NCR M63-10-STD
NCR M63-12-STD
NCR M63-13-STD
NCR M63-15-STD

MAGNETIC TAPE TRANSPORT

FIELD SERVICE MANUAL

49756400
Dec. 7, 1973

RECORD of REVISIONS

REVISION	NOTES
01	Preliminary Release.
(12-7-73)	
02	Added 9 Track 25 ips Phase and Dual Mode data. Also incorporated Engineering comments.
(1-4-74)	
03	Incorporated ECO's 12392, 12462, 12437 and 12463. Pages affected are as follows:1-8, 1-12, 1-12A,
(2-19-74)	(added) 2-21, 2-22, 2-30, 2-30A (added) 2-31, 2-40 thru 2-43, 4-2, 4-33, 4-35, 4-40, 4-44, 4-61
	and 4-62.
04	Incorporated ECO's 12464, 12493 and 12556 and additional Engineering data. Pages affected are
(4-23-74)	as follows: 1-3A (Added), 1-11, 2-22, 2-25, 2-27, 2-46, 2-47, 2-48, 2-50, 2-50A thru 2-50C
	(Added), 2-54, 2-55, 2-55A (added), 4-2, 4-27A, 4-28, 4-29, 4-31, 4-37, 4-39, 4-41, 4-45 thru
	4-48, 4-50, 4-53, 4-55 thru 4-58, 4-60, 4-64, and 4-66.
05	Incorporated Dual Mode data reflecting latest design.
(5-31-74)	Deleted Phase only data. Pages affected are: Preface, i, 1-1, 2-1, 2-46, 2-50, 2-50A, 2-50B,
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or use Comment Sheet in the back of this manual.

PREFACE

PURPOSE

This manual contains information necessary to maintain the single capstan, 25 inches per second magnetic tape transports. For transport models and characteristics refer to table below. The level of related information is such that previous knowledge of transports with the listed characteristics is required.

TRANSPORT CHARACTERISTICS

Model	Speed (ips)	Recording Mode	Density (bpi)	Track
△B	25	DM	800/1600	9
△C	25	NRZI	800	9
△D	25	NRZI	200/556/800	7

RELATED PUBLICATIONS

Magnetic Tape Transport Service Training Manual, Publication No. 49756300
Magnetic Tape Transport Parts Identification Manual, Publication No. 49756500
Magnetic Tape Transport Interface Manual, Publication No. 49756600 (NCR)
Magnetic Tape Transport Interface Manual, Publication No. 49756700 (CDC)

SPECIAL NOTES

Information in this manual is applicable only to the single capstan, 25 inches per second models of this series transport.

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SECTION I

INSTALLATION AND CHECKOUT

INSTALLATION AND CHECKOUT

1-1. GENERAL

This section provides information pertinent to site requirements, installation, checkout, and repacking of Models (B) thru (D) tape transports. (Figure 1-1).

1-2. SITE REQUIREMENTS

1-2.1 POWER

Input power requirement is 115 volts, 50 and 60 Hz. Power consumption is as follows:

Loaded - 400 watts

Motion - 600 watts

1-2.2 WEIGHT

The maximum hinged weight of the transport is 100 pounds.

1-2.3 TEMPERATURE AND HUMIDITY

The operating temperature, limited by the media, is 60° F to 90° F. The non-operating temperature is minus 30° F to 150° F with a maximum gradient of 20° F per hours.

The operating humidity, limited by the media, is 30 to 80%. The non-operating humdity is 5 to 95% without condensation.

1-2.4 ALTITUDE

The maximum altitude is 8000 feet operating, and 40,000 feet non-operating An optional high altitude kit is available for operation between 8000 and 12,000 feet.

1-2.5 GROUNDING

Grounding is at the option of the user. Grounding lugs are provided at the rear of the tape deck.

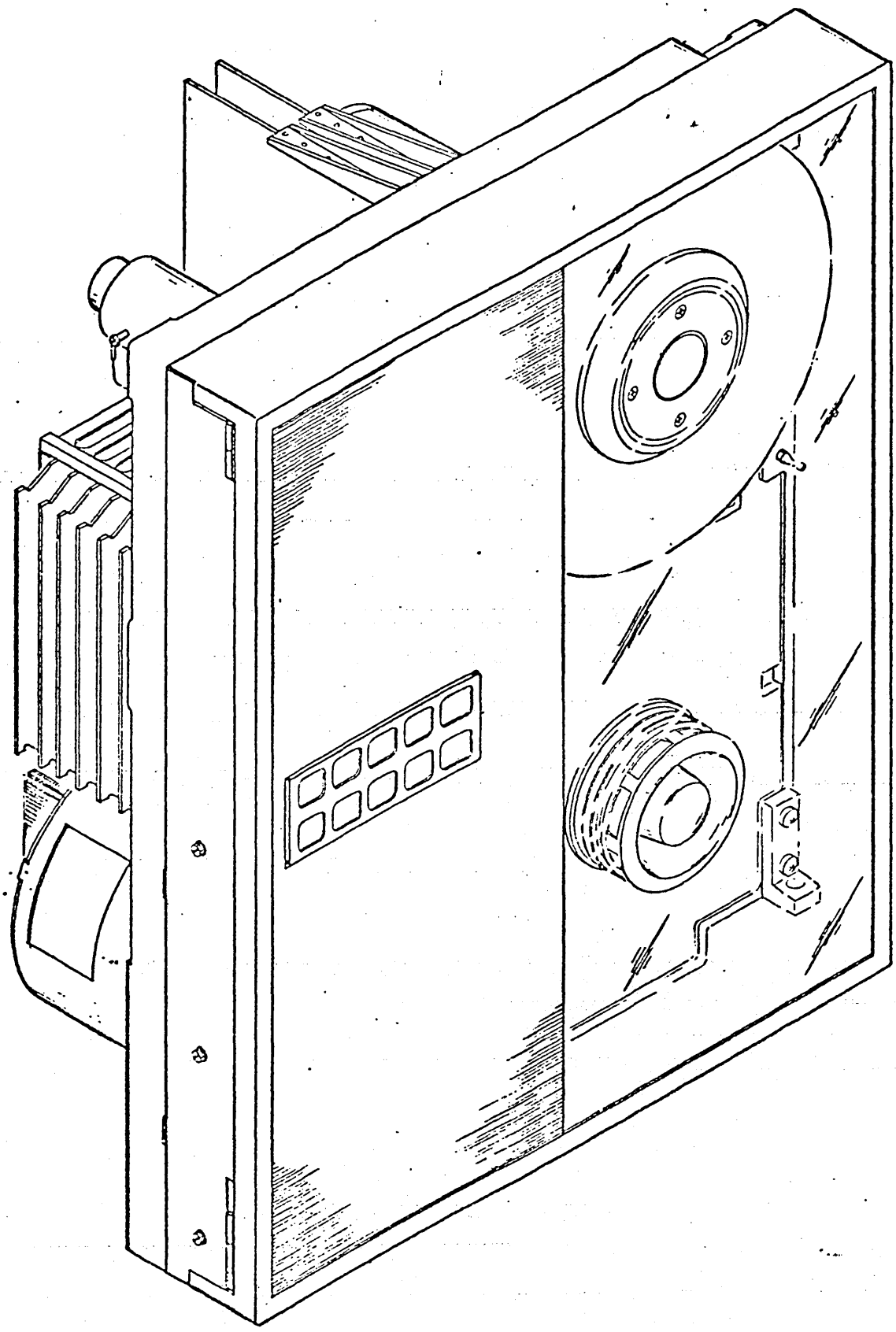


Figure 1-1. Magnetic Tape Transport

1-2.6 SPACE REQUIREMENTS

The transport is designed for installation in an EIA standard 19-inch rack. All parts of the transport are accessible through the front of the rack via the hinged deck. Figures 1-2 and 1-3 show the transport dimensions, mounting and center of gravity for the tape deck.

1-2.7 COOLING REQUIREMENTS

The enclosure of the transport must be designed to provide ambient temperature of 10° F maximum above the requirements stated in paragraph 1-2.3.

1-2.8 INTERFACE REQUIREMENTS

The transport operates in conjunction with a Tape Control Unit (TCU), referred to as the controller. Input/Output (I/O) control and data lines provide the interface connections. See Figure 1-2 for line allocation.

All I/O line signals are digital in nature. Voltage and logic levels are as follows:

Transmitter:

Logic 1 (TRUE) = 0.0 to 0.4 volts
Logic 0 (FALSE) = Dependent on external circuit

Receiver:

Logic 1 (TRUE) = 0.0 to 0.8 volts
Logic 0 (FALSE) = 2.4 to 5.5 volts

The two I/O connectors are a part of the logic chassis printed wiring board (U1J1 and U1J2). Each contain 28 pins arranged in 2 rows (A and B) of 14 pins each. Pins A1 and A14 are used for connector keying.

The I/O cables must be twisted pair, or equivalent, with a characteristic impedance of 95 ohms. The total cable length between connectors must not exceed 20 feet. The transports may be connected to the controller in either daisy-chain or radial hookup. The maximum number of transports in a daisy-chain is four.

NOTE

For typical compatible cable systems see Gore I360-2 or Ansley 202 Series.

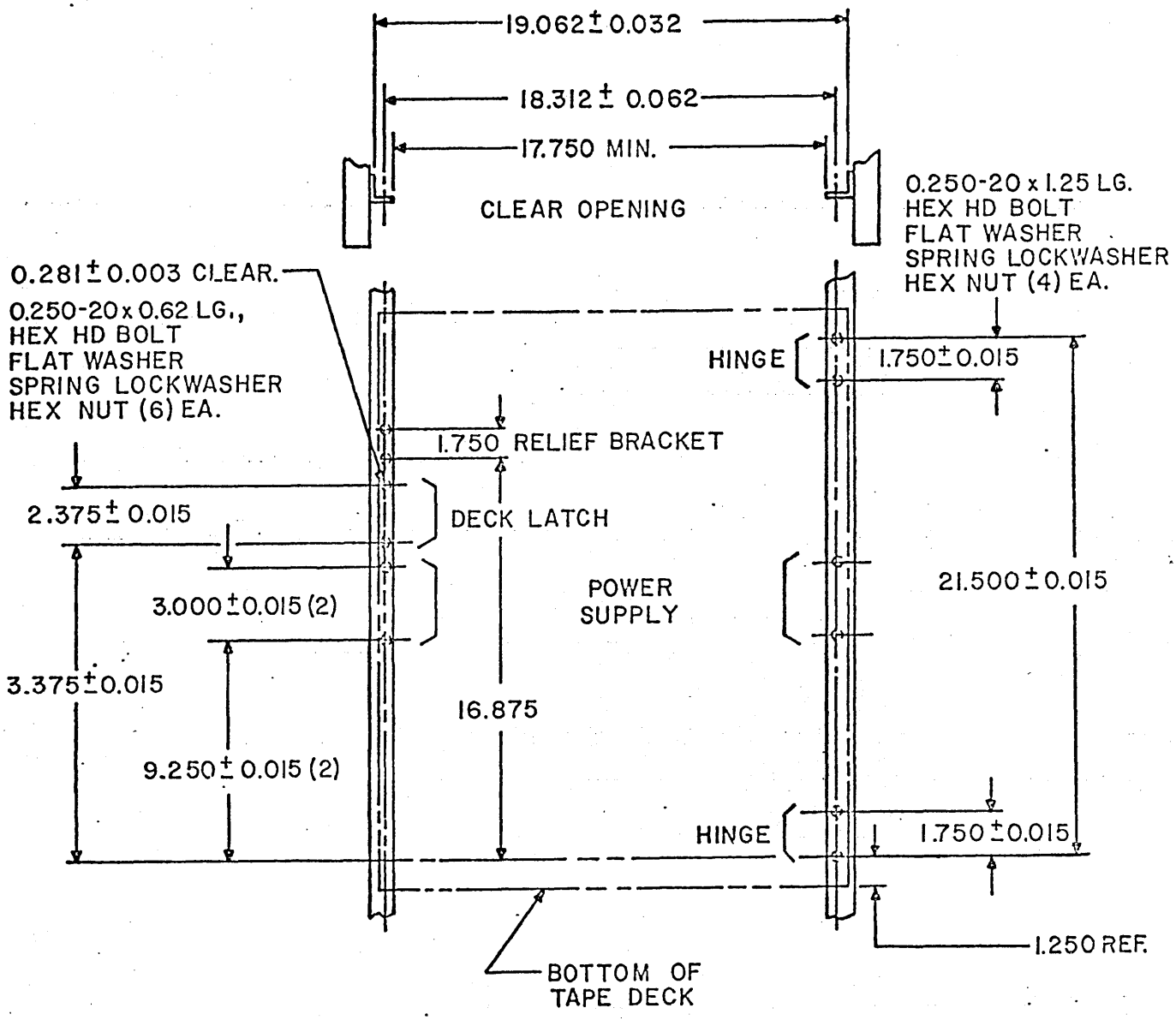
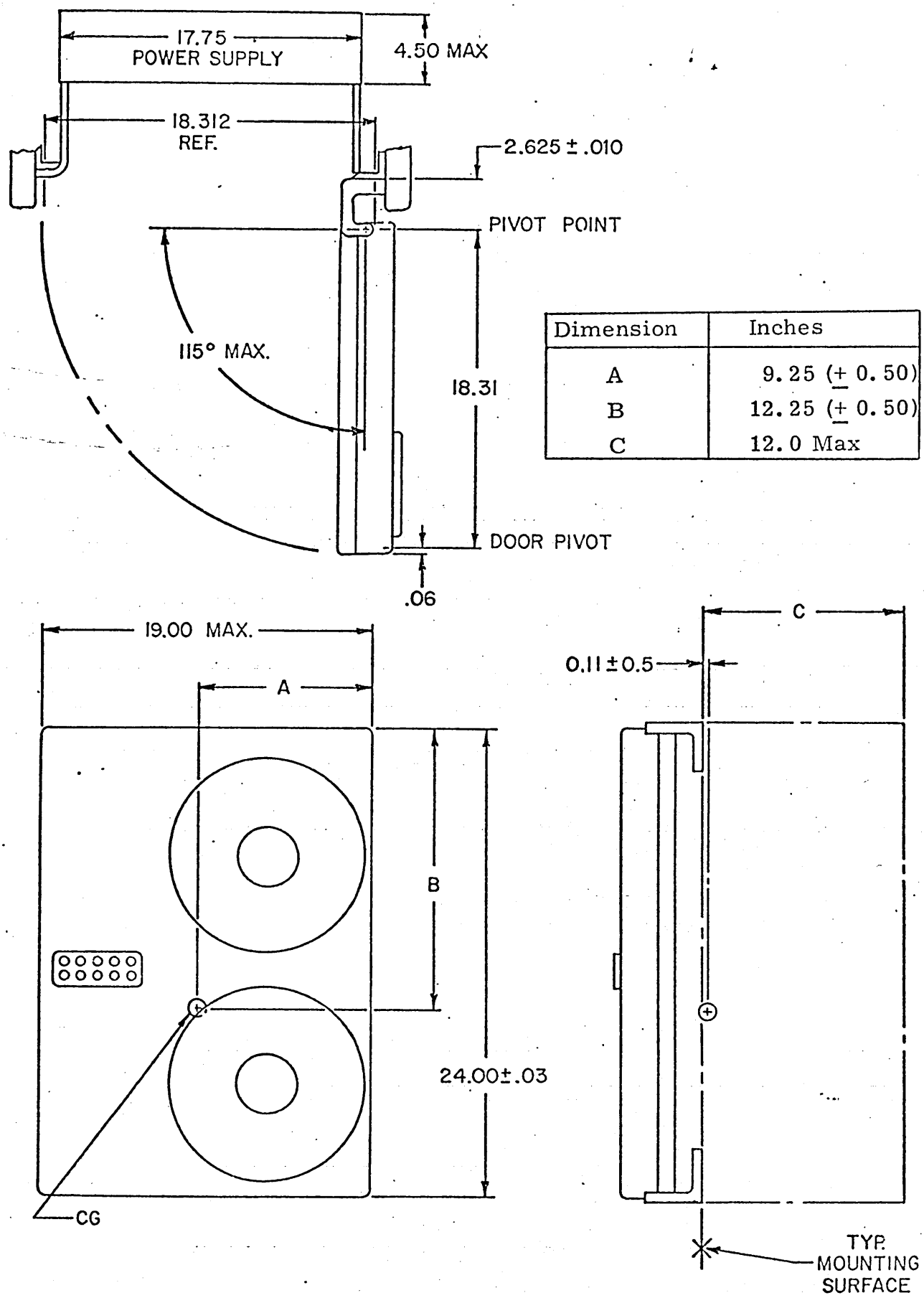


Figure 1-2. Installation



Dimension	Inches
A	9.25 (± 0.50)
B	12.25 (± 0.50)
C	12.0 Max

Figure 1-3. Equipment Outline

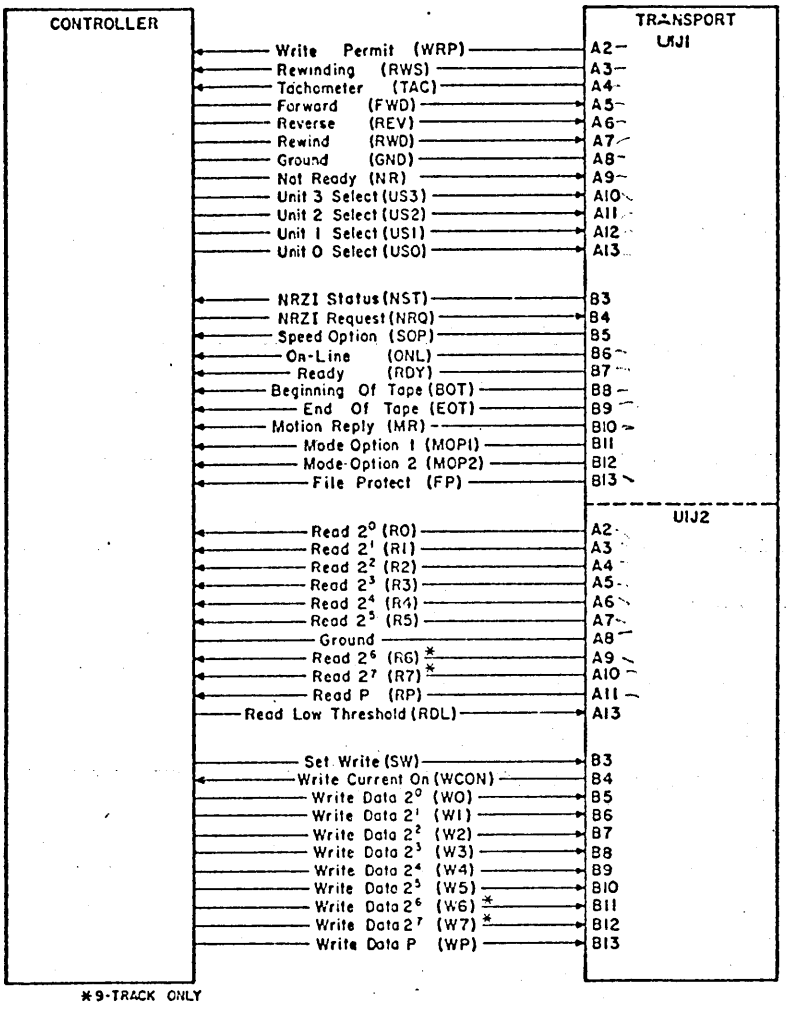


Figure 1-4. Interface Lines

1-3. INSTALLATION

1-3.1 HANDLING

When fully assembled and packaged the tape transport reflects a tendency toward top-front heaviness; observe proper precautions when moving (one man on each side of unit).

WARNING

Unit weights in excess of a hundred pounds. A two-man lift operation must be employed to prevent personal injury.

1-3.2 UNPACKING

The following step procedure should be followed in conjunction with Figure 1-5 for uncrating and preparing unit for on-line operation.

a. Cut tape down the middle of container and open covers.

b. Remove manual and package containing transport mounting hardware.

c. Remove top frame cushion.

d. Remove hold-down carton by lifting straight up.

e. Remove unit from container by the following procedure:

1. One man on each side of unit.

2. Utilizing the metal braces that secure unit to plywood panel, lift straight up out of container.

CAUTION

Do not use any components in unit when lifting. Severe damage to unit could result.

f. Inspect unit to ensure removal of all packing material.

g. Perform Initial Visual Inspection per Table 1-1.

h. Remove power supply and two support brackets. (Translator board attached to power supply, if used.)

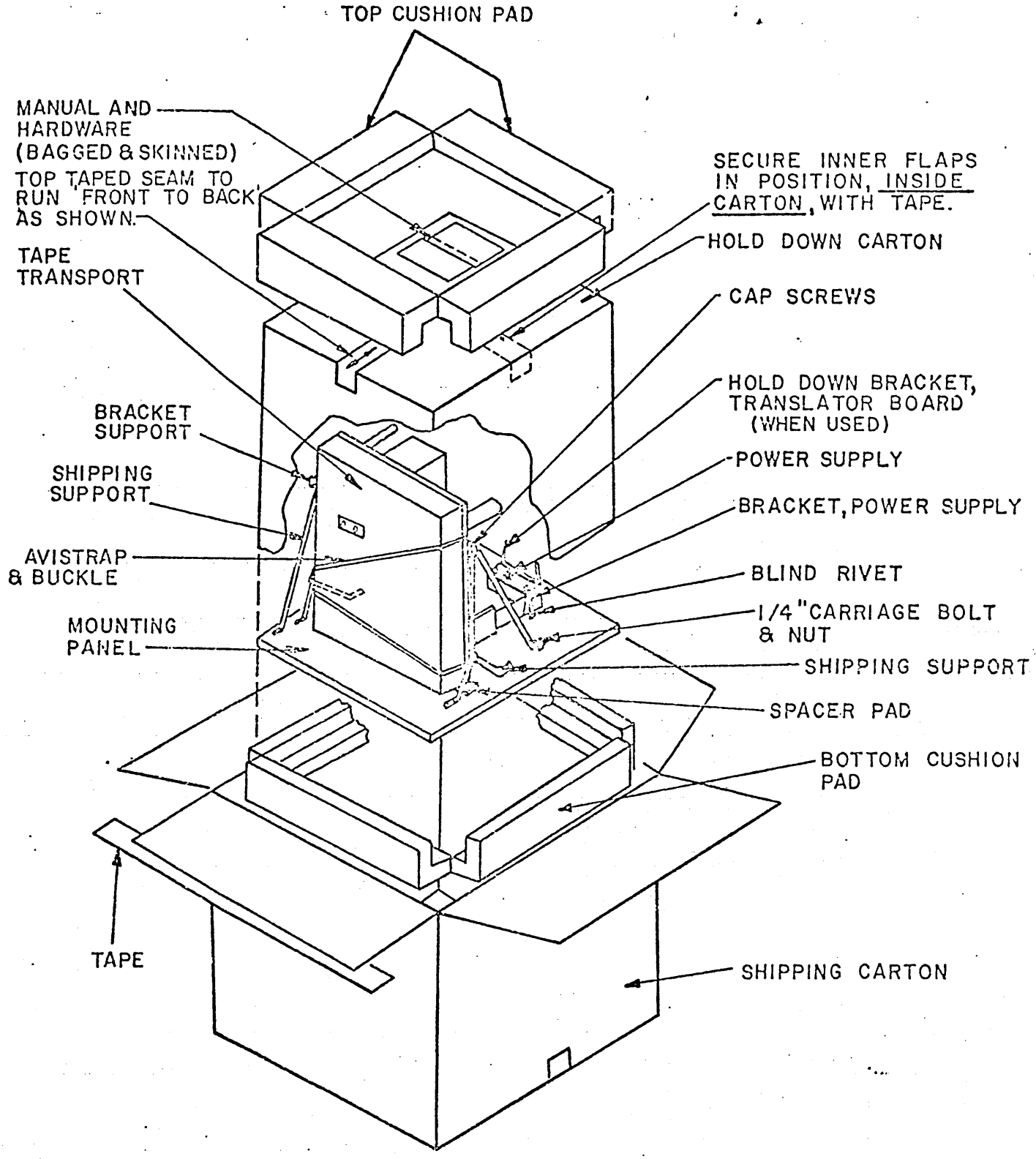


Figure 1-5. Unpacking

i. Remove eight bolts that secure unit to shipping support.

j. All shipping material should be stored for possible reshipment of tape transport.

Table 1-1. INITIAL VISUAL INSPECTION

ITEM	CHECK AND DESIRED CONDITION
Hinged Deck and Access Door	Painted surface unmarred, no structural damage, open and close is smooth and positive.
Switch-Lights (Operator Panel)	Intact and marking legible.
Tape Path	No visible obstructions in tape feed path and tape guides clean. No visible deformity to tape path components - all hardware firmly attached to tape deck.
Head Mounting Assembly	Electrical terminations properly connected. No visible damage to read/write heads.
Capstan Wheel	Clean - free to rotate, no tendency to bind by inserting screwdriver into slotted shaft. Inspect for excessive surface wear/deterioration of elastomeric surface, gashes and scratches on capstan, and oxide accumulation.
Printed Circuit Cards	Check chassis for visible evidence of damage - check all cards for proper seating. Check for full card compliment.
Plastic/Glass Enclosures	Check relative transparency, glass/plastic not chipped, smoked, or cracked.
Cabling/Wiring	Check for viewable continuity, badly crimped or broken leads or exposed conductors. Insulation sleeving correctly positioned. Connector pins not broken, bent, or shorted.
Pneumatics Connections	Hose and tubing connections properly routed - no visible evidence of leaks.
Fuses	Fuse elements not open - fuses properly seated within holders.
Chassis Ground	Unit is properly grounded.
Backplane	Pins not broken, bent, or shorted, No foreign material caught in the pins.
Fiber Optics	Not broken or loose.

1-3.3 MOUNTING

Item number in parentheses are reference in Figure 2-3.

Perform the following:

a. Mount power supply (Item 83) in cabinet, as indicated in Figure 1-2, with four 1/4 - 20 x 0.625 inch screws, flat washers, lockwashers and hex nuts.

b. Mount stay track (Item 93) to power supply support bracket (Item 84), as indicated in Figure 2-3, with two 6-32 x 0.1875 inch screws.

c. Mount bottom hinge (Item 87), as indicated in Figure 1-2, to rack with two 1/4 - 20 x 1.25 inch screws, flat washers, lockwashers and hex nuts.

d. Mount pad bracket (Item 104), as indicated in Figure 1-2 and 1-6, to rack with two 1/4 - 20 x 1.25 inch screws, flat washers, lockwashers and hex nuts.

e. Mount hold down stop (Item 92), as indicated in Figure 1-6, to rack with two 1/4 - 20 x 0.625 inch screws, flat washers, lockwashers and hex nuts.

f. Mount tape deck to hinge halves by the following step procedure:

WARNING

A two man mounting operation must by employed to prevent personal injury.

1. Mount tape deck to bottom hinge (Item 85).

2. Insert top hinge (Item 86) into deck hinge (Item 85) and mount top hinge (Item 86), as indicated in Figure 1-6, to rack with two 1/4 - 20 x 1/25 inch screws, flat washers, lockwashers and hex nuts.

NOTE

When the unit is installed and the deck is swung open, the assembly is top heavy. Ensure that cabinet has proper ballast to compensate for center of gravity.

h. Mount stay bracket (Item 94), as indicated in Figure 2-3, to tape deck, utilizing two 1/4-20 x 0.5 inch screws that were used to mount the lower R.H. shipping support.

i. Position stay rod (Item 95), as indicated in Figure 2-3, by the following step procedure:

1. Insert a nylon washer (Item 96) onto the end of stay rod (long end).

2. Insert stay rod (long end with nylon washer) through stay bracket, and insert stay rod (short end) into stay track (Item 93).

3. Secure stay rod with a retainer ring (Item 97).

j. Mount pad (Item 105), as indicated in Figures 1-2 and 1-6, to pad bracket (Item 104) with two 6-32 x 0.375 inch screws. Use shims as necessary (Items 99 and 100) to support tape deck weight.

k. Connect connectors P1 of cables W1, W2 and W3.

l. Connect ground strap between ground terminal E1 in power supply and the quick connect terminal (Item 108) in the upper R.H. corner on back of tape deck.

CAUTION

This ground strap must be connected to ensure complete electrical safety ground.

m. Remove shield (Item 58) and nylon channel (Item 59) by removing two 4-40 x 0.25 inch screws. Depending on unit electrical configuration, 50 or 60 hertz, add a jumper to the pneumatics regulator board 4940. (Add a jumper to R3 for 60 hertz and R14 for 50 hertz.) Replace shield and rubber channel.

CAUTION

One end of this jumper is equipped with a locking type socket. To remove the jumper from the pin, slightly lift the spring clip and remove socket from pin.

n. If translator board is installed, refer to Interface Equipment Manual (See Preface) for cable connection. If translator board is not installed cable connections C1E1 and C1E2 serve no function and are to be disregarded.

o. At location XA1 Electronics Cage Assembly, ensure that a jumper is placed between pin 16A and the appropriate pin for unit number selection.

Unit No. 0 pin 17A	Unit No. 2 pin 19A
Unit No. 1 pin 18A	Unit No. 3 pin 20A

NOTE

One end of this jumper is equipped with a locking type socket. To remove the jumper from the backplane pin, slightly lift the spring clip and remove socket from the pin.

p. When using the translator board, the unit must be wired for the optional stop mode. This is accomplished by a jumper between pins 13B and 14B at location XA4 of the Electronic Cage Assembly (supplied with interface kit).

CAUTION

One end of this jumper is equipped with a locking type socket. To remove the jumper from the backplane pin, slightly lift the spring clip and remove socket from the pin.

1-3.4 POWER-UP AND CHECKOUT

Following satisfactory completion of the Initial Visual Inspection, the unit is ready for power-up and checkout. Connect the primary ac cable to a compatible outlet. Consult Table 2-1 for appropriate tools and test equipment, and perform procedures indicated in step a.

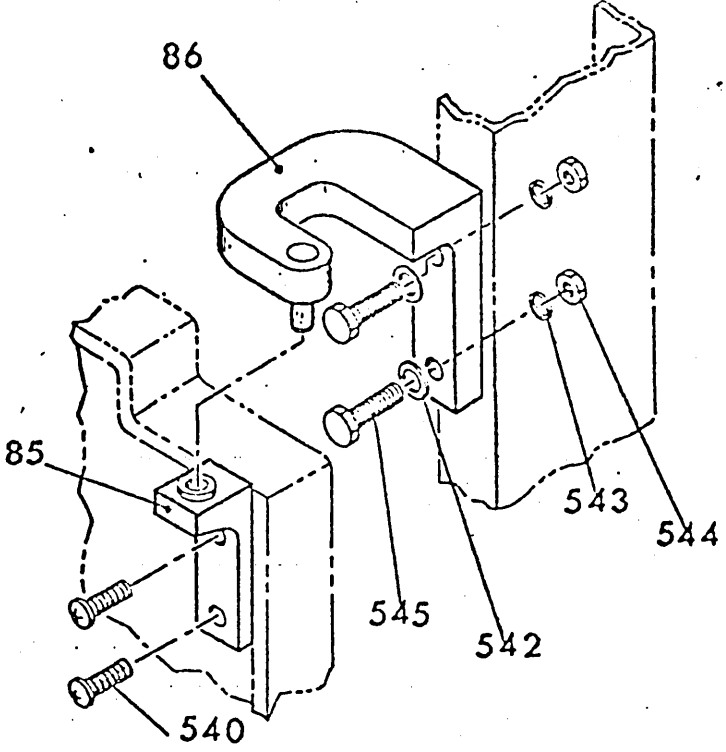
a. Perform the following tests from the following Minimum Performance Standards Test, Table 2-4.

NOTE

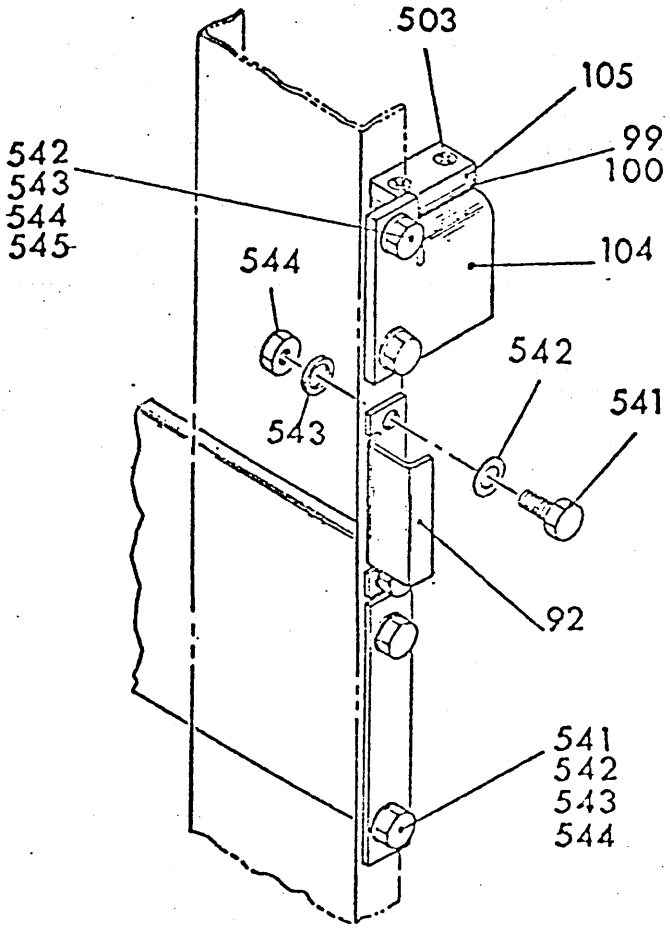
Verify that the 50/60 Hz jumper is correctly installed on the Pneumatics Regulator Printed Circuit Board.

1. Vacuum Check

2. Tape Tracking
3. Start Time
4. Stop Time
5. Gains
6. Read Skews
7. Write Skews
8. Loop Column Fiber Optics Check
9. EOT/BOT Fiber Optics



Hinge Assembly



Relief Bracket Assembly

Figure 1-6. Hinge and Relief Bracket Assemblies (Typical)

SECTION II

MAINTENANCE

MAINTENANCE

2-1. GENERAL

This section contains information necessary to maintain Models △B thru △D tape transports. Covered in this section are: maintenance aids, preventive maintenance, troubleshooting, and corrective maintenance.

2-2. MAINTENANCE AIDS

2-2.1 SPECIAL TOOLS AND TEST EQUIPMENT

The recommended special tools and test equipment, for maintenance of the tape transport, are listed in Table 2-1. Each required tool is indicated by an asterisk (*). Table 2-1 is in two parts. Part I lists tools peculiar to the transport and Part II lists common or commercially available tools. Only those tools listed in Part I are illustrated in Figure 2-1.

2-2.2 MATERIALS

Isoproply alcohol (99% pure) is the only recommended cleaning solvent. Other solvents may cause damage to plastic or other parts. There are no lubricants required.

2-2.3 MAINTENANCE PANEL

No maintenance panel is required for the tape transport. A Forward-Reverse switch is provided on the Control Logic board at location XA2 in the logic chassis. This switch permits tape movement in the forward or reverse direction.

Table 2-1. RECOMMENDED SPECIAL TOOLS AND TEST EQUIPMENT

ITEM		NAME	PART I PART NUMBER	FUNCTION
a	*	Reel Hub Alignment Tool	86731200	Used in reel hub alignments.
b	*	Capstan Motor Alignment	86731800	Used in capstan motor alignment.
c	*	Pin-Alignment, Tape	86731400	Used in capstan alignment.
d	*	Card Extender	59516400	Used in troubleshooting logic boards.
e		P. C. Card Puller	86732000	Used to remove logic boards from electronics cage assembly.
f	*	Write Current Test Cable	86733400	Used in write head current test.
g		Write Head Terminator	86733500	As indicated.
h	*	Resistor, Variable (25 ohms, ± 10%, 5W)	86734700	Fiber optics lamp test.
i	*	Capstan Installation Tool	86739300	Used in capstan replacement.
			PART II	
j		Amplitude Tape	64215200	Used to adjust read recovery amplitude and reference level.
k	*	Skew Tape (Master Tape)	64216000	Used to adjust read skews.
l	*	Vacuum Gauge (30 inches of water)	93108003	Used to adjust vacuum
m	*	Connector-Tube to Female Pipe (0.025-inch pipe thread)	94694303	Used in vacuum adjustment.
n	*	Tee Fitting (0.025-inch)	95854000	Used in vacuum adjustment.
o	*	Tubing (3-feet 0.250-inch I.D.)	94692105	Used in vacuum adjustment.
p		Back-Plane Pin Replacement Kit consists of: 1. Insulator Puller 2. Contact Extraction Tool 3. Contact Insertion Tool 4. Seating Blade (Used for installing new insulator) 5. Repair Contacts (Qty. 300) 6. Repair Insulators (Qty. 24) 7. Repair I/O Posts (Qty. 100) 8. 5/32 Allen Wrench 9. Necessary Instructions	86732300	As indicated.

Table 2-1. RECOMMENDED SPECIAL TOOLS AND TEST EQUIPMENT (Cont'd)

PART II (Cont'd)

ITEM	NAME	PART NUMBER	FUNCTION
q	Wire Wrap Gun	12210851	As indicated.
r	Bit-Wire Wrap (30 awg)	12210636	Used with wire wrap gun.
s	Sleeve-Wire Wrap (26-30awg)	95825202	Used with wire wrap gun.
t	Unwrap Tool (Dual End, 30 awg)	95825206	As indicated.
u	Extractor	95825015	Connector repair.
v	Extractor	95825104	Connector repair.
w	Insertion	95825103	Connector repair.
x	Crimping Tool	95825100	Connector repair.
y	Crimping Tool (20-30 awg)	95825002	Connector repair.
z	Crimping Tool (14-18 awg)	95825005	Connector repair.
aa	Crimping Tool (16-20 awg)	86732403	Connector repair.
ab	Extractor	86732402	Connector repair.
ac	Crimping Tool (24-28 awg)	86732401	Connector repair.
ad	Positioner - Male	95825101	Connector repair.
ae	Extractor	95825016	Connector repair.

NOTE:
Asterisk (*) indicates required tool.

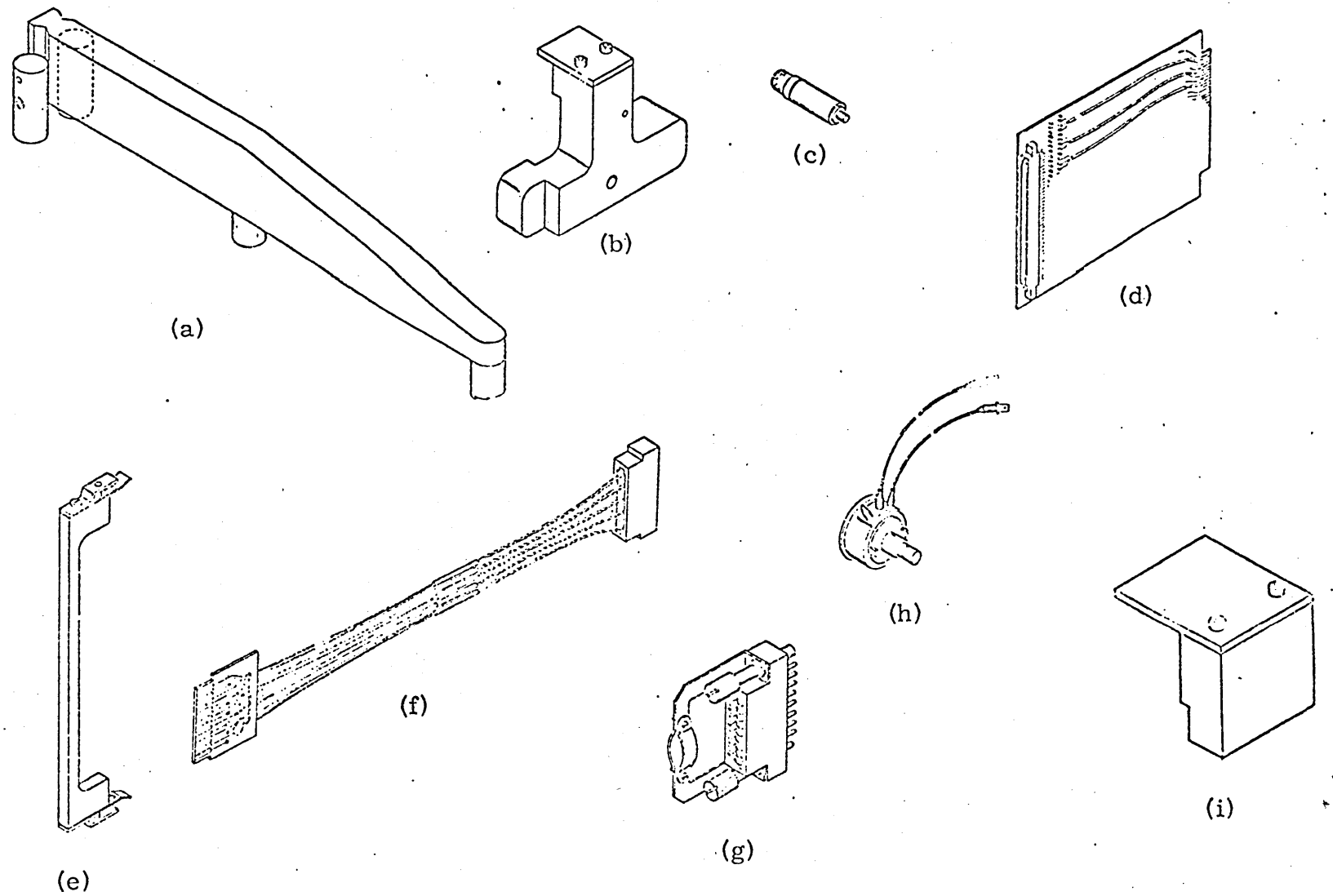


Figure 2-1. Special Tools and Test Equipment

PREVENTIVE MAINTENANCE

.1 ACTIVITIES AND OBJECTIVES - P/M

Preventive Maintenance incorporates those inspections and/or procedures, scheduled on a continuing basis, that are performed to eliminate undesirable conditions before operational degradation or total equipment failure can occur; e.g., dirt accumulation, excessive component wear or borderline adjustment/alignment. The P/M subsection is therefore a guide that establishes the manufacturers recommended activity schedule and includes specific cleaning, periodic component replacement and other procedures that are preventive in nature. Specific performance tests are scheduled to ascertain that the equipment is operating within acceptable margins and to identify corrective adjustments. Adherence to the P/M schedule should preempt most marginal problems and materially reduce equipment down time. Where a defective component or a misadjustment/alignment is exposed through a P/M activity, the appropriate remedial action will be referenced through Corrective Maintenance subsection.

.2 PREVENTIVE MAINTENANCE INDEX

Table 2-2 lists and schedules the manufacturer's P/M activity recommendations. As a rule of interpretation, it is understood that 8-hour activities are automatically a prerequisite of 2500-hour activities, etc. The hours are designated as operating hours. Operating hours are defined as power on/tape loaded. Remove all power prior to performing activity.

Included as the final entry in the maintenance section is a comprehensive Minimum Performance Standards Test (MPST).

The Level columns of Table 2-2 are designated, for scheduling purposes, as:

Level 1 - - - - - - - - - - - - - - - - - -8 hours
Level 2 - - - - - - - - - - - - - - - - -2500 hours
Level 3 - - - - - - - - - - - - - - - - -5000 hours

Table 2-2. PREVENTIVE MAINTENANCE INDEX

LEVEL 1	LEVEL 2	LEVEL 3		REFERENCE
X			Brush clean tape path area.	Para. 2-3.4a
X			Wipe clean head area and loop glass columns.	Para. 2-3.4b
X			Wipe clean tape tachs and capstan.	Para. 2-3.4b
X			Inspect tape path components for damage or oxide build-up.	Para. 2-3.4c
X			Diagnostic Run (Optional).	
	X		Replace blower.	Para. 2-5.2
	X		Clean tape path. Wipe, vacuum, inspect for wear and/or damage. Clean File Hub O rings with isopropyl alcohol.	Para. 2-3.4
	X		Verify Performance: a. Vacuum level b. Tape tracking c. File hub torque d. Start-stop distance e. Rewind speed f. Power supply voltages g. Skew and gains	Table 2-4
	X		Check fiber optics.	Table 2-4
	X		Diagnostic Run.	
		X	Replace Capstan	Para. 2-5.2
		X	Replace light bulbs in control panel and fiber optics.	Para. 2-5.2

2-3.3 PREVENTIVE MAINTENANCE PROCEDURES

When performing any cleaning procedure, a penlight, or equivalent, should be used to closely inspect any grooves, such as those around the EOT/BOT sensor. When inspecting any surfaces for nicks, scratches, or excessive wear, a magnifying glass should be used. Isopropyl alcohol (99%) is the only recommended cleaning solvent. Other solvents may cause damage to plastic or other parts.

2-3.4 PROCEDURE

The following procedures are used to inspect and clean the transport.

a. Using a brush moistened with isopropyl alcohol (99% pure), clean the following areas:

1. Tape cleaner - Ensure all dirt particles are removed from the grooves.
2. Loop column phototransistors - Remove all oxide build-up.
3. Tape guide spring loaded flanges - Push back flange and brush clean. Remove all oxide build-up around flange and stainless steel post.
4. EOT/BOT sensors - Brush clean grooves around sensors to remove all oxide build-up.

b. Using a lint-free cloth (Kimwipe) moistened with isopropyl alcohol (99% pure), clean the following areas:

1. Read/Write and Erase heads - Wipe clean head surfaces.
2. Tape guides and tape cleaner - Wipe clean to remove dirt particles. Use brush to loosen particles if necessary.
3. Loop column glass - Wipe clean.
4. Tape tachs - Wipe clean.
5. EOT/BOT prism - Wipe clean.
6. Capstan - While holding moistened cloth against capstan tape contact surface, insert screwdriver into slot on end of capstan shaft and rotate through several revolutions.
7. Loop Column Bed - Wipe clean.

CAUTION

Do not touch the outside diameter (tape contact surface) of the capstan with fingers. Use screwdriver in capstan shaft slot to rotate capstan. Use soft lint free wiper when handling capstan.

c. Using a penlight, or equivalent, and magnifying glass, inspect the following areas for oxide build-up or damage:

1. Tape path - Check head surfaces, guide post and flanges for scratches, burrs, etc., and any oxide build-up.

2. Tape tachs - Ensure free rotation without noise.

3. Loop columns - Tape on loop columns is not peeling.

4. Reel flanges - Tape does not rub against reel flanges.

d. Use vacuum cleaner with brush attachments to remove dust/dust accumulation from tape path area. Exercise care to prevent damage or misalignment of components.

2-4. TROUBLESHOOTING

Troubleshooting aids incorporated in this manual include a Troubleshooting Guide (Figure 2-2), a Minimum Performance Standards Test (Table 2-4), and a Card Placement Chart (Table 4-1).

The Minimum Performance Standards Test, Table 2-4, incorporates all electrical tests and adjustments and includes a Trouble Reference column with appropriate entries or cross-reference to the Troubleshooting Guide. The Minimum Performance Standards Test procedure, followed in the listed sequence, should permit isolation of difficult marginal conditions and provide for the restoration of an overhauled unit to full operating status.

2-5. CORRECTIVE MAINTENANCE

2-5.1 ACTIVITIES AND OBJECTIVES - C/M

Corrective Maintenance incorporates component removal, disassembly and replacement procedures, and all mechanical/electrical alignments and adjustments. A Minimum Performance Standards Test (MPST) is included as the final entry of this subsection (See Table 2-4).

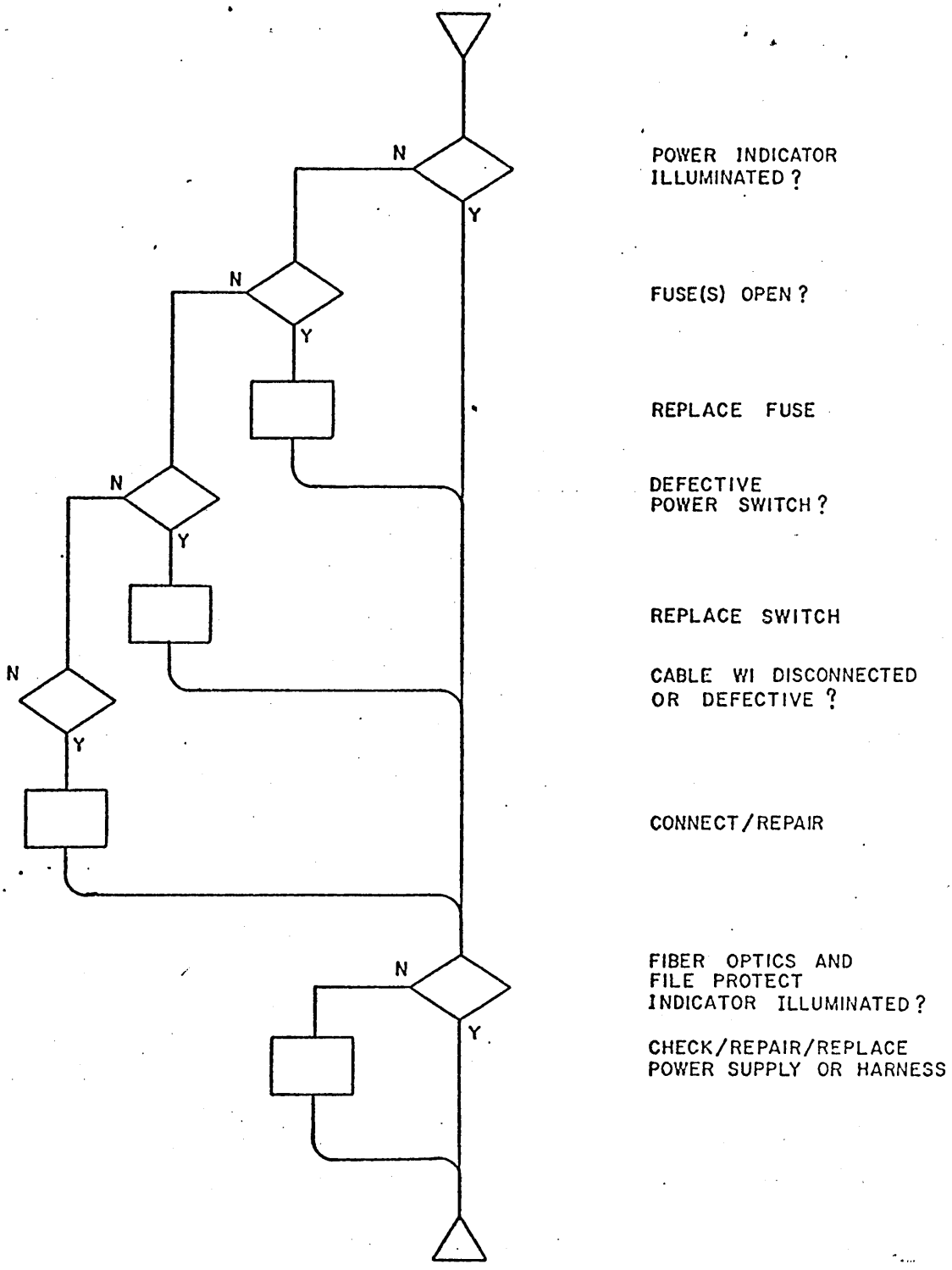
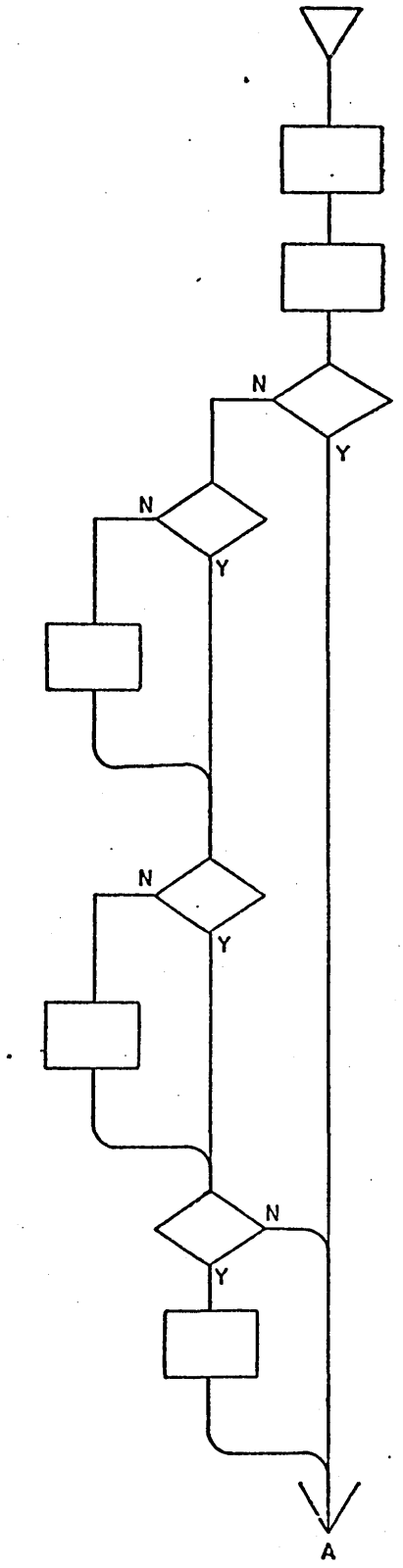


Figure 2-2. Troubleshooting Guide (Sheet 1)



THREAD TAPE

PRESS LOAD/REWIND SWITCH

HAS TAPE FORMED CORRECTLY IN LOOP COLUMNS ?

