83311300

CONTROL DATA CORPORATION

CONTROL DATA®
STORAGE MODULE DRIVE

BJ701

BJ7B1

INSTALLATION AND CHECKOUT
PREVENTIVE MAINTENANCE
CORRECTIVE MAINTENANCE
DIAGRAMS
WIRE LISTS
PARTS DATA

HARDWARE MAINTENANCE MANUAL

REVISION RECORD

REVISION	DESCRIPTION
A (12-01-75)	Preliminary manual, never printed.
B (02-20-76)	Manual released by ECO's: 37733, 37775, 37815. Also included are ECO's: 37636, 37653, 37655A, 37656, 37667, 37669, 37673, 37679, 37700, 37705, 37726, 37734, 37742, 37743, 37744, 37771, 37772, 37774, 37783, 37787, 37788, 37789, 37799, 37800, 37807A, 37811, 37813, 37814, 37826, 37827, 37828, 37831, 37839, 37840, 37853, 37854, 37867, 37868, 37869, 37895, 37896.
C (05-18-76)	Update manual with ECO's: 37787C, 37801, 37825A, 37910A, 37925, 37928, 37951, 37965, 37966, 37967, 37979, 48002. Technical and editorial changes.
D (09-16-76)	Update manual with ECO's: 37841C, 48003, 48014, 48028A, 48029, 48030, 48098, 48101, 48140; FCO 48014A. Technical and editorial changes. This edition obsoletes all previous editions. NOTE: ECO 37881B inadvertently omitted from Rev. D.
E (11-23-76)	Update manual with ECO's: 48056, 48086, 48113A, 48154, 48226. Technical and editorial changes.
F (02-15-77)	Update manual with ECO's: 48099A, 48365A. Technical and editorial changes.
G (04-12-77)	Update manual with ECO 48322; FCO's 48365, 48406, 48407. Technical and editorial changes.
H (05-10-77)	Update manual with ECO's 48575, 48504; FCO 48504. Technical and editorial changes.
J (08-05-77)	Update manual with ECO 48477; FCO's 48477, 48490, 48494. Technical and editorial.
K (10-10-77)	Manual updated to include the following ECO's: 48574, 48630, 48690A. Technical and editorial changes.
L (12-09-77)	Manual updated to include the following ECO's: 48602, 48744. Technical and editorial changes.
M (02-28-78)	Manual updated to include ECO's 55084, 48896. Technical and editorial changes.

REVISION LETTERS I, O, Q
AND X ARE NOT USED.

Address comments concerning this manual to:
Control Data Corporation
Twin Cities Disk Division
Customer Documentation Dept.
5950 Clearwater Drive
Minnetonka, Mn 55343
or use Comment Sheet in the back of this manual.

REVISION RECORD (Contd)

REVISION	DESCRIPTION
N (04-24-78)	Manual updated to include ECO's 48953, 48798. Technical and editorial changes.
P (06-26-78)	Manual updated to include ECO 55155. Technical and editorial changes.
R (08-14-78)	Manual updated to include ECO 55168. Technical and editorial changes.
S (10-18-78)	Manual updated to include ECO 55310 and 55393. Technical and editorial changes.
T (01-10-79)	Update with ECO 55290 and additional technical and editorial changes.
U (05-02-79)	Manual updated to include ECOs 55521, 55520, 55534, 37826 and 55522. Additional technical and editorial changes.
V (07-11-79)	Manual updated to include ECO's 55658, 55523B, 55700, and FCO 55700. Additional technical and editorial changes.
W (11-06-79)	Manual updated to include ECO's 55798, 55812 and additional technical and editorial changes.
Y (11-27-79)	Manual updated to include ECO 55884. Additional technical and editorial changes.
Z (01-11-80)	Manual updated to include ECO's 60000 and 55844B. Additional technical and editorial changes.
AA (04-15-80)	Manual updated to include ECO 60071. Additional technical and editorial changes.
AB (07-08-80)	Manual updated to include ECO 55952B. Additional technical and editorial changes.
AC (03-06-81)	Manual updated to incorporate ECO 60129 (Class II), 60353 and 60381. Technical and editorial changes.
AD (06-20-81)	Manual updated to incorporate ECO's 60392, 60421 and FCO 60394. Technical and editorial changes.
AE (10-08-81)	Manual updated to incorporate ECO DJ00043A. Technical and editorial changes.
AF (03-05-82)	Manual updated to incorporate ECO's DJ00029, DJ00044, DJ00072, DJ00075A. Technical and editorial changes.
AG (05-18-82)	Manual updated to incorporate ECO's DJ00143A, DJ00198. Technical and editorial changes.
AH (08-31-82)	Manual updated to incorporate ECO DJ00282, FCO DJ00284. Technical and editorial changes.
AJ (10-11-84)	Manual updated to incorporate ECO DJ00228E. Technical and editorial changes.

REVISION RECORD (Contd)

REVISION	DESCRIPTION
AK (12-05-84)	Manual updated to include ECO's DJ00463A, DJ00491A, DJ00493, DJ00505. Technical and editorial changes. (Class II ECO's: DJ00304, 315, 325, 349, 360, 420, 439, 456, 575, 647, 652, 654, 666, 729.

MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series code number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series code number is an FCO number If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

This correlation sheet also applies to the following related manuals:

Pub. No.____________________Rev.______

EQUIPMENT TYPE	SERIES CODE	WITH FCOs	COMMENTS
	10 & Above	48014A	
BJ701 A/C/E	14 & Above	48365	
BJ7B1 C/D	14 & Above	48406	
BJ7B1 A/B/E/F	14 & Above	48407	
BJ7B1 C/D	16 & Above	48504	
BJ7B1B	16 & Above	48477	
BJ7B1D	16 & Above	48490	
BJ701B	16 & Above	48494	
BJ701A-F/J/K	37 & Above	60379	
BJ701A-F/J/K	38 & Above	60394	
	39	None	
	40	None	
	41	None	
	42	None	
	43	None	
	44 thru 54	None	

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New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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iv	AK	1-6	M
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App B Div	-	B-22	U
Blank	-	B-23	U
B-i	U	B-24	U
Blank	-	B-25	U
B-1	U	Blank	-
Blank	-	Procedures	-
U/T Aids	-	Blank	-
Blank	-	B-27	U
B-3	U	B-28	U
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B-7	U	B-32	U
B-8	U	Cmt Sht	-
B-9	U	Rtn Env	-
Blank	-	Blank	-
DLTs	-	Cover	-

PREFACE

This manual contains maintenance information applicable to the following Control Data® Storage Module drives (SMD's):

BJ701A	BJ701J	BJ7B1F
BJ701B	BJ701K	BJ7B1J
BJ701C	BJ7B1A	BJ7B1K
BJ701D	BJ7B1B	BJ7B1L
BJ701E	BJ7B1D	
BJ701F	BJ7B1E	

Maintenance information is provided by six sections in this manual. Section numbers and a brief description of their contents are listed below.

Section 1 - Installation and checkout. Provides information on preparing the drive for initial use: unpacking, power/signal cabling, and initial checkout.

Section 2 - Preventive Maintenance. Provides detailed procedures on maintaining the equipment.

Section 3 - Corrective Maintenance. Provides general maintenance information, drive tests and adjustments, trouble analysis aids, repair and replacement procedures.

Section 4 - Diagrams. Contains logic diagrams and assembly schematics.

Section 5 - Wire Lists. Provides documentation on wiring for logic and mechanical assemblies.

Section 6 - Parts Data. Contains parts lists and illustrations showing all field replaceable parts.

The following manuals apply to the BJ701/BJ7B1 SMD's and are available from Control Data Corporation, Literature Distribution Services, 308 North Dale Street, St. Paul, MN 55103.

Publication No.	Title
83311300	Maintenance
83324220	Reference
83322440	CDC Microcircuits, Vol. 1 (Functional descriptions of integrated circuits).
83324440	CDC Microcircuits, Vol. 2 (Functional descriptions of integrated circuits).
83323770	A Guide for the Disk Drive Operator.

CONTENTS

5. WIRE LISTS

FIGURES

TABLES

APPENDIXES

IMPORTANT SAFETY INFORMATION AND PRECAUTIONS

Proper safety and repair is important to the safe, reliable operation of this unit. Service should be done by qualified personnel only. This maintenance manual describes procedures recommended by the manufacturer as effective methods of servicing the unit. Some of these procedures require the use of specially designed tools. For proper maintenance and safety, these specially designed tools should be used as recommended.

The procedures in this maintenance manual and labels on the unit contain warnings and cautions which must be carefully read and observed in order to minimize or eliminate the risk of personal injury. The warnings point out conditions or practices that are potentially hazardous to maintenance personnel. The cautions point out practices which, if disregarded, could damage the unit and make it unsafe for use.

For the safety of maintenance and operating personnel, the following precautions must be observed:

- Perform all maintenance in accordance with the procedures given in this manual.
- Read and observe all cautions and warnings provided in the procedures and labeled on the unit.
- Use the special tools called out in the maintenance procedure.
- Observe sound safety practices when performing maintenance.
- Use caution when troubleshooting a unit that has voltages present. Remove power from unit before servicing or replacing components.
- Wear safety glasses when servicing units.
- Wear safety shoes when removing or replacing heavy components.

It is also important to understand that these warnings and cautions are not exhaustive. The manufacturer could not possibly know, evaluate and advise maintenance personnel of all conceivable ways in which maintenance might be performed or the possible risk of each maintenance technique. Consequently, the manufacturer has not completed any such broad evaluation. Thus, any persons who use any non-approved maintenance procedure or tool must first satisfy themselves that neither their safety nor the unit performance will be jeopardized by the maintenance techniques they select.

SECTION 1

INSTALLATION AND CHECKOUT

INTRODUCTION

This section contains information concerning the initial installation and checkout of the drive.

The drive comes from the factory in any one of three configurations (refer to figure 1-1):

- Cabinet with drive on top.
- Cabinet with drive on top and also a drawer mounted drive.
- Drawer mount to be mounted in an available cabinet.

The basic configuration is a cabinet with a drive mounted on top. This basic configuration is expanded by adding a drawer mounted unit to the lower part of the cabinet. The drawer mount can be factory installed or may come separately, in which case it must be installed in a cabinet not already containing a drawer mount.

This section contains procedures for installation of all three configurations and is divided into the following areas:

- Uncrating - Describes the removal of the unit from the shipping package.
- Cabinet Location and Leveling - Describes installation of the drive cabinet (with or without drawer mounted drive).
- Power Wiring - Explains the grounding and wiring of the drives power system.
- Signal Cabling - Explains the connection and routing of the drive I/O cables.
- Sector Plug Installation - Describes the installation and wiring of the sector plug.
- Drawer Mount Installation - Describes installation of the drawer mounted drive into the cabinet.
- Final Checkout - Describes the final checkout of the drive.

UNCRATING

CAUTION

As unit is uncrated,use tools carefully to prevent damage to any assembly.

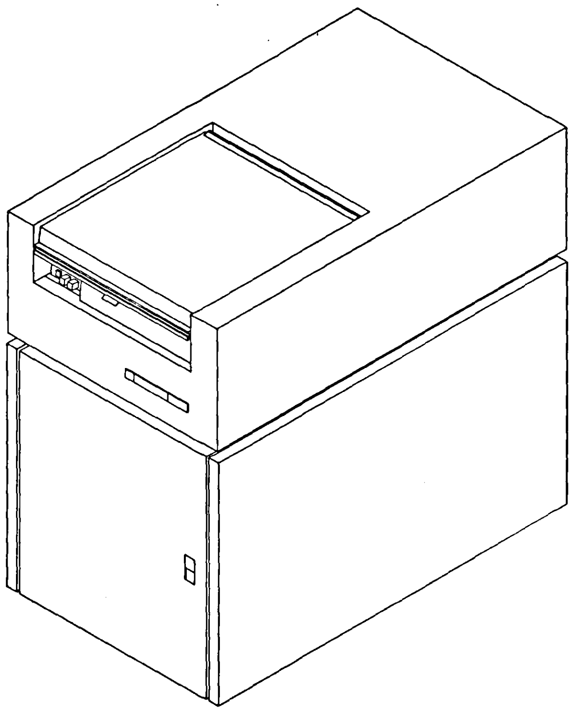
As unit is uncrated, inspect it for possible shipping damage. All claims for this type of damage should be filed promptly with the transporter involved. If a claim is filed for damages, save the original crating materials. Most crating material may be reused if reasonable care is used while uncrating.

Uncrate the unit as follows:

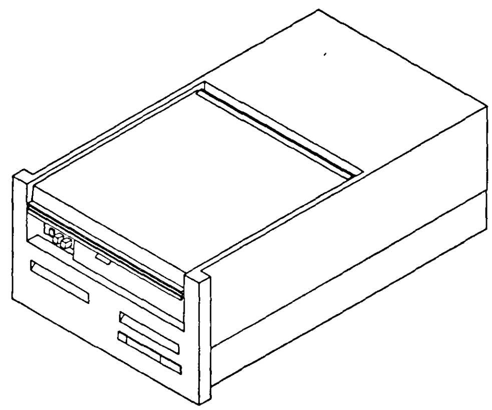
WARNING

Use care while cutting steel straps as they may whip when cut.

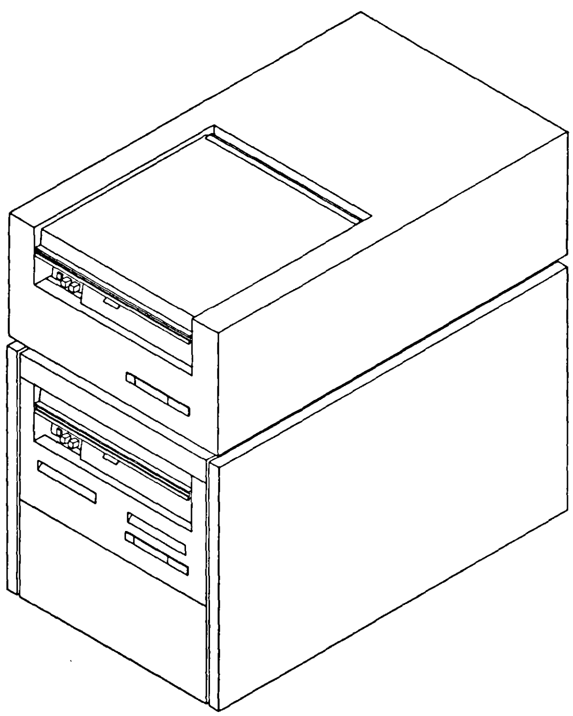
1. On air-shipped units, cut straps securing unit to skid.
2. Remove external packing material.
3. Remove polyethylene dust cover.
4. Open top cover by grasping sides of cover at back of unit and raising (cover is hinged at front of frame) cover up.
5. Open pack access cover by squeezing cover latch (figure 1-2).
6. Remove screw securing deck assembly to deck holddown bracket (figure 1-3). Loosen screw securing bracket to base assembly. Slide bracket away from deck as far as bracket will go and rotate bracket 90 degrees clockwise. Tighten screw. Install screw removed from deck into hole in deck, tighten screw.
7. Remove two deck-to-frame holddown screws at bottom of shroud (figure 1-3).
8. Raise deck assembly and install deck support bracket (figure 3-2).



CABINET WITH TOP MOUNTED
DRIVE



DRAWER MOUNT DRIVE



CABINET WITH BOTH TOP
MOUNT AND DRAWER MOUNTED DRIVES

9D27

Figure 1-1. Drive Physical Configurations

9. Inspect base assembly, deck assembly and power supply for damage.

10. Raise deck assembly and remove deck support bracket.

11. Secure deck assembly to base assembly using deck-to-frame hold down screws removed in step 7.

NOTE

Do not raise deck without first installing spacer and holddown screw between rear shock mounts and hinge as shown in figure 1-3.

12. Remove the screw located between the two shock mounts at rear of deck (figure 1-3). Remove spacer between deck and frame. Install screw and spacer in keeper hole in deck casting (screw must be securely installed in area between shock mounts whenever raising deck assembly).

13. Inspect top of deck assembly for damage.

14. Loosen two turnlock fasteners securing the logic chassis to the support arm at rear of deck. Swing support arm out away from logic chassis.

15. Grasp logic chassis fan and raise chassis up. Lock chassis in this position using slide bar on top of magnet assembly (figure 1-3).

16. Inspect logic chassis connectors and wiring for loose or broken wires. Make sure all logic cards are firmly seated in connectors.

17. Lower logic chassis and secure chassis in place using support arm and two turnlock fasteners.

18. Remove carriage locking pin and place it in storage hole (refer to figure 1-3).

19. Close top cover and pack access cover.

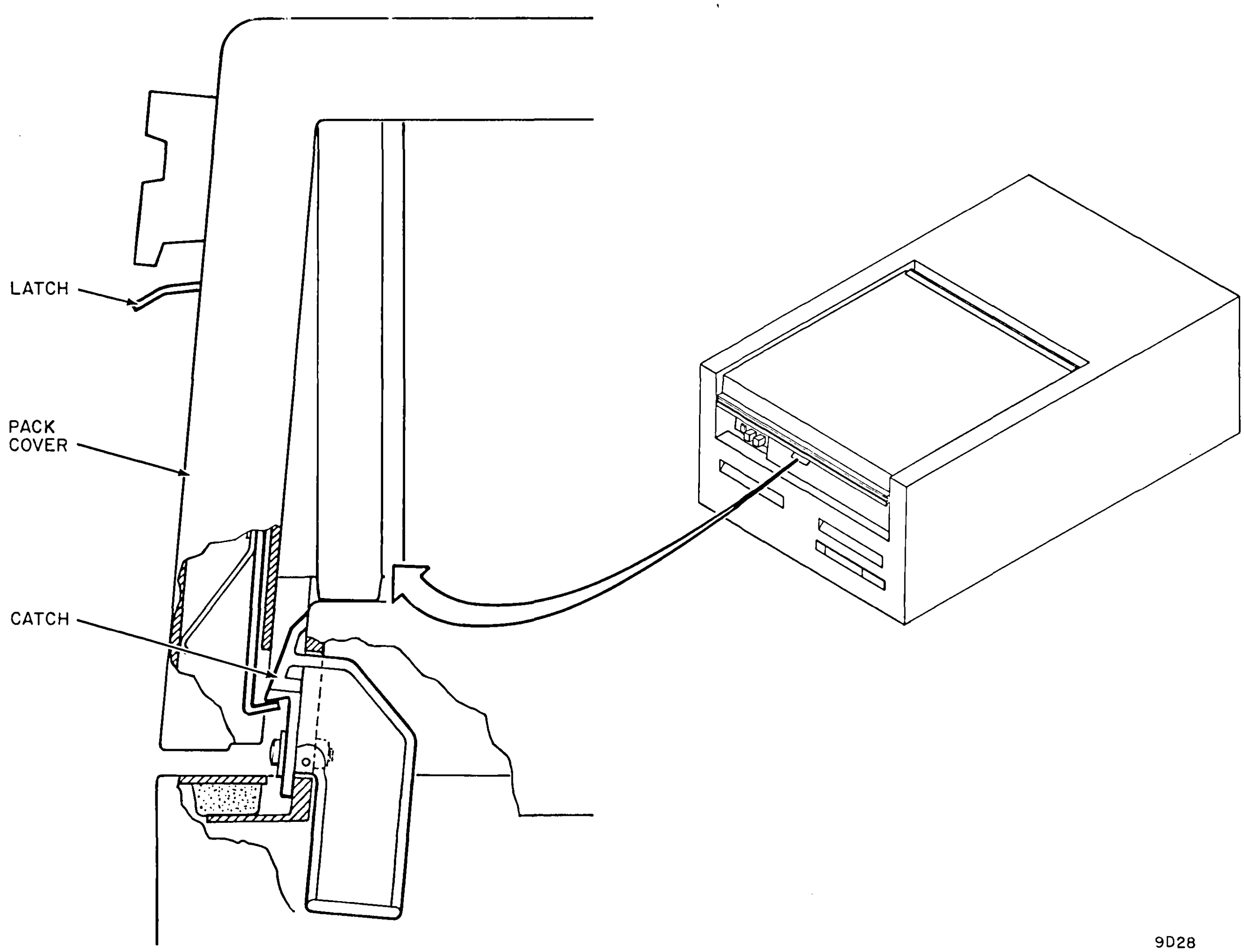


Figure 1-2. Pack Cover

20. On cabinet model, replace right side panel.

NOTE

If unit will not be placed on a false floor, install levelers before removing unit from skid.

21. Manually lift drive and remove skid from underneath.

CABINET INSTALLATION

GENERAL

The cabinet installation involved determining a suitable location and then leveling and aligning the unit once it is located.

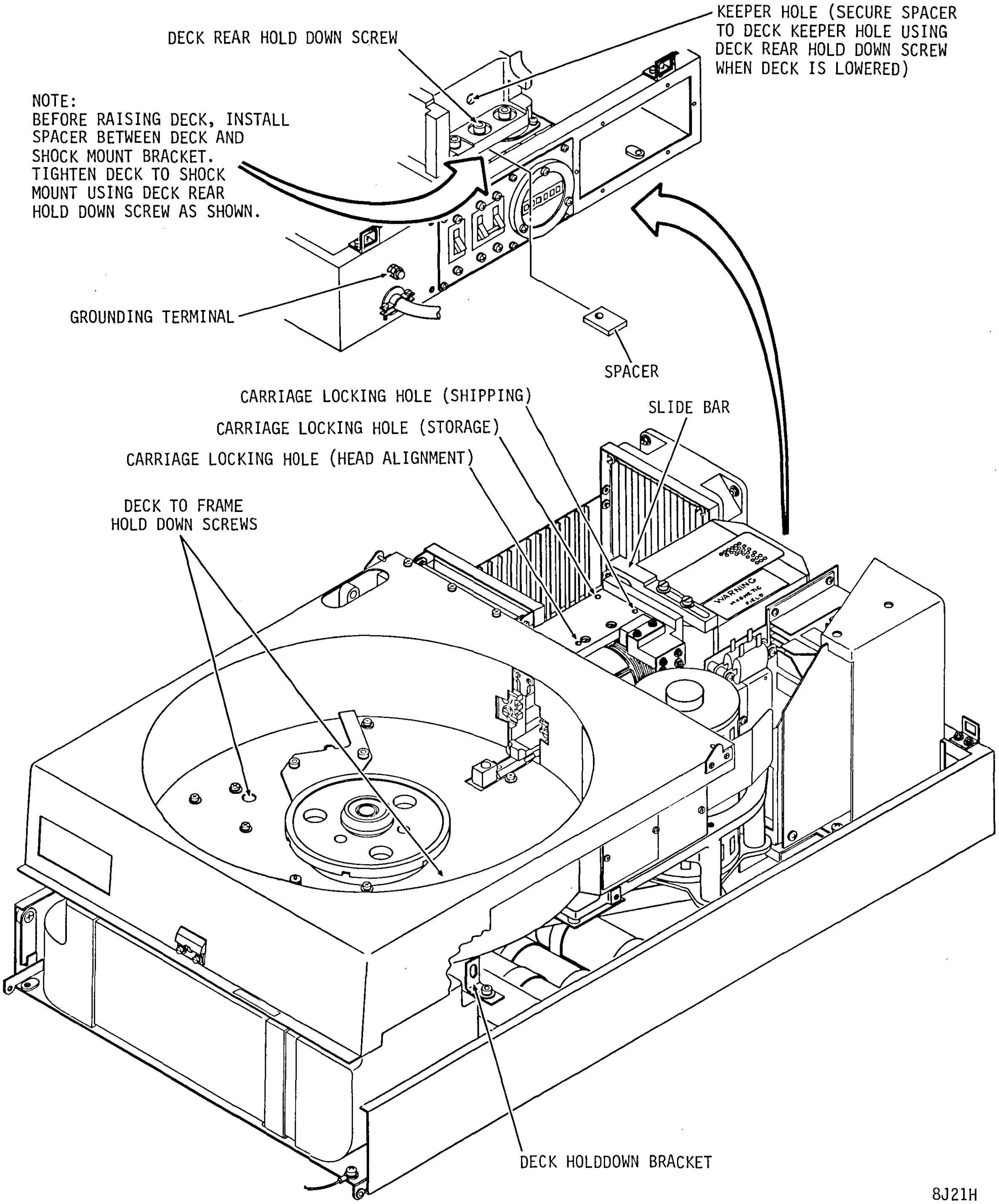


Figure 1-3. Drive Shipping Hardware

LOCATION

When the drive is installed, there must be enough clearance around the unit to permit access to it for maintenance. Table 1-1 and figures 1-4 and 1-5 give the size and space requirements of the drive.

