer to duplicate the label voltage preceded by an "F".

5) Move the service switch to the REVERSE position. Adjust the REV SP potentiometer to duplicate the label voltage preceded by an "R". Caution: Do not run tape off the take-up reel.

6) Run sufficient tape forward to allow a rewind at full speed of a least 30 seconds. Press the rewind pushbutton switch, and adjust the REW SP potentiometer to duplicate at TP5 the voltage reading preceded by "RW" on the tachometer label.

Procedure C. Mechanical clock devices which measure linear motion in either inches/second or feet/minute may be used. These friction devices are more useful in verifying correct speed setting than in actually adjusting speed since a new time-consuming measurement must be made after each small adjustment.

As Digi-Data does not provide a stroboscopic disc on its transport capstan a "strobe light" cannot be used to adjust speed.

10.2.3 START/STOP RAMP TIME ADJUSTMENT. The performance of this procedure requires an oscilloscope with a calibrated time base and external trigger and a Digi-Data maintenance card (TC-12, TC-15 or DEMC-3). If no maintenance card is available the field engineer may repeatedly move the service switch, or may may connect a square wave generator to the SFC input (J101 pin 8), or he may cause the system controller to write records repetitively. The directions which follow assume the employment of either a TC-12 or TC-15 card.

1) Remove the I/O cable and plug in the maintenance card. Set switches so the card is in the FWD PULSE mode.

2) Load a scrub tape to BOT, and place transport ON LINE.

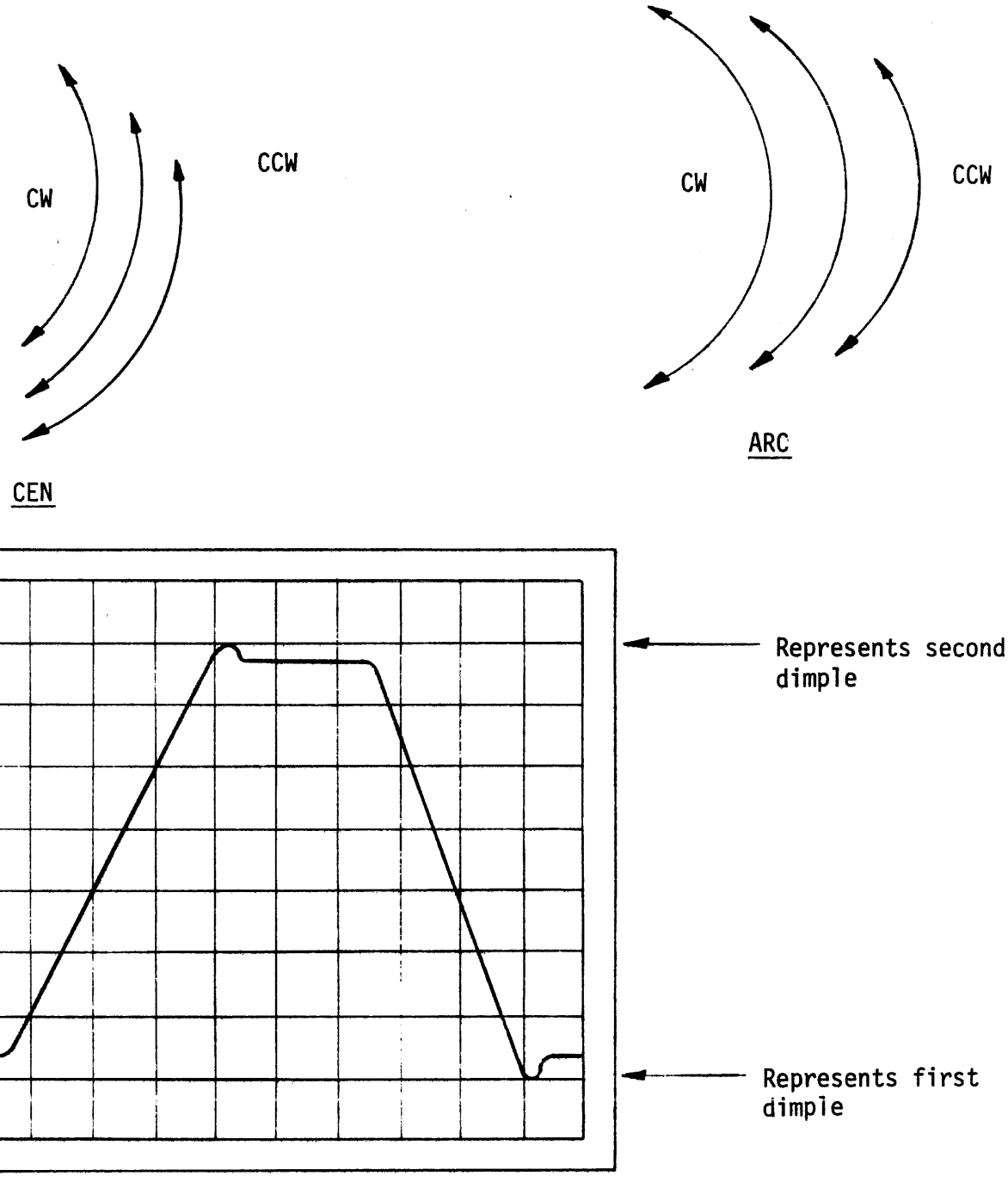


Figure 10-2

ARM POSITION ADJUSTMENTS

3) With oscilloscope view TP1 on the MC-17 card. Adjust the maintenance card GO and STOP times to achieve an adequate scope presentation; adjusting each to twice the desired ramp time (chart in step 5) is suggested.

4) Trigger negative on TP1 and view TP5 (tachometer feedback). Uncalibrate the scope amplitude and position the trace such that the 90% amplitude point of the start ramp may be easily ascertained. See figure 10-1.

5) Adjust the RAMP potentiometer (R106) to achieve the correct ramp time indicated below.

TAPE SPEED	TIME TO REACH 90% AMPLITUDE
12.5 ips	27 milliseconds
25 ips	13.5 milliseconds
37.5 ips	9.0 milliseconds
45 ips	7.5 milliseconds

6) Trigger positive to view the stop ramp and verify that it is equal in time to the start ramp.

7) Move motion switch on TC-12 (TC-15) to REV and verify that the reverse start and stop ramps are equal to each other and to the forward ramps.

10.3 REEL SERVO ADJUSTMENTS

10.3.1 ARM POSITIONING ADJUSTMENTS. The adjustment of the TU CEN, SUP CEN, TU ARC, SUP ARC potentiometers on the MC-17 card determine the position of the tape-buffering arms during various operations. Anytime the MC-17 card, a reel motor, or an arm photocell assembly is replaced or modified the following adjustment procedure must be performed. Two procedures are offered; procedure A may be followed when a maintenance card and an oscilloscope are available, procedure B is less convenient but requires no equipment.

Procedure A.

1) Power up, but do not load tape. Connect oscilloscope probe to TP8 on the MC-17 card. TP8 is the take-up arm photocell's input to the reel servo and represents actual take-up arm position.

2) Notice that the normal operating limits of each arm are indicated by small dimples on the front plate.

3) With your hand hold the take-up arm in line with the first dimple off the stop. Position the oscilloscope trace on the second from bottom graticule.

4) Move the take-up arm to the second dimple. Uncalibrate the oscilloscope's amplitude so that the trace is on the second from top graticule.

5) Remove the I/O cable and plug the maintenance card into J101.

6) Set the TU ARC and SUP ARC potentiometers full clockwise. Set the TU CEN and SUP CEN potentiometers to mid-range.

7) Load a scrub tape to BOT. NOTE: If the supply arm moves outside its normal operating limits the arm limit switch is closed and stops tape motion. If this happens adjust the SUP CEN potentiometer slightly CCW and try again.

8) Place the maintenance card switches in PULSE and FWD. Place the transport ON LINE. View TP1 on the MC-17 card with the oscilloscope. Adjust the maintenance card STOP time to about 50 milliseconds, adjust the GO time to more than 1 second.

9) Rewind the tape. Move the oscilloscope probe back to TP8. If the transport is OFF LINE place it ON LINE. After the tape has finished rewinding and has then moved several feet beyond the load point, switch the maintenance card from the FWD to SHUTTLE mode.

10) Make repeated small adjustments to the TU CEN and TU ARC potentiometers to create the oscilloscope presentation indicated in figure 10-2. NOTE: TU ARC varies the width of the swing, TU CEN shifts the reference point.

11) Rewind and unload the tape. Move the oscilloscope probe to TP7, the supply arm photocell.

12) Repeat steps 3 and 4 for the supply arm.

13) Load a scrub tape to BOT. Set the maintenance card switches to FWD and DC and place the transport ON LINE. After most of the tape has run onto the take-up reel switch to the PULSE-SHUTTLE mode. NOTE: Each arm has its widest arc when the reel which it servo's is nearly empty.

14) Repeat step 10 for the supply adjustments.

15) Double-check your work by looking at the front of the transport and observing that both arms do not swing outside the limits established by the dimples.

Procedure B.

1) Set the TU ARC and SUP ARC potentiometers fully counterclockwise. Set the TU CEN and SUP CEN potentiometers to mid-range.

2) Lay a piece of magnetic tape between the two portions of the BOT/EOT sensing assembly; this defeats the broken tape sensing circuit.

3) Tie J1, pin 22 to ground; this defeats the arm limit switch.

4) Depress the LOAD pushbutton. All three motors should turn.

5) Press the LOAD pushbutton and the ON LINE pushbutton simultaneously. This creates a false BOT indication and the capstan should therefore halt.

6) Holding the supply arm halfway between the two dimples as exactly as possible adjust the SUP CEN potentiometer so that the supply reel motor stops turning.

7) Repeat step 6 with the take-up arm, motor and TU CEN potentiometer.

8) Remove the ground from J1, pin 22 and the piece of magnetic tape from the BOT/EOT sensor assembly.

9) Load a reel of scrub tape to BOT.

10) Use the service switch to move tape alternately forward and reverse, and observe the swing of the take-up arm. Gradually turn the TU ARC potentiometer clockwise until the arm swings to each dimple. If one dimple is reached before the other adjust the TU CEN slightly; clockwise moves the center position right (1130 and 1630) or up (1730).

11) Use the service switch to run most of the tape onto the take-up reel, and then repeat step 10 for the supply side. See figure 10-2.

10.3.2 ARM LIMIT SWITCH.

1) Ensure that the 6-32 screws holding the microswitch in place are tight.

2) Connect the ohmmeter between the two soldered lugs of the switch.

3) Lift the supply arm off its stop. The meter should go from "short" to "open" before the dimple is reached. Release the arm to the stop; the meter should return to "short".

4) Move the supply arm to the opposite end of its arc. The meter should go from "open" to "short" after the second dimple is passed. Bring the arm back again and the meter should indicate "open" before the dimple is reached.

5) If the conditions indicated in steps 3 and 4 do not exist, loosen and move the appropriate arm limit reactor(s) on the vane to achieve those conditions.

10.3.3 ARM PHOTOCELL ALIGNMENT. This procedure for adjusting the position of the vane between the arm photocell and arm lamp requires only a voltmeter.

1) Power up, but do not load tape.

2) Connect voltmeter between ground and TP7 (supply photocell) or TP8 (take-up photocell) on the MC-17 card.

3) With your hand hold the appropriate arm in the center of its operating arc.

4) The voltmeter should read +3.0V $\pm$0.1. If not loosen the 6-32 set screw holding the vane and rotate the vane until the voltmeter reads +3 V.

5) Tighten the set screw and ensure that the voltmeter still reads +3V with the arm held center.

10.4 BOT/EOT ADJUSTMENT. This procedure requires the use of a voltmeter. Although these adjustments should be checked any time the RC-11 or RA-16 is replaced, the actual adjustments should be made on the BEC card.

1) Power up and wait at least one minute for warm-up before performing the voltage measurements indicated in the following steps.

2) Thread magnetic tape on the unit and turn the reels so that the tape is taut through the BOT/EOT sensor. Ensure that neither the BOT nor EOT reflective tab is within the sensor assembly.

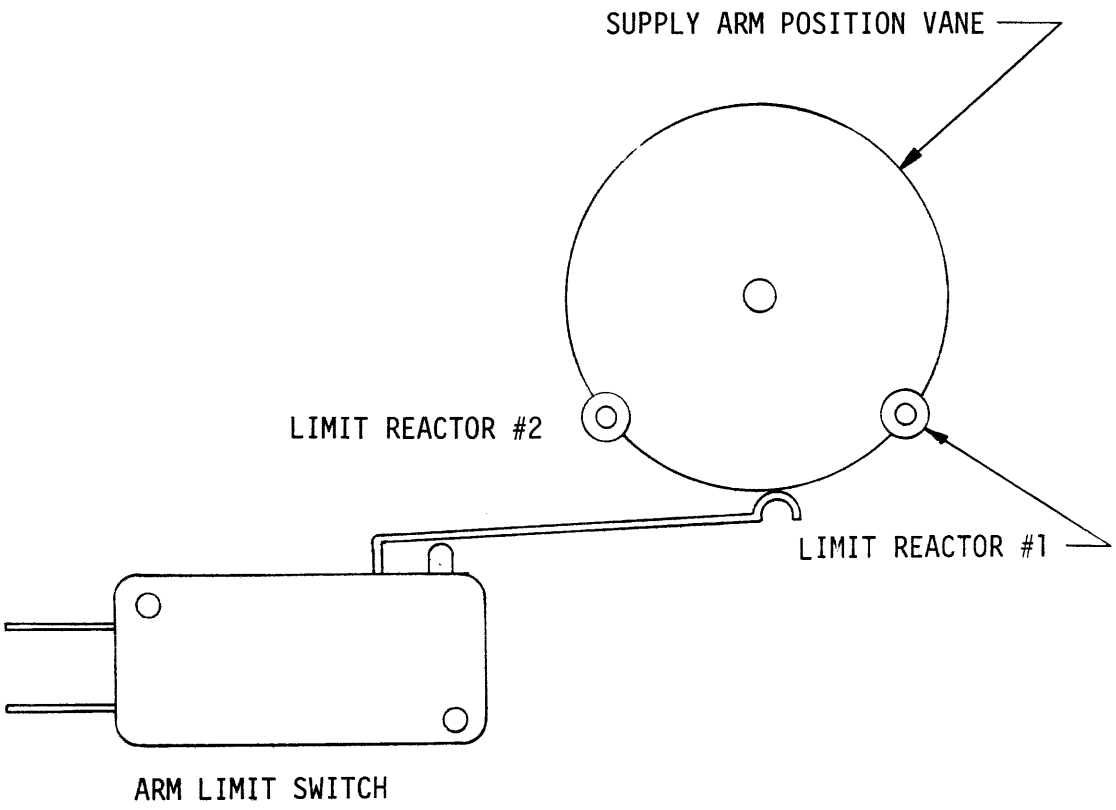


Figure 10-3, ARM LIMIT SWITCH ACTUATION

3) Connect a voltmeter to the BOT test point, pin 6 (white wire) on the BEC card. Adjust the BOT potentiometer (inside) to achieve a reading of 8 volts with brown tape, or 9 volts with black tape.

4) Connect the voltmeter to the EOT test point, pin 5 (yellow wire) on the BEC card, and adjust the BOT potentiometer (outside) to achieve a reading of 8 volts or 9 volts as above.

5) Pull the tape out of the sensor assembly, and ensure that the voltage at both the BOT and EOT test points drops below 0.5 volts.

10.5 READ AMPLIFIER GAIN ADJUSTMENTS. The gain of the read amplifier in each channel must be adjusted following the replacement of the head, the RC-11 card, or the PA-16 card. A standard reference level tape, recently recorded with an "all ones" data pattern should be used in performing these adjustments. Any high quality, freshly recorded tape may be employed if a standard reference level tape is not available. Do not use a master alignment tape for this adjustment.

NRZI UNITS ONLY.

1) Read an "all ones" tape at synchronous speed. If using a TC-12 or TC-15 card set the control switches to the READ, FWD, and DC positions. A seven-track dual density unit should be adjusted while reading a tape of the least density.

2) With an oscilloscope view TP P, located at the cathodes of CR105 and CR106 adjacent to the channel P read gain adjustment on the RC-11 card.

3) Adjust potentiometer R111 to achieve a signal amplitude of 6 volts peak-to valley.

4) Repeat steps 2 and 3 for each of the remaining channels. Seven track units do not employ channels 0 and 1.

P.E. UNITS OR NRZI/P.E. UNITS

1) Read an "all ones" or "all-zeros" phase encoded tape (3200 frpi) at synchronous speed. If using a Digi-Data maintenance card set the switches to the DC, FWD, and READ positions.

2) With an oscilloscope view TP P, located along the top edge of the PA-16 card.

3) Adjust the channel P read gain potentiometer R1013 to achieve a signal amplitude of 6 volts peak-to-peak.

4) Repeat steps 2 and 3 for each of the other eight channels.

10.6 ALIGNMENT OF THE FILE PROTECT ASSEMBLY. The point of depression at which the ring detecting plunger actuates the RING IN microswitch must be checked when either the RING IN switch or solenoid is replaced.

1) Power off and no tape loaded.

2) Connect an ohmmeter between the two soldered lugs of the RING IN microswitch. The meter should read an "open".

FRONT PLATE SIDE VIEW

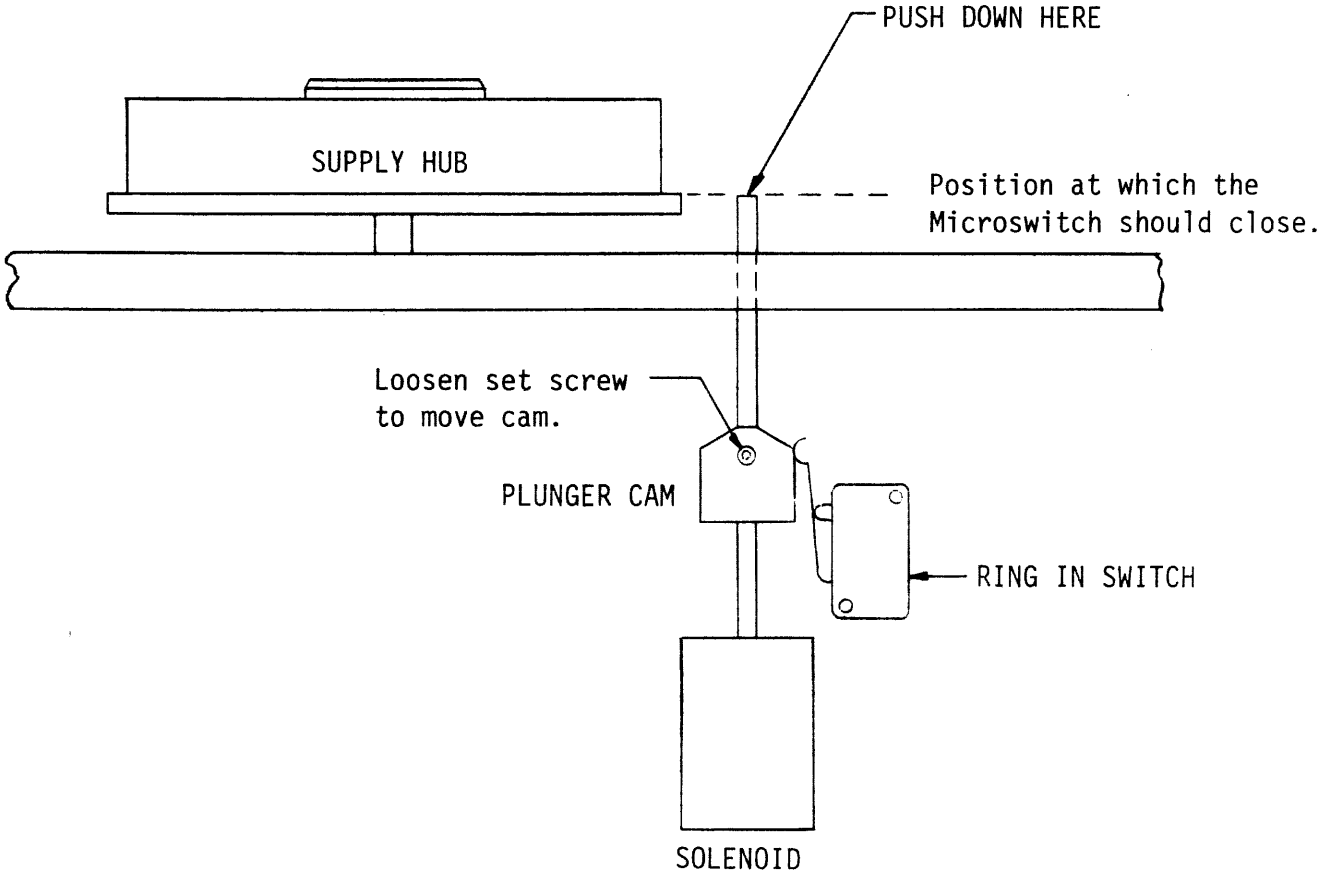


Figure 10-4, FILE PROTECT ASSEMBLY

3) Depress the protruding plunger. The meter should indicate a "short" at the inner lip of the supply hub. (See figure 10-4).

4) Loosen the set screw in the plunger cam and move the cam on the plunger until the condition indicated in step 3 is obtained.

5) Disconnect the meter. Power up, load a reel of tape with a write enable ring and verify that the solenoid retracts the plunger fully when the LOAD pushbutton is pressed and that the RING IN light is glowing.

10.7 CROSS-FEED MINIMIZATION (DUAL GAP UNITS ONLY). If errors are occuring in the read-after-write mode, or if a dual gap head is replaced some adjustment of the flux gate may be necessary to minimize the cross-feed between the write and read stacks.

NRZI ONLY UNIT

1) Plug a Digi-Data maintenance card, TC-12 or TC-15, into the I/O connector J101. Set the switches to write an NRZI "all ones" data pattern at the proper frequency (tape speed times data density), with continuous forward tape motion. If a maintenance card is not available the proper mode of operation may be achieved by grounding U51 pin 2 on the RC-11 and J101 pins 8, 28, and 30 (SFC, SWS, and SLT), and applying a 5 volt pulse train at the appropriate frequency to the WDS input, J101 pin 24.

2) Load a scrub tape equipped with a write ring to BOT. When the tape has halted at the load point carefully remove the tape from the capstan permitting it to wrap around the tape guide instead.

3) Press the ON/OFF LINE pushbutton placing the transport ON LINE. The capstan will turn, the write circuits will be active, but the tape will not advance.

4) With an oscilloscope view the signal on the anode of either diode next to the read gain adjustment potentiometer in any track. The waveform must be less than 1.0 volt peak-to-peak.

5) If the signal amplitude exceeds the specification in step 4 loosen the two screws which hold the flux gate assembly to the plate. Move the assembly slowly from side to side noting the position which results in the smallest peak-to-peak cross-feed signal. The assembly should be parallel to the head and as close as possible to it without touching the tape.

6) When the optimum position for minimum cross-feed has been determined tighten the two mounting screws, then verify that the assembly has not shifted while tightening the screws.

7) Power down and remove the tape.

P.E. ONLY OR P.E./NRZI UNITS

1) Plug a Digi-Data TC-12 or TC-15 maintenance card into the transport I/O connector J101. Set the switches to write a phase-encoded data pattern at continuous synchronous speed. Alternatively, a DEMC-3 card may be used with a phase encoded formatter to control the transport.

2) Same as step 2 in NRZI procedure above.

3) Same as step 3 in NRZI procedure above.

4) With an oscilloscope view the signal at TP P (or TP 0 through TP7) on the PA-16 card. The waveform must be less than 0.5 volts peak-to-peak.

5) Same as step 5 in the NRZI procedure above.

6) Same as step 6 in the NRZI procedure above.

7) Power down and remove the tape.

10.8 SKEW MEASUREMENT AND CORRECTION.

10.8.1 SKEW MEASUREMENT. To measure skew on any Digi-Data transport read an "all ones" tape and view the SKEW TEST POINT with an oscilloscope. The test point is TP 9 of the PA-16 card of "STP" on the RC-11 card; a convenient skew test point is also available on the maintenance card TC-12. The waveform indicated in figure 10-5 will be seen. When using the TC-15 a square low pulse will be observed rather than the "waterfall" in figure 10-5.

With an NRZI transport trigger positive on the SKEW GATE one-shot. That distance, and therefore time, by which the first to arrive channel precedes the last to arrive channel is called interchannel displacement or skew. Maximum allowable skew is 150% of the figures indicated below.

DENSITY	STATIC SKEW	TIME IN MICORSECONDS AT AVAILABLE SPEEDS			
		12.5 IPS	25 IPS	37.5 IPS	45 IPS
1600 BPI	150 microinches	12.0	6.0	4.00	3.33
800 BPI	150 microinches	12.0	6.0	4.00	3.33
556 CPI	250 microinches	20.0	10.0	6.66	5.55
200 CPI	250 microinches	20.0	10.0	6.66	5.55

Skew may be considered in two causal categories. Static skew is unchanging from character to character and is the result of tolerance build-up. For example, the head windings may not be perfectly in line with each other, and the head windings may not be perfectly perpendicular to the tape due to head mounting, plate flatness, and guide height variations. The purpose of the tape guides is to ensure that the tape moves across the head perpendicular to the windings, however too great a reliance upon the tape guides to accomplish this task to static skew removal will result in more dynamic skew.

Dynamic skew is that varying component of total skew which changes with tape direction, tape speed, and arm positions. Reel hub height, capstan height, and the variation of an arm's height throughout its arc all contribute to dynamic skew.

10.8.2 SKEW CORRECTION. Before concluding that one of the tape guides needs to be shimmed make the following checks.

1) Verify that tape has been properly threaded.

2) Clean all tape-handling components.

3) Check each tension arm roller for axial play. The roller should not move up and down. Horizontal tilt is normal. If either roller exhibits vertical play remove and replace it.

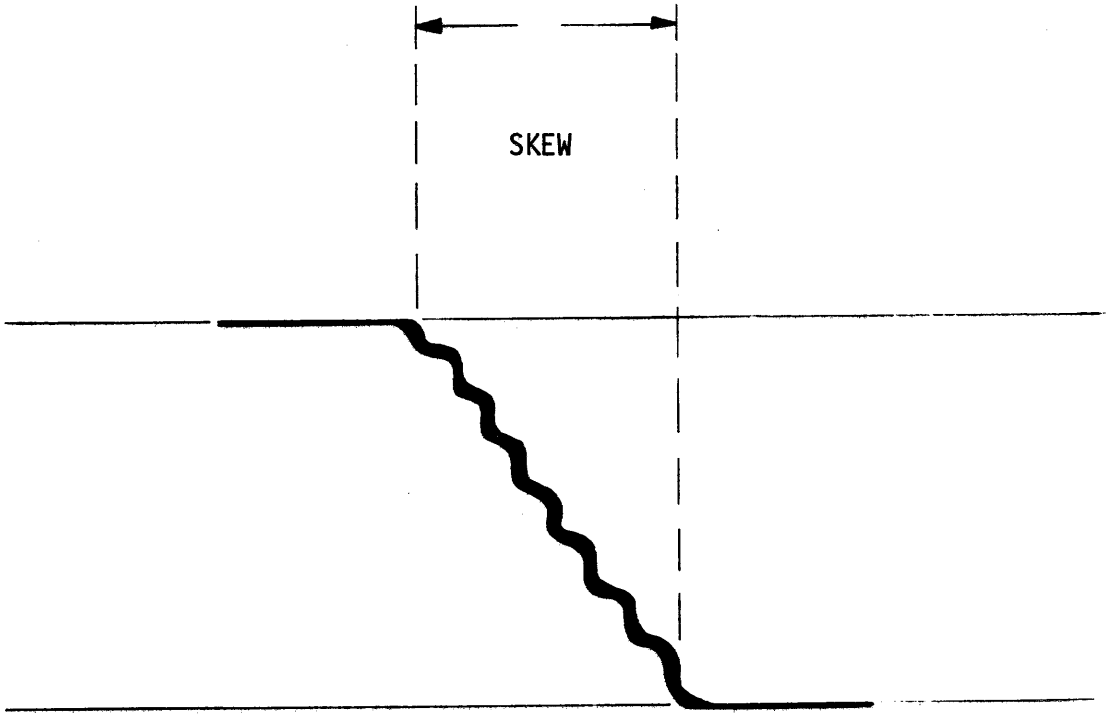


Figure 10-5, SKEW MEASUREMENT WAVEFORM

4) Check the stationary rollers for the absence of vertical play, and replace either if it exists.