PNEUMATICS ON ?

CHECK/REPLACE IN ORDER – LOAD REWIND SWITCH, PNEUMATICS REGULATOR BOARD, PNEUMATICS MOTOR, CONTROL LOGIC BOARD

REELS MOVE ?

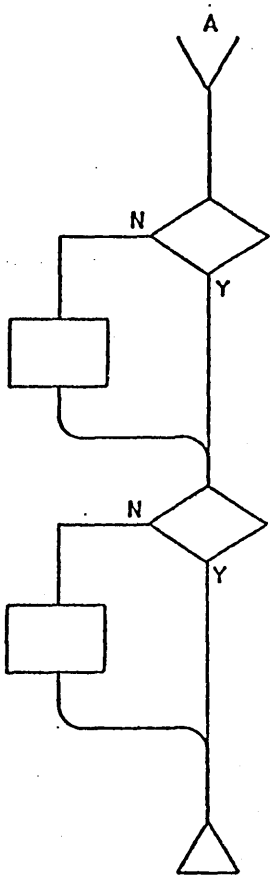
CHECK/REPLACE IN ORDER – P.A. FUSES, CONTROL LOGIC BOARD, REEL LOGIC BOARD, +40V P.S., P.A. BOARD(S), MOTOR(S)

UNIT FAULTED ?

CHECK/REPLACE IN ORDER – FIBER OPTICS, CONTROL LOGIC BOARD, REEL LOGIC BOARD, P.A. BOARD(S), VACUUM SPECIFICATION, VACUUM SENSOR

LOAD FAILURE (SHEET 1)

Figure 2-2. Troubleshooting Guide (Sheet 2)



SEARCH BOT ?

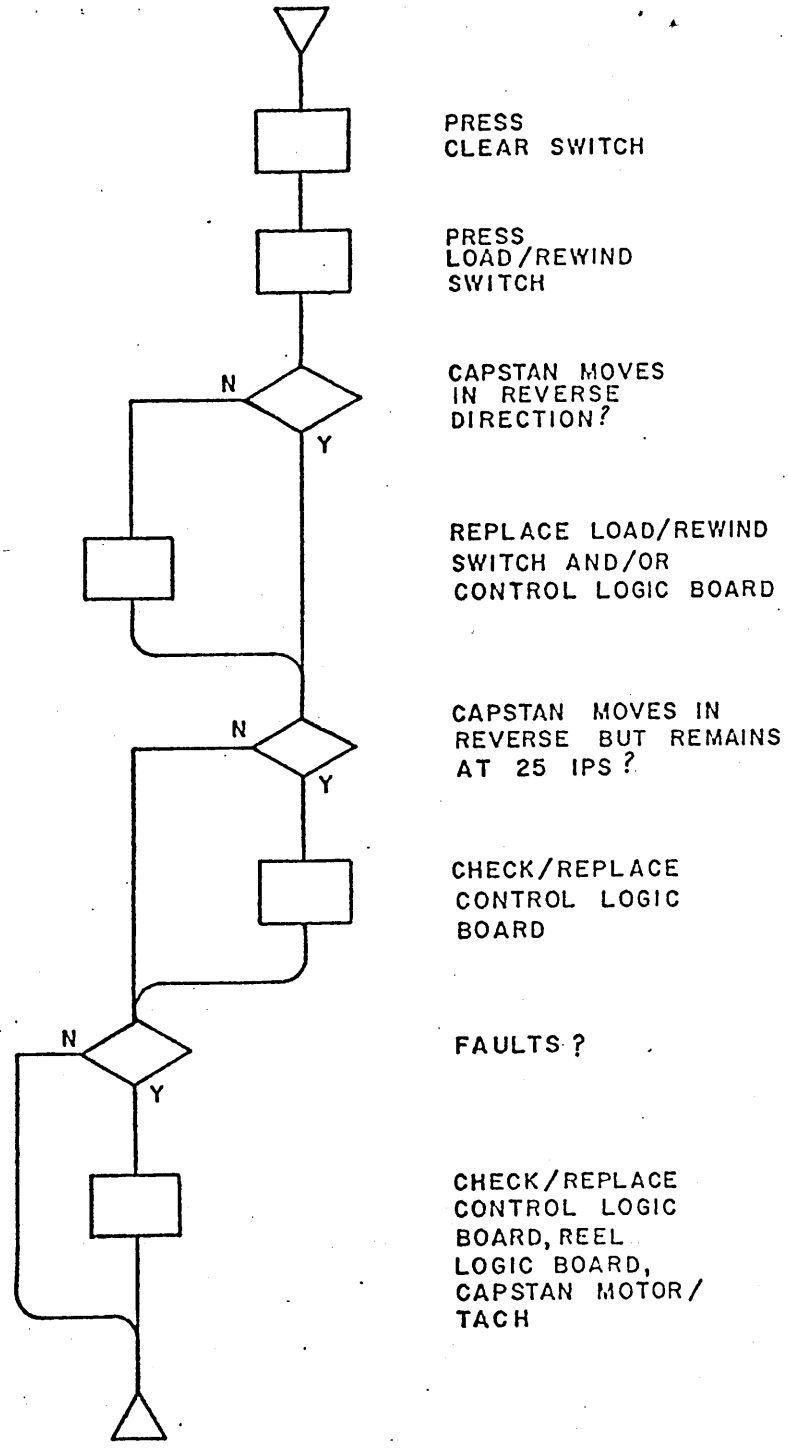
CHECK/REPLACE IN ORDER-CONTROL LOGIC BOARD, CAPSTAN LOGIC BOARD, P.A. BOARD(S), FUSE(S), MOTOR(S)

STOPS AT BOT ?

CHECK/REPLACE IN ORDER - BOT MARKER, EOT/BOT SENSORS, REEL LOGIC BOARD, CONTROL LOGIC BOARD

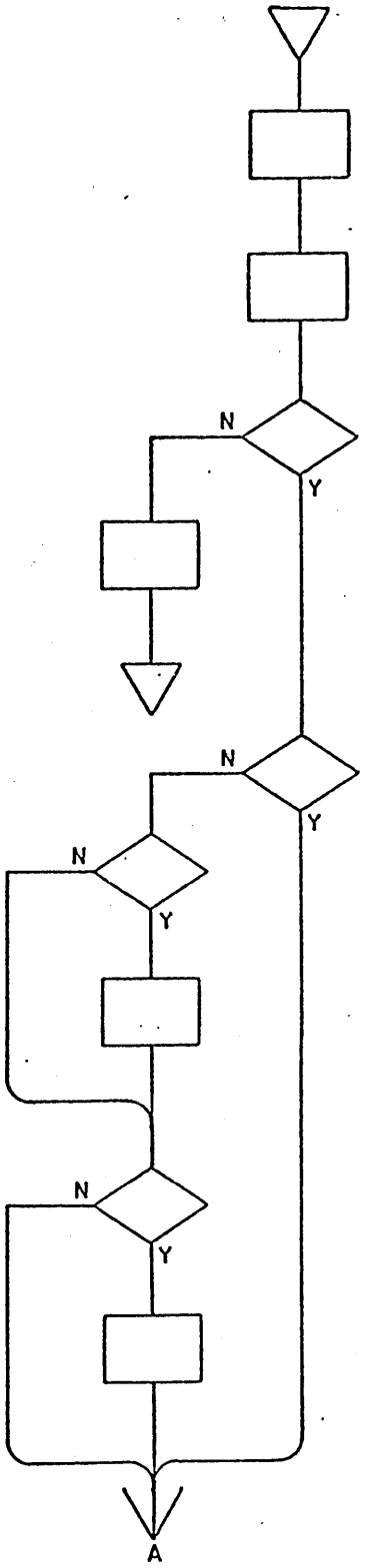
LOAD FAILURE (SHEET 2)

Figure 2-2. Troubleshooting Guide (Sheet 3)



REWIND FAILURE

Figure 2-2. Troubleshooting Guide (Sheet 4)



PRESS
CLEAR SWITCH

PRESS
UNLOAD SWITCH

REWIND
TO BOT ?

CHECK/REPLACE - UNLOAD SWITCH
AND/OR CONTROL LOGIC BOARD

ENTER REWIND
FLOW CHART

OVERSHOOTS BOT
AND EXECUTES A STOP ?

FAULTS AT BOT ?

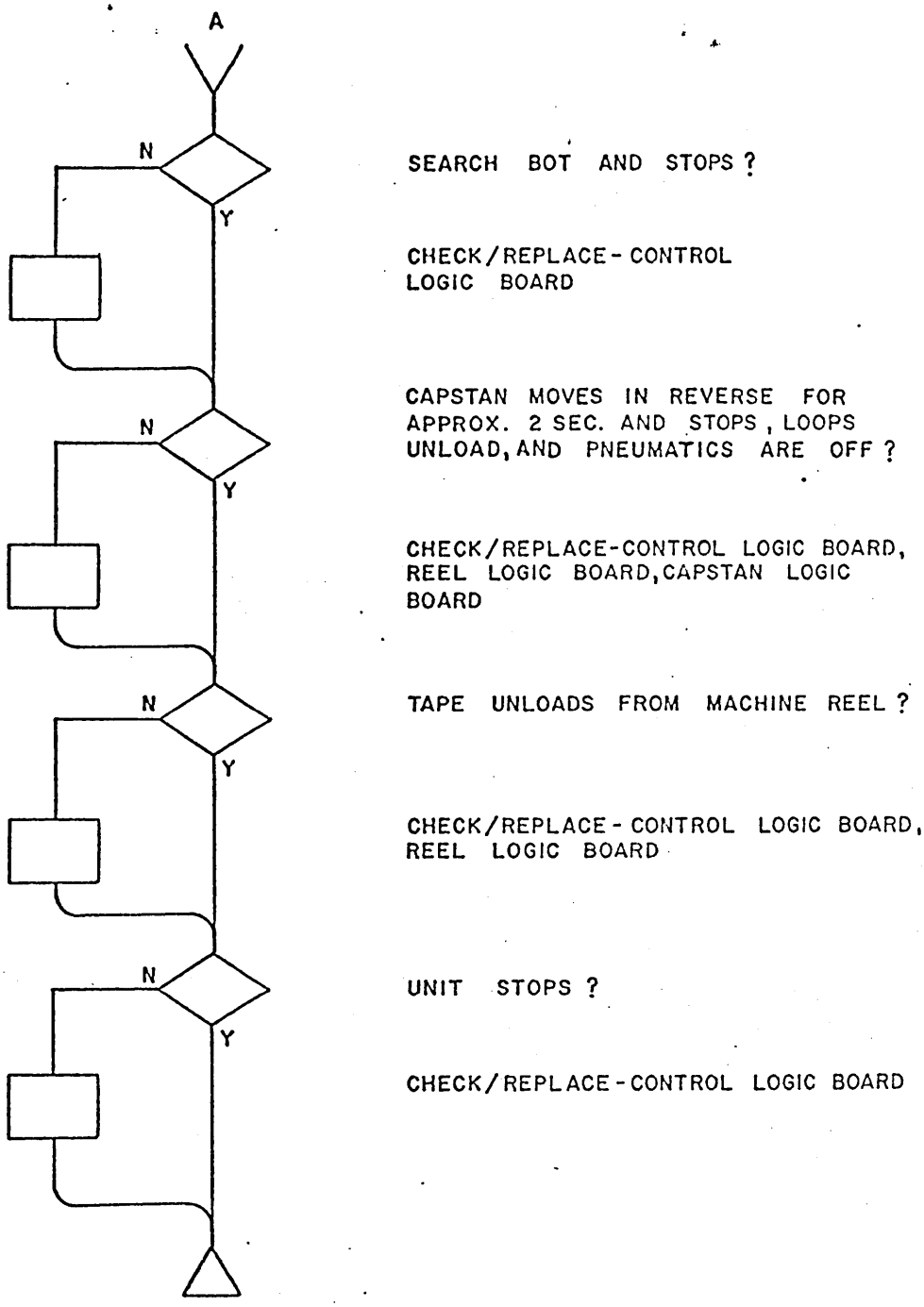
CHECK/REPLACE - CONTROL LOGIC
BOARD, CAPSTAN LOGIC BOARD

REWINDS OFF END OF TAPE ?

CHECK FOR BOT MARKER.
CHECK EOT/BOT SENSOR OPERATION.
CHECK/REPLACE - REEL LOGIC BOARD,
CONTROL LOGIC BOARD

UNLOAD FAILURE (SHEET 1)

Figure 2-2. Troubleshooting Guide (Sheet 5)



UNLOAD FAILURE (SHEET 2)

Figure 2-2. Troubleshooting Guide (Sheet 6)

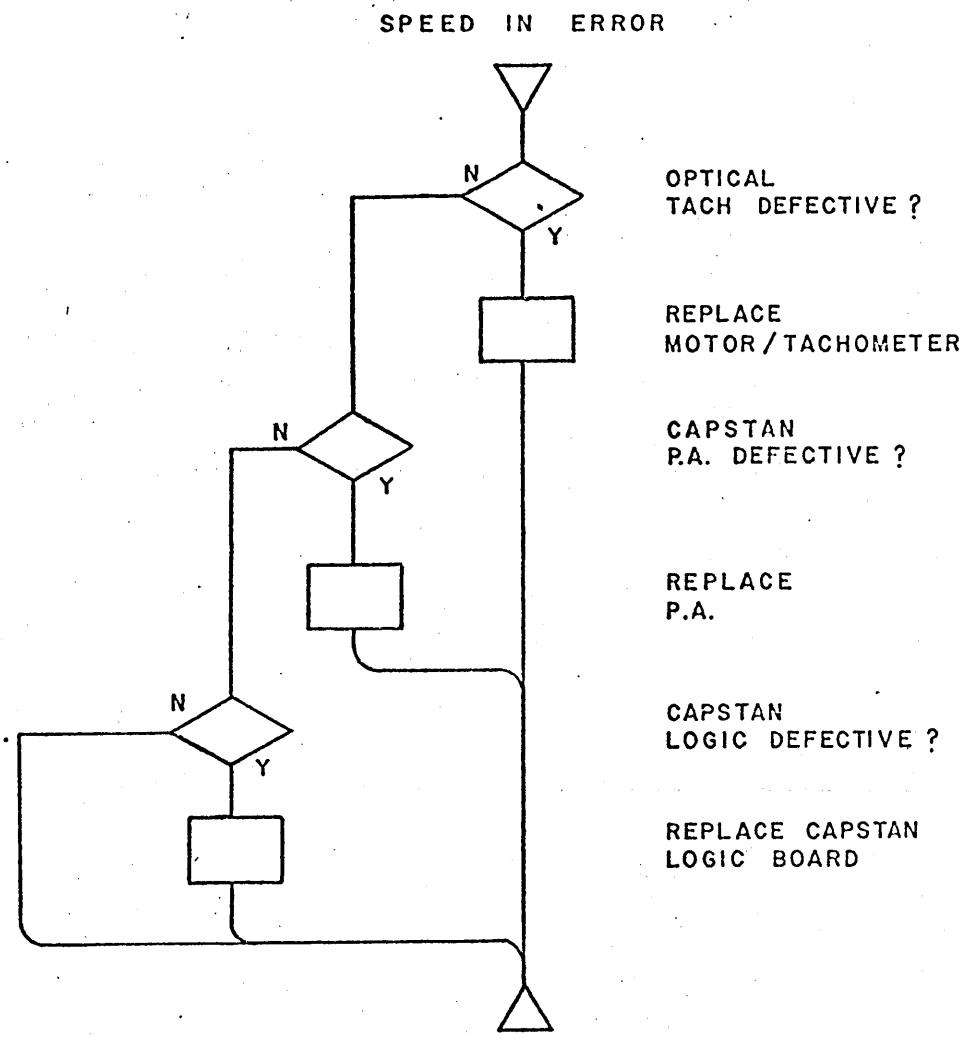


Figure 2-2. Troubleshooting Guide (Sheet 7)

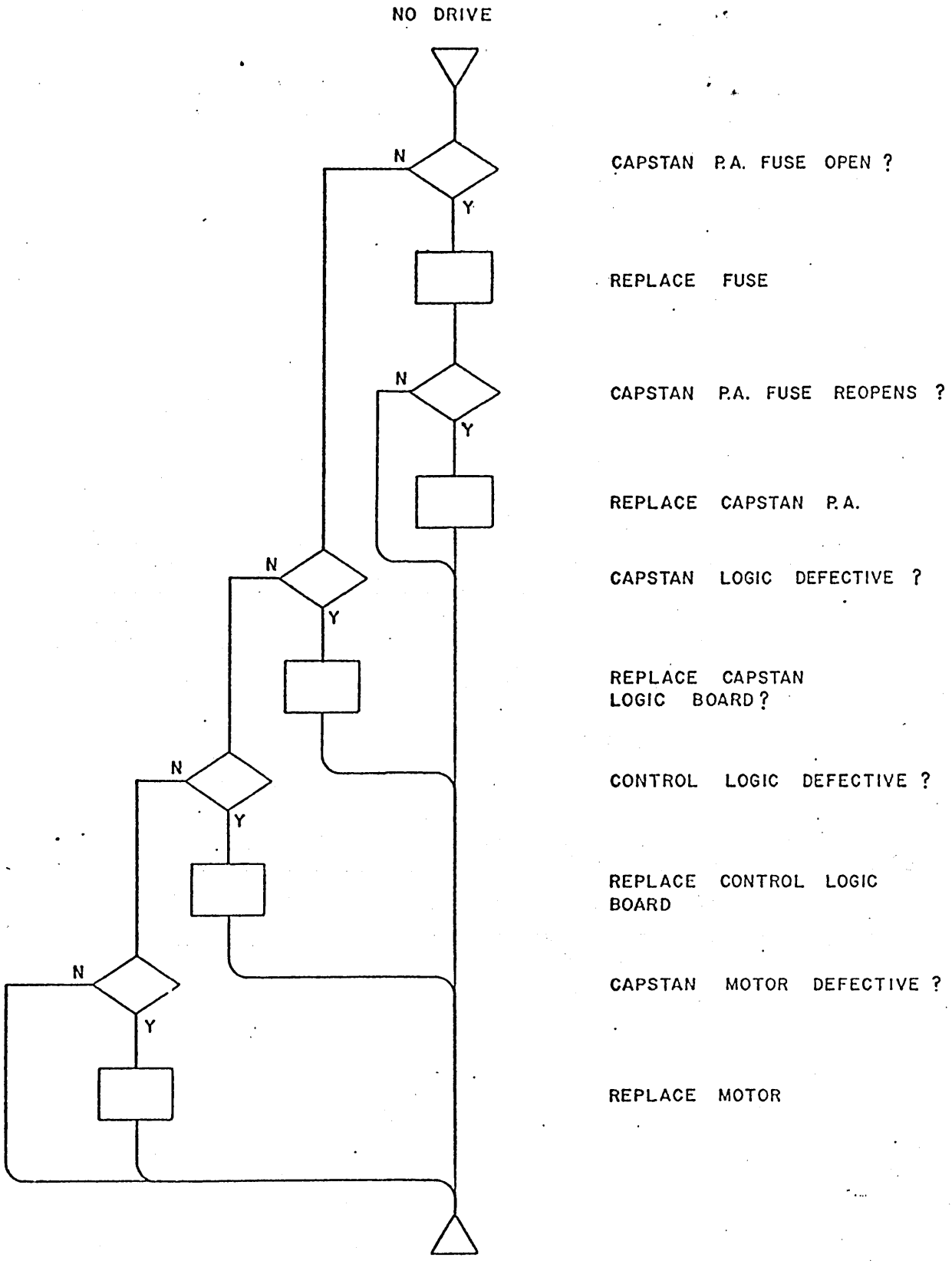
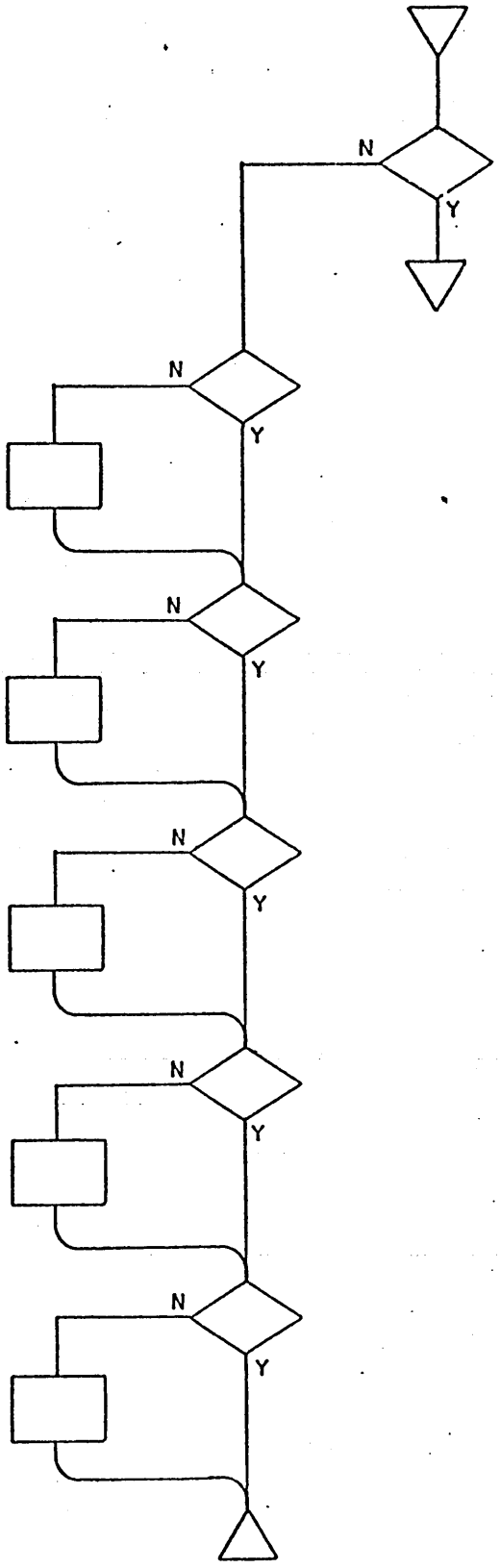


Figure 2-2. Troubleshooting Guide (Sheet 8)



WRITE PARITY ERROR ?

ENTER WRITE PARITY FLOW CHART

READ REF. LEVELS CORRECT ?

ADJUST

CAPSTAN DYNAMICS CORRECT ? (SPEED, START, STOP, etc.)

CHECK / CORRECT

READ SKEWS CORRECT ?

ADJUST

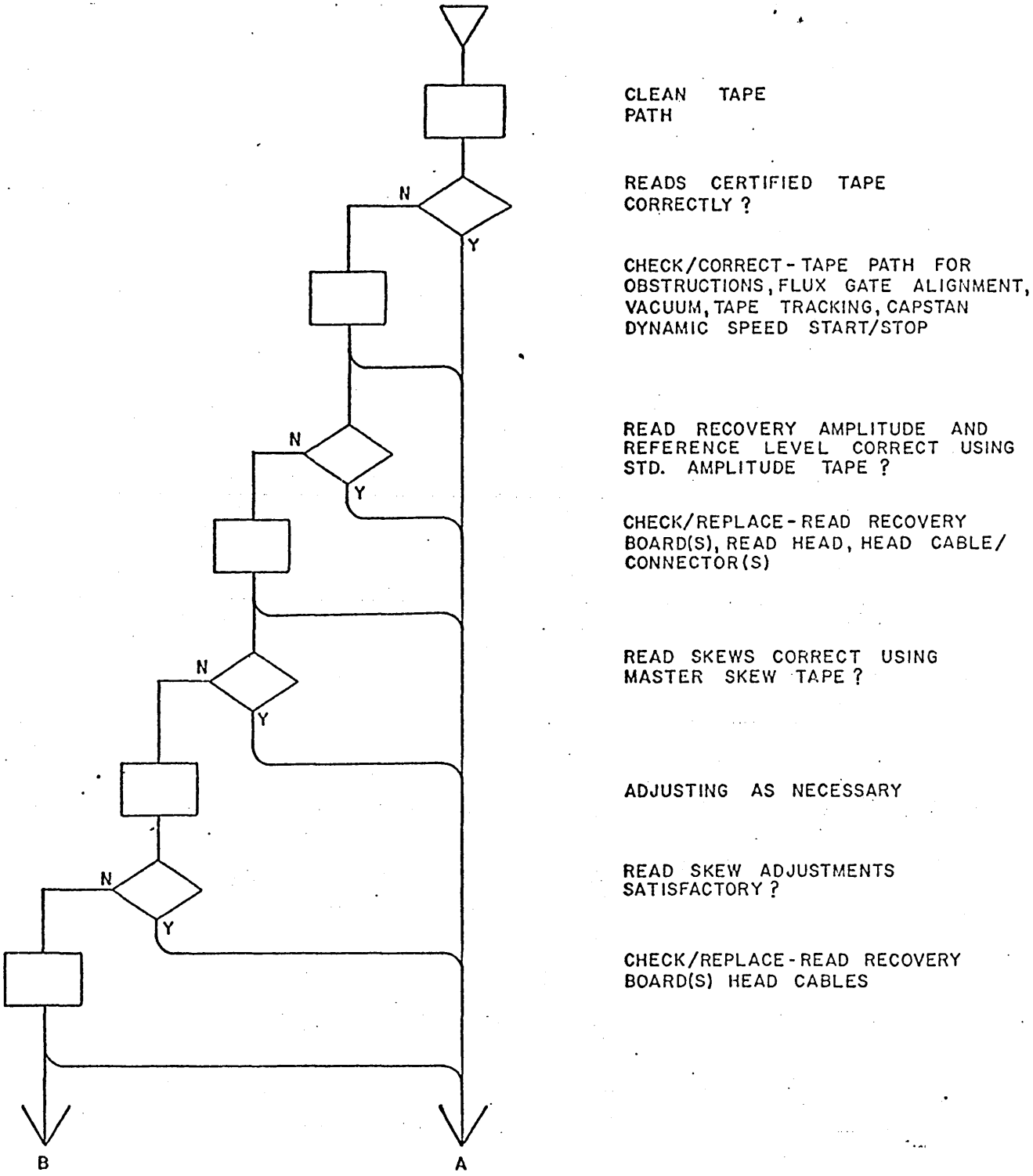
READ REGISTRATION CORRECT ?

CHECK/CORRECT

NOISE LEVEL SATISFACTORY ?

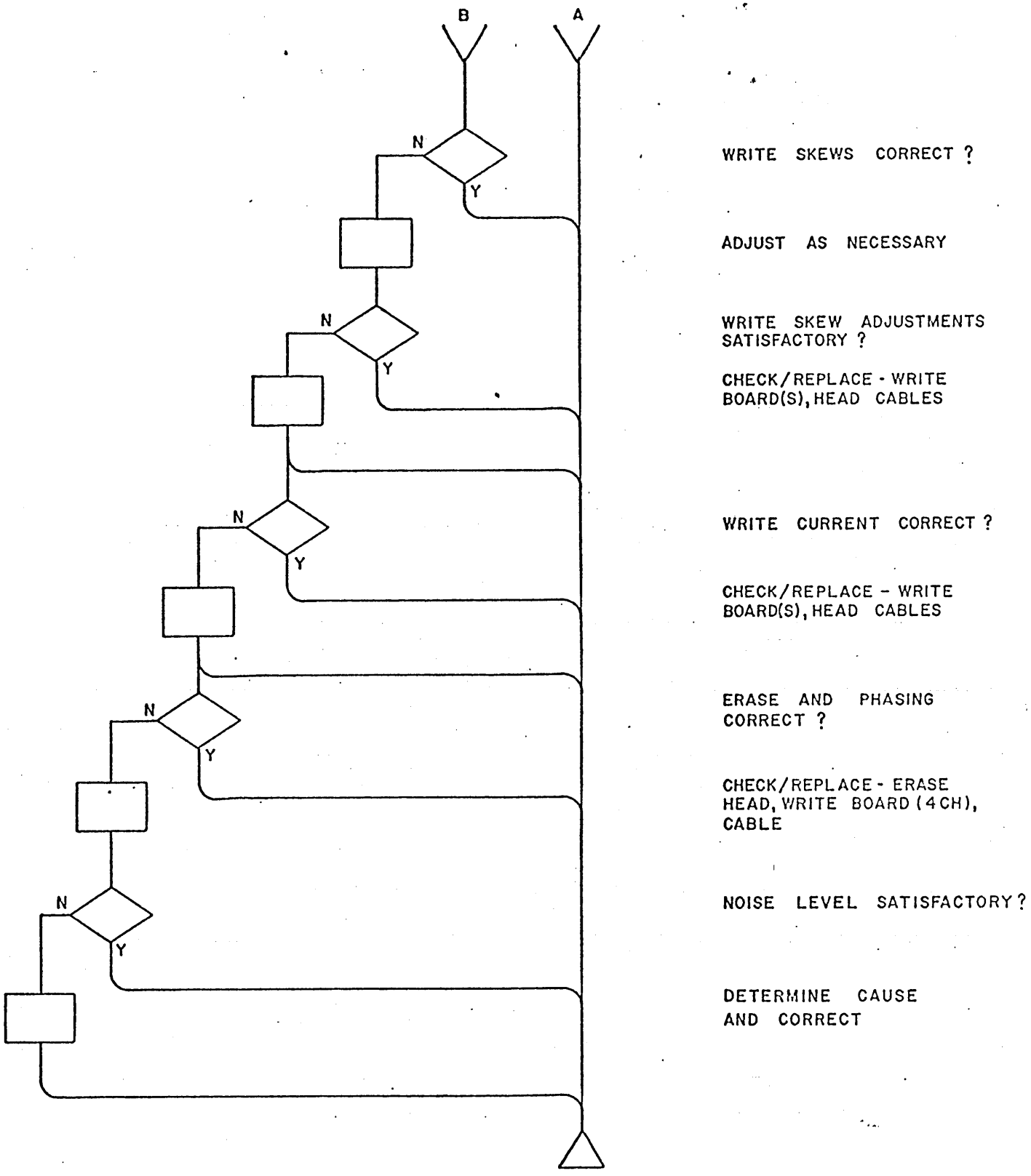
DETERMINE CAUSE AND CORRECT

Figure 2-2. Troubleshooting Guide (Sheet 9)



WRITE PARITY ERROR (SHEET 1)

Figure 2-2. Troubleshooting Guide (Sheet 10)



WRITE PARITY ERROR (SHEET 2)

Figure 2-2. Troubleshooting Guide (Sheet 11).

2-5.2 REMOVAL, REPLACEMENT AND ALIGNMENT PROCEDURES

Subordinate paragraphs provide instructions for the removal, replacement and alignment of components/assemblies where such are considered appropriate site maintenance activities.

Where a procedure is obvious by visual inspection, no instructions are provided. Electrical adjustments and alignments are covered as an integral part of the MPST, Table 2-4.

a. Capstan Removal (Figure 2-3)

1. Remove head cover (Item 1) by removing two 6-32 x 0.31 inch screws and filler plate (Item 8) from tape deck by removing three 6-32 x 0.63 inch phillips screws and flat washers.

CAUTION

Do not touch the outside diameter (tape contace surface) of the capstan with fingers or tools.

2. Place screwdriver blade in slot on front end of capstan hub (Item 88).

3. Grip hex nut (Item 89) at rear of capstan with an open end wrench.

4. Hold screwdriver firmly in slot while turning wrench in clockwise direction until nut is loose.

5. Place fingers behind capstan rim and pull firmly.

b. Capstan Replacement (Figure 2-3)

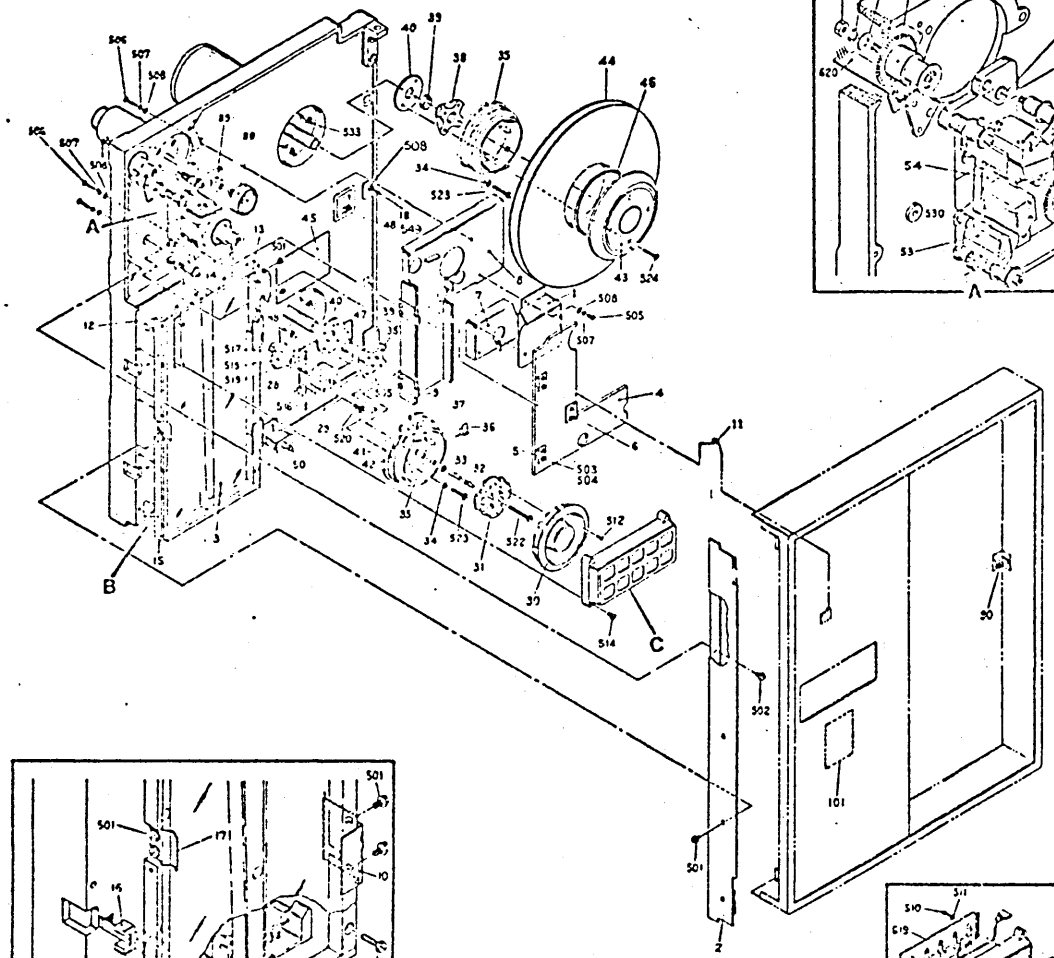
CAUTION

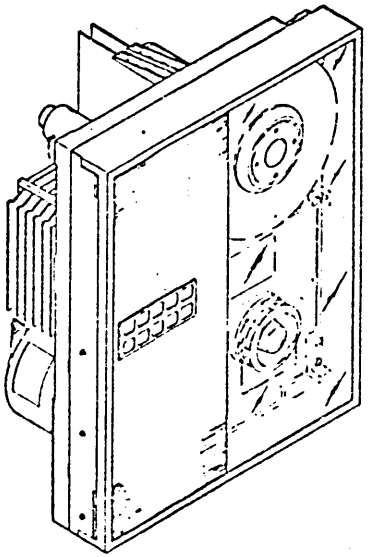
Do not touch the outside diameter (tape contact surface) of the capstan with fingers or tools.

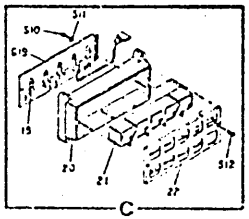
1. Place gauge (Item i, Table 2-1) in position on front of deck above capstan motor shaft as shown in Figure 2-4.

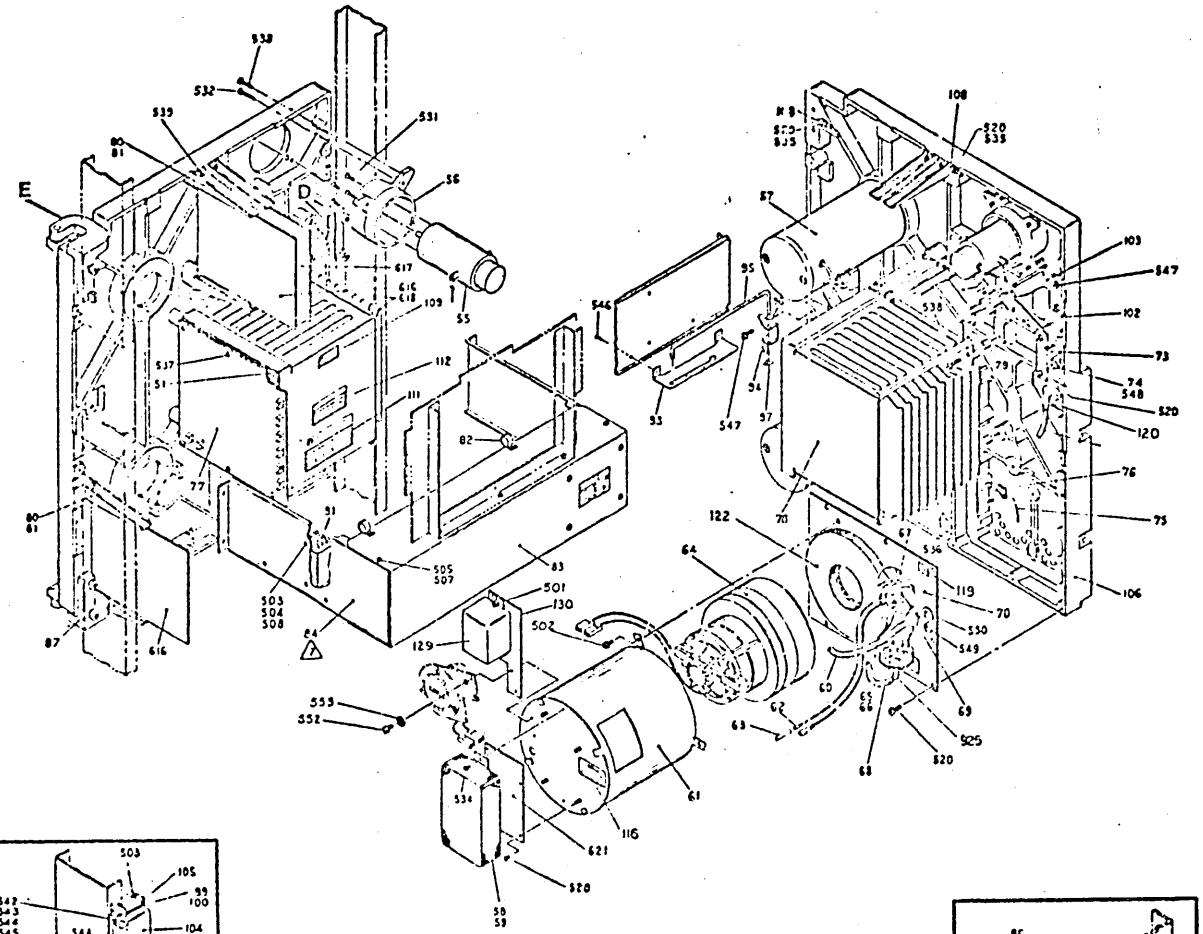
2. Loosen nut (Item 89) on capstan.

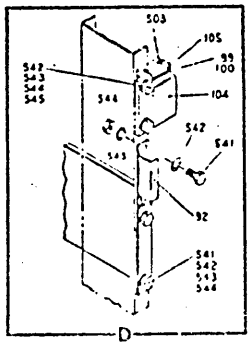
3. Place capstan, nut first, on motor shaft by pressing firmly on hub until rear edge of capstan rim contacts gauge.

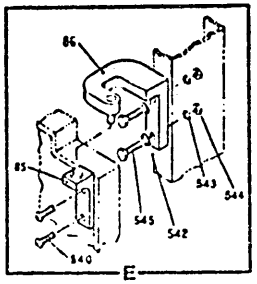












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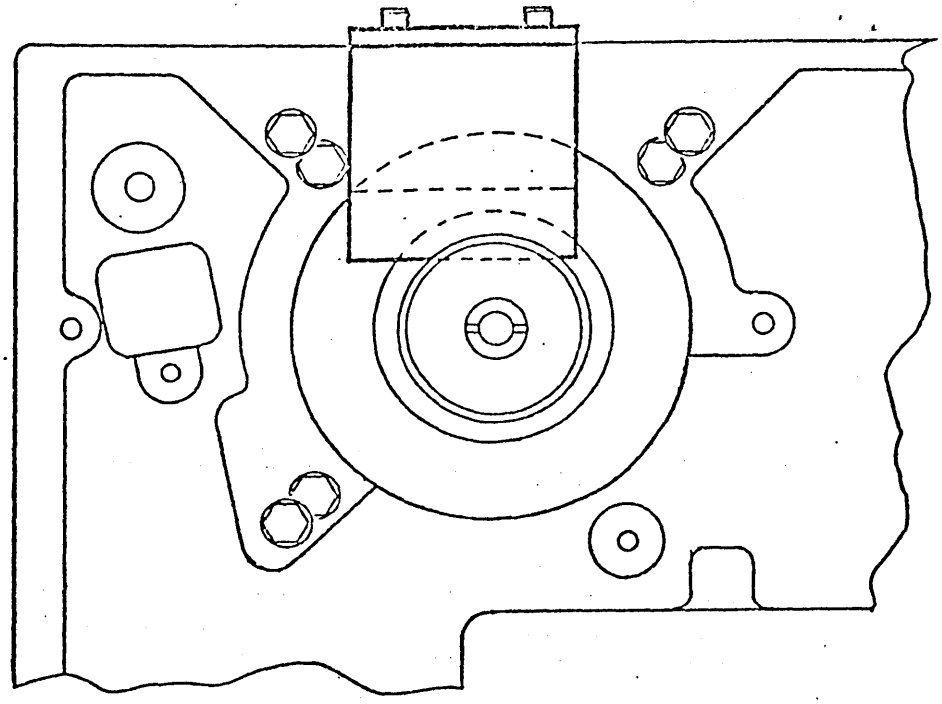


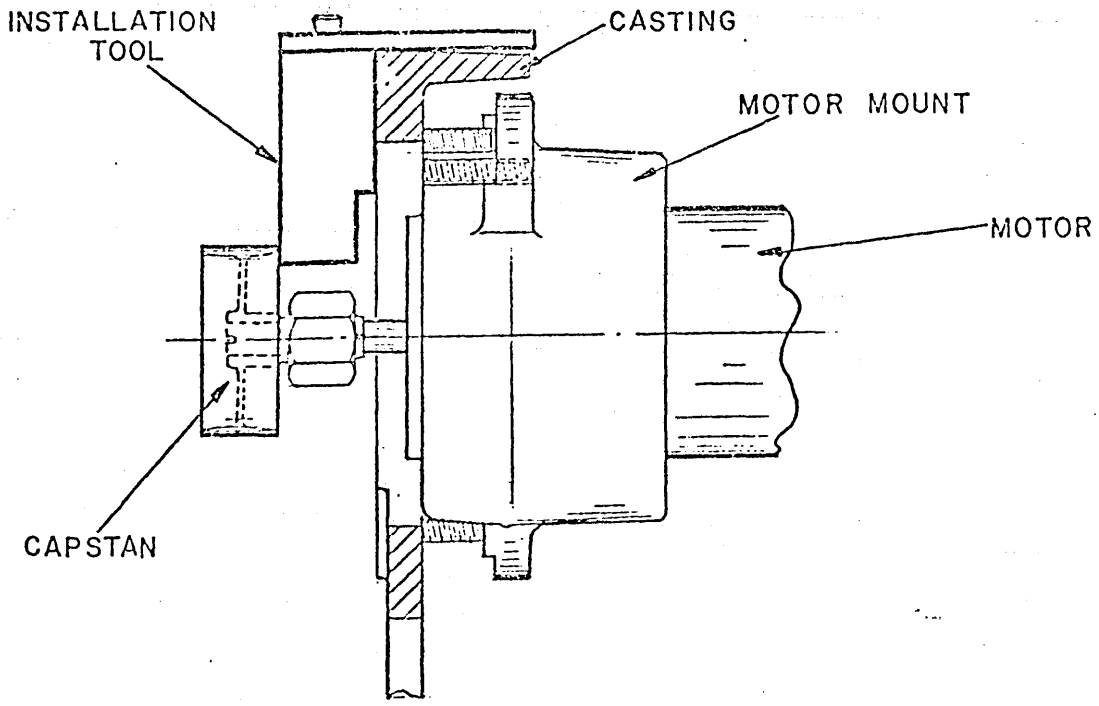


Figure 2-4. Capstan Replacement

4. Remove gauge, being careful not to move capstan out of position.

5. Tighten capstan nut by placing the blade of a screwdriver in the hub slot and turning the nut counterclockwise with an open end wrench to approximately 15 inch-pounds. Care should be taken to prevent moving capstan toward tape deck.

6. Perform Capstan Alignment procedure.

c. Capstan Alignment

1. If head cover and filler plate have not previously been removed, perform step 1 of Capstan Removal procedure.

2. Remove upper right hand head guide post and replace with alignment pin (Item c, Table 2-1).

3. Load transport with a tape having edge quality equivalent to a new tape.

4. Load loop columns and move approximately 200 feet of tape past load point.

5. Move tape in forward direction and adjust for alignment of tape relative to the back edge of the line on the alignment pin. Refer to Table 2-3 and perform forward adjustment to eliminate tape skew. See Figure 2-5 for adjustment screw location.

6. Move tape in reverse direction and adjust for alignment of tape relative to the back edge of the line on the alignment pin. Refer to Table 2-3 and perform reverse adjustment to eliminate tape skew. See Figure 2-5 for adjustment screw location.

7. Repeat steps 5 and 6 as necessary until there is no variation in tape movement.

8. Remove alignment pin and install tape guide.

9. Replace filler plate and head cover.

Table 2-3. CAPSTAN ALIGNMENT

TAPE MOTION	FORWARD		REVERSE	
When Tape Position is	Toward Deck	Away From Deck	Away From Deck	Toward Deck
Upper Right Screw	-	-	CW	CCW
Lower Left Screw	CW	CCW	-	-

NOTE

Use descretion in turning adjusting screws. Screws should not be turned more than 1/8 turn at anytime during preliminary adjustment and only slightly turned during final adjustment. Adjustment screws and holding screws should be firmly seated but not over torqued.

d. Capstan Motor Removal (Figure 2-3)

1. Remove all power from the transport.
2. Disconnect electrical connectors between capstan motor/tachometer and capstan power amplifier.
3. Remove head cover (Item 1) by removing two 6-32 x 0.31 inch screws and filler plate (Item 8) from tape deck by removing three 6-32 x 0.63 inch phillips screws and flat washers.
4. Removal of the capstan (Item 88) is not necessary, but if desired, refer to Capstan Removal procedure.

NOTE

Do not change setting of adjusting screws. If these screws are not moved during motor replacement, capstan realignment is simplified and can be accomplished without the use of the special tool (Item b, Table 2-1).

5. Remove three 10-32 x 1.00 inch screws holding motor assembly to tape deck.
6. Remove motor assembly from rear of tape deck.

7. Remove four 6-32 x 0.5 inch screws that secure motor to motor assembly.

NOTE

If motor and assembly do not separate easily, hold motor and gently tap assembly.

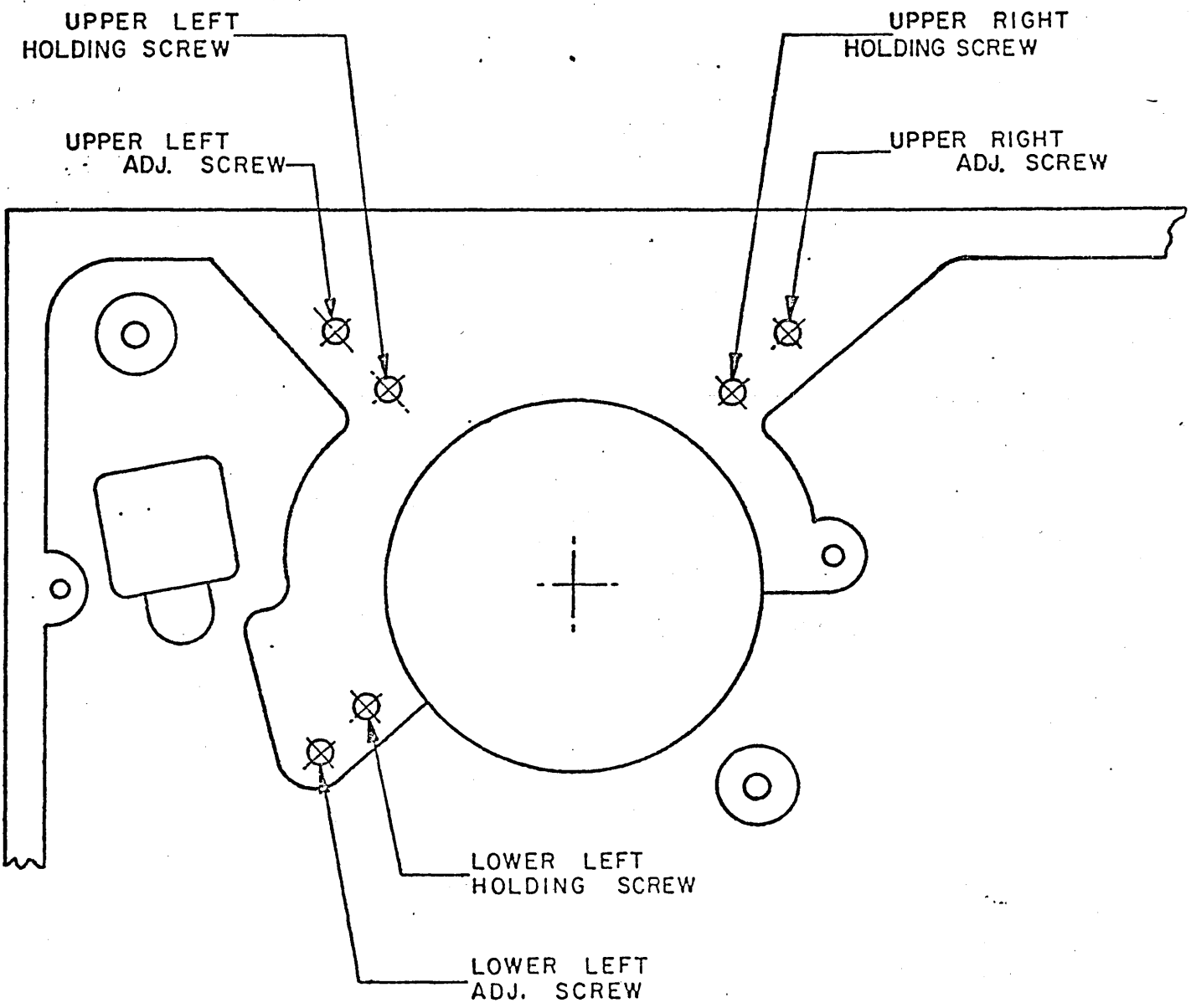


Figure 2-5. Capstan Motor Support and Adjustment Screws

e. Capstan Motor Replacement/Alignment (Figure 2-3)

1. Prior to motor replacement, if adjustment screws have been moved, set adjustment screws so that they protrude through the deck by 0.580 inch as measured from the front machined surface. This is a preliminary setting.

2. Place motor assembly in position from rear of tape deck and attach with three 10-32 x 1.00 inch screws.

3. Place gauge (Item b, Table 2-1) over motor shaft and carefully slide toward tape deck until three flat surfaces contact machined front surface of tape deck. (See Figure 2-6). Care should be taken not to jam gauge on motor shaft. If all three pads do not touch the tape deck surface, slide gauge away from the deck and adjust adjustment and holding screws. Recheck with gauge.

4. Repeat step 3 until the three flat surfaces of the gauge contact the machined front surface of the deck. The pin on the gauge should be in light contact with, or within 0.010 inch of, the motor mount. This will ensure the proper distance of the motor mount behind the front of the tape deck.

CAUTION

Care should be taken to ensure that the motor mount does not contact the head plate.

5. Reconnect electrical connectors between the capstan motor/tachometer and capstan power amplifier.

6. Replace and align capstan. Refer to Capstan Replacement and Capstan Alignment procedures.

7. Reassemble filler plate and head cover.

8. Reset capstan Start/Stop Time (See Subtest 4, Table 2-4).

f. Blower Assembly Removal (Figure 2-3)

1. Remove all power from the transport.
2. Remove pneumatics voltage regulator shield (Item 58) by removing two 4-40 x 0.25 inch screws (Item 534).
3. Disconnect wires at E3 through E6 on pneumatics voltage regulator board.
4. Loosen three screws (Item 502) at mounting flanges of blower housing.
5. Rotate blower assembly clockwise until flanges are clear of screw heads and remove assembly.