TABLE 1-1. INSTALLATION REQUIREMENTS

Specification	Value
Cabinet	
Height	(36.2 in)
Width	(21.5 in)
Depth	(36.0 in)
Weight	(345 lb)
Drawer Mount	
Height	(11.2 in)
Width	(19.3 in)
Depth	(30.6 in)
Weight	(165 lb)

LEVELING AND ALIGNING

The following procedure describes the leveling and aligning of the cabinet.

1. Roll cabinet to designated location.
2. Turn down leveling pads until casters are completely off of floor.
3. Place spirit level on main deck so ends of level point to front and rear of deck. Level unit to height of other units.
4. Adjust leveling pads until surface is horizontal within three angular degrees.
5. Place spirit level on main deck so ends of level point toward sides.
6. Adjust leveling pads until surface is horizontal within three angular degrees.
7. Repeat procedure until main deck is horizontal within three angular degrees regardless of spirit level orientation.

POWER WIRING

SITE ELECTRICAL REQUIREMENTS

Drive power requirements are listed in table 1-2. Drive line current versus startup time is shown in figure 1-6.

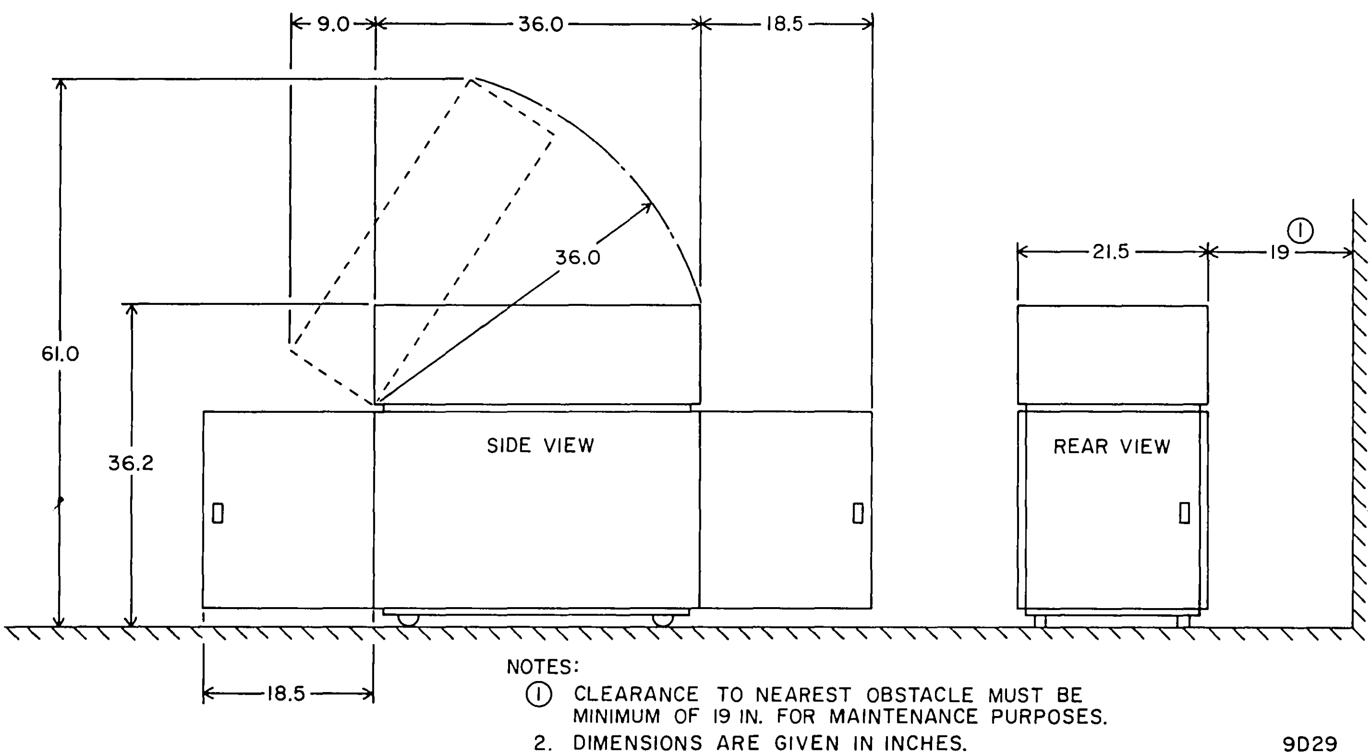


Figure 1-4. Cabinet Without Drawer Mount Space Requirements

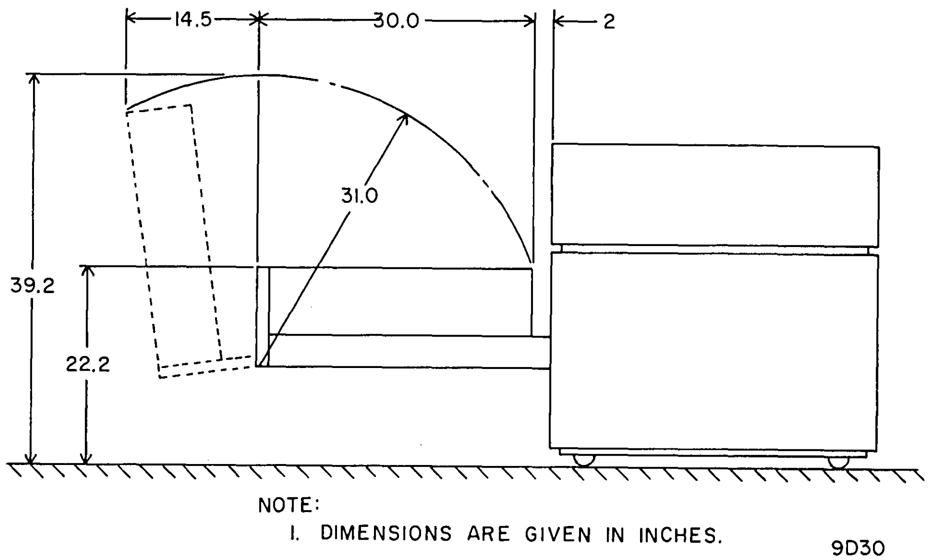


Figure 1-5. Cabinet With Drawer Mount Space Requirements

TABLE 1-2. POWER REQUIREMENTS

Specifications	Value			
AC Power Input Options	Voltage	Frequency	Phase	
	100 (±10) V ac	60 (+.6, -1.2) Hz	1	
	100 (±10) V ac	50 (+.5, -1) Hz	1	
	120 (+8, -18) V ac	60 (+.6, -1) Hz	1	
	220 (+15, -25) V ac	50 (+.5, -1) Hz	1	
	240 (+17, -27) V ac	50 (+.5, -1) Hz	1	
Power Used With Disks and Carriage in motion	Power Input	Max Line Current	Power Consumption	Power Factor
	100 V 60 Hz	6.2 A	0.55 KW	.80
	100 V 50 Hz	7.0 A	0.69 KW	.77
	120 V 60 Hz	6.6 A	0.47 KW	.70
	220 V 50 Hz	4.9 A	0.70 KW	.60
	240 V 50 Hz	5.1 A	0.75 KW	.57

Table continued on next page.

TABLE 1-2. POWER REQUIREMENTS (CONT'D)

Specifications	Value			
Power Used With Disks and Carriage at Rest	Power Input	Max Line Current	Power Consumption	Power Factor
	100 V 60 Hz	1.3 A	0.13 KW	0.9
	100 V 50 Hz	1.5 A	0.17 KW	0.9
	120 V 60 Hz	1.4 A	0.14 KW	0.9
	220 V 50 Hz	1.4 A	0.30 KW	0.9
	240 V 50 Hz	1.5 A	0.35 KW	0.9
Start Up Current	Refer to figure 1-6			

WARNING

Any 3 phase, 4 wire, wye circuit where over one half of the total load consists of electric discharge lighting, data processing (such as this unit), or similar equipment must meet the requirements given in the following topic. These requirements must be met in the United States, in order to comply with the National Electrical Code, and are recommended for installations in other countries. Failure to meet these requirements may result in hazardous conditions due to high currents (and heating) in the neutral conductors and transformers supplying the system.

SPECIAL REQUIREMENTS FOR 3 PHASE, 4 WIRE, WYE SITE POWER

General

This unit used single phase power. If the power originates from a 3 phase, wye branch or feeder circuit with a load as defined in the above warning, ensure that the circuit meets following specifications.

Specifications For Neutral Conductor

Always consider the neutral in the 3-phase, wye circuit as a current carrying conductor and ensure that it is no smaller than the line conductors.

Limiting Branch And Feeder Circuit Load Currents

Limit the maximum load current in each 3-phase, wye conductor (lines and neutral) to the values shown in table 1-2.1.

TABLE 1-2.1. CONDUCTOR LOAD CURRENT LIMITATIONS

Number of Conductors in Conduit, Cable, or Raceway	Limit to this Percentage of Value Specified by NEC* or Local or National Regulations
4 through 6	80%
7 through 24	70%
25 through 42	60%
43 and above	50%
* United States National Electrical Code.	

Power System Grounding

The site ac power system must have provisions for correct equipment safety grounding. All of the following conditions must be met.

1. The branch circuit supplying ac power to the drive must have safety ground provisions. Therefore, this current must include an insulated grounding conductor that is identical to the grounded and ungrounded branch circuit conductors. The insulated grounding conductor shall show either a green color or green with a yellow strip.

2. The grounding conductor specified in step 1 is to be grounded at the service equipment.

3. All power receptacles (including convenience outlets for oscilloscopes and other test equipment) must be at a common ground potential to prevent shock hazards if two equipments are touched simultaneously. Therefore, all attachment-plug receptacles in the vicinity of the drive are to be the grounding type; furthermore, the grounding conductors serving these receptacles are to be connected to the same grounding conductor that serves the drive.

System Grounding

The controller and its attached drives must be connected to earth ground. The permissible grounding schemes, listed in preferred order, are:

1. Controller and drives connected to qualified site floor ground. A qualified ground would be a floor grid where the horizontal and vertical members of the grid are mechanically secure and have ground straps or their equivalent joining them to assure a constant ground potential. In turn, the grid must be connected to earth ground. An alternate qualified floor ground is a grounding grid or grounding bus system provided under the false floor.

2. Controller and drives connected to otherwise qualified floor grid, except that floor grid is isolated from earth ground. In this case, controller is then connected to earth ground to ground the system.

3. No site floor grid available: controller and drives connected to each other in a daisy chain configuration. Controller connected to earth ground.

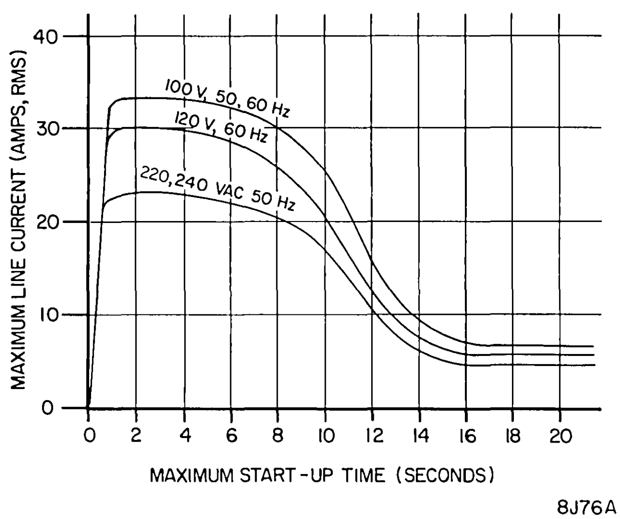


Figure 1-6. Line Current vs Start Up Time

Floor Grid Available

If a floor grid is available (schemes 1 or 2), each drive is to be individually connected to the floor grid. Ground each drive as follows:

1. Grounding terminal is mounted at the rear of unit, above the AC power cord. Route braided strap with free end into floor cutout.

2. Drill 11/32-inch hole in grid.

3. Secure strap lug to grid using screw (P/N 17901524) and lockwasher (P/N 10126403). Lockwasher goes under terminal lug.

Floor Grid Not Available

If a floor grid is not available, all of the drives must be connected to the controller in a daisy chain grounding configuration. In turn, the controller must be connected to earth ground.

The ground connections are via flat braided shielding (P/N 93267009). Cut this shielding to the lengths required to go from drive to drive,drive to controller,and controller to earth ground. Crimp and solder a terminal lug (P/N 40125601) to the end of each strap.

Earth ground at the site may be available at the main power distribution panel (if it is connected to building ground), at the steel plate in contact with the masonry below the panel (if the panel is not connected to earth ground), or to an earth ground bus. Connect one end of a prepared ground strap to the available ground.

Connect remainder of grounds as follows:

1. Grounding terminal is mounted at the rear of unit,above the AC power cord.

2. Attach two ground straps to this screw. One strap will go to each of the two closest drives. Tighten screws.

3. Repeat step 2 for remaining drives. Drive closest to controller is to be connected to controller ground.

4. Connect controller to earth ground.

AC Power Connections

Each drive (except the 220/240 Vac, 50 Hz units) receives its ac power via a 10-foot cable. This cable originates from line filter FL1 located in the rear of the drive below the power supply.

The 220/240 Vac, 50 Hz unit does not have an ac power connector, install connector to power (refer to figure 1-7) as follows:

- Green or green/yellow wire to Ground Terminal.

- Black to Phase One.

- White to Neutral Terminal.

The input power is available at terminal board TB1. This terminal board is located under the deck and ahead of the transformer, it is accessible by raising the deck. The drive is adapted to the desired input voltage option by wiring terminal board TB1 according to figure 1-8.

The power cable is routed out of the drive cabinet as shown in figure 1-9.

Signal Cabling

Each drive connects to the controller via two cables. These are designated the A cable and the B cable (refer to table 1-3 for pin assignments).

The B cable always connects directly to the controller. However, if more than one drive

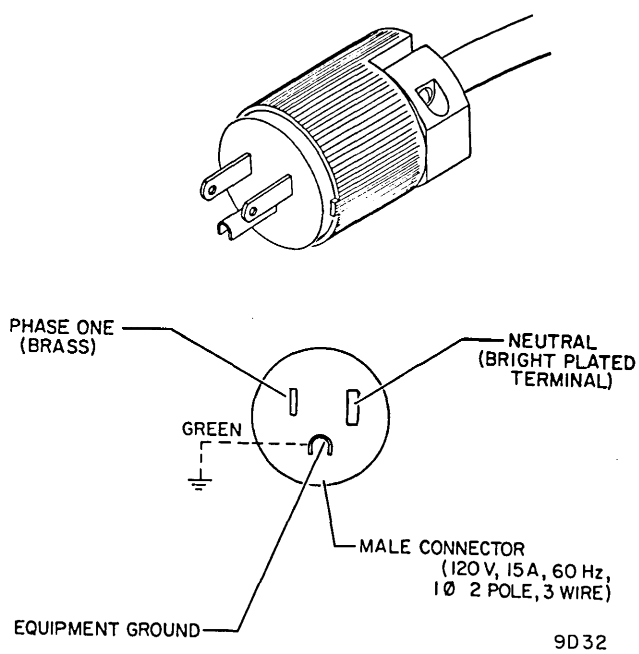


Figure 1-7. AC Power Plug

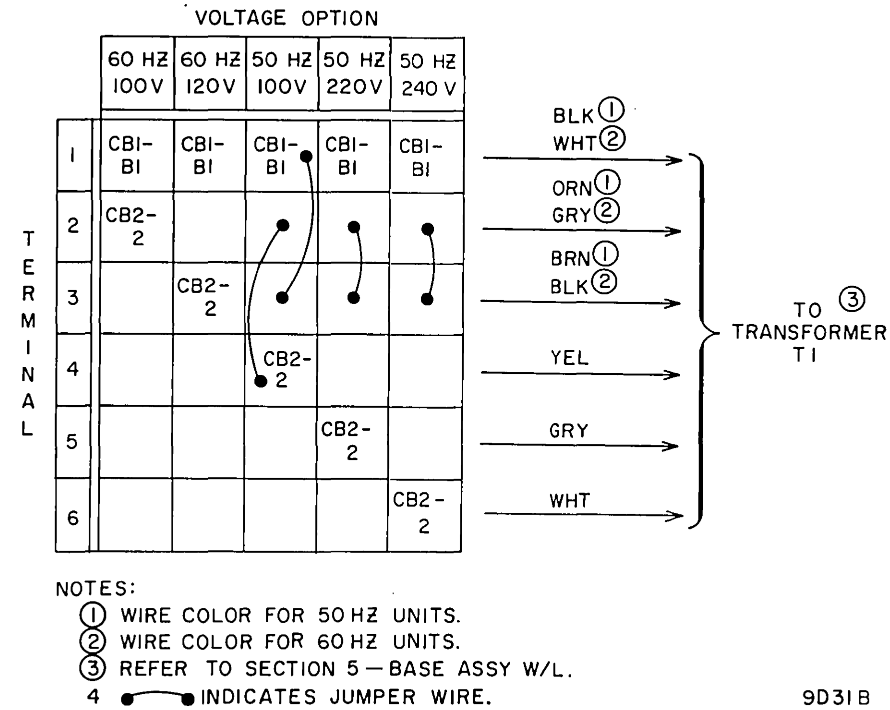


Figure 1-8. TB1 Input Wiring

is involved in the system, the A cable may be either star or daisy chain connected. Figure 1-10 shows both configurations.

When connected in a star configuration, each drive A cable connects directly to the controller and the extra A cable connector (used for daisy chaining) is terminated.

When connected in a daisy chain, the drives are connected as shown in figure 1-10. In this case, only the A cable of the first drive in the chain connects directly to the controller, and the others connect via the daisy chain. The last drive in the chain is left with an extra A cable connector and this is terminated.

Figure 1-9 shows a possible method of routing the cables within the cabinet. This figure shows the cabinet with a drawer mounted drive installed and the two drives connected in a daisy chain configuration. If the drives were connected in a star configuration the extra A cable connectors (J4) would be terminated.

For a list of cable and accessory part numbers, refer to table 1-4.

SECTOR PLUG INSTALLATION

The number of sector pulses generated by the drive for each revolution of the disk pack depends on the configuration of its sector plug. This plug is installed on the logic backpanel at card location A03 and its terminals have a one to one correspondence with the backpanel pins. This means that terminal 1A on the plug connects to pin 1A on the backpanel and so on.

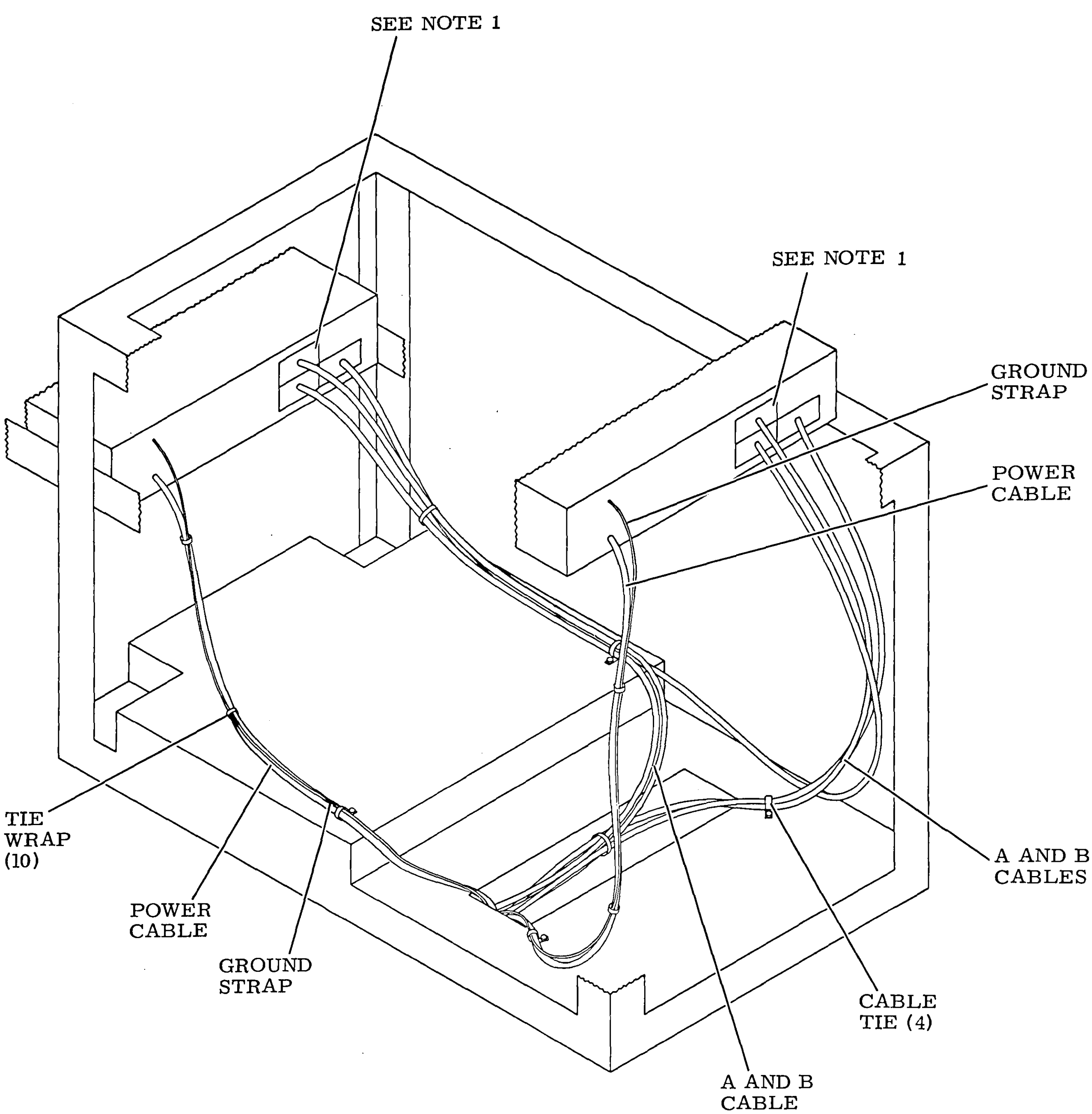
The plug furnishes preset inputs to the drives sector counter and table 1-5 shows the binary value of each sector plug terminal. The drive comes from the factory with its sector plug prewired for 64 sectors. If a different number of sectors is desired, it is necessary to rewire the plug.