5) Check the tape guide springs for freedom of movement. When depressed and released the bottom flange should snap up to its original position. If the flange movement feels spongy or sticks remove, dissemble, and clean the tape guide. Recommended solvents are heptane and alcohol.

If none of the above is the cause of the skew problem then tape guide shims must be added or removed. A small label on the rear of the front plate near the head indicates which guide, if either, was shimmed at the time of manufacture and how much it was shimmed. To determine which guide to shim perform the skew measurement as indicated in paragraph 10.8.1. Press lightly on the outside edge of the tape near each tape guide in turn. The guide where the skew is worsened by this pressing is the one which must be raised. See figure 9-6 in paragraph 9.9.3.

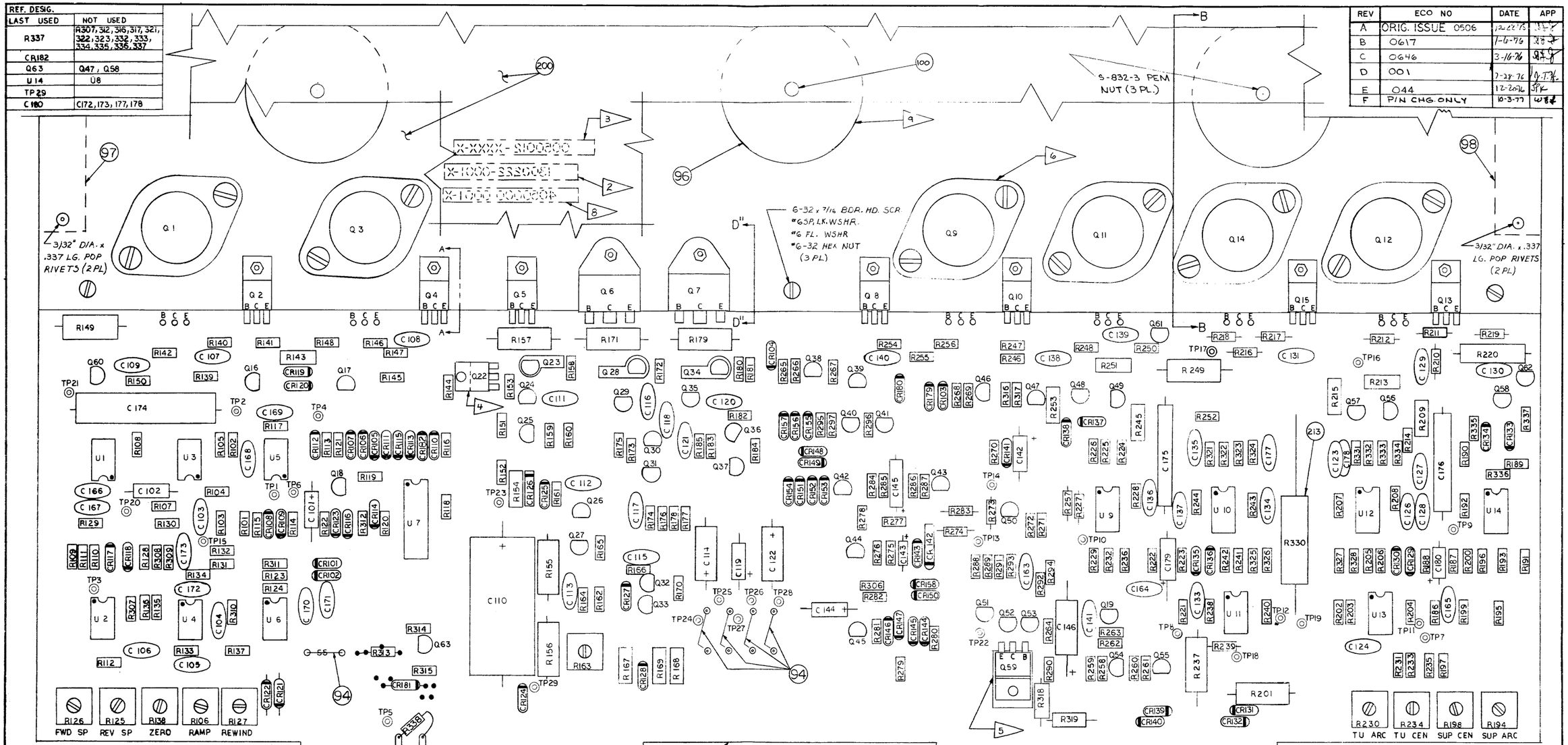
NOTE: Stationary roller height and arm roller height is adjustable with the center screw on some transports. Nominal heights are indicated in figure 9-6.

11 - ENGINEERING DOCUMENTATION

ASSEMBLY, MC-17	4050000
PARTS LIST, MC-17	0050012
SCHEMATIC, MC-17	0250002
POWER SUPPLY, RAW	Sheet 1
POWER SUPPLY, REGULATED	Sheet 2
CAPSTAN SERVO	Sheet 3
REEL SERVO'S	Sheet 4
RELAY CONTROL	Sheet 5
ASSEMBLY, RC-11	0051031
PARTS LIST, RC-11	0051031
SCHEMATIC, RC-11	0251143
CONTROL LOGIC	Sheet 1
READ CIRCUITS	Sheet 2
WRITE CIRCUITS	Sheet 3
ASSEMBLY, RA-16	4050001
PARTS LIST, RA-16	0050020
SCHEMATIC, RA-16	0250004
CONTROL LOGIC	Sheet 1
WRITE CIRCUITS	Sheet 2
ASSEMBLY, PA-16	4050005
PARTS LIST, PA-16	0050021
SCHEMATIC, PA-16	0250005
ASSEMBLY, BEC	4000693
PARTS LIST, BEC	0000694
SCHEMATIC, BES & BEC	0220028
ASSEMBLY, RR-2	CA- 0036
PARTS LIST, RR-2	PA-0195
WIRING, RR-2	LA-0119
SCHEMATIC, RR-2	SA-0033
OUTLINE, 1130	0750001
OUTLINE, 1630	0750002
OUTLINE, 1730	0750003
SHIPPING ASSEMBLY, 1130	4550000
SHIPPING ASSEMBLY, 1630	4550001
SHIPPING ASSEMBLY, 1730	4550002
INSTALLATION, 1130	0550021
INSTALLATION, 1630	0550020
INSTALLATION, 1730	0550019

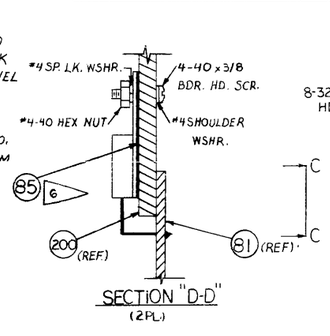
REF. DESIG. LAST USED	NOT USED
R337	R307, 312, 316, 317, 321, 322, 323, 332, 333, 334, 335, 336, 337
CR182	
Q63	Q47, Q58
U14	U8
TP29	
C180	C172, 173, 177, 178

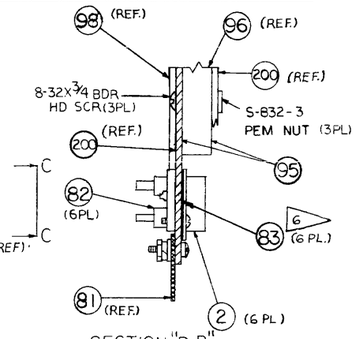
REV	ECO NO	DATE	APP
A	ORIG. ISSUE 0506	12-22-75	
B	0617	1-6-76	
C	0646	3-16-76	
D	001	7-28-76	
E	044	12-20-76	
F	P/N CHG. ONLY	10-3-77	

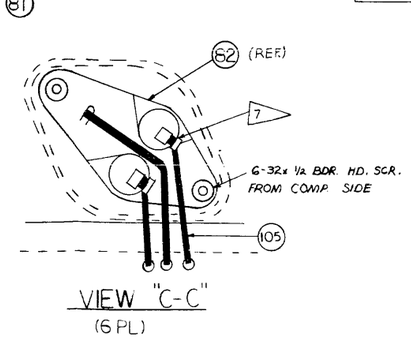


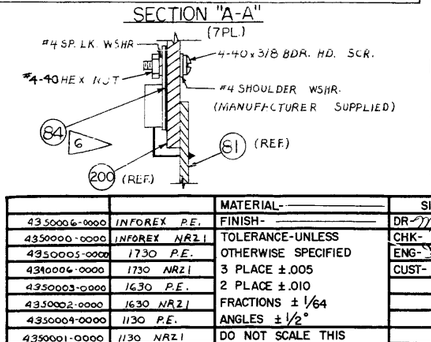
NOTES: (SEE NOTES CONT.)

1. ASSY. NO. -0001 (SEE P.L. # 00.5001 2-0000)
2. BOARD TO BE INDELIBLY STAMPED ON FARSIDE OF BOTTOM HEAT SINK WITH DRILL DETAIL NO. & REV. LEVEL AS SHOWN.
3. BOARD TO BE INDELIBLY STAMPED WITH APPROPRIATE VERSION LIST NO. & REV. LEVEL ON FARSIDE OF BOTTOM HEAT SINK AS SHOWN.
4. METAL SIDE UP
5. METAL SIDE DOWN WITH DOUBLE FACED TAPE (ITEM 104) UNDER TRANSISTOR









NOTES: (CONT.)

6. APPLY THERMAL COMPOUND (ITEM 95) BETWEEN MICA WSHR. & HEAT SINK USING SILK-SCREEN 62 50000-0001. ALSO APPLY (ITEM 95) BETWEEN MICA WASHERS & TRANSISTORS
7. BEND TAB 90° ABOVE CRIMP AND SLEEVE CONNECTION W/ PVC 105/11. (ITEM 102)
8. ASSY. NO. & REV. LEVEL TO BE INDELIBLY STAMPED ON FARSIDE OF BOTTOM HEAT SINK (ITEM 200) AS SHOWN.
9. APPLY THERMAL COMPOUND (ITEM 95) BETWEEN HEAT SINKS AND SPACERS.

		MATERIAL-	SIGNATURE	DATE
4350006-0000	INFOREX P.E.	FINISH-	DR-	11/4/75
4350000-0000	INFOREX NR21	TOLERANCE-UNLESS	CHK-	12/23/75
4350005-0000	1730 P.E.	OTHERWISE SPECIFIED	ENG-	12-22-75
4350006-0000	1730 NR21	3 PLACE ±.005	CUST-	
4350003-0000	1630 P.E.	2 PLACE ±.010		
4350002-0000	1630 NR21	FRACTIONS ± 1/64		
4350004-0000	1130 P.E.	ANGLES ± 1/2°		
4350001-0000	1130 NR21	DO NOT SCALE THIS		
NEXT ASS'Y	USED ON	PRINT		

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

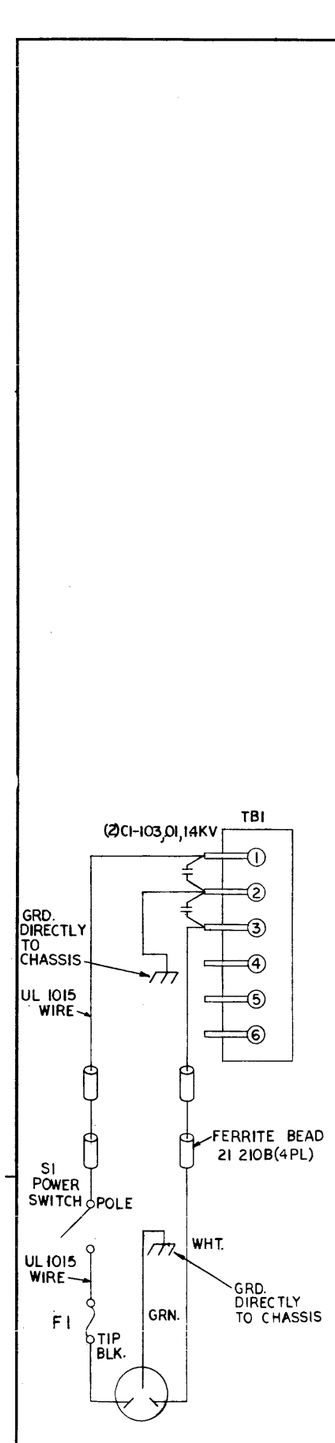
SCALE: 2:1 | SHEET 1 OF 1

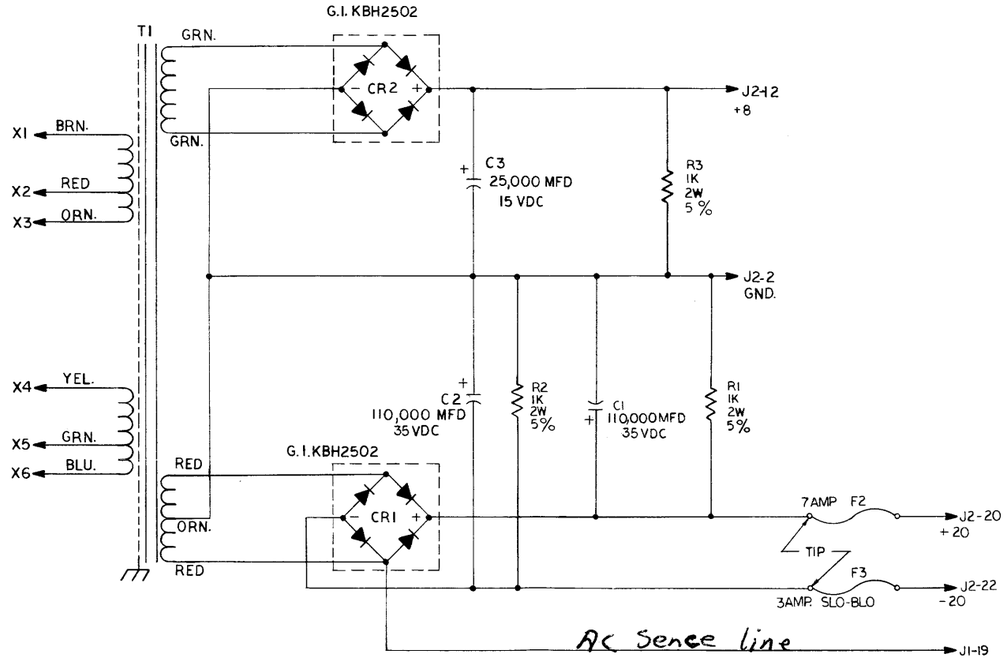
MC-17 ASSY.

size D | dwg no 4050000 | rev F

ON CHASSIS

REV	ECN NO	DATE	APP
A	ORIG ISSUE (0506)	12-22-75	JPK
B	0650	2-25-76	JPK
C	ECO-001	7-28-76	JPK
D	ECO-044	12-20-76	JPK
E	ECO-095	5-27-77	JPK
F	P/N WAS 02-4-50002 (P/N CHG. ONLY)	8-8-77	Tom Alt
G	ECO 122	10-11-77	JPK





PRIMARY CONNECTIONS						
VOLTAGE RANGE	TB1-1	TB1-3	TB1-4	TB1-5	TB1-6	F1
95-115	X1, X4	X2, X5	X3	X6		3AMP MDX
105-125	X1, X4	X3, X6	X2	X5		3AMP MDX
195-235	X1	X5	X2, X4	X3	X6	1.5AMP MDX
205-245	X1	X5	X3, X4	X2	X6	1.5AMP MDX
215-255	X1	X6	X3, X4	X2	X5	1.5AMP MDX

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
4350006-0000	INFOREX PE	FINISH- ——	DR- Tom Alt	12-10-75	
4350000-0000	INFOREX NRZI	TOLERANCE-UNLESS	CHK- JPK	12-22-75	
4350005-0000	1730 PE	OTHERWISE SPECIFIED	ENG- JPK	12-22-75	SCALE: N.T.S. SHEET 1 OF 5
4340006-0000	1730 NRZI	3 PLACE ± .005	CUST-		
4350003-0000	1630 PE	2 PLACE ± .010			SCHEMATIC DIAGRAM MC-17
4350002-0000	1630 NRZI	FRACTIONS ± 1/64			RAW DC POWER SUPPLY
4350004-0000	1130 PE	ANGLES ± 1/2°			
4350001-0000	1130 NRZI	DO NOT SCALE THIS			size D dwg no 0250002- REV G
NEXT ASS'Y	USED ON	PRINT			

REV	ECN NO	DATE	APP

P41 ← Ring in Lamp Signal

P2 SOLENOID ON

TP23

R151 15K

R152 4.7K

R153 1.5K

Q25

Q22 2N6109

R154 10 1/2W

C110 25V DC 1000 MFD

R155 68 2W

R156 68 2W

TP29

CR124 IN4002

9 RING SOLENOID +

K

RING-IN IND.

CR128 IN914

R167 10

P2 6

P2 A B C D E F H J I 2 3

CIRUIT COMMON CONNECTED TO CHASSIS NEAR RD/WT HEAD

P2 11 +20V M

R157 .39 2W

Q5 2N6109 ✳

Q24

R158 100

C111 .01 10V

Q23

R159 330

R160 4.7K

C112 .01 10V

CR125 IN914

CR126 SZ 5.6V

R161 220

Q26

Q27

R165 680

C113 .001

R162 360

R163 100 CW +12 ADJ.

R164 300

TP24 +12

C114 47MFD 25V AL

P1 T +12V DC

U

V

P4-M ON LINE IND.

POWER IND.

R168 10

P2 7 BOT BULB

R169 47

8 ARM BULBS

CR127 IN914

Q32

Q33

R166 1.5K

C115 .01

4 ARM PC 1

5 ARM PC 2

TP25

TP26 +5

C119 22MFD 15V DC AL

P1 13 P +5V DC

14 R

TP27 +5(S) → +5(S)

R170 220

12 +8V N

TIP3055 ✳ Q6

Q28

R171 .01 2W

R172 100

C116 .01 10V

Q29

R173 1.00K 1%

R175 470

C118 .001

Q31

Q30

C117 .01 10V

R174 261 1%

R176 100

R177 475 1%

R178 475 1%

13 −20V P

R179 1.0 2W

TIP3055 ✳ Q7

Q35

R180 100

C120 .01 10V

R181 330

Q34

R182 470

Q36

Q37

R183 1.5K

R184 1.50K 1%

R185 1.50K 1%

C121 .001

TP28 −12

C122 47 MFD 25V AL

12 N −12V DC

NOTES

1. UNLESS OTHERWISE SPECIFIED: RESISTORS IN OHMS, 5%, 1/4W CAPACITORS IN MICROFARADS.
2. ✳ = ON HEATSINK

		MATERIAL-	SIGNATURE	DATE
		FINISH-	DR- Mike Zimmo	12-10-75
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- F	12-24-75
		3 PLACE ± .005	ENG-	12-24-75
		2 PLACE ± .010	CUST-	
		FRACTIONS ± 1/64		
		ANGLES ± 1/2°		
		DO NOT SCALE THIS PRINT		
NEXT ASS'Y	USED ON			

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SCALE: N.T.S. SHEET 2 OF 5

SCHEMATIC DIAGRAM
MC-17 POWER SUPPLIES

size D dwg no 0250002- rev -G

REV	ECN NO	DATE	APP

TP1
FWD:-5.6V
STOP 0.0
REV:5.6V

R102 19.1K 1%
R101 19.1K 1%
U3
+12
-12
R104 100K
R105 1.5K
R103 3K
RAMP ADJ CW
20K R106
4.99K 1% R107
CR101
CR102
15K R108
C174 MYLAR
U1
C166 .01
C167 .01
R109 15K1%
U2
1.5K1% R110
15K1% R111
CR117
CR118
15K R112

TP2
TP3
TP4

FWD +5.6V
REV -5.6V FWD/REV. RAMP
+5.6V REV. RAMP
-5.6V FWD RAMP
TO REEL SERVO

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
RES IN OHMS 1/4W 5%
XSTR NPN 2N3414, PNP 2N5139, Q19 OMITTED DIODES IN914
OR AMPL SN72741P
2. *-HEATSINK
3. SEE VERSIONS OF PL 00-1-50012-0000 FOR UNSPECIFIED COMPONENT VALUES.

PWR FAIL FROM (RELAY CONTROL)
CR103 CR104
CR105 CR106 CR107

P1
FORWARD Z
REVERSE X
REWIND Y
REELS ON W

R113 15K
47K R114
CR108
CR109
R115 3K
U5
C169 .01
CR110 CR111 CR112
R116 1.5K
CR113
R117 47K
C168 .01
R119 30K
CR114
CR1 1730 ONLY
R118 1.5K
U7
SN15846N
R120 30K
R121 30K
CR115
Q18
CR116
C101 22µ TANT
1.5K R122
+4.9VDC
+5(S)
SS

R124 1.5K 1%
R123 1.5K 1%
U6
-4.9VDC
C171 .01
C170 .01

RWD:+3.6V
UNLD:+1.4V
TP6

20K REV. SPEED ADJ CW R125
R309
R310
R128 470K
R129 470K
C102 .0068 MYLAR
22K R130
20K FWD SPEED ADJ CW R126
R308

RWD SPEED ADJ
CR123
R127 10K
R131 5.6K
R134 470K
R132 1.5K1%
U4
C103 .05
R133 4.7K
C104 .01
C105 .01
TP15
Capstan voltage level
R311
R338
R135 470K
.01 C106
R136 33K
R137 33K
R138 10K CW ZERO ADJ
TP5
TP20

P2
BOT (PE ONLY) 14
CR181 IN914
R313 470
R315 68K
Q63
R314 47K

Q16
CR119
CR120
Q17
R143 1K 1/2W
100 R144
3K R139
R145 3K

R141 680
Q2 2N6109 *
R140 100
C107 .001
Q1 2N 3055*
R142 47
CR121 IN4002
TP21
R147 100
CR122 IN4002
C108 .001
Q4 2N5296*
Q3 2N 3055*
R146 1.5K
47 R148
R149 0.15 2W
R150 100
C109 .01
Q60

P2
20 X +20V
18 V CAPSTAN MOTOR + (VIA RELAYS)
22 Z -20V
17 U 16 T
T CAPSTAN TACH

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH- ——	DR- Tom Hill	11-16-75	
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- E	12-29-75	SCALE: N.T.S. SHEET 3 OF 5
		3 PLACE ±.005	ENG-	12-27-75	
		2 PLACE ±.010	CUST-		SCHEMATIC DIAGRAM MC17 CAPSTAN SERVO
		FRACTIONS ±1/64			
		ANGLES ±1/2°			SIZE D dwg no 0250002- REV G
NEXT ASS'Y	USED ON	DO NOT SCALE THIS PRINT			

REV	ECN NO	DATE	APP

P1 B 2 +20 · D 4 SUPPLY MOTOR + · A SUPPLY MOTOR − · K 9 TAKE-UP MOTOR + · H 7 -20 · L 10 TAKE-UP MOTOR − · E 5 MOTOR GROUND

TP16 · TP17 · TP18 · TP19

CR131 IN4002 · CR132 IN4002 · CR139 IN4002 · CR140 IN4002

Q12 2N3055* · Q13 2N6109* · Q14 2N3055* · Q15 2N5296* · Q11 2N3055* · Q10 2N6109* · Q9 2N3055* · Q8 2N5296*

Q56 · Q57 · Q62 · Q61 · Q49 · Q48 · Q54 · Q55

CR133 · CR134 · CR137 · CR138 · CR129 · CR130 · CR135 · CR136

R211 680 · R210 100 · R212 47 · R213 1K 1/2W · R214 100 · R209 470 1/2W · R215 470 1/2W · R216 100 · R217 1.5K · R218 47 · R219 100 · R220 .18 2W · R202 750 · R201 .01 2W · R203 825 1% · R204 75K 1% · R249 .15 2W · R250 100 · R247 680 · R246 100 · R248 47 · R255 100 · R252 100 · R254 1.5K · R245 470 1/2W · R253 470 1/2 W · R256 47 · R237 .01 2W · R238 750 · R239 825 1% · R240 75K 1% · R330 · R331

C129 .001 · C131 .001 · C130 .01 · C124 470 pf · C165 .01 · C139 .01 · C138 .001 · C140 .001 · C133 470 pf · C164 .01

U13 · U11 · U12 · U10 · U14 · U9

C126 .01 · R208 470K · R207 4.7K · C128 .01 · C127 .01 · C123 470 pf · C134 .01 · R243 470K · R244 4.7K · C137 .01 · C136 .01 · C135 470 pf

R205 15K · R328 · R327 · R206 15K · R324 · R241 15K · R325 · R326 · R242 15K

R187 220 · C180 · R188 15K · R200 15K CW · R197 15K · R198 1K SUP CEN · R199 470 · R222 220 · R223 15K · R236 15K CW · R233 15K · R234 1K TU CEN · R235 470 · C179 · R232 CW · R231 470 · R229 10 · R230 1K TU ARC

R186 100K · R196 CW · R195 470 · R193 10 · R194 1K SUP ARC · R221 100K · R258 1.5K · R259 8.2K · REELS ON (P1-W)

TP9 · TP10 · TP11 · TP12 · TP7 · TP8

C176 · R192 180K · R191 47K · R189 180K FWD/REV RAMP (FROM CAPSTAN SERVO) · R190 360K · C175 · R228 180K · R227 47K · R224 180K · R225 180K · R226 360K · FWD RAMP · REV RAMP (FROM CAP-STAN SERVO) · R257 4.7K · R260 15K · R261 15K

NOTES:
1. UNLESS OTHERWISE SPECIFIED RES. IN OHMS, 1/4W, 5% XSTR: 2N3414; DIODES IN914 OP AMP 741 TYPE; CAP. IN μf
2. * = ON HEATSINK
3. SEE VERSIONS OF PL.00-1-50012-0000 FOR UNSPECIFIED COMPONENT VALUES.