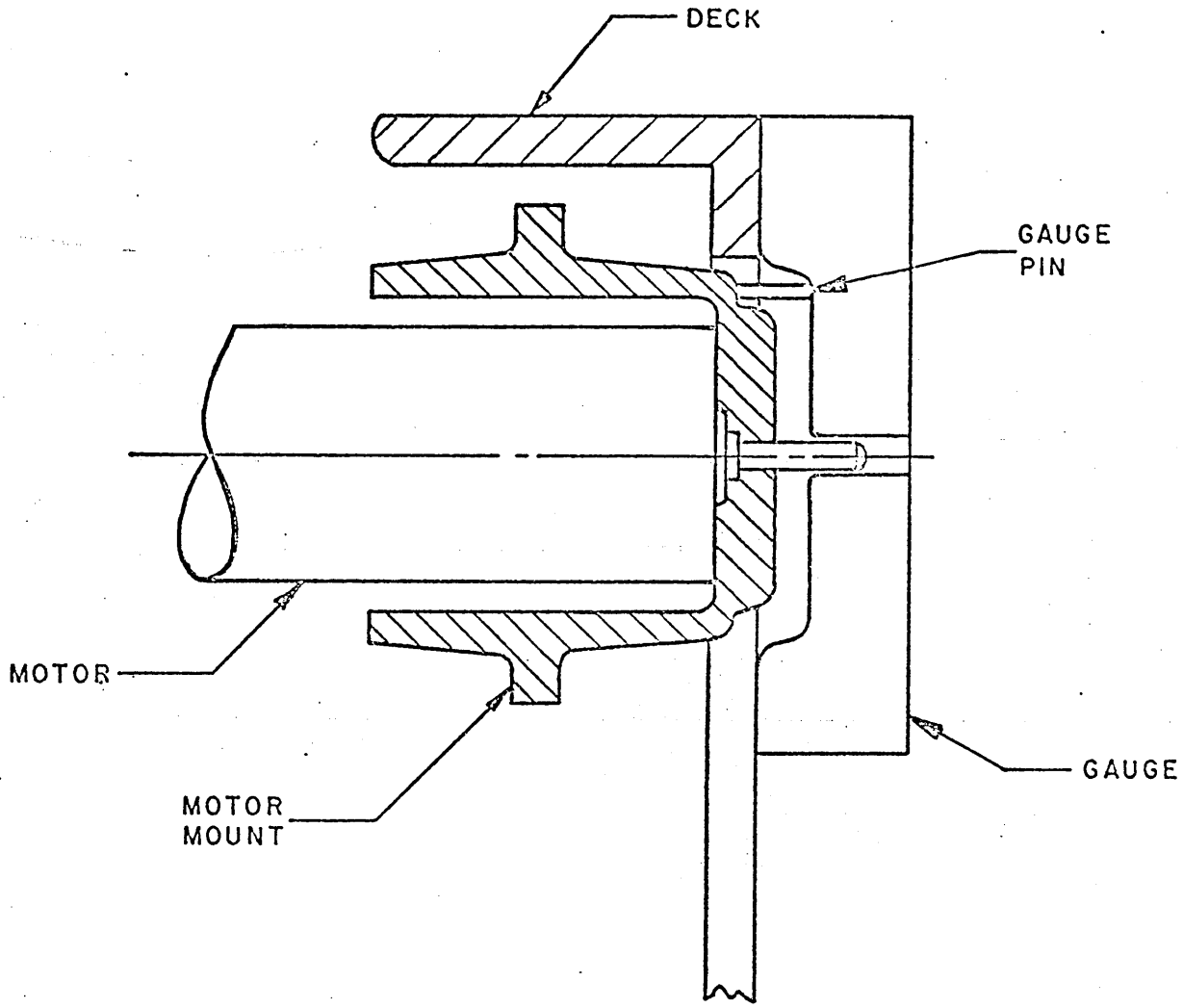


Figure 2-6. Capstan Motor Alignment

g. Blower Assembly Replacement (Figure 2-3)

1. Perform Removal procedure in reverse order, leaving pneumatics voltage regulator cover off until after adjustment.

h. Blower Assembly Vacuum Adjustment

1. Ensure that all power is removed from the transport.

2. Disconnect file protect tube from fitting at rear of deck assembly.

3. Attach vacuum gauge (Item 1, Table 2-1) to deck fitting by using connector-tube, tee fitting and tubing (Items m, n and o, Table 2-1), and attach file protect tube to tee. (See Figure 2-7)

NOTE

Verify that the 50/60 Hz jumper is correctly installed on the pneumatics regulator board.

4. Install cap plugs in both, the 0.375 and 0.250 inch, bleed holes of the vacuum plenum.

5. Power up transport and load loop columns with tape.

CAUTION

High voltage is present throughout pneumatics voltage regulator board.

6. Adjust potentiometer on pneumatics voltage regulator board, using a small plastic handle screwdriver, to obtain the minimum vacuum as indicated by gauge.

7. While monitoring the vacuum gauge, lower the vacuum reading to less than 14.5 inches of water by performing the following:

a. Remove the 0.250 inch plug. If vacuum is less than 14.5 inches of water, perform step 8. If reading is greater 14.5 inches of water replace 0.250 inch plug and perform step b below.

b. Remove the 0.375 inch plug. If vacuum is less than 14.5 inches of water, perform step 8. If reading is greater than 14.5 inches of water remove the 0.250 inch plug then perform step 8.

8. Adjust potentiometer on pneumatics voltage regulator board, using a small plastic handle screwdriver, to obtain a vacuum of 14.5 inches of water as indicated by the gauge.

NOTE

The object of the above procedure is to provide a vacuum reading of 14.5 inches of water with the regulator operating in its lower one-third adjustment range and running the blower at the minimum speed possible.

9. Remove all power from the transport.
10. Remove gauge and associated tubing.
11. Reconnect file protect tube to deck fitting.
12. Install voltage regulator cover.

i. Machine Reel Hub Alignment (Figure 2-3)

1. Remove all power from transport.
2. Remove control panel assembly from loop column door (Item 3) by removing four 6-32 x 0.25 inch phillips screws (Item 514).
3. Disconnect electrical connector from control panel.
4. Open loop column door (Item 3) and remove door by lifting off hinges.

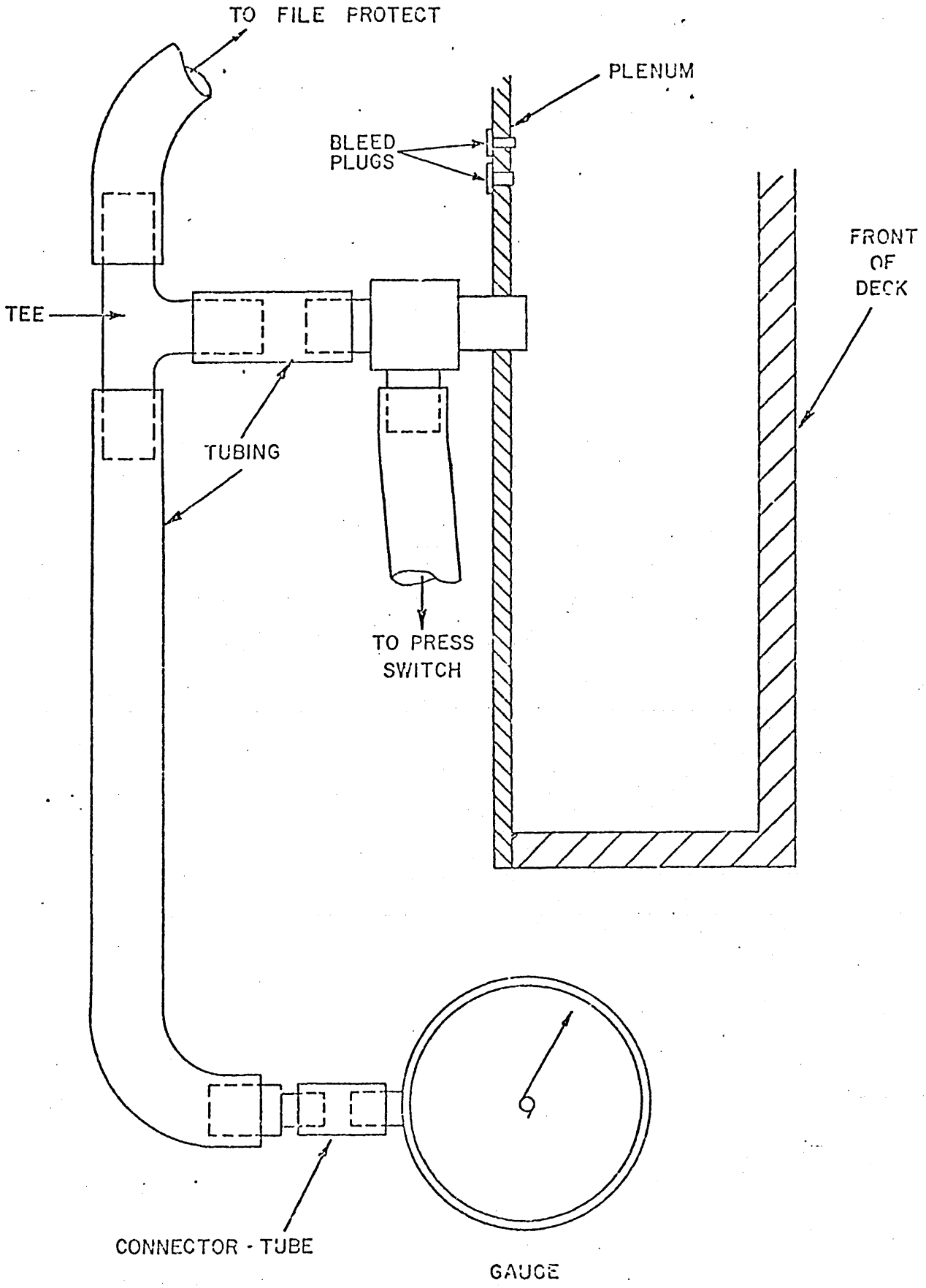


Figure 3-7. Vacuum Gauge Installation

5. Remove machine hub cover (Item 43) by removing four 6-32 x 0.625 inch phillips screws (Item 524).

6. Remove O ring (Item 46).

7. Remove reel (Item 44) from machine hub.

8. Loosen the four adjusting screws (Item 523) until hub rides freely on motor shaft. Slide hub away from tape deck but not off motor shaft.

9. Position the reel hub alignment tool (Item a, Table 2-1) over the hub. (See Figure 2-8)

CAUTION

Care should be taken in handling the reel hub alignment tool to prevent serious damage to the loop column surface.

10. Hold the reel hub alignment gauge against the hub while aligning the hub for a go position. (See Figure 2-8)

11. Tighten the four adjusting screws on hub. Check several points on the hub with the reel hub alignment tool. Repeat steps 8 through 11 as necessary to obtain the go position.

CAUTION

Check that the adjusting screws are tight after making adjustments. Serious damage to transport could result if the reel hub works loose during operation.

12. Replace reel (Item 44).

13. Replace O ring (Item 46).

14. Replace machine hub cover (step 5).

15. Replace loop column door (Item 3) on hinges and shut door.

16. Connect connector to control panel assembly.

17. Mount control panel assembly to loop column door with four 6-32 x 0.25 inch phillips screws.

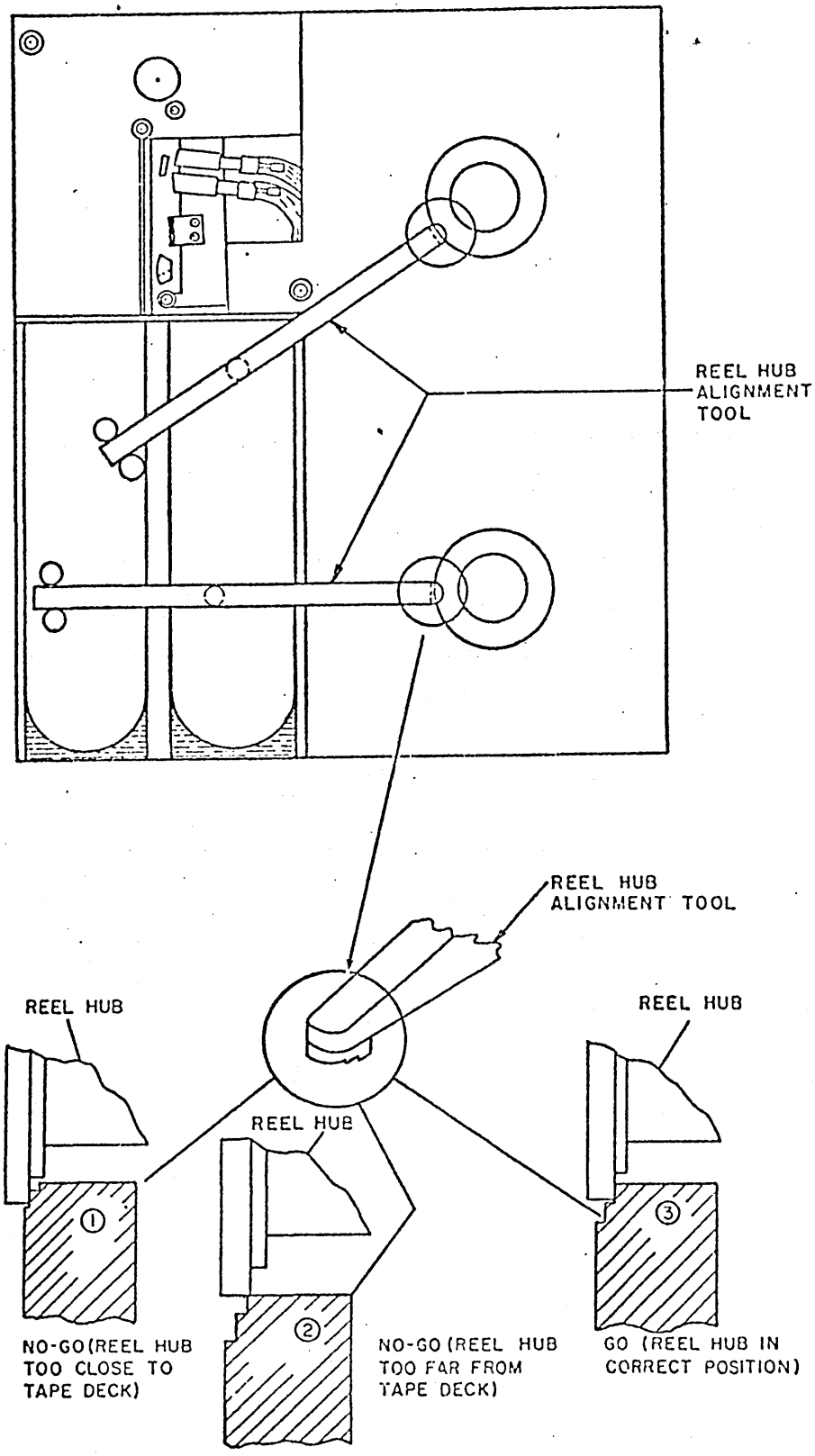


Figure 2-8. Reel Hub Alignment

j. File Reel Hub Assembly/Alignment (Figure 2-3)

1. Place lock ring plate (Item 40) onto file reel motor shaft.
2. Place split ring clamp (Item 39) onto file reel motor shaft with tapered end of clamp facing away from deck.
3. Place body clamp (Item 38) onto file reel motor shaft with the beveled side of shaft hole facing towards deck.
4. Place rubber O rings (Item 41 and 42) onto reel hub (Item 35). Item 41 should be in the groove closer to the rear of the hub.
5. Place reel hub onto file reel motor shaft and align the four holes in hub with the holes in body clamp and locking plate.
6. Insert two 8-32 x 1-1/4 inch screws (Item 523) with glide washers (Item 34) into hub but do not tighten.
7. Remove control panel assembly from loop column door (Item 3) by removing four 6-32 x 0.25 inch phillips screws (Item 514).
8. Disconnect electrical connector from control panel.
9. Open loop column door (Item 3) and remove door by lifting off hinges.
10. Position the reel hub alignment tool (Item a, Table 2-1) over the hub. (See Figure 2-8)

CAUTION

Care should be taken in handling the reel hub alignment tool to prevent serious damage to the loop column surface.

11. Hold the reel hub alignment tool against the hub while aligning the hub for a go position. (See Figure 2-8)
12. Tighten the two adjusting screws. Check several points on the hub with the reel hub alignment tool. Repeat steps 10 through 12 as necessary to obtain the go position.

CAUTION

Check that the adjusting screws are tight after making adjustment. Serious damage to the transport could result if the reel hub works loose during operation.

13. Insert two 8-32 x 2 inch screws (Item 522) into activator ring (Item 31).

14. Place a guide sleeve (Item 33), spring (Item 32), and guide washer (Item 34), in that order, onto each screw.

15. Place actuator ring onto file reel motor shaft and insert screws into two remaining holes in hub. Tighten screws.

16. Recheck hub alignment.

17. Install the four latches (Item 37) as follows:

    (a) While gently pressing the activator ring toward the deck, insert a latch into the hub with the long concave side outward and the thinner edge toward the O ring (Item 41). The thin edge must be wedged between the O ring and from edge of the O ring groove.
    edge nearest the technician.

    (b) Repeat step (a) for the remaining three latches. The hub may be turned to best suit the technician.

18. Install the two reel retainers (Item 36) into the hub with the thin edge in front edge of the O ring (Item 42).

19. Place the file hub knob (Item 30) onto the assembly. Ensure that the reel retainers are on the outside of the file hub knob. Align the four holes in the file hub knob with the holes in the activator ring and secure with four 4-40 x 0.375 inch screws.

20. Replace loop column door (Item 3) on hinges and shut door.

21. Connect connector to control panel assembly.

22. Mount control panel assembly to loop column door with four 6-32 x 0.25 inch phillips screws.

k. Tape Tach Removal (Machine Reel)

1. Remove head cover (Item 1) by removing two 6-32 x 0.31 inch screws and filler plate (Item 8) by removing three 6-32 x 0.63 inch phillips screws and flat washers.

CAUTION

Do not touch the outside diameter (tape contact surface) of the capstan with fingers or tools.

2. Disconnect W7P4 connector from sensor board assembly (Item 620). Note lead color to pin 1 for replacement purposes.

3. Carefully remove board assembly and mounting bracket (Item 52) by removing 6-32 x 0.25 inch hex head screw.

4. Remove 10-32 hex nut (Item 525) lock washer (Item 526) and flat washers (Item 527) by holding screwdriver in slotted shaft of tach.

5. Remove tach from deck.

l. Tape Tach Replacement/Alignment (Machine Reel)

1. Perform Removal procedure in reverse order taking care to align the photosensor, on the board assembly, in line with the tach shaft as near as possible. (See Figure 2-9.)

m. Tape Tach Removal (File Reel)

1. The file reel tach is removed in the same manner as the machine reel tach (para. k) except remove filler plate (Item 7) and disconnect connector W8P2.

n. Tape Tach Replacement/Alignment (File Reel)

1. Perform steps of paragraph k in reverse order substituting the filler plate and connector of paragraph m. Care should be taken to align the photosensor, on the board assembly, in line with the tape tach shaft as near as possible. (See Figure 2-9.)

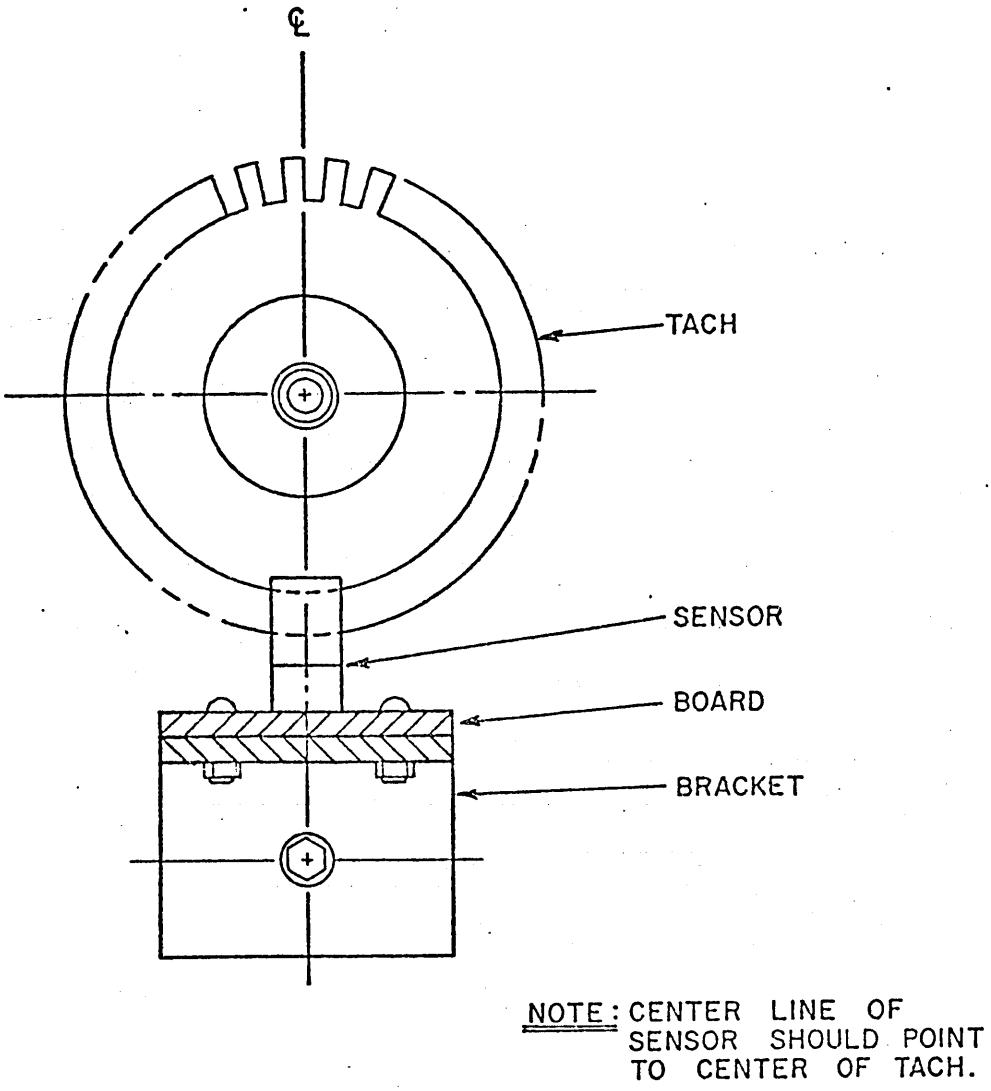


Figure 2-9. Tach Sensor Alignment

o. EOT/BOT Sensor Assembly Removal

1. Disconnect W9P2 connector. Note color of twisted pair wires to pins 1 and 2 for replacement purposes.

2. Remove light source from tape deck.

CAUTION

When handling fiber otpics do not bend sharply. The minimum bend radius is 0.4 inch.

3. Disconnect two fiber optics bundles from light source by inserting small screwdriver in slot along side of fiber optic socket to spread socket. Note position from where each bundle is removed for replacement purposes.

4. Remove two 6-32 x 0.5 inch phillips head screws (Item 530) holding assembly to deck.

5. Remove assembly from deck.

p. EOT/BOT Sensor Assembly Replacement/Alignment

1. Perform Removal procedure in reverse.

2. Clean assembly as described in Preventive Maintenance Procedures.

3. Perform Subtest 8b of Table 2-4 (MPST).

q. Fiber Optics Light Bulb Removal

1. Hold light source (Item 67) firmly and remove lamp socket by turning ccw approximately 45 degrees.

2. Pull bulb (Type 192) straight out from socket.

r. Fiber Optics Light Bulb Replacement/Alignment

1. Perform Removal procedure in reverse order.

2. Pull bulb (Type 192) straight out from socket.

s. Control Panel Light Bulb Removal

1. Remove two screws (Item 512) holding bezel (Item 22) to housing (Item 20).
2. Lift bezel from housing and allow to hang on wires. It is not necessary to disconnect the wires.
3. Remove diffuser (Item 21) by pulling straight out of housing.
4. Reach into assembly with fingers and extract snap-in bulb (Type 336) from holder.

t. Control Panel Light Bulb Replacement

1. Perform Removal procedure in reverse order.

u. File Protect Sensor Assembly Removal

1. Remove File Reel Hub assembly. This can be accomplished through inspection of Figure 2-3. Retain all parts for reassembly.
2. Remove plastic tubing from rear of sensor assembly (Item 29).
3. Remove two 10-32 x 0.5 inch screws holding sensor assembly to deck.
4. Partially remove sensor assembly from deck. Disconnect (unsolder if necessary the two wires from the switch. Note wire color and connection for reassembly purposes.

v. File Protect Sensor Assembly Replacement

1. Prior to installing sensor assembly ensure that the shoulder of the activator rod causes the switch to actuate.
2. Perform steps 2 through 4 of Removal procedure in reverse order.
3. Perform File Reel Hub Assembly/Alignment procedure, paragraph j.

4. Install tape reel without write enable ring, and ensure that activator rod does not touch reel when reel is rotated through 360 degrees.

5. Install a scratch tape loaded reel with a write enable ring installed on File Reel Hub.

6. Perform a load operation and ensure that vacuum pulls activator rod sufficiently to prevent touching of rod on ring.

7. Unload transport.

w. Head Assembly Removal

CAUTION

Do not remove any components attached to the head plate except tape guides and thread guide. All other components are replacable at the factory level only.

1. Remove thread guide (Item 107) and retain.

2. Remove head cover (Item 1) by removing two 6-32 x 0.31 inch screws, and filler plate (Item 8) by removing three 6-32 x 0.63 inch phillips screws and flat washers.

CAUTION

Do not touch the outside diameter (tape contact surface) of the capstan with fingers or tools.

3. Disconnect W14P1 and W15P3 connectors.

4. Unsolder two wires attached to erase head. Note wire color and connection for replacement purposes.

5. Remove two 10-32 x 0.5 inch hex screws holding head plate to deck. Remove assembly.

x. Head Assembly Replacement/Alignment

1. Perform Removal procedure in reverse order.

2. Perform Subtest 7 of Table 2-4 (MPST).

y. Loop Column Lower Sensors Fibers Optics Removal

1. Perform Blower Assembly Vacuum Adjustment procedure as outlined in paragraph h. If reading is 14.5 (± 0.5) inch H_2O no adjustment is necessary. Note reading.
2. Remove pneumatics voltage regulator shield (Item 58) by removing two 4-40 x 0.25 inch screws (Item 534).
3. Disconnect wires at E3 through E6 on pneumatics voltage regulator board.
4. Remove tubing at tee fitting leading to file protect sensor assembly.
5. Remove tubing from bottom of differential pressure switch leading to loop column manifold. Note routing.
6. Remove lower light source (Item 67) from tpae deck by pulling from bracket.

CAUTION

When handling fiber optics do not bend sharply. The minimum bend radius is 0.4 inch.

7. Remove three fiber optics from light source by inserting small screwdriver in slot along side of fiber optics socket to spread socket. Note position from where each bundle is removed for replacement purposes.
8. Remove pneumatics assembly from tape deck by removing seven 10-32 x 0.5 inch screws. Note screws holding ground wire and clamp to tape deck for reassembly purposes.
9. Remove fiber optic mounting block (Item 76) by removing 6-32 x 0.25 inch screw (Item 536).
10. Remove fiber optics from tape deck and vacuum seal.

z. Loop Column Lower Sensors Fiber Optics Replacement/Alignment

1. Insert fiber optics through vacuum seal and into tape deck.

CAUTION

When handling fiber optics do not bend sharply. The minimum bend radius is 0.4 inch.

2. Install fiber optic mounting block over fiber optics and secure to tape deck using 6-32 x 0.25 inch screw. Ensure that flange on fiber optics end is in slot of mounting block.

3. Attach pneumatics assembly to tape deck using seven 10-32 x 0.5 inch screws. Ensure that ground wire and clamp are attached by screws noted in step 8 of the Removal procedure (para. y).

CAUTION

Ensure that fiber optics routing is through slot in tape deck with cables from sensors and that when pneumatics mounting plate is in place, the vacuum seal is in place and compressed, and the fiber optics or cables are not pinched.

4. Route fiber optics through clamp then insert three fiber optics into light source. Observe Caution in step 1. Ensure that bundles are installed in same position as noted in step 7 of the Removal procedure (para y.).

5. Mount light source on bracket.

6. Install tubing from loop column manifold to bottom of differential pressure switch. Route as noted in step 5 of Removal procedure (para. y).

7. Install tubing from file protect sensor assembly to tee fitting.

8. Connect wires to E3 through E6 on pneumatic regulator board.

9. Perform Subtest 8a of Table 2-4 (MPST).

10. Perform Blower Assembly Vacuum Adjustment procedure as outlined in paragraph h. Prior to adjustment, compare read-

ing with that recorded in step 1 of the Removal procedure (para. y). If reading differs by more than 0.5 inch of H_2O, inspect for leaks between blower mounting plate (Item 70) and tape deck.

aa. Loop Column Upper Left Sensor Fiber Optics Removal

1. Remove bottom light source (Item 67) from tape deck by pulling from bracket.
2. Locate and remove fiber optics from light source by inserting small screwdriver in slot along side of fiber optics socket to spread socket. Note position from where bundle is removed for replacement purposes.
3. Remove fiber optic mounting block (Item 76) by removing 6-32 x 0.25 inch screw (Item 536).
4. Remove fiber optics from tape deck.

ab. Loop Column Upper Left Sensor Fiber Optics Replacement / Alignment

1. Insert fiber optics into tape deck.

CAUTION

When handling fiber optics do not bend sharply. The minimum radius is 0.4 inch.

2. Install fiber optic mounting block over fiber optics and secure to deck using 6-32 x 0.25 inch screw. Ensure that flange on fiber optics end is in slot of mounting block.
3. Observing Caution in step 1, route fiber optics through clamp then insert into light source in same location from which removed.
4. Mount light source on bracket.
5. Perform Subtest 8A of Table 2-4 (MPST).

ac. Loop Column Upper Right Sensor Fiber Optics Removal

1. Disconnect cable W15 from board at XA9 and XA10.
2. Remove board XA1 through XA10 from card cage (Item 78).

3. Disconnect wires at E1 through E8 on back plane assembly.

4. Disconnect cables W4 and W6 through W14 from back plane assembly.

5. Disconnect I/O cables from back plane assembly, if attached.

6. Remove card cage (Item 78) and four spacers (Item 79) from tape deck by removing four 10-32 x 0.75 inch screws.

7. Remove upper light source (Item 67) from tape deck by pulling from bracket.

8. Locate and remove fiber optics from light sources by inserting small screwdriver in slot along side of fiber optics socket to spread socket.

9. Remove fiber optics mounting block (Item 76) by removing 6-32 x 0.25 inch screw (Item 536).

10. Remove fiber optics from tape deck.

ad. Loop Column Upper Right Sensor Fiber Optics Replacement/ Alignment

1. Insert fiber optics into tape deck.

CAUTION

When handling fiber optics do not bend sharply. The minimum radius is 0.4 inch.

2. Install fiber optic mounting block over fiber optics and secure to deck using 6-32 x 0.25 inch screw. Ensure that flange on fiber optics end is in slot of mounting block.

3. Observing Caution in step 1, insert fiber optics into light source in same location from which removed.

4. Mount light source on bracket.

5. Attach card cage to tape deck using four 10-32 x 0.75 inch screws and four spacers (Item 79).

6. Connect cable W4 and W6 through W14 to back plane assembly. See Connection Diagram (Section IV).

7. Connect I/O cables.

8. Connect wires to E1 through E8 on back plane assembly.

9. Install boards in card cage at XA1 through XA10. Refer to Table 4-1 for board types and locations.

10. Connect cable W15 to boards at XA9 and XA10.

11. Perform Subtest 8a of Table 2-4 (MPST).

12. Perform Subtests 4, 5, and 7, as necessary, to ensure proper tape transport operation.

2-6. ELECTRICAL TEST AND ADJUSTMENTS

Subordinate paragraphs provide instructions for necessary adjustments too lengthly for inclusion in Table 2-4.

Table 2-4 incorporates electrical tests and adjustments and other operational check necessary to verify that the transport is capable of satisfactory operation. Prior to performing the tests of Table 2-4, an initial visual inspection should be performed as outlined in Table 1-1.

Table 2-4. MINIMUM PERFORMANCE STANDARDS TEST INDEX

2-6.1 READ SKEW ADJUSTMENTS C D

a. Perform Subtest 7a, Table 2-4, and perform any necessary adjustments. "GAINS"

b. Set up scope as follows:

1. Chop mode.
2. Internal triggering from positive edge of channel 1.
3. Vertical to 2 v/cm.
4. Horizontal to 2 μsec/cm.

c. Turn all read deskew potentiometers (R1 and R2) on Read Recovery NRZI boards (Locations XA5, XA6, and XA7) completely ccw. To ensure maximum ccw position, turn potentiometers a minimum of 20 turns.

d. Power up transport and load master skew tape (Item k, Table 2-1).

e. While reading forward, locate the read pulse that occurs latest in time as follows:

1. Connect channel 1 scope probe to XA8-TP3 (2^0).

2. Successively connect the channel 2 probe to the remaining digital test points (Refer to table in step f). If a pulse is not seen on the channel 2 trace, this pulse is occurring before the pulse on channel 1. If a pulse is seen on channel 2 trace, this pulse is occurring later in time than the pulse seen on channel 1.

3. When a pulse is found to be occurring later in time, move the channel 1 probe to this digital test point.

4. Continue checking the remaining digital test points listed in step e.2.

5. Repeat step e.3 then e.4, as necessary, until a track is found such that no pulse occurs on channel 2. The latest pulse occurring in time is then shown on channel 1. Note this digital test point for later use.

f. Set the scope to the external trigger mode and connect probe to one of the corresponding analog test points at XA5, XA6, or XA7 of the digital test point found in step e.5. The following table shows the track numbers and the corresponding digital and analog test points. Ground for the analog test points can be found at TP21 of their respective boards.

TRACK	DIGITAL TEST POINT	ANALOG TEST POINT
2^0	XA8-TP3	XA7-TP13 & TP14
2^1	XA8-TP4	XA5-TP13 & TP14
2^2	XA8-TP5	XA7-TP6 & TP7
2^3	XA8-TP6	XA5-TP19 & TP20
2^4	XA8-TP7	XA7-TP19 & TP20

TRACK	DIGITAL TEST POINT	ANALOG TEST POINT
2^5	XA8-TP8	XA6-TP13 & TP14
*2^6	XA8-TP9	XA6-TP19 & TP20
*2^7	XA8-TP10	XA5-TP6 & TP7
2^P	XA8-TP12	XA6-TP6 & TP7

*9-Track Only

g. Connect channel 1 probe to the digital test point noted in step e.5.

h. With the transport reading tape forward, adjust scope trigger level to center the 1 μsec pulse on channel 1.

i. Connect channel 2 probe in turn to each of the remaining digital test points, and adjust the respective forward deskew potentiometer (R2) until the channel 2 pulse is aligned with the channel 1 pulse.

j. After all tracks have been adjusted, perform Subtest 7b, Table 2-4, forward skew. READ NEW

k. Permit tape to continue forward until EOT is almost reached.

l. Clear the transport and initiate reverse tape motion via the FWD/REV switch on board at XA2.

m. With the scope set up as in step b, and using the procedure outlined in step e, locate the latest occurring pulse for reverse motion.

n. Repeat steps f through i, adjusting the reverse deskew potentiometer (R1) for each track.

o. After all tracks have been adjusted, perform Subtest 7c, Table 2-4, reverse skew.

p. Clear the transport and unload the master skew tape.

2-6.2 WRITE SKEW ADJUSTMENT (C)(D)

CAUTION

The transport must have properly deskewed read circuits prior to performing this procedure.

a. Set up scope as follows:

1. Chop mode.
2. Internal triggering from positive edge of channel.
3. Vertical to 2V/cm.
4. Horizontal to 2μ sec/cm.

b. Turn all write deskew potentiometers on Write Driver boards (Locations XA9 and XA10) completely ccw. To ensure maximum ccw position, turn potentiometers a minimum of 20 turns.

c. Power up transport and load a scratch tape.

d. While using the CPU (or Exerciser, if available) to write an all 1's tape, perform steps e.1 through g of paragraph 2-6.1.

e. While still writing all 1's adjust scope trigger level to center the 1μ sec pulse on channel 1.

f. Connect channel 2 probe in turn to each of the remaining digital test points and adjust the respective write deskew potentiometer until the channel 2 pulse is aligned with the channel 1 pulse. The following table shows the write deskew potentiometers and their respective tracks.

TRACK		DESKEW POTENTIOMETER
2^0	5	XA9-R13
2^1	4	XA10-R22
2^2	3	XA9-R4
2^3	6	XA10-R31
2^4	7	XA9-R22
2^5	8	XA9-R40
*2^6	9	XA10-R4
*2^7	10	XA10-R13
2^P	11	XA9-R31

*9-Track Only

g. After all tracks have been adjusted, perform Subtest 7c, Table 2-4.

h. Clear the transport and unload the scratch tape.

2-6.3 READ SKEW ADJUSTMENTS (NRZI) (B)

a. Perform Subtest 7d, Table 2-4, and perform any necessary adjustments.

b. Set up scope as follows:

1. Chop mode.
2. Internal triggering from positive edge of channel 1.
3. Vertical to 2 v/cm.
4. Horizontal to 2 μsec/cm.

c. Turn all read deskew potentiometers (R2 and R4) on Read Logic Board (location XA7) completely ccw. To ensure maximum ccw position, turn potentiometers a minimum of 20 turns.

NOTE

The deskew potentiometers are grouped in pairs on Read Logic Board (location XA7) in ascending bit order, starting at the top of the card (i.e., 2^0, 2^1, etc.). The top potentiometer of each pair is for forward deskew and the bottom potentiometer is for reverse deskew.

d. Power up transport and load master skew tape (Item k, Table 2-1).

e. While reading forward, locate the read pulse that occurs latest in time as follows:

1. Connect channel 1 scope probe to XA7-TP2 (2^0).
2. Successively connect the channel 2 probe to the remaining digital test points (Refer to table in step f). If a pulse is not seen on the channel 2 trace, this pulse is occurring before the pulse on channel 1. If a pulse is seen on channel 2 trace, this pulse is occurring later in time than the pulse seen on channel 1.
3. When a pulse is found to be occurring later in time, move the channel 1 probe to this digital test point.

4. Continue checking the remaining digital test points listed in step e. 2.

5. Repeat step e. 3 then e. 4, as necessary, until a track is found such that no pulse occurs on channel 2. The latest pulse occurring in time is then shown on channel 1. Note this digital test point for later use.

f. Set the scope to the external trigger mode and connect probe to the corresponding analog test point at XA8, XA9, or XA10 of the digital test point found in step e. 5. The following table shows the track numbers and the corresponding digital and analog test points. Ground for the analog test points can be found at TP21 of their respective boards.

TRACK	DIGITAL TEST POINT	ANALOG TEST POINT
2^0	XA7-TP2	XA8-TP6
2^1	XA7-TP3	XA8-TP8
2^2	XA7-TP5	XA8-TP10
2^3	XA7-TP7	XA9-TP6
2^4	XA7-TP9	XA9-TP8
2^5	XA7-TP11	XA9-TP10
2^6	XA7-TP13	XA10-TP6
2^7	XA7-TP15	XA10-TP8
2^P	XA7-TP17	XA10-TP10

g. Connect channel 1 probe to the digital test point noted in step e. 5.

h. With the transport reading tape forward, adjust scope trigger level to center the pulse on channel 1.

i. Connect channel 2 probe in turn to each of the remaining digital test points, and adjust the respective forward deskew potentiometer until the channel 2 pulse is aligned with the channel 1 pulse.

j. After all tracks have been adjusted, perform Subtest 7e, Table 2-4.

k. Permit tape to continue forward until EOT is almost reached.

l. Clear the transport and initiate reverse tape motion via the FWD/REV switch on board at XA2.

m. With the scope set up as in step b, and using the procedure outlined in step e, locate the latest occurring pulse for reverse motion.

n. Repeat steps f through i, adjusting the reverse deskew potentiometer (R1) for each track.

o. Clear the transport and unload the master skew tape.

2-6.4 WRITE SKEW ADJUSTMENT (B)

NOTE

The transport must have properly deskewed read circuits prior to performing this procedure.

a. Set up scope as follows:

1. Chop mode.
2. Internal triggering from positive edge of channel.
3. Vertical to 2 v/cm.
4. Horizontal to 2 μsec/cm.

b. Turn all write deskew potentiometers on write driver boards (locations XA5 and XA6) completely ccw. To ensure maximum ccw position, turn potentiometers a minimum of 20 turns.

c. Power up transport and load a scratch tape.

d. While using the CPU (or Exerciser, if available) to write an all 1's tape, perform steps e.1 through g of paragraph 2-6.3.

e. While still writing all 1's, adjust scope trigger level to center the pulse on channel 1.

f. Connect channel 2 probe in turn to each of the remaining digital test points, and adjust the respective write deskew potentiometer until the channel 2 pulse is aligned with the channel 1 pulse. The following table shows the write deskew potentiometers and their respective tracks.

TRACK	DESKEW POTENTIOMETER
2^0	XA6-R62
2^1	XA6-R63
2^2	XA6-R64
2^3	XA6-R65
2^4	XA5-R14
2^5	XA5-R17
2^6	XA5-R20
2^7	XA5-R23
2^P	XA5-R26

g. After all tracks have been adjusted, perform Subtest7f, Table 2-4.

h. Clear the transport and unload the scratch tape.

TABLE 2-4. MINIMUM PERFORMANCE STANDARDS TEST

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
1	Vacuum Check	PRECONDITIONS: Refer to paragraph 2-5.2h.	14.5 (± 0.5) inch H_2O.	Refer to paragraph 2-5.2h.	
2	Tape Tracking	PRECONDITIONS: Refer to paragraph 2-5.2c and 2-5.2i.	No viewable side movement of tape across capstan when tape is run forward and reverse direction. No excessive rubbing of tape on either reel sides. No twisting or binding of tape at tape guides.	Refer to paragraphs 2-5.2c and 2-5.2i.	
3	File Hub Torque	PRECONDITIONS: Unit powered up, tape loaded. Install a piece of masking tape on hub and a matching piece on the reel and mark a thin line on both. Perform diagnostic run. Exercise unit to forward/reverse direction.	At end of diagnostic run, the line on the two pieces of masking tape should line up.	Clean O ring using lint-free cloth moistened with isopropyl alcohol (99%).	
4a	Start Time	PRECONDITIONS: Unit powered up, tape loaded. SCOPE: Sync: Ext., + Slope Vert: 2V/cm Horiz: 2 msec/cm Attach Sync probe to XA4-TP3 (CMD). Attach scope probe to XA4-TP16 (VEL). Alternately place switch S1 (Loc XA2) to FWD and then depress the CLEAR switch (Control Panel) while observing scope.	Positive going pulse 15 (± 2.5) msec. duration.	Adjust potentiometer R40 on AR2.	

TABLE 2-4. MINIMUM PERFORMANCE STANDARDS TEST

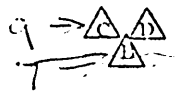
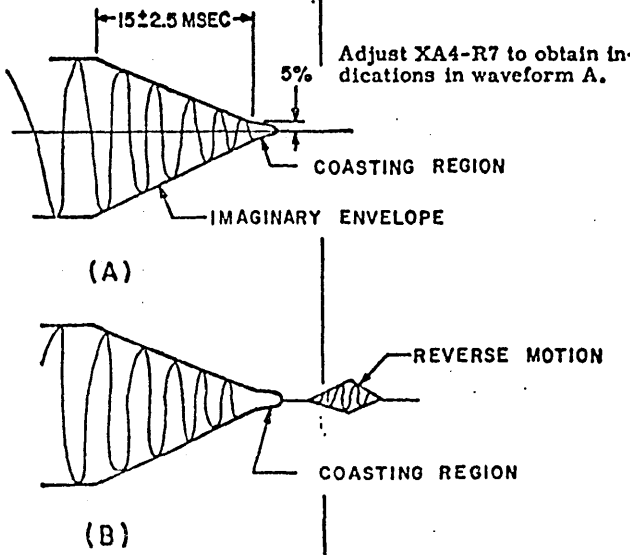
TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
4b	Stop Time 	PRECONDITIONS: Unit powered up, on all 1's tape loaded. Printed circuit board at XA4 extended using special tool (Item d). SCOPE: Sync: Ext., - Slope Vert: 0.5V/cm Horiz: 2 msec/cm Attach Sync probe to XA4-TP3 (CMD). Attach scope probe to XA7-TP19. Attach scope probe to XA10-TP10. Alternately place switch S1 (Loc XA2) to FWD and then depress the CLEAR switch (Control Panel) while observing scope. Waveform A shows the proper stopping profile. The imaginary envelope should reach 5 percent of its steady value in 15 (+ 2.5) msec. At this point, the coasting region will start and should last 1 to 2 milliseconds. Waveform B shows an improper stopping profile. The small area to the right of the main envelope indicates that the capstan is actually reversing.		Adjust XA4-R7 to obtain indications in waveform A.	

TABLE 2-4. MINIMUM PERFORMANCE STANDARDS TEST

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
5	Rewind Speed	PRECONDITIONS: Unit powered up, tape loaded. Initiate forward motion until there is enough tape on machine reel to allow a rewind. SCOPE: Sync: Int. Vert: 2V/cm Horiz: 50μsec/cm Initiate rewind motion. Attach scope to LOC3TP-16 and monitor pulse period.	Pulse period is 292 μsec ± 20%.		

TABLE 2-4. MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
6	Power Supply Voltages	PRECONDITIONS: Unit connected to compatable power outlet. Visual Inspection Table 1-1. Press POWER switch and observe appropriate indications. NOTE Front door must be opened and the interlock switch must be pulled out to its extreme limits. SCOPE SETUP: Sync: (+/-) Int. Vert: As required Horiz: 1ms/cm Use appropriate sync polarity - observe for correct indications. Scope probe to Backpanel and Power Amps as follows:	Power indicator illuminates. Fiber Optics elements illuminate: 1. Loop Column Sensors 2. BOT/EOT		Power Supply Fuses. Fiber Optics Lamp resistor on Control Logic Board at XA2.
		INPUT / GROUND /			
		A1U1E4 / A1U1E1 /	-5vdc		
		A1U1E5 / A1U1E6 /	+5vdc		
		A1U1E2 / A1U1E1 /	-12vdc		
		A1U1E3 / A1U1E1 /	+12vdc		
		AR1E2 / AR1E1 /	+40vdc		
		AR2E2 / AR2E1 /	+40vdc		
		AR3E2 / AR3E1 /	+10vdc		
7a	Gains ⚠ ⚠	PRECONDITIONS: Unit powered up and loaded with a standard amplitude tape. (Item j, Table 2-1). SCOPE SETUP: Sync: Int., AC Coupled, Auto Vert: 0.5 V/cm Horiz: 100 μsec/cm While performing a read after write (all 1's pattern), monitor the following test points differentially:			
		TRACK / SIGNAL LOCATION / GROUND /			
		2^0 / XA7-TP13 & TP14 / XA7-TP21	3 volts ± 10% p-p	Adjust gain potentiometer R3 associated with each track.	Read recovery cards and read/write head.
		2^1 / XA5-TP13 & TP14 / XA5-TP21			
		2^2 / XA7-TP6 & TP7 / XA7-TP21			
		2^3 / XA5-TP19 & TP20 / XA5-TP21			
		2^4 / XA7-TP19 & TP20 / XA7-TP21			
		2^5 / XA6-TP13 & TP14 / XA6-TP21			
		*2^6 / XA6-TP19 & TP20 / XA6-TP21			
		*2^7 / XA5-TP6 & TP7 / XA5-TP21			
		P / XA6-TP6 & TP7 / XA6-TP21			
		*9-Track Only			

TABLE 2-4. MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
7b	Read Skews ⚠c ⚠b	PRECONDITIONS: Unit powered up and loaded with a master skew tape. SCOPE SETUP: Sync: Ext. trigger probe to XA7-TP13, AC Coupled Vert: 2v/cm Horiz: 5μ sec/cm Attach scope probe to XA8-TP13 (OR buss).			
		Read forward and monitor total skew pulse width.	3 μs or less.	Refer to Read Skew Adjustment (Para. 2-6.1). NOTE Do not adjust unless width of skew pulse is more than 5 μs.	
		Read reverse and monitor total skew pulse width.	3 μs or less.	Refer to Read Skew Adjustment (Para 2-6.1).	
7c	Write Skew ⚠c ⚠b	PRECONDITIONS: Subtest 7b performed and necessary adjustments accomplished. Unit powered up and scratch tape loaded. SCOPE SETUP: Sync: Ext. Trigger probe to XA7-TP13, AC Coupled Vert: 2V/ cm Horiz: 5μ sec/cm Attach scope probe to XA8-TP13 (Or buss).			
		Using the CPU (or Exerciser, if available) write an all 1's tape and monitor total skew pulse width.	3 μs or less.	Refer to Write Skew Adjustment (Para 2-6.2).	
7d	NRZI Gains ⚠b	PRECONDITIONS: Unit powered up and loaded with a standard amplitude tape. (Item j, Table 2-1). SCOPE SETUP: Sync: Int., AC Coupled, Auto Vert: 0.5 V/cm Horiz: 100 μsec/cm While performing a read after write (all 1's pattern), monitor the following test points: TRACK — SIGNAL LOCATION — GROUND 2^0 — XA8-TP6 — XA8-TP21 2^1 — XA8-TP8 — XA8-TP21 2^2 — XA8-TP10 — XA8-TP21 2^3 — XA9-TP6 — XA9-TP21 2^4 — XA9-TP8 — XA9-TP21 2^5 — XA9-TP10 — XA9-TP21	1.50 (±0.15) volts p-p	Adjust gain potentiometer (R24) associated with each track.	Read recovery cards and read/write head.

Table 2-4. MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
7d	NRZI Gains (B)	TRACK / SIGNAL LOCATION / GROUND 2^6 XA10-TP6 XA10-TP21 2^7 XA10-TP8 XA10-TP21 P XA10-TP10 XA10-TP21			
7e	NRZI Skews (B)	PRECONDITIONS: Unit powered up and loaded with a master skew tape. SCOPE SETUP: Sync: Ext. trigger probe to XA10-TP10, AC Coupled Vert: 2v/cm Horiz: 5μsec/cm Attach scope probe to XA7-TP19 (OR buss).			
		Read forward and monitor total skew pulse width.	7 μs or less.	Refer to Read Skew Adjustment (Para. 2-6-3). NOTE Do not adjust unless width of skew pulse is more than μs.	
		Read reverse and monitor total skew pulse width.	7 μs or less.	Refer to Read Skew Adjustment (Para. 2-6.3).	
7f	Write Skew (B)	PRECONDITIONS: Subtest 7b performed and necessary adjustments accomplished. Unit powered up and scratch tape loaded. SCOPE SETUP: Sync: Trigger probe to XA10-TP10, AC Coupled Vert: 2V/cm Horiz: 5μ sec/cm Attach scope probe to XA7-TP19 (Or buss).			
		Using the CPU (or Exerciser, if available) write an all 1's tape and monitor total skew pusle width.	7 μs or less.	Refer to Write Skew Adjustment (Para. 2-6.4).	

TABLE 2-4. MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
7g	Phase Gains (B)	PRECONDITIONS: Unit powered up and loaded with a standard amplitude tape. (Item j, Table 2-1). Subtest 7d completed. SCOPE SETUP: Sync: Int., AC Coupled, Auto Vert: 0.5 V/cm Horiz: 100 μsec/cm While performing a read after write (all 1's pattern), monitor the following test points: TRACK — SIGNAL LOCATION — GROUND 2^0 — XA8-TP14 — XA8-TP21 2^1 — XA8-TP17 — XA8-TP21 2^2 — XA8-TP20 — XA8-TP21 2^3 — XA9-TP14 — XA9-TP21 2^4 — XA9-TP17 — XA9-TP21 2^5 — XA9-TP20 — XA9-TP21 2^6 — XA10-TP14 — XA10-TP21 2^7 — XA10-TP17 — XA10-TP21 P — XA10-TP20 — XA10-TP21	1.9 volts ± 10% p-p	Adjust gain potentiometer R38 associated with each track.	Read recovery cards and read/write head.

TABLE 2-4 MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
8a	Loop Column Fiber Optics Check	PRECONDITIONS: Unit powered up.			
		Locate satellite and fiber bundle that serves the lower left hand loop column servo port by removing from its satellite one of the bundles entering the pneumatics chamber.	Observe which servo port light source becomes dark.		
			CAUTION To avoid a complete retest and re-adjustment of the fiber optics system the lamp is not to be removed from its socket or the socket rotated in the satellite.		
		a. Unit powered down.			
		b. Insert variable resistor (Item h) in series with lamp circuit of satellite serving loop servo port being tested.			
		c. Set variable resistor (Item h) to its minimum resistance position.			
		d. Remove all tape from unit and power unit up.			
		e. Connect voltmeter to LOC. 3 TP14.	0.4 volts (max)		
		f. Adjust variable resistor (Item h) until the voltage at LOC. 3 TP14 is 2.4 volts minimum.			
		g. Power down transport, remove variable resistor (Item h) and measure its resistance.	Resistance should be 32 ohms or greater.	If resistance is less than 32 ohms, move bundle to another position on the satellite and re-perform test.	Fiber optics bundle. Logic card XA3. Fiber optics lamp resistor (on logic card XA2). Associated fiber optics lamp. Sensor.