Prior to rewiring the plug, the correct preset value for the counter must be determined. This is done using the following formula (refer to Publication Number 83324220 for more information).

$$4096 - \text{Length of Sector} = \text{Preset Value}$$

Where: length of sector

$$\frac{13440 \text{ (total dibits per revolution)}}{\text{Number of Desired Sectors}}$$



NOTES:

1. REPLACED BY TERMINATOR IF IT IS LAST DRIVE IN DAISY CHAIN OR STAR CONNECTED.

9D33D

Figure 1-9. Basic Cable Routing with Drawer Mount

TABLE 1-3. I/O CONNECTOR PIN ASSIGNMENTS

Cable A (J3,J4)		Cable A (J3,J4)		Cable B (J2)	
Pins	Function	Pins	Function	Pins	Function
1,4	Tag Gate Out	34,37	Bus Out Bit 5	A,B,C*	R/W Data
2,5	Tag Gate In	35,38	Bus Out Bit 6	H,J,E*	Write Clock
3,7	Bus In Bit 1	36,39	Bus Out Bit 7	M,N,K*	Servo Clock
8,12	Bus In Bit 4	40,43	Not used	AA,CC	Seek End
10,13	Index	41,44	Not used	BB,DD	Module Addressed
11,14	Bus In Bit 7	42,45	Bus In Bit 0		
15,18	Bus In Bit 2	46,49	Tag 1 (2^0)	EE,HH	Interrupt
16,20	Bus In Bit 5	48,51	Tag 2 (2^1)		
17,21	Bus In Bit 3	52,55	Tag 3 (2^2)		
22,25	Module Select Hold	53,56	Write Protect**		
23,26	Bus Out Bit 0	73	Remote Pick**		
24,27	Bus Out Bit 1	76	Remote Hold**		
28,31	Bus Out Bit 2	74,77	Sector	NOTES:	
29,32	Bus Out Bit 3	75,78	Bus In Bit 6	*Shield ground.	
30,33	Bus Out Bit 4			**S/C 10 and Above Only	

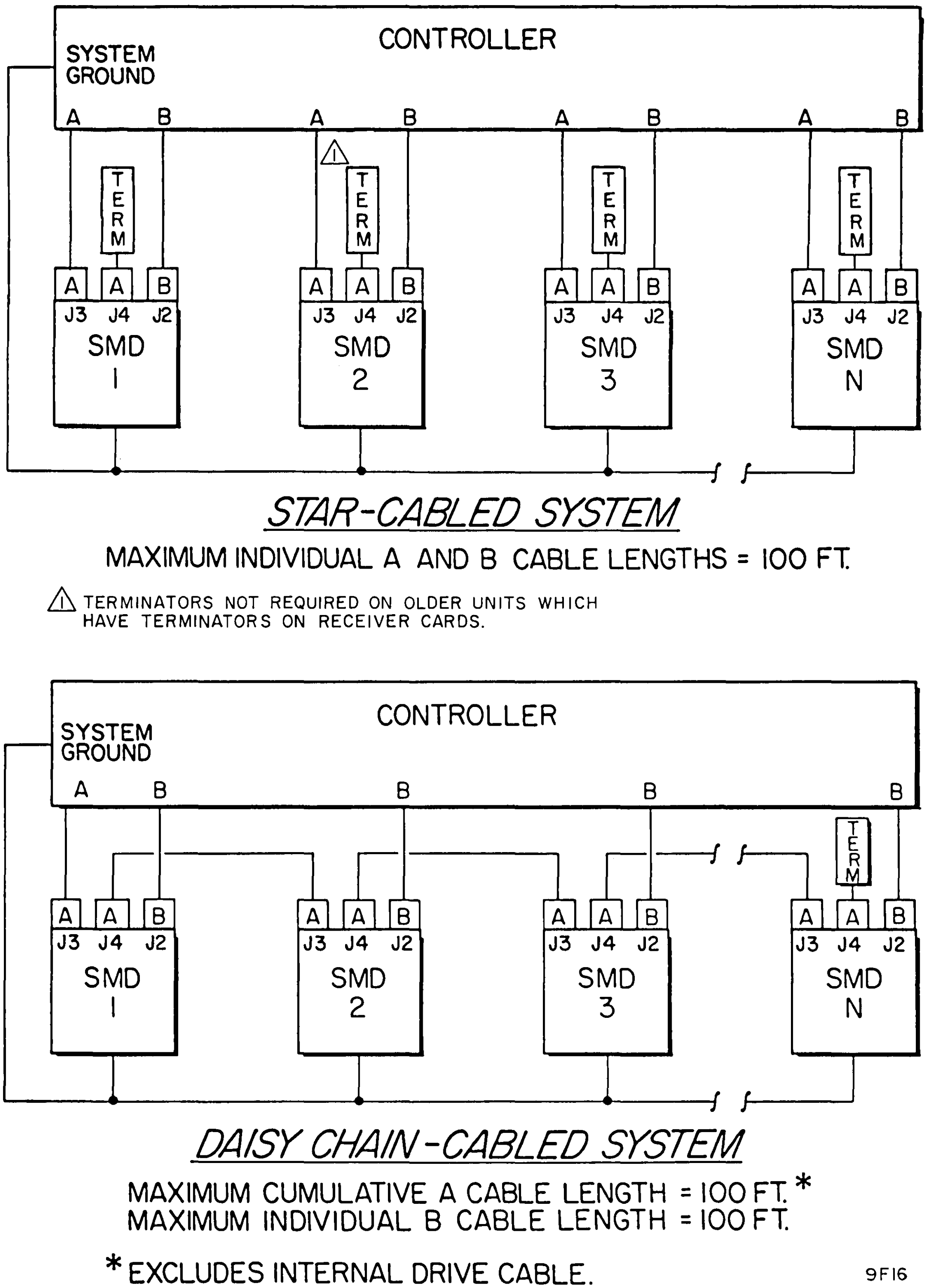


Figure 1-10. System Cabling

TABLE 1-4. ACCESSORIES

Cable and Accessories List				
Cable Length	A Cable * (Shielded)	A Cable (Unshielded)	B Cable * (Shielded)	B Cable (Unshielded)
1.53 m (5 ft)	77569702	77439102	47201700	75241300
3.05 m (10 ft)	77569703	77439103	47201701	75241301
4.58 m (15 ft)	77569704	77439104	47201702	75241302
6.10 m (20 ft)	77569705	77439105	47201703	75241303
7.63 m (25 ft)	77569706	77439106	47201713	75241313
9.16 m (30 ft)	77569707	77439107	47201704	75241304
10.7 m (35 ft)	77569708	77439108	47201714	75241314
12.2 m (40 ft)	77569709	77439109	47201705	75241305
I/O Plug Terminator - Part Number 40067209				
A Cable Straight-In Kit - Part Number 95050700**				

Notes:
*   Shielded A and B cables are used in high noise enviroments.
** Kit used to modify 90° connector (standard on factory units) to 180° connector.

Depending on the number of sectors desired, the sector length may or may not come out evenly (without a remainder). How this is taken into account when using the formula is explained in the following examples.

EXAMPLE 1:

a. 64 sectors are desired so sector length is: 13440/64 which equals 210. This means there will be 64 sectors each 210 dibits in length.

b. Substituting into the preset value formula: 4096 - 210 = 3886.

c. Referring to table 1-5, the plug is wired as follows:

2B(2^{11}) 2A(2^{10}) 3B(2^{9}) 3A(2^{8}) 9B(2^{5}) 13A(2^{3}) 14B(2^{2}) 14A(2^{1}) 3886	Should be a logical one and connect to terminal 5A (+5V)	8B(2^{7}) 8A(2^{6}) 9A(2^{4}) 15(2^{0}) 210	Should be a logical zero and connect to terminal 1A (GND)

TABLE 1-5. SECTOR PLUG WIRING

Plug Terminal	2B	2A	3B	3A	8B	8A	9B	9A	13A	14B	14A	15B
Binary Value	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Decimal Value	2048	1024	512	256	128	64	32	16	8	4	2	1
NOTE: Those terminals to be set to a logical one should be connected to terminal 5A (+5V). Those terminals to be set to a logical zero should be connected to plug terminal 1A (gnd).												

EXAMPLE 2:

a. 71 sectors are desired so sector length is: 13440/71 which equals 189 with a remainder of 21. This means there will be 71 sectors each 189 dibits in length and one sector (the last before index) 21 dibits in length.

b. Substituting into the preset value formula (note that the remainder of 21 is not used): 4096 - 189 = 3907

c. In this case the sector plug should be wired to preset the counter to 3907. The correct wiring is determined using table 1-5 (refer to example 1).

The procedure for wiring the sector plug is as follows (refer to figure 1-11 and table 1-5):

1. Remove the existing jumper wires from the plug.

2. Compute the desired sector length and preset value then determine the proper wiring by referring to table 1-5.

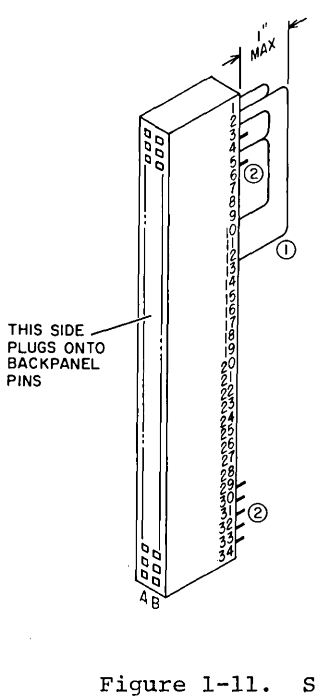
NOTE

In steps 3 and 4, use 24 AWG wire of the correct length with a contact crimped to each end. Refer to figure 1-11 for details.

3. Daisy chain together all the terminals that are to be a logical one and connect the daisy chain to terminal 5A (+5V).

4. Daisy chain together all the terminals that are to be a logical zero and connect the daisy chain to terminal 1A (ground).

5. Insert a wire and contact pin into all unused terminals in rows 1 through 6 and rows 30 through 34 (refer to figure 1-11).



NOTES:
1. JUMPER WIRE IS 24 AWG (CDC PN 24548305) AND HAS A CONTACT (CDC PN 94245607) CRIMPED ONTO EACH END.
2. INSERT WIRE AND CONTACT (CRIMPED TOGETHER) INTO UNUSED TERMINALS IN ROWS 1-6 AND 30-34.
3. TERMINAL 5A CONNECTS TO +5V ON BACKPANEL AND TERMINAL 1A CONNECTS TO GND ON BACKPANEL.

9D35

Figure 1-11. Sector Plug Installation

DRAWER MOUNT INSTALLATION

Perform the following procedure to install the drawer mounted drive into an acoustic cabinet. It is assumed that all power, ground and signal cables have been removed from the top mounted drive. Figure 1-12 shows the cabinet as it appears before the installation and indicated the parts that have to be removed before the drawer mount drive can be installed.

1. Remove and discard front door and its associated hardware from drive cabinet as follows (refer to figure 1-12).

   a. Remove ground strap.

   b. Lift out release pin from lower hinge and remove door.

   c. Remove both upper and lower hinges from drive cabinet.

   d. Remove front door latch.

2. Remove and discard rear door as follows:

   a. Disconnect ground strap from door.

   b. Disconnect fan cable from door.

   c. Lift out release pin from lower hinge and remove door.

3. Remove left and right side panels as follows:

   a. Remove ground strap.

   b. Loosen two quarter turn fasteners and lift side panel off.

   NOTE

   A convenient support for ballast installation is made by laying two, 2-inch by 4-inch boards on floor (2-inch edge against floor) and covering them with a piece of 1/2-inch plywood.

4. Position ballast beneath frame and attach ballast to underside of cabinet floor using four flat washers, lock washers, and screws. See figure 1-14.

5. Refer to figure 1-14 and install upper and lower front panels. Connect ground strap to lower front panel.

6. Loosely install catches using two flat washers, lock washers and screws for each. Position keeper latches so that distance from cut out to bottom of keeper latch is less than distance from cut out to top of keeper latch.

7. Perform Slide Assembly Installation procedure.

8. Install case assembly on drive.

9. Slide drive to its closed position and tighten hardware securing keeper latches. This ensures that keeper latches are properly aligned to case.

10. Install the I/O cables (refer to discussion on signal cabling).

11. Connect the power wiring and ground the drive (refer to discussion on power wiring).

12. Install new rear door as follows:

    a. Place door on hinges and install release pin.

    b. Install ground strap disconnected from old door in step 2 (refer to figure 1-15).

    c. Connect fan cable disconnected from old door in step 2 (refer to figure 1-15).

13. Replace side panels by reversing the procedure of step 3.

14. Proceed to initial checkout and startup of the drive (refer to discussion on initial checkout and startup).

RACK MOUNT OPTION INSTALLATION

GENERAL

The rack mount option enables the standard SMD base assembly (with special case assembly) to be mounted in a 19-inch standard EIA rack. The depth of this type of rack shall be 36 inches minimum. The features of this type of mounting are:

- Slides have built-in stop (at 22 inches) in the pack access position.
- Slides have built-in locks (at 32 inches) in the maintenance position.

ASSEMBLY INSTRUCTIONS

1. Perform Slide Assembly Installation procedure.

2. Loosely install right and left keeper latches using two screws each. Orient keeper latches so that short leg of each keeper latch protrudes in the lowest position (protruding leg then forms bottom of L-shaped keeper latch).

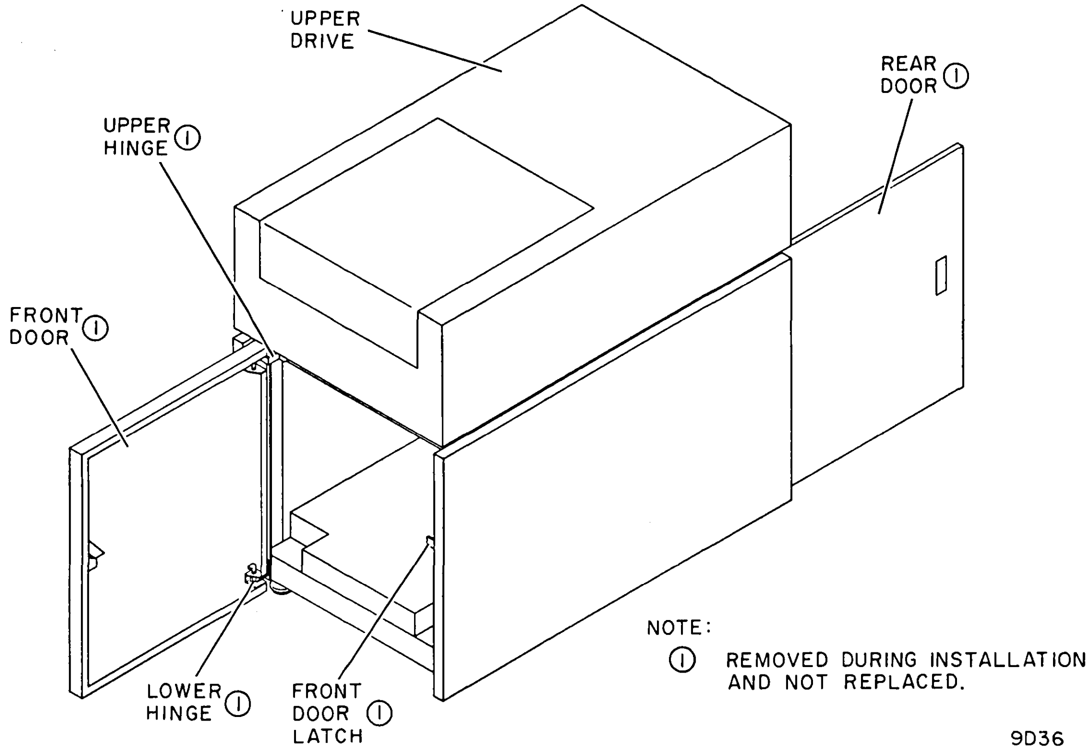


Figure 1-12. Cabinet Before Drawer Mount Installation

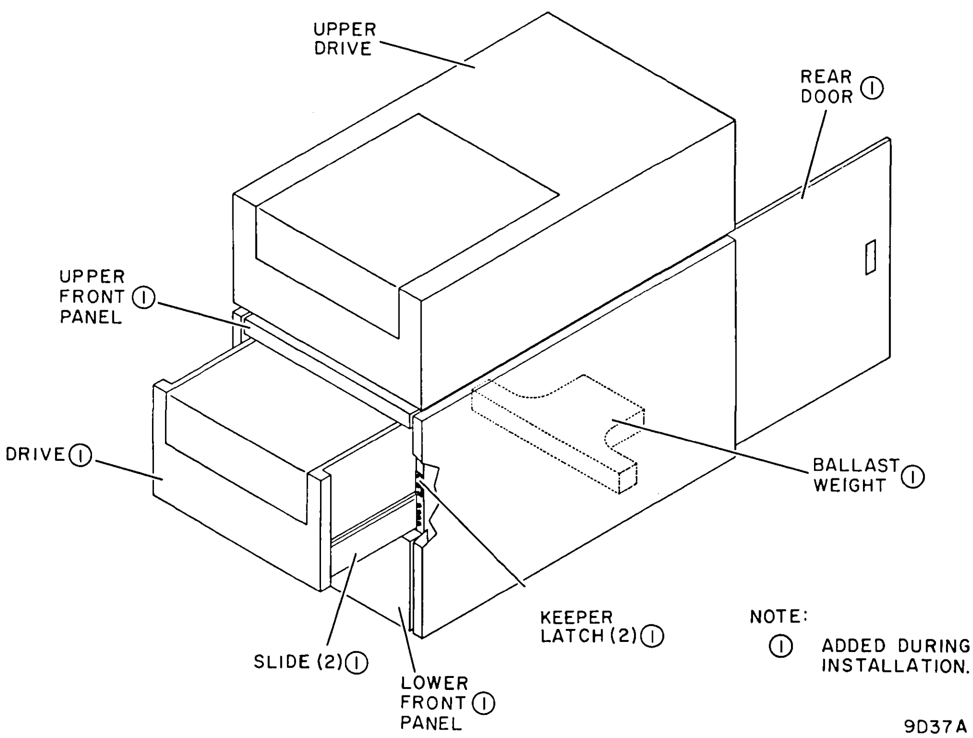


Figure 1-13. Cabinet After Drawer Mount Installation

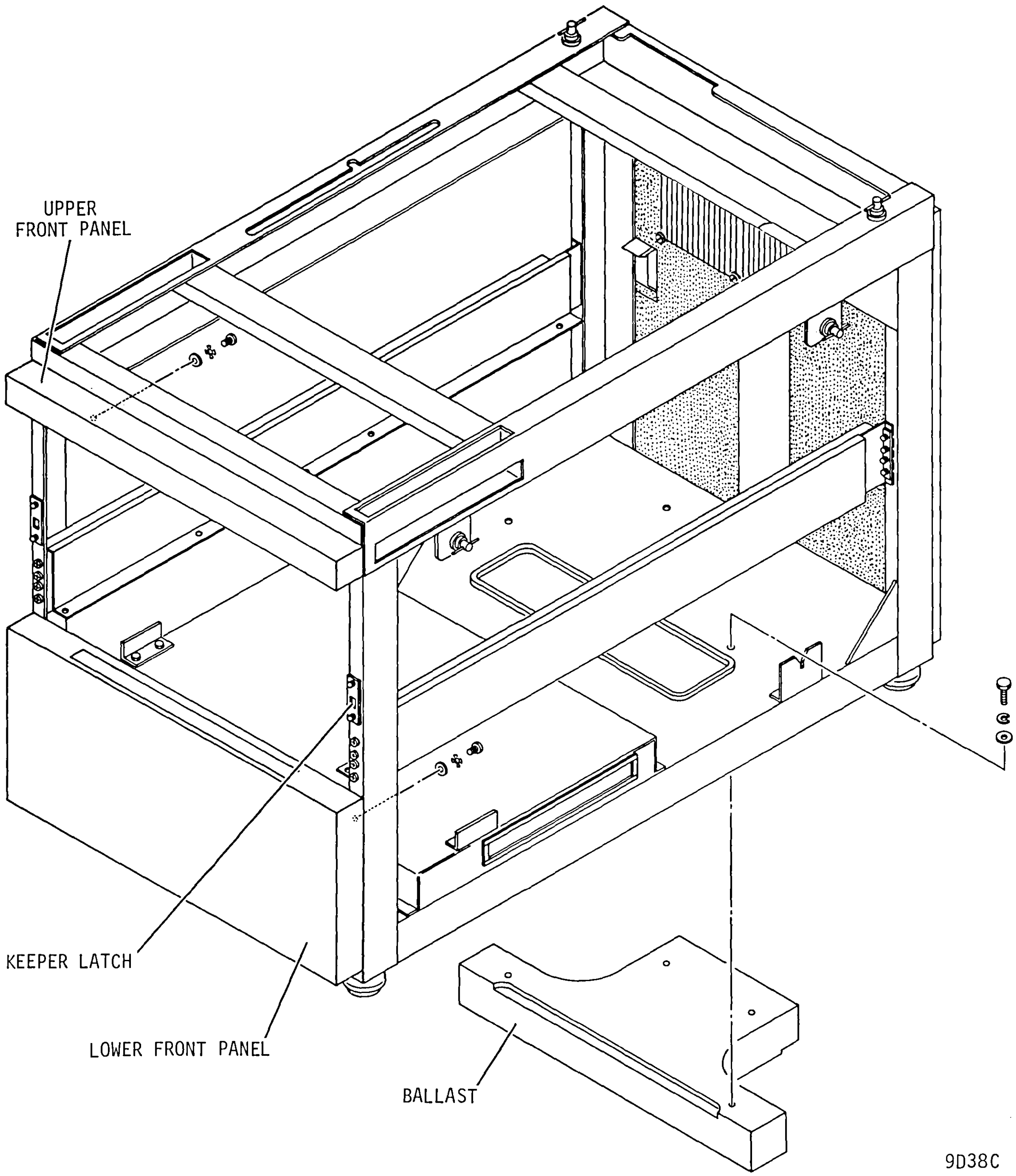


Figure 1-14. Ballast and Front Panel Installation

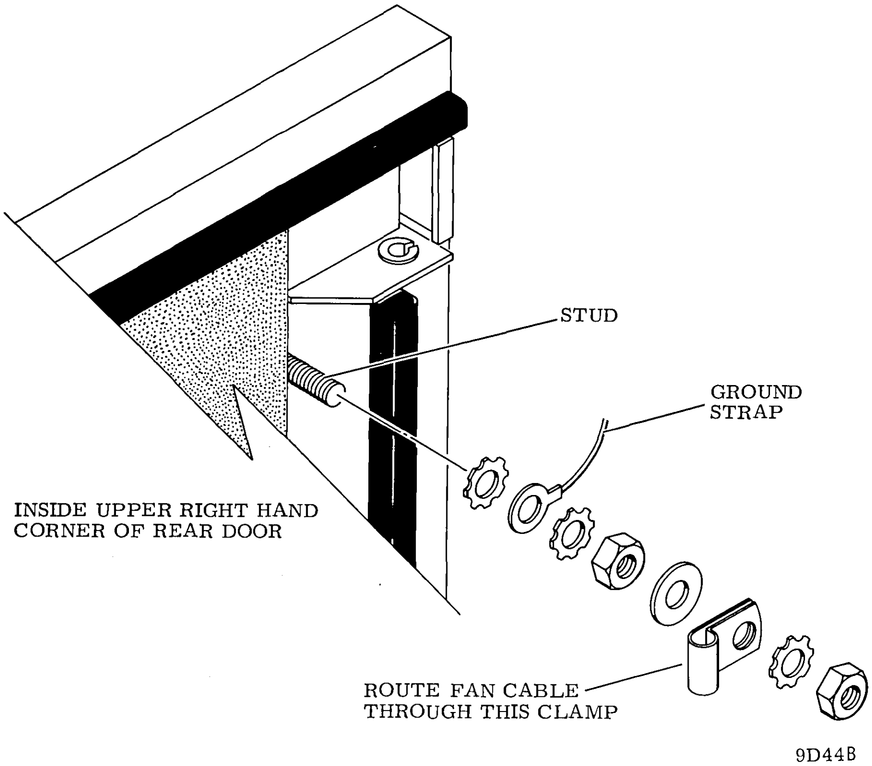


Figure 1-15. Rear Door Ground/Fan Cable Installation

3. Install case assembly on drive.

4. Slide drive to its closed position and tighten hardware securing keeper latches. This ensures that keeper latches are properly aligned to case.