P1 1 · +5.6 · SUPPLY PC Photo Sensor

P1 11 · +5.6 · TAKE-UP PC Photo Sensor

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794	
		FINISH-	DR- Mike Quinn	12-8-75		
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK-	12-29-75		
		3 PLACE ±.005	ENG-	12-30-75	SCALE: N.T.S.	SHEET 4 OF 5
		2 PLACE ±.010	CUST-		SCHEMATIC DIAGRAM MC-17	
		FRACTIONS ±1/64			REEL SERVO AMPLIFIERS	
		ANGLES ±1/2°				
		DO NOT SCALE THIS PRINT			size D	dwg no 0250002- rev 16
NEXT ASS'Y	USED ON					

REV	ECN NO	DATE	APP

MC-17 COMPONENTS

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   RES. IN OHMS; 1/4W, 5% XSTR. 2N3414;
   DIODES IN914;
   CAPS IN μf
2. CAPS C151 THROUGH C162 ARE 0.1μf500V
3. SEE VERSIONS OF PL. 00-1-50012-0000 FOR UNSPECIFIED COMPONENT VALUES.

CAPSTAN SERVO
(SEE SH. 3 THIS DWG)

SUPPLY MOTOR SERVO
(SEE SH.4 THIS DWG)

TAKE-UP MOTOR SERVO
(SEE SH.4 THIS DWG)

P2 17U Feed back; 16T Faward/Reverse; V Pos Feedback Sum → K1 7 6 → J11 1 2 3 4 → P11 → TACH → CAPSTAN MOTOR

P1 4D +; A −; 9K +; 10L −; 16 +5(S); 15S +20; M; 18; 17; T +12

K1 8 NC 9; K1 10

J9 1 2 → P9 → SUPPLY REEL MOTOR

A C CR4 +20(R) J1-B; -20(R) J1-H

K2 5 6; K2 7

1130,1630 TO J1-A 1730 TO K2-6

-20(R) J1-H R305 7.5Ω 10W

K1 14 15; K1 16

A C CR3 + −

J10 1 2 → P10 → TAKE-UP REEL MOTOR

J10 INSTALLED AS SHOWN FOR 1130/1630 INTERCHANGE J10 PINS 1 AND 2 FOR 1730.

K2 11 12; K2 13

+20(R) J1-B R304 7.5Ω 10W

1130, 1630 TO J1-10 1730 TO K2-12

Reels on Relay K1 4 1

Rewind Relay K2 4 1

RELAY BASE (BOTTOM VIEW)
16 9 10 / 14 15 8 / 13 6 7 / 11 12 5 / 4 3 2 1

P1 8 → +5(S) R285 4.7K; CR148; R286; R287 4.7K; C145 10 20V; CR149; TP13; Q51; R288 4.7K; Q59 2N6109; R290 1.5K; R318; TP22; R289 1.5K; Q53; Q52; 2.7K R294; C146 22μf 16V; R291 47K; R292 150; R293 1.5K; R319

+20 R277 47K; Q42; Q44; R278 15K; R284 15K; CR142 IN4744A; CR143; R275 15K; R274 1.5K; C143 1.0 35V; R276 47K; CR144; CR150; CR151 CR152 CR153 CR154

From MC17 SH. 1 — AC SENSE 19

SET BT 20 — Broken Tape TO P4-3 — LOAD P.B. — NO — ARM LIMIT SW. 22

+5(S) R279 6.8K; CR145; CR146; CR147; R280 47K; R281 47K; Q45; R282 15K; R306 47; C144 10 16V; P1 Z K W U → FORWARD; REVERSE; REELS ON; REWIND 21

CR155; CR157; CR156; R295 15K; Q40; CR180 IN4004; Q41; R296 15K; CR158; R297 47K

+5(S) R283 15K; R264 4.7K; R262 47K; C141 .01; R263 15K; Q19

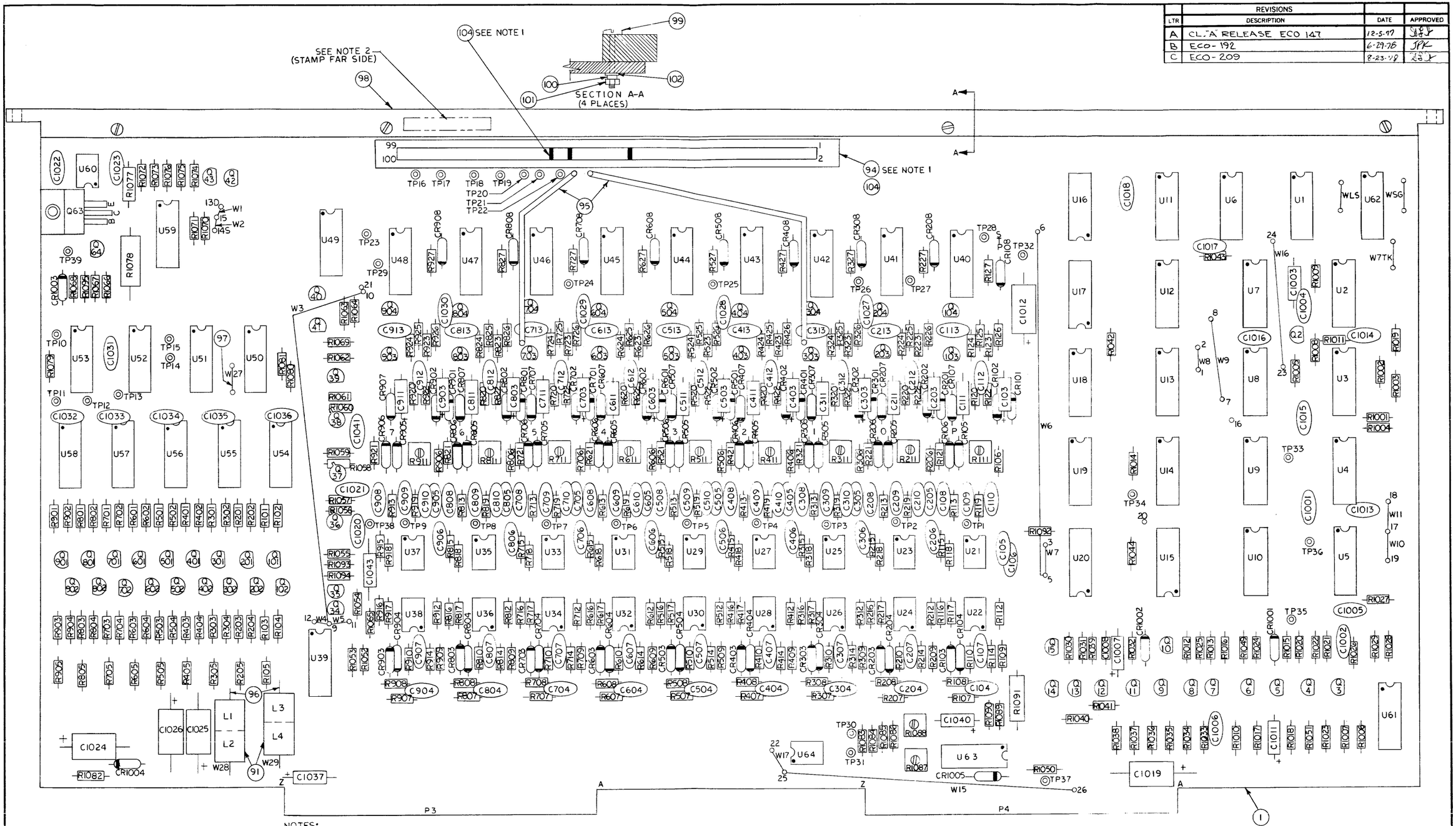
+20 CR179 IN4004

+12; R269 1.5K; Q46; R268 15K; R265 15K; Q38; Q39; R266 47K; R267 15K; R270 15K; CR141; C142 3.3 15V; R271 100K; R272 47K; TP14; R273 100K → POWER FAIL TO CAPSTAN

RC11 SH. 2

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794	
		FINISH-	DR- Tom A Lee	12-1-75		
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK-	12-24-75	SCALE: N.T.S.	SHEET 5 OF 5
		3 PLACE ±.005	ENG-	12-29-75		
		2 PLACE ±.010	CUST-		SCHEMATIC DIAGRAM MC-17 RELAY CONTROL	
		FRACTIONS ±1/64				
		ANGLES ±1/2°				
NEXT ASS'Y	USED ON	DO NOT SCALE THIS PRINT			SIZE D DWG NO 0250002-	REV G

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	CL"A" RELEASE ECO 147	12-5-77	[illegible]
B	ECO-192	6-29-78	SPK
C	ECO-209	8-23-78	[illegible]



NOTES:
1. INSERT KEYS (ITEM 104) BETWEEN PINS 43 & 45, 57 & 59, 61 & 63 ON CONNECTOR (ITEM 94).
2. PART NUMBER, APPROPRIATE VERSION NUMBER AND LATEST REV LEVEL TO BE PERMANTLY MARKED IN BLACK IN AREA INDICATED ON FAR SIDE OF BOARD.

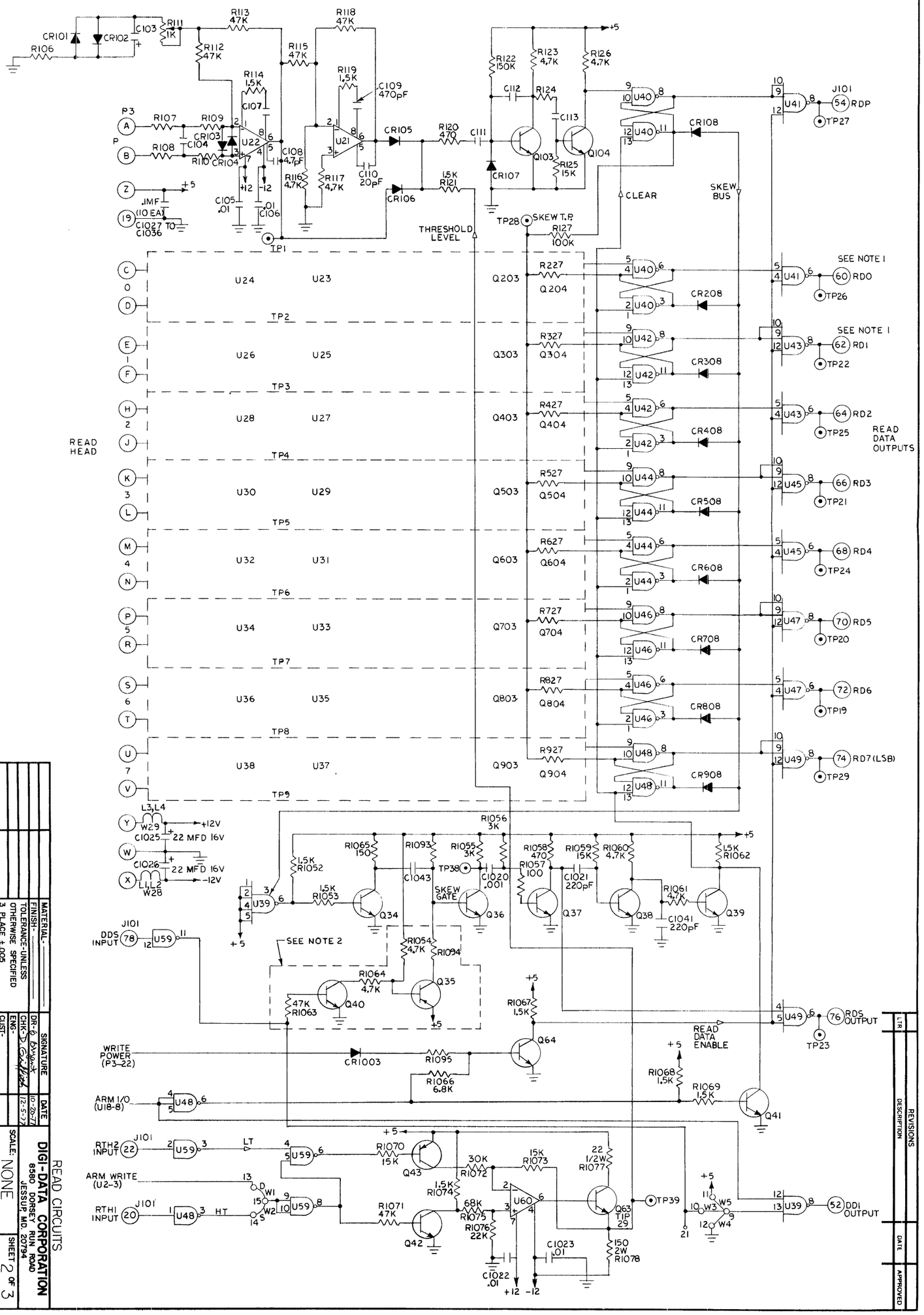
		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH-	DR-B Emmert	10-25-77	
		TOLERANCE-UNLESS	CHK- [illegible]	11-21-77	
		OTHERWISE SPECIFIED	ENG- [illegible]	12-5-77	SCALE: 2:1 SHEET 1 OF 1
		3 PLACE ±.005	CUST-		
		2 PLACE ±.010			RC-11 ASSEMBLY
4050001-	1130 NRZI	FRACTIONS ± 1/64			
4050002-	1630 NRZI	ANGLES ± 1/2°			
4050006-	1730 NRZI	DO NOT SCALE THIS			size D dwg no 0051031-0000 rev C
NEXT ASS'Y	USED ON	PRINT			

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	CL. 'A' RELEASE ECO 147	12-5-77	
B	ECO-209	8-23-78	

		MATERIAL-	SIGNATURE	DATE	CONTROL LOGIC
		FINISH-	DR-B. Bryant	10-21-77	DIGI-DATA CORPORATION
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK-	12-5-77	8580 DORSEY RUN ROAD
		3 PLACE ±.005	ENG-	12-5-77	JESSUP, MD. 20794
		2 PLACE ±.010	CUST-		SCALE: NONE SHEET 1 OF 3
		FRACTIONS ± 1/64			SCHEMATIC DIAGRAM RC-11
		ANGLES ± 1/2°			
NEXT ASS'Y	USED ON	DO NOT SCALE THIS PRINT			size D dwg no 0251143-0000 rev B

NRZI

NOTES:
1. TRACKS 0 AND 1 NOT USED IN 7 TRACK TRANSPORTS.
2. COMPONENTS WITHIN AREA DESIGNATED BY DOTTED LINE ARE 7 TRACK DUAL DENSITY ONLY.
3. ALL UNUSED GATE INPUT PINS TIED TO +5.



NEXT ASSY	MATERIAL		
USED ON	FINISH		
DO NOT SCALE THIS PRINT	TOLERANCE UNLESS OTHERWISE SPECIFIED 3 PLACE ± .005 2 PLACE ± .010 FRACTIONS ± 1/64 ANGLES ± 1/2°	DR-	
		CHK'D	
		ENG-	
		CUST-	

READ CIRCUITS

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP MD. 20794

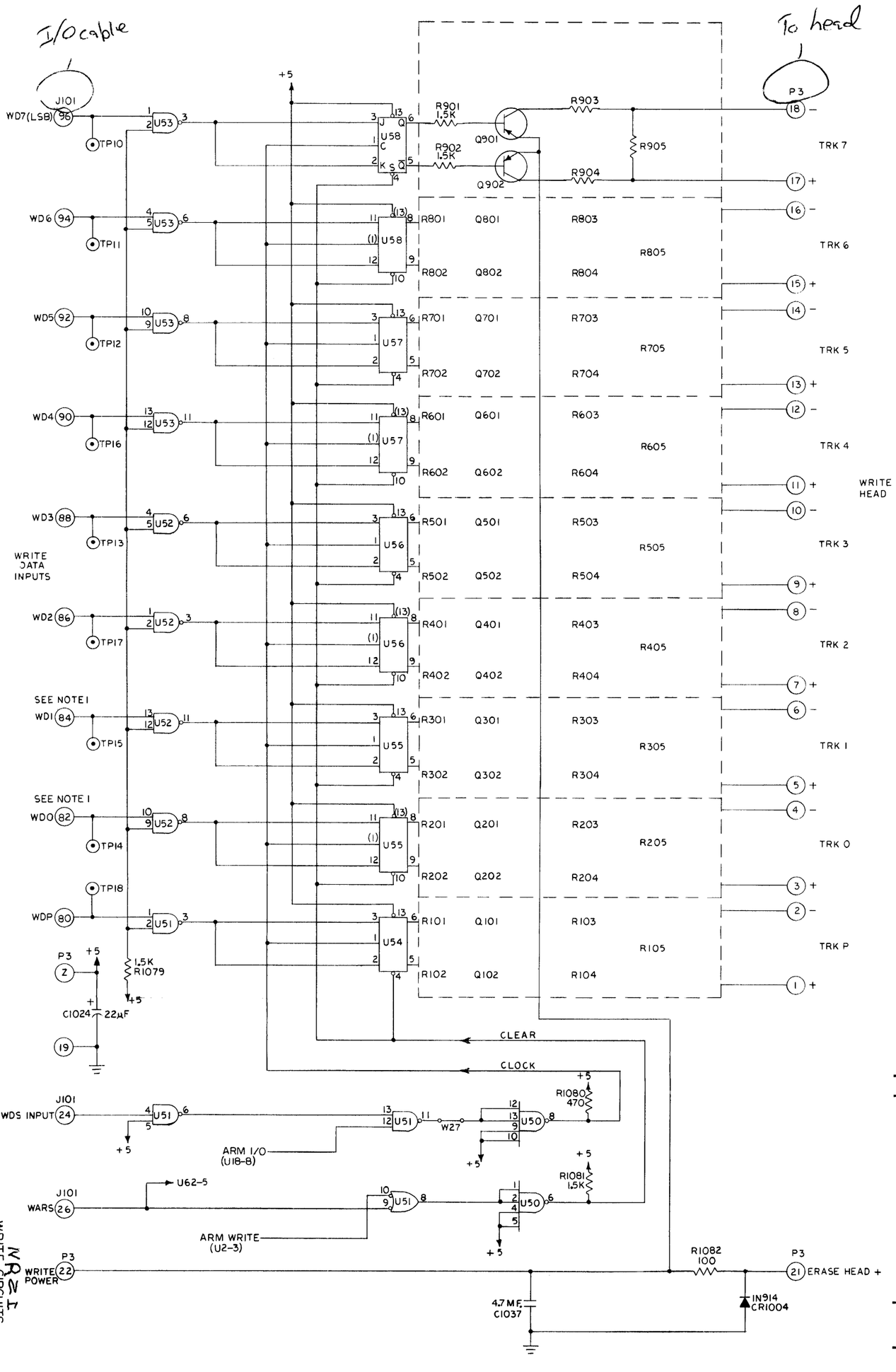
SCHEMATIC DIAGRAM RG11

SIZE D | DWG NO 0251143-0000 | REV B

SCALE: NONE | SHEET 2 OF 3

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

NOTES:
1. TRACKS 0 AND 1 NOT USED IN 7 TRACK TRANSPORTS.



NEXT ASSY		MATERIAL	
USED ON		FINISH	
DO NOT SCALE THIS PRINT	TOLERANCE UNLESS OTHERWISE SPECIFIED 3 PLACE ± .005 2 PLACE ± .010 FRACTIONS ± 1/64 ANGLES ± 1/2°	DR.	DATE 10-9-72
		CHK'D	12-5-72
		ENG.	
		CUST.	

MR II WRITE CIRCUITS

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP MD. 20794

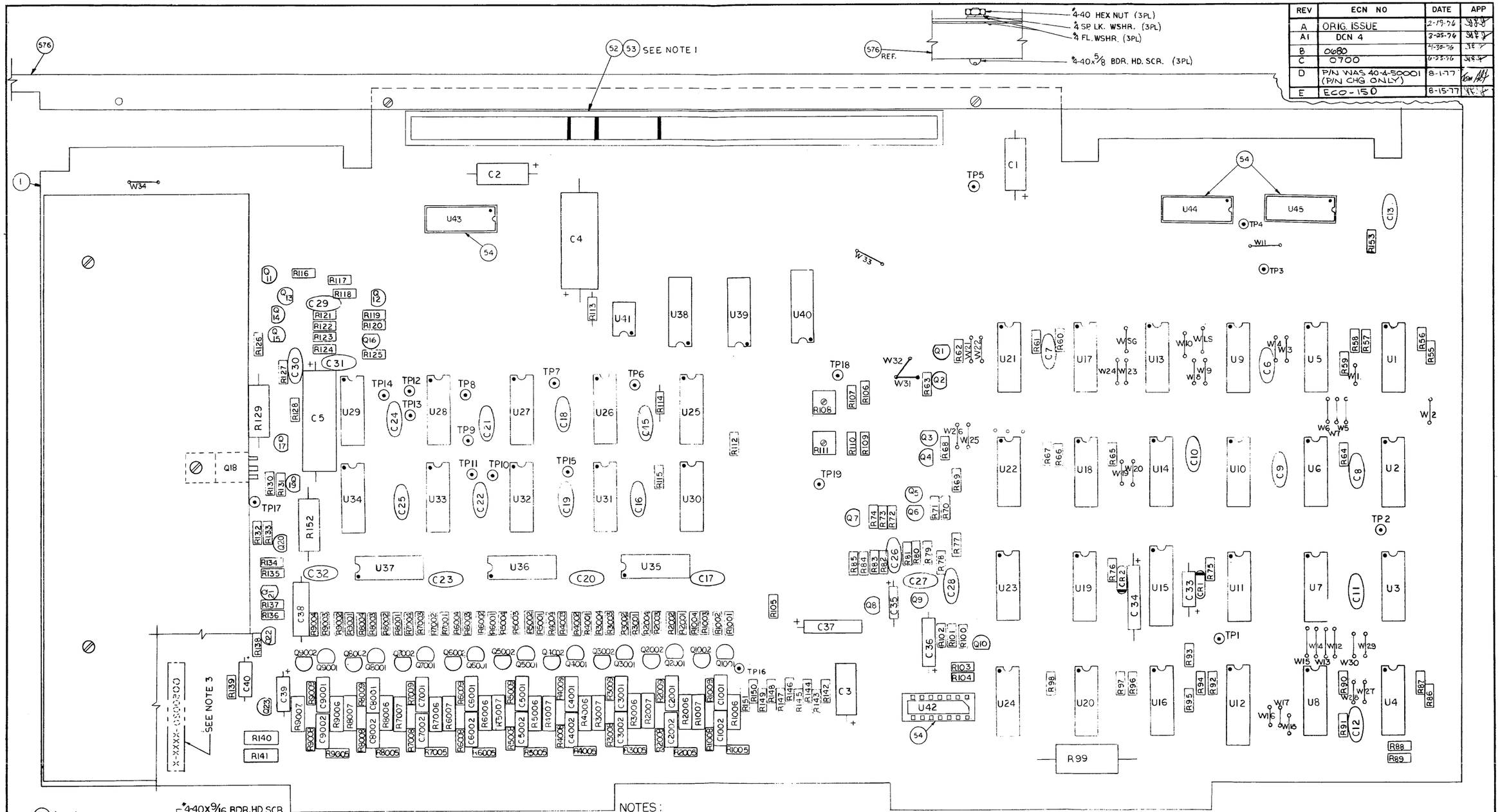
SCHEMATIC DIAGRAM RG-11

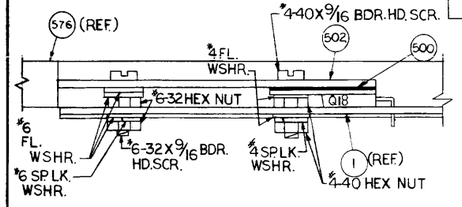
SIZE D | DWG NO 0251143-0000 | REV B

SCALE NONE | SHEET 3 OF 3

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	2-19-76	
A1	DCN 4	3-25-76	
B	0680	4-30-76	
C	0700	6-23-76	
D	P/N WAS 40-4-50001 (P/N CHG ONLY)	8-1-77	
E	ECO-150	8-15-77	



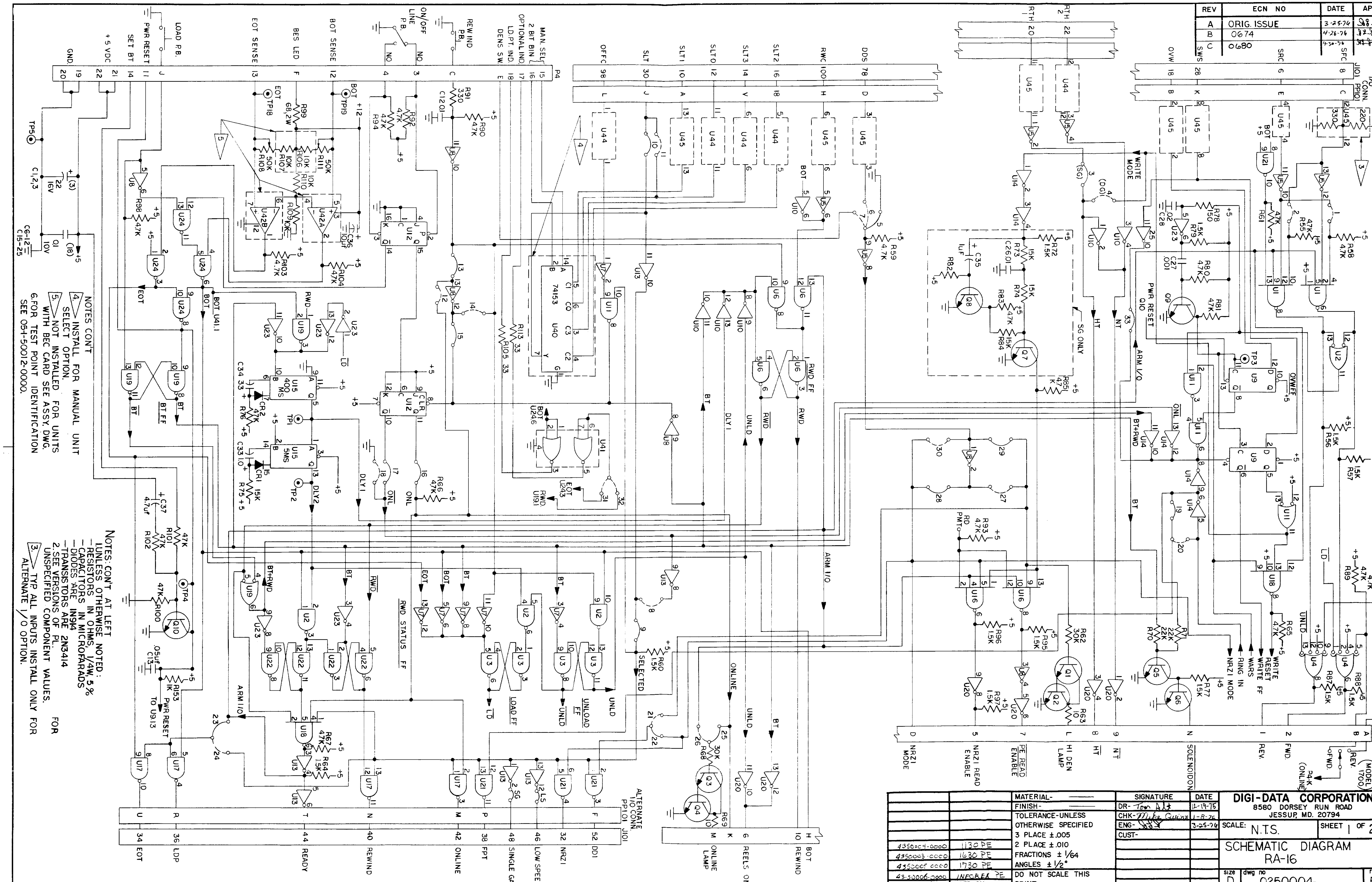


NOTES:

1. INSERT KEYS (ITEM 53) BETWEEN PIN 43 & 45, 57 & 59, 61 & 63 ON CONNECTOR.
2. SEE P.L. 0050020-0000
3. BOARD TO BE INDELIBLY STAMPED WITH APPROPRIATE VERSION LIST NO. & REV. LEVEL ON BACK OF BOARD AS SHOWN.