TABLE 2-4 MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
		Locate lower right hand loop column servo port bundle and perform steps a thru d.			
		Connect voltmeter to LOC. 3 TP13.	0.4 volts (max)		
		Adjust variable resistor (Item h) until the voltage at LOC. 3 TP13 is 2.4 volts minimum.			
		Perform step g.	Same as step g.		Same as step g.
		Locate upper right hand loop column servo port bundle and perform steps a thru d.			
		Connect voltmeter to LOC. 3 TP15.	2.4 volts (min)		
		Adjust variable resistor (Item h) until the voltage at LOC. 3 TP15 is 0.4 volts maximum.			
		Perform step g.	Same as step g.		Same as step g.
		Locate upper right hand loop column servo port bundle and perform steps a thru d.			
		Connect voltmeter to LOC. 3 TP5.			
		Adjust variable resistor (Item h) until the voltage at LOC. 3 TP5 is 0.4 volts maximum.			
		Perform step g.	Same as step g.		Same as step g.
8b	EOT/BOT Fiber Optics	PRECONDITIONS: Perform steps a thru c of 8a.			
		Power up transport and load tape.			
		Advance tape to a position where the reflective marker is located directly over the bundle being tested (either EOT or BOT).			
		NOTE For reflective marker, use standard EOT/BOT type marker.			

TABLE 2-4 MINIMUM PERFORMANCE STANDARDS TEST (Cont'd)

TEST REF.	TEST PERFORMED	CONDITIONS AND/OR INSTRUCTIONS	OBSERVATIONS AND/OR INDICATIONS	ADJUSTMENT PROCEDURE	TROUBLE REFERENCE
8b (Cont'd)	EOT/BOT Fiber Optics	Connect voltmeter to LOC. 3 TP12 for EOT, and LOC. 3 TP19 for BOT. Adjust variable resistor (Item h) until the voltage at LOC. 3 TP12 for EOT, and LOC. 3 TP19 for BOT is 0.4 volts maximum. Power down unit, remove variable resistor (Item h) and measure its resistance.	2.4 volts (min) Resistance should be 4 ohms or greater.	If resistance is less than 4 ohms, move bundle to another position on satellite and re-perform test.	Fiber optics bundle. Logic card XA3. Associated fiber optics lamp. Sensor.

SECTION III

WIRE LISTS

WIRE LISTS

3-1. GENERAL

Wire Lists are not contained within this manual. All necessary wiring data is on logic diagrams, machine schematics, and the Back Plane Printed Wiring Board Diagram. (Refer to Section IV - DIAGRAMS).

SECTION IV

DIAGRAMS

DIAGRAMS

4-1. GENERAL

This section contains the schematics and diagrams necessary to maintain the transport in an operational status. Included are the logic diagrams for control and input/output, machine schematics showing interconnection of the various transport components and discrete board schematics covering the read/write electronics as well as the motor power amplifiers.

Individual schematics of circuitry, such as the EOT/BOT marker sensors, loop box sensors, etc., are shown on the machine schematics.

The Card Placement Chart is shown in Table 4-1. All cards listed with a location are found in the logic chassis. All cards listed without a location are mounted on the tape deck.

Figure 4-1 shows a typical logic symbol used on the diagrams and describes the various nomenclature. Table 4-2 contains a description of the abbreviations contained on the logic diagrams.

Data for the more complex components are listed in Table 4-3. The symbol for these components is also contained within the description. A cross-reference list of element numbers to commercial identification is shown in the beginning of this table.

Table 4-1. CARD PLACEMENT CHART

MODEL / LOCATION	B	C	D	FUNCTION
XA1	5220	5211	5216	I/O Logic
XA2	5210	5210	5210	Control Logic
XA3	5212	5212	5212	Reel Logic
XA4	5242	5242	5215	Capstan Logic
XA5	--	4532	4532	Read Recovery
XA5	4743	--	--	Write Driver 5 Channel
XA6	--	4532	4532	Read Recovery
XA6	4742	--	--	Write Driver 4 Channel
XA7	--	4532	4532	Read Recovery
XA7	5248	--	--	Read Logic
XA8	--	5240	5240	NRZI Read Logic
XA8	4552	--	--	Read Recovery
XA9	--	4735	4735	NRZI Write 5 Channel
XA9	4552	--	--	Read Recovery
XA10	--	4734	4734	NRZI Write 4 Channel
XA10	4552	--	--	Read Recovery
	4930	4930	4930	LO. COL. SNSR
	4940	4940	4940	Pneumatics Regulator
	4932	4932	4932	EOT/BOT
	5157	5157	5157	Reel Power Amplifier
	5158	5158	5158	Capstan Power Amplifier
	5147	5147	5147	Control Panel
	5163	5163	5163	Tach Sensor

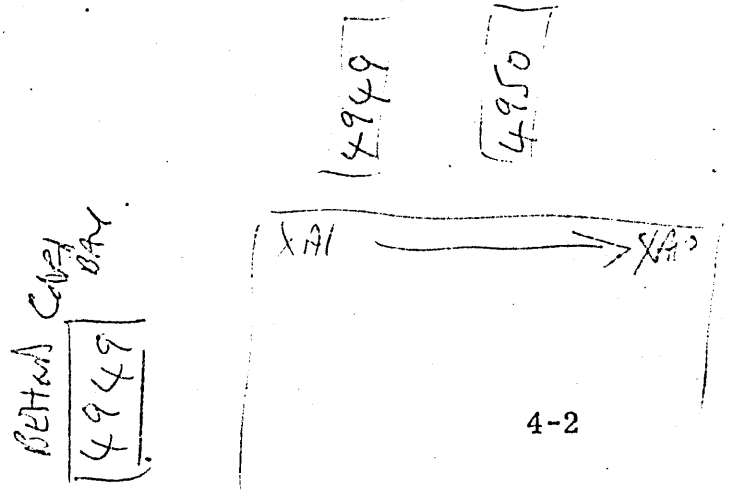
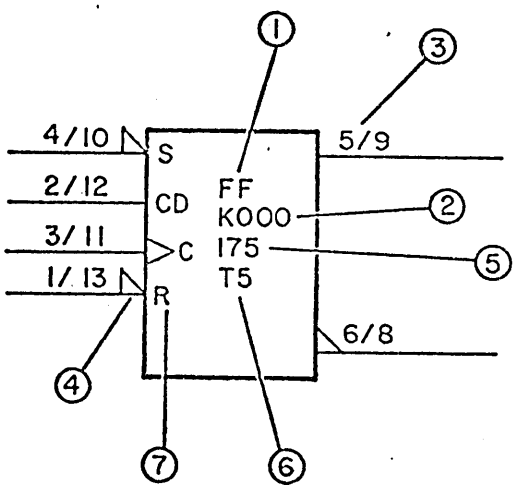


Table 4-2. LOGIC DIAGRAM ABBREVIATIONS

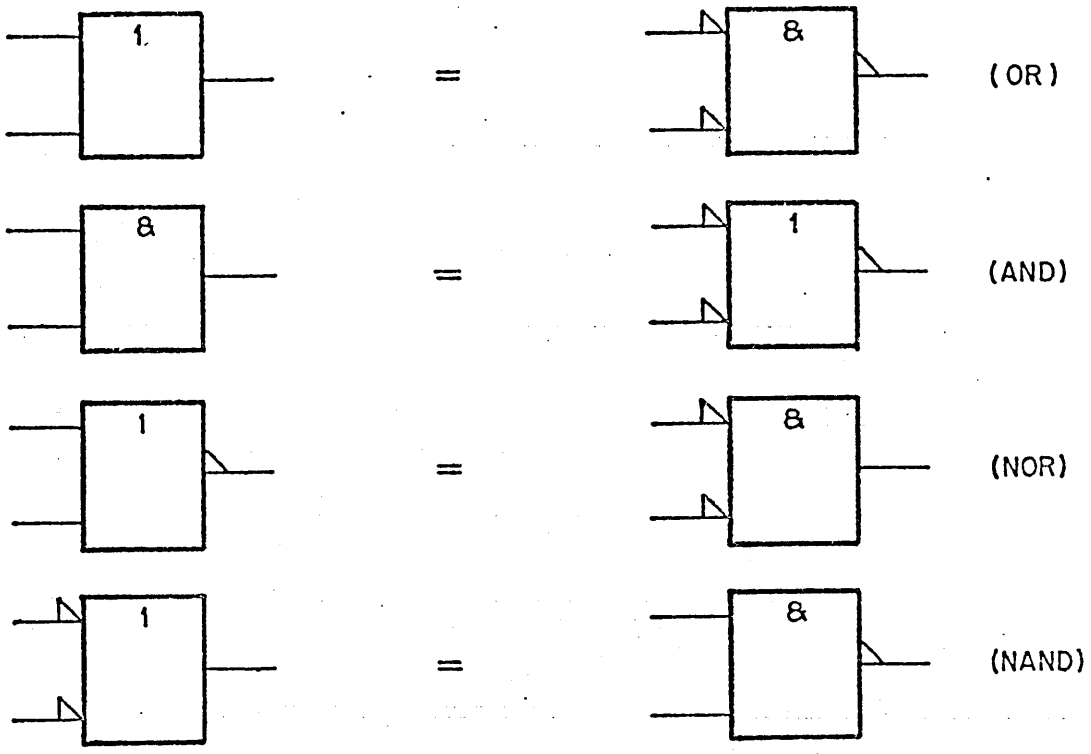
ABBREV.	INTERPRETATION
BOT	Beginning of Tape
BSY	Busy
CAP	Capstan
CLK	Clock
CLR	Clear
CMD	Command
DLY	Delay
DN	Down
DR	Drive
DYN	Dynamic
ENBL	Enable
EOT	End of Tape
F	File
FP	File Protect
FWD	Forward
HI	High
IND	Indicator
INT	Interlock
LD	Load
LO	Low
LP	Loop
LST	Last
LT	Left
MACH, M	Machine
MOP1, MOP2	Mode Option
MOT	Motor
NR	Not Ready
NST	NRZI Status
ONL	On-Line
PLS	Pulse
PMC	Power Master Clear
PNEU	Pneumatics
PU	Pull Up
RD0-RD7, RDP	Read Data
RDL, RD LO	Read Low Threshold
RDY	Ready
REV	Reverse
RL	Reel
RPLY	Reply
RT	Right
RWD, REW, RWND	Rewind
RWS	Rewinding
SEL	Select
SENS	Sensor
SOP	Speed Option
SPD	Speed
SW	Set Write
SW	Switch
TAC, TACH	Tachometer
UNLD	Unload
US0-US3	Unit Select
VAC	Vacuum
VEL	Velocity
WCON	Write Current On
WD0-WD7, WDP	Write Data
WP	Write Permit
WR	Write



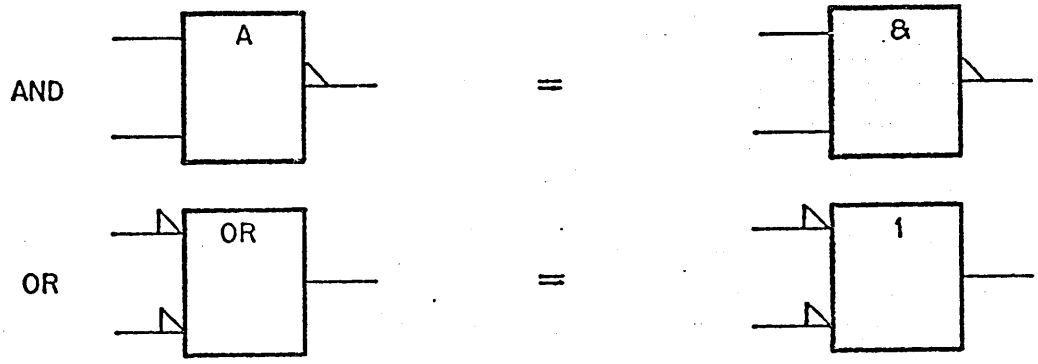
FIND NO.	DESCRIPTION
1	FUNCTION - An abbreviation stating the function performed by the logic block. In the example, FF stands for flip-flop (bistable) multivibrator.
2	TERM - An alpha-numeric that uniquely identifies a particular logic symbol. It consists of a letter and several numbers, and is used to locate and trace logic.
3	PIN NUMBER - The pin number of the IC associated with the logic symbol.
4	POLARITY INDICATOR - At input, indicates that input is active when low. At output, indicates that logical function has been performed when low.
5	TYPE - An element number that identifies the type of IC. It is used to look up the IC data found in Table 4-3. Data is arranged in type number sequence and supplied for the more complex IC's.
6	LOCATION - An alpha-numeric that locates an IC on the board.
7	PIN FUNCTION - An abbreviation that describes the signal or function associated with pin.

Figure 4-1. Logic Symbol Nomenclature

Table 4-3. INTEGRATED CIRCUIT DATA



SYMBOLS USED FOR SAME TYPE IC DUE TO CIRCUIT FUNCTION.



SYMBOLS USED INTERCHANGEABLY FOR SAME FUNCTION.

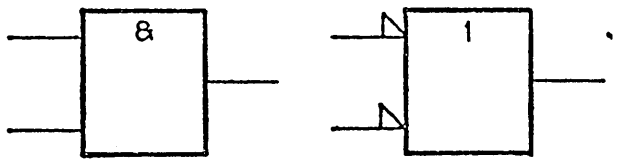
Table 4-3. INTEGRATED CIRCUIT DATA (Cont'd)

CROSS-REFERENCE LIST

ELEMENT NUMBER	COMMERCIAL NUMBER
140	7400
141	7410
146	7404
148	7402
149	7486
156	74107
158	74161
174	937
175	7474
193	74123
194	74121
200	7406
201	7408
201C	7409
203	7405
204	7438
208	7420
213	7411
219	384A
224	7427
500	74193
507	7442
537	7493
555	555
905	75451

DESCRIPTION

14 pin dual-in-line package which contains four TTL 2-input positive NAND gates.



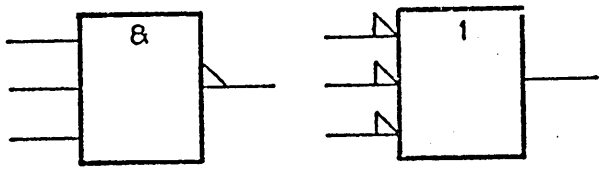
TRUTH TABLE

INPUTS		OUTPUT
A	B	Y
0	0	1
1	0	1
0	1	1
1	1	0

140 (7400)

DESCRIPTION

14 pin dual in-line package containing three TTL 3-input positive NAND gates.



TRUTH TABLE

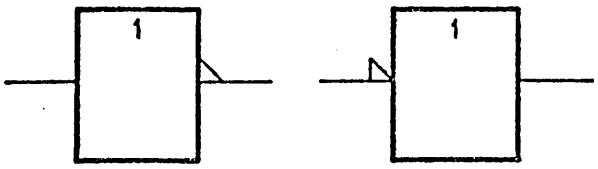
INPUTS			OUTPUT
A	B	C	Y
0	X	X	1
X	0	X	1
X	X	0	1
1	1	1	0

X = EITHER LOGIC 1 OR 0

141 (7410)

DESCRIPTION

14 pin dual-in=line package which contains sux TTL inverter circuits.



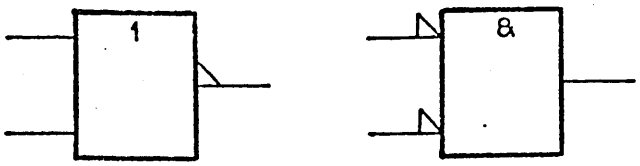
TRUTH TABLE

INPUT	OUTPUT
A	Y
0	1
1	0

146 (7404)

DESCRIPTION

14 pin dual-in-line package containing four TTL 2-input positive NOR gates.



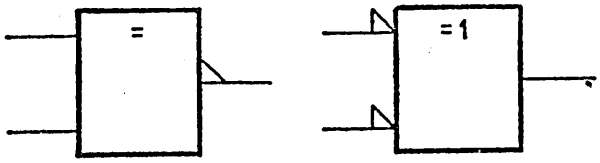
TRUTH TABLE

INPUTS		OUTPUT
A	B	Y
0	0	1
1	0	0
0	1	0
1	1	0

148 (7402)

DESCRIPTION

14 pin dual-in-line package containing four 2-input TTL Exclusive-OR gates.



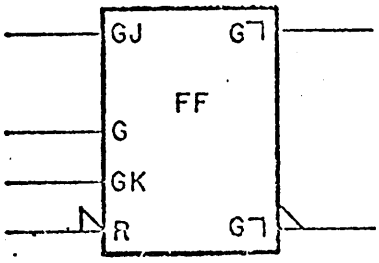
TRUTH TABLE

INPUTS		OUTPUT
A	B	Y
0	0	0
1	0	1
0	1	1
1	1	0

149 (7486)

DESCRIPTION

14 pin dual-in-line package containing two independent TTL J-K master-slave flip-flops. Each J-K master-slave flip-flop contains a master and a slave flip-flop. The master samples data at the GJ and GK inputs when the clock (G) waveform is at a logic 0. When the clock goes to a logic 1, the GJ and GK inputs are disabled. The data contained in the master is transferred to the slave outputs on the logic 1 to 0 transition of the clock waveform. A logic 0 input to the master reset (R) input sets Q (pins 3,, 5) to a logic 0 and $\overline{Q}$ (pins 2, 6) to a logic 1 independently of all other inputs.



TRUTH TABLE

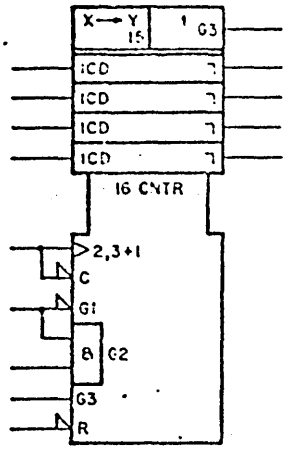
t_n		t_{n+1}
GJ	GK	Q
0	0	Q_n
0	1	0
1	0	1
1	1	$\overline{Q}_n$

NOTES: 1. t_n = BIT TIME BEFORE CLOCK PULSE.

2. t_{n+1} = BIT TIME AFTER CLOCK PULSE.

DESCRIPTION

16 pin dual-in-line package containing a 4-bit TTL synchronous binary up counter. It is used as a high speed counter, or a 4-bit storage register. In both counter and register modes the outputs change state during logic 0 to 1 transition of the clock input. The parallel inputs are disabled when the G1 input is a logical 1.



TRUTH TABLE

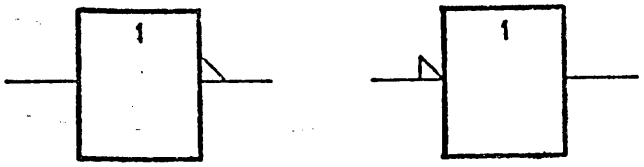
MODE	t_1								t_2				
	INPUTS								OUTPUTS				
		MODE SELECT	COUNT 4 ENABLE		PARALLEL DATA								
		G1	PIN 7 G2	PIN 10 G3	PIN 3 (D0)	PIN 4 (D1)	PIN 5 (D2)	PIN 6 (D3)	PIN 14 (Q0)	PIN 13 (Q1)	PIN 12 (Q2)	PIN 11 (Q3)	PIN 15
REGISTER CLEAR	0	X	X	X	X	X	X	X	0	0	0	0	0
PARALLEL LOAD	1	0	X	0	$D0_1$	$D1_1$	$D2_1$	$D3_1$	$D0_1$	$D1_1$	$D2_1$	$D3_1$	0
	1	0	X	1	1	1	1	1	1	1	1	1	1
	1	0	X	1	0	0	0	0	0	0	0	0	0
UP COUNTER	1	1	0	X	X	X	X	X	$Q0_1$	$Q1_1$	$Q2_1$	$Q3_1$	TC_1
	1	1	X	0	X	X	X	X	$Q0_1$	$Q1_1$	$Q2_1$	$Q3_1$	0
	1	1	1	1	X	X	X	X	0	0	0	0	0
	1	1	1	1	X	X	X	X	1	0	0	0	0
	1	1	1	1	X	X	X	X	0	1	0	0	0
	1	1	1	1	X	X	X	X	1	1	0	0	0
	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈	≈
	1	1	1	1	X	X	X	X	0	1	1	1	0
	1	1	1	1	X	X	X	X	1	1	1	1	1
	1	1	1	1	X	X	X	X	0	0	0	0	0

NOTES: 1. t_1 = BIT TIME BEFORE CLOCK PULSE:
2. t_2 = BIT TIME AFTER CLOCK PULSE.
3. XX_1 = INPUT OR OUTPUT STATE AT TIME T_1
4. COUNT ENABLE = G2 • G3
5. TC = G3 • Q0 • Q1 • Q2 • Q3
6. X = EITHER LOGIC 1 OR 0.

158 (74161)

DESCRIPTION

14 pin dual-in-line package containing six DTL inverter circuits.



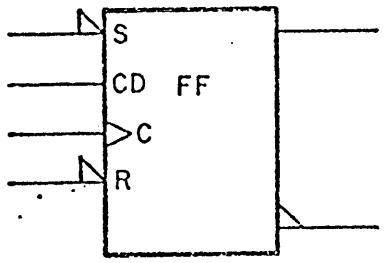
TRUTH TABLE

INPUT	OUTPUT
A	Y
0	1
1	0

174 (937)

DESCRIPTION

14 pin dual-in-line package containing two independent TTL D-type edge-triggered flip-flops. The data appearing on the D input is transferred to the complementary outputs on the logic 0 to 1 transition of the clock input. After the logic 0 to 1 transition of the clock input, the data input (CD) is locked out. A logic 0 input to the master set (S) inputs sets Q (pins 5, 9) to logic 1 independently of the clock input. Similarly a logic 0 input to the master reset (R) inputs sets Q to a logic 0. With both S and R inputs at logic 0, both Q (pins 5, 9) and $\overline{Q}$ (pins 6, 8) outputs are at a logic 1.



TRUTH TABLE

t_n INPUTS			t_{n+1} OUTPUTS	
S	R	D	PIN 5,9 (Q)	PIN 6,8 ($\overline{Q}$)
0	1	X	1	0
1	0	X	0	1
0	0	X	1	1
1	1	1	1	0
1	1	0	0	1

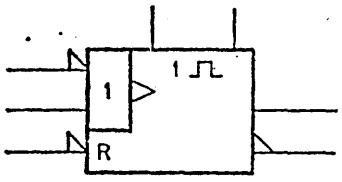
X = EITHER LOGIC 1 OR 0.
t_n = BIT TIME BEFORE LOGIC 0 TO 1 TRANSITION OF CLOCK PULSE.
t_{n+1} = BIT TIME AFTER CLOCK PULSE.

175 (7474)

DESCRIPTION

16 pin dual-in-line package containing two TTL retriggerable single shots having two trigger inputs, one active level 1 (pins 2, 10) and one active level 0 (pins 1, 9). The output pulse duration is a function of an external timing network. The overriding clear input (R) permits any output pulse to be terminated at any time independently of any other inputs.

If the trigger signal is applied to the active 1 input, triggering will occur on the rising edge of the waveforms. By applying the trigger input to the active 0 input, triggering will occur on the falling edge of the waveform. Each time the trigger conditions are met, the external timing capacitor is discharged and a new cycle is started. Successive trigger inputs with a period shorter than the output pulse delay time retrigger the single shot resulting in a continuous true output.



TRUTH TABLE

MODE	INPUTS			OUTPUTS[2]	
	PIN 1,9	PIN 2,10	R	PIN 13,5 (Q)	PIN 4,12 ($\bar{Q}$)
MASTER RESET	X	X	0	0	1
TRIGGERING	1	X	1	0	1
INHIBITED	X	0	1	0	1
POSITIVE EDGE TRIGGERING	0	0→1	1	POSITIVE PULSE OF WIDTH T	NEGATIVE PULSE OF WIDTH T
NEGATIVE EDGE TRIGGERING	1→0	1	1		

NOTES: 1. X = LOGIC 1 OR 0.
2. WIDTH "T" OF OUTPUT PULSE IS DETERMINED BY THE EXERNAL TIMING NETWORK.

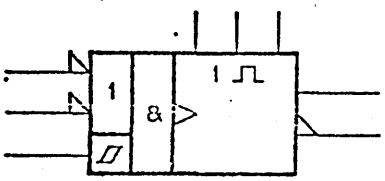
193 (74123)

DESCRIPTION

14 pin dual-in-line package containing a TTL single shot having three trigger inputs, one of which is active level 1 and two active level 0. The output pulse duration is a function of an external timing network.

Pins 3 and 4 are negative-edge-triggered-logic inputs, and will trigger the single shot when either or both go to a logic 0 with pin 5 at logic 1. Pin 5 is a positive-edge-triggered-logic input, and will trigger the single shot when it goes to a logic 1 with either pin 3 or 4 at logic 0.

Once triggered, the outputs are independent of further transitions on the inputs and are a function only of the timing network.



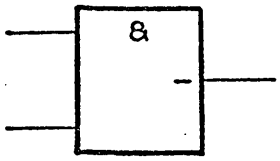
TRUTH TABLE

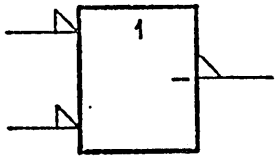
MODE	INPUTS			PIN 6 (Q)	PIN 1 ($\bar{Q}$)
	PIN 3	PIN 4	PIN 5		
TRIGGERING INHIBITED	X 1	X 1	0 X	0 0	1 1
NEGATIVE EDGE TRIGGERING	1→0 X	X 1→0	1 1	POSITIVE PULSE OF WIDTH T	NEGATIVE PULSE OF WIDTH T
POSITIVE EDGE TRIGGERING	0 X	X 0	0→1 0→1		

NOTES: 1. X = LOGIC 1 OR 0
2. WIDTH "T" OF OUTPUT PULSE IS DETERMINED BY THE EXERNAL TIMING NETWORK.

DESCRIPTION

14 pin dual-in-line package containing four TTL 2-input positive AND gates with open-collector outputs.





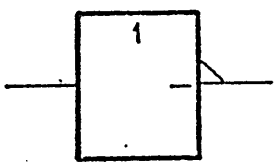
TRUTH TABLE

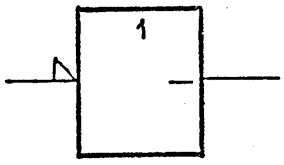
INPUTS		OUTPUT
A	B	Y
0	0	0
1	0	0
0	1	0
1	1	1

201C (7409)

DESCRIPTION

14 pin dual-in-line package that contains six TTL hex inverters with open collector output.

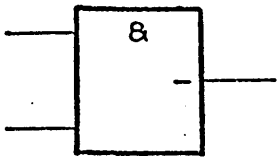


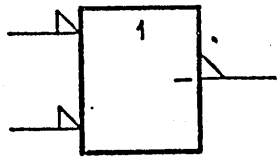


203 (7405)

DESCRIPTION

14 pin dual-in-line package containing four TTL 2-input positive AND gates with open-collector outputs.





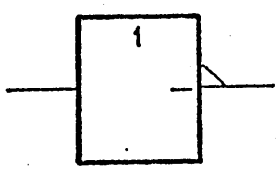
TRUTH TABLE

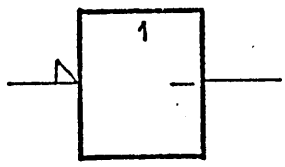
INPUTS		OUTPUT
A	B	Y
0	0	0
1	0	0
0	1	0
1	1	1

201C (7409)

DESCRIPTION

14 pin dual-in-line package that contains six TTL hex inverters with open collector output.

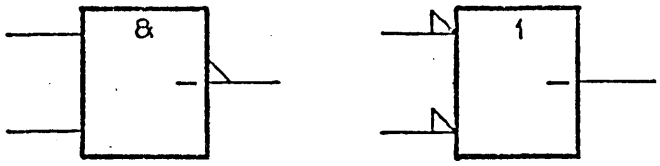




203 (7405)

DESCRIPTION

14 pin dual-in-line package containing four TTL 2-input positive NAND gates with open collector output.



TRUTH TABLE

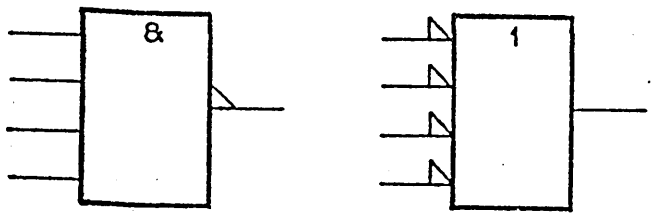
INPUTS		OUTPUT
A	B	Y
0	X	1
X	0	1
1	1	0

X= EITHER LOGIC 1 OR 0

204 (7438)

DESCRIPTION

14 pin dual-in-line package containing two 4-input TTL positive NAND gates.



TRUTH TABLE

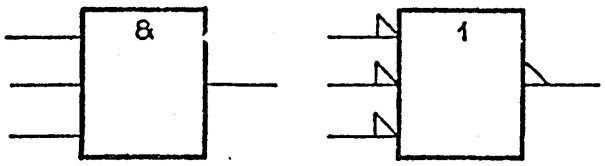
INPUTS				OUTPUT
A	B	C	D	Y
0	X	X	X	1
X	0	X	X	1
X	X	0	X	1
X	X	X	0	1
1	1	1	1	0

X = EITHER LOGIC 1 OR 0.

208 (7420)

DESCRIPTION

14 pin dual-in-line package that contains three TTL 3-input positive AND gates.



TRUTH TABLE

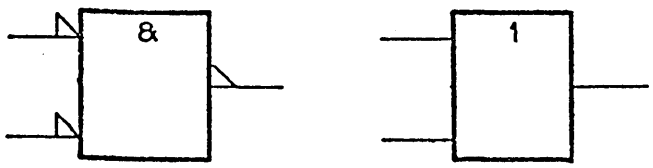
INPUTS			OUTPUT
A	B	C	Y
0	X	X	0
X	0	X	0
X	X	0	0
1	1	1	1

X = EITHER LOGIC 1 OR 0

213 (7411)

DESCRIPTION

14 pin dual-in-line package which contains four independent 2-input OR gates.



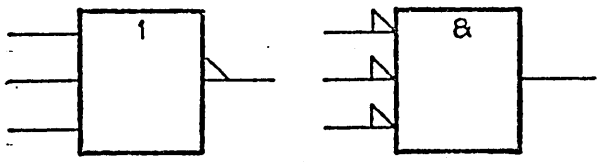
TRUTH TABLE

INPUTS		OUTPUT
A	B	Y
0	0	0
1	0	1
0	1	1
1	1	1

219 (384A)

DESCRIPTION

14 pin dual-in-line package that contains three TTL 3-input positive NOR gates.



TRUTH TABLE

INPUTS			OUTPUT
A	B	C	Y
0	X	X	1
X	0	X	1
X	X	0	1
1	1	1	0

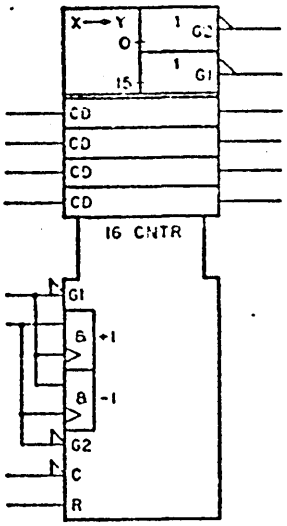
X = EITHER LOGIC 1 OR 0

224 (7427)

DESCRIPTION

16 pin dual-in-line package containing a 4-bit synchronous binary up/down counter. The outputs are triggered by a logic 0 to 1 transition of either count (clock) input. The direction of counting is determined by which count input is pulsed while the other count input is high. The output may be preset to any state by entering the desired data at the data inputs while the load input pin 11 is logic 0. The output will change to agree with the data inputs independently of the count pulses. The master reset input forces all outputs to logic 0, independently of count and load inputs, when a logic 1 is applied.

Both borrow and carry outputs are available to cascade both the up-and-down counting functions. The borrow output (G2) produces a pulse equal in width to the count-down input when the counter overflows. Similarly, the carry output (G1) produces a pulse equal in width to the count-up input when an overflow condition exists. Cascading is accomplished by feeding the borrow and carry outputs to the count-down and count-up inputs respectively of the succeeding counter.



TRUTH TABLE

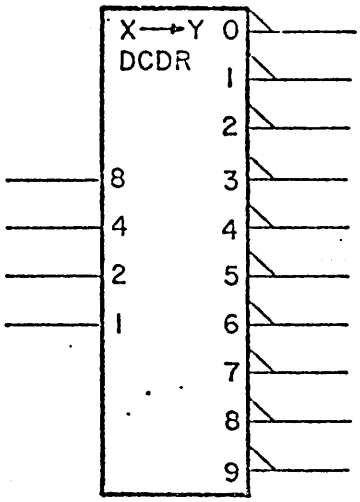
	t_1								t_2					
	INPUTS								OUTPUTS					
MODE	MASTER RESET	MODE SELECT	COUNT ENABLE		PARALLEL DATA									
		LOAD	UP	DOWN										
REGISTER CLEAR	1	X	X	X	X	X	X	X	0	0	0	0	0	0
PARALLEL LOAD	0	0	X	X	DO_1	DO_2	DO_3	DO_4	DO_1	DO_2	DO_3	DO_4	0	0
	0	0	X_1	X_1	1	1	1	1	1	1	1	1	X_1	X_1
	0	0	X_1	X_1	0	0	0	0	0	0	0	0	X_1	X_1
UP COUNTER	0	1	↑	1	X	X	X	X	$Q0_1$	$Q1_1$	$Q2_1$	$Q3_1$	1	1
	0	1	↑	1	X	X	X	X	1	0	0	0	0	0
	0	1	↑	1	X	X	X	X	0	1	0	0	0	0
	0	1	↑	1	X	X	X	X	1	1	0	0	0	0
	0	1	1	↑	X	X	X	X	0	1	1	1	0	0
	0	1	1	↑	X	X	X	X	1	0	0	0	1	0
DOWN COUNTER	0	1	1	↑	X	X	X	X	$Q0_1$	$Q1_1$	$Q2_1$	$Q3_1$	1	1
	0	1	1	↑	X	X	X	X	0	0	0	0	1	0
	0	1	1	↑	X	X	X	X	1	1	1	1	0	0
	0	1	1	↑	X	X	X	X	0	1	0	0	0	0
	0	1	↑	1	X	X	X	X	1	0	1	1	0	0
	0	1	↑	1	X	X	X	X	0	0	0	0	0	0
	0	1	↑	1	X	X	X	X	1	0	0	0	0	0
	0	1	↑	1	X	X	X	X	0	0	0	0	0	0

NOTES: 1. t_1 = BIT TIME BEFORE COUNT PULSE.
2. t_2 = BIT TIME AFTER COUNT PULSE.
3. XX_1 = INPUT OR OUTPUT STATE AT TIME t_1.
4. X_1 = DEPENDENT ON COUNT ENABLE STATE.
5. ↑ = COUNT ENABLE PULSE TRANSITION 0 TO 1.
6. X = EITHER LOGIC 1 OR 0.
7. G1 AND G2 PULSE WIDTH EQUAL TO COUNT ENABLE PULSE WIDTH.

500 (74193)

DESCRIPTION

16 pin dual-in-line package containing a TTL BCD-TO-DECIMAL decoder. The decoder accepts a four input binary code and provides ten mutually exclusive active logic 0 outputs. All outputs are a logic 1 when binary codes greater than nine are applied to the inputs.



TRUTH TABLE

BINARY CODE	INPUTS				OUTPUTS									
	A1	A2	A4	A8	X0	X1	X2	X3	X4	X5	X6	X7	X8	X9
0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
1	1	0	0	0	1	0	1	1	1	1	1	1	1	1
2	0	1	0	0	1	1	0	1	1	1	1	1	1	1
3	1	1	0	0	1	1	1	0	1	1	1	1	1	1
4	0	0	1	0	1	1	1	1	0	1	1	1	1	1
5	1	0	1	0	1	1	1	1	1	0	1	1	1	1
6	0	1	1	0	1	1	1	1	1	1	0	1	1	1
7	1	1	1	0	1	1	1	1	1	1	1	0	1	1
8	0	0	0	1	1	1	1	1	1	1	1	1	0	1
9	1	0	0	1	1	1	1	1	1	1	1	1	1	0
10	0	1	0	1	1	1	1	1	1	1	1	1	1	1
11	1	1	0	1	1	1	1	1	1	1	1	1	1	1
12	0	0	1	1	1	1	1	1	1	1	1	1	1	1
13	1	0	1	1	1	1	1	1	1	1	1	1	1	1
14	0	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1

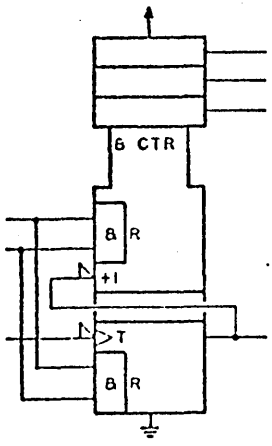
DESCRIPTION

14 pin dual-in-line package containing a TTL 4-bit binary counter consisting of four master-slave flip-flops internally interconnected to provide a divide-by-two counter (output pin 12) and divide-by-eight counter (output pins 9, 8, and 11). When both master reset inputs (pins 2, 3) are at a logic 1, the count mode is inhibited and all outputs are returned to a logic 0. The counter changes state on the logic 1 to 0 transition of the clock inputs (pins 14 and 1).

As the output pin 12 is not internally connected to the succeeding flip-flops, the counter may be operated in two independent modes:

1. When used as a 4-bit ripple-through counter, output pin 12 must be externally connected to input pin 1. The input count pulses are applied to input pin 14. Simultaneous divisions of 2, 4, 8, and 16 are performed at output pins 12, 9, 8, and 11 respectively as shown in the truth table below.

2. When used as a 3-bit ripple-through counter, the input count pulses are applied to input pin 1. Simultaneous frequency divisions of 2, 4, and 8 are available at output pins 9, 8, and 11 respectively. Use of indepenent flip-flop is possible if the reset function coincides with the reset of the 3-bit ripple-through counter.



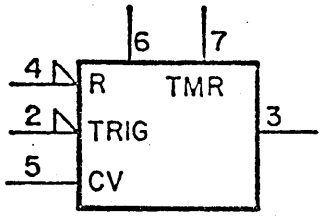
TRUTH TABLE

COUNT	PIN 11	PIN 8	PIN 9	PIN 12
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1
16	0	0	0	0

NOTES: 1. OUTPUT PIN 12 CONNECTED TO PIN 1.
2. EITHER (OR BOTH) PIN 2 AND PIN 3 MUST BE AT A LOGIC 0 TO COUNT.

DESCRIPTION

8 pin dual-in-line package containing a single monolithic timing circuit. It can be used as a timer for pulses from microseconds through one hour as well as a monostable or astable multivibrator. Timing is accomplished through the use of external components.

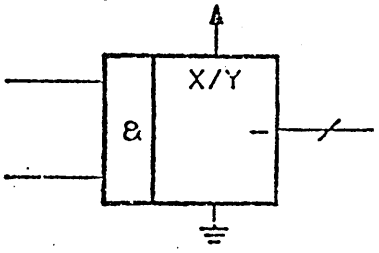


555 (555)

Table 4-3. INTEGRATED CIRCUIT DATA (Cont'd)

DESCRIPTION

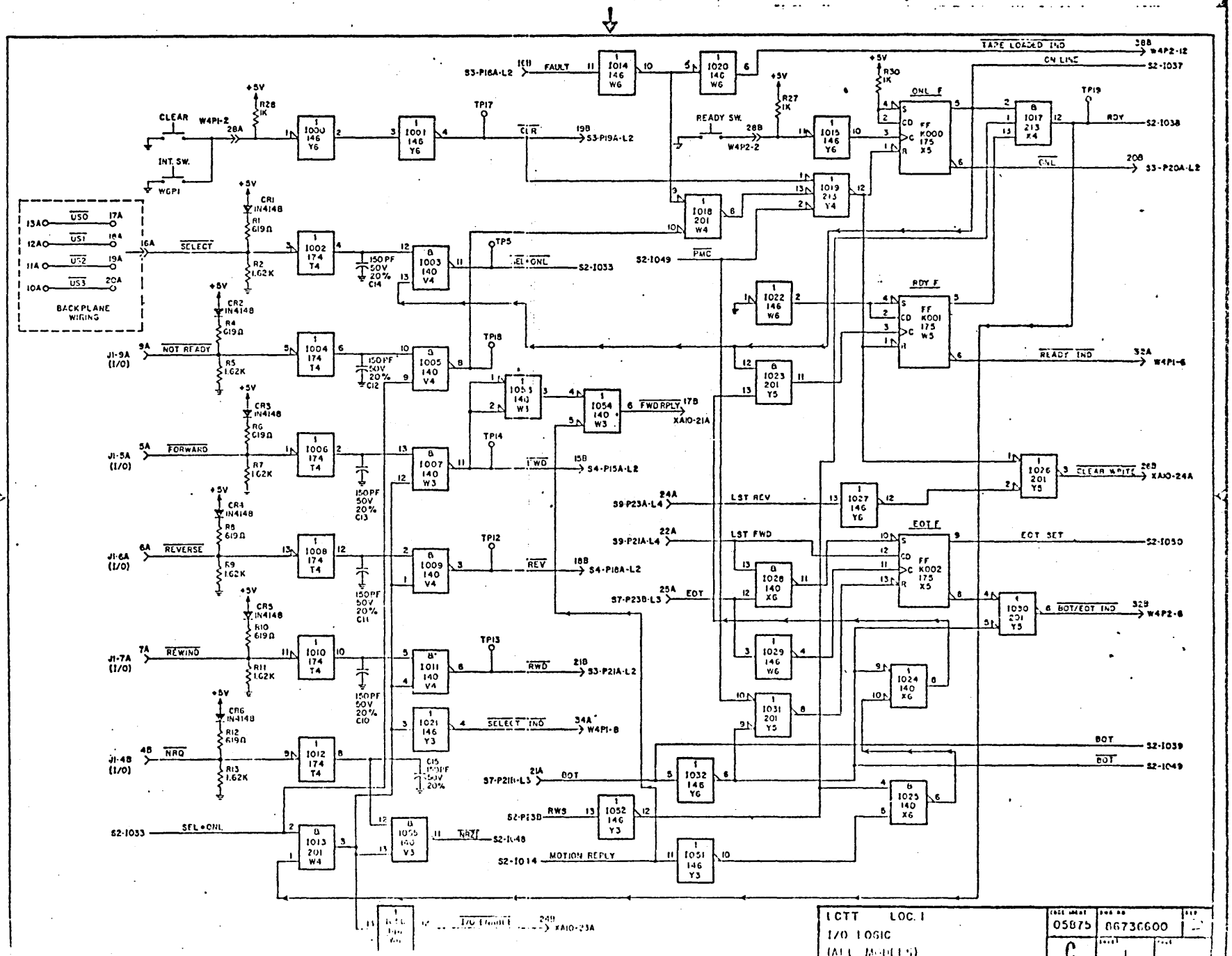
8 pin dual-in-line package containing two independent peripheral drivers. It is used to drive transmission lines, lamps, relays and various memories. Each driver consists of a 2-input TTL NAND gate internally connected to an NPN transistor with an open-collector output.

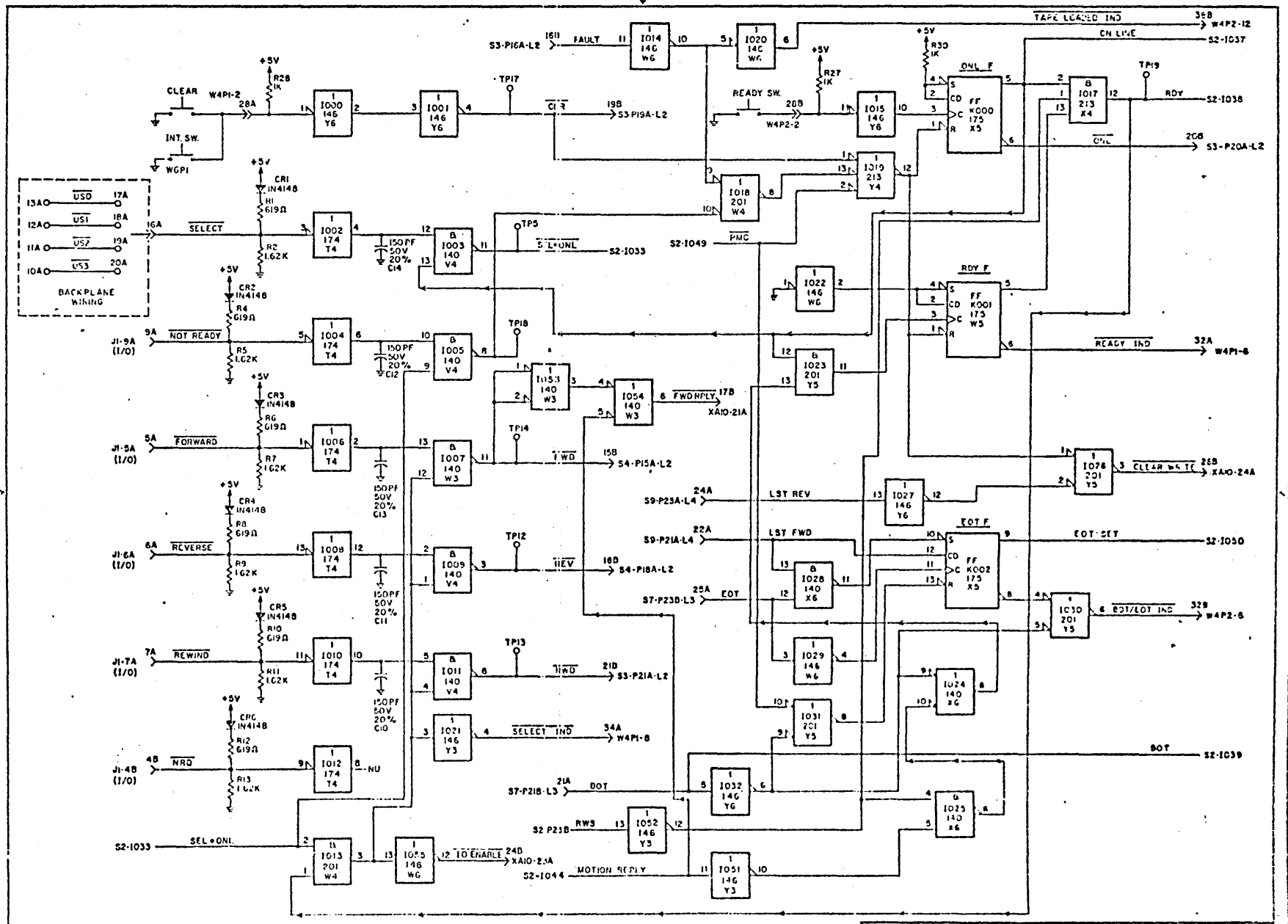


TRUTH TABLE

A	B	Y
0	0	0
1	0	0
0	1	0
1	1	*

* DEPENDENT ON EXTERNAL CIRCUITRY. (+30V MAX)

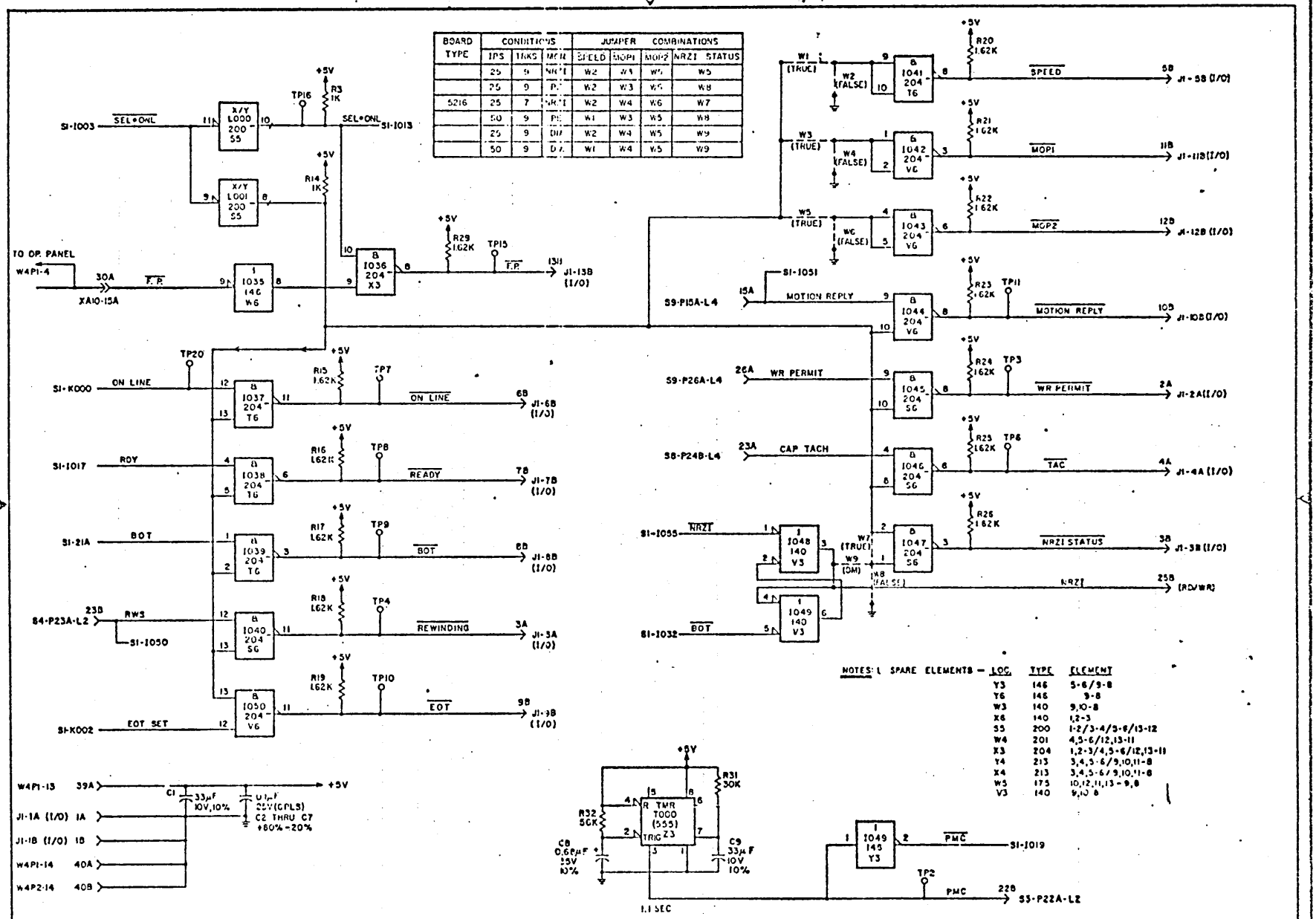

CLEAR
W4P1-2
28A
INT. SW.
W6P1
+5V
R28 1K
CLR
19B
S3-P19A-L2
TPI7
S3-P16A-L2
FAULT
READY SW.
28B
W4P2-2
R27 1K
R30 1K
ONL F
FF K000 175 X5
TAPE LOADED IND
38B
W4P2-12
ON LINE
S2-1037
RDY
S2-1038
TPI9
ONL
20B
S3-P20A-L2
US0 17A
US1 18A
US2 19A
US3 20A
BACKPLANE WIRING
SELECT
16A
CR1 IN4148
R1 619Ω
R2 1.62K
150PF 50V 20% C14
TP5
SEL•ONL
S2-1033
S2-1049
PMC
RDY F
FF K001 175 W5
READY IND
32A
W4P1-6
J1-9A (1/0)
NOT READY
9A
CR2 IN4148
R4 619Ω
R5 1.62K
150PF 50V 20% C12
TPI8
FWD RPLY
17B
XA10-21A
J1-5A (1/0)
FORWARD
5A
CR3 IN4148
R6 619Ω
R7 1.62K
150PF 50V 20% C13
TPI4
FWD
15B
S4-P15A-L2
CLEAR WRITE
26B
XA10-24A
S9-P23A-L4
24A
LST REV
J1-6A (1/0)
REVERSE
6A
CR4 IN4148
R8 619Ω
R9 1.62K
150PF 50V 20% C11
TPI2
REV
18B
S4-P18A-L2
S9-P21A-L4
22A
LST FWD
EOT F
FF K002 175 X5
EOT SET
S2-1050
S7-P23B-L3
25A
EOT
BOT/EOT IND
32B
W4P2-6
J1-7A (1/0)
REWIND
7A
CR5 IN4148
R10 619Ω
R11 1.62K
150PF 50V 20% C10
TPI3
RWD
21B
S3-P21A-L2
SELECT IND
34A
W4P1-8
J1-4B (1/0)
NRQ
4B
CR6 IN4148
R12 619Ω
R13 1.62K
C15 150PF 50V 20%
S7-P21B-L3
21A
BOT
BOT
S2-1039
BOT
S2-1049
S2-P13B
RWS
S2-1033
SEL•ONL
NRZI
S2-1048
S2-1014
MOTION REPLY
I/O ENABLE
24B
XA10-23A
LCTT LOC. I
I/O LOGIC
(ALL MODELS)
05875
86736600
C
1