SLIDE ASSEMBLIES INSTALLATION

Install slide assemblies as follows:

1. Loosen adjusting screws and nuts securing rear recess bracket to main bracket so that slide assembly can be adjusted. Refer to figure 1-16.

2. Push brackets into fully closed position.

3. Loosely attach nut plates to frame using four screws and lock washers each.

4. Extend main and rear recess brackets of slide assembly and place slotted ends of brackets between nut plates and frame. Slide assemblies must be positioned with quick disconnect flanges at bottom and facing each other.

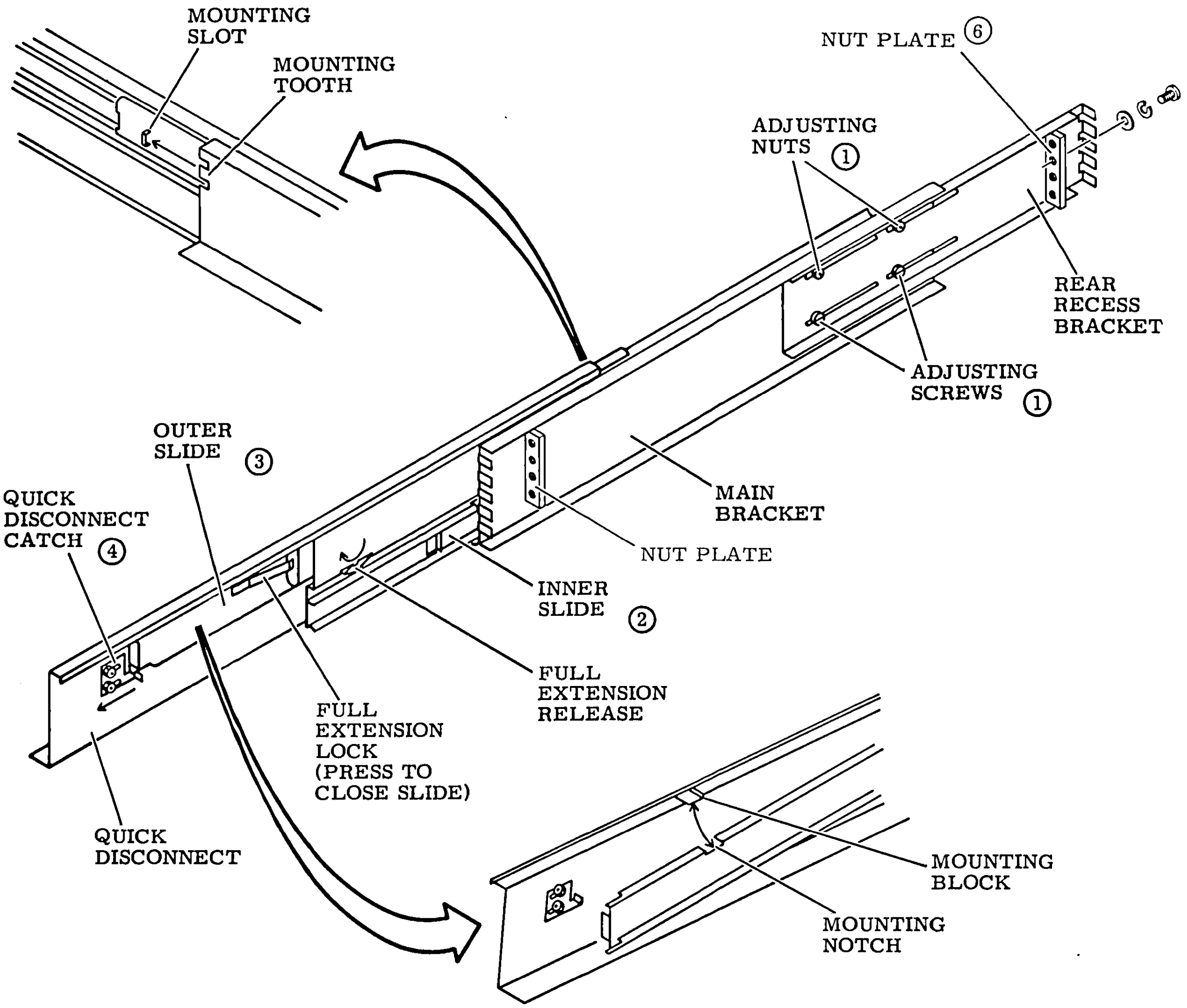
5. Ensure that slide assemblies are aligned and parallel, then tighten mounting hardware securing each end of slide assemblies to frame.

6. Extend slide assemblies to full extension as follows (refer to figure 1-16). Pull out inner slide until it stops, then depress full extension release and extend outer slide until it locks in fully extended position.

7. Loosen two nuts securing each quick disconnect keeper latch and then slide keeper latch forward. See direction arrow in figure 1-16.

8. Lift quick disconnect enough to disengage mounting block (on disconnect) from mounting notch (on slide), then pull quick disconnect forward until mounting tooth slips out of mounting slot.

9. If drive has mounting pads on the bottom, remove them.



NOTES:

1. ALLOW REAR RECESS BRACKET ADJUSTMENT.
2. LOCKS IN EXTENDED POSITION WHEN OUTER SLIDE IS FULLY EXTENDED.
3. EXTENDED BY PRESSING FULL EXTENSION RELEASE. FULL EXTENSION LOCK SNAPS OUT WHEN THIS SLIDE IS FULLY EXTENDED.
4. LOOSENING NUTS ALLOWS CATCH TO MOVE IN DIRECTION OF ARROW THUS ALLOWING QUICK DISCONNECT TO BE REMOVED.
5. ASSEMBLY SHOWN IS FOR RIGHT SIDE OF DRIVE.
6. NUT PLATES, WHICH ARE FURNISHED WITH SLIDE, ARE SUPPLIED WITH EITHER HOLES CENTERED IN THE NUT PLATE OR HOLES OFFSET FROM THE CENTER OF THE NUT PLATE. ON NUT PLATES WITH OFFSET HOLES, INSTALL NUT PLATES SO HOLES ARE CLOSED TO THE BRACKETS.

9G28A

Figure 1-16. Slide Assembly

NOTE

For ease of assembly and to prevent damage to case assembly, remove case before installing drive on slide assemblies.

10. Using four countersunk flat-head screws and countersunk washers on each side, attach quick disconnects to drive's base.

CAUTION

Before mounting drive ensure that all slide assembly mounting hardware is secure. Use two people to lift drive on to slides. When installing drawer-mounted drive, use care not to exert undue downward pressure or frame may tip forward.

11. Carefully lift drive over full extended slide assemblies. Engage mounting teeth of quick disconnects with mounting slots of outer slides. Seat mounting blocks of quick disconnects into mounting notches of outer slides.

12. Slide quick disconnect keeper latches toward rear until they are under outer slides. Tighten nuts to secure keeper latches. This locks the drive to the slide assemblies.

13. Press in (to release) full extension locks and then push drive all the way in and out several times to ensure that it moves freely. If binding occurs, check slide assemblies for proper alignment.

INITIAL CHECKOUT AND STARTUP

This procedure assumes that all of the preceding procedures have been completed. Before performing this procedure, become familiar with all preventive maintenance procedures in section 2, with the safety precautions and maintenance preliminary conditions specified in section 3, and with all operating instructions in section 2 of publication number 83317300.

1. Set AC and DC power circuit breakers to OFF.

2. Remove dust or dirt from interior of shroud and cabinet per Clean Shroud and Spindle procedure of section 2.

3. Open cabinet top cover.

4. Remove logic chassis card cover.

5. Verify that all logic chassis cards are firmly seated in their connectors.

6. Install logic chassis card cover.

7. Verify that drive is connected to external power source and that external circuit breaker (if any) is on.

8. Turn on AC circuit breaker. The main blower motor shall start.

9. Set front panel start switch to off.

10. Open top cover from rear.

11. Remove black voice coil wire.

12. Turn on POWER SUPPLY circuit breaker. The logic fan shall start.

13. Install clean scratch pack as directed in section 2 of publication number 83317300.

14. Press the START switch. Observe the following:

    a. Start indicator lights.

    b. Spindle motor starts.

    Purge unit in this mode for 10 minutes.

15. Stop unit and replace voice coil wire.

CAUTION

If abnormal heads load is observed, power down unit and have a qualified CE inspect heads and disk pack for damage.

16. Press START switch. Observe the following:

    a. START indicator lights.

    b. Spindle motor starts.

    c. Heads load.

17. Perform head/arm alignment procedure (refer to Section 3).

18. Perform required controller/system checks.

19. Close cabinet top cover.

SECTION 2

PREVENTIVE MAINTENANCE

INTRODUCTION

Performance of the drive is dependent on the proper and timely execution of a preventive maintenance routine. Such a routine is provided by the Preventive Maintenance Index (table 2-1).

The index consists of six levels based on a calendar period or hours of operation (whichever comes first). The elapsed time meter keeps a cumulative record of hours of operation. Perform preventive maintenance in accordance with the indication of this meter. The Procedure column (table 2-1) lists the title of the paragraph containing the required instructions.

The following levels of scheduled preventive maintenance are required:

Level 1 - Weekly or 150 hours (no preventive maintenance scheduled)

Level 2 - Bimonthly or 1000 hours (no preventive maintenance scheduled)

Level 3 - Quarterly or 1,500 hours

Level 4 - Semiannually or 3,000 hours

Level 5 - Annually or 6,000 hours (no preventive maintenance scheduled)

Level 6 - Biennially or 9,000 hours

MAINTENANCE MATERIALS

The material used in the procedures of this section are listed in table 3-1.

TABLE 2-1. PREVENTIVE MAINTENANCE INDEX

Level	Est.Time (Minutes)	Procedure
4	2	Inspect actuator assembly
4	5	Clean primary filter*
4	2	Check power supply outputs
4	1	Clean shroud and spindle
4	2	Clean and lubricate lockshaft
4	5	Clean carriage rails and bearings
6	20	Replace absolute filter*

* Intervals are maximum times. Preventive maintenance may be required more frequently depending on dust contamination level of operating area.

LEVEL 4 MAINTENANCE PROCEDURES

INSPECT ACTUATOR ASSEMBLY

1. Open pack access cover.
2. Open cabinet top.
3. Inspect entire actuator for presence of dust and other foreign materials. Pay particular attention to the following areas:

   a. Circular cutouts in face of magnet assembly (receives voice coil).

   b. Rail surfaces (particularly horizontal surfaces) of carriage track on which carriage and bearing assembly travels.

4. Use lint-free gauze dampened with media cleaning solution (not soaked) to remove deposits or attracted particles. Refer to Clean Carriage Rails and Bearings procedure.

CLEAN PRIMARY FILTER (ALL UNITS EXCEPT 2X ACOUSTIC)

1. Remove air filter (figure 2-1) by lifting upward so that bottom edge clears retaining trough. Pull filter towards you and out of trough.
2. Agitate filter in mild detergent solution. Rinse in reverse direction with a low pressure nozzle.
3. Shake any excess water from filter and allow filter to dry before proceeding.
4. Replace filter in drive.

CLEAN PRIMARY FILTER (2X OPTION ONLY)

1. Raise case assembly.
2. Remove hardware securing filter holddown flange and filter to case assembly (figure 2-2). Remove filter holddown flange.
3. Remove air filter from top cover by lifting upward so the bottom edge clears retaining trough. Pull bottom of filter towards you and out of top trough.
4. Agitate filter in mild detergent solution. Rinse in reverse direction with a low pressure nozzle.
5. Shake excess water from filter and allow filter to dry before proceeding.
6. Replace filter in drive.
7. Install holddown flange and install washers and nuts removed in step 2.

CHECK POWER SUPPLY OUTPUTS

Perform Output Voltage Check Procedure (see Trouble Analysis Aids Section of this manual).

CLEAN SHROUD AND SPINDLE

1. Stop spindle motor.
2. Open pack access cover.

CAUTION

Keep disk pack at least three inches away from any part of the magnet assembly.

3. Remove disk pack.

CAUTION

Bearing damage can occur if alcohol runs into spindle.

4. Clean shroud with a lint-free gauze that is slightly dampened with head cleaning solution. Wipe shroud to remove all dirt and smudges. Thoroughly wipe spindle surface.
5. After cleaning shroud, use a wad of adhesive-type tape and pick up any particles that were not picked up with gauze. Make certain that all particles are removed from interior of shroud.

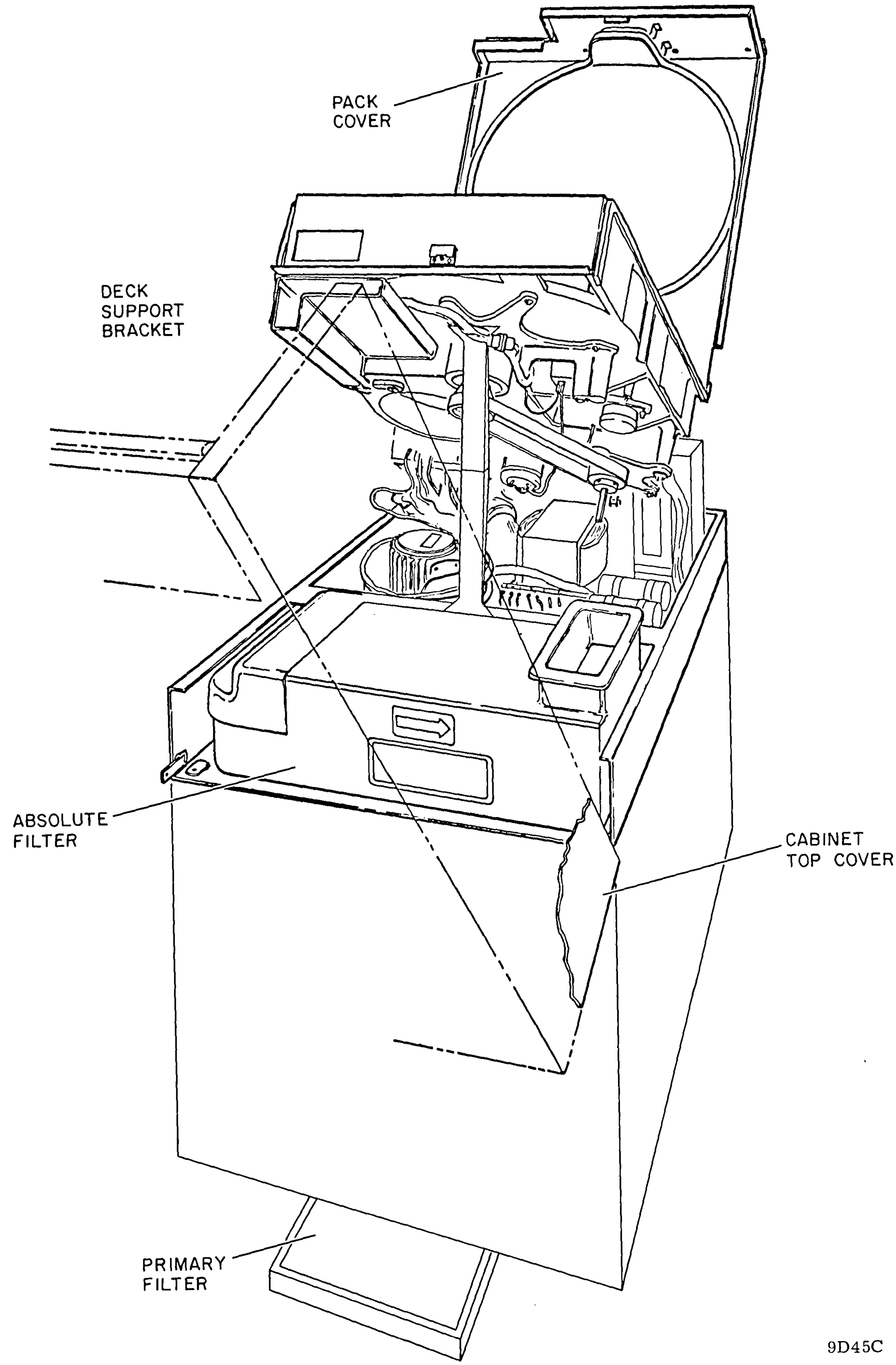


Figure 2-1. Air Filter Locations
(All Units except Acoustic 2X)

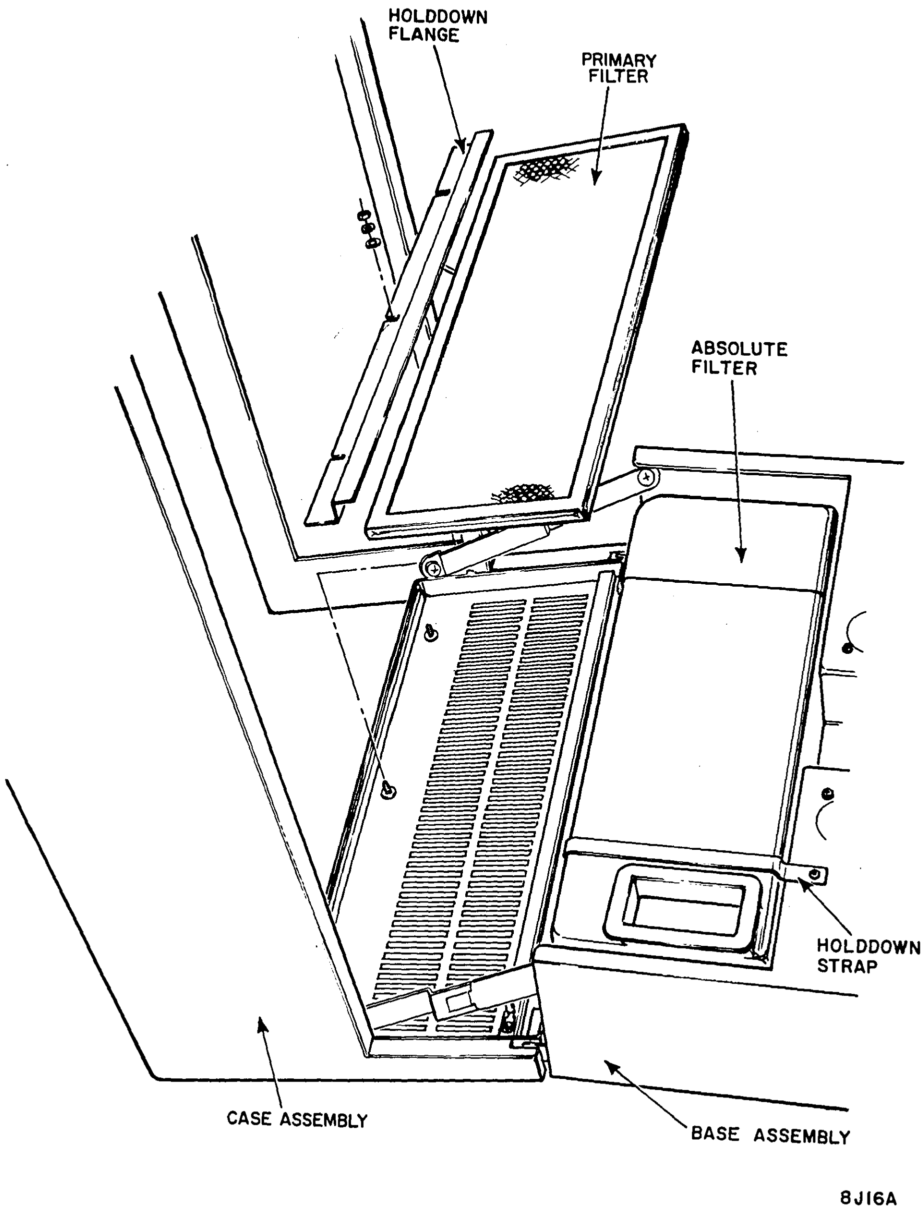


Figure 2-2. Cabinet Filters
(Acoustic 2X only)

CLEAN AND LUBRICATE LOCKSHAFT

1. Stop spindle motor.
2. Open pack access cover.
3. Remove disk pack.
4. Use lint-free gauze and a brush or sharp instrument to clean lockshaft threads on top of spindle.
5. Apply a thin coat of lubricant paste to threads.

CAUTION

Inspecting and cleaning the rails and bearings is a delicate procedure that should be performed only by qualified service personnel.

CLEAN CARRIAGE RAILS AND BEARINGS

1. Turn off UNIT POWR circuit breaker.
2. Remove cabinet top cover.
3. Open pack access cover.
4. Remove disk pack

CAUTION

If, when performing step 5, it is necessary to use head cleaning solution, use extreme caution not to get any solution into the bearings.

5. Using a clean, dry clean swab or Q tip, clean all rail and bearing surfaces (figure 2-3). In some cases, it may be necessary to dampen (not soak) the swab or Q tip with head cleaning solution. It is necessary to manually move carriage to gain access to all surfaces. Do not move carriage so far that heads load.
6. Wipe rails and bearing surfaces with dry gauze.
7. Check for cleanliness by manually moving carriage. If any slight resistance to free rolling is encountered, repeat steps 4 and 5.

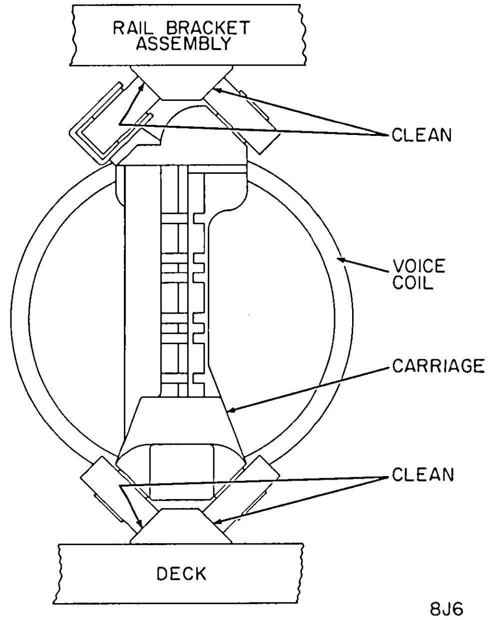


Figure 2-3.
Carriage Rails and Bearings.