LAST USED	NOT USED
U45	—
R153, (9)009	—
C40, (9)002	C14
CR2	—
TP19	—
Q23, (9)002	—
JUMPER 34	—

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH-	DR- Mike Quinn	11/21/75	
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- Rob Taylor	2-18-76	
		3 PLACE ±.005	ENG-	2-19-76	SCALE: 2:1 SHEET 1 OF 1
		2 PLACE ±.010	CUST-		
4350005-0000	1730 PE	FRACTIONS ±1/64			RA-16 ASSEMBLY
4350003-0000	1630 PE	ANGLES ±1/2°			
4350009-0000	1130 PE	DO NOT SCALE THIS			size D dwg no 4050001-0000 rev E
4350006-0000	INFOREX PE	PRINT			
NEXT ASS'Y	USED ON				



REV	ECN NO	DATE	APP
A	ORIG. ISSUE	3-25-76	[illegible]
B	0674	4-26-76	[illegible]
C	0680	4-30-76	[illegible]

NOTES CONT

4. INSTALL FOR MANUAL UNIT SELECT OPTION.
5. NOT INSTALLED FOR UNITS WITH BEC CARD SEE ASSY. DWG.
6. FOR TEST POINT IDENTIFICATION SEE 054-50012-0000.

NOTES: CONT AT LEFT

1. UNLESS OTHERWISE NOTED:
   - RESISTORS IN OHMS, 1/4W, 5%
   - CAPACITORS IN MICROFARADS
   - DIODES ARE 1N914
   - TRANSISTORS ARE 2N3414
2. SEE VERSIONS OF PL FOR UNSPECIFIED COMPONENT VALUES.
3. TYP ALL INPUTS INSTALL ONLY FOR ALTERNATE I/O OPTION.

NEXT ASS'Y	USED ON
4350004-0000	1130 PE
4350003-0000	1630 PE
4350005-0000	1730 PE
43-50006-0000	INFOREX PE

MATERIAL-
FINISH-
TOLERANCE-UNLESS OTHERWISE SPECIFIED
3 PLACE ±.005
2 PLACE ±.010
FRACTIONS ± 1/64
ANGLES ± 1/2°
DO NOT SCALE THIS PRINT

SIGNATURE	DATE
DR- [illegible]	12-19-75
CHK- [illegible]	1-8-76
ENG- [illegible]	3-25-76
CUST-	

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SCALE: N.T.S. SHEET 1 OF 2

SCHEMATIC DIAGRAM RA-16

SIZE D DWG NO 0250004- REV D

REV	ECN NO	DATE	APP
D	P/N WAS 02-9-50004 (P/N CHG. ONLY)	8-8-77	TGM

NOTES:
1. UNLESS OTHERWISE SPECIFIED: ALL RESISTORS WITH VALUES SHOWN ARE 5%, 1/4 W, CAP IN MFD.
2. SEE VERSIONS OF PL FOR UNSPECIFIED COMPONENT VALUES.

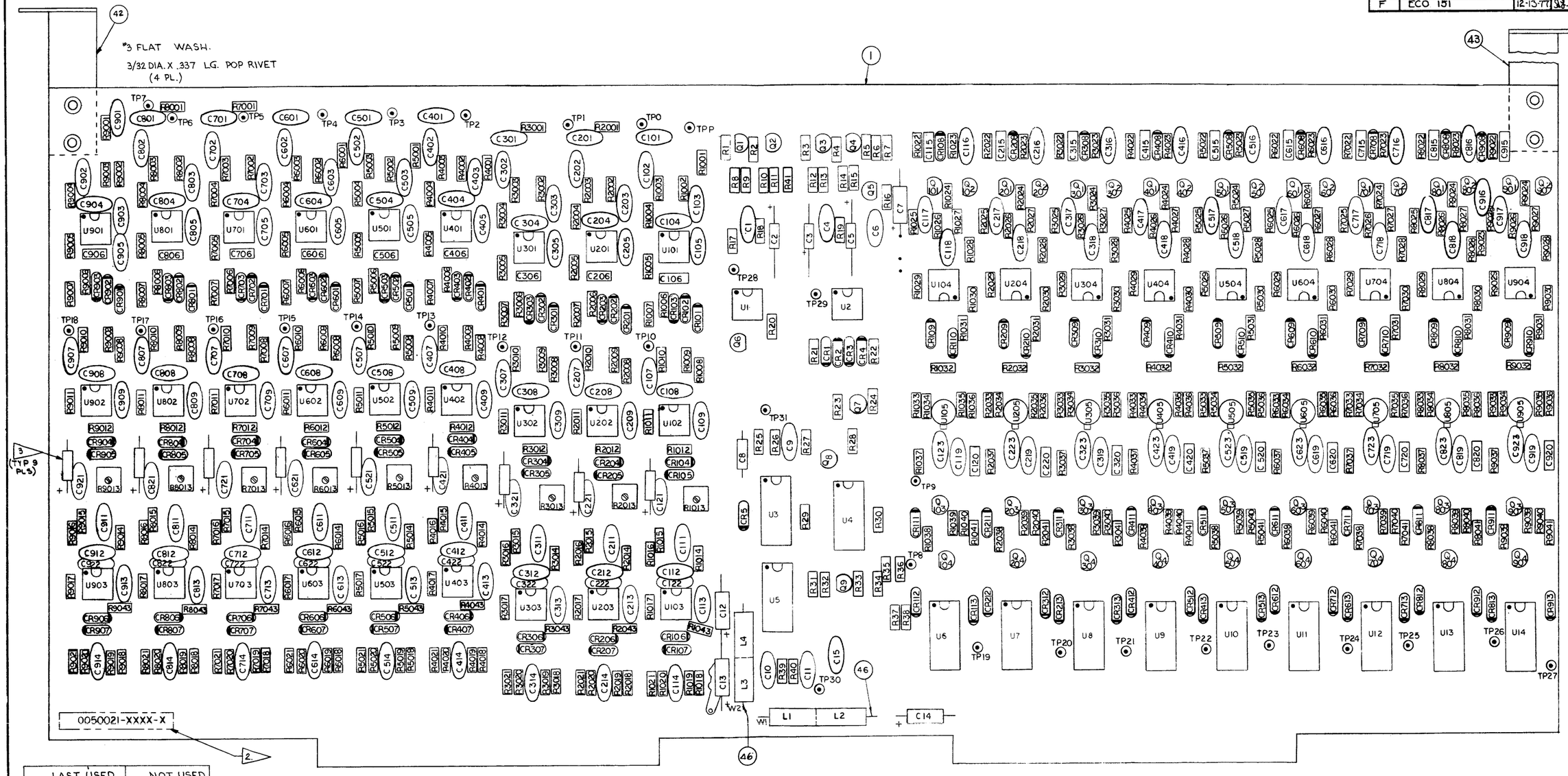
TYPICAL ALL INPUTS RESISTORS INSTALLED ONLY FOR ALTERNATE I/O OPTION

DUAL DENSITY MODELS ONLY

PE ONLY MODELS

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794	
		FINISH-	DR- Mike Guma	1-5-76		
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- Mike Guma	1-8-76		
		3 PLACE ±.005	ENG-		SCALE: N.T.S.	SHEET 2 OF 2
		2 PLACE ±.010	CUST-		SCHEMATIC DIAGRAM RA-16 WRITE CIRCUITS	
		FRACTIONS ±1/64				
		ANGLES ±1/2°				
		DO NOT SCALE THIS PRINT			size D	dwg no 0250004 - rev D
NEXT ASS'Y	USED ON					

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	2-19-76	
B	0660	3-25-76	
C	ECO 003	7-22-76	
D	ECO - 069	3-15-77	
E	P/N CHG 40-4-50005-	4/4/77	
F	ECO 151	12-13-77	



LAST USED	NOT USED
R9041, R41	
TP 31	
U14, U905	
CR913, CR5	
Q904, Q9	
C923 C15	
L4	

NOTES:
1. ASSY. NO -0001 (SEE PL. 0050021-0000)
2. BOARD TO BE INDELIBLY STAMPED WITH APPROPRIATE VERSION LIST NO. & REV. LEVEL ON BOARD AS SHOWN.
3. COMPONENTS WILL BE EITHER C110 THROUGH C910 OR R1042 THROUGH R9042, DEPENDING ON THE VERSION PART LIST. FOR VERSIONS USING THE CAPACITORS, THE POLARITY IS AS SHOWN.

		MATERIAL-	SIGNATURE	DATE
		FINISH-	DR- Mike Quinn	11-30-76
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- Ted Taylor	2-11-76
		3 PLACE ±.005	ENG- [illegible]	2-19-76
		2 PLACE ±.010	CUST-	
4350005-0000	1730 PE	FRACTIONS ±1/64		
4350003-0000	1630 PE	ANGLES ±1/2°		
4350004-0000	1130 PE	DO NOT SCALE THIS PRINT		
4350006-0000	INFOBEX PE			
NEXT ASS'Y	USED ON			

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SCALE: 2:1 SHEET 1 OF 1

PA-16 ASSEMBLY

size D dwg no 4050005- rev F

G | ECO-206 | 8-22-78 | JFK

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	3-25-76	
B	ECN 0698	6-25-76	
C	ECO-003	7-22-76	
D	ECO-060	3-15-77	
E	PINLIAS 02-6-50005 (AN CHG ONLY)	6-2-78	
F	ECO-190	6-26-78	JFK

SKEW TP TP9 — DROP DET TP TP8

SGL GAP ONLY

P5 — READ HEAD

HEAD AMPLIFIER

DUAL DENSITY MODELS ONLY

PE DIFFERENTIATOR

PE PEAK DETECTOR

PE LEVEL MONITOR

PE DATA

NRZI DATA

NRZI PEAK DETECTOR

NRZI INVERTER

NRZI DE-SKEW REGISTER

READ DATA LINE DRIVERS — P4 / J101

NOTES:

1. UNLESS OTHERWISE SPECIFIED : RESISTORS IN OHMS, 1/4W, 5%, CAPS. IN MFD, DIODES IN914, TRANSISTORS 2N3414
2. SEE VERSIONS OF PL. 0050021-0000 FOR UNSPECIFIED COMPONENT VALUES.
3. FOR TEST POINT IDENTIFICATION SEE 0550013-0000

TRK P								
TRK 0	U203	U202	TP11	U201	Q201	TP0	Q202	Q203	Q204	U8 TP20	14 RD0
TRK 1	U303	U302	TP12	U301	Q301	TP1	Q302	Q303	Q304	U8 TP21	15 RD1
TRK 2	U403	U402	TP13	U401	Q401	TP2	Q402	Q403	Q404	U10 TP22	16 RD2
TRK 3	U503	U502	TP14	U501	Q501	TP3	Q502	Q503	Q504	U10 TP23	17 RD3
TRK 4	U603	U602	TP15	U601	Q601	TP4	Q602	Q603	Q604	U12 TP24	18 RD4
TRK 5	U703	U702	TP16	U701	Q701	TP5	Q702	Q703	Q704	U12 TP25	19 RD5
TRK 6	U803	U802	TP17	U801	Q801	TP6	Q802	Q803	Q804	U14 TP26	20 RD6
TRK 7	U903	U902	TP18	U901	Q901	TP7	Q902	Q903	Q904	U14 TP27	21 RD7

+12VDC, GND, -12VDC — DUAL DENSITY MODELS ONLY

NRZI READ STROBE GENERATOR

$\overline{HT}$, $\overline{NT}$, $\overline{PE\ READ\ ENABLE}$, NRZI READ ENABLE — P6

4350004-0000	1130 PE	MATERIAL-	
4350003-0000	1630 PE	FINISH-	
4350005-0000	1730 PE	TOLERANCE-UNLESS OTHERWISE SPECIFIED	3 PLACE ±.005
4350006-0000	INFOREX PE		2 PLACE ±.010
NEXT ASS'Y	USED ON		FRACTIONS ± 1/64
			ANGLES ± 1/2°
			DO NOT SCALE THIS PRINT

	SIGNATURE	DATE
DR- Mike Quinn		12-15-76
CHK- Tom Alt		1-15-76
ENG- JFK		3-25-76
CUST-		

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SCALE: N.T.S. | SHEET 1 OF 1

SCHEMATIC DIAGRAM
PA-16 READ CIRCUITS

size D | dwg no 0250005- | rev G

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
1	1	1300552-0001	PA-16 DRILL DETAIL	
2	27	2451167-7011	OPERATIONAL AMPLIFIER (709)	U101, U201,
				U301, U401,
			U501, U601, U701, U801, U901, U103	U203, U303,
			U403, U503, U603, U703, U803, U903	U104, U204,
			U304, U404, U504, U604, U704, U804	U904
3	9	2451168-7111	VOLTAGE COMPARATOR (710)	U105, U205,
				U305, U405,
			U505, U605, U705, U805, U905	
4	1	2451104-7411	OPERATIONAL AMPLIFIER (741)	U2
5	5	2450063-1858	DTL GATES (858)	U6, U8, U10,
				U12, U14
6	18	2350016-0001	NPN SILICON (19030)	Q103, Q203,
				Q303, Q403,
			Q503, Q603, Q703, Q803, Q903, Q104	Q204, Q304,
			Q404, Q504, Q604, Q704, Q804, Q904	
7	4	2350017-0001	PNP SILICON (2907)	Q3, Q4, Q5, Q7

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
G	ECO-190	6-29-76	JPK		
F	ECO151	12-15-77	JPK		
E	069	3-15-77	J.T.H.		
D	003	7-22-76	J.T.H.	4350008 0000	
C	0698	6-25-76	G.L.G.	4350007 0000	
B	0660			4350006 0000	
A	ORIG. ISSUE			4350005 0000	

DIGI-DATA CORPORATION

DR RGB	12-15-77	ENG JPK	12-15-77
CHK DDJ	12-15-77		

TITLE: PA-16 BASIC

P.L. NO. 0050021-0001 | SH. 1 OF 7 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
8				
			RESISTORS, DEP. CBN., 1/4W, 5%	
9	1	2150004-0101	100 OHM	R6
10	1	2150004-0271	270 OHM	R16
11	1	2150004-0301	300 OHM	R7
12	27	2150004-0331	330 OHM	R1035, R2035,
				R3035, R4035,
			R5035, R6035, R7035, R8035, R9035,	R1036, R2036,
			R3036, R4036, R5036, R6036, R7036,	R8036, R9036,
			R1041, R2041, R3041, R4041, R5041,	R6041, R7041,
			R8041, R9041	
13	9	2150004-0471	470 OHM	R1038, R2038,
				R3038, R4038,
			R5038, R6038, R7038, R8038, R9038	
15	9	2150004-0152	1.5K OHM	R1003, R2003,
				R3003, R4003,

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16 BASIC

P.L. NO. 0050021-0001 | SH. 2 OF 7 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
			R5003, R6003, R7003, R8003, R9003,	
16	9	2150004-0222	2.2K OHM	R1031, R2031,
				R3031, R4031,
			R5031, R6031, R7031, R8031, R9031	
17	9	2150004-0272	2.7K OHM	R1034, R2034,
				R3034, R4034,
			R5034, R6034, R7034, R8034, R9034	
18	12	2150004-0472	4.7K OHM	R1032, R2032,
				R3032, R4032,
			R5032, R6032, R7032, R8032, R9032,	R21, R22, R24
19	18	2150004-0103	10K OHM	R1033, R2033,
				R3033, R4033,
			R5033, R6033, R7033, R8033, R9033,	R1028, R2028,
			R3028, R4028, R5028, R6028, R7028,	R8028, R9028
20	15	2150004-0153	15K OHM	R1006, R2006,
				R3006, R4006,
			R5006, R6006, R7006, R8006, R9006,	R3, R4, R12,
			R14, R23, R28	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16 BASIC

P.L. NO. 0050021-0001 | SH. 3 OF 7 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
21	1	2150004-0303	30K OHM	R15
22	9	2150004-0333	33K OHM	R1004, R2004,
				R3004, R4004,
			R5004, R6004, R7004, R8004, R9004	
23	10	2150004-0473	47K OHM	R1040, R2040,
				R3040, R4040,
			R5040, R6040, R7040, R8040, R9040,	R36
24	9	2150004-0104	100K OHM	R1037, R2037,
				R3037, R4037,
			R5037, R6037, R7037, R8037, R9037	
25	9	2150004-0154	150K OHM	R1029, R2029,
				R3029, R4029,
			R5029, R6029, R7029, R8029, R9029	
26	9	2150046-1102	POT, SINGLE TURN, 1K OHM	R1013, R2013,
				R3013, R4013,
			R5013, R6013, R7013, R8013, R9013	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16 BASIC

P.L. NO. 0050021-0001 | SH. 4 OF 7 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
			RESISTORS, METAL FILM, 1/8W, 1%	
27	1	2150020-1501	1.5K OHM	R19
28	1	2150020-2491	2.49K OHM,	R13
29	9	2150020-3320	332 OHM	R1005, R2005, R3005, R4005 R5005, R6005, R7005, R8005, R9005
30	1	2150020-1472	14.7K OHM	R5
31	9	2150020-1502	15K OHM	R1030, R2030, R3030, R4030, R5030, R6030, R7030, R8030, R9030
			CAPACITORS	
32	9	2250107-5309	DIPPED MICA, 100V, 20%, 3.0 pF	C113, C213, C313, C413, C513, C613, C713, C813, C913
33	9	2250144-3200	CER. DISC, COG, 1000V, 20 pF	C103, C203, C303, C403, C503, C603, C703, C803, C903

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

DIGI-DATA CORPORATION

DR | ENG | CHK | TITLE: PA-16 BASIC

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0001	SH. 5 OF 7	REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
34	56	2250134-5103	CER. DISC, Y5F, 20V, 20%, .01 uF	C101, C201, C301, C401, C501, C601, C701, C801, C901, C102, C202, C302, C402, C502, C602, C702, C802, C902, C121, C221, C321, C421, C521, C621, C721, C821, C921, C122, C222, C322, C422, C522, C622, C722, C822, C922, C123, C223, C323, C423, C523, C623, C723, C823, C923, C4, C6, C118, C218, C318, C418, C518, C618, C718, C818, C918
35	2	2250116-4105	TANT. ELEC., 35V, 10%, 1 uF	C3, C5
36	1	2250116-4475	TANT. ELEC., 35V, 10%, 4.7 uF	C7
37	3	2250115-4226	TANT. ELEC., 20V, 10%, 22 uF	C12, C13, C14
38	40	2550002-9140	DIODE, SILICON F.S. (1N914)	CR109, CR209, CR309, CR409, CR509, CR609, CR709, CR809, CR909, CR110, CR210, CR310, CR410, CR510, CR610, CR710, CR810, CR910, CR111, CR211, CR311, CR411, CR511, CR611, CR711, CR811, CR911, CR113, CR213, CR313, CR413, CR513, CR613, CR713, CR813, CR913, CR1, CR2, CR3, CR4

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

DIGI-DATA CORPORATION

DR | ENG | CHK | TITLE: PA-16 BASIC

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0001	SH. 6 OF 7	REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 1	PART NUMBER	DESCRIPTION	REFERENCE
			MISCELLANEOUS	
39	4	2090002-0001	FERRITE BEADS	L1, L2, L3, L4
40	33	2070017-0001	TERMINAL TURRET, THRU HOLE	TPP, TPO, TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31
41	REF	4050005-0000	PA-16 ASSEMBLY	
42	1	1110577-0002	BRACKET HOLD DOWN, LEFT	
43	1	1110577-0001	BRACKET HOLD DOWN, RIGHT	
44	4	5951120-0312	RIVET, DOME HD., 3/32 DIA. X 250 LG.	
45	4	5250008-1202	FLAT WASHER, #3	
46	AR	2050023-0002	WIRE, BUSS, #20	W1, W2
47	AR	2950000-0701	TUBING HEAT SHRINK 3/8"	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0001

DIGI-DATA CORPORATION

DR | ENG | CHK | TITLE: PA-16 BASIC

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0001	SH. 7 OF 7	REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 2	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	9	2250147-4101	CER. DISC, S3N, 1000V, 100 pF	C104, C204, C304, C404, C504, C604, C704, C804, C904
202	9	2250144-4479	CER. DISC, COG, 1000V, 4.7 pF	C105, C205, C305, C405, C505, C605, C705, C805, C905
203	9	2250122-4222	MYLAR, W.F., 100V, .0022 uF	C106, C206, C306, C406, C506, C606, C706, C806, C906
204				
205	9	2250146-4330	CER. DISC, S2L, 1000V, 33 pF	C112, C212, C312, C412, C512, C612, C712, C812, C912
206	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C119, C219, C319, C419, C519, C619, C719, C819, C919

BASIC VERSION

NOTES:

P.L. NO. 0050021-0002

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
G	ECO-190	6-29-78	JPK		
F	ECO-151	12-15-77	SFS		
E	ECO-062	3-15-77	J.T.H.		
D	ECO-003	7-22-76	J.T.H.		
C	0698	6-25-76	G.L.G.		
B					
A					

DIGI-DATA CORPORATION

DR [illegible] 12-15-77 | ENG SFS 12-15-77 | CHK [illegible] 12-15-77 | TITLE: PA-16, 45 IPS, SGL. GAP, 1600 BPI

P.L. NO. 0050021-0002	SH. 1 OF 4	REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 2	PART NUMBER	DESCRIPTION	REFERENCE
207	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208	9	2250146-4470	CER. DISC, S2L, 1000V, 47 pF	C114, C214,
				C314, C414,
			C514, C614, C714, C814, C914	
			RESISTORS	
300	9	2150004-0364	DC, 1/4W, 5%, 360K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	
301	18	2150020-4422	M.F., 1%, 1/8W, 44.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002,	R1014, R2014,
			R3014, R4014, R5014, R6014, R7014,	R8014, R9014
303	9	2150020-1742	M.F., 1%, 1/8W, 17.4K OHM	R1016, R2016
				R3016, R4016,
			R5016, R6016, R7016, R8016, R9016	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0002

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, SGL. GAP, 1600 BPI

P.L. NO. 0050021-0002 | SH. 2 OF 4 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 2	PART NUMBER	DESCRIPTION	REFERENCE
304	36	2150020-7500	M.F., 1%, 1/8W, 750 OHM	R1018, R2018,
				R3018, R4018,
			R5018, R6018, R7018, R8018, R9018,	R1019, R2019,
			R3019, R4019, R5019, R6019, R7019,	R8019, R9019,
			R1020, R2020, R3020, R4020, R5020,	R6020, R7020,
			R8020, R9020, R1021, R2021, R3021,	R4021, R5021,
			R6021, R7021, R8021, R9021	
341	9	2150020-4751	M.F., 1%, 1/8W, 4.75K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	
342	9	2150020-4750	M.F., 1%, 1/8W, 475 OHM	R1042, R2042,
				R3042, R4042,
			R5042, R6042, R7042, R8042, R9042	
343	9	2150020-1742	M.F., 1%, 1/8W, 17.4K OHM	R1043, R2043,
				R3043, R4043,
			R5043, R6043, R7043, R8043, R9043	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0002

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, SGL. GAP, 1600 BPI

P.L. NO. 0050021-0002 | SH. 3 OF 4 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 2	PART NUMBER	DESCRIPTION	REFERENCE
375	18	2550002-0001	DIODE, SILICON (1N914)	CR106, CR206,
				CR306, CR406,
			CR506, CR606, CR706, CR806, CR906,	CR107, CR207,
			CR307, CR407, CR507, CR607, CR707,	CR807, CR907
410	9	2150004-0152	RESISTOR, DEPOSITED CARBON, 1/4W, 5%, 1.5K Ohm	R1017, R2017,
				R3017, R4017,
			R5017, R6017, R7017, R8017, R9017	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0002

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, SGL. GAP, 1600 BPI

P.L. NO. 0050021-0002 | SH. 4 OF 4 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 4	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	9	2250147-4101	CER. DISC, S3N, 1000V, 100 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904	
202	9	2250144-4479	CER. DISC., C0G, 1000V, 4.7 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905	
203	9	2250122-4222	MYLAR, W.F., 100V, .0022 pF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	
204				
205	9	2250144-3270	CER. DISC, C0G, 1000V, 27 pF, 5%	C112, C212,
				C312, C412,
			C512, C612, C712, C812, C912	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0004

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
G	ECO-190	6-24-78	JPP		
F	ECO-151	12-15-77	JPP		
E	ECO-068	3-15-77	J.T.H.		
D	ECO-005	7-22-76	J.T.H.		
C	0698	6-25-76	G.L.G.		
B					
A					

DIGI-DATA CORPORATION

DR [illegible] 12-15-77 | ENG JPP 12-15-77

CHK [illegible] 12-15-77

TITLE: PA-16 45 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0004 | SH. 1 OF 4 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 4	PART NUMBER	DESCRIPTION	REFERENCE
206	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C119, C219,
				C319, C419,
			C519, C619, C719, C819 C919	
207	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208	9	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C114, C214,
				C314, C414,
			C514, C614, C714, C814, C914	
223	9	2250116-4105	TANT. ELECT., 35V, 1 uF	C110, C210
				C310, C410,
			C510, C610, C710, C810, C910	
			RESISTORS	
300	9	2150004-0364	D.C., 1/4W, 5%, 360K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0004

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0004 | SH. 2 OF 4 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 4	PART NUMBER	DESCRIPTION	REFERENCE
301	9	2150020-4422	M.F., 1%, 1/8W, 44.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002	
302	9	2150004-0271	DC, 1/4W, 5%, 270 OHM	R1017, R2017,
				R3017, R4017,
			R5017, R6017, R7017, R8017, R9017	
303	9	2150004-0183	DC, 1/4W, 5%, 18K OHM	R1016, R2016,
				R3016, R4016,
			R5016, R6016, R7016, R8016, R9016	
304	36	2150004-0222	DC, 1/4W, 5%, 2.2K OHM	R1018, R2018,
				R3018, R4018,
			R5018, R6018, R7018, R8018, R9018,	R1019, R2019,
			R3019, R4019, R5019, R6019, R7019,	R8019, R9019,
			R1020, R2020, R3020, R4020, R5020,	R6020, R7020,
			R8020, R9020, R1021, R2021, R3021,	R4021, R5021,
			R6021, R7021, R8021, R9021	
340	9	2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
				R3014, R4014,
			R5014, R6041, R7014, R8014, R9014	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0004

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0004 | SH. 3 OF 4 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 4	PART NUMBER	DESCRIPTION	REFERENCE
341	9	2150020-1002	M.F., 1%, 1/8W, 10K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0004

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0004 | SH. 4 OF 4 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	20	2250147-4101	CER. DISC, S3N, 1000V, 100 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904, C116,	C216, C316,
			C416, C516, C616, C716, C816, C916,	C10, C11
202	9	2250144-4479	CER. DISC, C0G, 1000V, 4.7 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905	
203	9	2250122-3222	MYLAR, W.F., 100V, 5%, .0022 uF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	
204				
205	9	2250144-3270	CER. DISC, C0G, 1000V, 27 pF, 5%	C112, C212,
				C312, C412,
			C512, C612, C712, C812, C912	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0005