LCTT LOC 1 TYPE 5211

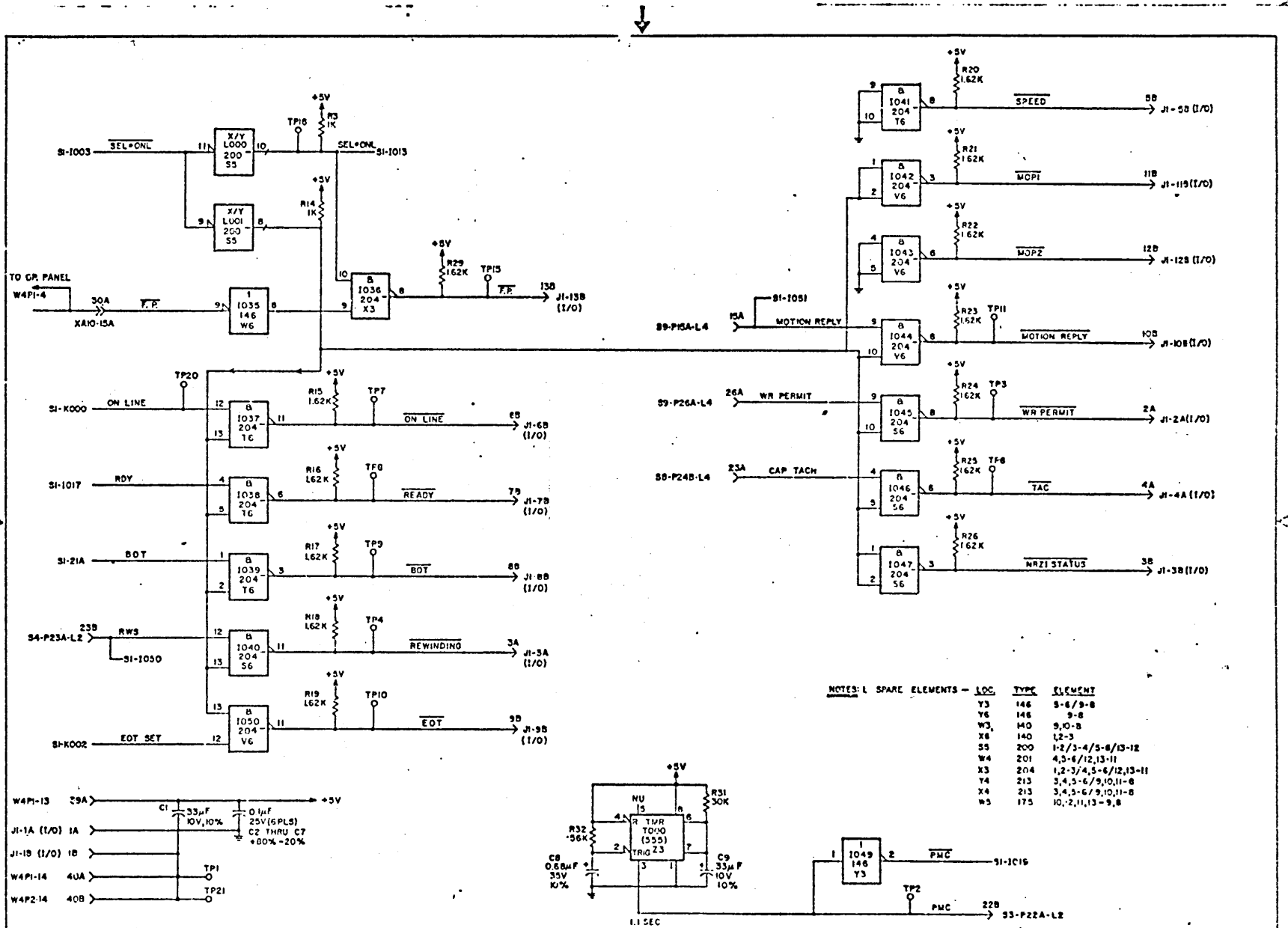
I/O LOGIC

05875 | 8673600



LCTT (ALL MODELS)
I/O LOGIC LOC 1

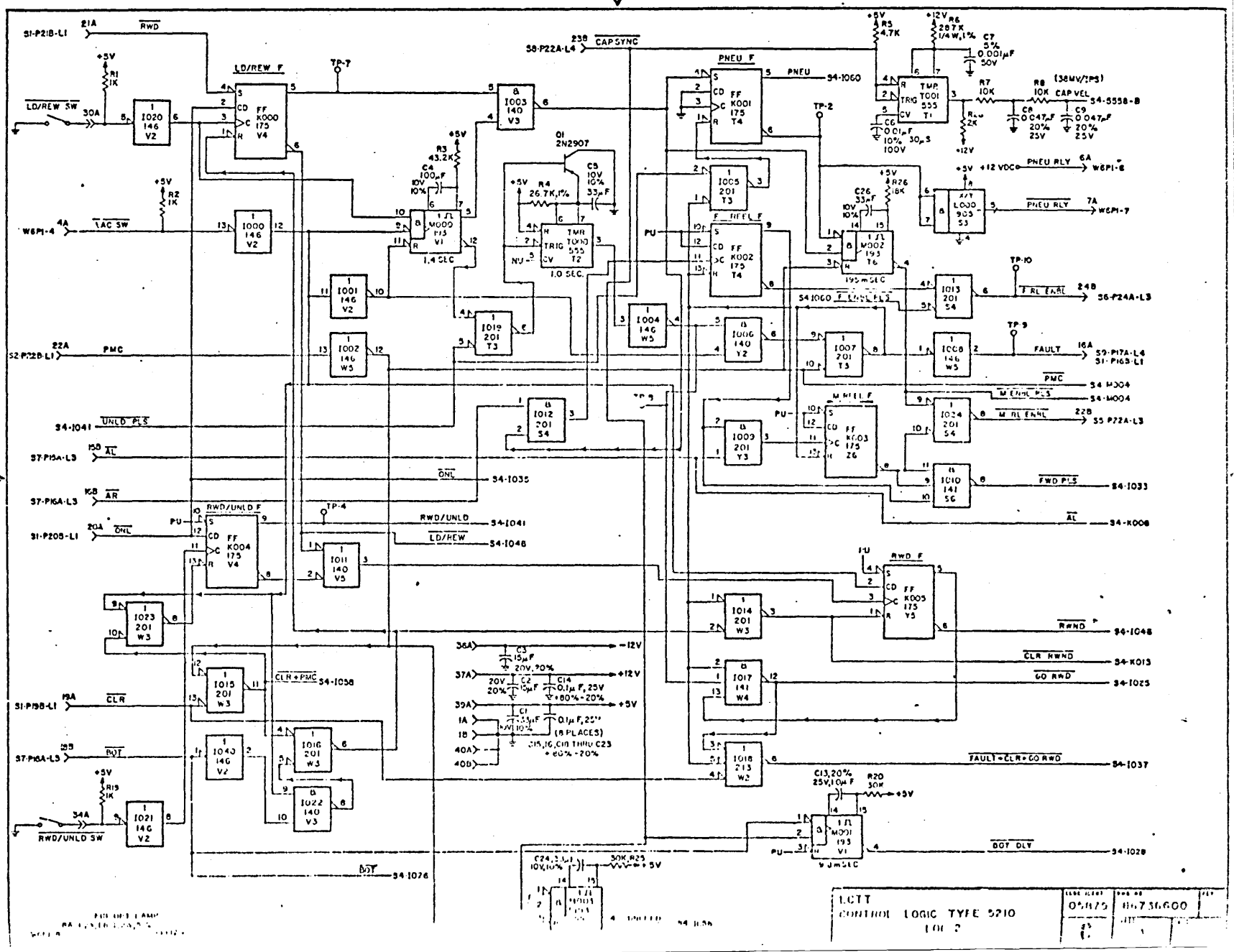
05875 86736600 C

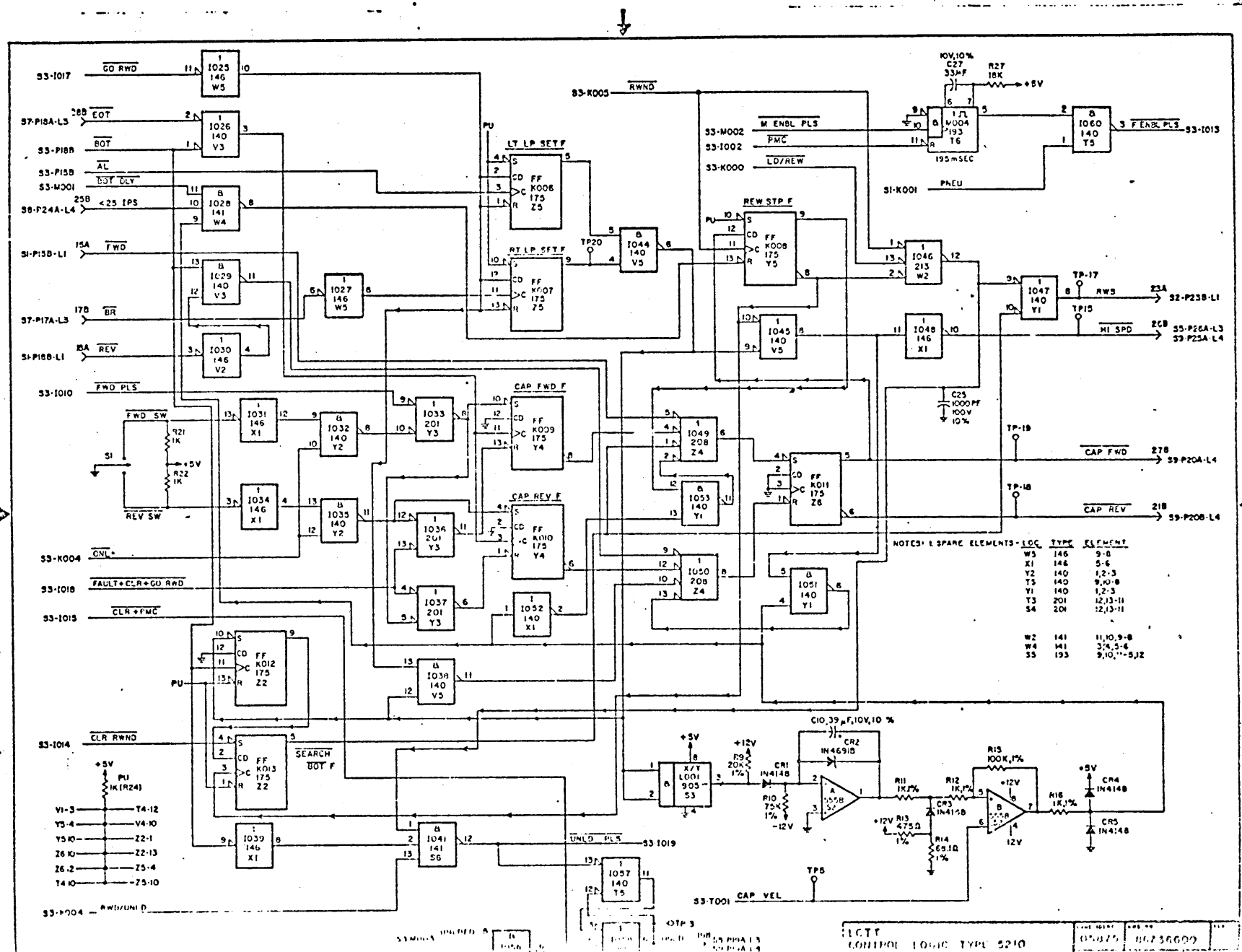


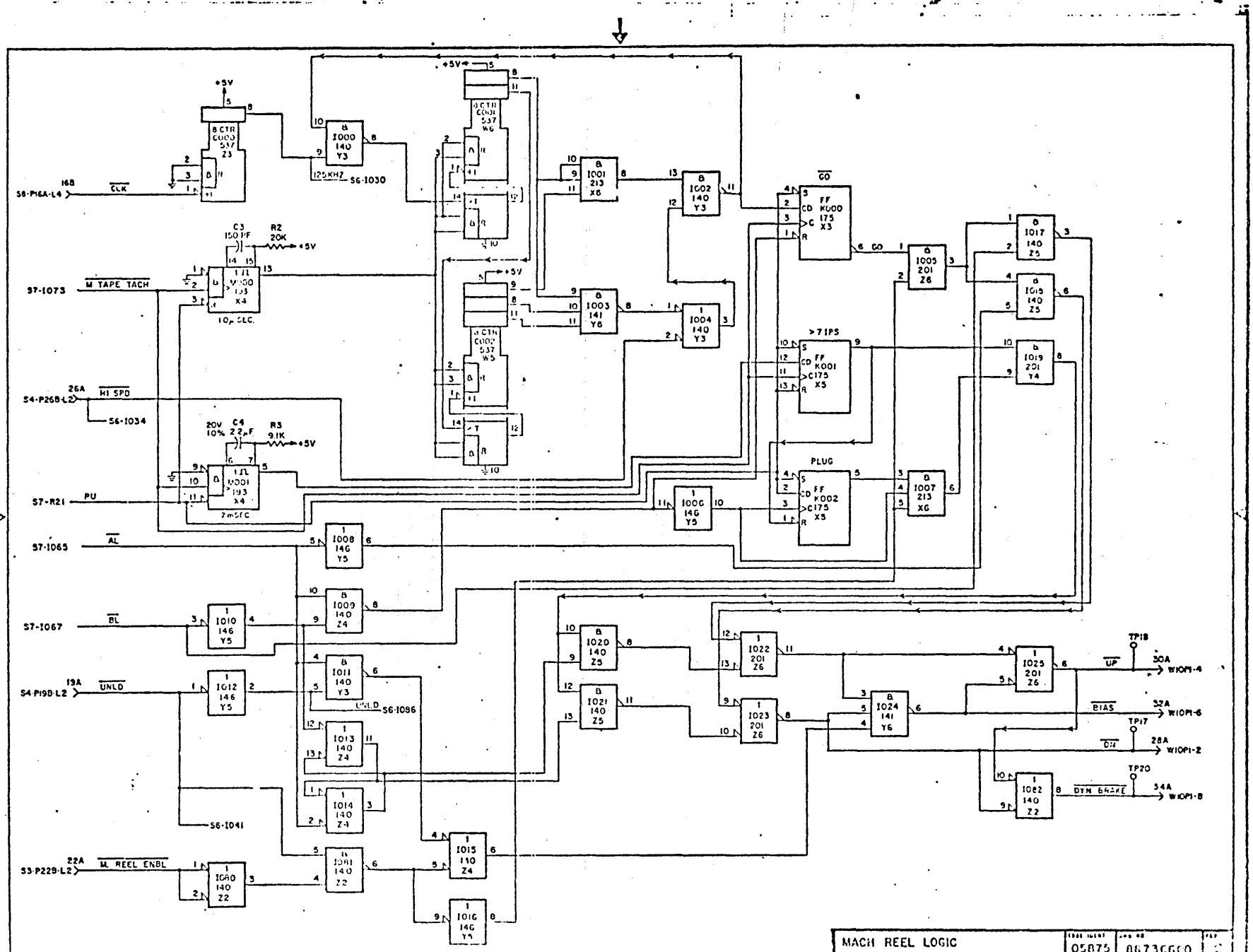
NOTES: 1. SPARE ELEMENTS —

LOC	TYPE	ELEMENT
Y3	146	5-6/9-8
Y6	146	9-8
W3	140	9,10-8
X6	140	1,2-3
S5	200	1-2/3-4/5-6/13-12
W4	201	4,5-6/12,13-11
X3	204	1,2-3/4,5-6/12,13-11
Y4	213	3,4,5-6/9,10,11-8
X4	213	3,4,5-6/9,10,11-8
W5	175	10,-2,11,13-9,8

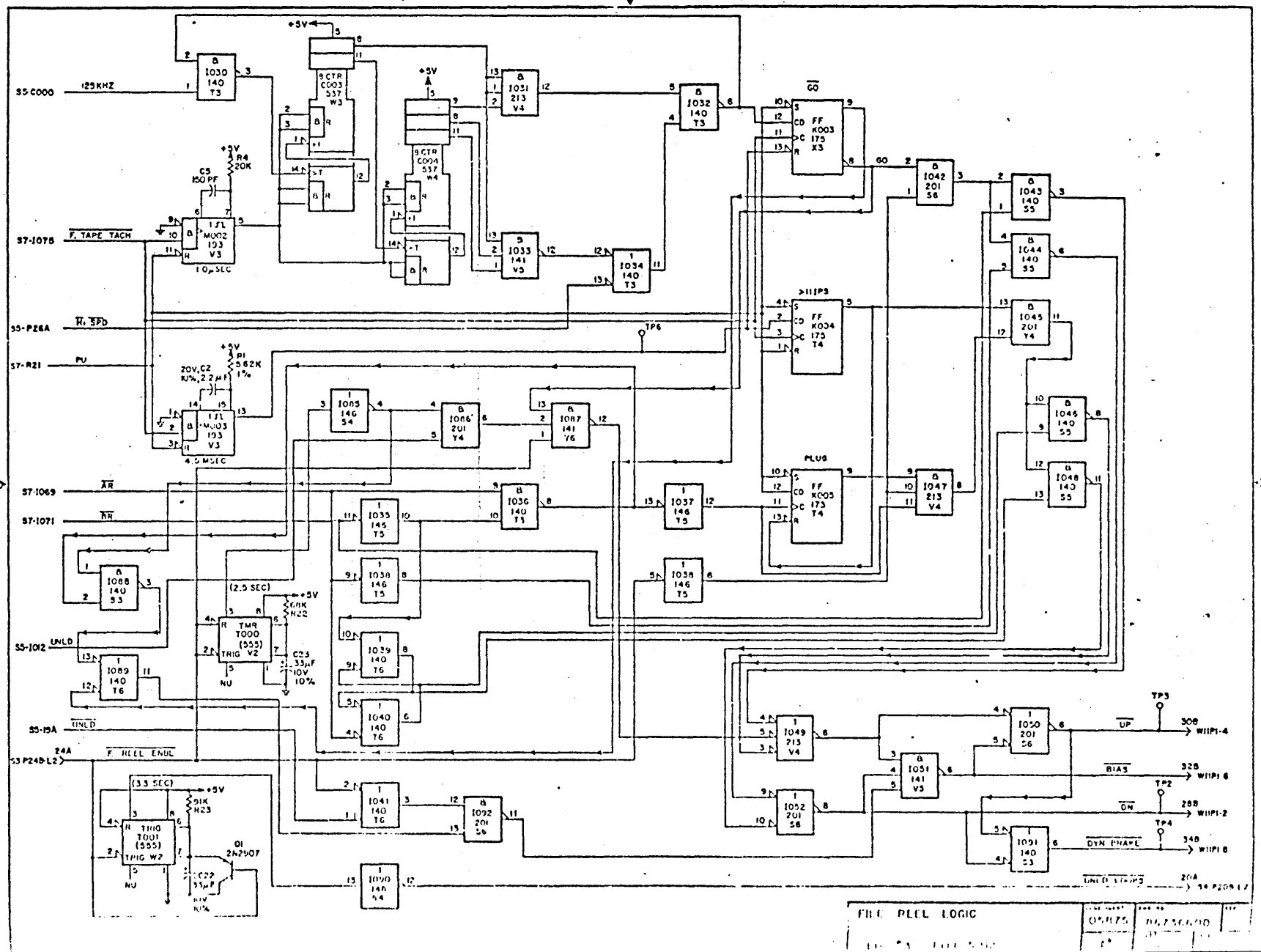
LCTT		CODE IDENT 05875	DWG NO 86736600
I/O LOGIC LOC 1 TYPE 5211		C	SHEET 2

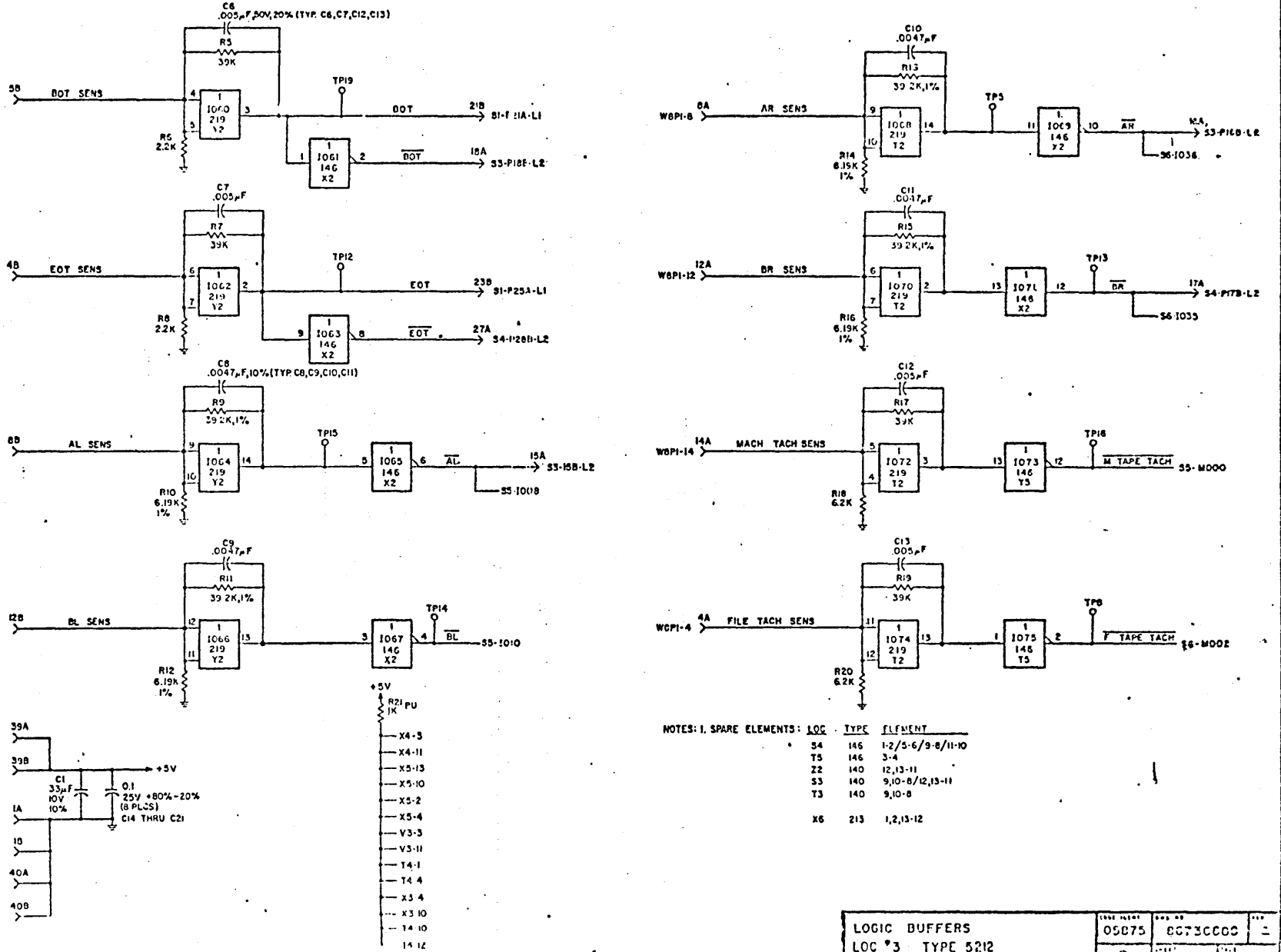

LCTT
CONTROL LOGIC TYPE 5210
LOC 2
05/8/75
8673600


S3-I017 GO RWD
S7-P18A-L3 28B EOT
S3-P18B BOT
S3-P15B AL
S3-M001 BOT DLY
S8-P24A-L4 25B <25 IPS
SI-P15B-L1 15A FWD
S7-P17A-L3 17B BR
SI-P18B-L1 18A REV
S3-I010 FWD PLS
FWD SW
REV SW
S3-K004 CNL
S3-I018 FAULT+CLR+GO RWD
S3-I015 CLR+PMC
S3-I014 CLR RWND
S3-P004 FWD/UNLD
S3-K005 RWND
S3-M002 M ENBL PLS
S3-I002 PMC
S3-K000 LO/REW
SI-K001 PNEU
LT LP SET F
RT LP SET F
REW STP F
CAP FWD F
CAP REV F
SEARCH BOT F
UNLD PLS S3-I019
CAP VEL TP5
3 F ENBL PLS S3-I013
RWS 23A S2-P23B-L1
HI SPD 20B S5-P26A-L3 S3-P25A-L4
CAP FWD 27B S3-P20A-L4
CAP REV 21B S3-P20B-L4
TP17
TP15
TP19
TP18
TP20
TP3
NOTES: 1. SPARE ELEMENTS - LOC TYPE ELEMENT
W5 146 9-8
X1 146 5-6
Y2 140 1,2-3
T5 140 9,10-8
Y1 140 1,2-3
Y3 201 12,13-11
S4 201 12,13-11
W2 141 11,10,9-8
W4 141 3,4,5-6
S5 193 9,10,11-5,12
LGTT
CONTROL LOGIC TYPE 5210
B6236600



MACH REEL LOGIC	05875	8873C000	C
	6		


+5V
125KHZ
S5-C000
9 CTR C003 537 W3
9 CTR C004 537 W4
C5 150 PF
R4 20K
F. TAPE TACH
S7-1078
10 μSEC
I030 140 T3
I031 213 V4
I032 140 T3
I033 141 V3
I034 140 T3
GO
FF K003 175 X3
I042 201 S6
I043 140 S5
I044 140 S5
>IIIP3
FF K004 175 T4
I045 201 Y4
TP6
H. SPD
S5-P26A
PU
S7-R21
R1 5.62K 1%
20V, C2 10%, 2.2 MF
I045 140 S4
I086 201 Y4
I087 141 Y6
4.5 MSEC
I046 140 S5
PLUG
FF K005 173 T4
I047 213 V4
I048 140 S5
AR
S7-1069
BR
S7-1071
I036 140 T5
I037 146 T5
I035 145 T5
I038 146 T5
I088 140 S3
(2.5 SEC)
+5V
68K R22
TMR T000 (555) TRIG V2
NU
C23 33μF 10V 10%
S5-1012
UNLD
I089 140 T6
I039 140 T6
I040 140 T6
S5-19A
UNLD
24A
S3 P24B-L2
F. REEL ENDL
I049 213 V4
I050 201 S6
I051 141 V3
I052 201 S6
I051 140 S3
TP3
UP
308
W1P1-4
BIAS
328
W1P1-6
TP2
DN
288
W1P1-2
TP4
DYN BRAKE
348
W1P1-8
(33 SEC)
91K R23
THR T001 (555) TRIG W2
Q1 2N2907
C22 33μF
I041 140 T6
I092 201 S6
I090 140 S4
UNLD STOPS
20A
S4 P20B-L7
FILE REEL LOGIC

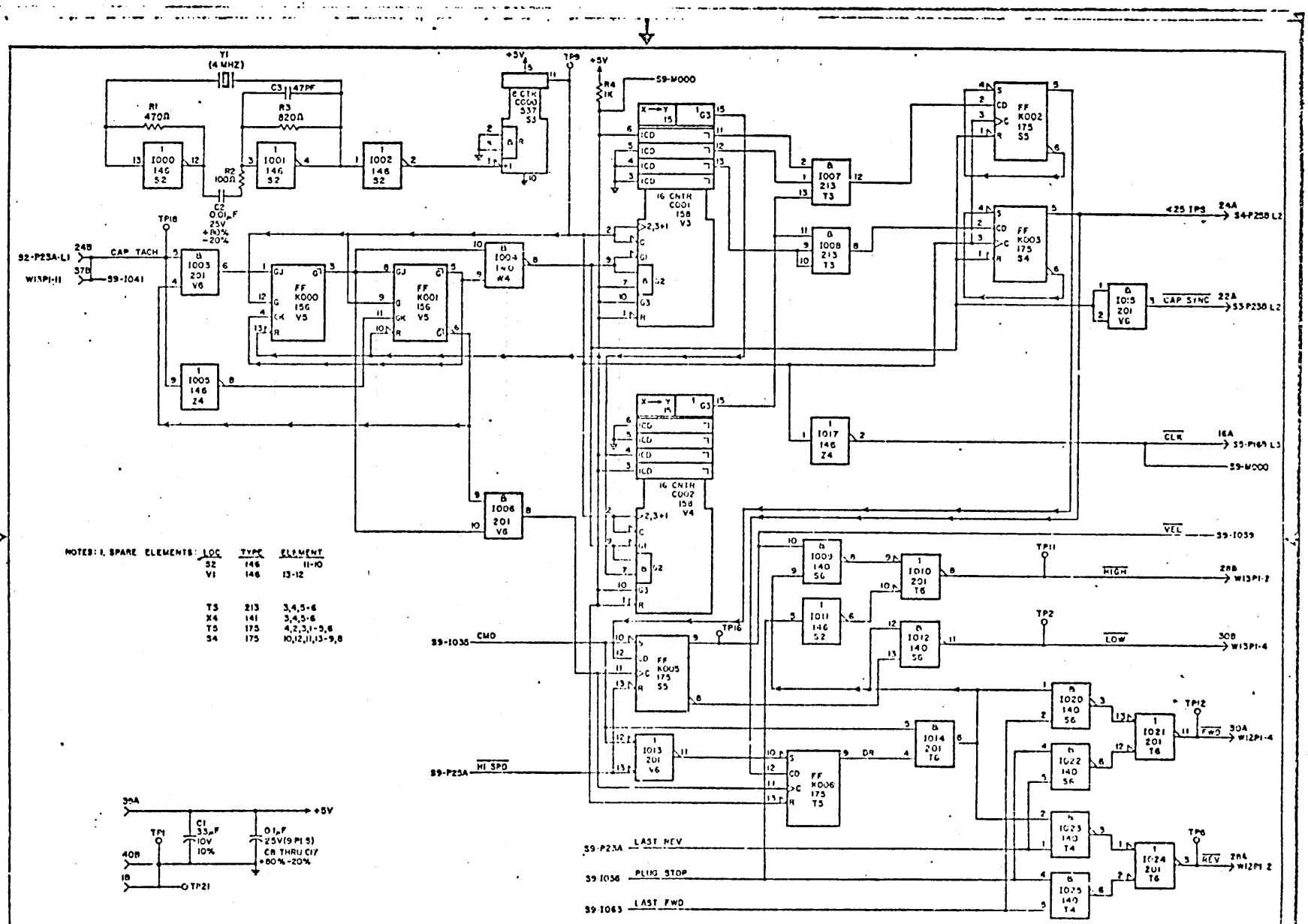


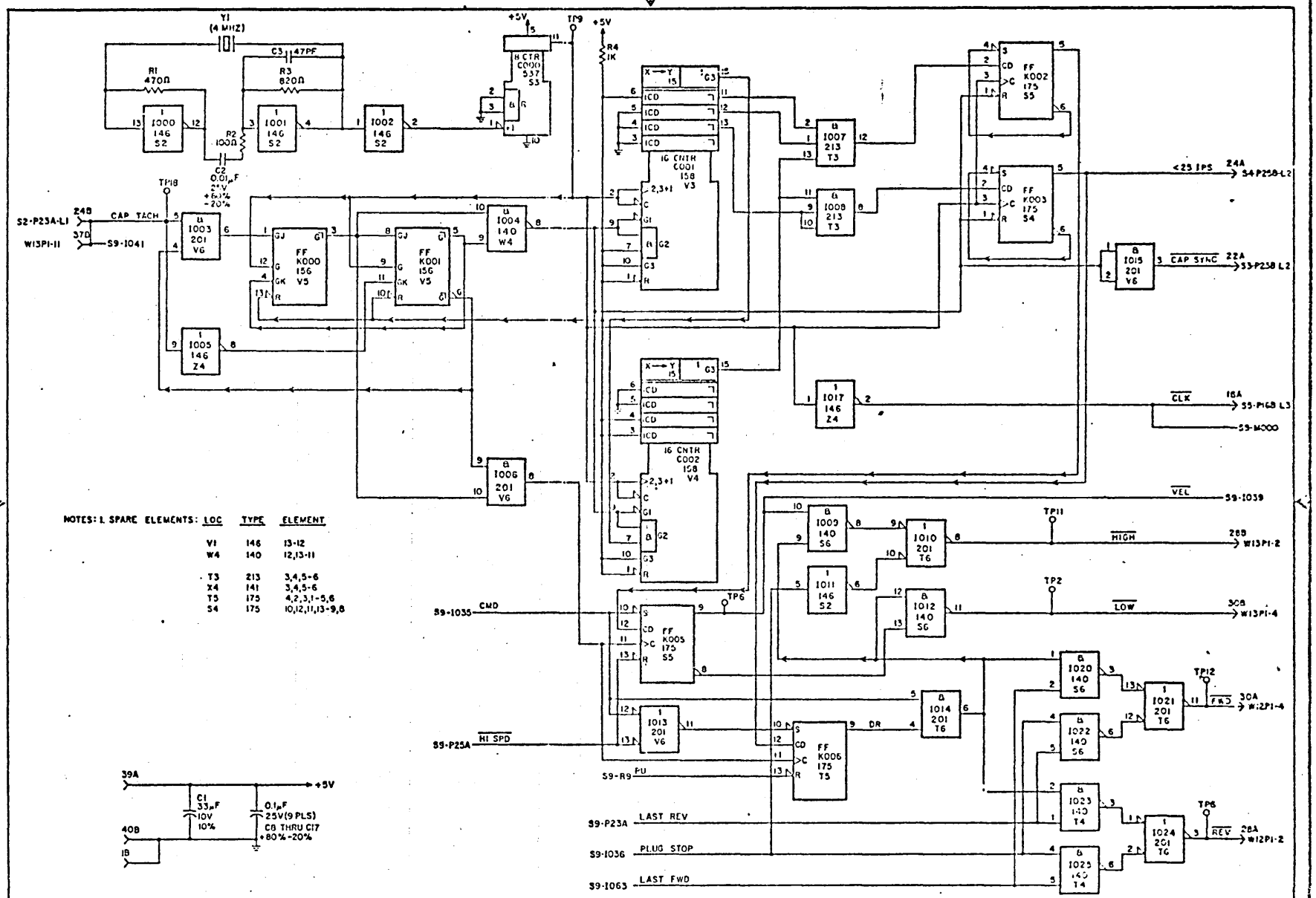
NOTES: 1. SPARE ELEMENTS:

LOC	TYPE	ELEMENT
S4	146	1-2/5-6/9-8/11-10
T5	146	3-4
Z2	140	12,13-11
S3	140	9,10-8/12,13-11
T3	140	9,10-8
X6	213	1,2,13-12

LOGIC BUFFERS
LOC *3 TYPE 5212

05075 | 8873C000 | C | 7

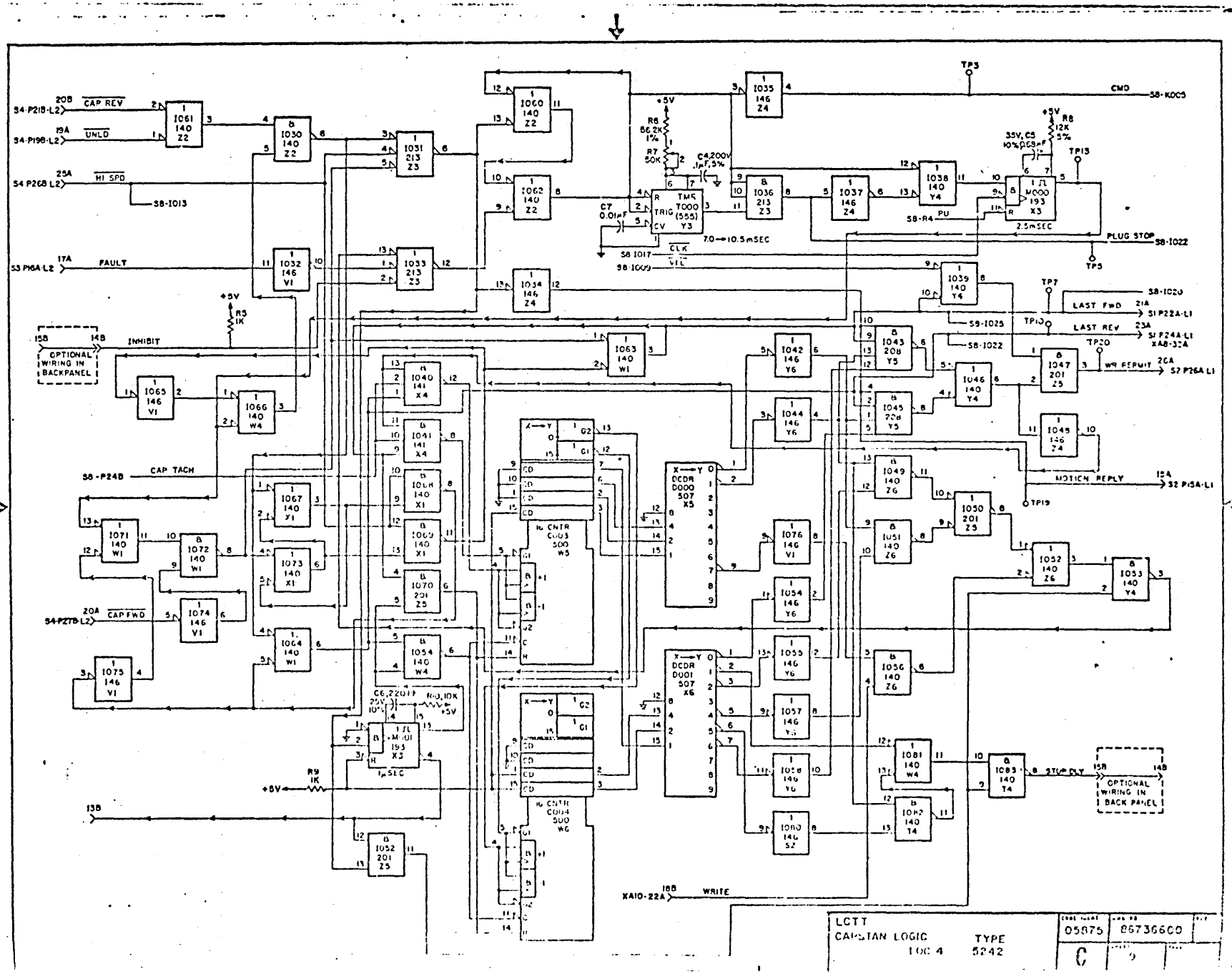

Y1 (4 MHZ)
C3 47PF
R1 470Ω
R3 820Ω
R2 100Ω
C2 0.01μF 25V +80% -20%
+5V
TP9
R4 1K
59-M000
TP18
52-P23A-L1
CAP TACH
WI3PI-11
59-I041
16 CNTR C001 I58 V3
16 CNTR C002 I58 V4
<25 IPS
24A
S4-P25B L2
CAP SYNC
22A
S3-P23B L2
CLR
16A
S5-P16B L3
59-M000
VEL
59-I039
TP11
HIGH
28B
WI3PI-2
TP2
LOW
30B
WI3PI-4
TP12
FWD
30A
WI2PI-4
TP6
REV
28A
WI2PI-2
59-I036
CMD
TP16
59-P23A
HI SPD
59-P23A
LAST REV
59-I036
PLUG STOP
59-I063
LAST FWD
30A
+5V
C1 33μF 10V 10%
0.1μF 25V(9 PLS) C8 THRU C17 +80% -20%
40B
18
TP21
NOTES: 1. SPARE ELEMENTS:
LOC TYPE ELEMENT
S2 146 11-10
V1 146 13-12
T3 213 3,4,5-6
X4 141 3,4,5-6
T5 175 4,2,3,1-9,6
S4 175 10,12,11,13-9,8
LCTT
CAPSTAN & DIGITAL TACH
LOC -4 TYPE 524
05975
C

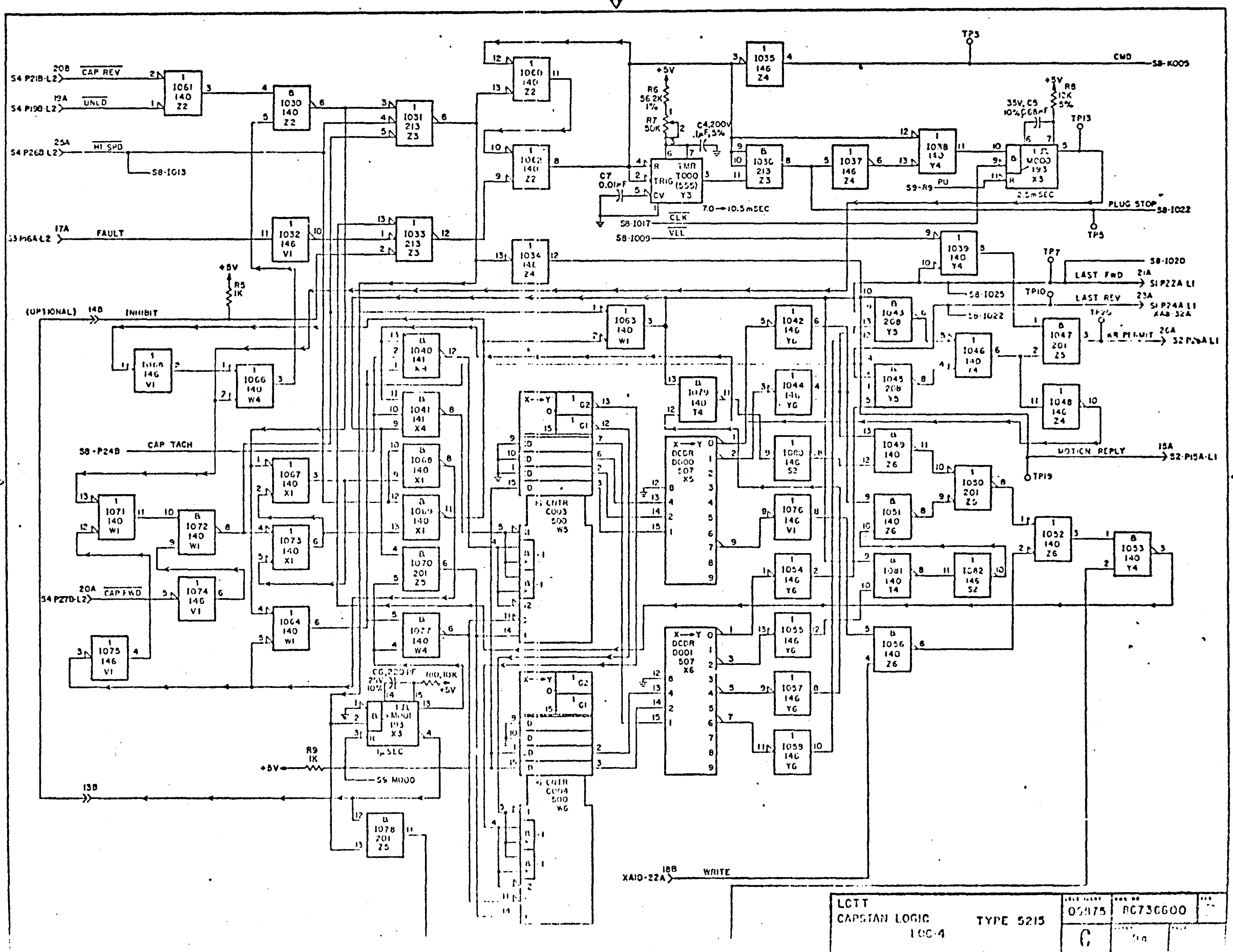


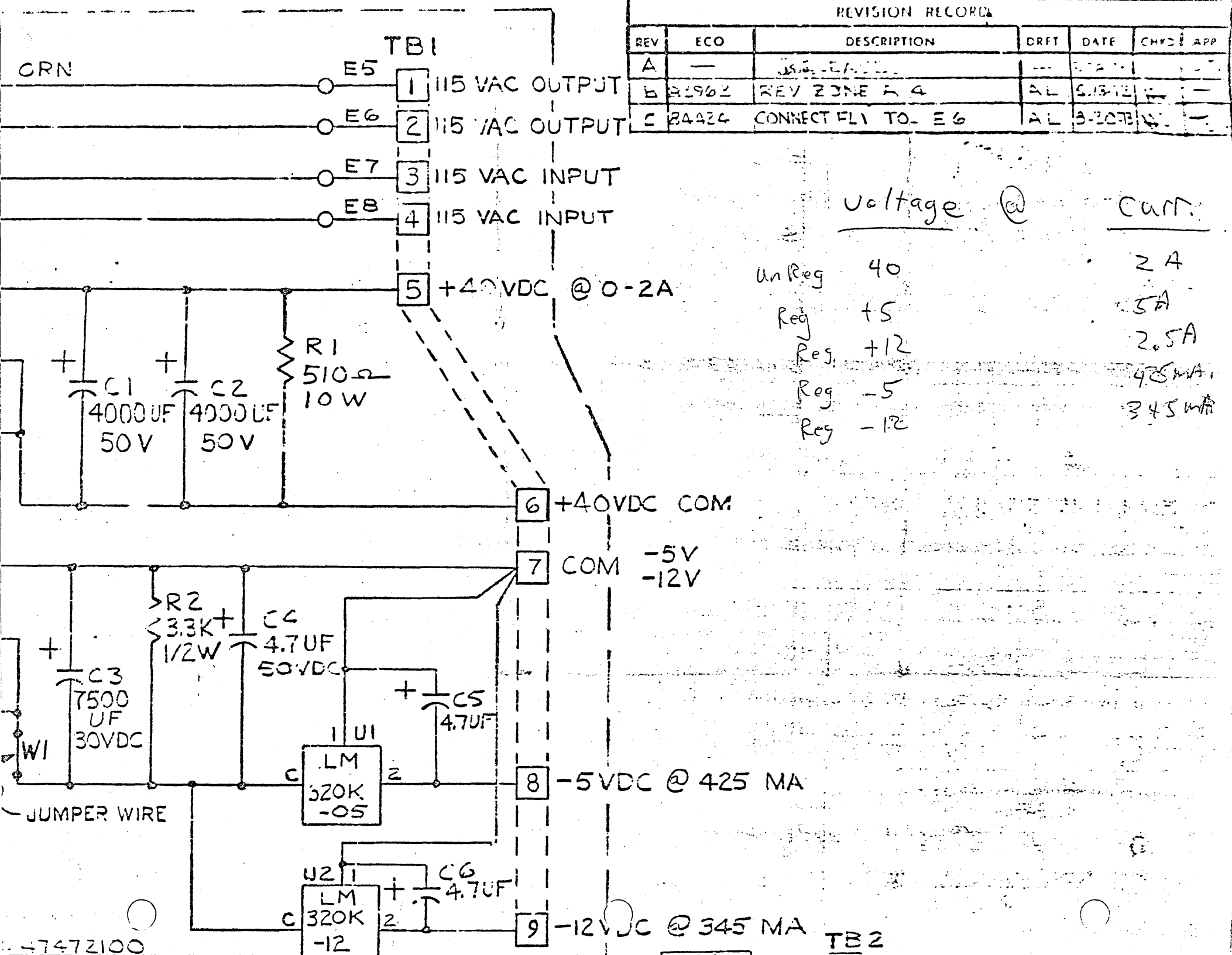
NOTES: 1. SPARE ELEMENTS:

LOC	TYPE	ELEMENT
V1	146	13-12
W4	140	12,13-11
T3	213	3,4,5-6
X4	141	3,4,5-6
T5	175	4,2,3,1-5,6
S4	175	10,12,11,13-9,8

LCTT CAPSTAN & DIGITAL TACH LOC.-4 TYPE 5015	05975	86736600	C

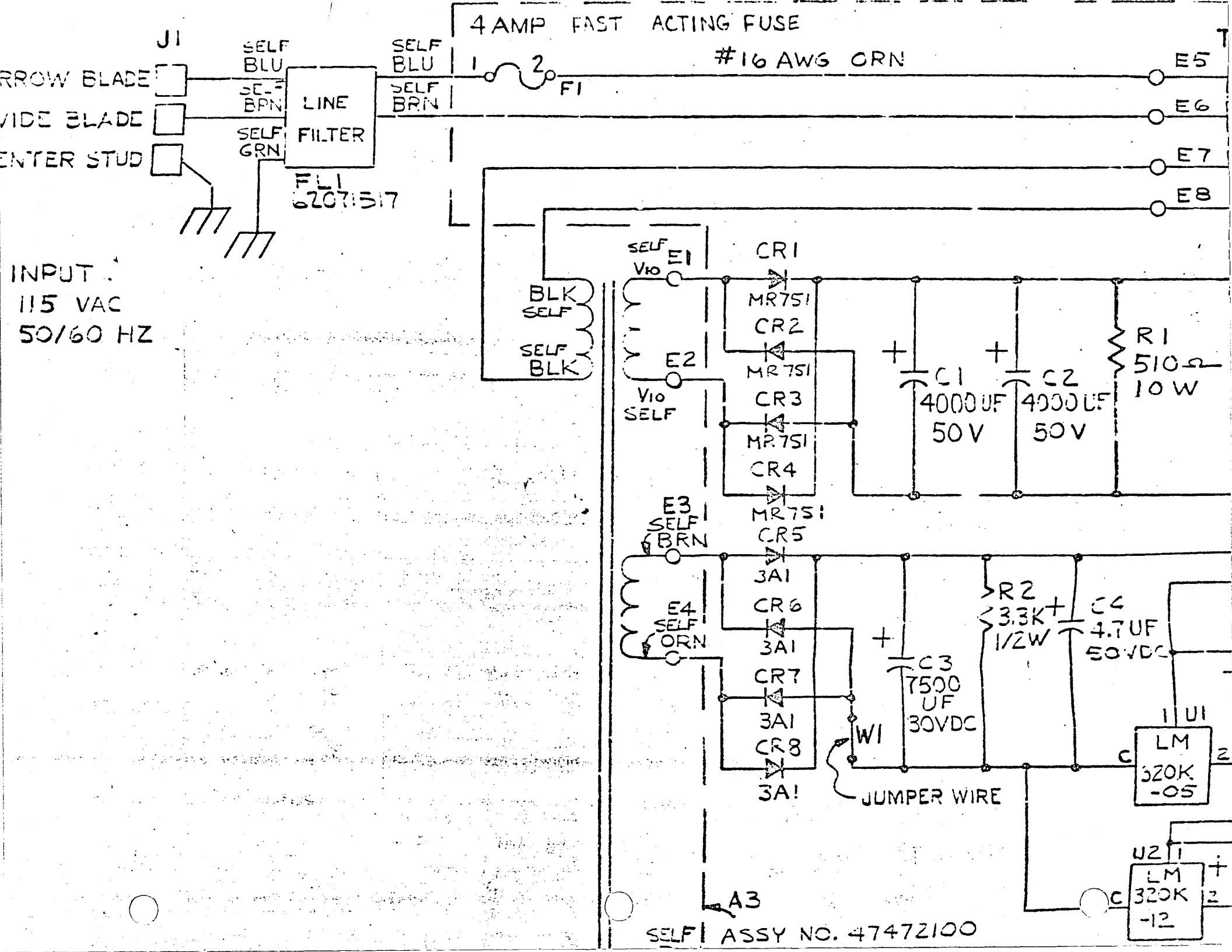

CAP REV
UNLD
HI SPD
FAULT
INHIBIT
OPTIONAL WIRING IN BACKPANEL
CAP TACH
CAP FWD
WRITE
CMD
PLUG STOP
LAST FWD
LAST REV
WR REPMIT
MOTION REPLY
STOP DLY
TMS 7000 (555)
LCTT
CAPSTAN LOGIC
TYPE
LOC 4
5242
05875
867366C0
C