LEVEL 6 MAINTENANCE PROCEDURES

REPLACE ABSOLUTE FILTER

An adequate supply of clean air to the pack area is essential to proper operation of the drive. The absolute filter traps all dirt particles too small to be stopped by the primary filter. Eventually the filter becomes too clogged to yield a sufficient airflow, and it must be replaced. Its useful life depends on the drives operating environment.

The user has two options: (1) replace the absolute filter at fixed intervals dependent on site environment or (2) obtain a pressure gauge (see table 3-1) and replace the absolute filter when it fails the testing procedure given below.

With the first option, replacement of the absolute filter is required once every two years when the drive is operated in a computer room environment. If the drive is operated in something other than a computer room environment, absolute filter replacement is required more often. In a non-computer room environment, it is suggested that the absolute filter be replaced every year or whenever there is doubt about the ability of the filter to pass air into the shroud area.

With the second option, maintenance personnel can periodically check the airflow through the absolute filter to determine the proper time for filter replacement. Regardless of a planned testing schedule, testing should be performed whenever there is doubt about the ability of the filter to pass air into the shroud area.

The following describes testing and replacement of the absolute filter.

Testing Absolute Filter

1. Remove power from the drive.
2. Gain access to absolute filter and determine whether filter has a hole and plastic plug for test purposes. If not,
   a. Remove filter from drive.
   b. Drill a 0.25 inch (6.35 mm) hole in the location shown in figure 2-4.
   c. Thoroughly clean shavings from filter before reinstalling it in drive.
3. Remove plastic plug and insert tubing attached to the differential pressure gauge (refer to list of Maintenance Tools and Materials).
4. Apply power to drive and load heads.
5. If pressure is 0.5 inch-water or less, filter should be replaced. If pressure is above 0.5 inch-water, filter need not be replaced at this time.
6. Remove tubing and insert plug. (Spare plastic plugs are included in the gauge test kit.) The plastic plug must be inserted at all times except when making pressure measurements.
7. Return drive to normal operation.

Replacing Absolute Filter

1. Remove power from drive and raise deck to maintenance position.
2. Remove screw and lockwasher securing filter retaining bracket (see Figure 6-15 in Section 6).
3. Remove bracket by pivoting it toward front of drive and disenaging flange on bracket from slot in base pan.
4. Remove absolute filter by pulling it toward front of drive. It may be necessary to jiggle filter to disengage it from blower motor outlet.
5. Wipe base pan clean in area under absolute filter and around blower motor outlet.
6. Install new filter by sliding it in from front of drive and engaging it in blower motor outlet.
7. Install filter retaining bracket and secure with screw and lockwasher.
8. Return deck to normal operating position.
9. Set circuit breaker to On and allow blowers to purge unit for at least five minutes.

NOTE

If a pressure gauge is not available, skip step 10 and return drive to normal operation.

10. Perform Testing Absolute Filter procedure.

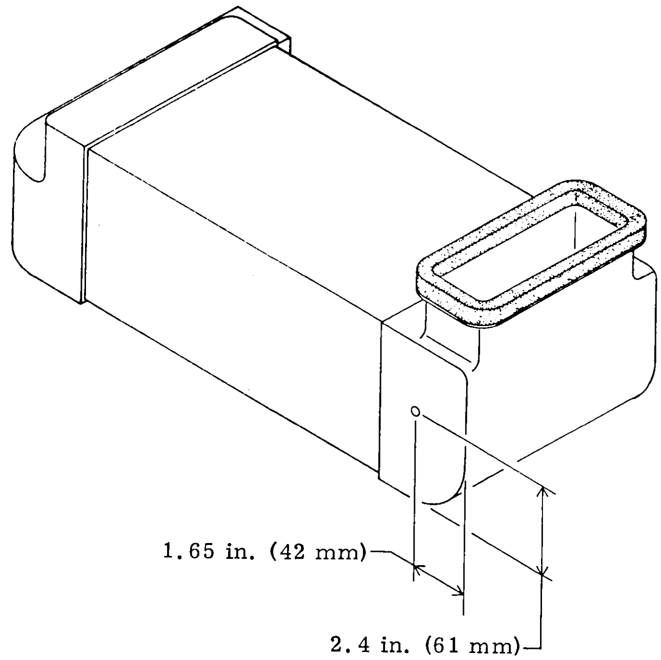


Figure 2-4. Drilling of Absolute Filter

SECTION 3

CORRECTIVE MAINTENANCE

CORRECTIVE MAINTENANCE 3

INTRODUCTION

This section contains instructions for drive corrective maintenance. This information is provided in the form of general maintenance information, drive tests and adjustments, trouble analysis aids, and repair and replacement procedures.

SECTION 3A

GENERAL MAINTENANCE INFORMATION

GENERAL

Maintenance information is provided to aid in the repair of functionally deficient drives. Tests are performed to isolate causes of drive failures such as:

- Inability to perform required adjustments.
- The occurrence of accessing failures.
- The occurrence of read recovery or writing malfunctions.

In general, before performing any drive adjustments or maintenance procedures, install a scratch pack or its equivalent on the drive and switch the drive to an "off-Line" mode of operation to prevent system interference.

NOTE

The paragraphs following safety precautions describe, in general terms, the methods used for gaining access to the various servicing areas of the drive. Once these procedures have been described, they will not be repeated in subsequent maintenance instructions. Therefore, maintenance personnel are urged to read through the general procedures at least once to become familiar with these standard procedures.

WARNINGS AND PRECAUTIONS

Observe the following warnings and precautions at all times. Failure to do so may cause equipment damage and/or injury.

- Use care while working with power system. Line ac voltages are present at AITB1.
- Keep hands away from actuator during seek operations and when reconnecting leads to voice coil (under certain conditions, emergency retract voltage may be present, causing sudden reverse motion and head unloading).
- When performing head alignment utilize the carriage locking pin to prevent personal injury.
- Use caution while working near heads. If heads are touched, fingerprints can damage them. Clean heads immediately if they are touched.
- Keep pack access cover closed unless it must be open for maintenance. This prevents entrance of dust into pack area.
- Keep all watches, disk packs, meters, and other test equipment at least two feet away from voice coil magnet when case assembly is raised.
- Use scratch pack for maintenance procedures, do not use data pack; otherwise customer data may be destroyed.
- Do not use CE alignment disk pack unless specifically directed to do so. These packs contain prerecorded alignment data that can be destroyed if test procedure requires drive to write. This alignment data cannot be generated in the field.
- Install deck rear holddown screw and spacer before raising deck assembly and installing support bracket. Remove screw and spacer and install in keeper hole (in back of deck) after deck assembly is back in operating position.
- Do not remove any logic card without first turning POWER SUPPLY circuit breaker off.
- If power to spindle motor is lost while heads are loaded and voice coil leadwire is disconnected, immediately manually retract carriage. Otherwise heads will crash when disk speed is insufficient to permit heads to fly.
- If drive fails to power down when START switch is pressed, disconnect black voice coil lead wire and manually retract carriage before troubleshooting malfunction.
- Observe all precautions listed under Electrostatic Discharge Protection and Head/Disk Special Precautions and Procedures.

HEAD/DISK SPECIAL PRECAUTIONS AND PROCEDURES

GENERAL

To maintain the high data integrity of the drive, it is necessary to follow certain special precautions and procedures pertaining to the disk pack and heads. These precautions and procedures will minimize the possibility of destructive head to disk contact (head crash) and subsequent loss of data. In addition to preventive measures, these discussions also describe methods of detecting and recovering from a head crash should one occur.

PRECAUTIONS

There are five primary variables that cause the great majority of head crashes. These are 1) the disk drive, 2) the disk pack, 3) the environment, 4) the maintenance and 5) the operator of the disk drive. A list of precautions that can be taken to prevent head crashes will be given for each variable.

1. Disk Drive

   - Check the action of the pack access cover latch as it is closed. Latching should occur only after the cover seal has been compressed slightly. The pumping action of the spinning disk pack can cause dirt and dust particles to be drawn in to the shroud if the cover is not sealed at all points. Using a strip of paper (dollar bill size), check the pack access cover-shroud seal by opening the pack access cover and laying the slip of paper on the shroud, then closing the cover (latched). Resistance should be felt while trying to withdraw the paper. Check at multiple places on each side of the shroud.

   - Check for adequate positive pressure air flow of 0.5 inches of water (see Replace Absolute Filter procedure).

   - Make certain the wood shipping block is removed and the coarse filter is installed in its place. Make certain the coarse filter is not plugged.

   - Make certain the shroud area is clean. Look for possible foreign materials and if present find the source and eliminate it.

   - If the unit has had a carriage slam, examine the heads for damage and the disk pack for divots where oxide has been removed.

   - Ensure that the heads loaded switch is correctly positioned (see Heads Loaded Switch Adjustment procedure). A switch that is too far forward or back may result in the heads projecting slightly into the shroud area so that head 0 may be damaged by the plastic cover during pack load/unload.

2. Disk Pack

   - Do not use damaged disk packs. If disk packs arrive in damaged cartons or are suspected of having been dropped, have them inspected before use as the disks may have been bent.

   - Keep hands, pencils, or other objects off the disk pack surfaces. The disk pack surfaces not only can be contaminated this way, but also can be distorted or damaged through impact, excessive pressure or abrasion.

   - Never lift or hold a disk pack by any of the recording disks, as permanent damage will result.

   - Clean the outside (interiors should also be cleaned if contaminated), surfaces of the protective covers periodically to remove any build-up of dust that may occur. Use a lint free gauze pad dampened with head cleaning solution. If possible, use a vacuum cleaner to remove dust that accumulates on the cover lip.

   - If the disk drives are not in use and the blower is shut off, take the disk packs out of the drives and store them in their protective canisters.

   - Do not allow the pack to rest on or strike any other object when its bottom protective cover is removed.

   - Reassemble the disk pack bottom and top protective covers after the pack is mounted in the drive. This should be done even when no disk pack is contained in the cover to prevent dust and dirt from accumulating inside the covers.

- Replace cracked, distorted, or otherwise physically damaged pack covers.

- Do not place disk pack identifying labels anywhere except outside the top protective cover assembly. The pack serial number may be used to maintain correct pack to canister identification.

- The temperature of the disk pack must be stabilized to the temperature of the room in which the drive is operating.

3. Environment

- Install the drive in a room which is kept carefully dusted with particular attention given to keeping a smooth floor mopped and a carpeted floor vacuumed. Carpeted floors can be particularly troublesome because of the dirt and dust they trap and the amount of lint they generate. Traffic in the room housing the disk drive should be kept to a minimum.

- Maintain as much separation as possible between the disk drive and printers and tape and card punch equipment. These machines can generate a lot of paper, carbon, and ink particles. Do not store packs near this type of equipment.

- Eliminate eating, drinking, or smoking in the disk drive area if at all possible. Particles of food and drink can be ingested into the shroud area when the pack access cover is opened and closed. Smoke particles have a sticky characteristic. The absolute filter on the disk drive will clog more rapidly in such an environment.

- If at all possible, maintain the relative humidity in the disk drive operating room at 40% to 50%. Low relative humidity levels can lead to particle attraction and accumulation by static electricity.

- Disk packs and disk drives must be stabilized to the same temperature.

- Avoid building construction in the area of the drive or area used for pack storage. If construction is absolutely necessary make certain that protective steps are taken to avoid contamination in the area of the packs and drives.

- One of the sources of head/disk contamination is the ambient air in the room in which the drive operates. Although the drive is designed to operate successfully over a wide range of ambient air conditions, it follows that the cleaner the room air can be maintained, the better and longer the drive air filtering and handling system can do its job of keeping potentially destructive particles out of the head/disk gap.

4. Maintenance

- Do not, under any circumstances, clean the heads while they are in the unit. If head cleaning is required, remove the heads from the unit and clean per the manual procedure given in this manual. This must only be performed by trained personnel.

- Control Data does not recommend periodic field cleaning of disk packs. If field cleaning is employed, it is done at the risk of the user. Packs that are suspected for any reason should be returned to the vendor for disposition.

- Do not over lubricate the spindle lockshaft.

- Do not use any type of oil or lubricant on the drive except for the very small amount used on the lockshaft.

5. Operator

- Keep the disk pack access cover closed and latched and if possible, keep the shroud blower energized at all times. This will help keep contaminants out of the shroud cavity and away from the heads. Remove pack and store in its protective canister if blower motor is not energized.

- Do not store pack on drives - vibration will shake them off.
- Never lift or hold a disk pack by any of the recording disks, as permanent damage and or contamination will result.
- Keep disk packs out of the drives and locked in their protective covers when not in use.
- Do not allow the pack to rest on or strike any other object when its bottom protective cover is removed for installation in the drive.
- Reassemble the disk pack bottom and top protective covers. This should be done even when no disk pack is contained in the cover, to prevent dust and dirt from accumulating inside the covers.
- Do not place disk pack identifying labels anywhere except outside the top protective cover assembly. The pack serial number may be used to maintain correct pack to canister identification.
- Do not eat, smoke, or allow beverages near the drive or pack.

DETECTION AND RECOVERY

General

Previous sections have been concerned with precautions to be observed and preventive maintenance steps to be taken to minimize the occurrence of head crashes. But suppose all of those things have been done and the drive is in operation. Will the drive even issue any warning of an impending head crash? If a head does crash is there any danger that the crash can be propagated to other disk packs and other drives? If so what should be done? Answers to these questions will be covered in this section.

Head Crash Detection

It is important that the drive operator be aware of a number of head crash signals and warnings provided by the drive itself. These are described in the following paragraphs.

CAUTION

Should the conditions under 1, 2, or 3, below, be detected, shut down the drive at once. Under these conditions the pack should not be installed on another drive without first ensuring that the pack has not been damaged or contaminated. (See "Evaluate the Disk Pack" and "Disk Pack Inspection and Cleaning" in this section). Also, do not attempt to operate the drive with another disk pack until full assurance is made that no damage or contamination has occurred to the drive heads or to the shroud area.

1. Head to disk contact may have occurred if the following conditions are noted when the heads are over the disk.
   - An audible "ping" or a scratching noise is heard.
   - A burning odor is detected.
2. Head to disk contact will have occurred if:
   - Concentric rings, nicks or areas where oxide has been removed are observed on the disk surface.
   - Small deposits of very fine black dust are observed on the shroud walls. Test by running fingertip along shroud wall and inspecting.
3. Warnings of impending head crashes are very often provided by the data signals picked up by the heads. Under conditions of increasing contamination in the air cushion on which the head flies, variations in flying height can become a significant proportion of the nominal height. Since both the magnetic intensity of the data pulse as recorded on the disk and the pulse as read from the disk are greatly influenced by head gap to disk distance, variations in flying height can result in the generation of data errors. Continuous monitoring of data error rate is strongly recommended. A pack may have been damaged yet have no marks visible to the naked eye. A significant increase in data error rate of the order of five to ten times normal should be heeded as a definite warning signal.

Guide For Determining The Cause Of Head Crashes

If the drive has been shut down because head crash detection signals have been observed, the following steps should be taken:

1. Reconstruct the operating history of the disk pack. The purpose of this history is to determine the actual source of the crash (first drive and pack).

   a. Evaluate drive failures that may possibly have occurred prior to head crash.

   b. If available, make the previous drive on which the crashed pack was used, and the previous pack used on the crashed drive, part of the investigation. The crash may have been propagated.

   c. Try to reconstruct the mode of operation when the failure occurred. Had anything unusual happened prior to the failure?

   d. How long had the pack been on the drive before the crash? Was it a new pack? New drive? Had there been any shipping damage when the drive or pack arrived on the site?

2. Reconstruct the conditions of drive, pack and heads as they existed prior to the crash.

   a. Drop the circuit breakers and disconnect the power cord.

   b. Remove the top cover.

   c. Reinstall the crashed disk pack.

   d. Manually position the head arm assemblies toward the spindle to the point just before the head arms slide off the head cam towers.

   e. Looking through the shroud observation window with a hi-intensity light, look to see if the heads appear to be equidistant with respect to the disks. (Under no circumstances should any part of the head be in contact with a disk prior to sliding off the cam surface.

   f. With the heads still in the "over the disk condition", manually turn the pack (by rotating with the top trim shield) and verify that the head to disk spacing remains constant.

   g. Look at the recording surfaces and make note of which disk pack surfaces (and heads) have had contact.

   h. Slide the head arms off the cam towers onto the disks. Do not rotate the disk pack or traverse the heads across disks. Look at the head assemblies (particularly those which have not crashed). Note any head load springs that are relatively close to or touching the disk.

   i. Retract the carriage and remove the pack. (Evaluate the heads) and further inspect those head assemblies during step 4 of this procedure.

3. Evaluate the Drive

   a. With the disk pack removed, manually position the carriage so that the heads are in a loaded position. Traverse the carriage repeatedly between the carriage front stops and the unload cams. If resistance is found, check for the following possible causes: bound velocity transducer; flex lead retainer mispositioned and is striking the rail bracket; worn rail; bad carriage bearing; obstruction caught on the magnet; foreign material on the rails. Retract the carriage to the full retract position.

   b. Connect the power cord and turn on the AC breaker. Check for adequate air flow entering the shroud area. If questionable, either compare with another drive in the area or remove the positive air filter and replace with another filter. Drop the AC breaker and disconnect the power cord.

   c. Using a strip of paper (dollar bill size), check the pack access cover seal as follows. Open the pack access cover, lay the slip of paper on the shroud, close cover (latched), and try to withdraw the paper. Resistance should be felt while trying to withdraw the paper. Check several places on each side of the shroud.

   d. When cleaning the shroud area, look for possible foreign material (paper, plastic, etc.). If contamination exists, try to determine the type and its possible source.

e. Note head positions then remove all heads for evaluation and cleaning.

4. Evaluate the Heads

   a. While making head-pack observations in the drive, if it was noted that any part of a head load spring appeared to be close to a disk, the possibility exists that the fixed arm (part attached to the carriage) is bent. Look at the subject head for evidence of a burnish mark on the cam arm where it might possibly have struck the disk on a head cam.

   b. Compare crashed heads to non-crashed heads and look for possible mechanical failure differences such as bent gimbal springs, etc.

   c. Return non-recoverable heads to the manufacturer for further analysis.

5. Evaluate the Disk Pack

   a. Install crashed pack on drive (use a pack inspector if available) and try to determine if pack has been damaged in any way. Using observation window in shroud and high intensity light, rotate pack and note any disk fluctuation (up and down). None should be in evident (including upper and lower cover disks).

   b. Look on pack trim shield (top of pack) for any evidence of adhesive. A pack identification label might have been applied.

   c. Look for an unusually high amount of "dings" or chips at the outer area of the data disks. If found, these may be due to carriage slams - a drive malfunction.

Recovery From A Head Crash

The following procedure should be used to ensure all contamination is removed from a unit after a head crash. This is essential to eliminate propagation to both packs and drives. Consult the repair and replacement section of the manual for details on these steps.

1. Remove all power to the drive.

2. Remove the case assembly.

3. Remove all heads, keeping them in order.

4. Clean the inside of the shroud and the inside of the pack access cover using lint free cloths and head cleaning solution. Do not let any solution contact the rubber gasket in the pack access cover.

5. Clean the rails and carriage (if crash debris was coarse). Remove the magnet and the carriage and coil assembly if necessary.

6. Clean the air system duct surfaces with head cleaning solution.

7. Replace the carriage and coil assembly and magnet if removed. Ensure that the carriage motion is smooth and unobstructed.

8. Consult the paragraph on head-arm replacement criteria in the repair and replacement section of this manual before installing the heads. Replace any heads that are defective per these criteria. Replacement heads should be new or those that have been cleaned by properly trained personnel. Ensure before replacing any undamaged heads that their spoiler holes are free of the characteristic fine dust which they collect when a crash occurs. Install the heads and tighten their clamping screws to 1.4 N·M (12 lb in).

9. Reinstall the case assembly.

10. Disable the voice coil drive. Apply power and purge for five minutes with a good pack rotating.

11. Perform a manual heads load. Be aware of any burning odor behind the drive, an indication that the heads are still not flying correctly. If this odor is detected repeat the head crash recovery procedure starting from step 1.

12. Enable the voice coil drive. Load a scratch pack. Using a field test unit perform a sequence forward write operation, covering the entire pack. Read back for ten minutes, first sequencing forward over the entire pack then performing random seeks. Look for error free performmance. This will give confidence that all heads are flying correctly.

13. Perform a head alignment per the procedure called out in the tests and adjustments section in the manual.

ELECTROSTATIC DISCHARGE PROTECTION

All drive electronic assemblies are sensitive to static electricity, due to the electrostatically sensitive devices used within the drive circuitry. Although some of these devices such as metal-oxide semiconductors are extremely sensitive, all semiconductors as well as some resistors and capacitors may be damaged or degraded by exposure to static electricity.

Electrostatic damage to electronic devices may be caused by a direct discharge of a charged conductor, or by exposure to the static fields which surround charged objects. To avoid damage to drive electronic assemblies, service personnel must observe the following precautions when servicing the drive:

- Ground yourself to the drive - whenever the drive electronics are or will be exposed, connect yourself to ground with a wrist strap (see table 2-1 for part number). Connection may be made to any metal assembly or to the ground jack at the rear of the drive. As a general rule, remember that you, the drive, and the circuit cards must all be at ground potential to avoid potentially damaging static discharges.

- Keep cards in conductive bags - when circuit cards are not installed in the drive, keep them in conductive static shielding bags (see table 2-1 for part number). These bags provide absolute protection from direct static discharge and from static fields surrounding charged objects. Remember that these bags are conductive and should not be placed where they might cause an electrical short circuit.

- Remove cards from bags only when you are grounded - all cards received from the factory are in static shielding bags, and should not be removed unless you are grounded.

- Turn off power to drive before removing or installing any circuit cards.

MAINTENANCE TOOLS AND MATERIALS

The tools, test equipment and materials recommended for drive maintenance are listed in table 3-1.

TABLE 3-1. MAINTENANCE TOOLS AND MATERIALS

Description	Part Number
Blank Tab Card (Computer Card)	CDC 70631686
Card Extender	CDC*54109701
Carriage Alignment Arm	CDC 75018400
CE Disk Pack 877-51 (400 TPI)	CDC 70438700
Chip Extender - Chip Cliplog	CDC 12212196
Cloth, Lint Free	CDC 94211400
Computer Card	5084
Crocus Cloth	Commercially Available
Deck Support Bracket (S/C 16 & Below)	CDC 87073000
Dust Remover, Super Dry (12 oz)	CDC 95047800
Field Test Unit TB216A	CDC 82338800
Gauze, Lint Free	CDC 12209713
Grease, Dielectric (4 oz)	CDC 95533600
Head Alignment	CDC 77440503
Head Adjustment Tool	CDC 75018803
High Intensity Light**	CDC 12212038
Head Cleaning Solution (8 oz)	CDC 82365800
Hose Assembly	CDC 82346500
Loctite, Grade C	Loctite Corp.
Loctite Primer, Grade N	Loctite Corp.
Lubricant Paste	CDC 95016101
Mirror	Commercially Available
Nutdriver, Hollow Stem	Exelite #6
Oscilloscope, Dual Trace	Tektronix 454 or equivalent
Oscilloscope Hood	Tektronix 016-0083-00
Pin Straightener	CDC 87369400
Potentiometer Adjustment Tool	CDC 12212278
Pressure Gauge Kit, Differential (Optional)	CDC 73040100
Push-Pull Gauge	CDC 12210836
Removal Tool, 20-30 AWG	CDC 92020500
Scope Probe Tip (Hatchet Type)	CDC 12212885
Speed Sensor Adjustment Tool (Go NoGo Tool)	CDC 87052601
Static Ground Wrist Strap	
Large (6 1/2 to 8 inch Wrist)	CDC 12263496
Small (up to 6 1/2 inch Wrist)	CDC 12263623
Static Shielding Bag	CDC 12263627
Tape, Adhesive	Commercially Available
Terminator, S/C 09 and blw	CDC 40067207
Terminator, S/C 10 and abv	CDC 40067208
Top Cover Support Rod, S/C 07 W/O 37686 and below only	CDC 87062300
Torque Screwdriver	CDC 92016400
Torque Screwdriver Bit	CDC 87016701
Volt/Ohmmeter (Digital)	Ballentine 345 or equivalent
Wire Wrap Bit, 30 AWG	CDC 12218402
Wire Wrap Gun, Electric	CDC 12259111
Wire Wrap Sleeve	CDC 12218403

*CDC® is a registered trademark of Control Data Corporation.