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
G	ECO-190	6-29-78	JPK		
F	ECO-151	12-15-77	[illegible]		
E	ECO-069	3-15-77	J.T.H.		
D	ECO-003	7-22-76	J.T.H.		
C	0698	6-25-76	G.L.G.		
B					
A					

DIGI-DATA CORPORATION

DR [illegible] 12-15-77 | ENG [illegible] 12-15-77

CHK [illegible] 12-15-77

TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0005 | SH. 1 OF 9 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
206	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C119, C219,
				C319, C419,
			C519, C619, C719, C819, C919	
207	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208	19	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C114, C214,
				C314, C414,
			C514, C614, C714. C814, C914, C108,	C208, C308,
			C408, C508, C608, C708, C808, C908,	C9
209				
210	10	2250134-5103	CER. DISC, Y5F, 20V, 20%, .01 uF	C107, C207,
				C307, C407,
			C507, C607, C707, C807, C907, C1	
211				
212	18	2250144-3200	CER. DISC, C0G, 1000V, 20 pF	C109, C209,
				C309, C409,
			C509, C609, C709, C809, C909, C117,	C217, C317,
			C417, C517, C617, C717, C817, C917	

BASIC VERSION

NOTES:

P.L. NO. 0500121-0005

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI

P.L. NO.	SH.	OF	REV.
0050021-0005	2	9	G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
213	9	2250122-4222	MYLAR, W.F., 100V, .0022 uF	C115, C215,
				C315, C415,
			C515, C615, C715, C815, C915	
214				
215				
216				
217	10	2250116-4105	TANT. ELECT., 35V, 1.0 uF	C110, C210,
				C310, C410,
			C510, C610, C710, C810, C910, C2	
218	1	2250122-4332	MYLAR, W.F., 100V, .0033 uF	C8
219				
220				
221				
222	1	2250133-7104	CER. DISC, Y5F, 10V, .1 uF	C15
223				
			TRANSISTORS	
275	21	2350016-0001	NPN SILICON ST (NS19030)	Q101, Q201,
				Q301, Q401,
			Q501, Q601, Q701, Q801, Q901, Q102,	Q202, Q302,
			Q402, Q502, Q602, Q702, Q802, Q902,	Q6, Q8, Q9

BASIC VERSION

NOTES:

P.L. NO. 0500121-0005

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI

P.L. NO.	SH.	OF	REV.
0050021-0005	3	9	G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
276				
277	2	2350017-0001	PNP SILICON (PN2907)	Q1, Q2
278				
			RESISTORS	
300	9	2150004-0364	DC, 1/4W, 5%, 360K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	
301	9	2150020-4422	M.F., 1%, 1/8W, 44.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002	
302	13	2150004-0152	DC, 1/4W, 5%, 1.5K OHM	R1011,R2011,
				R3011,R4011,
			R5011,R6011,R7011,R8011,R9011,R30,R32,R34,R35	
303	9	2150004-0183	DC, 1/4W, 5%, 18K OHM	R1016, R2016,
				R3016, R4016,
			R5016, R6016, R7016, R8016, R9016	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0005

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI

P.L. NO.	SH.	OF	REV.
0050021-0005	4	9	G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
304	36	2150004-0222	DC, 1/4W, 5%, 2.2K OHM	R1018, R2018,
				R3018, R4018,
			R5018, R6018, R7018, R8018, R9018,	R1019, R2019,
			R3019, R4019, R5019, R6019, R7019,	R8019, R9019,
			R1020, R2020, R3020, R4020, R5020,	R6020, R7020,
			R8020, R9020, R1021, R2021, R3021,	R4021, R5021,
			R6021, R7021, R8021, R9021	
305	49	2150004-0472	DC, 1/4W, 5%, 4.7K OHM	R1001, R2001,
				R3001, R4001,
			R5001, R6001, R7001, R8001, R9001,	R1009, R2009,
			R3009, R4009, R5009, R6009, R7009,	R8009, R9009,
			R1023, R2023, R3023, R4023, R5023,	R6023, R7023,
			R8023, R9023, R1026, R2026, R3026,	R4026, R5026,
			R6026, R7026, R8026, R9026, R1027,	R2027, R3027,
			R4027, R5027, R6027, R7027, R8027,	R9027, R17,
			R37, R38, R40	
306	18	2150020-4752	M.F., 1%, 1/8W, 47.5K OHM	R1008, R2008,
				R3008, R4008,
			R5008, R6008, R7008, R8008, R9008,	R1012, R2012,
			R3012, R4012, R5012, R6012, R7012,	R8012, R9012
307				

BASIC VERSION

NOTES:

P.L. NO. 0500121-0005

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI

P.L. NO.	SH.	OF	REV.
0050021-0005	5	9	G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
308	9	2150004-0223	DC, 1/4W, 5%, 22K OHM	R1010, R2010,
				R3010, R4010,
			R5010, R6010, R7010, R8010, R9010	
309				
310				
311	10	2150004-0471	DC, 1/4W, 5%, 470 OHM	R1022, R2022,
				R3022, R4022,
			R5022, R6022, R7022, R8022, R9022,	R31
312				
313	18	2150004-0153	DC, 1/4W, 5%, 15K OHM	R1024, R2024,
				R3024, R4024,
			R5024, R6024, R7024, R8024, R9024,	R1, R2, R8,
			R10, R26, R27, R29, R33, R39,	
314	9	2150004-0154	DC, 1/4W, 5%, 150K OHM	R1025, R2025,
				R3025, R4025,
			R5025, R6025, R7025, R8025, R9025	
315				
316				
317				
318				
319				

BASIC VERSION — NOTES:

DIGI-DATA CORPORATION

DR | ENG
CHK
TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI
P.L. NO. 0050021-0005 | SH. 6 OF 9 | REV. G

REV. | CHG. NO. | DATE | APPR. | NEXT ASSY. | USED ON

P.L. NO. 0050021-0005

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
320				
321				
322	1	2150020-4021	M.F., 1%, 1/8W, 4.02K OHM	R9
323				
324	1	2150020-1822	M.F., 1%, 1/8W, 18.2K OHM	R11
325				
326	1	2150020-8250	M.F., 1%, 1/8W, 825 OHM	R18
327	1	2150004-0470	DC, 1/4W, 5%, 47 OHM	R20
328				
329				
330				
331				
332				
333				
334				
335				
336				
337				
338				
339	1	2150020-2552	M.F., 1%, 1/8W, 25.5K OHM	R41

BASIC VERSION — NOTES:

DIGI-DATA CORPORATION

DR | ENG
CHK
TITLE: PA-16, 45 IPS, DUAL GAP, 800/1600 BPI
P.L. NO. 0050021-0005 | SH. 7 OF 9 | REV. G

REV. | CHG. NO. | DATE | APPR. | NEXT ASSY. | USED ON

P.L. NO. 0050021-0005

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
340	9	2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
				R3014, R4014,
			R5014, R6014, R7014, R8014, R9014	
341	9	2150020-1002	M.F., 1%, 1/8W, 10.0K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	
376	46	2550002-0001	DIODE, SILICON FS (1N914)	CR101, CR201,
				CR301, CR401,
			CR501, CR601, CR701, CR801, CR901,	CR102, CR202,
			CR302, CR402, CR502, CR602, CR702,	CR802, CR902,
			CR103, CR203, CR303, CR403, CR503,	CR603, CR703,
			CR803, CR903, CR108, CR208, CR308,	CR408, CR508,
			CR608, CR708, CR808, CR908, CR112,	CR212, CR312,
			CR412, CR512, CR612, CR712, CR812,	CR912, CR5
			INTEGRATED CIRCUITS	
400	9	2451167-7011	OP AMP (709)	U102, U202,
				U302, U402,
			U502, U602, U702, U802, U902	

BASIC VERSION — NOTES:

DIGI-DATA CORPORATION

DR | ENG
CHK
TITLE: PA-16 45 IPS DUAL GAP, 800/1600 BPI
P.L. NO. 0050021-0005 | SH. 8 OF 9 | REV. G

REV. | CHG. NO. | DATE | APPR. | NEXT ASSY. | USED ON

P.L. NO. 0050021-0005

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 5	PART NUMBER	DESCRIPTION	REFERENCE
401	4	2450063-1846	DTL GATES (846)	U7, U9, U11,U13
402	1	2451104-7411	OP AMP (741)	U1
403	2	2450056-6123	54/74 MONO. MULTIVIB. (74123)	U3, U5
404	1	2450063-1844	DTL GATES (844)	U4
410	9	2150004-0271	RESISTOR,DEPOSITED CARBON,1/4W, 5%,270 Ohm	R1017,R2017,
				R3017,R4017,
			R5017,R6017,R7017,R8017,R9017	

BASIC VERSION — NOTES:

DIGI-DATA CORPORATION

DR | ENG
CHK
TITLE: PA-16 45 IPS, DUAL GAP, 800/1600 BPI
P.L. NO. 0050021-0005 | SH. 9 OF 9 | REV. G

REV. | CHG. NO. | DATE | APPR. | NEXT ASSY. | USED ON

P.L. NO. 0050021-0005

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 6	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904	
202	9	2250144-3200	CER. DISC, C0G, 1000V, 20 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905	
203	9	2250122-4332	MYLAR, W.F., 100V, .0033 uF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	
204	9	2250146-4470	CER. DISC, S2L, 1000V, 47 pF	C111, C211,
				C311, C411,
			C511, C611, C711, C811, C911	
205	9	2250146-4330	CER. DISC, S2L, 1000V, 33 pF	C112, C212,
				C312, C412,
			C512, C612, C712, C812, C912	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0006

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
E	ECO-190	6-27-78	JPK		
D	ECO-151	12-15-77			
C	ECO-069	3-15-77	J.T.H.		
B	ECO-003	7-22-76	J.T.H.		
A	0698	6-25-76	G.L.G.		

DIGI-DATA CORPORATION

DR 12-15-77 ENG 12-15-77

CHK 12-15-77

TITLE: PA-16, 37.5 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0006 SH. 1 OF 3 REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 6	PART NUMBER	DESCRIPTION	REFERENCE
206	18	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C119, C219,
				C319, C419,
			C519, C619, C719, C819, C919, C114,	C214, C314,
			C414, C514, C614, C714, C814, C914	
207	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208				
223	9	2250116-4105	TANT. ELECT., 35V, 1 uF	C110, C210,
				C310, C410,
			C510, C610, C710, C810, C910	
			RESISTORS	
300	9	2150004-0224	DC, 1/4W, 5%, 220K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	
301	9	2150020-3322	M.F., 1%, 1/8W, 33.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0006

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR ENG

CHK

TITLE: PA-16, 37.5 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0006 SH. 2 OF 3 REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 6	PART NUMBER	DESCRIPTION	REFERENCE
302	18	2150004-0152	DC, 1/4W, 5%, 1.5K OHM	R1015, R2015,
				R3015, R4015,
			R5015, R6015, R7015, R8015, R9015, R1017, R2017,	
			R3017, R4017, R5017, R6017, R7017, R8017, 9017	
303	9	2150004-0223	DC, 1/4W, 5%, 22K OHM	R1016, R2016,
				R3016, R4016,
			R5016, R6016, R7016, R8016, R9016	
304	36	2150004-0222	DC, 1/4W, 5%, 2.2K OHM	R1018, R2018,
				R3018, R4018,
			R5018, R6018, R7018, R8018, R9018,	R1019, R2019,
			R3019, R4019, R5019, R6019, R7019,	R8019, R9019,
			R1020, R2020, R3020, R4020, R5020,	R6020, R7020,
			R8020, R9020, R1021, R2021, R3021,	R4021, R5021,
			R6021, R7021, R8021, R9021	
340	9	2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
				R3014, R4014,
			R5014, R6014, R7014, R8014, R9014	
341	9	2150020-1002	M.F., 1%, 1/8W, 10.0K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0006

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

DIGI-DATA CORPORATION

DR ENG

CHK

TITLE: PA-16, 37.5 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0006 SH. 3 OF 3 REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904	
202	27	2250144-3200	CER. DISC, C0G, 1000V, 20 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905, C109,	C209, C309,
			C409, C509, C609, C709, C809, C909,	C117, C217,
			C317, C417, C517, C617, C717, C817,	C917
203	9	2250122-3332	MYLAR, W.F., 100V, 5%, .0033 uF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	
204	9	2250146-4470	CER. DISC, S2L, 1000V, 47 pF	C111, C211,
				C311, C411,
			C511, C611, C711, C811, C911	
205	9	2250146-4470	CER. DISC, S2L, 1000V, 33 pF	C112, C212,
				C312, C412,

BASIC / VERSION

NOTES:

P.L. NO. 0050021-0007

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
E	ECO-190	6-27-78	JPK		
D	ECO-151	12-15-77			
C	ECO-069	3-15-77	J.T.H.		
B	ECO-003	7-22-76	J.T.H.		
A	0698	6-25-76	G.L.G.		

DIGI-DATA CORPORATION

DR 12-15-77 ENG 12-15-77

CHK 12-15-77

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0007 SH. 1 OF 8 REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
			C512, C612, C712, C812, C912	
206	28	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C119, C219,
				C319, C419,
			C519, C619, C719, C819, C919, C114,	C214, C314,
			C414, C514, C614, C714, C814, C914,	C108, C208,
			C308, C408, C508, C608, C708, C808,	C908, C9
207	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208				
209				
210	10	2250134-5103	CER. DISC, Y5F, 20V, 20%, .01 uF	C107, C207,
				C307, C407,
			C507, C607, C707, C807, C907, C1	
211				
212				
213	10	2250122-4332	MYLAR, W.F., 100V, .0033 uF	C115, C215,
				C315, C415,
			C515, C615, C715, C815, C915, C8	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0007	SH. 2 OF 8	REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
214	11	2250147-4101	CER. DISC, S3N, 1000V, 100 pF	C116, C216,
				C316, C416,
			C516, C616, C716, C816, C916, C10,	C11
215				
216				
217	10	2250116-4105	TANT. ELECT., 35V, 1.0 uF	C110, C210,
				C310, C410,
			C510, C610, C710, C810, C910, C2	
218				
219				
220				
221				
222	1	2250133-7104	CER. DISC, Y5F, 10V, .1 uF	C15
223				
			TRANSISTORS	
275	21	2350016-0001	NPN SILICON (STNS19030)	Q101, Q201,
				Q301, Q401,
			Q501, Q601, Q701, Q801, Q901, Q102	Q202, Q302,
			Q402, Q502, Q602, Q702, Q802, Q902	Q6, Q8, Q9
276				
277	2	2350017-0001	PNP SILICON (PN2907)	Q1, Q2
278				

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0007	SH. 3 OF 8	REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
			RESISTORS	
300	9	2150004-0224	DC, 1/4W, 5%, 220K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	
301	9	2150020-3322	M.F., 1%, 1/8W, 33.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002	
302	31	2150004-0152	DC, 1/4W, 5%, 1.5K OHM	R1011, R2011,
				R3011, R4011,
			R5011, R6011, R7011, R8011, R9011,	R1015, R2015,
			R3015, R4015, R5015, R6015, R7015,	R8015, R9015,
			R1017,R2017,R3017,R4017,R5017,R6017,R7017,R8017,	
			R9017,R30,R32,R34,R35	
303	18	2150004-0223	DC, 1/4W, 5%, 22K OHM	R1010, R2010,
				R3010, R4010,
			R5010, R6010, R7010, R8010, R9010,	R1016, R2016,
			R3016, R4016, R5016, R6016, R7016,	R8016, R9016
304	36	2150004-0222	DC, 1/4W, 5%, 2.2K OHM	R1018, R2018,
				R3018, R4018,
			R5018, R6018, R7018, R8018, R9018,	R1019, R2019,

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0007	SH. 4 OF 8	REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
			R3019, R4019, R5019, R6019, R7019,	R8019, R9019,
			R1020, R2020, R3020, R4020, R5020,	R6020, R7020,
			R8020, R9020, R1021, R2021, R3021,	R4021, R5021,
			R6021, R7021, R8021, R9021	
305	49	2150004-0472	DC, 1/4W, 5%, 4.7K OHM	R1001, R2001,
				R3001, R4001,
			R5001, R6001, R7001, R8001, R9001,	R1009, R2009,
			R3009, R4009, R5009, R6009, R7009,	R8009, R9009,
			R1023, R2023, R3023, R4023, R5023,	R6023, R7023,
			R8023, R9023, R1026, R2026, R3026,	R4026, R5026,
			R6026, R7026, R8026, R9026, R1027,	R2027, R3027,
			R4027, R5027, R6027, R7027, R8027,	R9027, R17, R37,
			R38, R40	
306	18	2150020-4752	M.F., 1%, 1/8W, 47.5K OHM	R1008, R2008,
				R3008, R4008,
			R5008, R6008, R7008, R8008, R9008,	R1012, R2012,
			R3012, R4012, R5012, R6012, R7012,	R8012, R9012
307				
308				
309				
310				

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON	P.L. NO. 0050021-0007	SH. 5 OF 8	REV. E

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
311	10	2150004-0471	DC, 1/4W, 5%, 470 OHM	R1022, R2022,
				R3022, R4022,
			R5022, R6022, R7022, R8022, R9022,	R31
312				
313	18	2150004-0153	DC, 1/4W, 5%, 15K OHM	R1024, R2024,
				R3024, R4024,
			R5024, R6024, R7024, R8024, R9024,	R1, R2, R8, R10,
			R26, R27, R29, R33, R39	
314	9	2150004-0154	DC, 1/4W, 5%, 150K OHM	R1025, R2025,
				R3025, R4025,
			R5025, R6025, R7025, R8025, R9025	
315				
316				
317				
318				
319				
320				
321				
322	1	2150020-4021	M.F., 1%, 1/8W, 4.02K OHM	R9
323				
324	1	2150020-1822	M.F., 1%, 1/8W, 18.2K OHM	R11
325				

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0007 | SH. 6 OF 8 | REV. E

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
326	1	2150020-8250	M.F., 1%, 1/8W, 825 OHM	R18
327	1	2150004-0470	DC, 1/4W, 5%, 47 OHM	R20
328				
329				
330				
331				
332				
333				
334				
335				
336				
337				
338				
339	1	2150020-2552	M.F., 1%, 1/8W, 25.5K OHM	R41
340	9	2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
				R3014, R4014,
			R5014, R6014, R7014, R8014, R9014	
341	9	2150020-1002	M.F., 1%, 1/8W, 10.0K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0007 | SH. 7 OF 8 | REV. F

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 7	PART NUMBER	DESCRIPTION	REFERENCE
376	46	2550002-0001	DIODE, SILICON, FS (1N914)	CR101, CR201,
				CR301, CR401,
			CR501, CR601, CR701, CR801, CR901,	CR102, CR202,
			CR302, CR402, CR502, CR602, CR702,	CR802, CR902,
			CR103, CR203, CR303, CR403, CR503,	CR603, CR703,
			CR803, CR903, CR108, CR208, CR308,	CR408, CR508,
			CR608, CR708, CR808, CR908, CR112,	CR212, CR312,
			CR412, CR512, CR612, CR712, CR812,	CR912, CR5
			INTEGRATED CIRCUITS	
400	9	2451167-7011	OP AMP (709)	U102, U202,
				U302, U402,
			U502, U602, U702, U802, U902	
401	4	2450063-1846	DTL GATES (846)	U7, U9, U11, U13
402	1	2451104-7411	OP AMP (741)	U1
403	2	2450056-6123	54/74 MONO. MULTIVIB. (74123)	U3, U5
404	1	2450063-1844	DTL GATES (844)	U4

BASIC VERSION

NOTES:

P.L. NO. 0050021-0007

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 37.5 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0007 | SH. 8 OF 8 | REV. E

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 8	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	27	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904, C119,	C219, C319,
			C419, C519, C619, C719, C819, C919,	C114, C214,
			C314, C414, C514, C614, C714, C814,	C914
202	27	2250144-3200	CER. DISC, C0G, 1000V, 20 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905, C111,	C211, C311,
			C411, C511, C611, C711, C811, C911,	C112, C212,
			C312, C412, C512, C612, C712, C812,	C912
203	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	
204				
205				
206				
207	9	2250122-4682	MYLAR, W.F., 100V, .0068 uF	C120, C220,
				C320, C420,

BASIC VERSION

NOTES:

P.L. NO. 0050021-0008

DIGI-DATA CORPORATION

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON
G	ECO-190	6-29-78	JPK		
F	ECO-151	12-15-77	[illegible]		
E	ECO-062	3-15-77	J.T.H.		
D	ECO-003	7-22-76	J.T.H.		
C	0698	6-25-76	G.L.G.		
A					

DR [illegible] 12-15-77 | ENG [illegible] 12-15-77

CHK [illegible] 12-15-77

TITLE: PA-16, 25 IPS DUAL GAP, 1600 BPI

P.L. NO. 0050021-0008 | SH. 1 OF 3 | REV. G

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 8	PART NUMBER	DESCRIPTION	REFERENCE
			C520, C620, C720, C820, C920	
208				
223	9	2250116-4105	TANT. ELECT., 35V, 1 uF	C110, C210,
				C310, C410,
			C510, C610, C710, C810, C910	
			RESISTORS	
300	9	2150004-0304	DC, 1/4W, 5%, 300K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	
301	9	2150020-3322	M.F., 1%, 1/8W, 33.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002	
302	45	2150004-0222	DC, 1/4W, 5%, 2.2K OHM	R1015, R2015,
				R3015, R4015,
			R5015, R6015, R7015, R8015, R9015,	R1018, R2018,
			R3018, R4018, R5018, R6018, R7018,	R8018, R9018,
			R1019, R2019, R3019, R4019, R5019,	R6019, R7019,
			R8019, R9019, R1020, R2020, R3020,	R4020, R5020,
			R6020, R7020, R8020, R9020, R1021,	R2021, R3021,
			R4021, R5021, R6021, R7021, R8021,	R9021

BASIC VERSION

NOTES:

P.L. NO. 0050021-0008

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 25 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0008 | SH. 2 OF 3 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 8	PART NUMBER	DESCRIPTION	REFERENCE
303	9	2150004-0333	DC, 1/4W, 5%, 33K OHM	R1016, R2016,
				R3016, R4016,
			R5016, R6016, R7016, R8016, R9016,	
304				
340	9	2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
				R3014, R4014,
			R5014, R6014, R7014, R8014, R9014	
341	9	2150020-1002	M.F., 1%, 1/8W, 10.0K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	
410	9	2150004-0152	D.C.,1/4W,5%,1.5K Ohm	R1017,R2017,
				R3017,R4017,
			R5017,R6017,R7017,R8017,R9017	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0008

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 25 IPS, DUAL GAP, 1600 BPI

P.L. NO. 0050021-0008 | SH. 3 OF 3 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	87	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904, C108,	C208, C308,
			C408, C508, C608, C708, C808, C908,	C114, C214,
			C314, C414, C514, C614, C714, C814,	C914, C119,
			C219, C319, C419, C519, C619, C719,	C819, C919, C9
202	45	2250144-3200	CER. DISC, COG, 1000V, 20 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905, C109,	C209, C309,
			C409, C509, C609, C709, C809, C909,	C111, C211,
			C311, C411, C511, C611, C711, C811,	C911, C112,
			C212, C312, C412, C512, C612, C712,	C812, C912,
			C117, C217, C317, C417, C517, C617,	C717, C817,
			C917	
203	9	2250122-3472	MYLAR, W.F., 100V, 5%, .0047 uF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

REV.		
G	ECO-190	6-29-78 JPK
F	ECO-151	12-15-77 SAS-Y
E	ECO-069	3-15-77 J.T.H.
D	ECO-002	7-22-76 J.T.H.
C	0698	6-25-76 G.L.G.
A		

DIGI-DATA CORPORATION

DR RAB	12-15-77	ENG SAS-Y	12-15-77
CHK DCY	12-15-77		

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 1 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
204				
205				
206				
207	9	2250122-4682	MYLAR, W.F., 100V, .0068 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208				
209				
210	10	2250134-5103	CER. DISC, Y5F, 20V, 20%, .01 uF	C107, C207,
				C307, C407,
			C507, C607, C707, C807, C907, C1	
211				
212				
213	10	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C115, C215,
				C315, C415,
			C515, C615, C715, C815, C915, C8	
214	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C116, C216,
				C316, C416,
			C516, C616, C716, C816, C916	
215				
216				

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 2 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
217	10	2250116-4105	TANT. ELECT., 35V, 1.0 uF	C110, C210,
				C310, C410,
			C510, C610, C710, C810, C910, C2	
218				
219				
220	2	2250147-4101	CER. DISC, S3N, 1000V, 100 pF	C10, C11
221				
222	1	2250133-7104	CER. DISC, Y5F, 10V, .1 uF	C15
223				
			TRANSISTORS	
275	21	2350016-0001	NPN, SILICON NS(ST19030)	Q101, Q201,
				Q301, Q401,
			Q501, Q601, Q701, Q801, Q901, Q102,	Q202, Q302,
			Q402, Q502, Q602, Q702, Q802, Q902,	Q6, Q8, Q9
276				
277	2	2350017-0001	PNP, SILICON (PN2907)	Q1, Q2
278				
			RESISTORS	
300	9	2150004-0304	DC, 1/4W, 5%, 300K OHM	R1039, R2039,
				R3039, R4039,
			R5039, R6039, R7039, R8039, R9039	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 3 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
301	9	2150020-3322	M.F., 1%, 1/8W, 33.2K OHM	R1002, R2002,
				R3002, R4002,
			R5002, R6002, R7002, R8002, R9002	
302	45	2150004-0222	DC, 1/4W, 5%, 2.2K OHM	R1015, R2015,
				R3015, R4015,
			R5015, R6015, R7015, R8015, R9015,	R1018, R2018,
			R3018, R4018, R5018, R6018, R7018,	R8018, R9018,
			R1019, R2019, R3019, R4019, R5019,	R6019, R7019,
			R8019, R9019, R1020, R2020, R3020,	R4020, R5020,
			R6020, R7020, R8020, R9020, R1021,	R2021, R3021,
			R4021, R5021, R6021, R7021, R8021,	R9021
303	9	2150004-0333	DC. 1/4W, 5%, 33K OHM	R1016, R2016,
				R3016, R4016,
			R5016, R6016, R7016, R8016, R9016	
304				
305	49	2150004-0472	DC, 1/4W, 5%, 4.7K OHM	R1001, R2001,
				R3001, R4001,
			R5001, R6001, R7001, R8001, R9001,	R1009, R2009,
			R3009, R4009, R5009, R6009, R7009,	R8009, R9009,
			R1023, R2023, R3023, R4023, R5023,	R6023, R7023,
			R8023, R9023, R1026, R2026, R3026,	R4026, R5026,