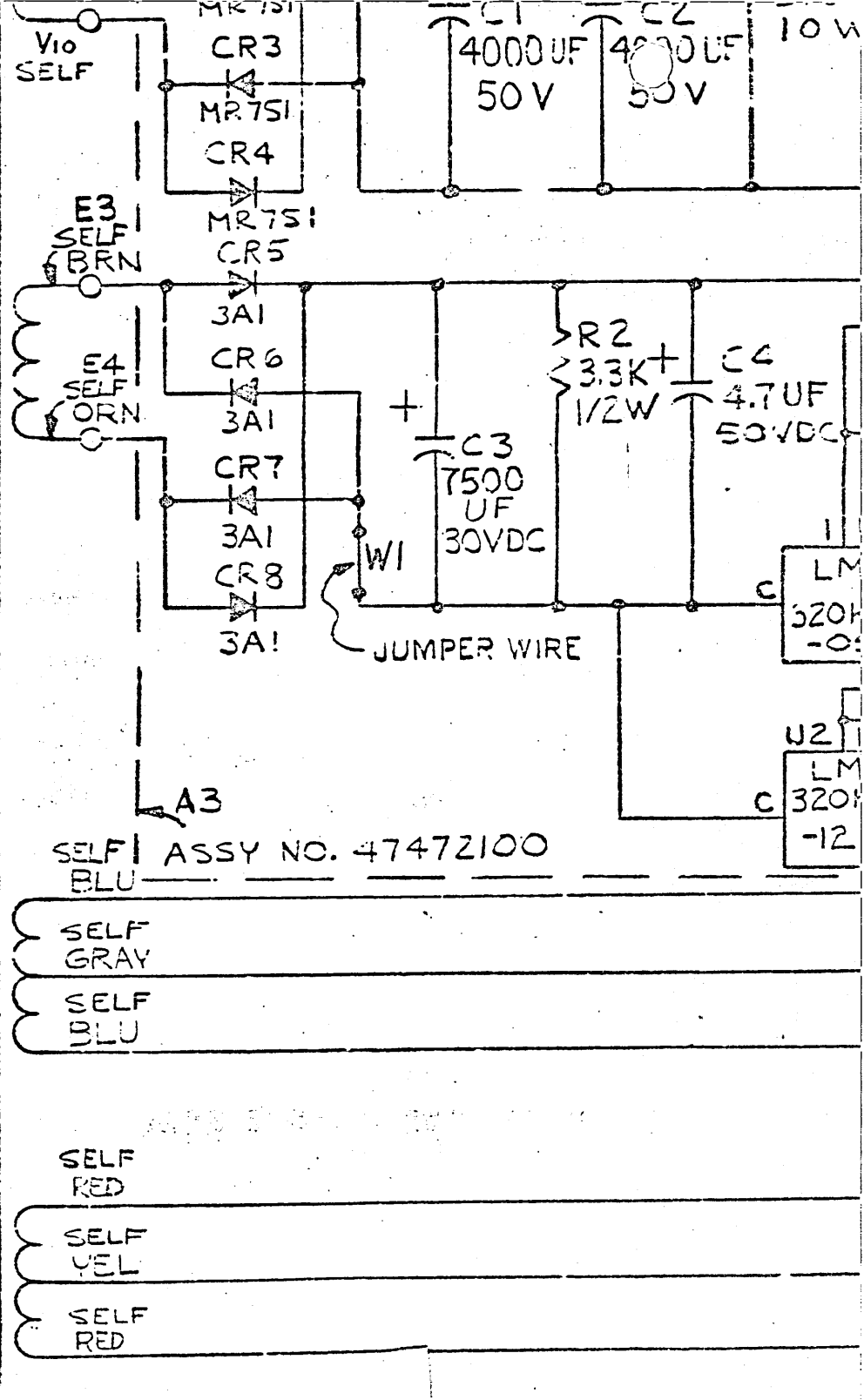

CAP REV
UNLD
HI SPD
FAULT
(OPTIONAL)
INHIBIT
CAP TACH
CAP FWD
CMD
PLUG STOP
LAST FWD
LAST REV
MOTION REPLY
WRITE
LCTT
CAPSTAN LOGIC
LOC-4
TYPE 5215
8C730600



REVISION RECORD					
REV	ECO	DESCRIPTION	DRFT	DATE	CHK'D APP
A	—	[illegible]	---	[illegible]	
B	82962	REV ZONE A 4	AL	5-13-82	
C	84426	CONNECT FLY TO E6	AL	8-20-82	

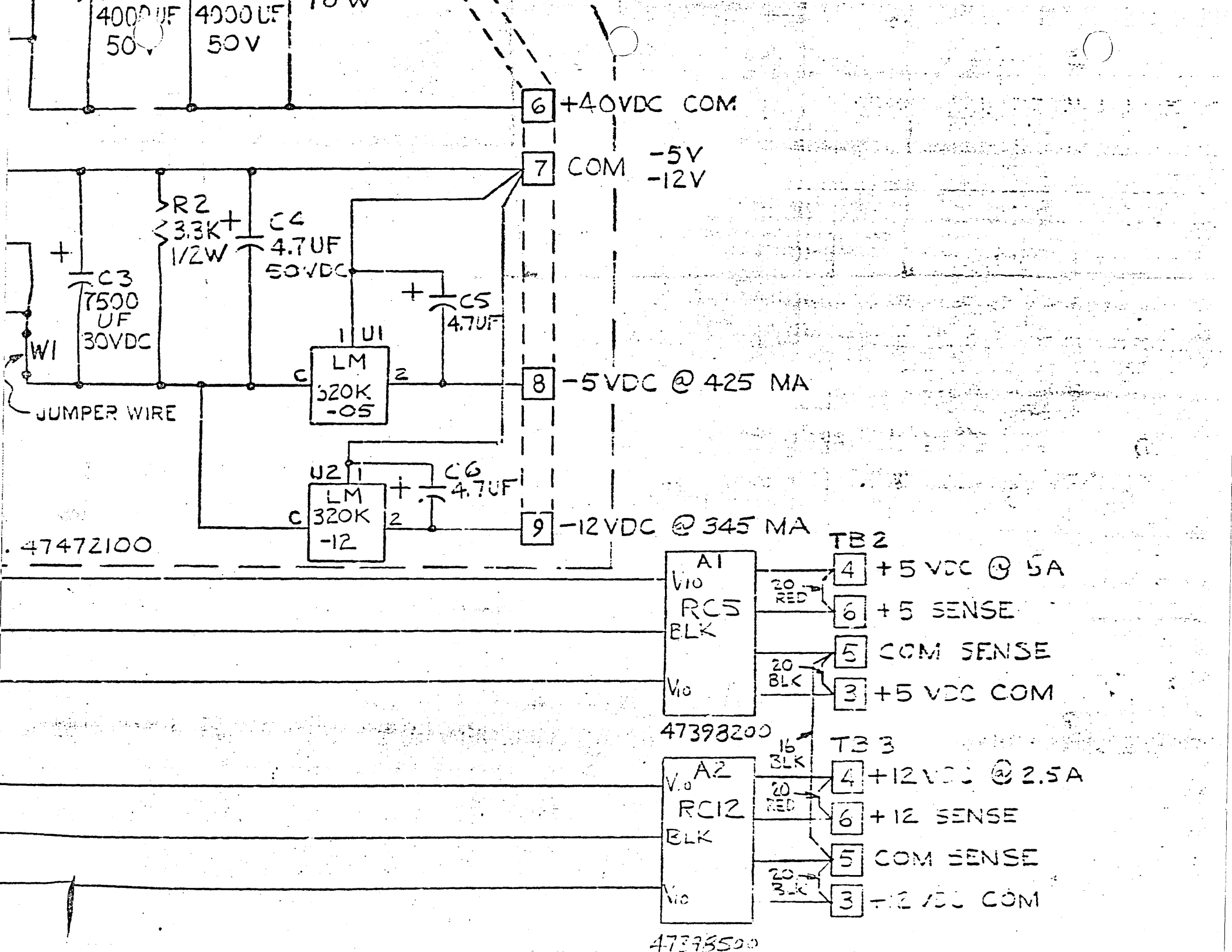
Voltage @	Curr.
UnReg 40	2A
Reg +5	.5A
Reg +12	2.5A
Reg -5	425mA
Reg -12	345mA

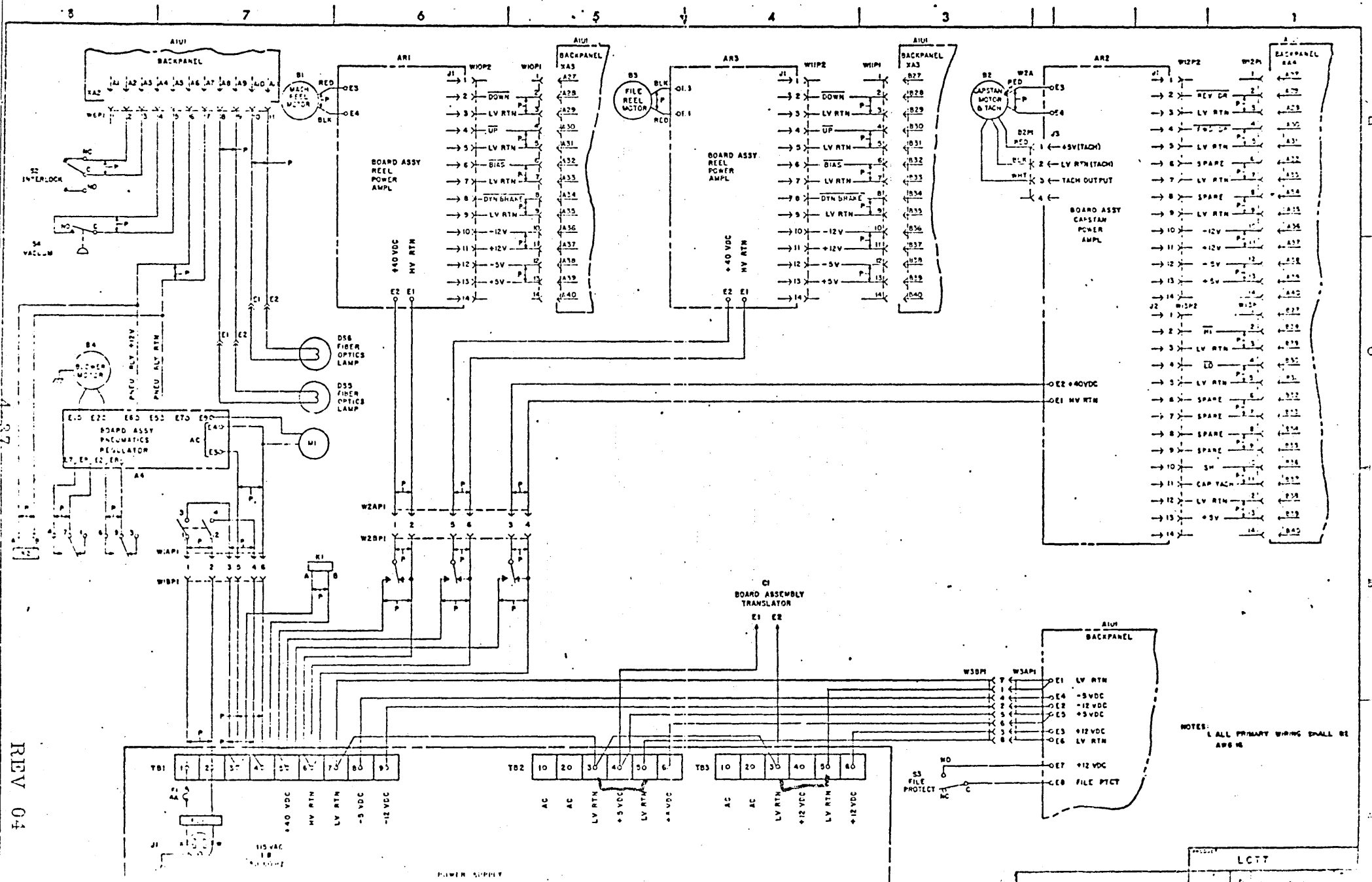

4 AMP FAST ACTING FUSE
#16 AWG ORN
J1
RROW BLADE
VIDE BLADE
ENTER STUD
SELF BLU
SELF BRN
SELF GRN
LINE FILTER
FL1
6207517
F1
E5
E6
E7
E8
INPUT :
115 VAC
50/60 HZ
BLK SELF
SELF BLK
E1
E2
E3
E4
CR1
MR751
CR2
CR3
CR4
CR5
3A1
CR6
CR7
CR8
C1
4000 UF
50 V
C2
4000 UF
50 V
R1
510Ω
10 W
R2
3.3K
1/2W
C4
4.7 UF
50 VDC
C3
7500
UF
30VDC
W1
JUMPER WIRE
U1
LM
320K
-05
U2
LM
320K
-12
A3
ASSY NO. 47472100



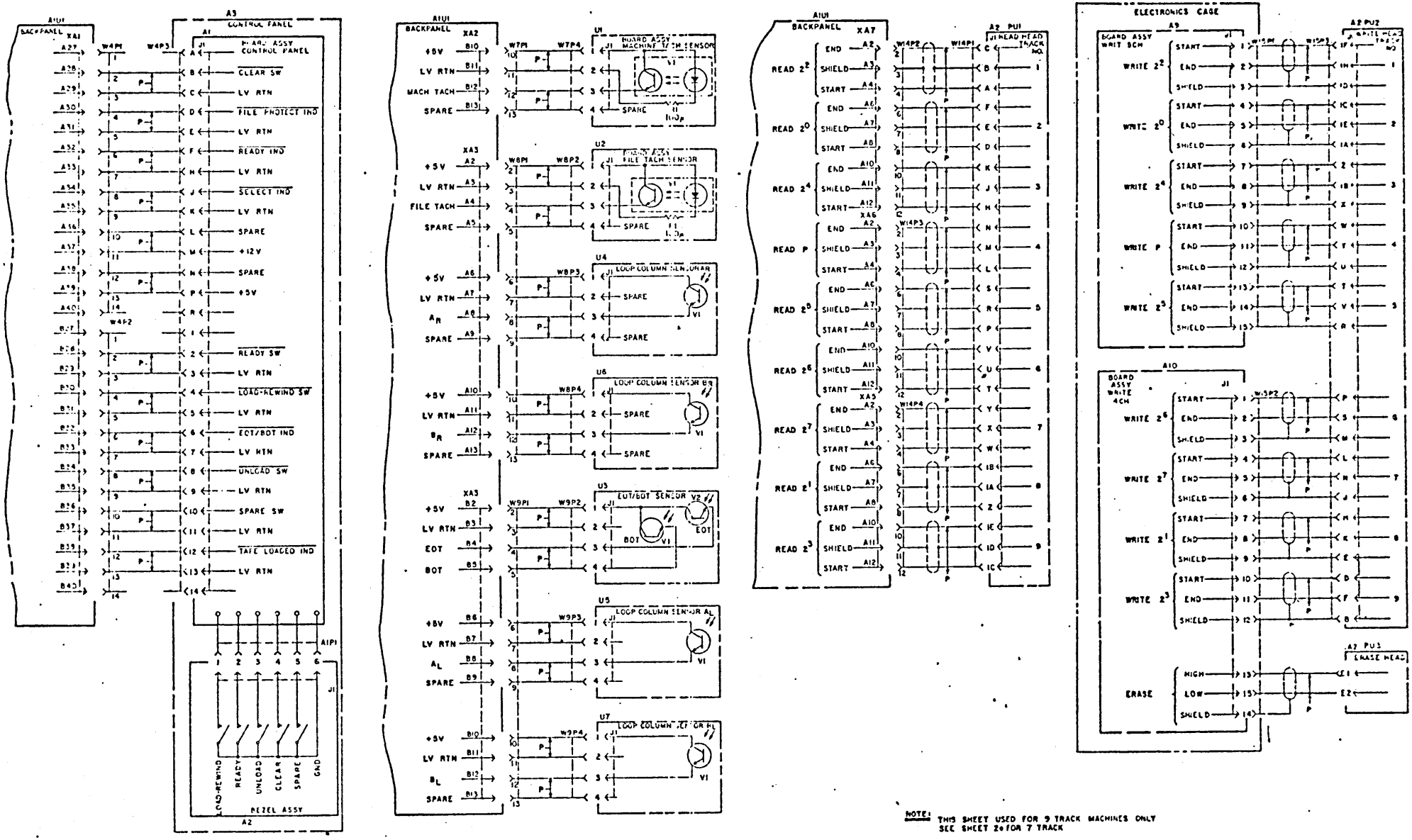
NOTE

1. ASSY NO. FOR THIS POWER SUPPLY IS 47454500.


4000 UF 50V
4000 UF 50V
6 +40VDC COM
7 COM -5V -12V
R2 3.3K 1/2W
C4 4.7UF 50VDC
C3 7500 UF 30VDC
C5 4.7UF
W1
JUMPER WIRE
U1 LM 320K -05
8 -5VDC @ 425 MA
U2 LM 320K -12
C6 4.7UF
9 -12VDC @ 345 MA
47472100
A1 RC5
47398200
TB2
4 +5 VDC @ 5A
6 +5 SENSE
5 COM SENSE
3 +5 VDC COM
A2 RC12
47398500
TB3
4 +12 VDC @ 2.5A
6 +12 SENSE
5 COM SENSE
3 +12 VDC COM

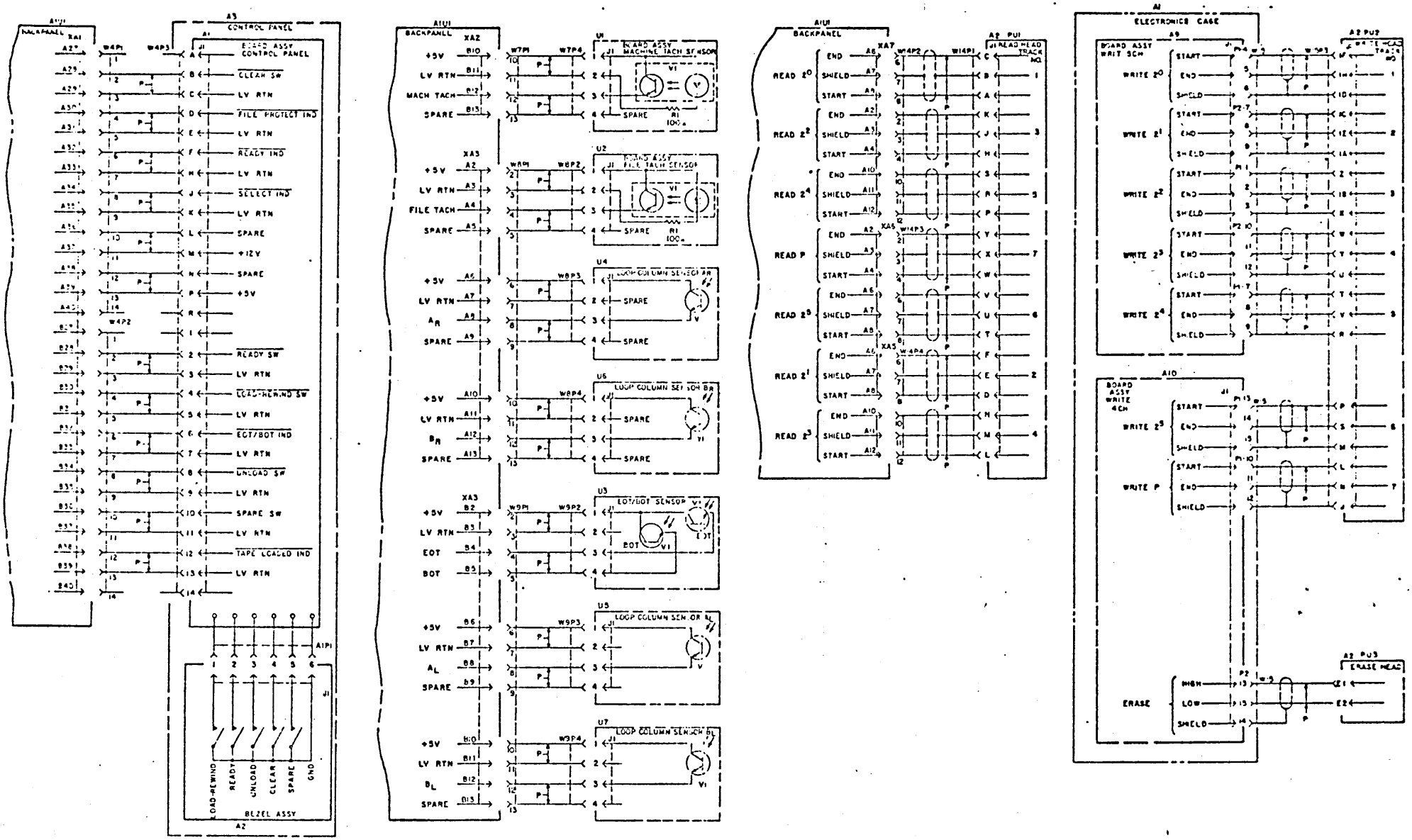

A1U1
BACKPANEL
XA1
XA2
XA3
XA4
XA5
XA6
XA7
XA8
XA9
XA10
XA11
W6P1
B1
MACH REEL MOTOR
RED
BLK
E3
E4
S2
INTERLOCK
S4
VACUUM
NC
NO
C
P
A1R1
BOARD ASSY
REEL
POWER
AMPL
W10P2
W10P1
J1
DOWN
LV RTN
UP
BIAS
DYN BRAKE
-12V
+12V
-5V
+5V
+40VDC
HV RTN
E2
E1
B3
FILE
REEL
MOTOR
BLK
RED
E1.3
E1.1
A1R3
W11P2
W11P1
B2
CAPSTAN
MOTOR
& TACH
W2A
W2M
J3
+5V(TACH)
LV RTN(TACH)
TACH OUTPUT
A1R2
BOARD ASSY
CAPSTAN
POWER
AMPL
W12P2
W12P1
REV CR
SPARE
SH
CAP TACH
B4
BLOWER MOTOR
PNEU +12V
PNEU RTN
DS6
FIBER
OPTICS
LAMP
DS5
FIBER
OPTICS
LAMP
C1
C2
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
E12
BOARD ASSY
PNEUMATICS
REGULATOR
A4
AC
M1
K1
W1AP1
W1BP1
W2AP1
W2BP1
C1
BOARD ASSEMBLY
TRANSLATOR
W3BM
W3AP1
E1 LV RTN
E4 -5VDC
E2 +12VDC
E5 +5VDC
E3 +12VDC
E6 LV RTN
E7 +12VDC
E8 FILE PTCT
S3
FILE
PROTECT
NO
NC
C
TB1
TB2
TB3
J1
F1
A1
115 VAC
+40 VDC
HV RTN
LV RTN
-5 VDC
-12 VDC
AC
POWER SUPPLY
NOTES:
1. ALL PRIMARY WIRING SHALL BE AWG 16
LCTT
POWER DISTRIBUTION

REV 04



NOTE: THIS SHEET USED FOR 9 TRACK MACHINES ONLY
SEE SHEET 26 FOR 7 TRACK

CONTROL & READ/WRITE	LCTT		
	05875	D	RELEASED



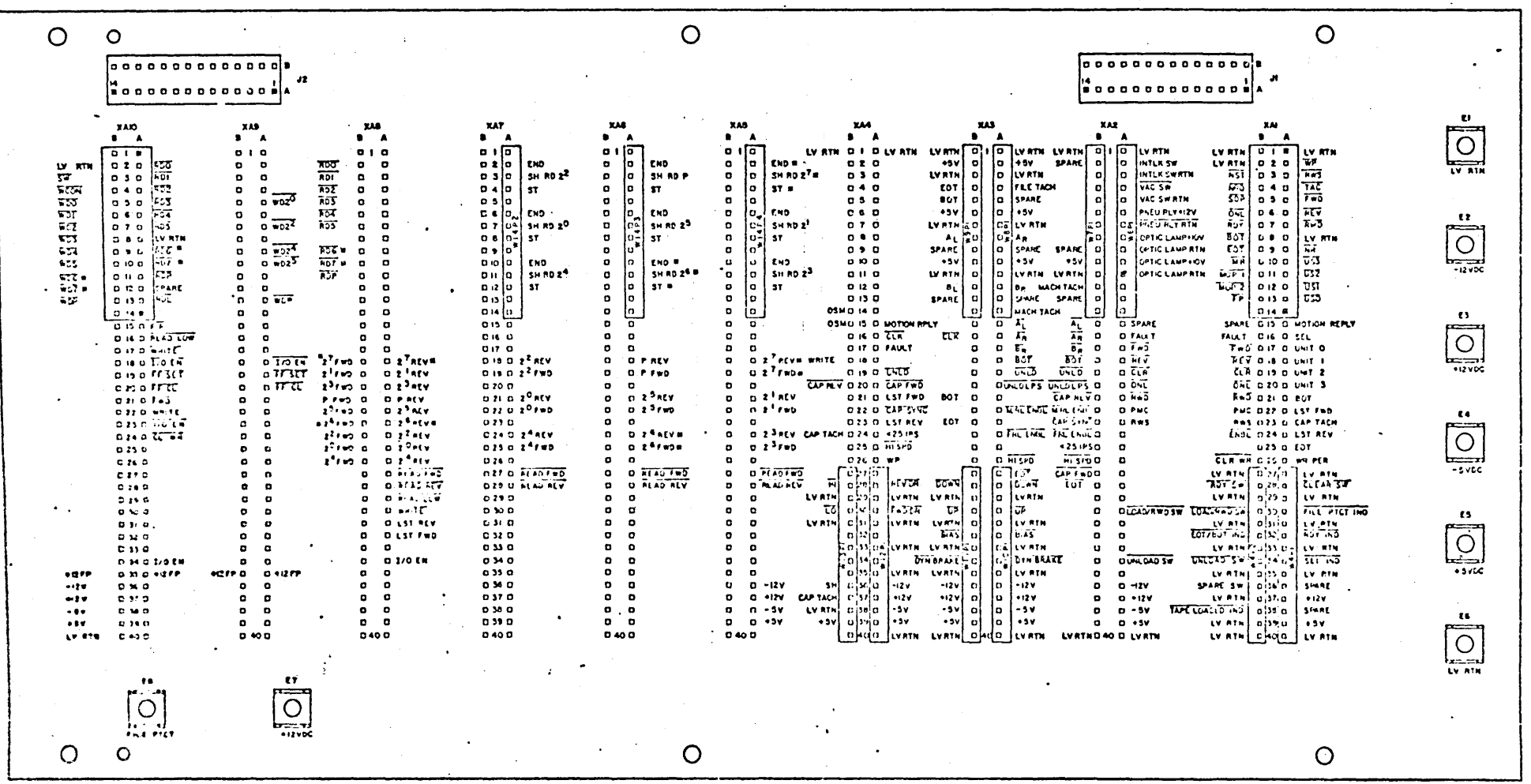
NOTE: THIS SHEET USED FOR 7 TRACK MACHINES ONLY SEE SHEET 2 FOR 9 TRACK

LCTT

CONTROL PCA READ/WRITE

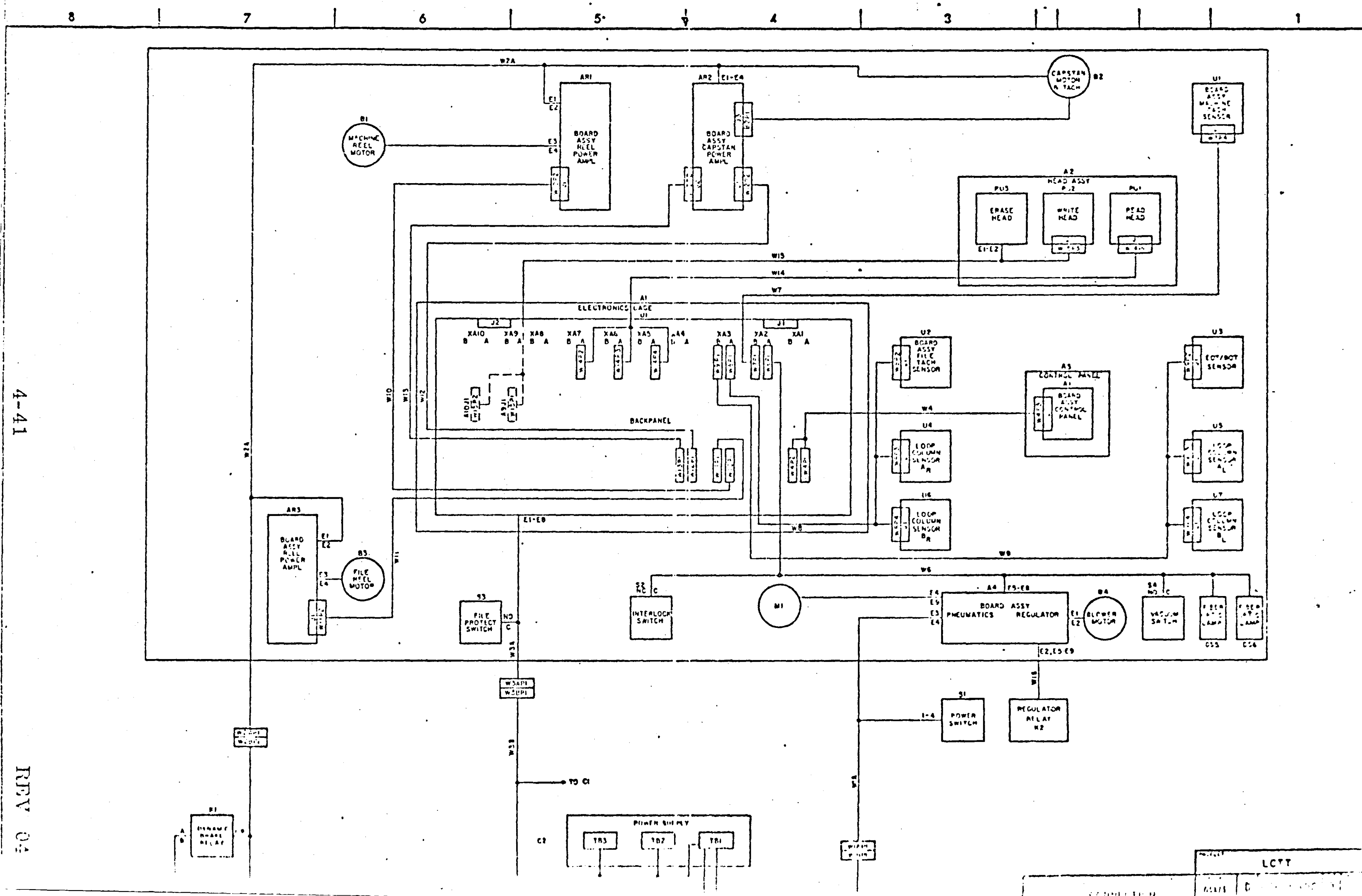
4-39

REV C

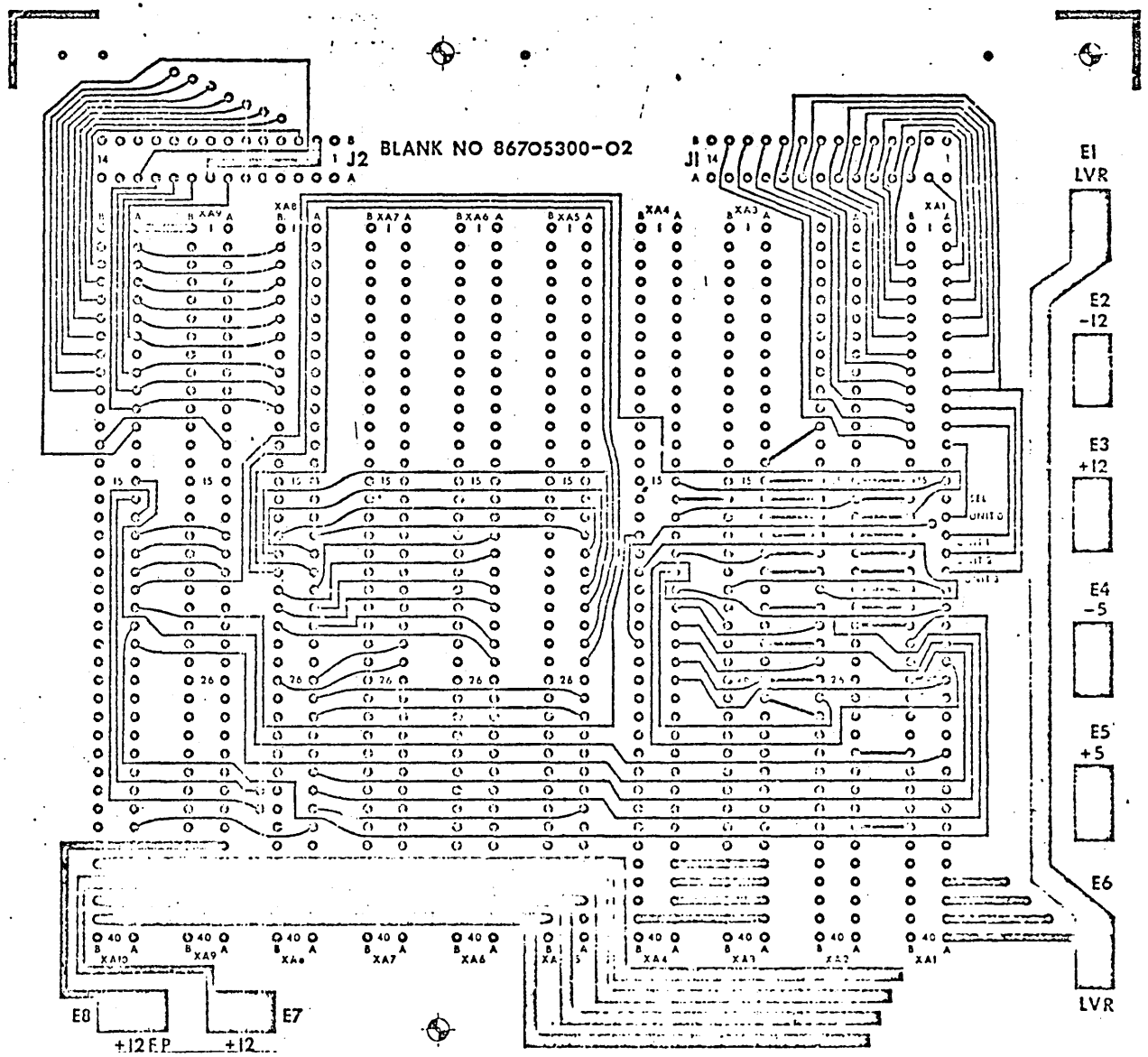


NOTE: # NOT USED ON 7 TRACK MACHINES

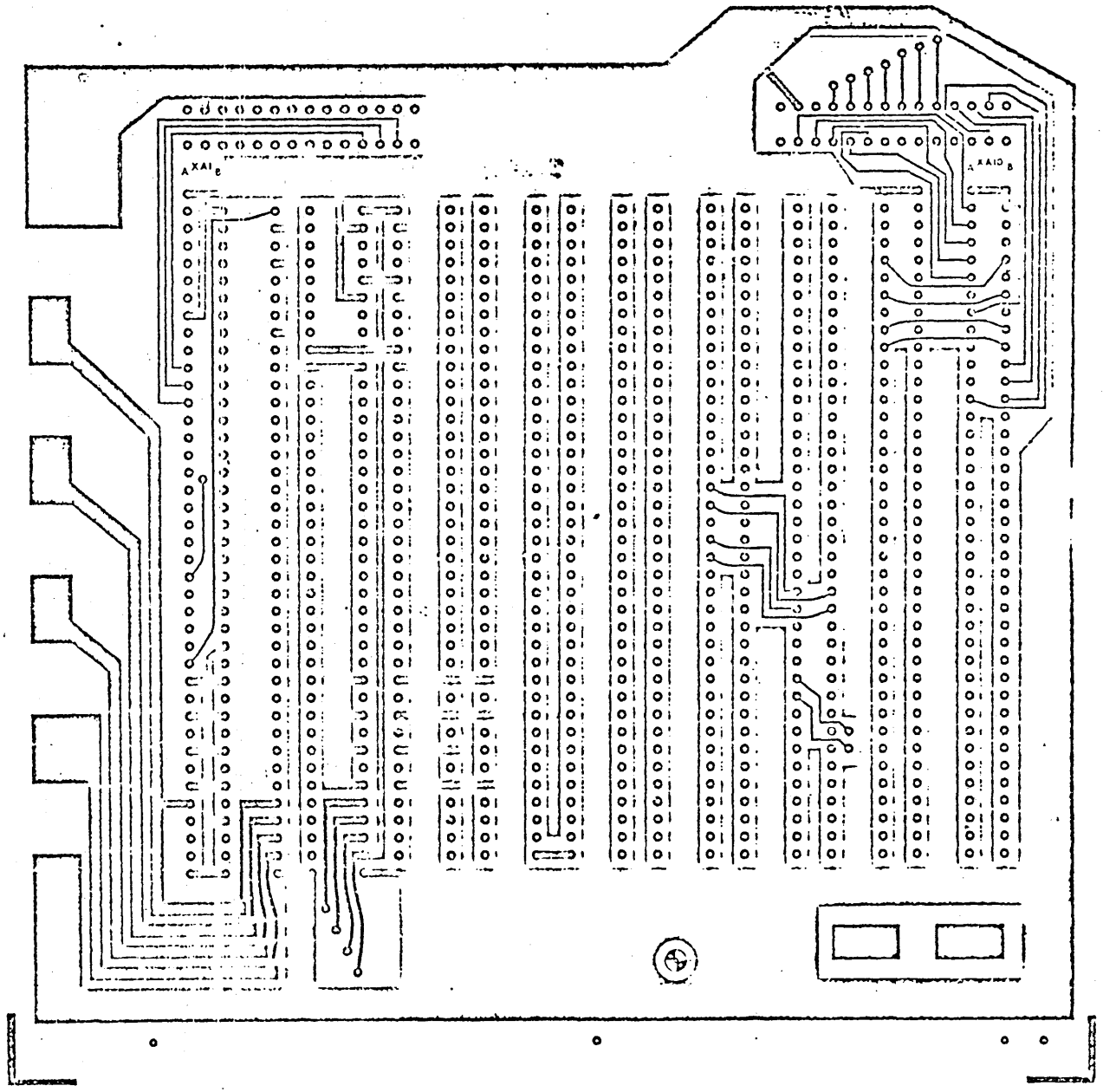
LCTT



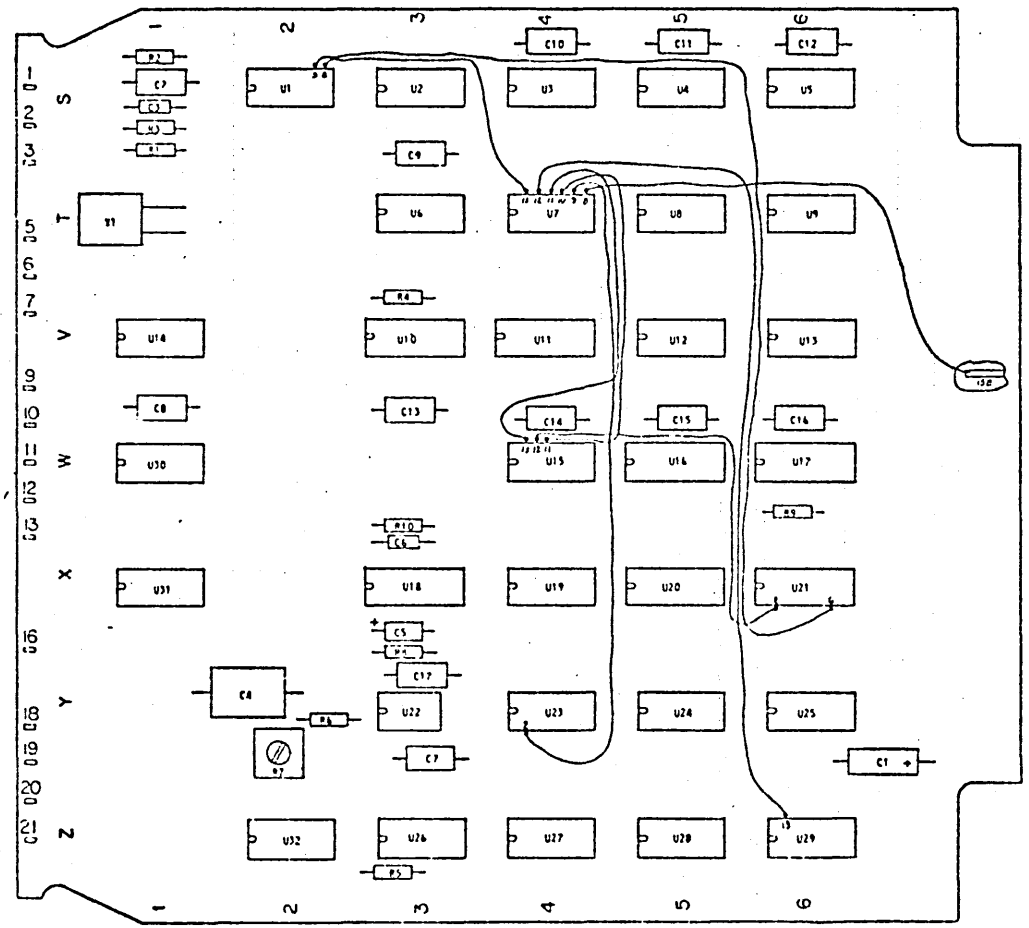
CAPSTAN MOTOR & TACH
B2
BOARD ASSY CAPSTAN POWER AMPL
AR1
AR2
BOARD ASSY REEL POWER AMPL
MACHINE REEL MOTOR
B1
BOARD ASSY MACHINE TACH SENSOR
U1
HEAD ASSY
A2
ERASE HEAD
WRITE HEAD
READ HEAD
ELECTRONICS CAGE
A1
BACKPANEL
BOARD ASSY FILE TACH SENSOR
U2
CONTROL PANEL
A3
BOARD ASSY CONTROL PANEL
EOT/BOT SENSOR
U3
LOOP COLUMN SENSOR
U4
U5
U6
U7
BOARD ASSY REEL POWER AMPL
AR3
FILE REEL MOTOR
B3
FILE PROTECT SWITCH
S3
INTERLOCK SWITCH
M1
BOARD ASSY PNEUMATICS REGULATOR
A4
BLOWER MOTOR
B4
VACUUM SWITCH
S4
POWER SWITCH
S1
REGULATOR RELAY K2
TO C1
POWER SUPPLY
TB3
TB2
TB1
C2
DYNAMIC BRAKE RELAY
K1
LCTT



Back Plane Printed Wiring Board (Sheet 1)



Back Plane Printed Wiring Board (Sheet 2)



MFG REV	ECO	SHEET REVISION STATUS	REVISION RECORD				
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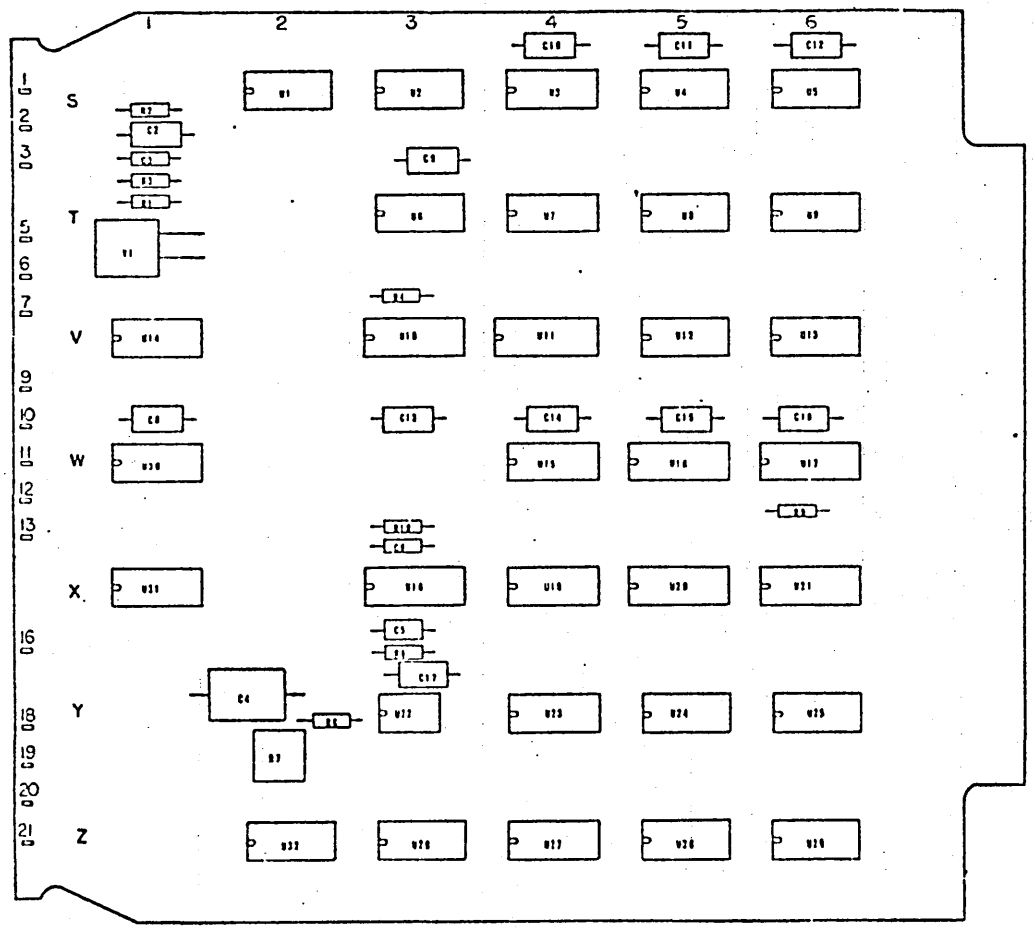
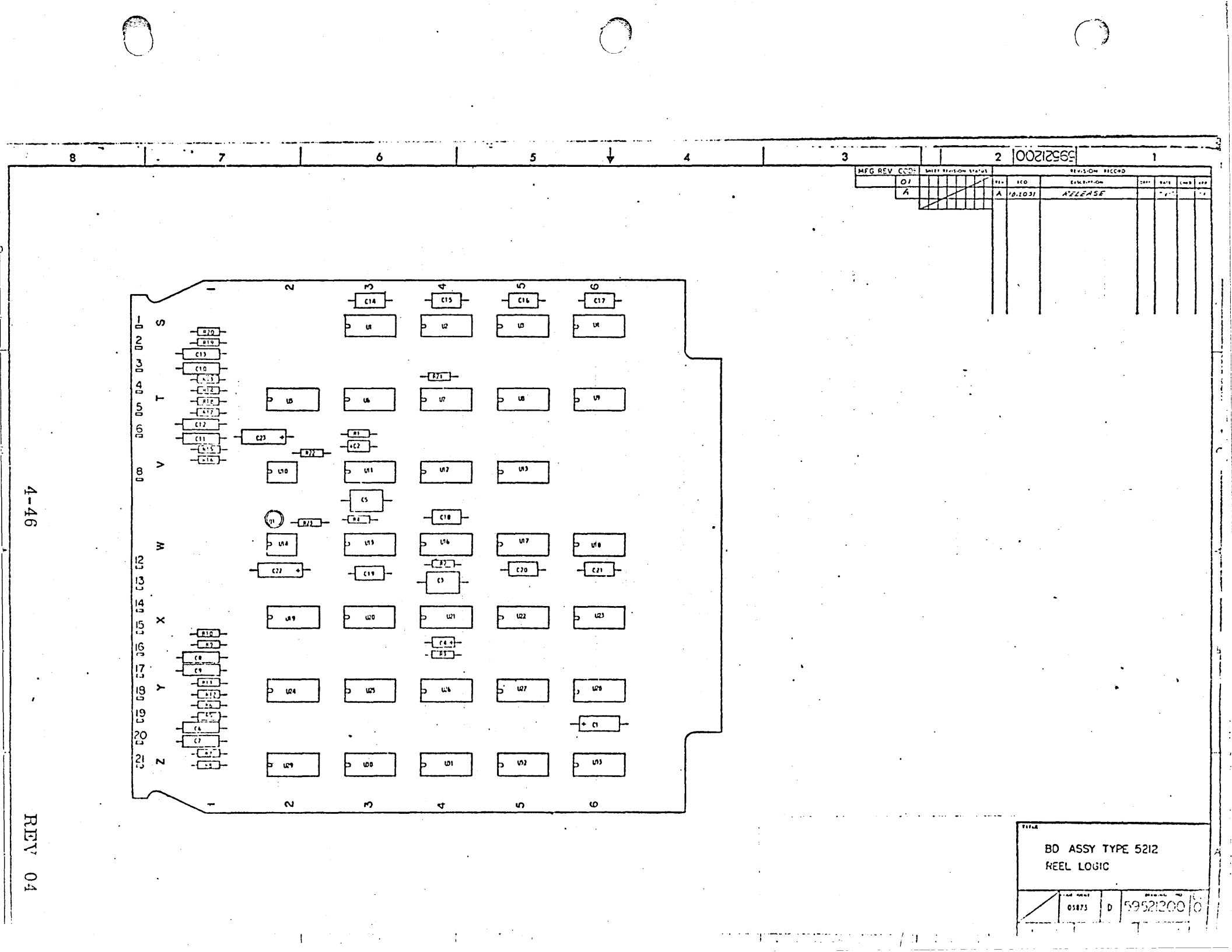
	A		A	[illegible]	RELEASE		

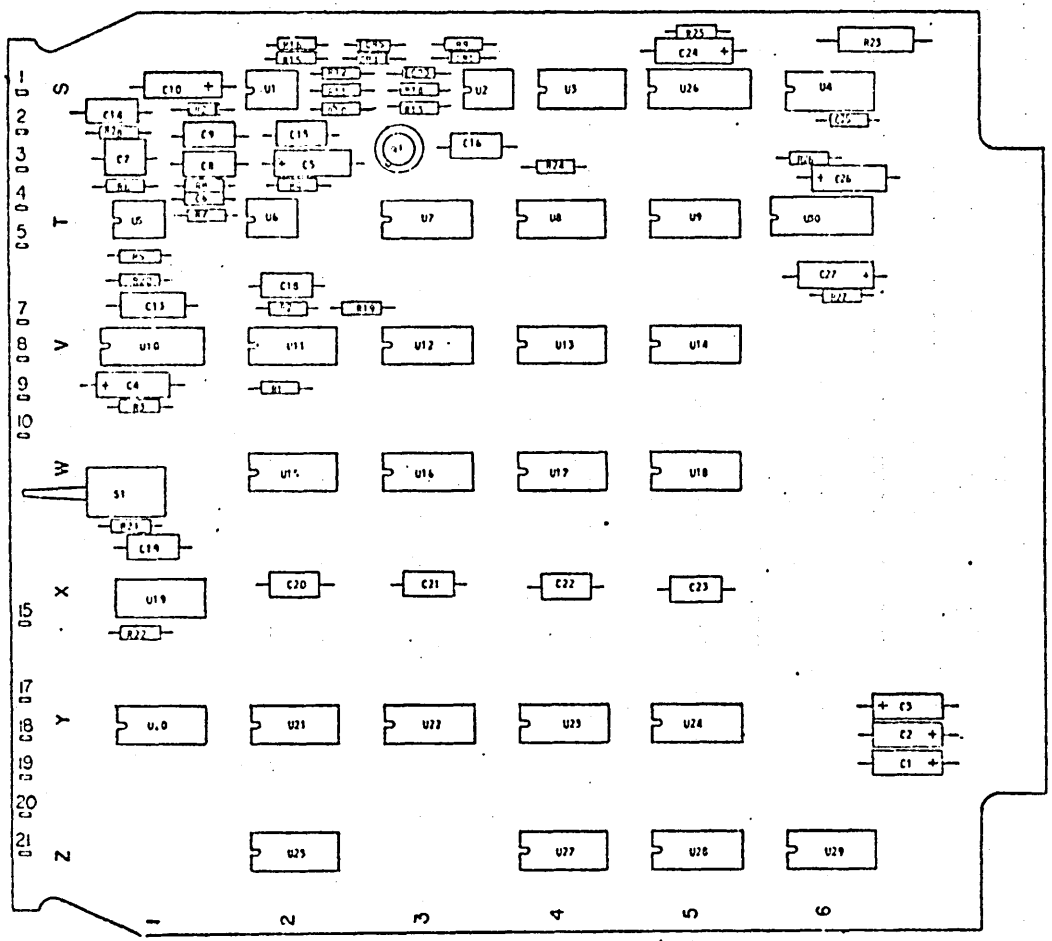
BD ASSY TYPE 5242
CAPSTAN LOGIC

C1875 D



BD ASSY TYPE 5215
CAPSTAN 25,7,N


8
7
6
5
4
3
2
1
59521200
MFG REV CODE
SHEET REVISION STATUS
REVISION RECORD
01
A
REV
ECO
DESCRIPTION
DATE
A
18.1031
RELEASE
BD ASSY TYPE 5212
REEL LOGIC
03873
D
59521200
0



MFG REV	CODE
	C1
	A
	A

REVISION RECORD					
	ECO	DESCRIPTION	DATE	BY	CHK	APP
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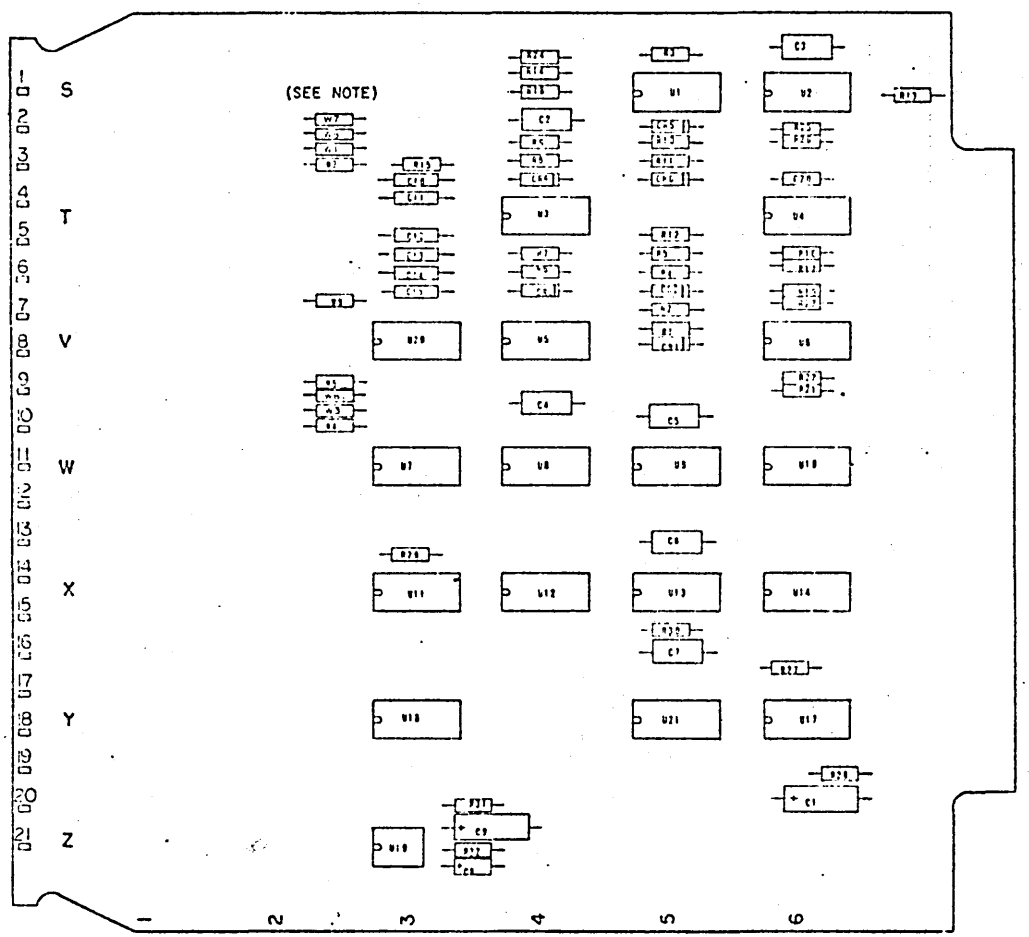
	812331	P.C. CHANGE ONLY	[illegible]	[illegible]	[illegible]	[illegible]

3D ASSY TYPE 5210
CONTROL LOGIC

	05875	D	5952100



NOTE: SEE LOGIC DIAGRAM 86736000, SHEET 2
FOR W1 THROUGH W9 USE.