**Works only with 120 V, 60 Hz. For other voltages and frequencies, use commercially available 100 or 150 watt outdoor floodlight with suitable receptacle and extension cord. Note: Light must have hard safety glass bulb and all items must be rated for use with applicable source power.

MAINTENANCE PRELIMINARY CONDITIONS

INTERLOCKS

Opening the pack cover or raising deck breaks the control interlock (figure 3-1). The heads unload, the spindle motor shuts down, and the READY indicator extinguishes. Refer to Publication No. 83317300, Theory of Operation section for Control Interlock function.

DISK PACK INSTALLATION AND REMOVAL

Installation

Make certain the disk pack to be installed has been properly maintained.

1. Raise pack access cover.
2. Turn disk pack cover handle counterclockwise to remove bottom cover. Set bottom cover aside.

CAUTION

Non-fully retracted heads indicate a problem in the drive's servo, and may result in damage to the pack or heads during pack installation or removal. If heads are not fully retracted, contact maintenance personnel. DO NOT push on heads.

3. Place disk pack squarely on spindle and turn disk pack cover handle clockwise until spindle brake plate engages.
4. Continue turning (clockwise) until handle is tight.
5. Remove disk pack cover (by lifting straight up) and store with bottom cover.
6. Close pack access cover.

Removal

1. Press drive START switch to stop drive motor.
2. Raise pack access cover.

CAUTION

Non-fully retracted heads indicate a problem in the drive's servo, and may result in damage to the pack or heads during pack installation or removal. If heads are not fully retracted, contact maintenance personnel. DO NOT push on heads.

3. Place disk pack cover squarely onto disk pack and turn disk pack cover handle counterclockwise until spindle brake plate engages.
4. Continue turning handle (counterclockwise) until a clicking sound is heard.
5. Lift disk pack and cover straight up and remove.
6. Put bottom cover into place and turn disk pack cover handle clockwise until bottom cover is secure.
7. Close pack access cover.

CASE ASSEMBLY RAISING AND LOWERING

For the purpose of raising and lowering procedures, there are two types of case assemblies:

1. 1 x acoustic top case.
2. 2 x acoustic top case.

The 1 x acoustic top case can have one of two methods of latching:

a. Two 1/4 turn fasteners
b. A slide-bolt latch

The 2 x acoustic case is latched with two push-release catches. These catches may or may not be secured with socket head screws.

1 x Acoustic Top Case Raising

1. Open rear door and look inside drive to determine how case is secured.
2. Release top case as follows:
   a. If case is secured by 1/4-turn fasteners, use a screwdriver to release the two 1/4-turn fasteners, then lift up on rear of case.
   b. If case is secured by a slide-bolt latch, use a six mm hex wrench to actuate the latch while lifting upward on rear of case.
3. Continue to lift case upward until support rod reaches its end of travel.
4. Then lower case until support rod bottoms securely in stop groove of support rod slide.

1 x Acoustic Top Case Lowering

1. Push case assembly forward until it reaches its end of travel.
2. Lift up on support rod.

3. Lower case while continuing to lift up on support rod just long enough for it to clear stop groove in guide; then continue to lower case to its closed position.

4. Secure case as required by:

   a. Using a screwdriver to turn the two 1/4-turn fasteners to their locked position, or

   b. Confirming that the slide-bolt latch is fully extended below the latch catch.

2 x Acoustic Case Raising

1. Look at the rear of case assembly to determine how case is secured. If the latches are secured by socket head screws, loosen them.

CAUTION

Lift up case only about one inch during the next step.

2. Release case as follows:

   a. Depress the release catches and lift up case slightly, or

   b. Depress the socket head screws and lift up case slightly.

3. After case has been released and raised about an inch, swing hinged rear panel of case outward ot clear the logic chassis fan.

4. Pivot case upward and toward the front until it rests on case support arms. (In older units, a top cover support rod must be installed.)

2 x Acoustic Case Lowering

CAUTION

To avoid damage to latches and logic chassis fan, carefully follow instructions pertaining to the case rear panel as the case is lowered.

1. Pivot case toward rear and downward, and, as it is being lowered, swing hinged rear panel outward so it clears logic chassis fan. Do not completely close case.

2. When case is about one inch from touching frame, swing hinged rear panel inward until it reaches its end of travel.

3. While holding in hinged rear panel, lower case assembly to its fully closed position.

4. Ensure that the latches catch. If socket head screws are used, tighten them.

DECK MAINTENANCE POSITION

To perform some of the corrective maintenance procedures, it is necessary to raise the deck to a maintenance position. Refer to figure 3-2.

Raise Deck

1. Press drive START switch to drop drive motor.

2. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

3. Disconnect input power cable from external power source.

4. Remove disk pack (refer to Disk Pack Installation and Removal paragraph). Leave pack access cover open.

5. Remove two deck front holddown screws.

6. Raise the case assembly (refer to Case Assembly Raising and Lowering paragraph).

CAUTION

Do not raise deck without installing spacer between deck and shock mount bracket. Damage to rear shock mounts could occur.

7. Remove deck rear holddown screw and spacer from keeper hole and install spacer between deck and shock mount bracket.

8. Secure deck to shock mount bracket using deck rear holddown screw.

9. Perform step 9a for S/C 16 and below units and perform step 9b for S/C 17 through 19 and 9c for S/C 20 and above units.

   a. Lift deck and install deck support bracket into front shock mounts. Lower deck onto deck support bracket. Deck support bracket fits into deck casting where deck front holddown screws were removed.

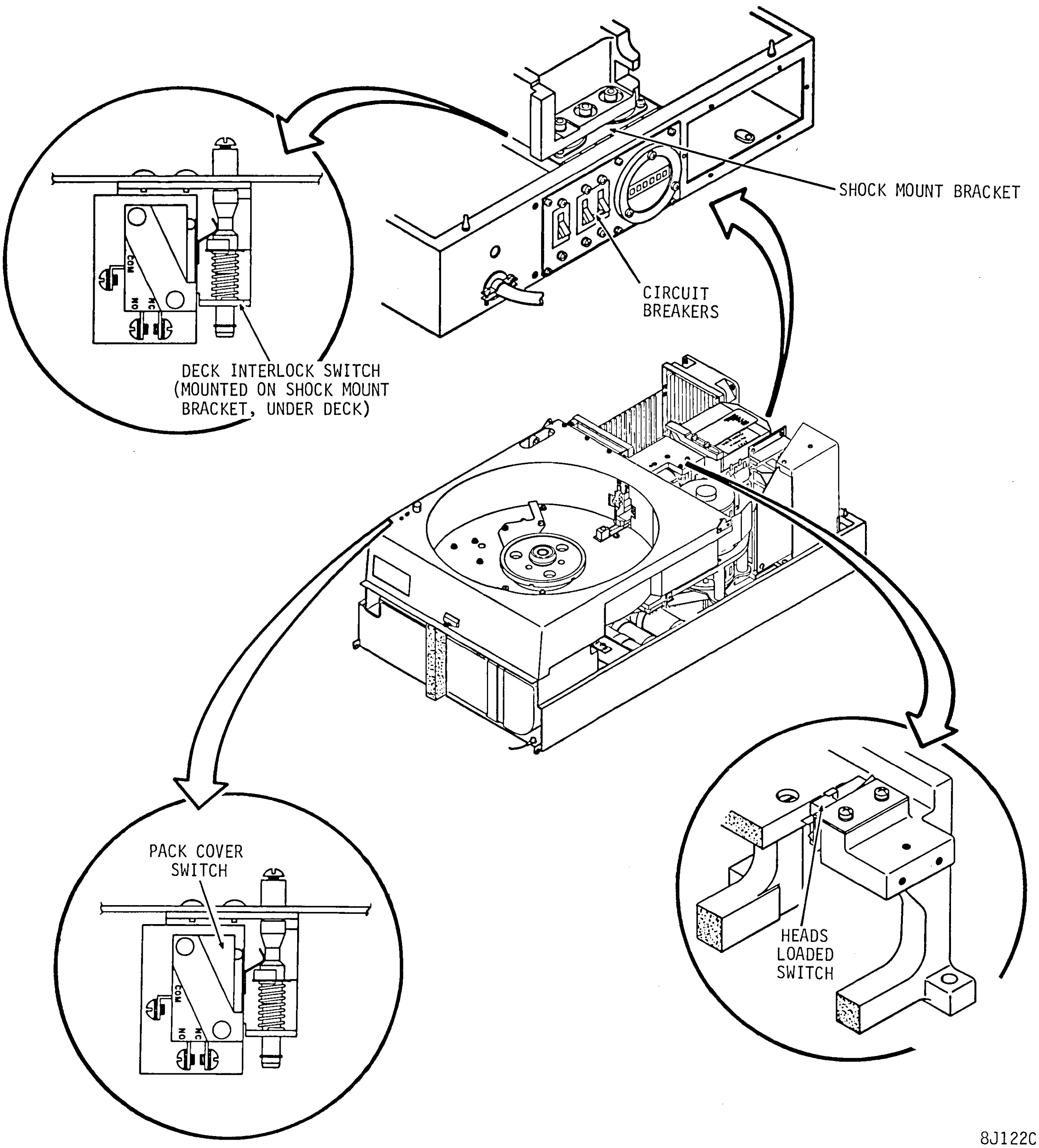


Figure 3-1. Control Interlocks

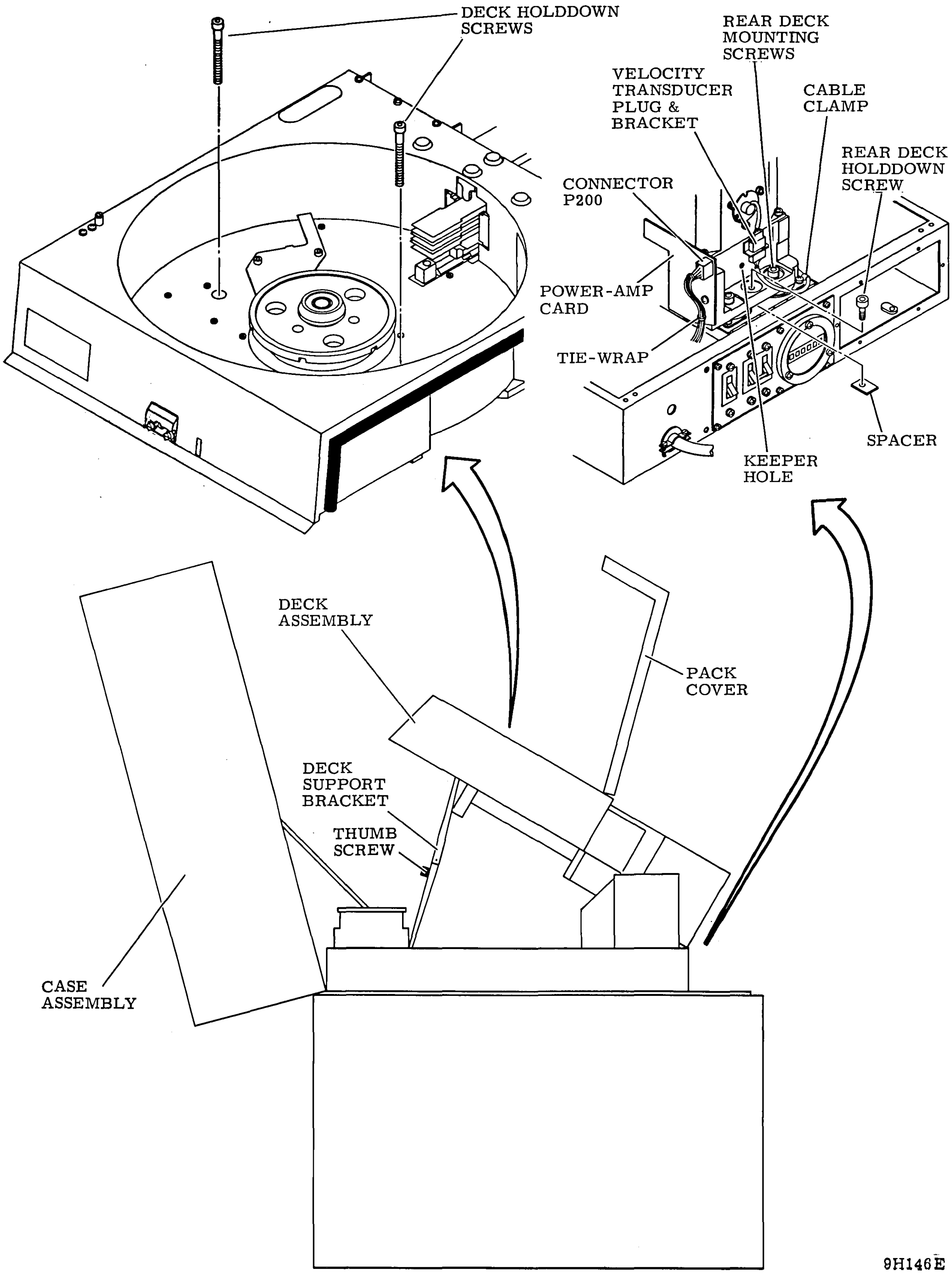


Figure 3-2. Drive Maintenance Position
(S/C 17 and Abv)

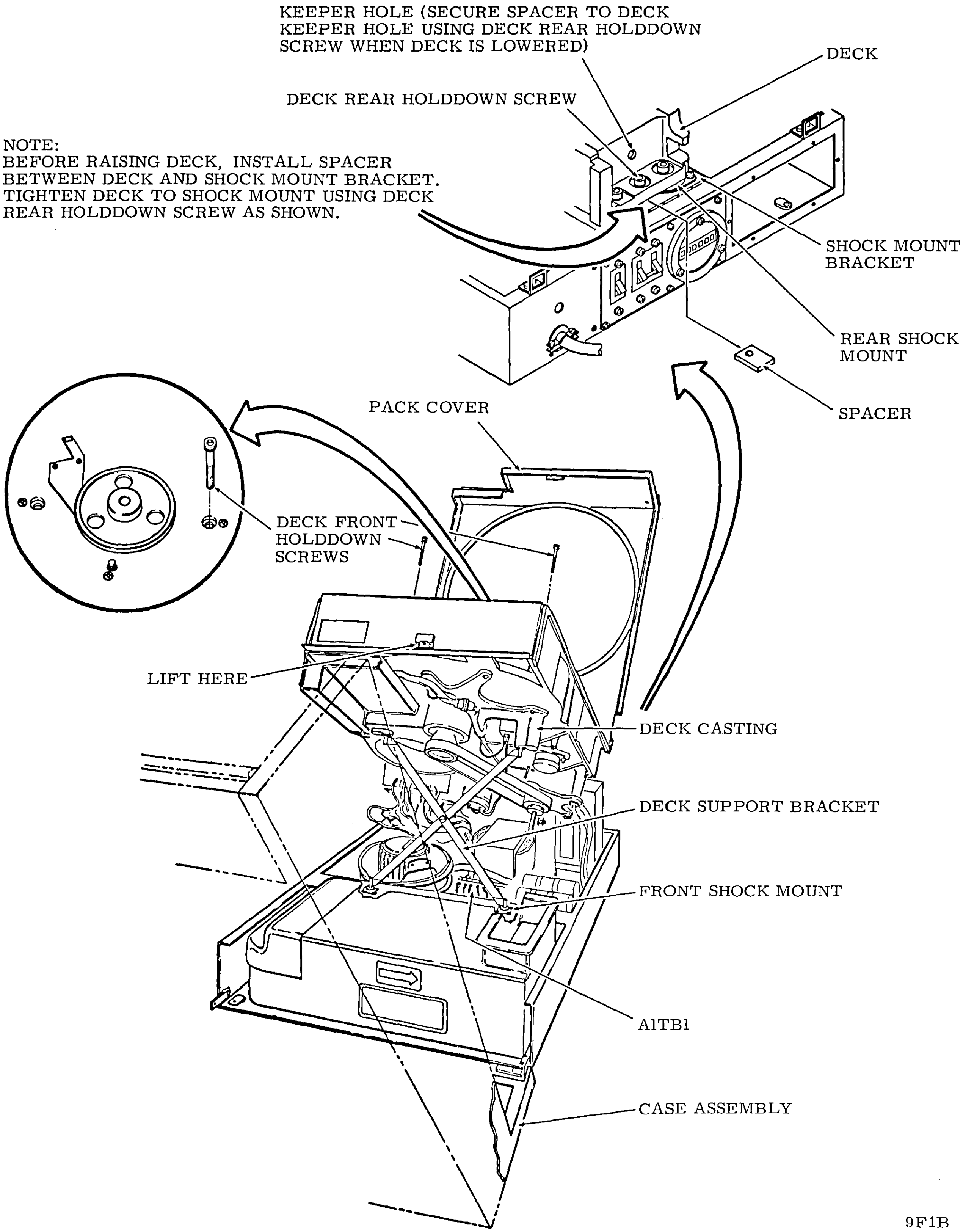


Figure 3-2.1. Drive Maintenance Position
(S/C 16 and Blw)

b. Lift up deck from front of drive until deck support bracket is completely extended. Carefully lower deck until support bracket slides into locking position (hinge in center of bracket should point slightly towards rear of drive.

c. Lift deck from front of drive until deck support bracket is completely extended. Carefully lower deck until support bracket slides into position (hinge in center of bracket should point slightly towards rear of drive). Remove thumb screw from storage hole and secure in the locking hole located on the face of the deck support bracket. The thumb screw must be in the locking hole when deck is in raised position.

Lower Deck

1. Perform step 1a for S/C 16 and below units and perform step 1b for S/C 17 through 19 and 1c for S/C 20 and above units.

   a. Lift deck and remove deck support bracket.

   b. Lift deck until the deck support bracket disengages from locked position and push front of bracket slightly, then lower.

   c. Remove thumb screw from locking hole and secure in storage hole. Lift deck until the deck support bracket disengages from locked position and push back of the bracket slightly forward, then lower deck slowly.

2. Inspect underside of deck and base assembly for any particles of dust or foreign material. If material is present, vacuum area and with a dampened cloth, remove any residue.

3. Lower deck to normal operating position.

4. Secure deck to front shock mounts using two deck front holddown screws.

5. Remove deck rear holddown screw and spacer. Store in keeper hole.

6. Lower case assembly (refer to Case Assembly Raising and Lowering paragraph).

7. Connect input power cable to external power source.

8. Set AC POWER and POWER SUPPLY circuit breakers to ON.

9. Install disk pack (refer to Disk Pack Installation and Removal paragraph).

10. Press drive START switch to load heads.

LOGIC CHASSIS MAINTENANCE POSITION

The logic chassis is hinged on a bracket attached to the deck. The logic chassis is secured to the deck by a turnlock fastener. To raise the logic chassis to the maintenance position, proceed as follows:

1. Raise case assembly.

2. Loosen turnlock fastener securing logic chassis to deck.

3. Swing logic chassis to a vertical position.

4. Move slide bar (located on top of magnet assembly) toward logic chassis until it stops.

5. Lower logic chassis onto slide bar.

NOTE

Steps 6 and 7 are only necessary if card accessibility is required.

6. Loosen four screws securing logic chassis cover to logic chassis. Do not remove.

7. Swing cover away from top screws (closest to fan) and lift off of bottom screws.

8. To lower logic chassis to operating position, reverse steps 1 through 7.

SIDE PANEL REMOVAL AND INSTALLATION

(CABINET MODEL)

The side panels are secured to the frame by two screws located toward the top of the panel. Also, a quick disconnect ground strap is attached to the panel in the lower corner. The panel tilts out from the top and lifts off the bottom positioning brackets.

OFF-LINE OPERATION

Certain procedures require execution of operational commands (seek, read, etc.). These commands may be derived by means of the FIELD TEST EXERCISER (refer to Preface applicable Publication number for tester operating procedures).

USE OF TEST SOFTWARE

The drive is prepared for test software whenever the drive motor is up to speed, the heads are loaded and the READY indicator on the control panel is lighted. Refer to manuals or other documentation applicable to the specific system or subsystem for information concerning the test software routines.

MANUAL HEAD POSITIONING

Power On Manual Head Positioning

Manual head positioning (with power on and disk pack up to speed) is not recommended unless required by maintenance procedure or loss of servo control makes it necessary.

1. Observe the following safety precautions during manual carriage operation.

   - Make certain that heads will unload or are unloaded before turning power off.
   - If power to drive motor is lost while heads are loaded and voice coil leadwire is disconnected, immediately retract carriage. Otherwise, heads crash when disk speed is insufficient to enable heads to fly.
   - When positioning heads, do not use excessive downward force on voice coil.
   - Before reconnecting black voice coil leadwire, make sure fingers and tools are clear of coil and actuator.
   - Do not use CE disk pack unless specifically directed to do so. Use only the type of pack called for in the maintenance procedure.

2. Install disk pack (refer to Disk Pack Installation and Removal paragraph).

   CAUTION

   If loss of servo control necessitates manual loading and unloading of heads, observe the following:

   Do not load heads unless disk pack is up to speed.

   When manually loading or unloading heads, simulate normal load (unload) speed of servo under electrical control.

   Disconnect black voice coil leadwire before attempting to load heads.

3. Press drive START switch to allow normal power-up first seek.

4. Raise case assembly (refer to Case Assembly Raise and Lower paragraph).

5. Disconnect black voice coil leadwire (refer to figure 3-3).

6. Remove magnet cover to gain access to voice coil (refer to figure 3-3).

7. Position carriage as required by maintenance procedure by applying a lateral (parallel to voice coil movement) pressure to voice coil.

   WARNING

   Keep hands away from actuator.

8. Replace black voice coil leadwire:

   a. Touch black leadwire to terminal and ensure carriage locks on cylinder. If erratic voice coil movement is noticed, remove leadwire immediately and troubleshoot malfunction.

   b. After carriage locks on cylinder, firmly seat black voice coil leadwire.

9. Replace magnet cover.

10. Lower case assembly (refer to Case Assembly Raising and Lowering paragraph).

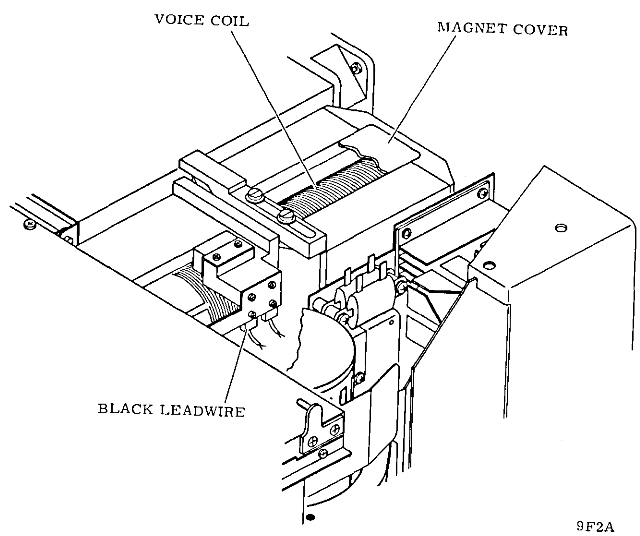


Figure 3-3.
Magnet Cover and Voice Coil.