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 4 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
			R6026, R7026, R8026, R9026, R1027,	R2027, R3027,
			R4027, R5027, R6027, R7027, R8027,	R9027, R17, R37,
			R38, R40	
306	18	2150020-4752	M.F., 1%, 1/8W, 47.5K OHM	R1008, R2008,
				R3008, R4008,
			R5008, R6008, R7008, R8008, R9008,	R1012, R2012,
			R3012, R4012, R5012, R6012, R7012,	R8012, R9012
307				
308	9	2150004-0223	DC, 1/4W, 5%, 22K OHM	R1010, R2010,
				R3010, R4010,
			R5010, R6010, R7010, R8010, R9010	
309	22	2150004-0152	DC, 1/4W, 5%, 1.5K OHM	R1011, R2011,
				R3011, R4011,
			R5011,R6011,R7011,R8011,R9011,R1017,R2017,R3017,	
			R4017,R5017,R6017,R7017,R8017,R9017,R30,R32,R34,R35	
310				
311	10	2150004-0471	DC, 1/4W, 5%, 470 OHM	R1022, R2022,
				R3022, R4022,
			R5022, R6022, R7022, R8022, R9022,	R31
312				
313	18	2150004-0153	DC, 1/4W, 5%, 15K OHM	R1021, R2024,

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 5 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
			R3024, R4024, R5024, R6024, R7024,	R8024, R9024,
			R1, R2, R8, R10, R26, R27, R29, R33,	R39
314	9	2150004-0154	DC. 1/4W, 5%, 150K OHM	R1025, R2025,
				R3025, R4025,
			R5025, R6025, R7025, R8025, R9025	
315				
316				
317				
318				
319				
320				
321				
322	1	2150020-4021	M.F., 1%, 1/8W, 4.02K OHM	R9
323				
324	1	2150020-1822	M.F., 1%, 1/8W, 18.2K OHM	R11
325				
326	1	2150020-8250	M.F., 1%, 1/8W, 825 OHM	R18
327	1	2150004-0470	DC, 1/4W, 5%, 47 OHM	R20
328				
329				
330				
331				

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 6 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
332				
333				
334				
335				
336				
337				
338				
339	1	2150020-2552	M.F., 1%, 1/8W, 25.5K OHM	R41
340	9	2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
				R3014, R4014,
			R5014, R6014, R7014, R8014, R9014	
341	9	2150020-1002	M.F., 1%, 1/8W, 10.0K OHM	R1007, R2007,
				R3007, R4007,
			R5007, R6007, R7007, R8007, R9007	
376	46	2550002-0001	DIODE, SILICON, F.S. (1N914)	CR101, CR201,
				CR301, CR401,
			CR501, CR601, CR701, CR801, CR901,	CR102, CR202,
			CR302, CR402, CR502, CR602, CR702,	CR802, CR902,
			CR103, CR203, CR303, CR403, CR503, CR603,	CR703, CR803,
			CR903, CR108, CR208, CR308, CR408,	CR508, CR608,

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 7 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 9	PART NUMBER	DESCRIPTION	REFERENCE
			CR708, CR808, CR908, CR112, CR212,	CR312, CR412,
			CR512, CR612, CR712, CR812, CR912,	CR5
			INTEGRATED CIRCUITS	
400	9	2451167-7011	OP AMP (709)	U102, U202,
				U302, U402,
			U502, U602, U702, U802, U902	
401	4	2450063-1846	DTL GATES (846)	U7, U9,U11,U13
402	1	2451104-7411	OP AMP (741)	U1
403	2	2450056-6123	54/74 MONO. MULTIVIB. (74123)	U3, U5
404	1	2450063-1844	DTL GATES (844)	U4

BASIC VERSION

NOTES:

P.L. NO. 0050021-0009

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 25 IPS, DUAL GAP, 800/1600 BPI

P.L. NO. 0050021-0009 | SH. 8 OF 8 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10	PART NUMBER	DESCRIPTION	REFERENCE
200	1	0050021-0001	PA-16 BASIC	
			CAPACITORS	
201	20	2250147-4101	CER. DISC, S3N, 1000V, 100 pF	C104, C204,
				C304, C404,
			C504, C604, C704, C804, C904, C116,	C216, C316,
			C416, C516, C616, C716, C816, C916,	C10, C11
202	9	2250144-4479	CER. DISC, COG, 1000V, 4.7 pF	C105, C205,
				C305, C405,
			C505, C605, C705, C805, C905	
203	9	2250122-3222	MYLAR, W.F., 100V, 5%, .0022 uF	C106, C206,
				C306, C406,
			C506, C606, C706, C806, C906	
204	9	2250146-4470	CER. DISC, S2L, 1000V, 47 pF	C111, C211,
				C311, C411,
			C511, C611, C711, C811, C911	
205	9	2250146-4330	CER. DISC, S2L, 1000V, 33 pF	C112, C212,
				C312, C412,
			C512, C612, C712, C812, C912	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0010

REV.	CHG. NO.	DATE	APPR.
G	ECO-190	6-29-78	JPE
F	ECO-151	12-5-77	
E	ECO-069	5-15-77	J.T.H.
D	ECO-033	1-25-77	J.T.H
C	ECO-032	6-25-76	G.L.G
A			

DIGI-DATA CORPORATION

DR 12-1-77 | ENG 12-5-77

CHK 12-5-77

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 1 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10	PART NUMBER	DESCRIPTION	REFERENCE
206	9	2250148-4221	CER. DISC, Z5F, 1000V, 220 pF	C119, C219,
				C319, C419,
			C519, C619, C719, C819, C919	
207	9	2250122-4472	MYLAR, W.F., 100V, .0047 uF	C120, C220,
				C320, C420,
			C520, C620, C720, C820, C920	
208	19	2250148-4471	CER. DISC, Z5F, 1000V, 470 pF	C108, C208,
				C308, C408,
			C508, C608, C708, C808, C908, C114,	C214, C314,
			C414, C514, C614, C714, C814, C914,	C9
209				
210	10	2250134-5103	CER. DISC, Y5F, 20V., 20%, .01 uF	C107, C207,
				C307, C407,
			C507, C607, C707, C807, C907, C1	
211				
212	18	2250144-3200	CER. DISC, COG, 1000V, 20 pF	C109, C209,
				C309, C409,
			C509, C609, C709, C809, C909, C117	C217, C317,
			C417, C517, C617, C717, C817, C917	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR | ENG

CHK

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 2 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
213	9				2250122-4222	MYLAR, W.F., 100V, .0022 uF	C115, C215,
							C315, C415,
						C515, C615, C715, C815, C915	
214							
215							
216							
217	10				2250116-4105	TANT. ELECT., 35V, 1.0 uF	C110, C210,
							C310, C410,
						C510, C610, C710, C810, C910, C2	
218	1				2250122-4332	MYLAR, W.F., 100V, .0033 uF	C8
219							
220							
221							
222	1				2250133-7104	CER. DISC, Y5F, 10V, .1 uF	C15
223							
						TRANSISTORS	
275	21				2350016-0001	NPN SILICON, NS, (ST19030)	Q101, Q201,
							Q301, Q401,
						Q501, Q601, Q701, Q801, Q901, Q102	Q202, Q302,
						Q402, Q502, Q602, Q702, Q802, Q902	Q6, Q8, Q9

BASIC | VERSION | NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 3 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
276							
277	2				2350017-0001	PNP SILICON, (PN2907)	Q1, Q2
278							
						RESISTORS	
300	9				2150004-0364	DC, 1/4W, 5%, 360K OHM	R1039, R2039,
							R3039, R4039,
						R5039, R6039, R7039, R8039, R9039	
301	9				2150020-4422	M.F., 1%, 1/8W, 44.2K OHM	R1002, R2002,
							R3002, R4002,
						R5002, R6002, R7002, R8002, R9002	
302	31				2150004-0152	DC, 1/4W, 5%, 1.5K OHM	R1011, R2011,
							R3011, R4011,
						R5011,R6011,R7011,R8011,R9011,R1015,R2015,R3015,	
						R4015,R5015,R6015,R7015,R8015,R9015,R1017,R2017,	
						R3017,R4017,R5017,R6017,R7017,R8017,R9017,R30,R32,	
						R34,R35	
303	9				2150004-0183	DC, 1/4W, 5%, 18K OHM	R1016, R2016,
							R3016, R4016,
						R5016, R6016, R7016, R8016, R9016	

BASIC | VERSION | NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 4 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
304	36				2150004-0751	DC, 1/4W, 5%, 750 OHM	R1018, R2018,
							R3018, R4018,
						R5018, R6018, R7018, R8018, R9018,	R1019, R2019,
						R3019, R4019, R5019, R6019, R7019,	R8019, R9019,
						R1020, R2020, R3020, R4020, R5020,	R6020, R7020,
						R8020, R9020, R1021, R2021, R3021,	R4021, R5021,
						R6021, R7021, R8021, R9021,	
305	49				2150004-0472	DC, 1/4W, 5%, 4.7K OHM	R1001, R2001,
							R3001, R4001,
						R5001, R6001, R7001, R8001, R9001,	R1009, R2009,
						R3009, R4009, R5009, R6009, R7009,	R8009, R9009,
						R1023, R2023, R3023, R4023, R5023,	R6023, R7023
						R8023, R9023, R1026, R2026, R3026,	R4026, R5026,
						R6026, R7026, R8026, R9026, R1027,	R2027, R3027,
						R4027, R5027, R6027, R7027, R8027,	R9027, R17,
						R37, R38, R40	
306	18				2150020-4752	M.F., 1%, 1/8W, 47.5K OHM	R1008, R2008
							R3008, R4008,
						R5008, R6008, R7008, R8008, R9008,	R1012, R2012,
						R3012, R4012, R5012, R6012, R7012,	R8012, R9012

BASIC | VERSION | NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 5 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
307							
308	9				2150004-0223	DC, 1/4W, 5%, 22K OHM	R1010, R2010,
							R3010, R4010,
						R5010, R6010, R7010, R8010, R9010	
309							
310							
311	10				2150004-0471	DC, 1/4W, 5%, 470 OHM	R1022, R2022,
							R3022, R4022,
						R5022, R6022, R7022, R8022, R9022,	R31
312							
313	18				2150004-0153	DC, 1/4W, 5%, 15K OHM	R1024, R2024,
							R3024, R4024,
						R5024, R6024, R7024, R8024, R9024,	R1, R2, R8, R10,
						R26, R27, R29, R33, R39	
314	9				2150004-0154	DC, 1/4W, 5%, 150K OHM	R1025, R2025,
							R3025, R4025,
						R5025, R6025, R7025, R8025, R9025	
315							
316							
317							
318							
319							

BASIC | VERSION | NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR		ENG	
CHK			

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 6 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
320							
321							
322	1				2150020-4021	M.F., 1%, 1/8W, 4.02K OHM	R9
323							
324	1				2150020-1822	M.F., 1%, 1/8W, 18.2K OHM	R11
325							
326	1				2150020-8250	M.F., 1%, 1/8W, 825 OHM	R18
327	1				2150004-0470	DC, 1/4W, 5%, 47 OHM	R20
328							
329							
330							
331							
332							
333							
334							
335							
336							
337							
338							
339	1				2150020-2552	M.F., 1%, 1/8W, 25.5K OHM	R41
340	9				2150004-0683	DC, 1/4W, 5%, 68K OHM	R1014, R2014,
							R3014, R4014,
						R5014, R6014, R7014, R8014, R9014	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR | | ENG |

CHK

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 7 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
341	9				2150020-1002	M.F., 1%, 1/8W, 10.0K OHM	R1007, R2007
							R3007, R4007,
						R5007, R6007, R7007, R8007, R9007	
375	82				2550002-0001	DIODE, SILICON, FS (1N914)	CR101, CR201,
							CR301, CR401,
						CR501, CR601, CR701, CR801, CR901,	CR102, CR202,
						CR302, CR402, CR502, CR602, CR702,	CR802, CR902,
						CR103, CR203, CR303, CR403, CR503,	CR603, CR703,
						CR803, CR903, CR104, CR204, CR304,	CR404, CR504,
						CR604, CR704, CR804, CR904, CR105,	CR205, CR305,
						CR405, CR505, CR605, CR705, CR805,	CR905, CR106,
						CR206, CR306, CR406, CR506, CR606,	CR706, CR806,
						CR906, CR107, CR207, CR307, CR407,	CR507, CR607,
						CR707, CR807, CR907, CR108, CR208,	CR308, CR408,
						CR508, CR608, CR708, CR808, CR908,	CR112, CR212,
						CR312, CR412, CR512, CR612, CR712,	CR812, CR912,
						CR5	
						INTEGRATED CIRCUITS	
400	9				2451167-7011	OP AMP (709)	U102, U202,
							U302, U402,
						U502, U602, U702, U802, U902	

BASIC VERSION

NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR | | ENG |

CHK

TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

P.L. NO. 0050021-0010 | SH. 8 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

ITEM	QTY/DASH 10				PART NUMBER	DESCRIPTION	REFERENCE
401	4				2450063-1846	DTL GATES (846)	U7, U9, U11, U13
402	1				2451104-7411	OP AMP (741)	U1
403	2				2450056-6123	54/74 MONO. MULTIVIB. (74123)	U3, U5
404	1				2450063-1844	DTL GATE (844)	U4

BASIC VERSION

NOTES:

P.L. NO. 0050021-0010

DIGI-DATA CORPORATION

DR | | ENG |

CHK

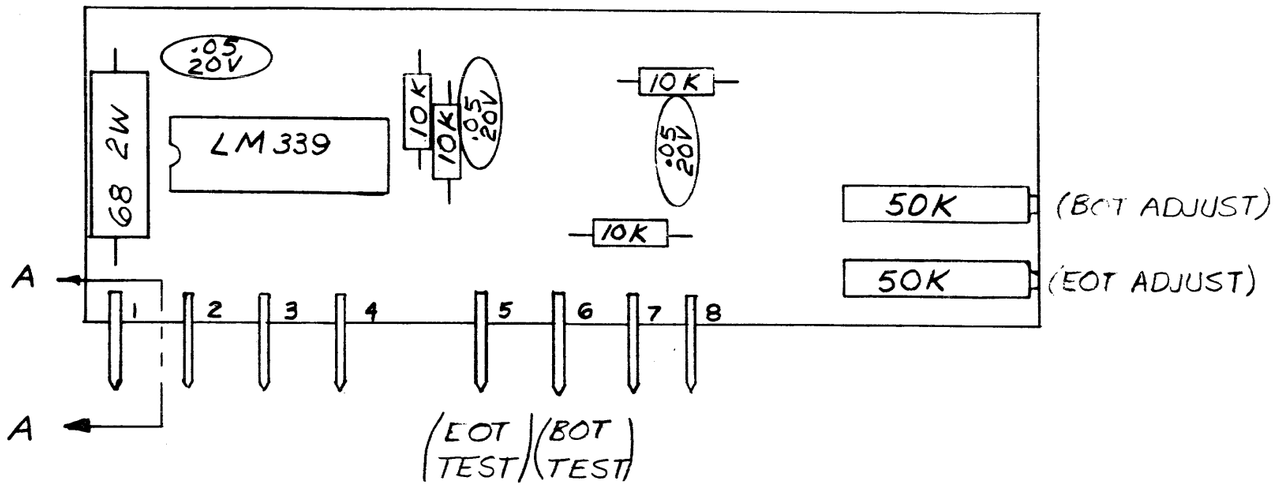
TITLE: PA-16, 45 IPS, SGL. GAP, 800/1600 BPI

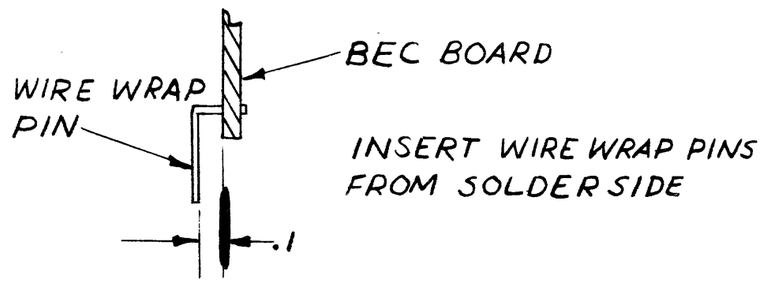
P.L. NO. 0050021-0010 | SH. 9 OF 9 | REV. G

REV.	CHG. NO.	DATE	APPR.	NEXT ASSY.	USED ON

D.D. FORM 04-1-50001-0000

REV	ECN NO	DATE	APP
A	0362	11/20/74	PJ
B	0426	1/31/75	DDW
C	0492	5-28-75	PJ
D	P/N WAS 40-2-00693 (P/N CHG ONLY)	8-4-77	Tom Alt





SECTION A-A

NOTES:

1. PARTS LIST 0000694-0000
2. EXCEPT WHERE NOTED: ALL RESISTOR VALUES IN OHMS, 5% 1/4 W, ALL CAPACITOR VALUES ARE IN MFD.
3. ASSY. NO. -0001 (AS SHOWN)

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH-	DR- J. EUSTIS	11/20/74	
		TOLERANCE-UNLESS	CHK-		
		OTHERWISE SPECIFIED	ENG-	11/20/74	SCALE: 2/1 SHEET 1 OF 1
		3 PLACE ± .005	CUST-		
		2 PLACE ± .010			
9140011-0000	1730	FRACTIONS ± 1/64			ASSY BEC (BOT/EOT)
9150006-0000	1630	ANGLES ± 1/2°			
9150007-0000	1130	DO NOT SCALE THIS			size B dwg no PC-B00693 rev D
NEXT ASS'Y	USED ON	PRINT			

4000693 -

ITEM	QTY	PART NUMBER	PART DESCRIPTION	VENDOR NUMBER	REFERENCE
1	1	13006 92-0001	BEC PC BOARD		
2	1	21500 10-0001	LM 339		
3	3	22500 25-0034	.22 uf 20V CAP.		
4	4	21500 22-0324	10K 1/4 W 5%		
5	1	21500 [illegible]	33Ω 2W		
6	2	21500 [illegible]	50 K POTS		
7	8	20700 25-0001	WIRE WRAP PINS	[illegible]	[illegible]
8	REF	40006 93-0001	ASSY. BEC (BOT/EOT)		

NOTES:

REV.	ECN NO.	DATE	APPR.	NEXT ASSY.	USED ON
C	REVISED P/N	10-27-77	WBF	41500057 -0000	1130
B	2426	2-4-75	DLO	41500006 -0000	1630
A	ORIG. ISSUE	11-20-74	FS	41500117 -0000	[illegible]

DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

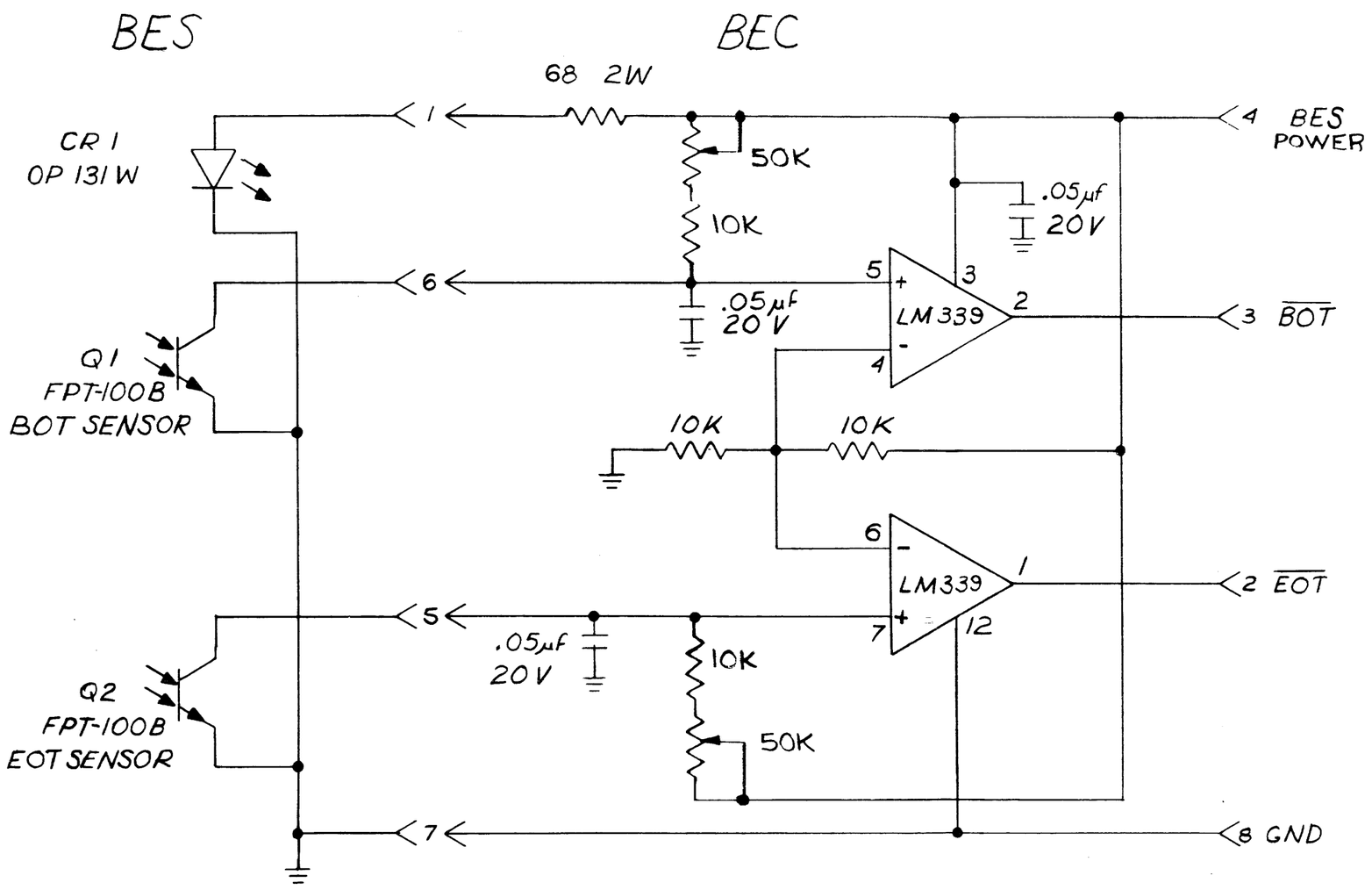
DR [illegible] [illegible] ENG [illegible] [illegible]
CHK [illegible] 4-16-76 CUST

TITLE:
ASSY. BEC (BOT/EOT)

0000694-0000 SH. OF 1 1 REV. C

0000694-0000

REV	ECN NO	DATE	APP
A	0362	11/20/74	[illegible]
B	0426	1-31-75	DDW
C	0492	5-28-75	[illegible]
D	P/N WAS 02-2-20028 (P/N CHG ONLY)	8-1-77	Tom [illegible]



		MATERIAL-	SIGNATURE	DATE
		FINISH-	DR- J. EUSTIS	11/12/74
		TOLERANCE-UNLESS	CHK-	
		OTHERWISE SPECIFIED	ENG-	11/22
		3 PLACE ± .005	CUST-	
4020693	1700	2 PLACE ± .010		
4020693	1600	FRACTIONS ± 1/64		
4020693	1120	ANGLES ± 1/2°		
4020693	1100	DO NOT SCALE THIS		
NEXT ASS'Y	USED ON	PRINT		

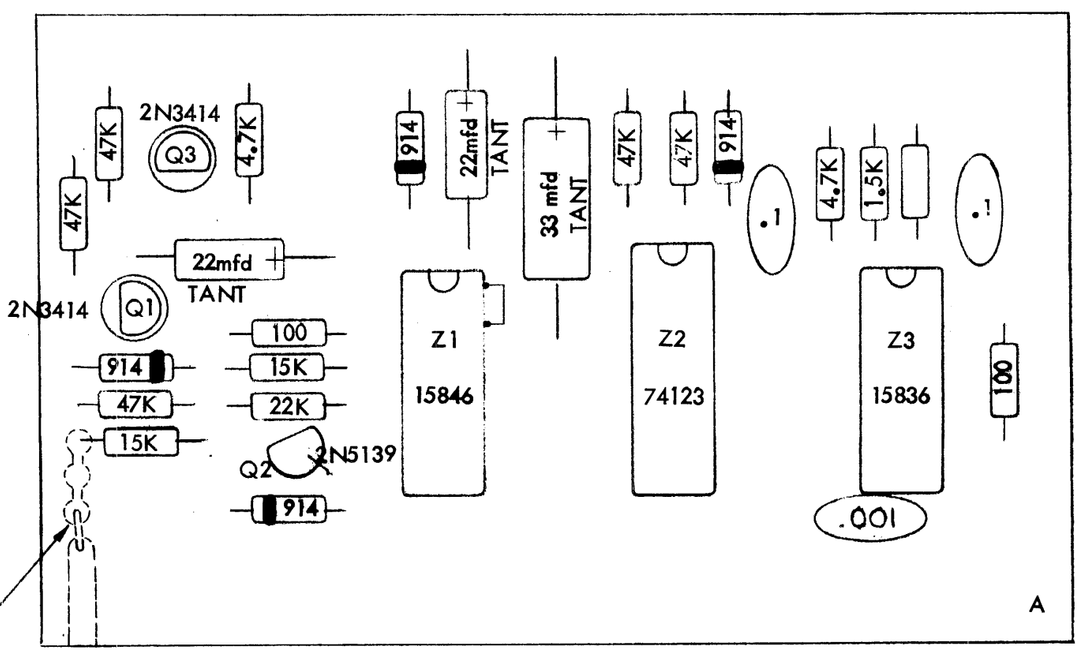
DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

SCALE: DNA | SHEET 1 OF 1

SCHEMATIC DIAGRAM BOT SENSOR, BES & BEC

size B | dwg no 0220028 | rev D

CA-0036



JUMPER ON BACK OF CARD FROM PAD CONNECTED FROM 15K TO PIN 22

REV	ECN NO	DATE	APPR
C	P10 CKG	8/11/77	[illegible]
B	0458	4/2/75	[illegible]
A	0427	2/4/75	DDW

PARTS LIST PA-0135

ASSEMBLY RR-2

DB 4-11-73

DIGI-DATA CORPORATION

SHEET 1 OF 1

CA-0036 C

4010036

FIG. 4 REMOTE RESTART CARD ASSEMBLY

ITEM	QTY	DESCRIPTION	DRAWING NUMBER	MFG. NO.	REFERENCE
		CHIPS			
	1	15846			
	1	74123			
	1	15836			
		TRANSISTORS			
	2	2N3414			
	1	2N5139			
		DIODES			
	4	IN914			
		CAPACITORS			
	1	33mFd TANT			
	2	22mFd TANT			
	9	.1μFd			
	1	.001μFd			
		RESISTORS			
	5	41K 1/4w 5%			
	1	24K 1/4w 5%			
	2	15K 1/4w 5%			
	2	4.7K 1/4w 5%			
	1	1.5K 1/4w 5%			
	2	100Ω 1/4w 5%			
	1	DRILL DETAIL RR-2 CARD	A-0540		
	REF	ASSEMBLY RR-2	CA-0036		

REV	DESCRIPTION	DATE	APPR
A	0453	4/	/ /

DIGI-DATA CORP.