MFG TAB STATUS

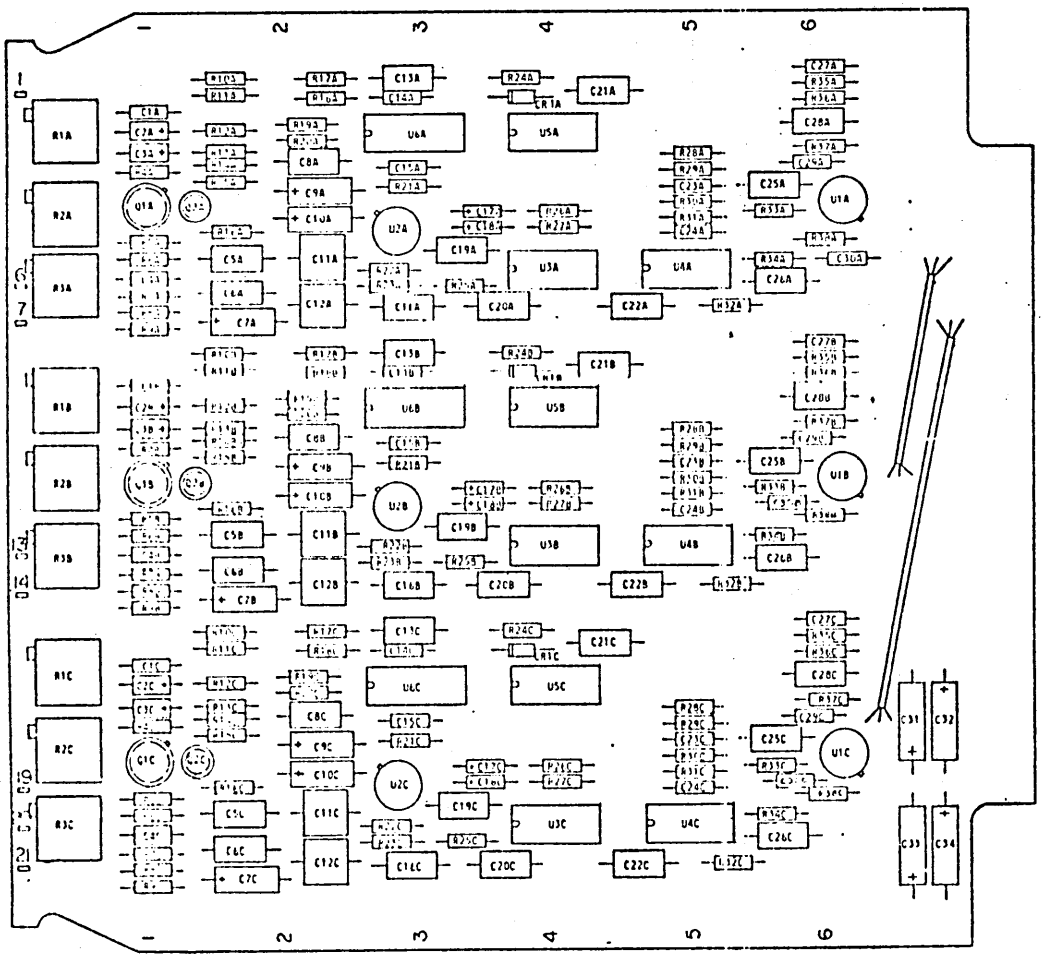
SHEET REVISION STATUS

REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP
D1						

BD ASSY UNIVERSAL
I/O LOGIC

05875 D

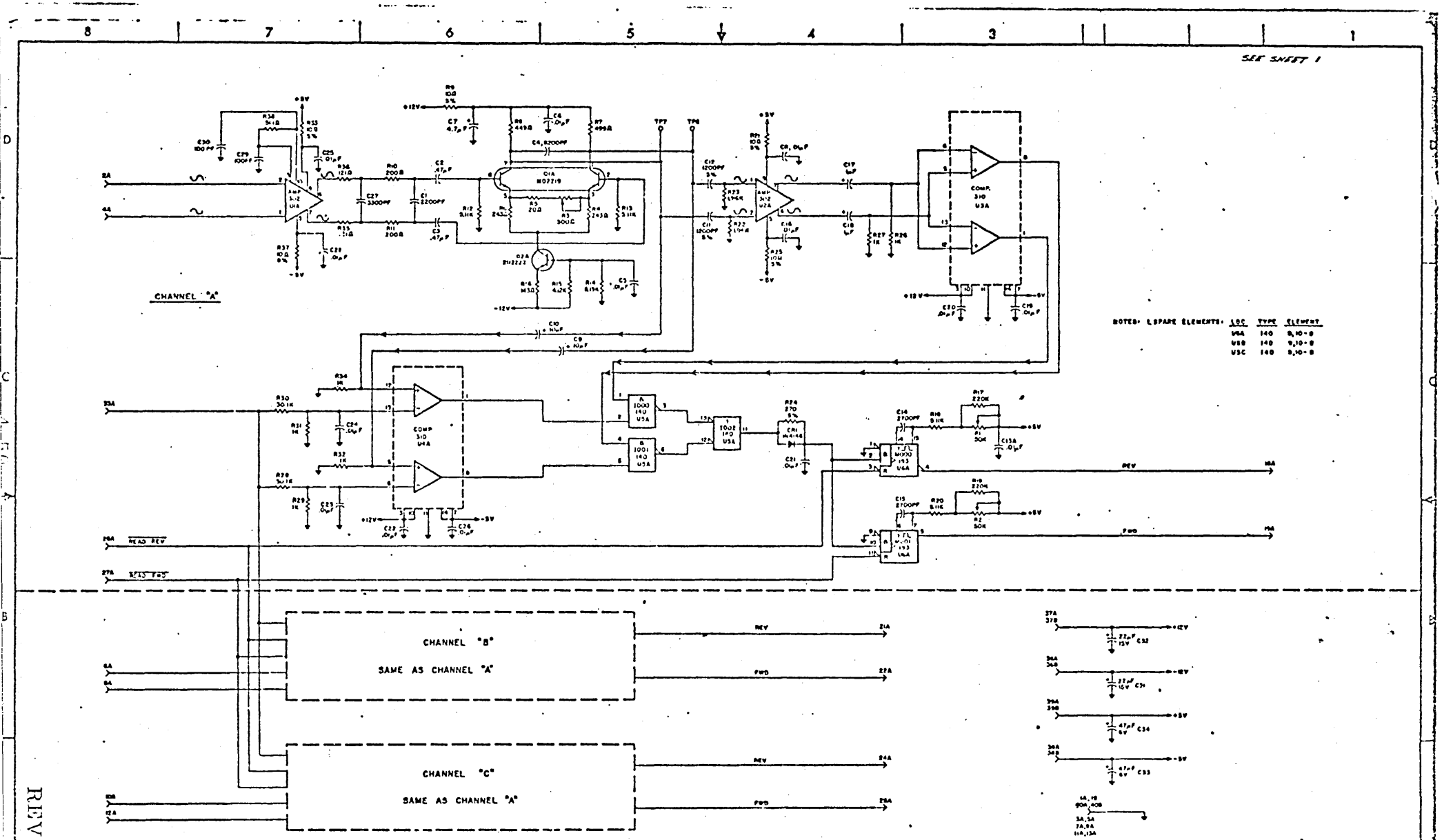


MFG REV	CODE
	A
	B
	A

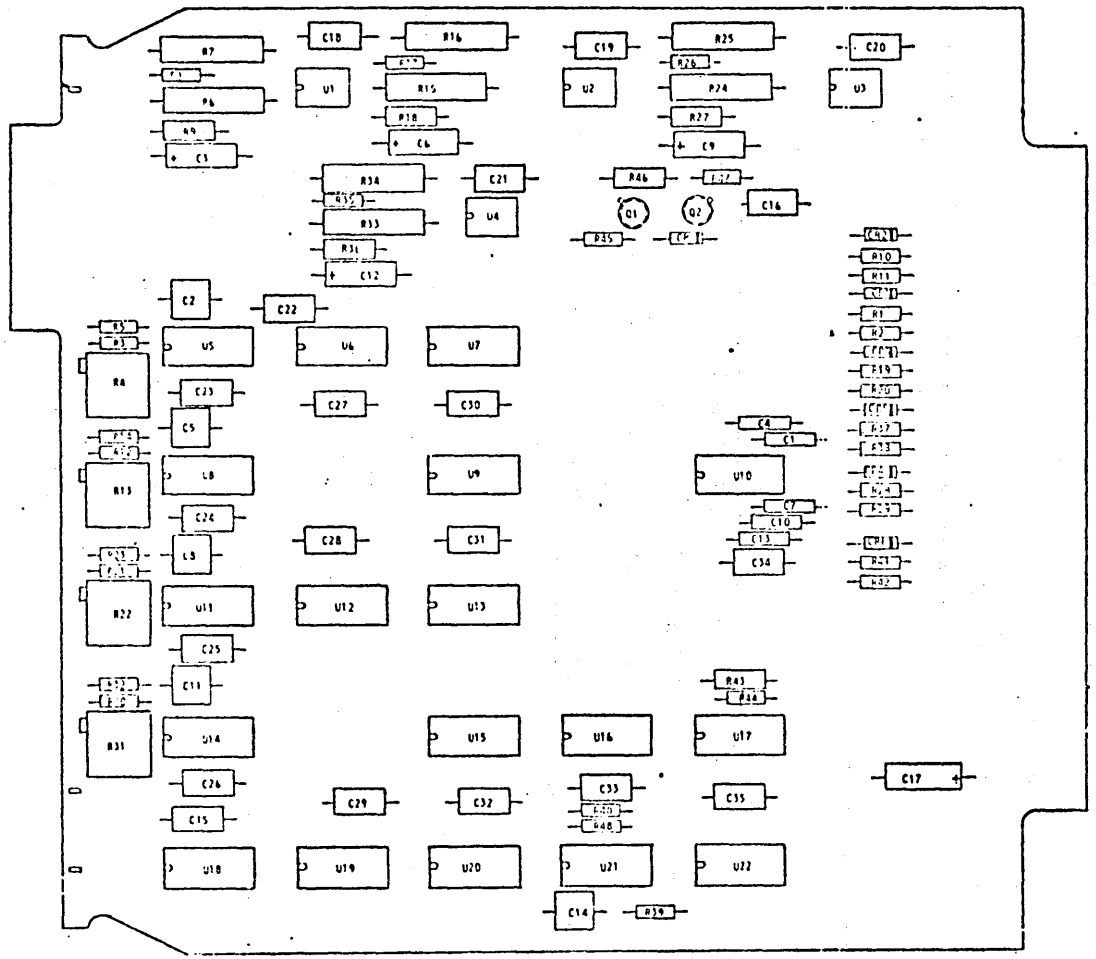
REV	ECO	DESCRIPTION	SHEET	DATE	BY	APP'D
A						
B						
A						

PCB ASSY TYPE 4532
READ RECOVERY-NRZI

	CAGE NUMBER 05875	D

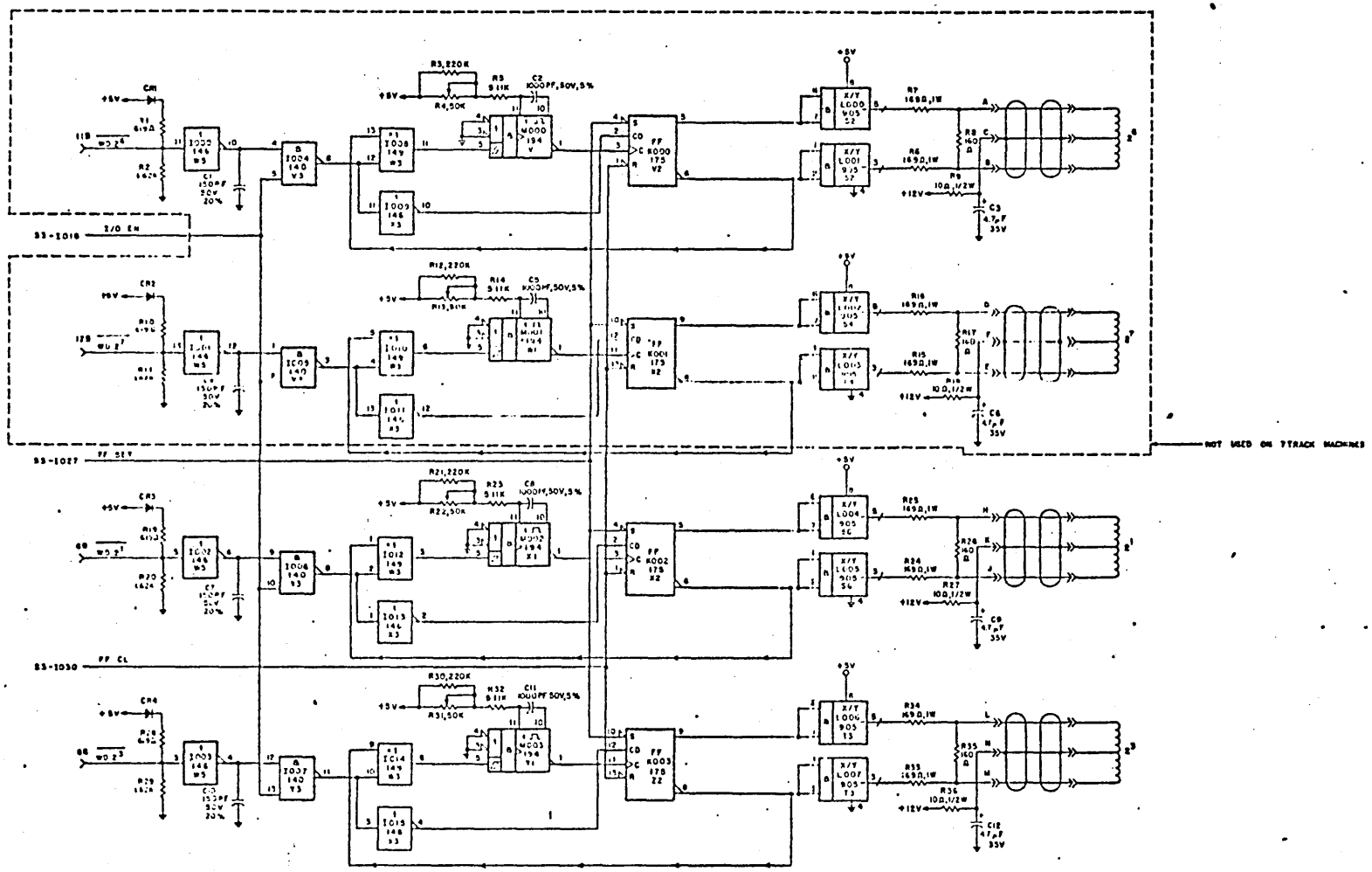

SEE SHEET 1
CHANNEL "A"
CHANNEL "B"
SAME AS CHANNEL "A"
CHANNEL "C"
SAME AS CHANNEL "A"
READ REV
READ FWD
REV
FWD
NOTES: 1. SPARE ELEMENTS:
LOC TYPE ELEMENT
U6A 140 9,10-8
U6B 140 9,10-8
U6C 140 9,10-8
LCTT
NRZI READ RECOVERY

REV 04



PRINTED WIRING BOARD
4 CHANNEL WRITE DRIVER

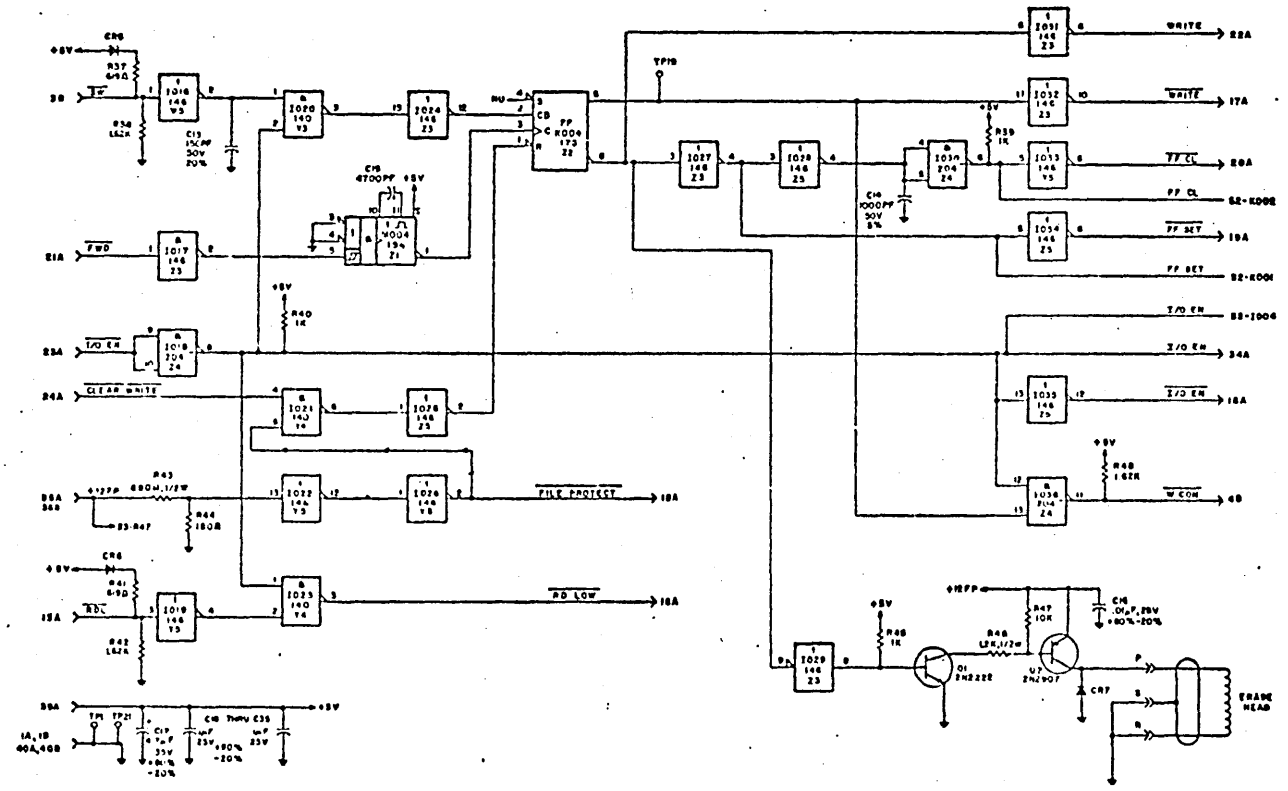
C1275 D



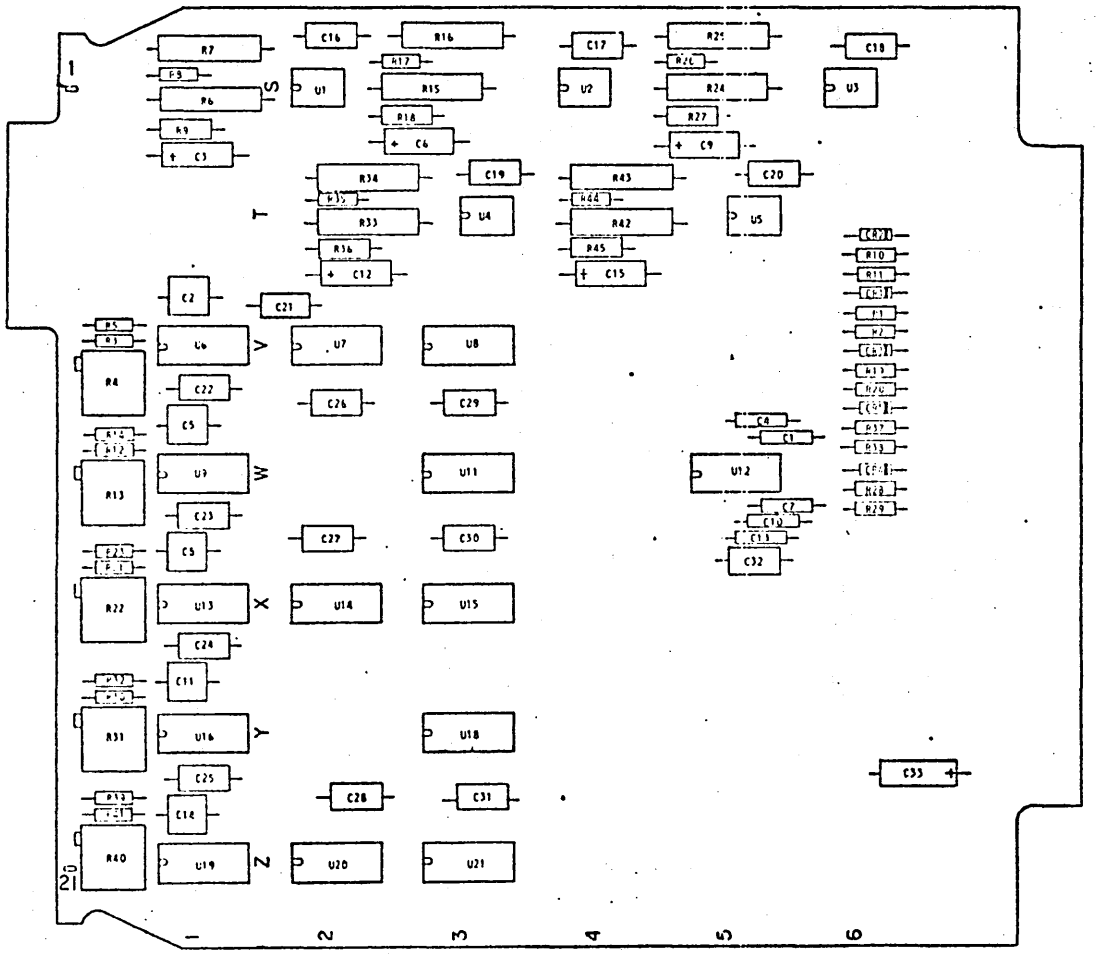
NOTES:
1. ALL DIODES ARE IN4148 UNLESS OTHERWISE STATED.
2. SPARE ELEMENTS:

LOC	TYPE	ELEMENT
W5	146	9-8
X3	146	5-6/9-8
Y5	146	9-8/11-10
Z5	146	9-8/11-10
V3	140	9,10-8/12,13-11
Y3	140	4,5-6
X4	140	9,10-8/12,13-11
Z4	140	1-2-3
V2	175	[illegible] 8,9

4 CHANNEL WHITE ENTER	C1273	D	50473450


WRITE
WRITE
FF CL
FF CL
FF SET
FF SET
I/O EN
I/O EN
I/O EN
W CON
CLEAR WRITE
FILE PROTECT
RD LOW
FWD
RDC
TP19
+8V
+HPP
CR6
CR7
Q1 2N2222
Q2 2N2907
FRAME HEAD
4 CHANNEL

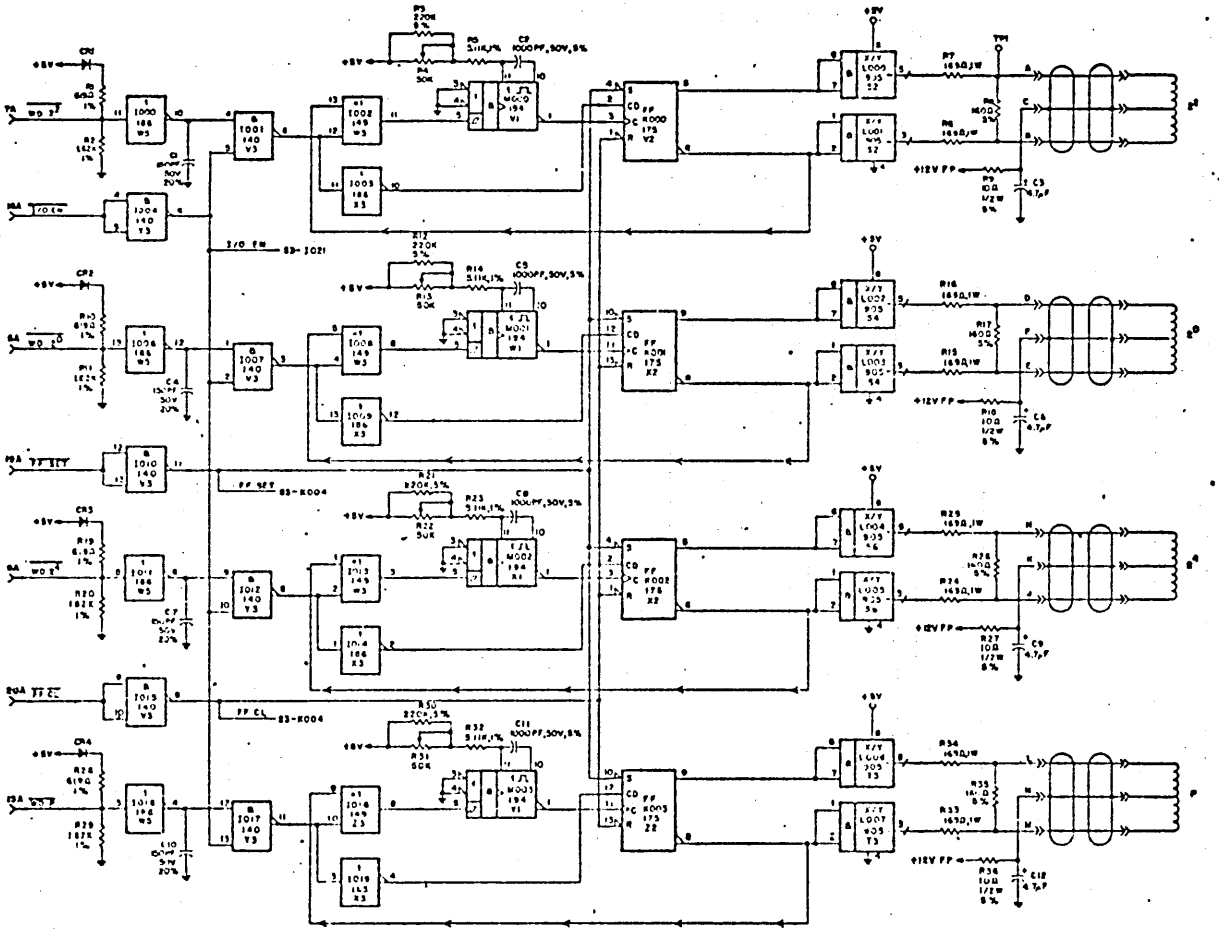
REV 04



MFG REVCODE	THREE REVISION STATUS	REVISION RECORD
01		
A		
A		
A		

BD ASSY TYPE 4735
5 CHANNEL WRITE DRIVER

05875 D



NOTES:
1. ALL DIODES ARE 1N4148 UNLESS NOTED OTHERWISE
2. SPARE ELEMENTS:

LOC	TYPE	ELEMENT
W8	188	9-8
X3	186	9-8
W3	140	9,10-8
Z5	140	4,9-8/12,13-11
V2	175	10,12,11,13 8,6

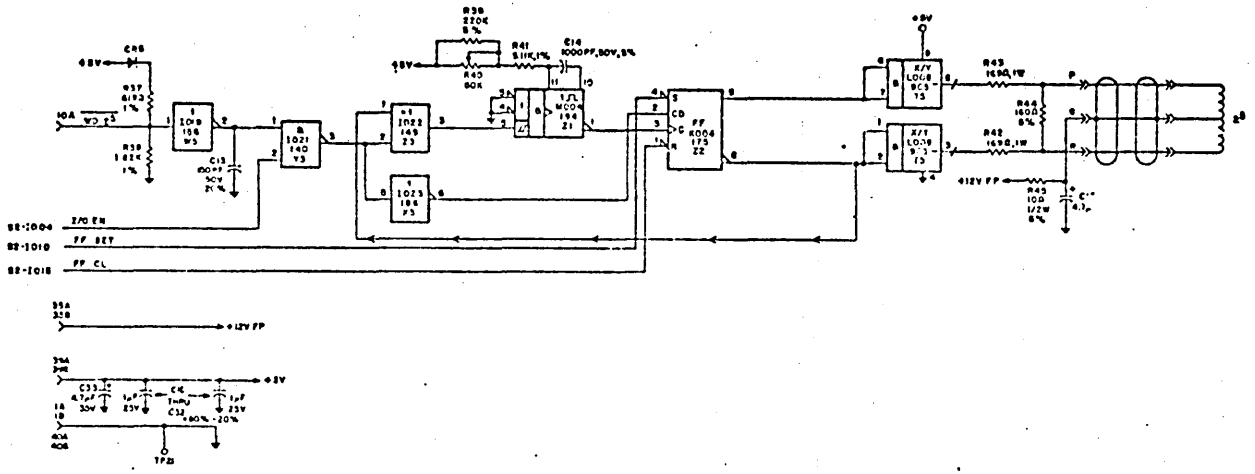
REVISION RECORD

REV	ECO	DESCRIPTION	DRFT	DATE	CHKD	APP

SEE SHEET 1

5 CHANNEL WRITE DRIVER	81875	D	99473500

REV 04



REV 04

REVISION RECORD						
REV	ECO	DESCRIPTION	SHEET	DATE	CHKD	APP

SEE SHEET 1

5 CHANNEL WHITE DRIVER	01875	D	5947500

MFG TAB STATUS	SHEET REVISION STATUS	REVISION RECORD					
		REV	ECO	DESCRIPTION	DRN	DATE	CHKD	APP'D
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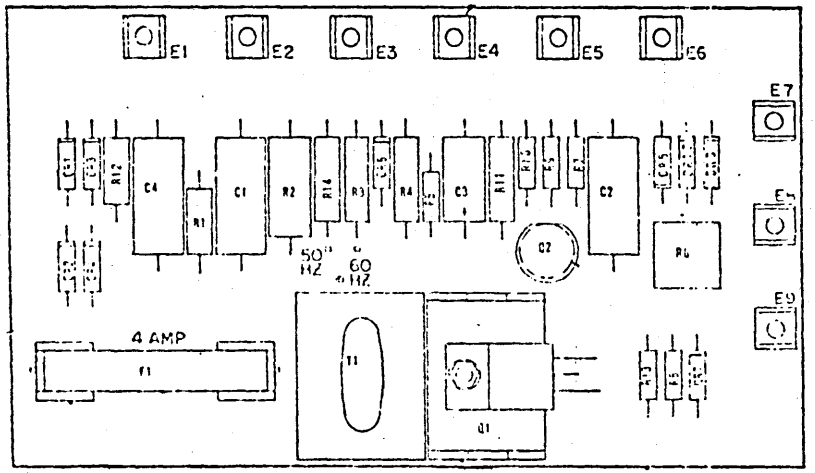
A								



NOTE:
1. TRANSFORMER MAY BE ORIENTED EITHER WAY.

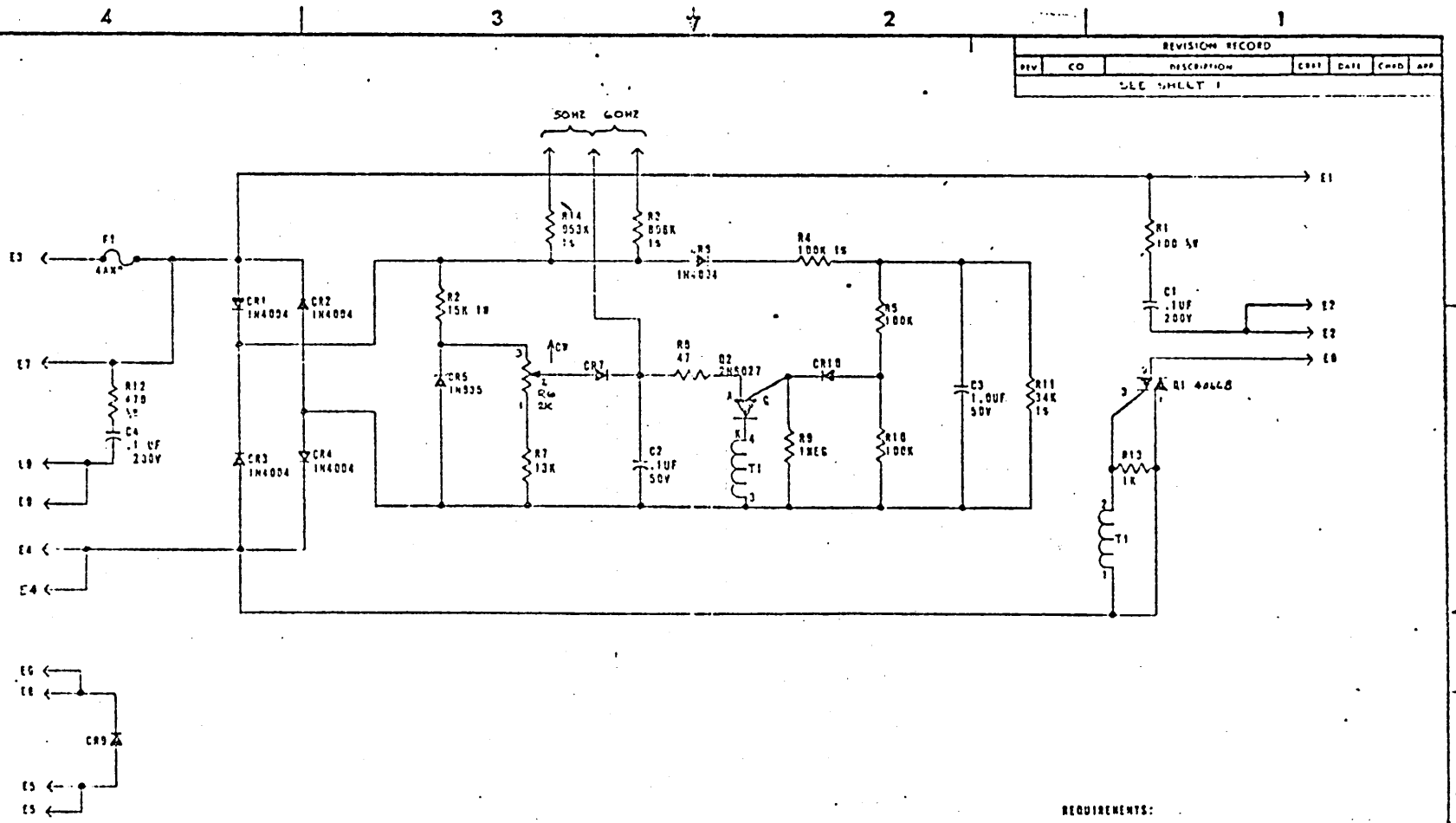
TITLE

BD ASSY TYPE 4940
PNEUMATIC REGULATOR

CODE IDENT		DRAWING NO
05875	C	E-4940000

E-4940000

REV. C4

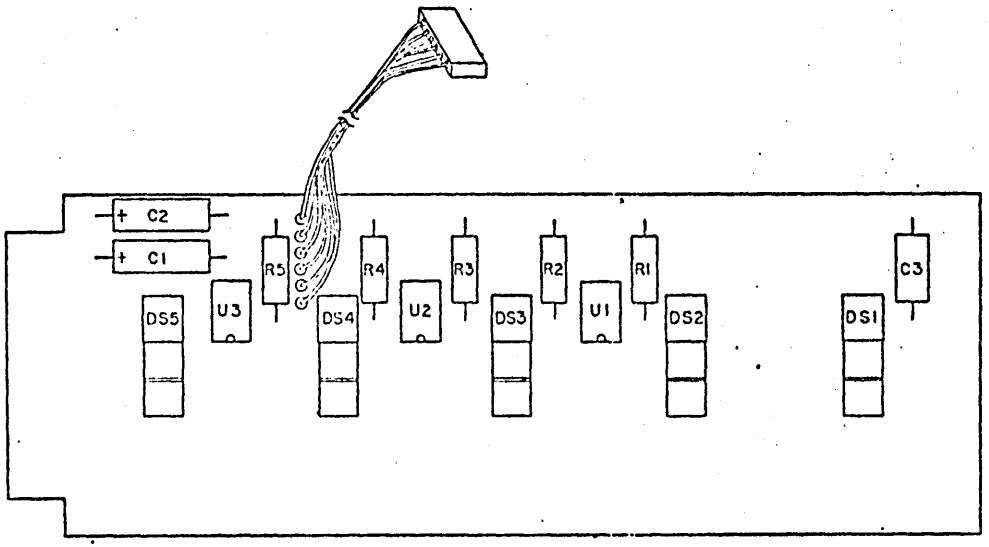


REQUIREMENTS:

1. UNLESS OTHERWISED SPECIFIED, ALL RESISTORS ARE 1/4 W 5%. ALL DIODES ARE 1N4148.

BD ASSY TYPE 4940 PNEUMATIC REGULATOR	05075	C	5939400

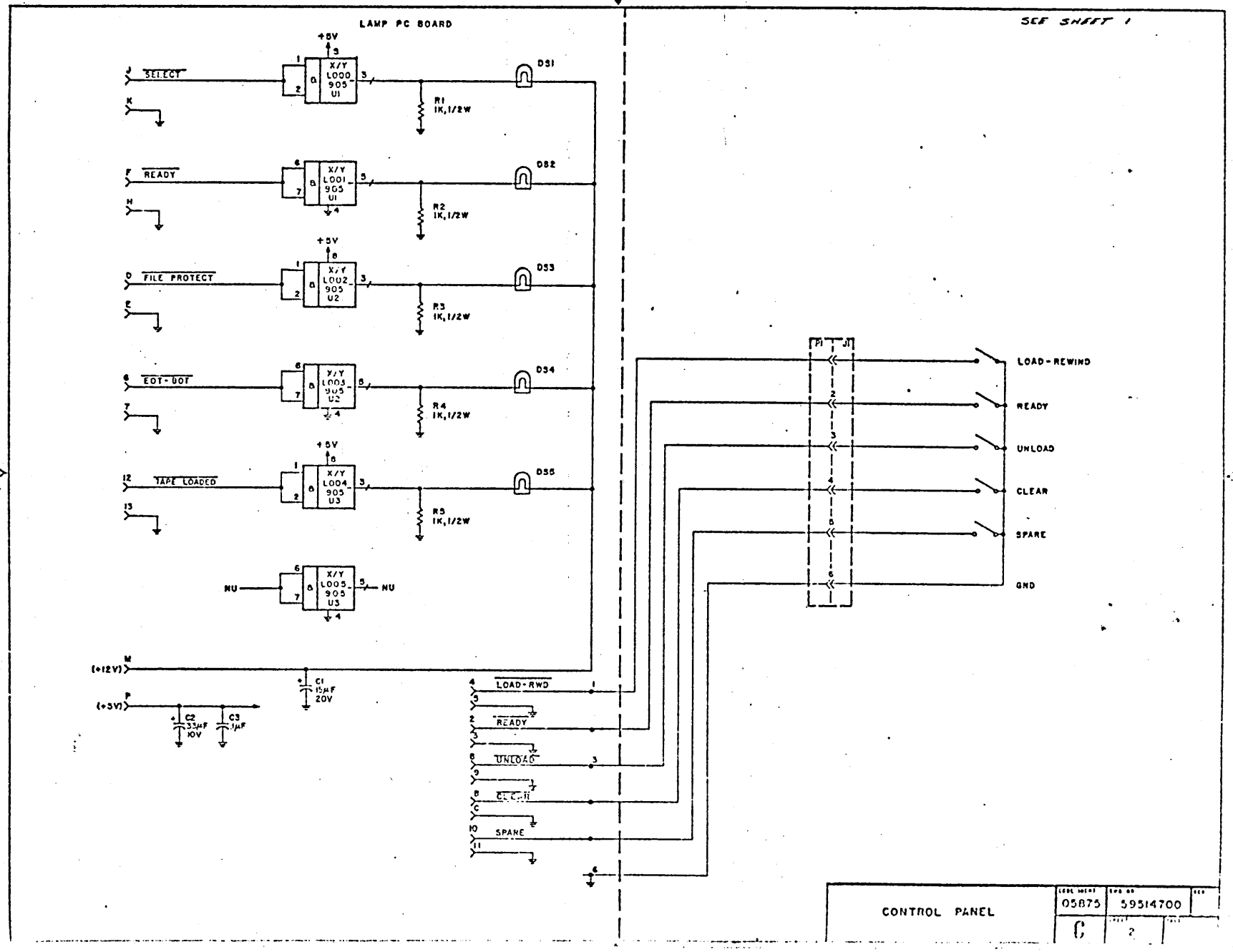
MFG REV	CODE	SHEET REVISION STATUS	REVISION RECORD					
	01	12	REV	ECO	DESCRIPTION	CHKD	APP
	A	A	A	531310	RELEASE		
	A	B	B	531552	SEE LDT		

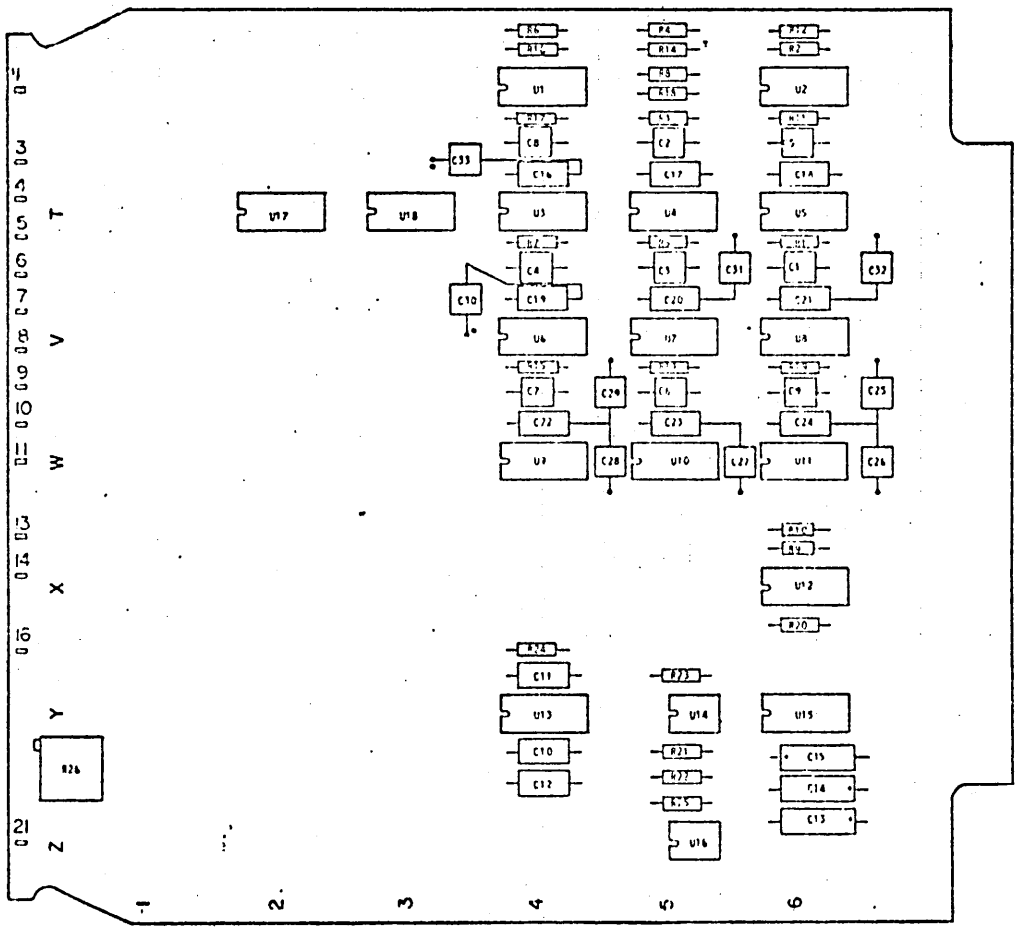


TITLE

BD ASSY TYPE 5147
CONTROL PANEL

CODE IDENT		DRAWING NO	CD
05875	C	59514700	1

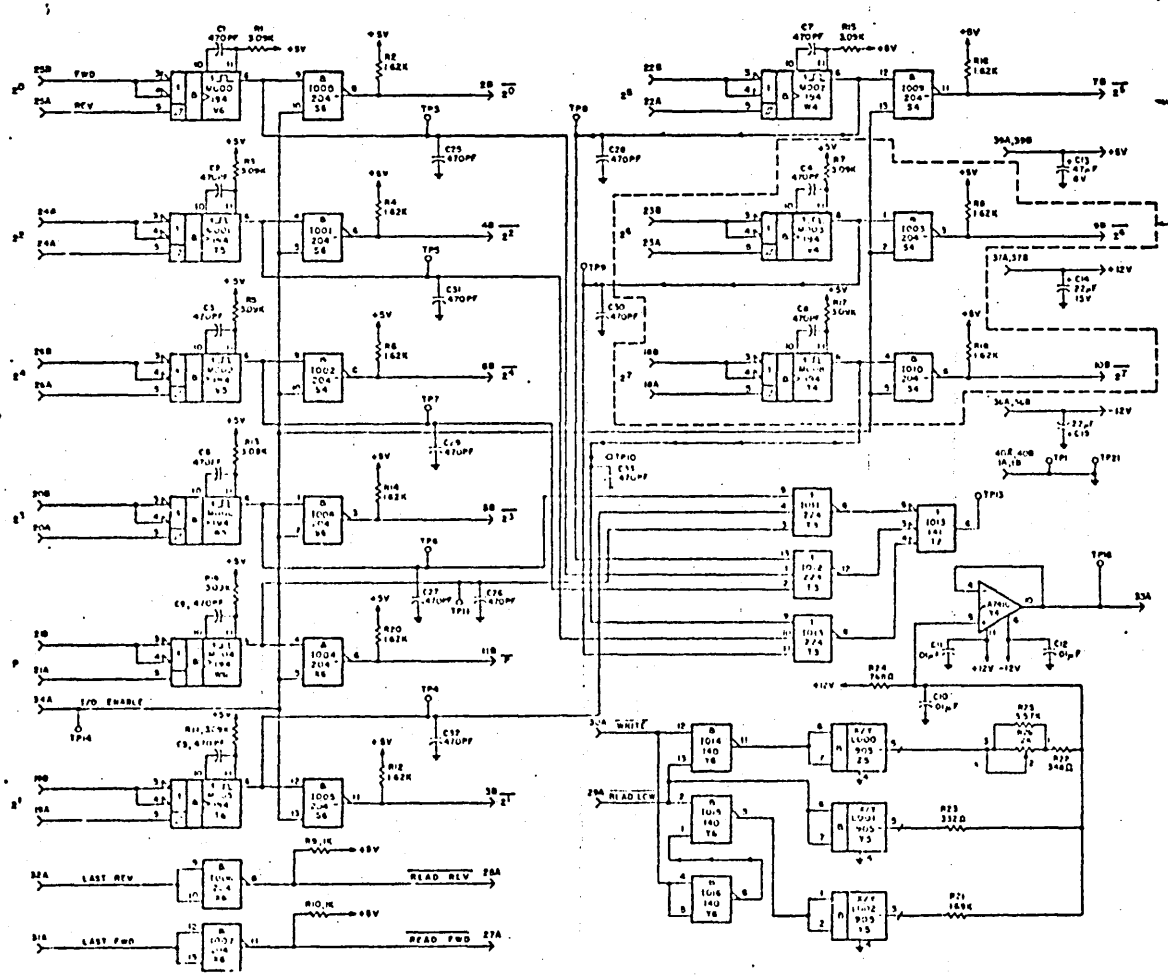

LAMP PC BOARD
SEE SHEET 1
+5V
SELECT
READY
FILE PROTECT
EOT-BOT
TAPE LOADED
NU
X/Y L000 905 U1
X/Y L001 905 U1
X/Y L002 905 U2
X/Y L003 905 U2
X/Y L004 905 U3
X/Y L005 905 U3
R1 1K,1/2W
R2 1K,1/2W
R3 1K,1/2W
R4 1K,1/2W
R5 1K,1/2W
DS1
DS2
DS3
DS4
DS5
(+12V)
(+5V)
C1 15μF 20V
C2 33μF 10V
C3 1μF
LOAD-RWD
READY
UNLOAD
CLEAR
SPARE
P1
J1
LOAD-REWIND
READY
UNLOAD
CLEAR
SPARE
GND
CONTROL PANEL
05875
59514700
C



MFG REV	CODE	SHEET REVISION STATUS	REVISION RECORD					
	01			ECO	DESCRIPTION	DRAWN	DATE	CHKD	APP'D
	A			[illegible]	RELEASE				

BD ASSY TYPE 5240
READ LOGIC-NRZI

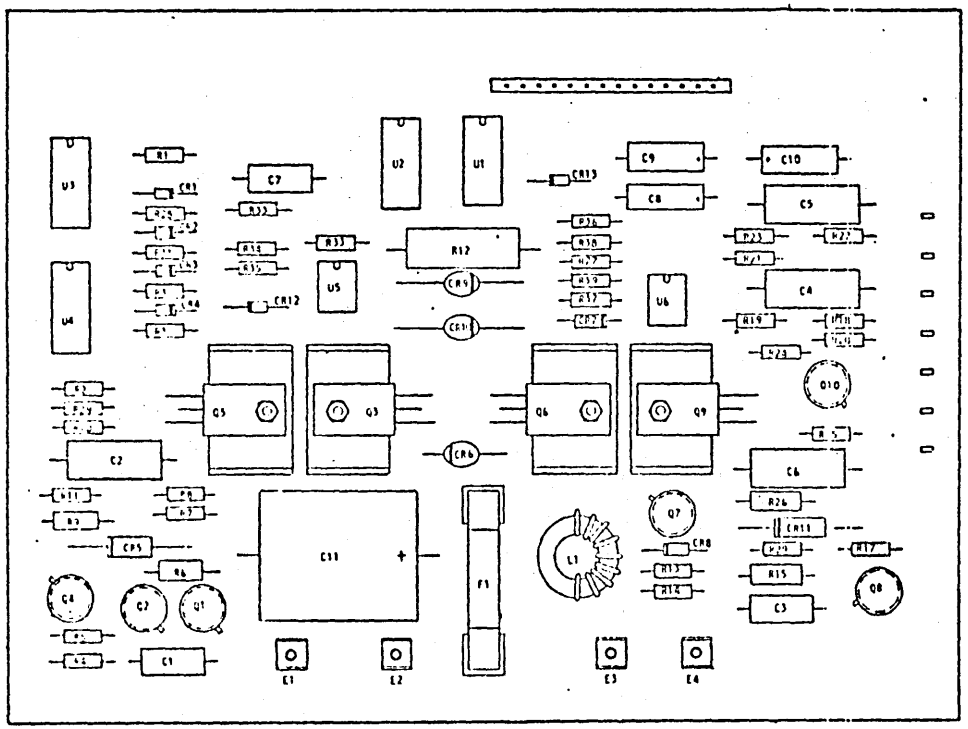
05875 D



NOTES:
1. ALL RESISTORS ARE 1%, 1/4W UNLESS OTHERWISE STATED.
2. SPARE ELEMENTS:

LOC	TYPE	ELEMENT
X8	204	1,2-3
X9	140	9,10-12
Z8	905	1,2-3

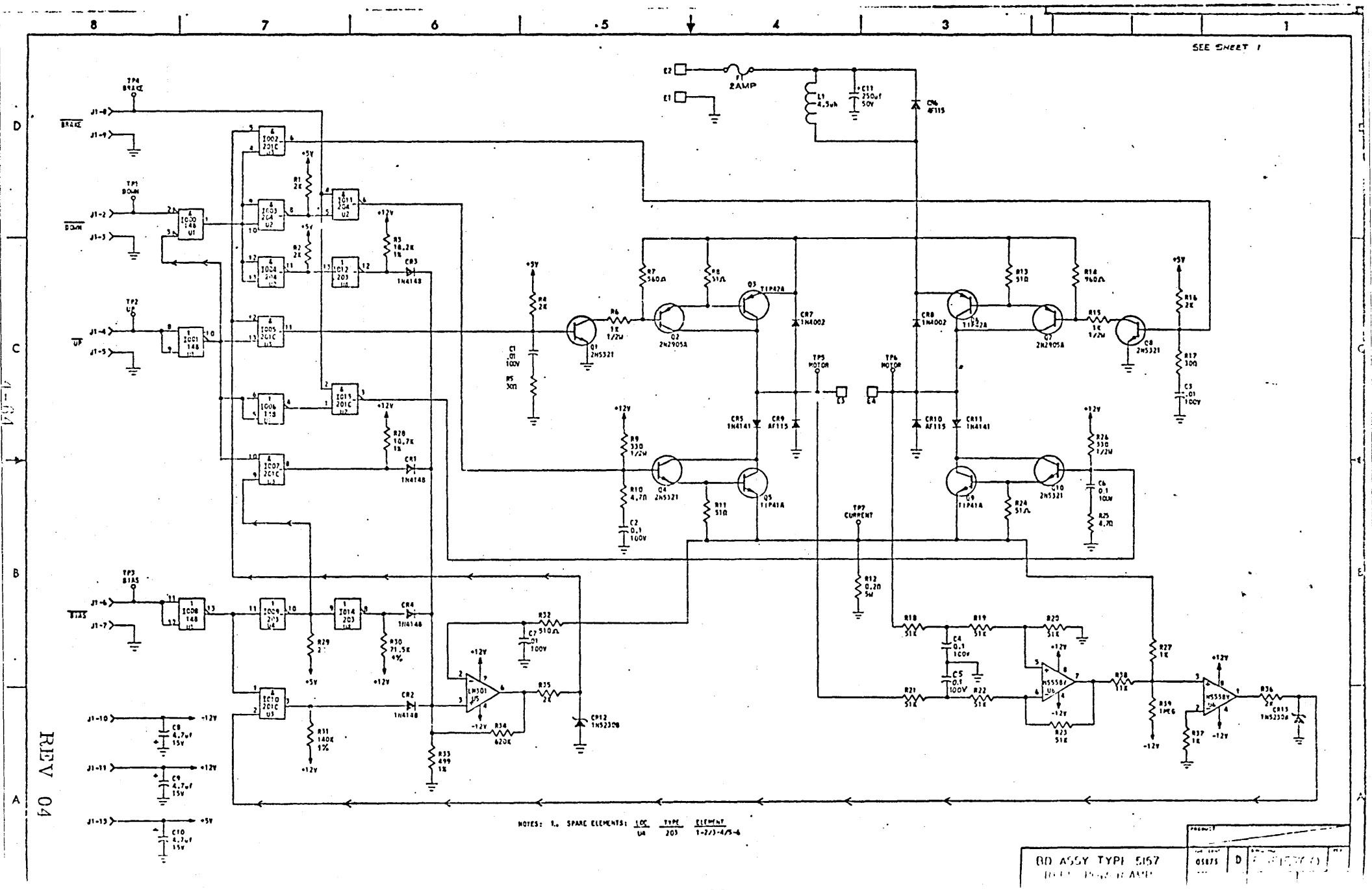
MFG REV	SCCE
	01
	A
	A

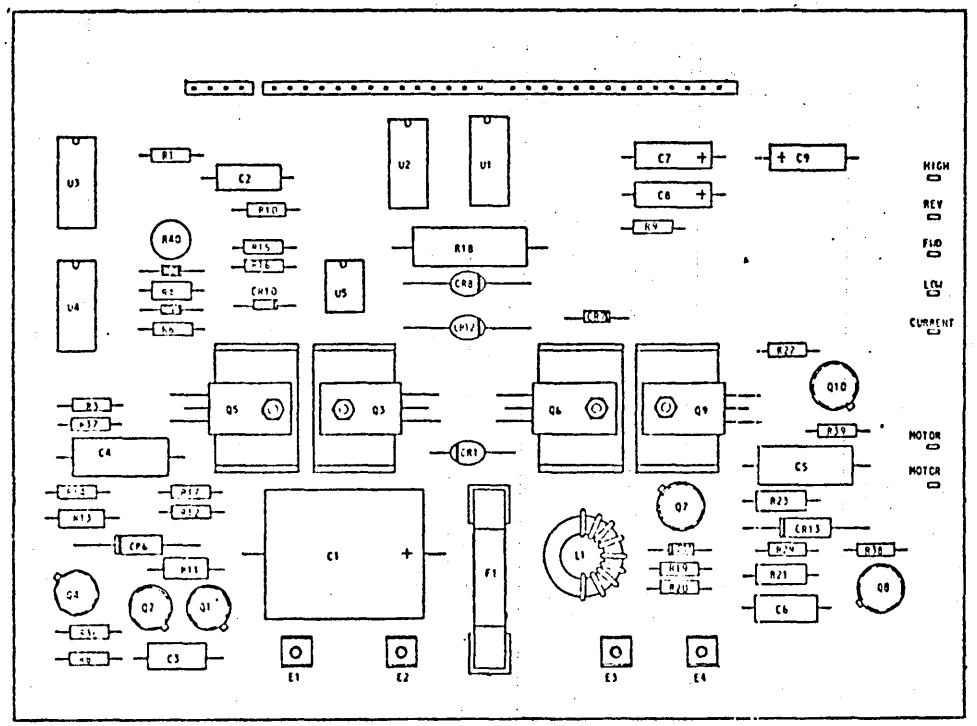


TITLE

PRINTED WIRING BOARD
REEL POWER AMPLIFIER

	03875	D	[illegible]


SEE SHEET 1
BRAKE
DOWN
UP
BIAS
2AMP
L1 4.5uh
C11 250uf 50V
CR6 AF115
+5V
+12V
-12V
R1 2K
R2 2K
R3 18.2K 1%
R4 2K
R5 Xm
R6 1K 1/2W
R7 560Ω
R8 51Ω
R9 33Ω 1/2W
R10 4.7Ω
R11 51Ω
R12 0.2Ω 5W
R13 51Ω
R14 960Ω
R15 1K 1/2W
R16 2K
R17 30Ω
R18 51K
R19 51K
R20 51K
R21 51K
R22 51K
R23 51K
R24 51K
R25 4.7Ω
R26 33Ω 1/2W
R27 1K
R28 10.7K 1%
R29 2
R30 71.5K 1%
R31 140K 1%
R32 510Ω
R33 499 1%
R34 620K
R35 2K
R36 2K
R37 1K
R38 1K
R39 1MEG
C1 100V
C2 0.1 100V
C3 .01 100V
C4 0.1 100V
C5 0.1 100V
C6 0.1 10W
C7 .01 100V
C8 4.7uf 15V
C9 4.7uf 15V
C10 4.7uf 15V
Q1 2N5321
Q2 2N2905A
Q3 TIP42A
Q4 2N5321
Q5 TIP41A
Q6 TIP42A
Q7 2N2905A
Q8 2N5321
Q9 TIP41A
Q10 2N5321
CR1 1N4148
CR2 1N4148
CR3 1N4148
CR4 1N4148
CR5 1N4141
CR7 1N4002
CR8 1N4002
CR9 AF115
CR10 AF115
CR11 1N4141
CR12 1N5230B
CR13 1N5230B
TP1 DOWN
TP2 UP
TP3 BIAS
TP4 BRAKE
TP5 MOTOR
TP6 MOTOR
TP7 CURRENT
E1
E2
E3
E4
J1-0
J1-1
J1-2
J1-3
J1-4
J1-5
J1-6
J1-7
J1-10
J1-11
J1-13
IC00 74S
IC01 74S
IC02 23IC
IC03 23IC
IC04 23IC
IC05 23IC
IC06 74S
IC07 20IC
IC08 74S
IC09 20J
IC10 20IC
IC11 20J
IC12 20J
IC13 20IC
IC14 20J
U1
U2
U3
U4
U5
U6
LM301
MC5558V
NOTES: 1. SPARE ELEMENTS: LOC U4 TYPE 20J ELEMENT 1-2/3-4/5-6
BD ASSY TYPE 5157
05875
D
REV 04



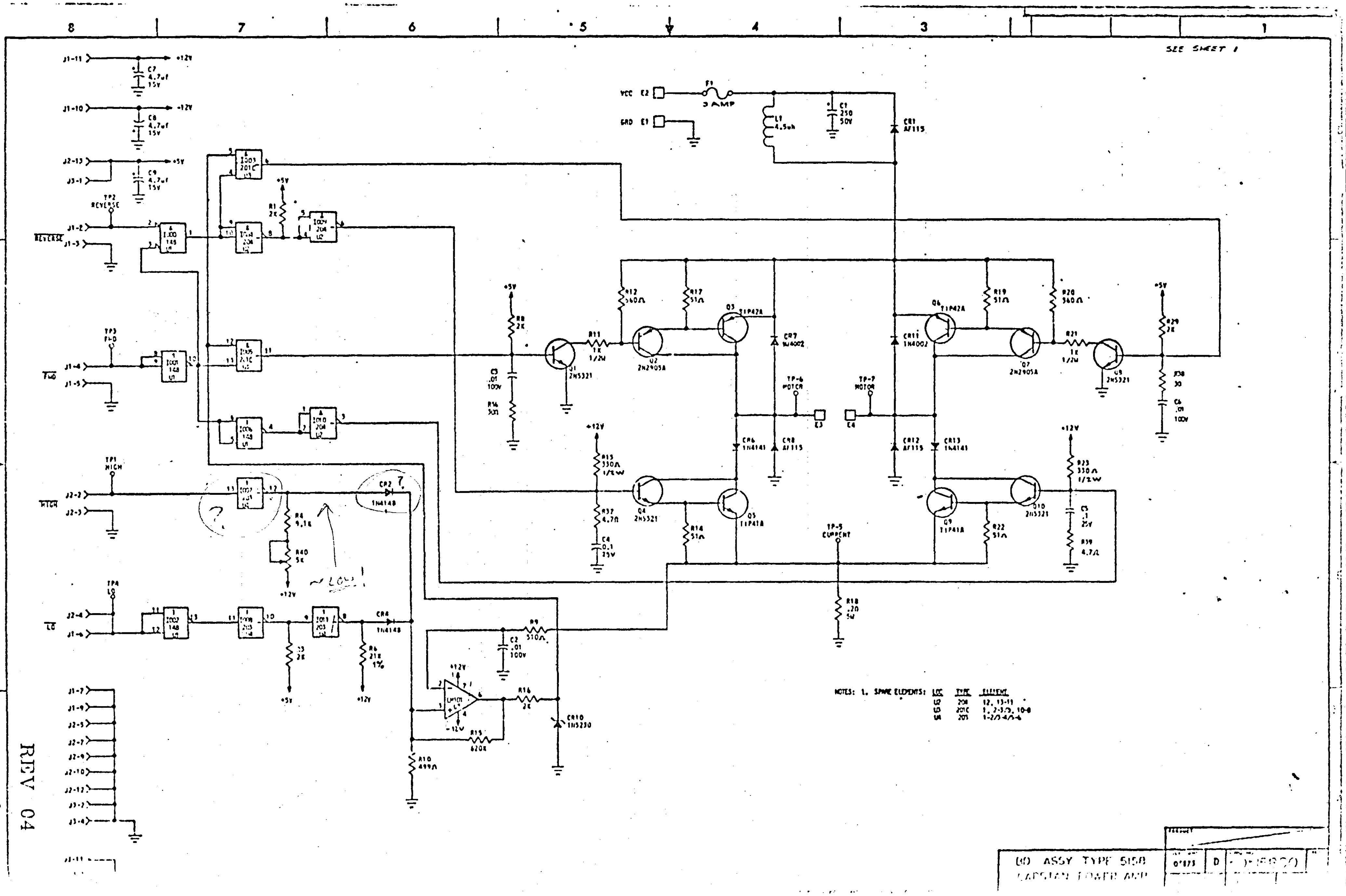
U1 - 7402
U2 - 7438
U3 - 7409
U4 - 7405

MFG. REV	CHG #	DESCRIPTION	DATE	APPROVED
	Q1			
	A			
	A			

TITLE

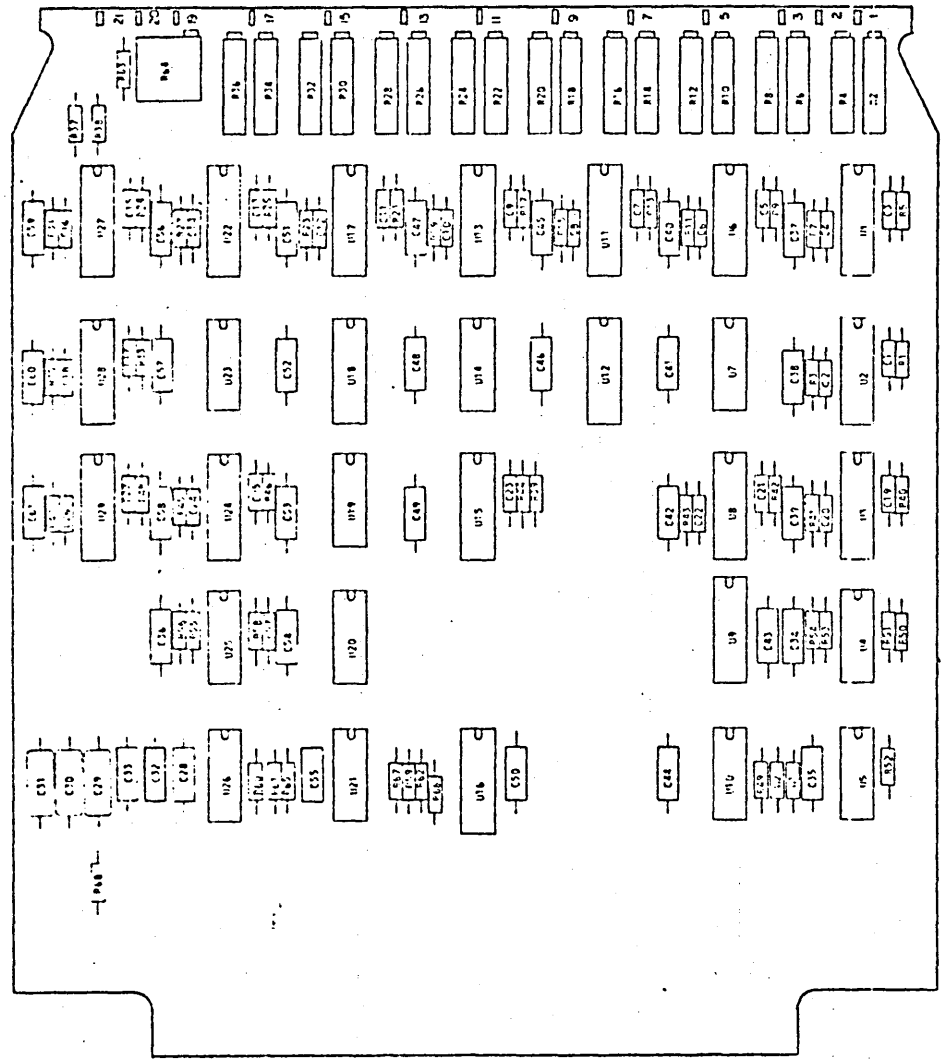
BD ASSY TYPE 5158
CAPSTAN PWR AMP

	05375	D	


SEE SHEET 1
VCC E2
GND E1
F1
3 AMP
L1
4.5uh
C1
250
50V
CR1
AF115
J1-11
+12V
J1-10
J2-13
+5V
J3-1
C7
4.7uf
15V
C8
4.7uf
15V
C9
4.7uf
15V
TP2
REVERSE
J1-2
J1-3
TP3
FWD
J1-4
J1-5
TP1
HIGH
J2-2
J2-3
TP4
LO
J2-4
J1-6
R1
2K
R4
9.1K
R40
5K
R5
2K
R6
21K
1%
CR2
1N4148
CR4
1N4148
R9
510Ω
C2
.01
100V
LM101
R16
2K
R15
620K
R10
499Ω
CR10
1N5230
R8
2K
C3
.01
100V
R14
30Ω
Q1
2N5321
R11
1K
1/2W
R12
560Ω
R17
51Ω
Q2
2N2905A
Q3
TIP42A
CR7
1N4002
TP-6
MOTOR
TP-7
MOTOR
E3
E4
CR11
1N4002
Q6
TIP42A
R19
51Ω
R20
560Ω
Q7
2N2905A
R21
1K
1/2W
Q8
2N5321
R29
2K
R30
30
C6
.01
100V
CR6
1N4141
CR8
AF115
CR12
AF115
CR13
1N4141
R13
330Ω
1/2W
R32
4.7Ω
C4
0.1
25V
Q4
2N5321
Q5
TIP41A
R14
51Ω
TP-5
CURRENT
R18
.20
5W
Q9
TIP41A
R22
51Ω
Q10
2N5321
R23
330Ω
1/2W
C5
.1
25V
R39
4.7Ω
NOTES: 1. SPARE ELEMENTS: LOC TYPE ELEMENT
U3 204 12, 13-11
U3 201C 1, 2-3/5, 10-8
U4 203 1-2/3-4/5-6
~LOW!
I/O ASSY TYPE 5150
CAPSTAN POWER AMP

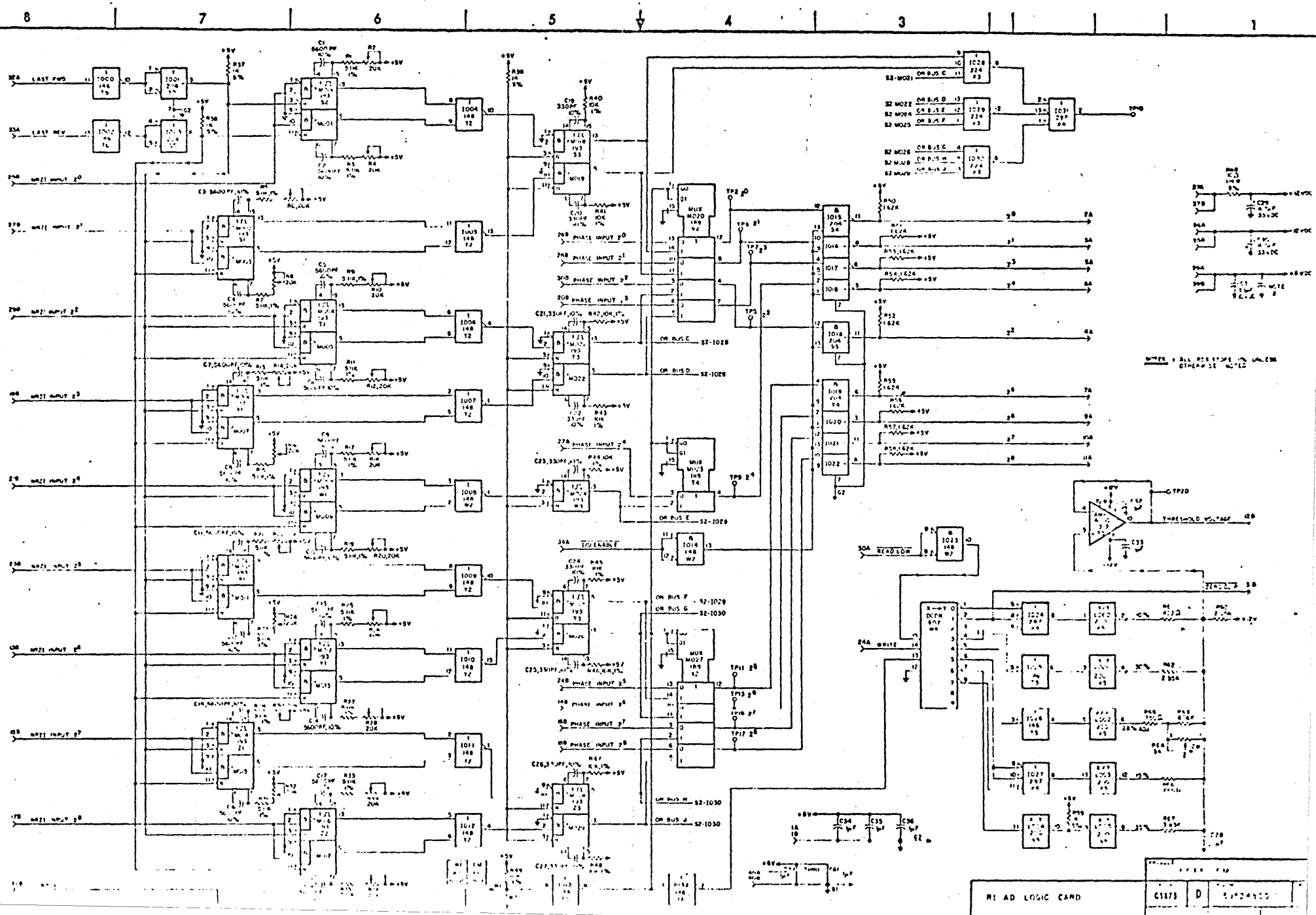
4-66

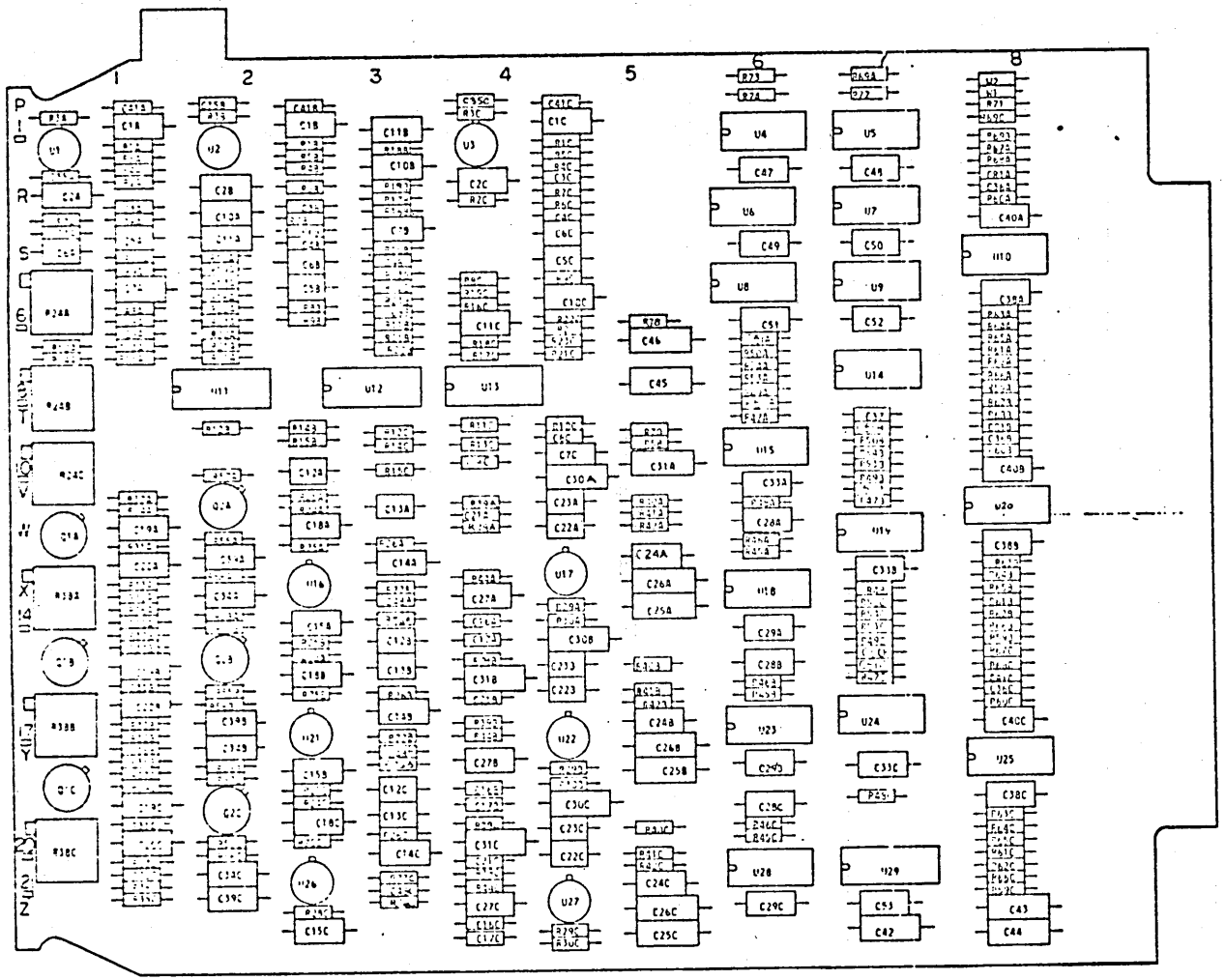
REV 04



8D ASSY TYPE 8243
4D LOGIC DW

REV 05

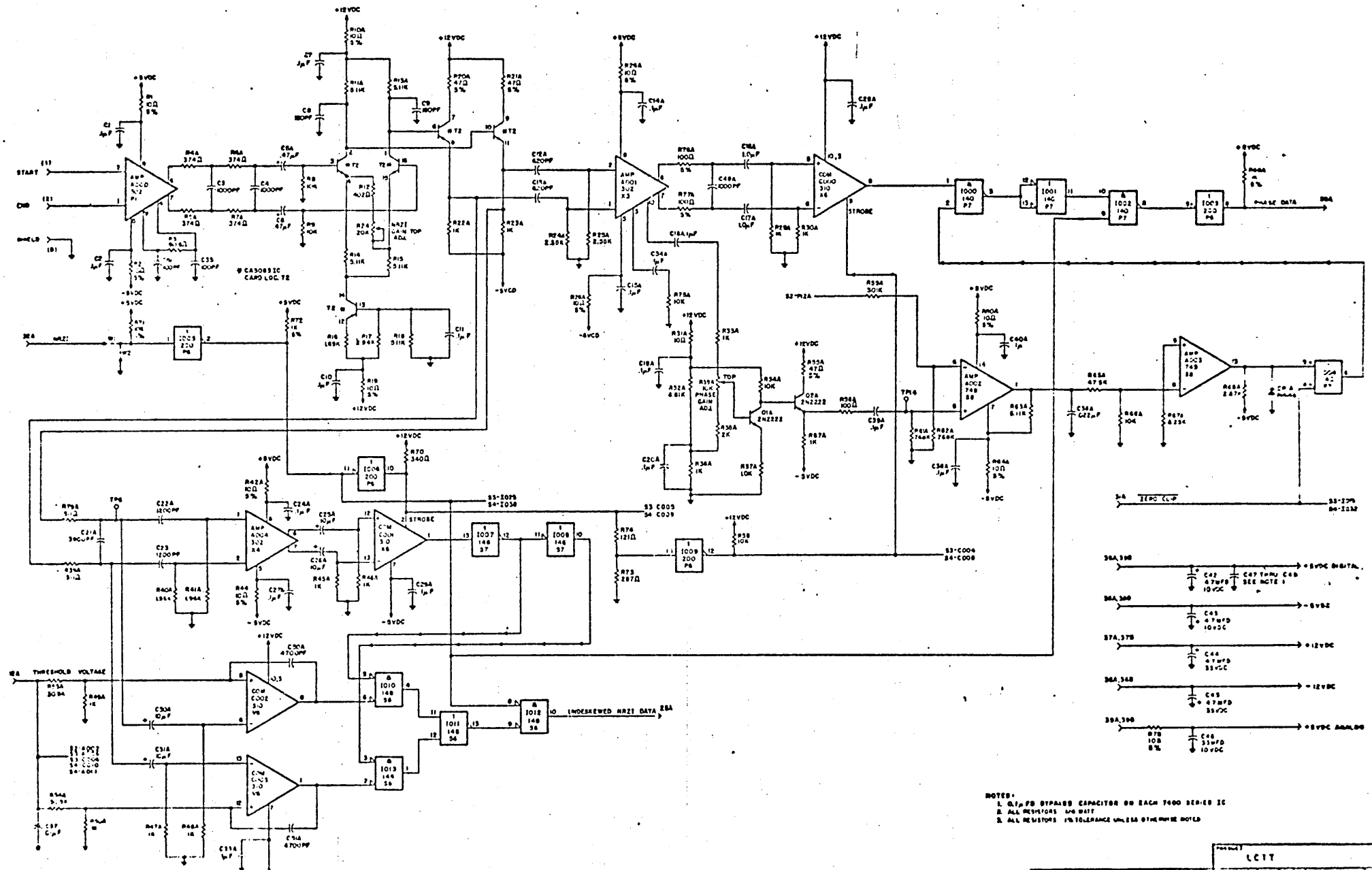

8
7
6
5
4
3
1
D
C
B
A
4-69
REV 05
READ LOGIC CARD



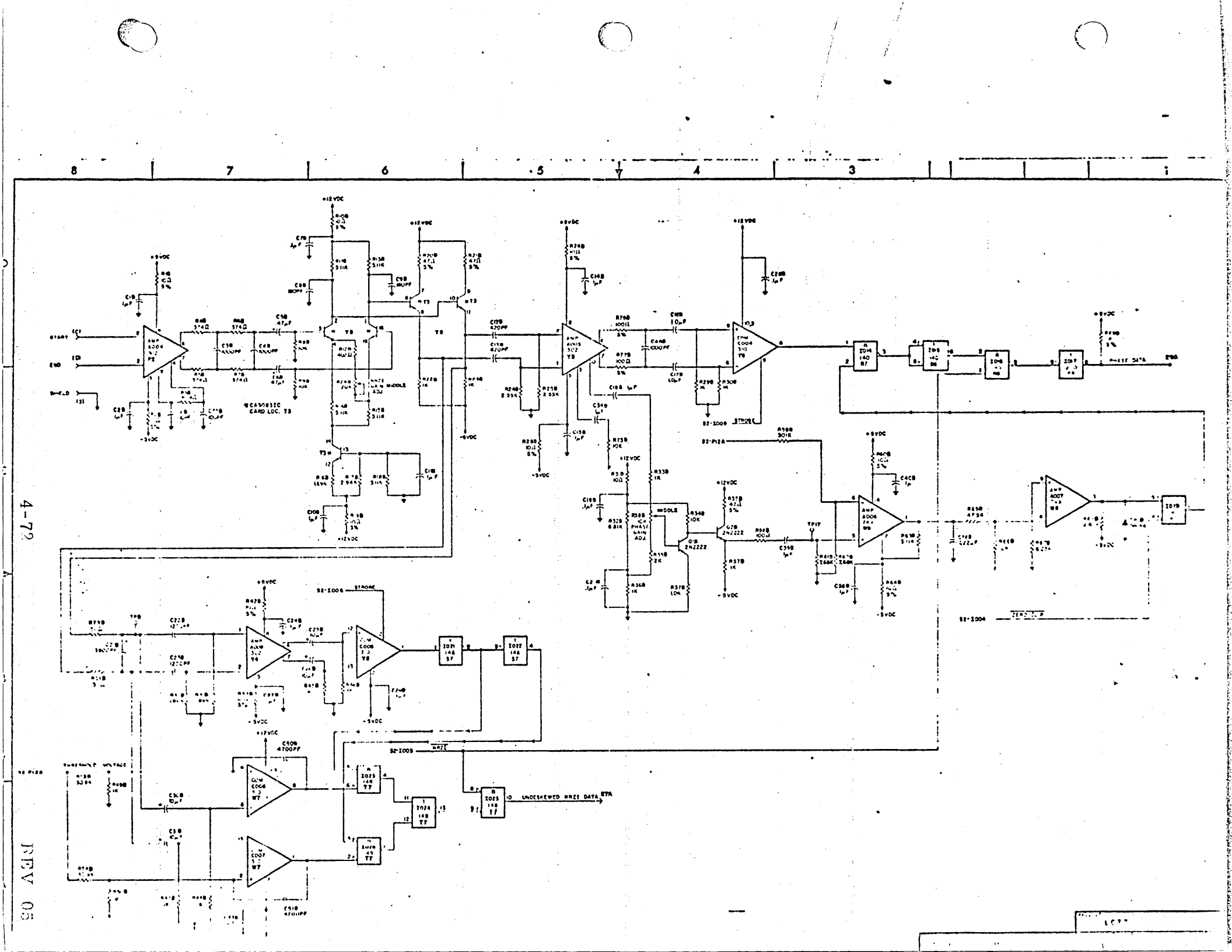
BD ASSY TYPE 4552
RD REC

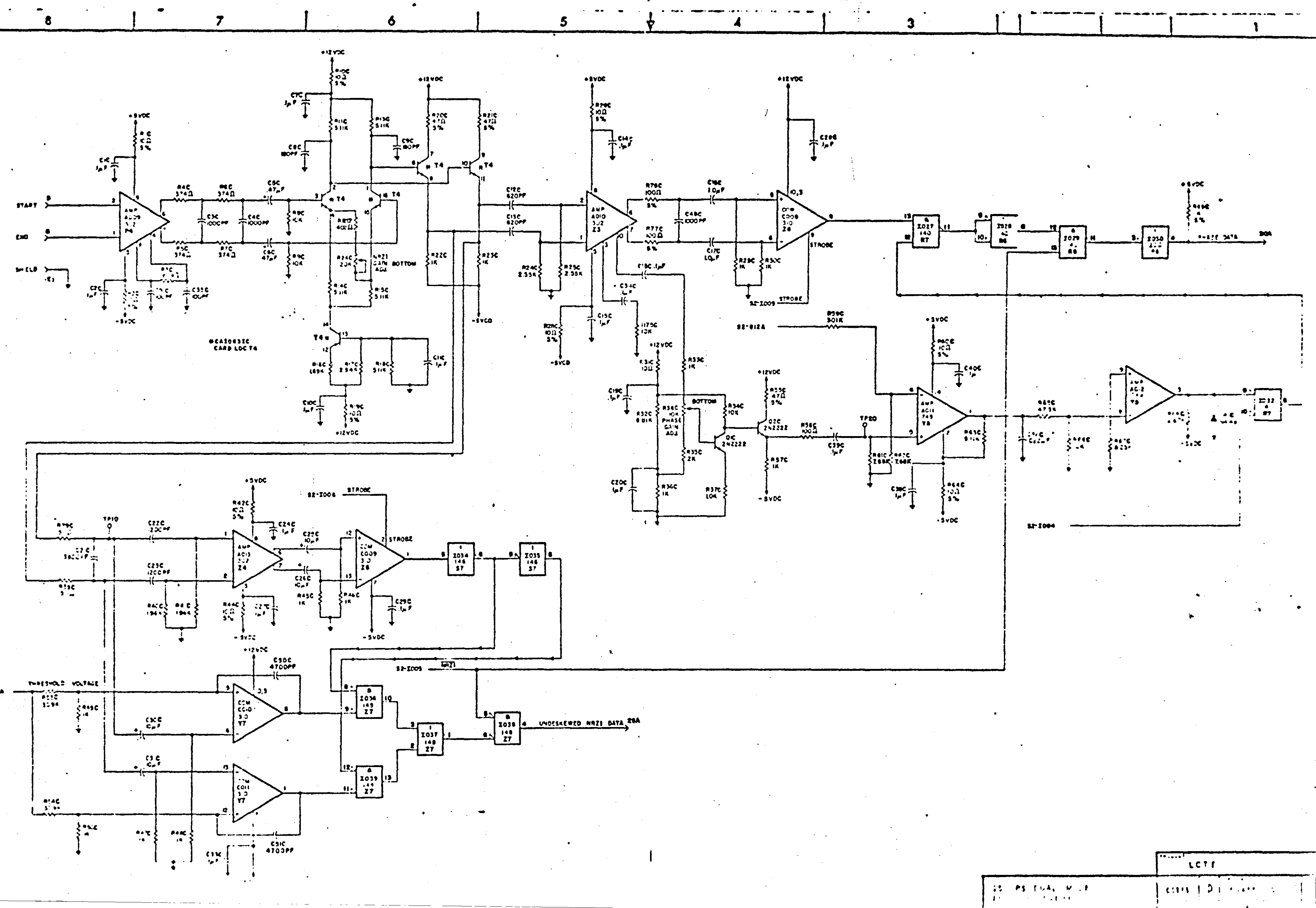
01875 D

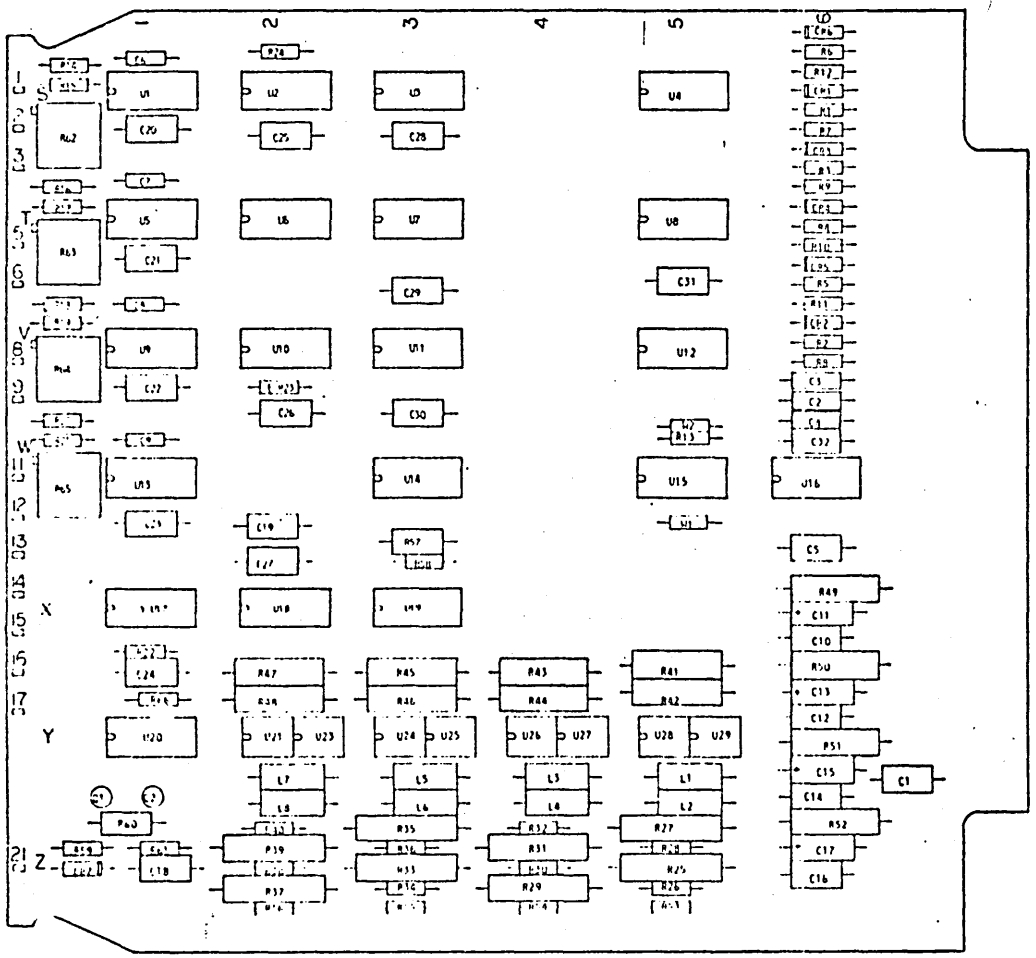
REV 05



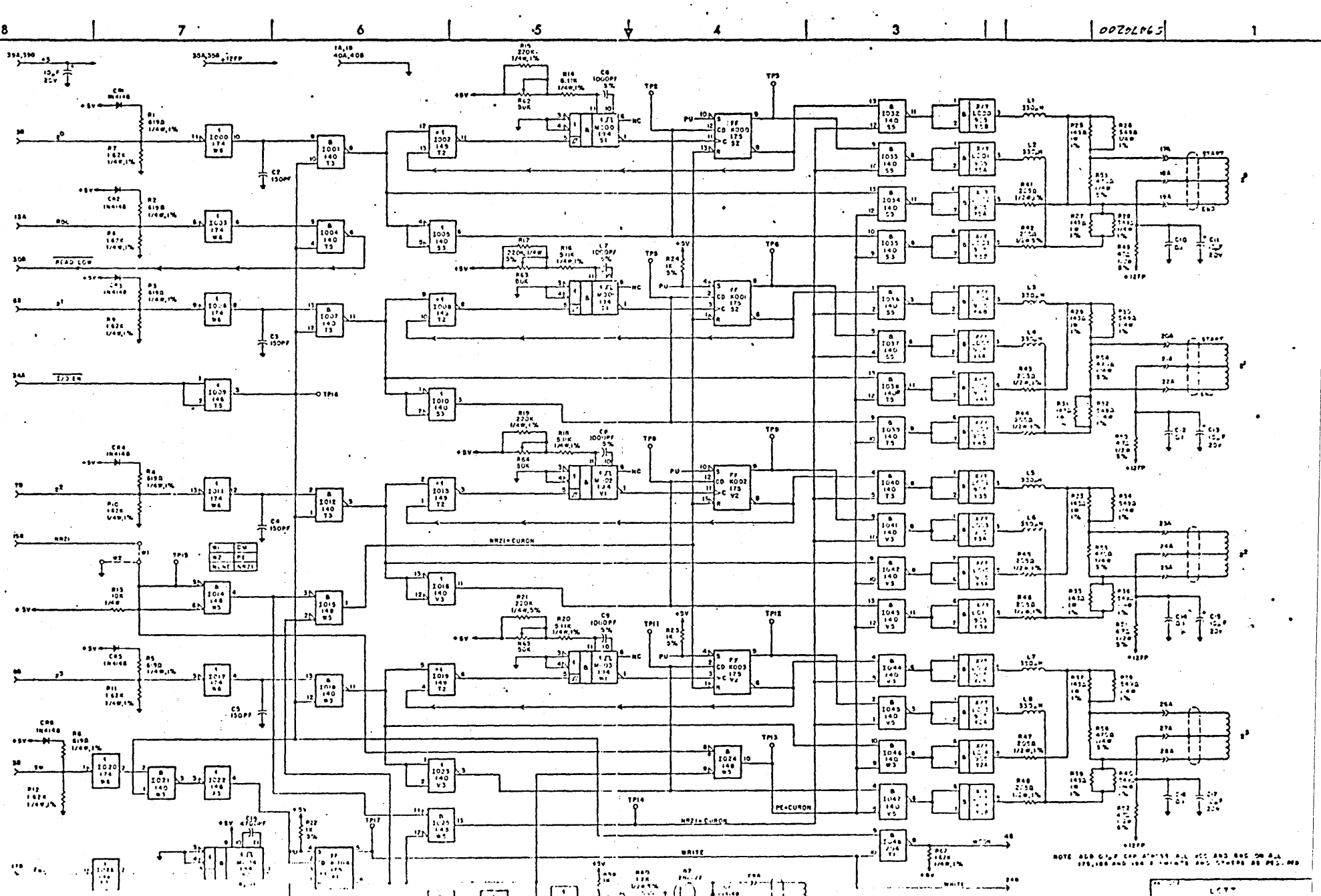
NOTES:
1. 0.1μFD BYPASS CAPACITOR ON EACH 7400 SERIES IC
2. ALL RESISTORS 1/4 WATT
3. ALL RESISTORS 5% TOLERANCE UNLESS OTHERWISE NOTED


8
7
6
5
4
3
1
4-76
REV 03


START
END
SHIELD
THRESHOLD VOLTAGE
UNDESKEWED NRZI DATA
STROBE
PHASE GAIN ADJ
+12VDC
+5VDC
-5VDC

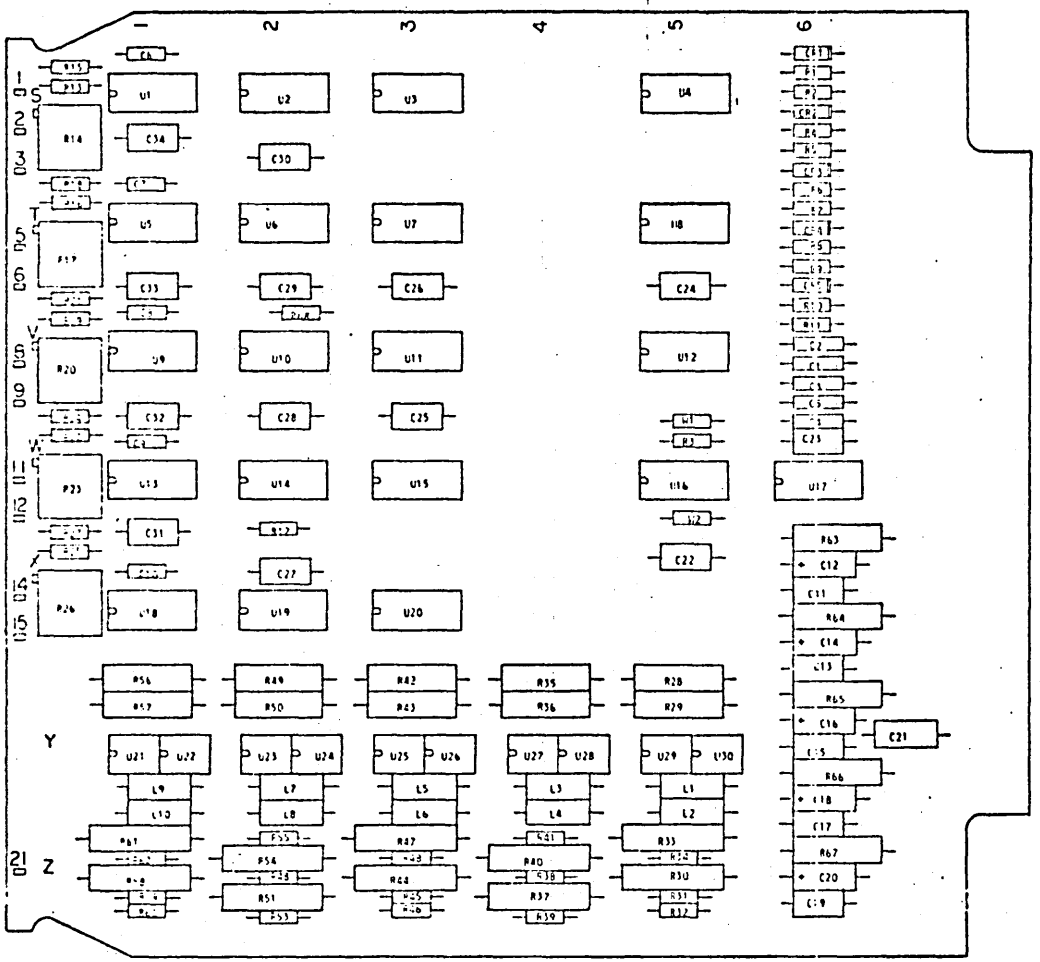


BD ASSY TYPE 4342
WRT DR 4 DM



4-75

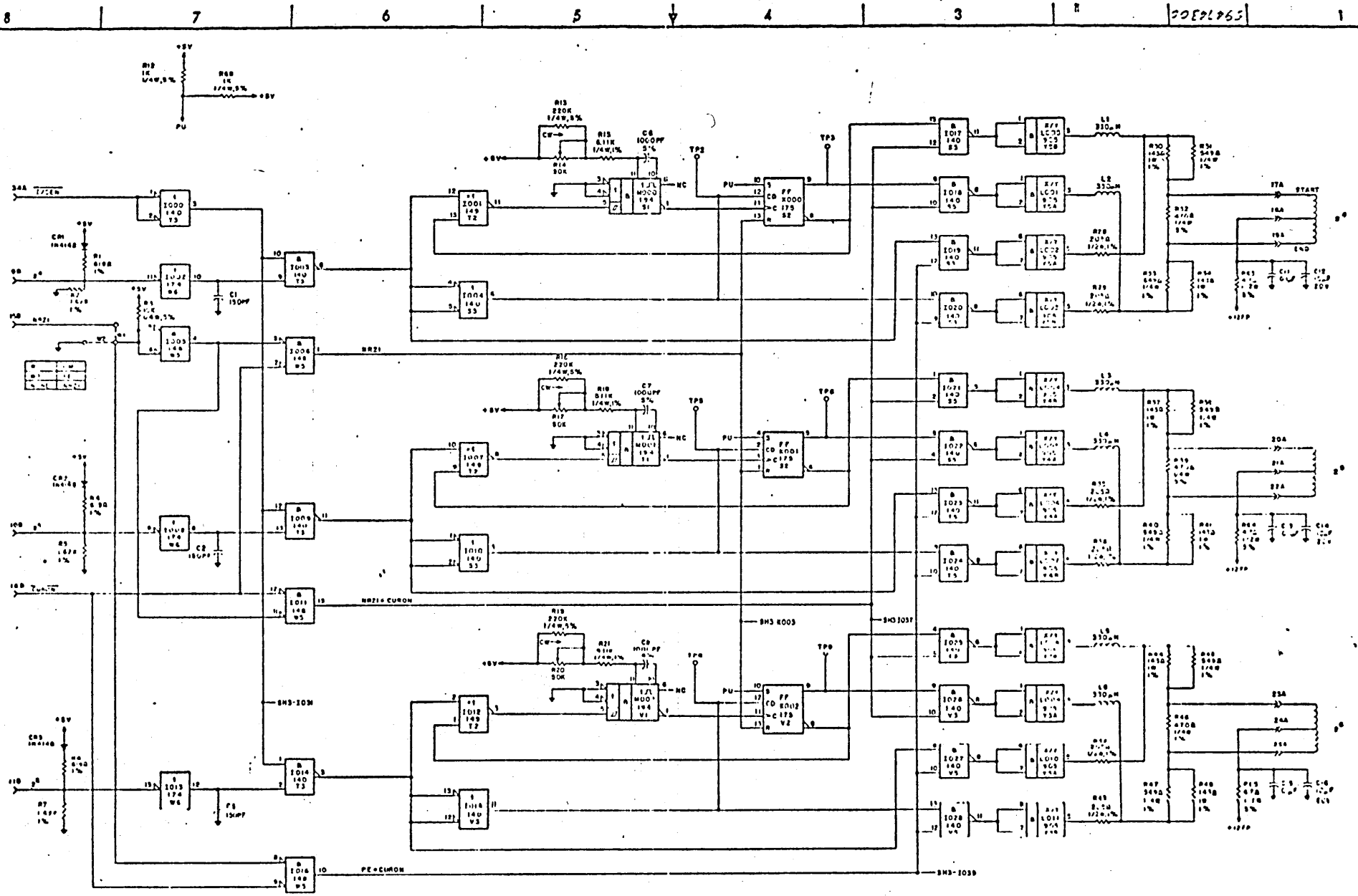
REV

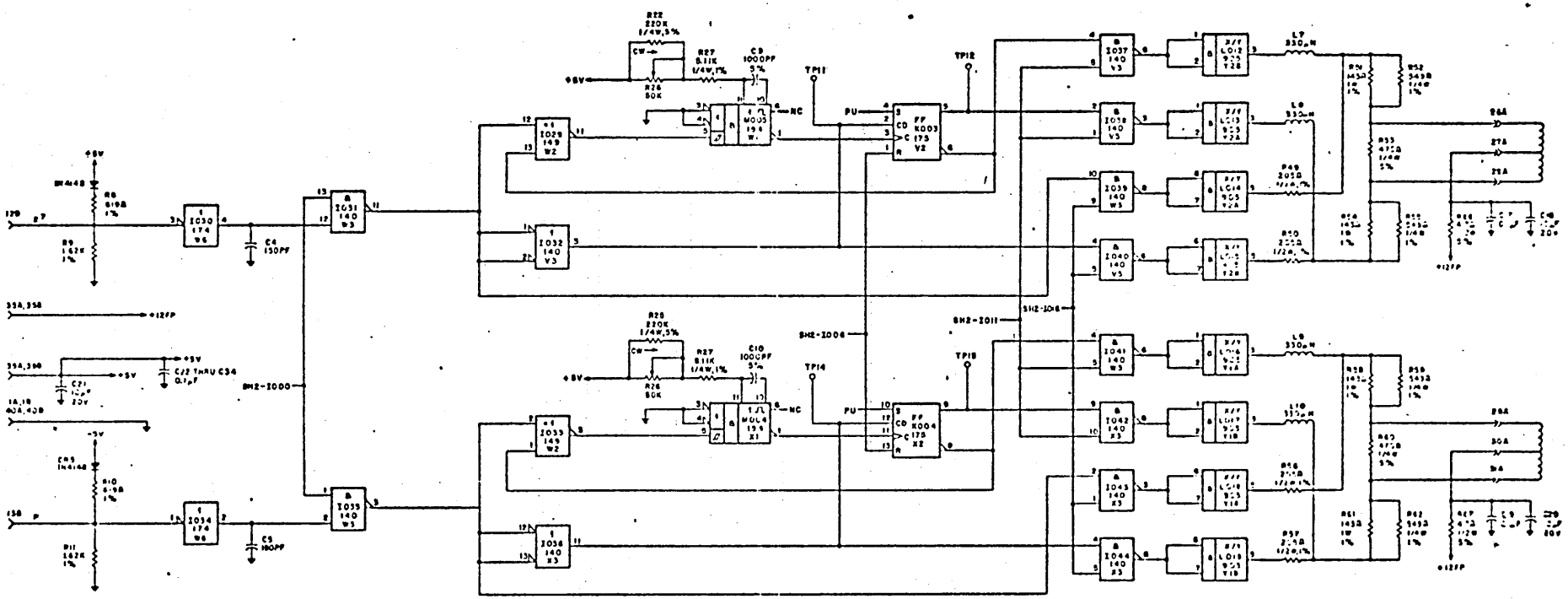


BD ASSY TYPE 4743
ART DR 5 DW

4-76

REV 05





SECTION V

INTERFACE EQUIPMENT

INTERFACE EQUIPMENT

5-1. GENERAL

For Interface Equipment data refer to Preface for appropriate manual.