Power Off Manual Head Positioning

CAUTION

Do not position heads manually with power off and a disk pack installed.

1. Press drive START switch to stop drive motor.
2. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
3. Remove disk pack (refer to Disk Pack Installation and Removal paragraph).
4. Raise case assembly (refer to Case Assembly Raising and Lowering paragraph).
5. Remove magnet cover to gain access to voice coil (refer to figure 3-3).

CAUTION

Do not use excessive downward pressure on voice coil.

6. Position carriage as required by maintenance procedure by applying a lateral (parallel to coil movement) pressure to voice coil.
7. Return carriage to full retract position.
8. Replace magnet cover.
9. Install disk pack (refer to Disk Pack Installation and Removal paragraph).
10. Set AC POWER and POWER SUPPLY circuit breakers to ON.
11. Press drive START switch to load heads.

PREPARING DRIVE FOR OFF-LINE OPERATION

1. Press drive START switch to stop drive motor.
2. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
3. Raise case assembly to gain access to logic chassis.
4. Place logic chassis in maintenance position.

NOTE

If the drive is in a system that is daisy chain, it is necessary to by-pass the drive so other drives remain under system control.

5. Disconnect cables from J2, J3, and J4.
6. Terminate J4.
7. Connect tester cable as follows:
   a. P1 to J3 on drive.
   b. P2 to J2 on drive.
   c. P3 and P4 to tester.
8. Loosen four screws securing logic chassis cover and remove cover.
9. Set AC POWER and POWER SUPPLY circuit breakers to ON.

CAUTION

If normal load is not observed, drop POWER SUPPLY circuit breaker to OFF immediately.

10. Press START switch to start drive motor and load heads. When heads are loaded and READY indicator is lighted, the drive is ready to perform the test.
11. Perform the desired test procedure.

PREPARING DRIVE FOR ON-LINE OPERATION

1. Press drive START switch to stop drive motor.
2. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
3. Disconnect terminator from J4.
4. Replace logic chassis cover.
5. Connect cables (from system) to J2, J3, and J4.
6. Set AC POWER and POWER SUPPLY circuit breakers to ON.
7. Return logic chassis to normal operation position.
8. Lower case assembly.
9. Press drive START switch to start the drive motor and load heads.

SECTION 3B

DRIVE TESTS AND ADJUSTMENTS

GENERAL

This section provides information on all the electrical test and adjustments which can be performed in the field. The adjustments contained here are limited to those which can be performed at the drive level. These tests should only be performed as required elsewhere in this manual, or when there is suspicion that the drive is not functioning properly. A drive that passes all the requirements in this section may be considered operationally acceptable. If any of the adjustments, contained in this section, cannot be completed satisfactorily, terminate the procedure and refer to the Trouble Analysis section.

Mechanical adjustments are contained in the Repair and Replacement section. Other tests normally associated with analyzing a malfunction, are contained in the Trouble Analysis section. A person performing these tests and adjustments should already be familiar with the information contained in the General Maintenance Information section. Refer to that section for information on safety precautions and maintenance tools and materials.

These procedures assume that an FTU is connected to the drive (or that suitable software is available), that a scratch pack is installed (or CE pack where noted), and that the drive is powered on. All the following tests are written, providing first a check procedure, and then the adjustment. If the drive meets the criteria of the check, there is no need of the adjustment.

The following procedures are contained in this section, in the order specified:

- Plus and Minus 5 Volt Adjustment
- Head Arm Alignment
- Velocity Gain Adjustment

PLUS AND MINUS 5-VOLT REGULATORS

This procedure checks the output of the plus and minus 5-volt power supplies while the drive is doing repeat seeks. Power supply outputs are checked at the logic chassis backpanel. Therefore, the supplies are being checked in a manner to account for both line loss and loading.

This procedure assumes that the FTU is connected to the drive, a scratch pack is installed and power is applied.

ADJUSTMENT S/C 23 AND BELOW

1. Raise logic chassis to maintenance position.
2. Connect digital volt/ohmmeter between GND and +5 V fastons on logic chassis backpanel.
3. Command drive to do repeat seeks between cylinders 0 and 32.
4. Plus 5-volt output should be +5.10 ±0.05 volts. If not, adjust +5 V potentiometer (see figure 3-4) until output is within specification.
5. Move volt/ohmmeter leads to -5 V faston.
6. Minus 5-volt output should be -5.10 ±0.05 volts. If not, adjust -5 V potentiometer (see figure 3-4) until output is within specification.
7. If any adjustment was necessary in preceeding steps, recheck both outputs.
8. When both power supply outputs are within specification, restore drive to normal operation.

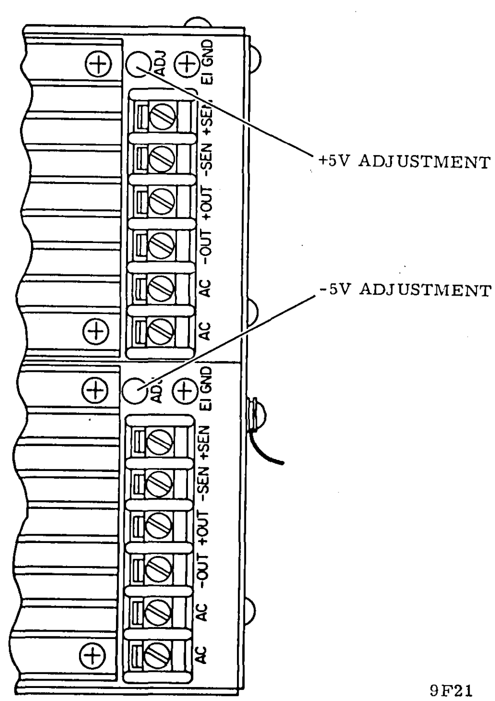


Figure 3-4. Power Supply Adjustment (S/C 23 and Below)

ADJUSTMENT S/C 24 AND ABOVE

1. Raise logic chassis to maintenance position.

2. Connect digital volt/ohmmeter between GND and +5 V fastons on logic chassis backpanel.

3. Command drive to do repeat seeks between cylinders 0 and 32.

4. Plus 5-volt output should be +5.10 ±0.05 volts. If not, adjust +5 V potentiometer on card A1A1 (see figure 3-4.1) until output is within specifications.

5. Move volt/ohmmeter leads to -5 V faston.

6. Minus 5-volt output should be -5.10 ±0.05 volts. If not, adjust -5 V potentiometer on card A1A1 (see figure 3-4.1 until output is within specification.

7. If any adjustment was necessary in preceeding steps, recheck both outputs.

8. When both power supply outputs are within specification, restore drive to normal operation.

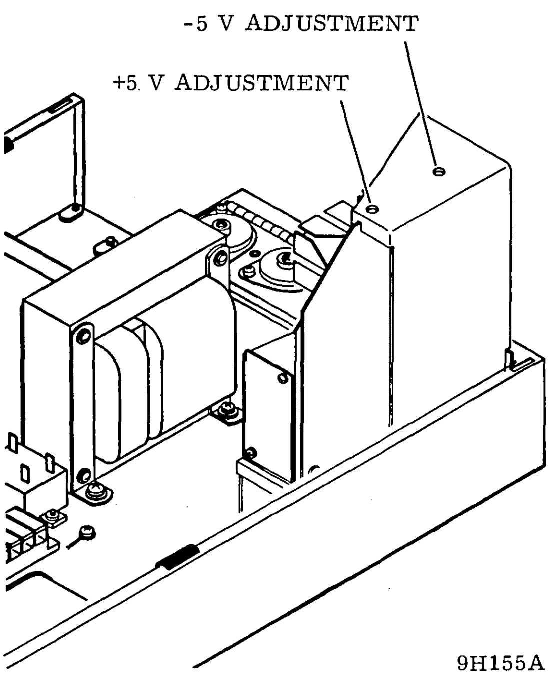


Figure 3-4.1. Power Supply Adjustment (S/C 24 and Above)

HEAD ALIGNMENT

GENERAL

Alignment of the heads is checked under the following conditions:

1. During initial installation of the drive.

2. After replacing one or more head arm assemblies.

3. When misalignment of one or more heads is suspected. (For example, inability to read a pack written on another drive.)

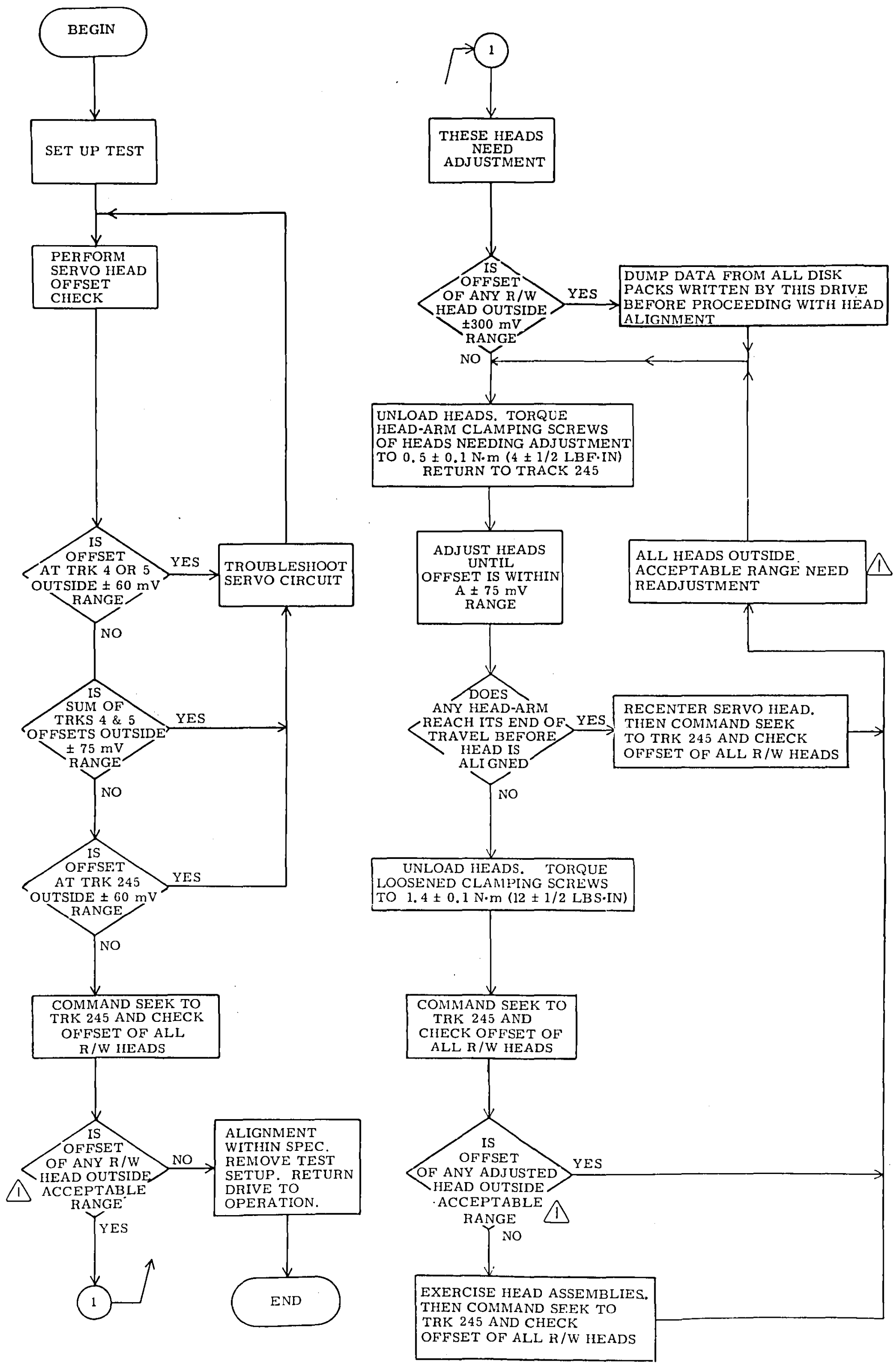
If it is determined that a head is misaligned, the head arm is adjusted to bring the alignment of the head within specifications. Figure 3-5 is a flowchart summarizing the basic functions of the head alignment check and adjustment procedure.

Head alignment is performed by using a Field Test Unit (FTU) or by using the controller, microprogram diagnostics, head alignment card and meter. This procedure applies only to the method using an FTU. Refer to the FTU maintenance manual for switch settings and functions called for in this procedure.

When performing head alignment, give special consideration to the following:

Thermal Stabilization - In order to ensure accuracy during head alignment, it is important that the drive, CE pack, and FTU be at their normal operating temperature. This requires that all three be connected and allowed to operate (pack turning and heads loaded to cylinder zero) for a minimum of 60 minutes. If head alignment is being performed on more than one drive, and provided that the pack was taken immediately from a previous drive, and provided that the drive under test has been operating with heads loaded for a minimum of 60 minutes preceding tests; then the CE pack only requires a 15-minute stabilization time.

Alignment Tool - Use only the head alignment tool specified in the maintenance tools and materials table. Use of a different tool may cause damage to head arm or carriage. Always inspect the adjustment end of tool prior to use. Tool must be free of nicks and scratches and must have a polished surface where it enters the carriage alignment hole. If any aluminum deposits are present, polish tool surface with crocus cloth. Any other polishing medium will damage the tool. Do not use a defective tool; repair or replace tool if damage exists. When using tool, position it so that pin in end of tool engages alignment slot in head arm. The tool should slip easily through the alignment hole in the carriage and into the alignment slot in the head arm. If anything



⚠ ACCEPTABLE RANGE DEPENDS ON CE PACK USED:

- IF PACK IS SAME ONE USED FOR LAST ALIGNMENT, RANGE IS 0 ± 150 mv.
- IF PACK IS NOT SAME ONE USED FOR LAST ALIGNMENT, RANGE IS 0 ± 225 mv.

Figure 3-5. Basic Head Alignment Check and Adjustment Procedure more than a small amount of force is required to adjust the head, the tool is probably binding in the hole of the carriage. Ensure that alignment tool is kept perpendicular to hole in carriage at all times.

Carriage Locking - During the alignment procedure (when the heads are over the alignment track) the carriage locking pin and ring assembly must be installed in the ALIGN TRACK LOCK hole in the rail bracket assembly. This locks the carriage in one head alignment position. Failure to install the pin and ring assembly would allow the carriage to retract if any emergency retract signal were generated. Since your hands are in the actuator during the head alignment procedure, the retract could be dangerous.

CAUTION

Should an emergency retract condition be generated when the locking pin is in the ALIGN TRACK LOCK hole, the following results may occur:
- Blown fuses,
- Tripped dc circuit breaker
- Blown power amplifier transistors, and
- Unretracted heads on a stationary CE pack.

Carefully observe the instructions regarding the installation and removal of the carriage locking pin and ring assembly.

INITIAL SETUP

1. Install CE disk pack and perform thermal stabilization.
2. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
3. Raise case assembly to maintenance position.
4. Install head alignment card into location A08 of the logic chassis.
5. Raise logic chassis.
6. Connect FTU to drive. Refer to FTU maintenance manual for installation instructions.
7. Install terminator on I/O connector. If unit is a dual channel drive, install terminator on I/O connector of channel being used by FTU.
8. Connect meter cables between head alignment card and FTU-null meter. (Refer to figure 3-5.1).
9. Connect oscilloscope to test point Z (ground) and test point Y (dibits) on head alignment card.
10. Install head alignment cable between A08 pins 8-11 A and B and J104 of head select/read amplifier card.

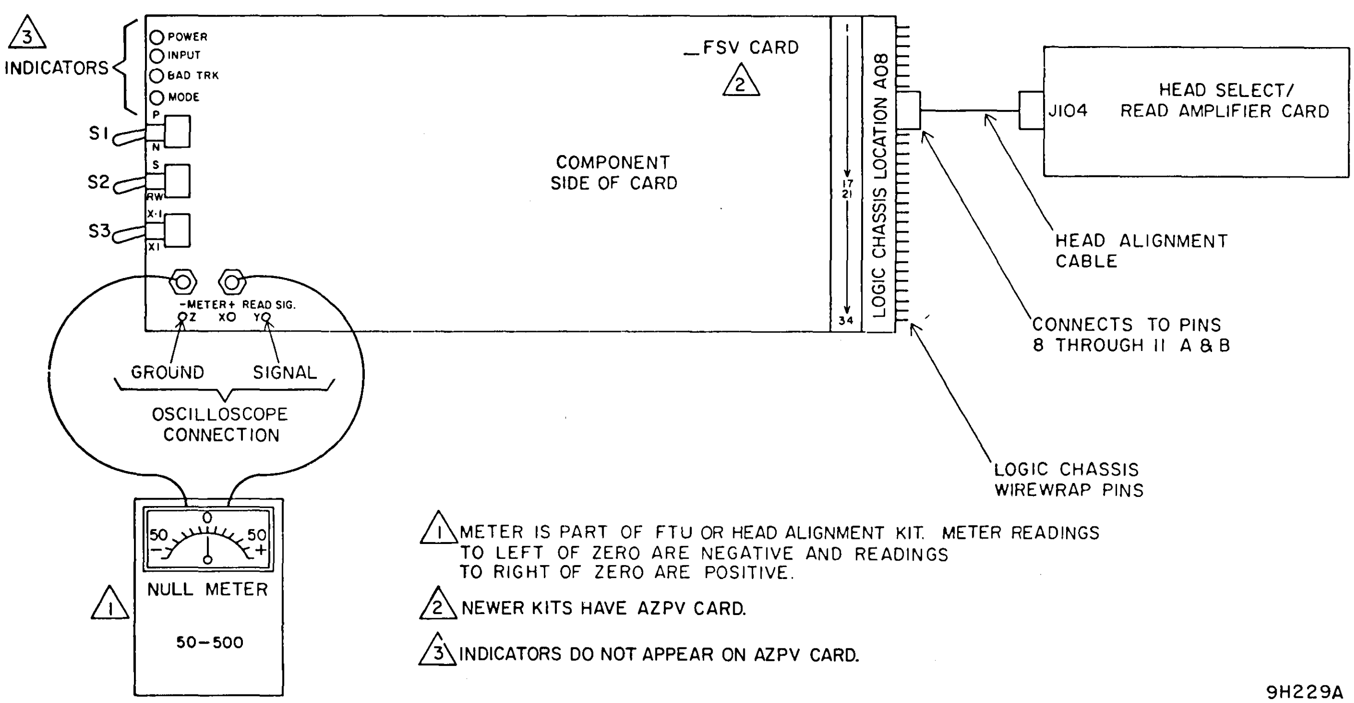


Figure 3-5.1. Head Alignment Setup

11. Set AC POWER and POWER SUPPLY circuit breakers to ON.

12. Press START switch to start drive motor and load heads.

CAUTION

The CE disk pack has odd-even dibits on tracks 000 through 330 only. Do not attempt to access beyond cylinder 330.

SERVO HEAD OFFSET CHECK

1. Set head alignment card S/RW switch to S and X.1/X1 switch to X.1.

2. Command a continuous seek between cylinders 240 and 245 for a minimum of 30 seconds.

3. Command direct seek to cylinder 004.

4. Observe dibit pattern on oscilloscope. It should be similar to the one shown in figure 3-5.2.

5. Toggle P/N switch to both P and N positions and record null meter readings. If both P and N readings are less than 50 mV, the X.1/X1 switch can be set to X1 position for a more accurate readings.

6. Calculate head offset by the following formula:

   (P) - (N) = OFFSET

   Where P is meter reading with P/N switch in P position and N is meter reading with switch in N position. Meter readings to right of zero are positive and meter readings to left of zero are negative.

Example 1: P = +20, N = +15;
(P) - (N) = (+20) - (+15) = +5

Example 2: P = +20, N = -15;
(P) - (N) = (+20) - (-15) = +35

Example 3: P = -20, N = +15;
(P) - (N) = (-20) - (+15) = - 35

7. Record offset calculated in step 6.

8. Evaluate servo head offset as follows:

   - If offset ranges between +60 mV and -60 mV, it is acceptable so proceed with head alignment.

   - If offset is outside ±60 mV range, it is unacceptable. In this case, trouble shoot servo system before proceeding with head alignment.

9. Command direct seek to cylinder 005 and repeat steps 4 through 8.

10. Add offset readings from cylinders 004 and 005. This sum should range between +75 mV and -75 mV. If it does not, troubleshoot servo system.

OSCILLOSCOPE SETTINGS

LOGIC GND TO SCOPE GND

VOLTS / DIV
CH 1 - 20MV/CM
CH 2 - NOT USED

TIME / DIV
A - 1μS/CM
B - NOT USED

TRIGGERING
A - +INTERNAL
B - NOT USED

PROBE CONNECTIONS
CH 1 TO TPY (RD SIGNAL) ON HD ALIGNMENT CARD
CH 2 TO NOT USED

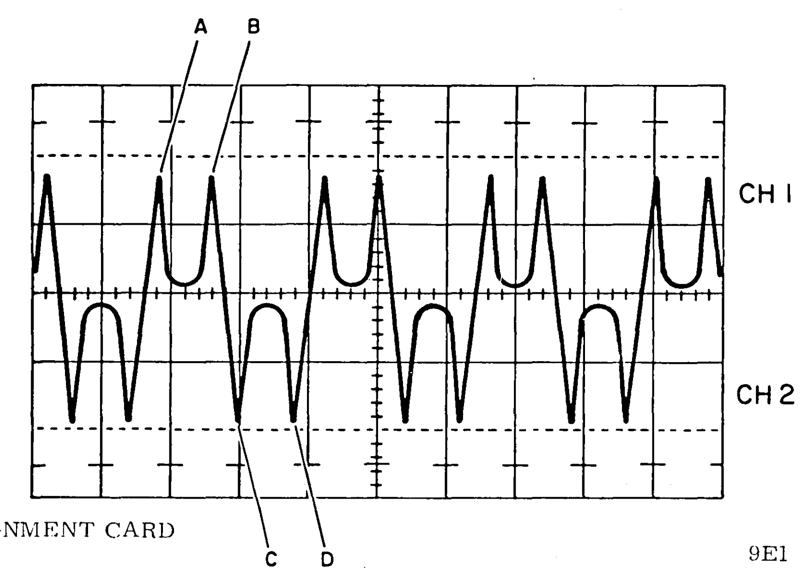


Figure 3-5.2 Head Alignment Waveform

Example 1:

$P_4 = -25$, $N_4 = -15$;
$(P) - (N) = (-25) - (-15) = -10$ mV

$P_5 = +10$, $N_5 = -10$;
$(P) - (N) = (+10) - (-10) = +20$ mV

(-10) + (+20) = +10 mV

Sum is within ±75 mV range and is therefore acceptable.

Example 2:

$P_4 = +30$, $N_4 = -10$;
$(P) - (N) = (+30) - (-10) = +40$ mV

$P_5 = +15$, $N_5 = -30$;
$(P) - (N) = (+15) - (-30) = +45$ mV

(+40) + (+45) = +85 mV

Sum is outside ±75 mV range and is therefore unacceptable. Servo system troubleshooting is required.