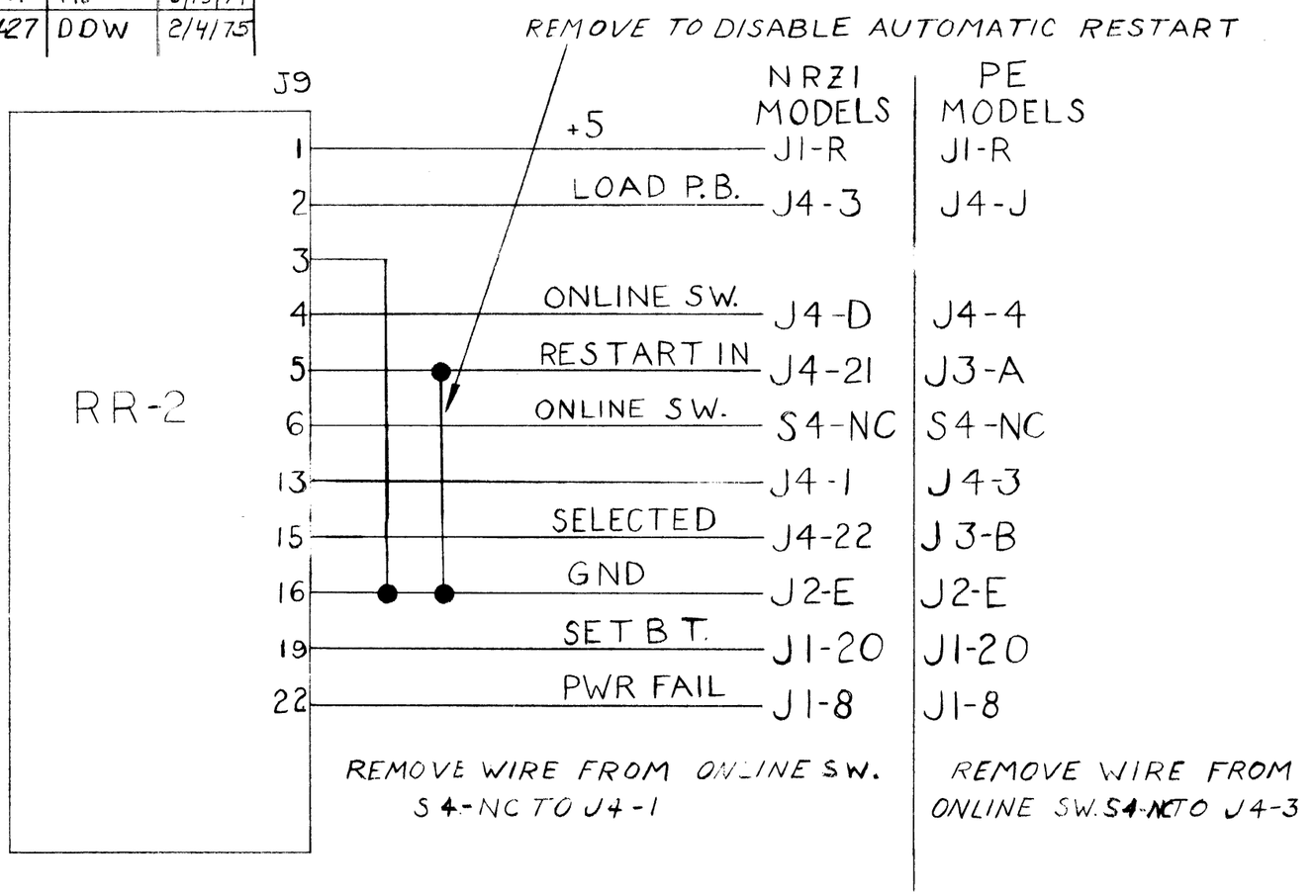
REV. A

PARTS LIST PA-0135

RR-2 CARD

SHEET 1 OF 1

REV	ECN	APPR	DATE
A	0211	MCD	6/13/74
B	0427	DDW	2/4/75



NOTES:

1. ADD KEY (VIKING #091-0024-000 OR EQUIVALENT) TO RR-2 CONNECTOR BETWEEN PINS 1 & 8

FIG. 3 REMOTE RESTART WIRING

RR-2 WIRING	DIGI-DATA CORPORATION
Test 6/13/74	SHEET 1 OF 1 | LA-0119 B

REV	ECN NO.	DATE	APPR
A	0458	4/2/73	P.E

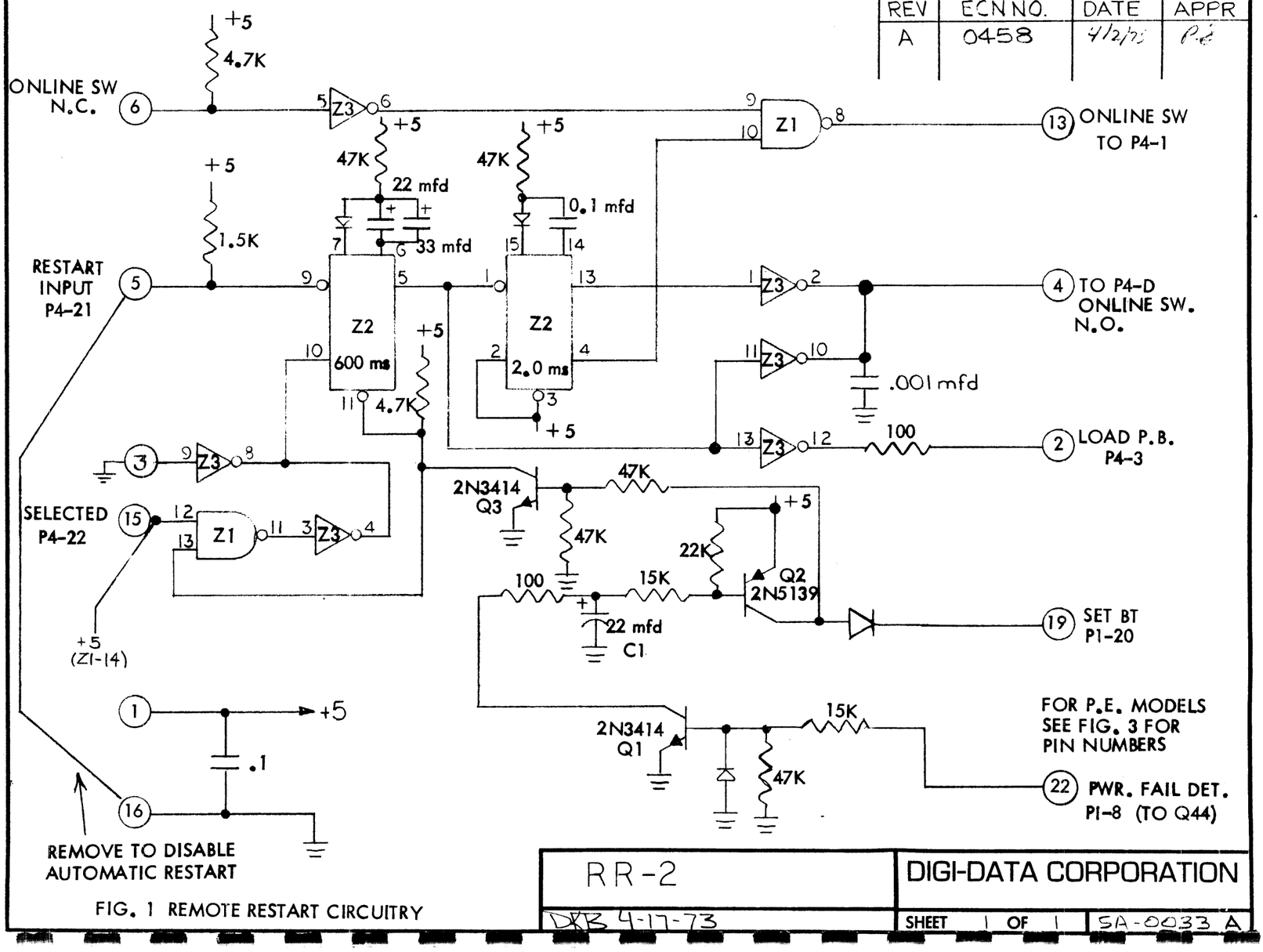
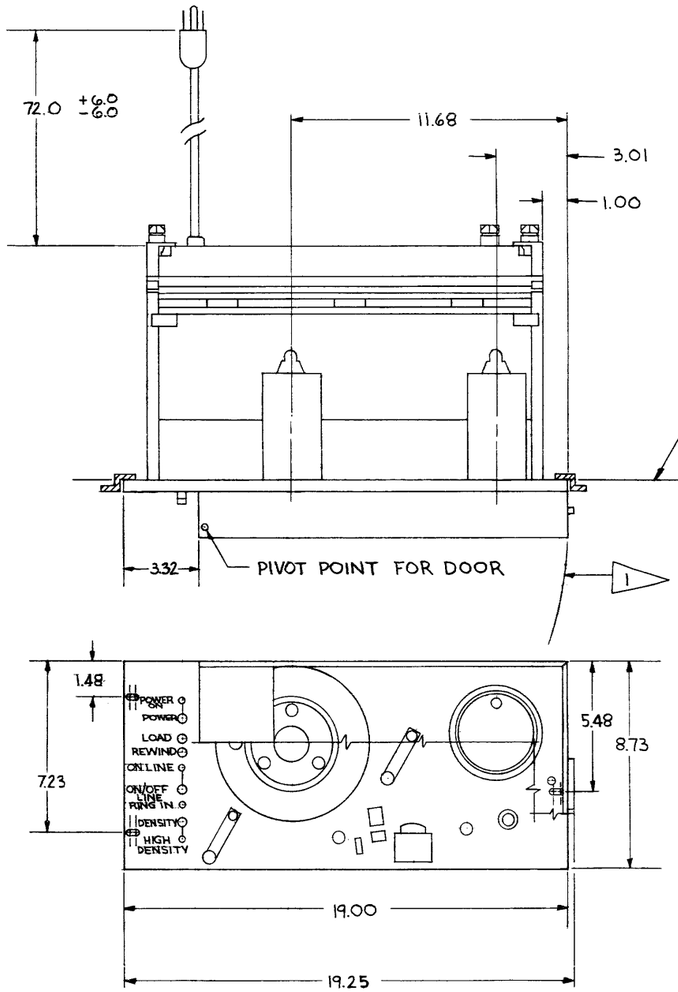
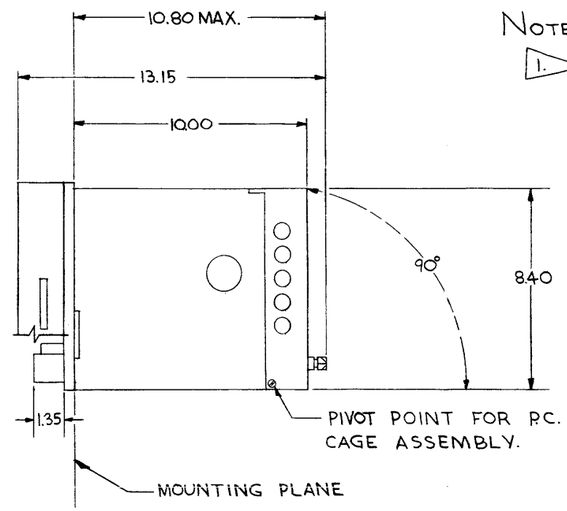


FIG. 1 REMOTE RESTART CIRCUITRY

RR-2	DIGI-DATA CORPORATION
DRB 4-17-73	SHEET 1 OF 1 — SA-0033 A

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	1-30-76	
B	P/N WAS 07-3-50001 (P/N CHG ONLY)		



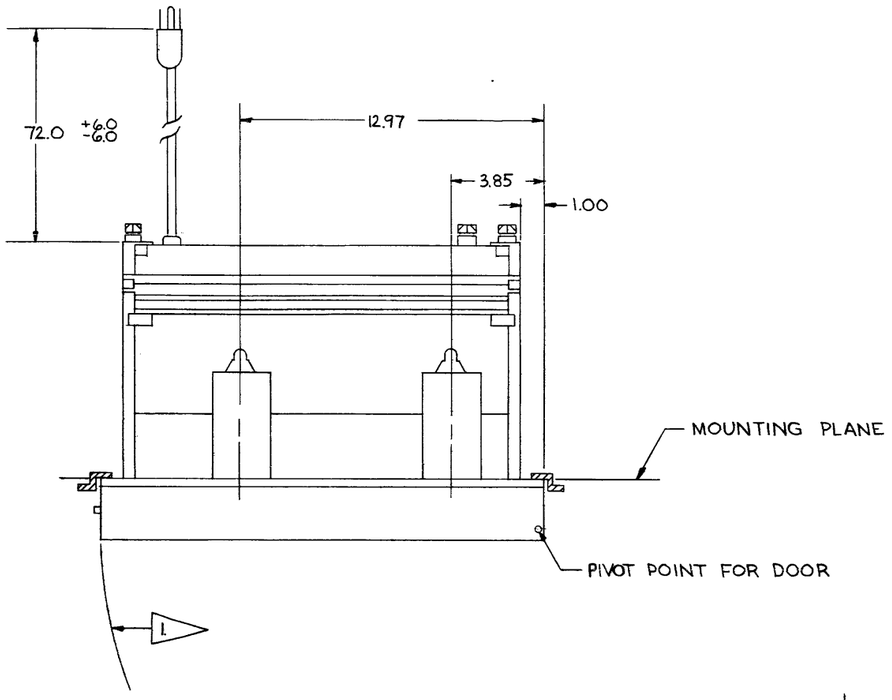


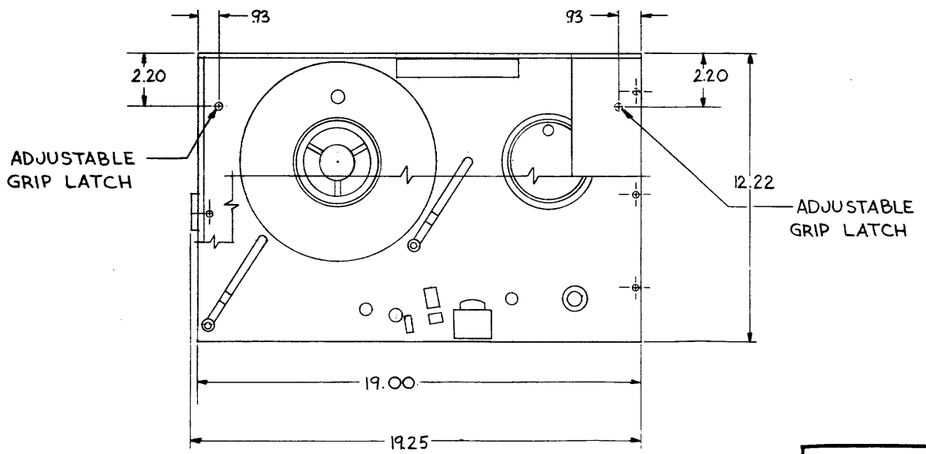
NOTES:

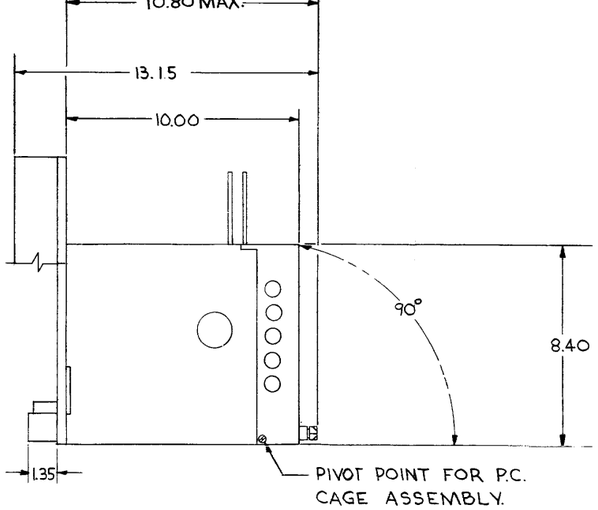
1. DOOR MAY BE OPENED 180°

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH-	DR- Tom A Ilt	1-6-76	
		TOLERANCE-UNLESS	CHK- Bob Taylor	1-29-76	
		OTHERWISE SPECIFIED	ENG-	1-30-76	SCALE: 1:4 SHEET 1 OF 1
		3 PLACE ± .005	CUST-		
		2 PLACE ± .010			
		FRACTIONS ± 1/64			OUTLINE 1130 TRANSPORT
		ANGLES ± 1/2°			
	1130	DO NOT SCALE THIS			size C dwg no 0750001- rev B
NEXT ASS'Y	USED ON	PRINT			

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	1-30-76	
B	P/N WAS 07-3-50002 (P/N CHG ONLY)	8-4-77	



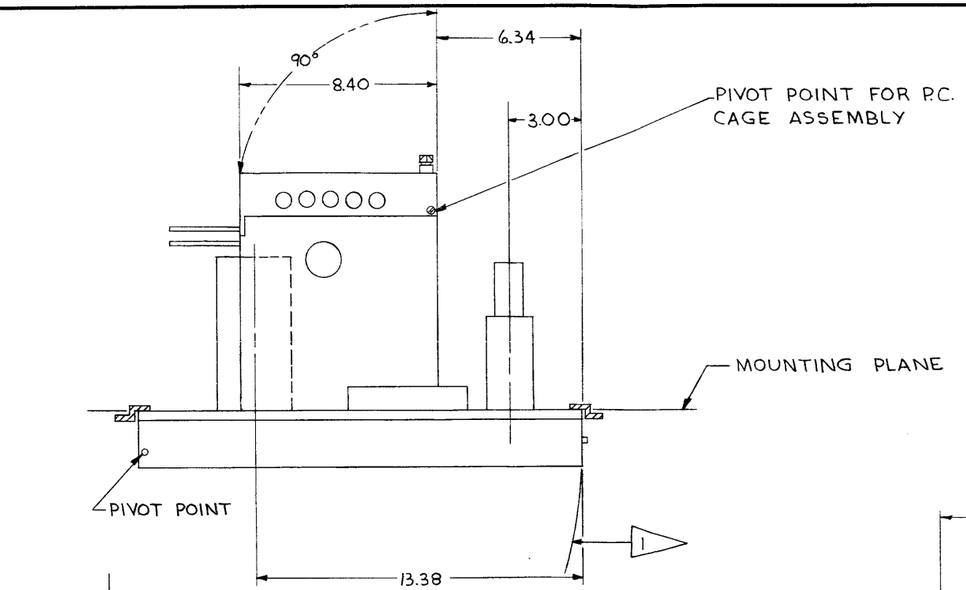


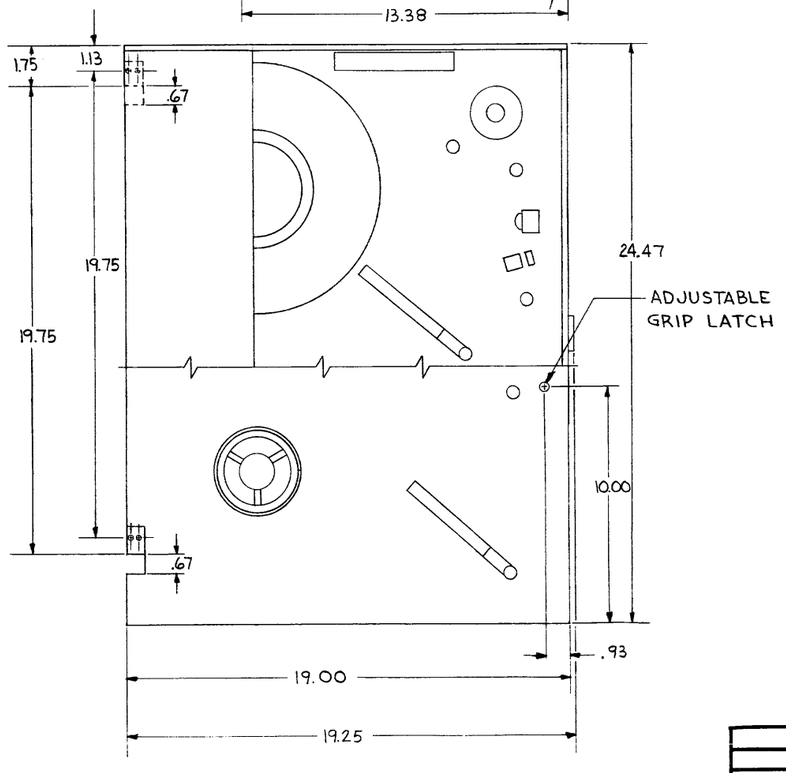


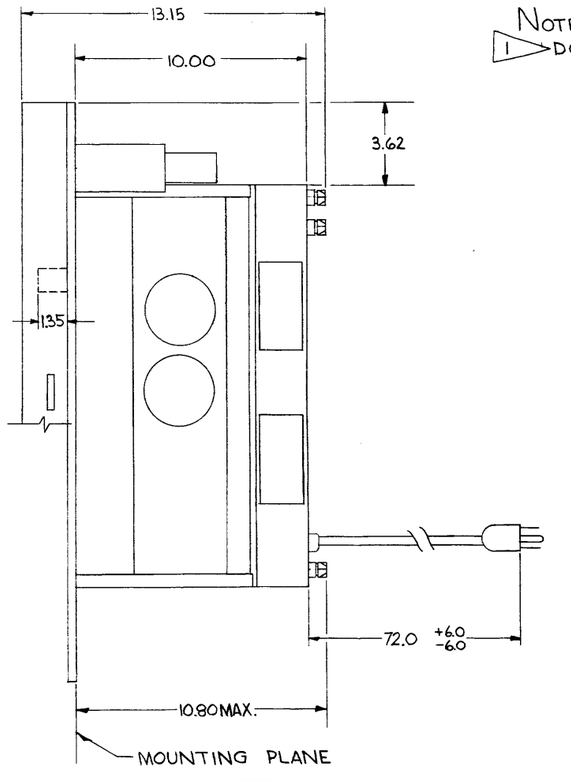
NOTES:
1. DOOR MAY BE OPENED 180°

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH- ——	DR- Tom A Jt	1-7-76	
		TOLERANCE-UNLESS	CHK- Bob Taylor	1-30-76	
		OTHERWISE SPECIFIED	ENG-	1-30-76	SCALE: 1:4 SHEET 1 OF 1
		3 PLACE ±.005	CUST-		
		2 PLACE ±.010			OUTLINE 1630 TRANSPORT
		FRACTIONS ± 1/64			
		ANGLES ± 1/2°			
	1630	DO NOT SCALE THIS			size C dwg no 0750002- rev B
NEXT ASS'Y	USED ON	PRINT			

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	1-30-76	
B	P/N WAS 07-3-50003 (P/N CHG ONLY)	8-4-77	Tom Abt





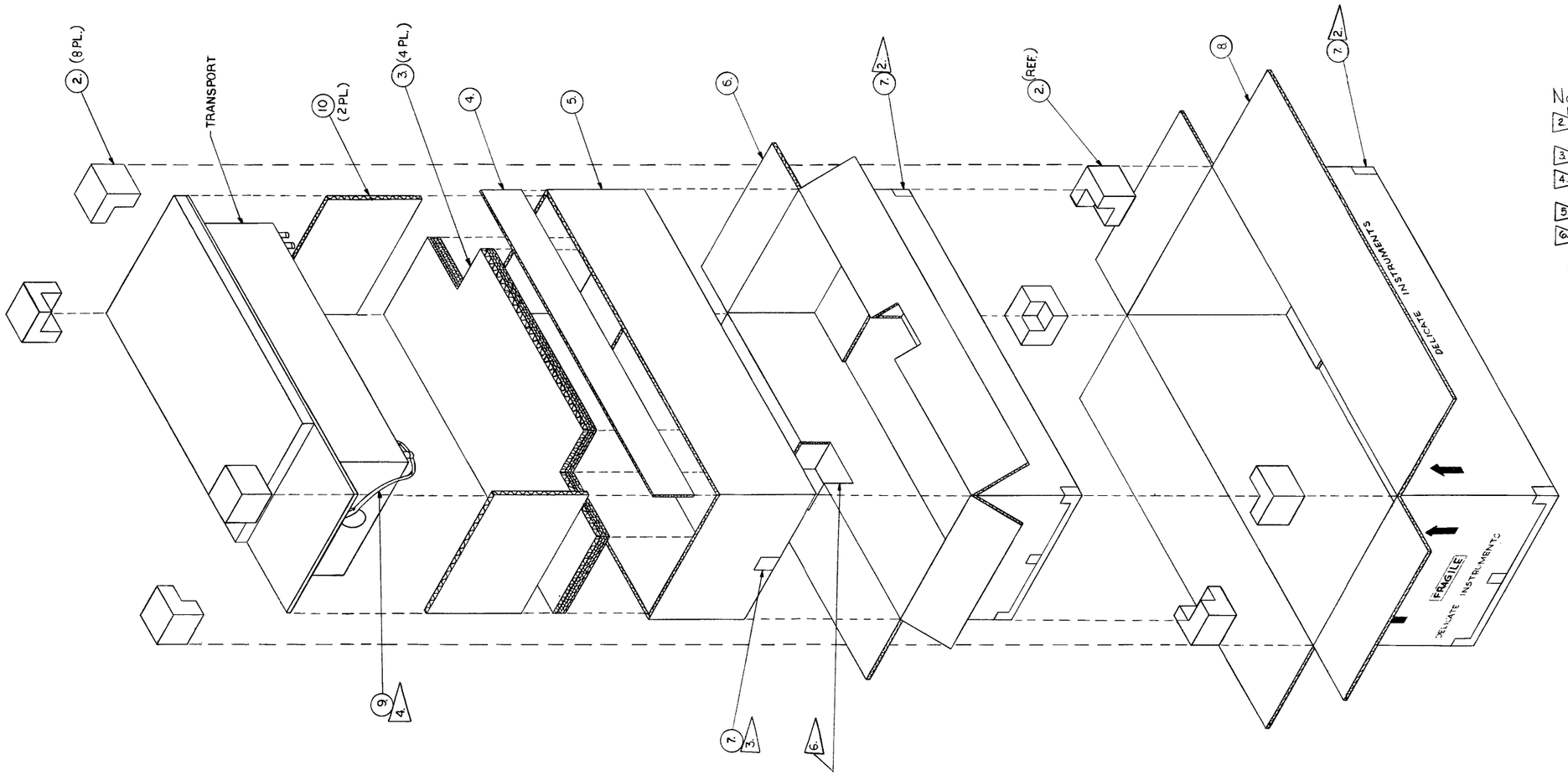


NOTES:
1. DOOR MAY BE OPENED 180°

		MATERIAL-	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH-	DR- Tom Abt	1-8-76	
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- Bob Taylor	1-29-76	
		3 PLACE ±.005	ENG-	1-30-76	SCALE 1:4 SHEET 1 OF 1
		2 PLACE ±.010	CUST-		
		FRACTIONS ±1/64			OUTLINE 1730 TRANSPORT
4350005-0000	1730 PE	ANGLES ±1/2°			
4340006-0000	1730 NEZI	DO NOT SCALE THIS			size C dwg no 0750003- rev B
NEXT ASS'Y	USED ON	PRINT			

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	3-31-76	
B	0687	5-15-76	
C	P/N WAS 45-4-50000 P/N CHG. ONLY	6-9-77	

FIG. 1



NOTES:
1. SEE PL. 0050042-0000.
2. INNER & OUTER CARTONS TO BE SECURELY TAPED ON TOP & BOTTOM AS SHOWN.
3. BOTTOM OF SLEEVE TO BE SECURELY TAPED AS SHOWN.
4. A.C POWER CORD, TO BE RUN THROUGH ACCESS HOLE AND TAPED TO INSIDE OF CHASSIS.
5. TRAY TO BE SECURELY STAPLED IN FOUR CORNERS AS SHOWN.
6. HANDLING FLAP TO BE CUT OUT AS SHOWN USING MARKINGS ON CARTON AS A GUIDE FOR LOCATION OF CUTS.

VERSION TABLE		
ASSY. NO.	FIG. NO.	REMARKS
-0001	1	WITH DOOR
-0002	2	WITHOUT DOOR

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH- ——	DR- Tom A.H.	3-18-76	
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK-	3-31-76	SCALE: N.T.S. SHEET 1 OF 2
		3 PLACE ±.005	ENG-	3-31-76	
		2 PLACE ±.010	CUST-		SHIPPING ASSY. (WITH DOOR)
		FRACTIONS ±1/64			
		ANGLES ±1/2°			
	1130	DO NOT SCALE THIS PRINT			size D dwg no 4550000- rev C
NEXT ASS'Y	USED ON				

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	3-31-76	
B	0687	5-15-76	
C	PINWAS 45-4-50001 PIN CHG. ONLY	8-9-77	

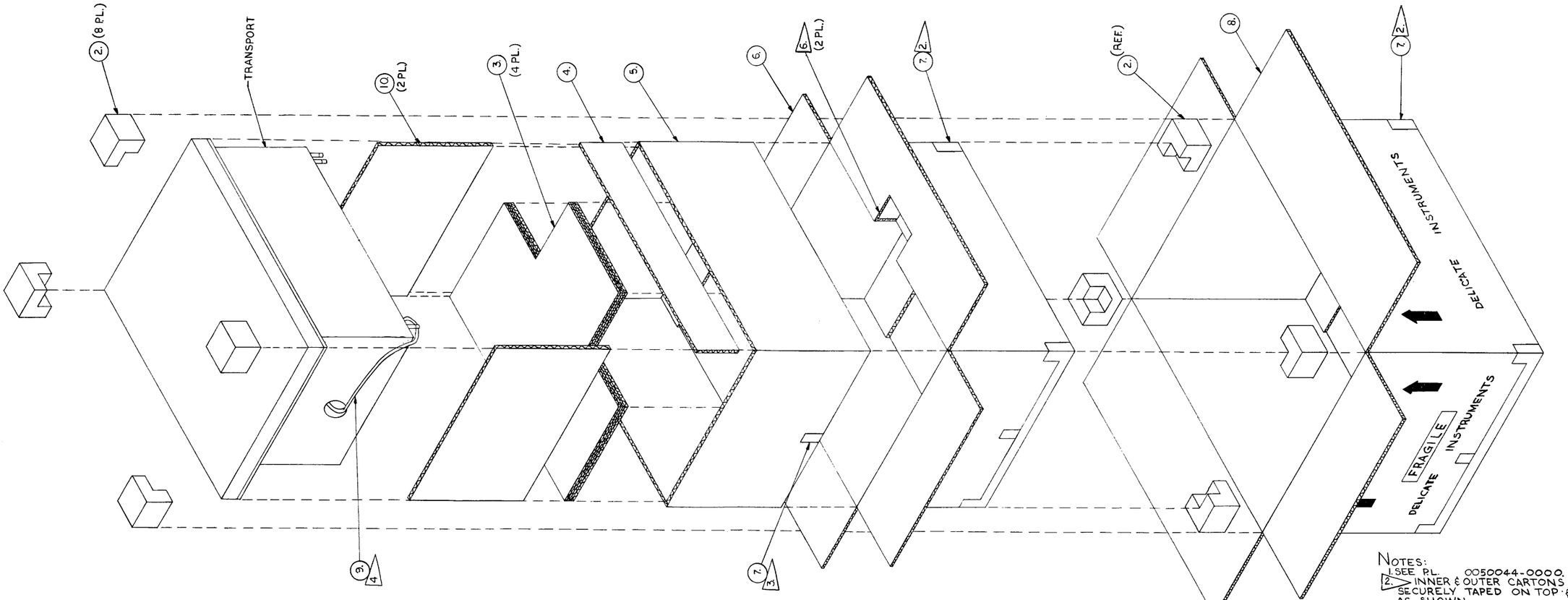


FIG. 1

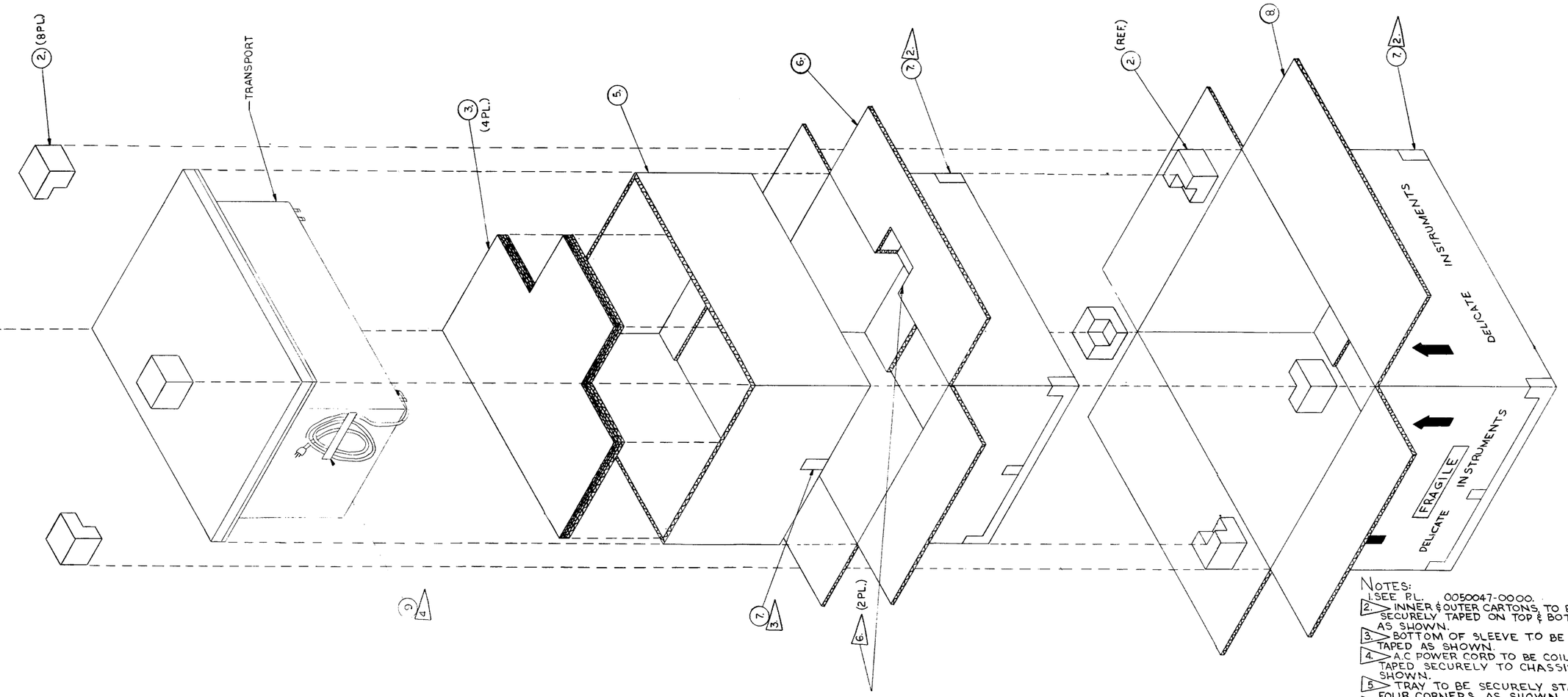
VERSION TABLE		
ASSY. NO.	FIG. NO.	REMARKS
-0001	1	WITH DOOR
-0002	2	WITHOUT DOOR

NOTES:
1. SEE PL. 0050044-0000.
2. INNER & OUTER CARTONS TO BE SECURELY TAPED ON TOP & BOTTOM AS SHOWN.
3. BOTTOM OF SLEEVE TO BE SECURELY TAPED AS SHOWN.
4. A.C. POWER CORD TO BE RUN THROUGH ACCESS HOLE AND TAPED TO INSIDE OF CHASSIS.
5. TRAY TO BE SECURELY STAPLED IN FOUR CORNER AS SHOWN.
6. HANDLING FLAP TO BE CUT OUT AS SHOWN USING MARKINGS ON CARTON AS A GUIDE FOR LOCATION OF CUTS.

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH- ——	DR- Tom Alt	3-22-76	
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- Rust	3-31-76	SCALE: N.T.S. SHEET 1 OF 2
		3 PLACE ±.005	ENG- [illegible]	3-31-76	
		2 PLACE ±.010	CUST-		SHIPPING ASSY. (WITH DOOR)
		FRACTIONS ± 1/64			
		ANGLES ± 1/2°			
	1630	DO NOT SCALE THIS PRINT			SIZE D DWG NO 4550001- REV C
NEXT ASS'Y	USED ON				

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	4-8-76	
B	I-I/N WAS 45-4-50002 I/N CHG. ONLY	8-9-77	

FIG. 1

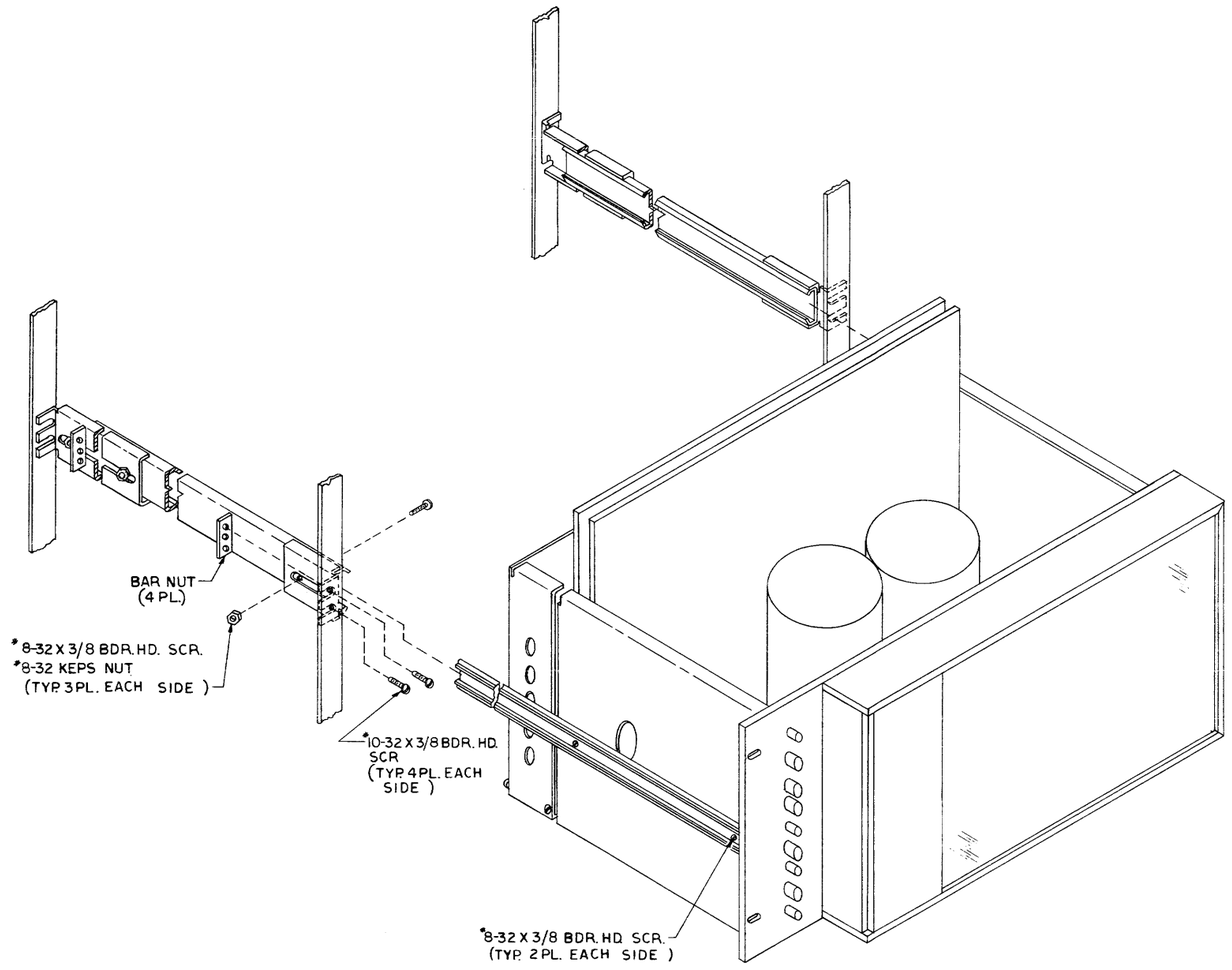


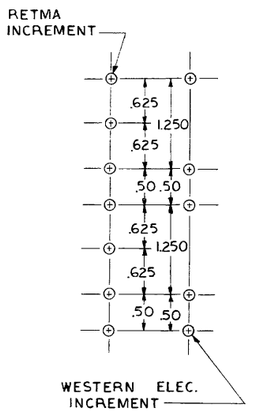
NOTES:
1. SEE P.L. 00500047-0000.
2. INNER & OUTER CARTONS TO BE SECURELY TAPED ON TOP & BOTTOM AS SHOWN.
3. BOTTOM OF SLEEVE TO BE SECURELY TAPED AS SHOWN.
4. A.C POWER CORD TO BE COILED & TAPED SECURELY TO CHASSIS AS SHOWN.
5. TRAY TO BE SECURELY STAPLED IN FOUR CORNERS AS SHOWN.
6. HANDLING FLAP TO BE CUT OUT AS SHOWN USING MARKINGS ON CARTON AS A GUIDE FOR LOCATION OF CUTS.

VERSION TABLE		
ASSY. NO.	FIG. NO.	REMARKS
-0001	1	WITH DOOR
-0002	2	WITHOUT DOOR

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH- ——	DR- Tom Alt	4-2-76	
		TOLERANCE-UNLESS OTHERWISE SPECIFIED	CHK- Ray	4-7-76	
		3 PLACE ±.005	ENG-	4-8-76	SCALE: N.T.S. SHEET 1 OF 2
		2 PLACE ±.010	CUST-		
		FRACTIONS ± 1/64			SHIPPING ASSY. (WITH DOOR)
		ANGLES ± 1/2°			
	1730	DO NOT SCALE THIS			SIZE D DWG NO 4550002 REV B
NEXT ASS'Y	USED ON	PRINT			

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	12-21-76	[illegible]
B	P/N WAS 05-4-50021 (P/N CHG. ONLY)	8-8-77	[illegible]





NOTES:

1. IMPORTANT INSTALLATION CONSIDERATION: TOP AND BOTTOM EDGE OF CHASSIS FRONT PANELS SHOULD BE CENTERED ON 1/2 INCH HOLE SPACING.

		MATERIAL- ——	SIGNATURE	DATE
		FINISH- ——	DR- Tom Alt	9-7-76
		TOLERANCE-UNLESS	CHK- W. E. Fortress	12-21-76
		OTHERWISE SPECIFIED	ENG- [illegible]	12-21-76
		3 PLACE ±.005	CUST-	
		2 PLACE ±.010		
		FRACTIONS ± 1/64		
		ANGLES ± 1/2°		
		DO NOT SCALE THIS		
NEXT ASS'Y	USED ON	PRINT		

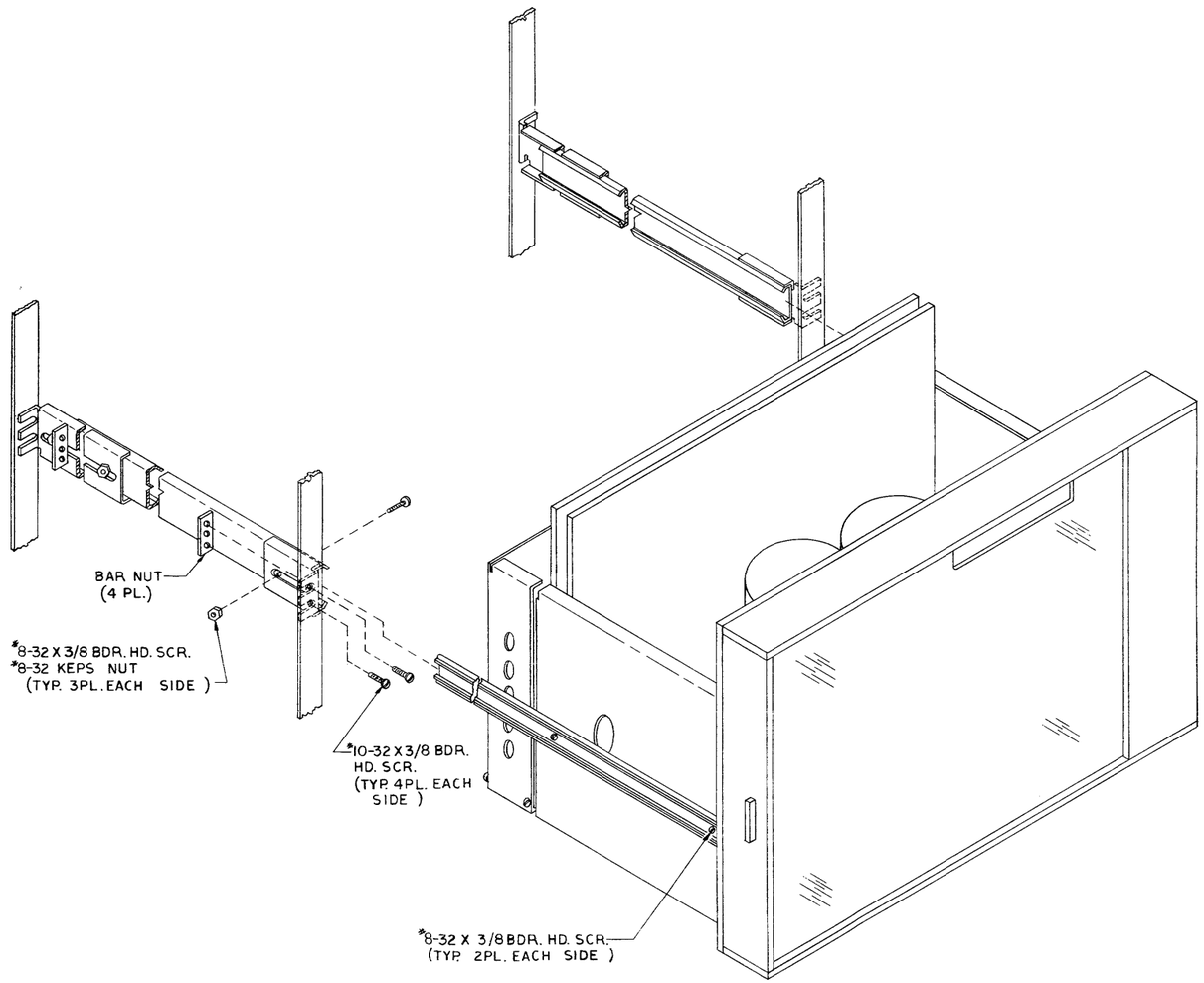
DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

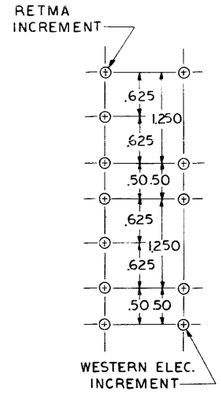
SCALE: —— SHEET 1 OF 1

INSTALLATION 1130
SERIES TRANSPORT

size D | dwg no 0550021 | rev B

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	12-21-76	[illegible]
B	P/N WAS 05-4-50020 (P/N CHG. ONLY)	9-9-77	[illegible]





NOTES:
1. IMPORTANT INSTALLATION CONSIDERATION: TOP AND BOTTOM EDGE OF CHASSIS FRONT PANELS SHOULD BE CENTERED ON 1/2 INCH HOLE SPACING.

		MATERIAL- ——	SIGNATURE	DATE
		FINISH- ——	DR- Tom Alt	9-7-76
		TOLERANCE-UNLESS	CHK- W. E. Furness	12-21-76
		OTHERWISE SPECIFIED	ENG- [illegible]	12-21-76
		3 PLACE ±.005	CUST-	
		2 PLACE ±.010		
		FRACTIONS ± 1/64		
		ANGLES ± 1/2°		
		DO NOT SCALE THIS		
NEXT ASS'Y	USED ON	PRINT		

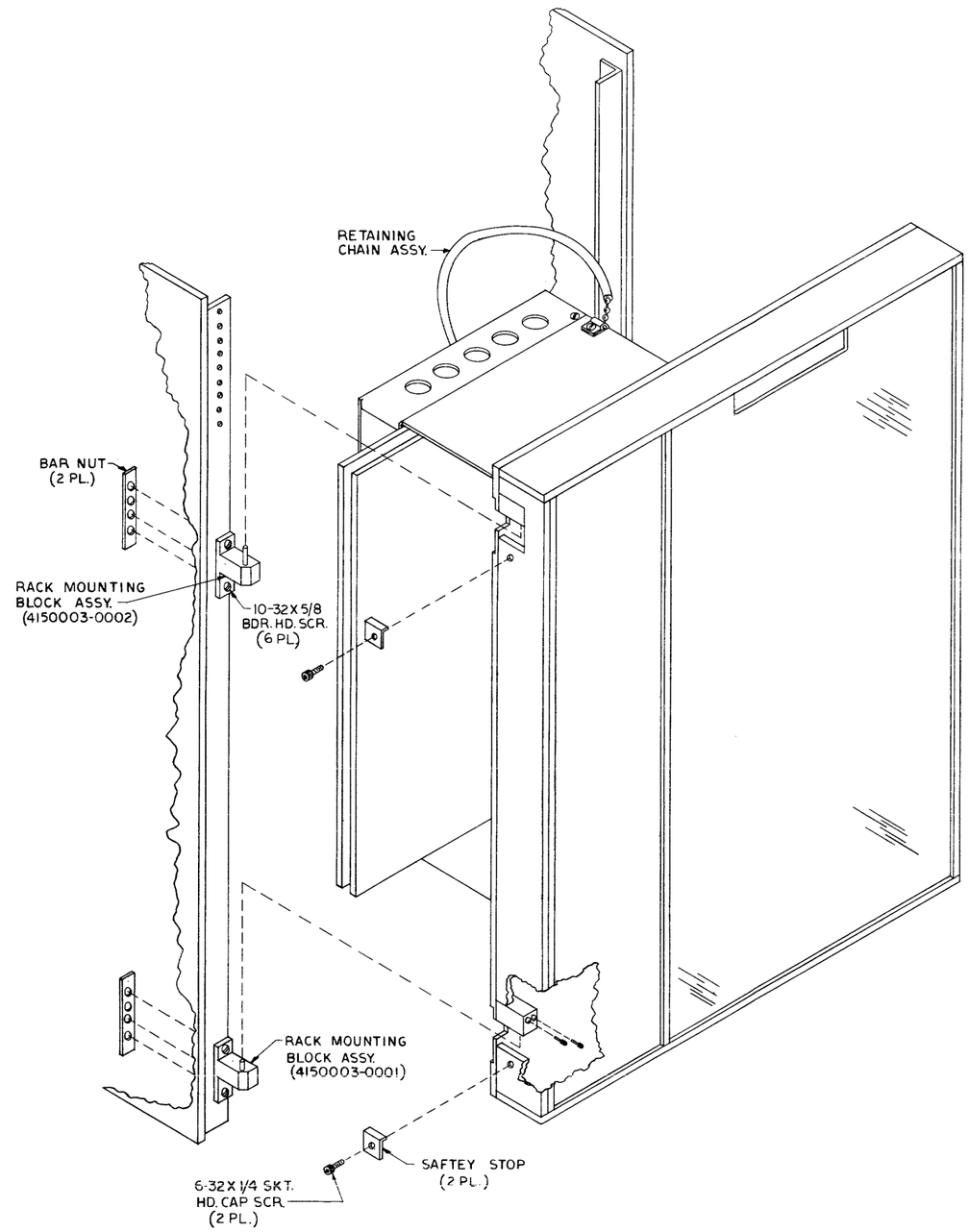
DIGI-DATA CORPORATION
8580 DORSEY RUN ROAD
JESSUP, MD. 20794

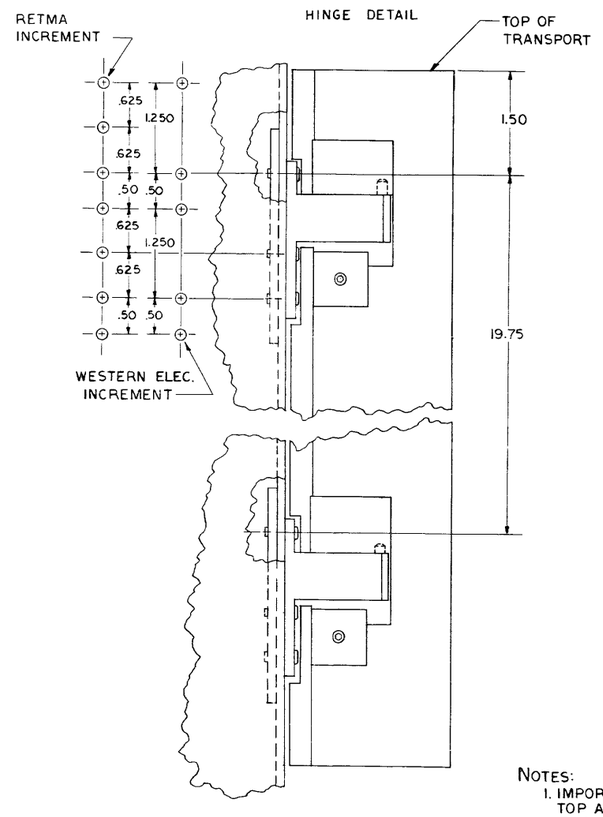
SCALE: —— SHEET 1 OF 1

INSTALLATION 1630
SERIES TRANSPORT

size D | dwg no 0550020 | rev B

REV	ECN NO	DATE	APP
A	ORIG. ISSUE	9-1-76	[illegible]
B	P/N WAS 05-4-50019 (P/N CHG. ONLY)	8-8-77	Tom Alt





NOTES:
1. IMPORTANT MOUNTING CONSIDERATION: TOP AND BOTTOM EDGE OF CHASSIS FRONT PANEL SHOULD BE CENTERED ON 1/2 INCH HOLE SPACING.

		MATERIAL- ——	SIGNATURE	DATE	DIGI-DATA CORPORATION 8580 DORSEY RUN ROAD JESSUP, MD. 20794
		FINISH- ——	DR- Tom Alt	9-1-76	
		TOLERANCE-UNLESS	CHK- W. E. FURNESS	9-1-76	
		OTHERWISE SPECIFIED	ENG- [illegible]	9-1-76	SCALE: —— SHEET 1 OF 1
		3 PLACE ±.005	CUST-		
		2 PLACE ±.010			INSTALLATION, 1730 SERIES TRANSPORT
		FRACTIONS ± 1/64			
		ANGLES ± 1/2°			
		DO NOT SCALE THIS			SIZE D DWG NO 0550019- REV B
NEXT ASS'Y	USED ON	PRINT			