11. Command direct seek to cylinder 245, install carriage locking pin (refer to figure 3-6) and repeat steps 4 through 8.

READ/WRITE HEADS CHECK AND ADJUSTMENT

1. Set R/RW switch to RW. Observe that dibit pattern is similar to that shown in figure 3-5.2.
2. Calculate offset of all read/write heads by using same method given in steps 5 and 6 of Servo Head Check.
3. Remove carriage locking pin.

CAUTION

If any offset exceeds a 0 ±300 mV range, those heads are excessively misaligned. Therefore, to avoid possible loss of data, transfer data from packs written with those heads to other storage before proceeding with alignment.

4. Evaluate read/write head offset as follows:

   a. When using same CE pack as used for last alignment, offsets must range between +150 mV and -150 mV. If all offsets are within this range, alignment is satisfactory so proceed to step 16.

   b. When using a different CE pack than the one used for last alignment, offsets must range between +225 mV and -225 mV. If all offsets are within this range, alignment is satisfactory so proceed to step 16.

   c. If any offsets are outside acceptable range, as defined in steps a or b (whichever applies), these heads are misaligned. Proceed to step 5.

5. Press START switch to stop drive motor and unload heads.
6. Remove connector support bracket (see figure 3-19).
7. Loosen head-arm mounting screws securing heads requiring alignment and torque these screws to 4 ±1/2 lbf•in (0.5 +0.1 N•m).
8. Press START switch to start drive motor and load heads.
9. Command direct seek to cylinder 245.

CAUTION

Use extreme care to avoid short circuit contact with write driver board when installing or removing head alignment tool and torque wrench.

10. Align heads as follows:

   a. Install jumper between A04-11A (Seek Error) and ground. This jumper prevents force exerted during alignment from moving the heads off the alignment cylinder to an adjacent cylinder. Be sure to remove jumper before commanding drive to perform another seek.

   b. Select head to be aligned.

WARNING

To prevent personal injury in case of an emergency retract, install carriage locking pin in head alignment hole prior to positioning head alignment tool. Be sure to remove pin before next seek is performed.

   c. Install head alignment tool so that tool pin engages head-arm alignment slot (refer to figure 3-6).

   d. Observe oscilloscope and adjust head to obtain belanced dibit pattern. Pattern is balanced when point A amplitude equals point B and point C equals point D (see figure 3-5.1).

   e. Observe null meter and adjust head until offset ranges between +75 mV and -75 mV. Calculate offset as described in steps 5 and 6 of Servo Head

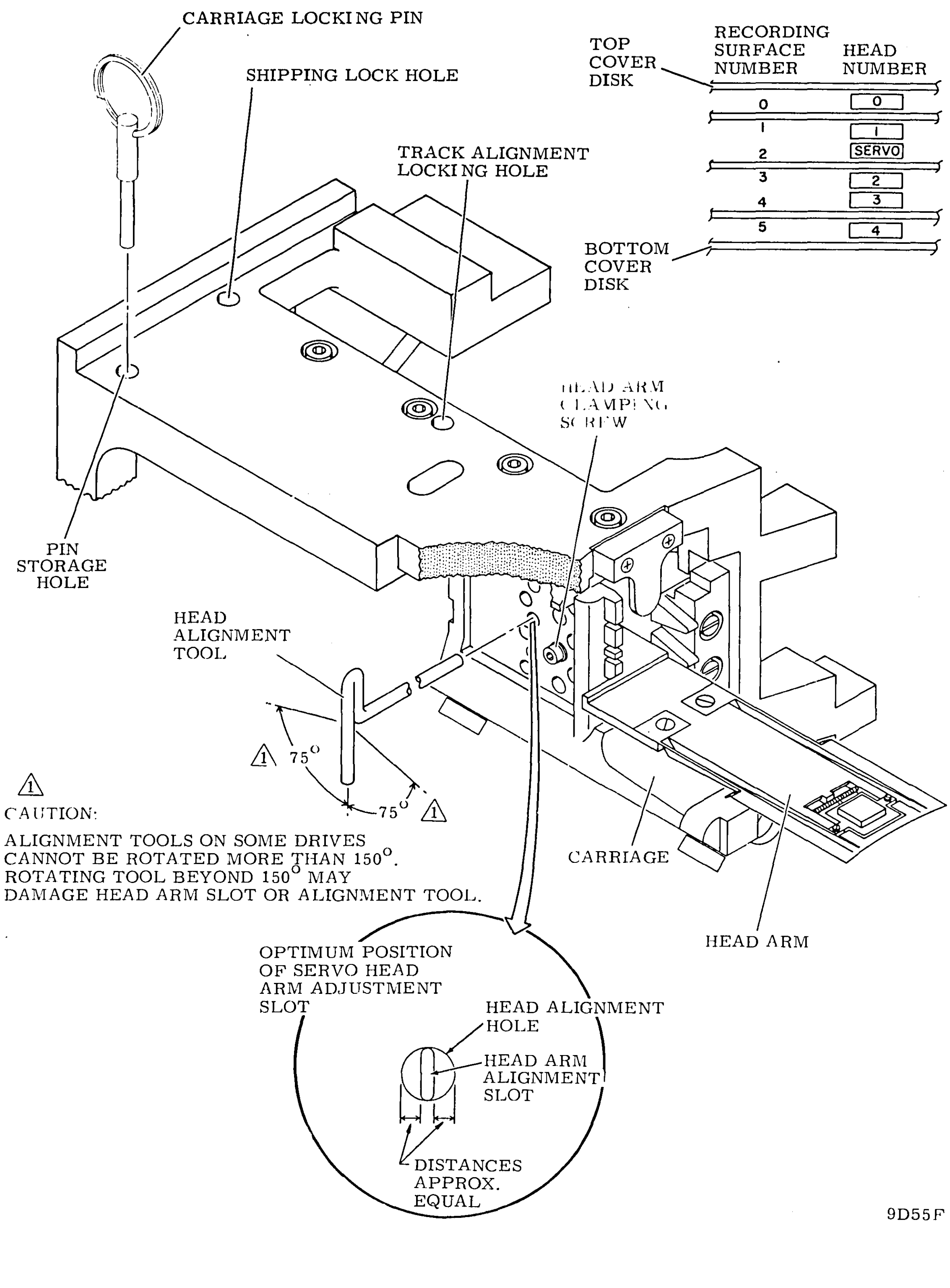


Figure 3-6. Head Arm Alignment

Check. Occasionally, a head cannot be aligned because its adjustment slot is at its end of travel. If this occurs, check position of servo head-arm adjustment slot and, if necessary, recenter it. However, it should be noted that any slight adjustment of the servo head requires realignment of all read/write heads. Torque servo head to 12 ±1/2 lbf·in (1.4 ±0.1 N·m).

f. Repeat steps a through e for all heads to be aligned.

11. Remove carriage locking pin and also remove jumpers from A2B09-11A.

12. Press START switch to stop drive motor and unload heads.

13. Torque head-arm clamp screws of each head adjusted to 12 ±1/2 lbf·in (1.4 ±0.1 N·m). While torqueing screws, use only straight arm allen wrench and keep it as perfectly aligned as possible with screws. If care is not taken during this operation, head may be pushed out of alignment.

14. Check each head adjusted to see if torqueing screws affected alignment. If any heads are outside ±150 mV range, readjust them as directed in steps 7 through 13.

15. Perform the following to ensure that heads will remain aligned under normal operating conditions:

   a. Command continuous seeks between cylinders 240 and 245 for a minimum of 30 seconds.

   b. Unload and load heads at least twice.

   c. Command direct seek to cylinder 245.

   d. Check alignment of each head adjusted. If any heads are outside acceptable range (as defined in step 4), repeat this procedure starting with step 10.

16. Press START switch to stop drive motor.

17. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

18. Disconnect test setup and remove alignment card and terminator (if installed).

19. Replace connector support bracket (see figure 3-19).

20. Lower logic chassis to normal operating position.

21. Lower case assembly.

22. Remove CE pack.

23. Restore drive to on-line operation.

VELOCITY GAIN ADJUSTMENT

These procedures provide information for checking and, if necessary, adjusting the servo system velocity signal for both the 40 MB and 80 MB drives. If the adjustment cannot be completed satisfactorily, the procedure must be terminated. If this happens, refer to the Trouble Analysis section. These procedures assume that an FTU is connected, and that a scratch pack is installed on the drive.

40 MEGABYTE UNITS

1. With drive case closed, command random seeks for a minimum of 10 minutes to provide thermal stability.
2. Stop random seeks and set up oscilloscope as shown in figure 3-6.1. Oscilloscope ground references must be as shown.
3. Command continuous seeks to cylinder 410 (hex 19A) and adjust oscilloscope trigger level to obtain waveform shown in figure 3-6.1.
4. Measure full length seek time. Time between On Cylinder pulses should be 36 to 39 milliseconds.
5. If full length seek time is not as specified, perform velocity gain adjustment. Adjust velocity gain potentiometer E2R6 on card A12 (see figure 3-7) until full length seek time is between 36 to 39 milliseconds. (See figure 3-6.1)
6. Return drive to normal operation.

80 MEGABYTE UNITS

1. With drive case closed, command random seeks for a minimum of 10 minutes to provide thermal stability.
2. Stop random seeks and set up oscilloscope as shown in figure 3-6.2. Oscilloscope ground references must be as shown.
3. Command continuous seeks to cylinder 822 (hex 336) and adjust oscilloscope trigger level to obtain waveform shown in figure 3-6.2.
4. Measure full length seek time. Time between On Cylinder pulses should be 52 to 54 milliseconds.
5. If full length seek time is not as specified, perform velocity gain adjustment. Adjust velocity gain potentiometer E2R6 on card A12 (see figure 3-7) until full lenth seek time is between 52 to 54 milliseconds. (See figure 3-6.2.)
6. Return drive to normal operation.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	0.2V	A09-24B	+ON CYLINDER SENSE

CH 2- NOT USED

TRIGGERING:

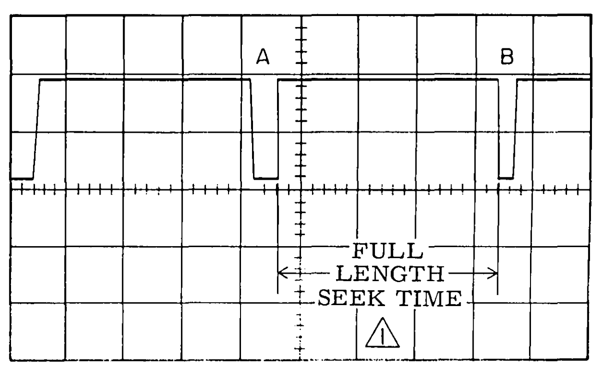
SLOPE/SOURCE	CONNECTION	SIGNAL NAME
TRIGGER A- +EXT (USE X10 PROBE)	A09-23B	-FORWARD SEEK

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 10ms MODE: CH 1

NOTES:

⚠ MEASUREMENT IS FROM TRAILING EDGE OF PULSE A TO LEADING EDGE OF PULSE B



9F28A

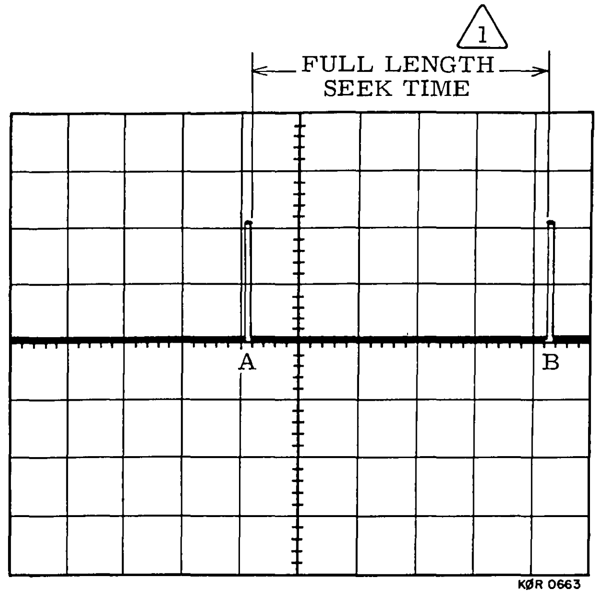
Figure 3-6.1. Velocity Gain Waveform - 40 Megabyte

OSCILLOSCOPE SETUP

	VOLTS / DIV	TEST POINT	SIGNAL NAME
CH 1 – (USE X PROBE)	0.2V	A04 03A	+ON CYLINDER
CH 2 – (USE X PROBE)	NOT USED		

	SLOPE / SOURCE	TEST POINT	SIGNAL NAME
TRIGGER A – (USE X 10 PROBE)	+/EXT	A04 07A	-FORWARD SEEK
TRIGGER B – (USE X PROBE)	NOT USED		

TIME / DIV: 10 ms   **MODE TRIGGER:** CH 1



9F20A

ADDITIONAL SETTINGS: NONE

1 MEASUREMENT IS FROM TRAILING EDGE OF PULSE A TO LEADING EDGE OF PULSE B.

Figure 3-6.2. Velocity Gain Waveform - 80 Megabyte

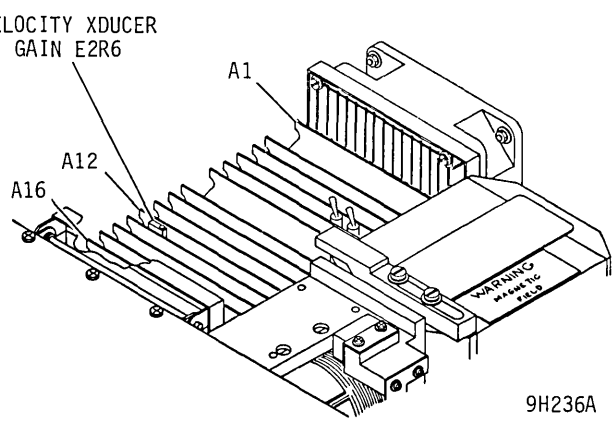


Figure 3-7. Velocity Gain Adjustment Locations

SPEED TRANSDUCER ELECTRICAL CHECK

This procedure checks the output of the speed transducer. Perform the following steps when you suspect that the spindle is not reaching normal operating speed.

1. Install a scratch pack.

2. Connect oscilloscope as shown in figure 3-7.1 and start drive motor.

3. Observe that the speed transducer output is between -0.60 and -1.28 volts on the negative swing and between +0.9 and +2.1 volts on the positive swing.

4. If oscilloscope reading is not within tolerance, power down drive, remove pack and perform Speed Transducer Adjustment procedure (shown in section 3D). If the speed transducer is within mechanical tolerance as described in section 3D and oscilloscope reading is still incorrect, replace speed transducer.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	△1 0.5 V/CM	A10-27A	
CH 2			

TRIGGERING:

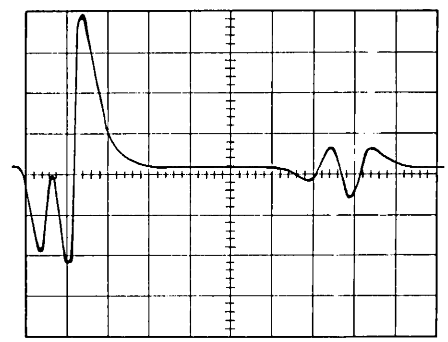
SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-INT CH 1		

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.2 MS/CM MODE:

NOTES: △1 USE X1 PROBE.

2. CALIBRATE SCOPE TO GROUND.



9X35

Figure 3-7.1 Speed Transducer Electrical Check

SECTION 3C

TROUBLE ANALYSIS AIDS

GENERAL

Various types of malfunction can occur during the course of drive operation. No attempt has been made to correlate the many possible malfunctions to their most likely cause. However, as a troubleshooting aid on the broad subject of accessing errors, these four categories are definable:

- Seek errors
- Address errors
- On cylinder errors
- Seek monitor checks

Prior to beginning detailed tests or adjustments, perform the procedures in Drive Tests and Adjustments. If these tests and adjustments do not correct the malfunction or reveal a correctable problem, proceed with the Power System Checks.

POWER SYSTEM CHECKS

OUTPUT VOLTAGES CHECK

Perform the following check with the drive performing continous 128-track seeks. The +5V and -5V adjustment procedures are located in the Drive Tests and Adjustments paragraphs of this section. All measurements should be made by connecting a digital volt/ohmmeter at the logic chassis connection or at the capacitor in the case of -42V. The following voltages shall be present:

1. Ground to +20 (+20±2 vdc).
2. Ground to +5 (+5.1±0.05 vdc).
3. Ground to +42 (+42±2 vdc).
4. Ground to -20 (-20±2 vdc).
5. Ground to -42 (-42±2 vdc).
6. Ground to -5 (-5.1±0.05 vdc).

EMERGENCY RETRACT TEST

1. Raise case assembly.
2. Press drive START switch to start drive motor and load heads.
3. Apply a ground to A13-14B and observe that heads unload.
4. Sync an oscilloscope negative on A13-14B and observe the output at the -LQV card, location A12, TPF. The output at TPF should peak at 2.0 (±0.5) volts during the retract.
5. Prepare drive for on line operation.

SERVO SYSTEM ADJUSTMENTS AND CHECKS

GENERAL

The following procedures check the logic associated with the servo. These procedures are applicable only if adjustments could not be made or if troubleshooting a malfunctioning drive.

All servo system checks are written as independent procedures. If more than one check is being made, drive preparation steps may be omitted for subsequent checks.

VELOCITY GAIN CHECK

Refer to the Velocity Gain Adjustment procedure in the Drive Tests and Adjustments section for instructions on checking velocity gain.

FINE POSITION AMPLITUDE CHECK

1. Prepare drive for use with test software or field test exerciser.
2. Trigger oscilloscope negative external on wirewrap pin A04-07A (Not Forward).
3. Connect oscilloscope channel 1 to test point F on card A11 (Fine Position Analog).
4. Set oscilloscope volts per division control to 2 volts per cm and time per division control to 1 ms per cm.
5. Command continuous seeks between cylinders 000 and 001.
6. Amplitude of waveform (refer to figure 3-4) should be between 8.6 and 12.6 volts peak to peak. If voltage exceeds tolerance, replace card at A11. If tolerance is still not met, replace card at A10.
7. Prepare drive for on line operation.

ON CYLINDER DELAY CHECK

1. Prepare drive for use with test software or field test exerciser.
2. Trigger oscilloscope positive external at wirewrap pin A04-15A (On Cylinder Sense).
3. Connect oscilloscope channel 1 to wirewrap pin A04-03A (On Cylinder).
4. Command continuous seeks between cylinders 000 and 001.
5. Observe that On Cylinder pulse occurs between 1.40 and 2.10 ms from start of the trace. If not, replace card A04.
6. Prepare drive for on line operation.

COARSE VELOCITY INTEGRATOR CHECK

This procedure checks operation of Desired Velocity Function Generator. Function Generator smooths steps in coarse position error signal which are present during last 256 cylinders of a seek.

1. Prepare drive for use with test software or field test exerciser.

NOTE

Insert spare wirewrap pin (or equivalent) into back of connector attached to backpanel so oscilloscope probe can be attached.

2. Trigger oscilloscope positive external at wirewrap pin A09-26B (T≤7).
3. Connect oscilloscope channel 1 to test point D on card A12.

OSCILLOSCOPE SETTINGS

LOGIC GND TO SCOPE GND

VOLTS / DIV
- CH 1 - 2V/CM
- CH 2 - NOT USED

TIME / DIV
- A - 1MS/CM
- B - NOT USED

TRIGGERING
- A - EXT NEG, A04-07A
- B - NOT USED

PROBE CONNECTIONS
- CH 1 TO A11-TPF
- CH 2 NOT USED

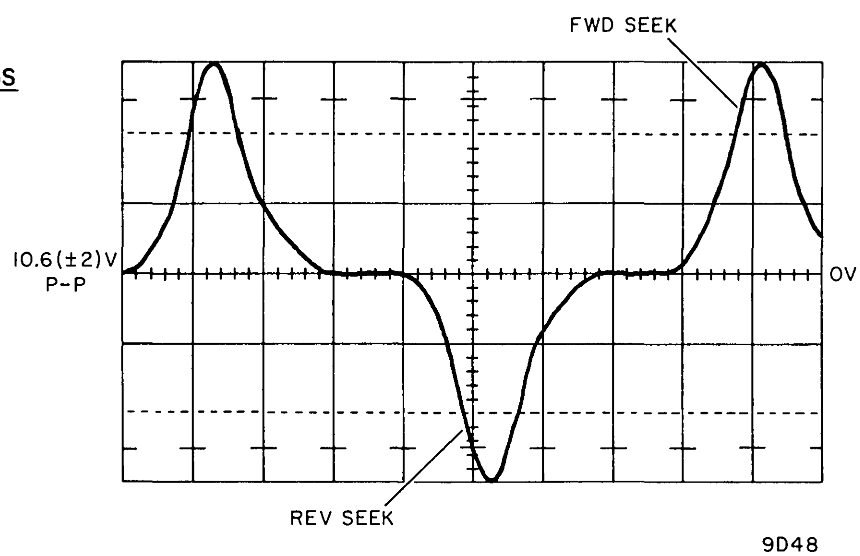


Figure 3-8. Fine Position Amplitude Waveform

4. Command continuous seeks between cylinders 000 and 256.

5. Adjust oscilloscope controls to display two sloped curves (refer to figure 3-9).

6. The amplitude of the last discontinuity (see figure 3-9) should be from .03 to .05 volts (ignore spike). If it does not meet these specifications perform Digital to Analog Converter and Velocity Transducer Gain Uniformity Checks.

7. Prepare drive for on line operation.

DIGITAL TO ANALOG CONVERTER CHECK

The position converter output should be clamped at negative saturation until tracks to go is less than 256 (T<256). During remainder of seek position converter output is under control of digital to analog converter.

1. Prepare drive for use with test software or with field test exerciser.

2. Trigger oscilloscope negative external at wirewrap pin A04-08A (Not Rev Seek).

3. Connect oscilloscope channel 1 to test point C on Card A12 (D/A Converter).

4. Command continuous seeks between cylinders 000 and 260.

5. Observe waveforms and evaluate them as follows (oscilloscope settings and waveforms are shown on figure 3-10):

   a. Ensure that top waveform on figure 3-10 has an amplitude of -10.5 volts maximum.

   b. Ensure that steps on the bottom waveform (except for the last two) have height between 20 and 60 mV. Last two steps should each have height of 40 mV.

6. If requirements of step 5 are not met, replace cards in A12 or A13.

7. Prepare drive for on line operation.

VELOCITY TRANSDUCER GAIN UNIFORMITY CHECK

1. Prepare drive for use with test software or field test exerciser.

2. Trigger oscilloscope positive external at wirewrap pin A09-26B (T≤7).

3. Connect oscilloscope channel 1 to test point B on card A12 (velocity integrator output).

4. Command continuous seeks between cylinders 000 and 007.

OSCILLOSCOPE SETTINGS

LOGIC GND TO SCOPE GND

VOLTS / DIV
- CH I -.2V/CM
- CH 2 -NOT USED

TIME / DIV
- A-.5MS/CM
- B-NOT USED

TRIGGERING
- A-EXT POS, A09-26B
- B-NOT USED

PROBE CONNECTIONS
- CH I TO A12-TPD
- CH 2 NOT USED

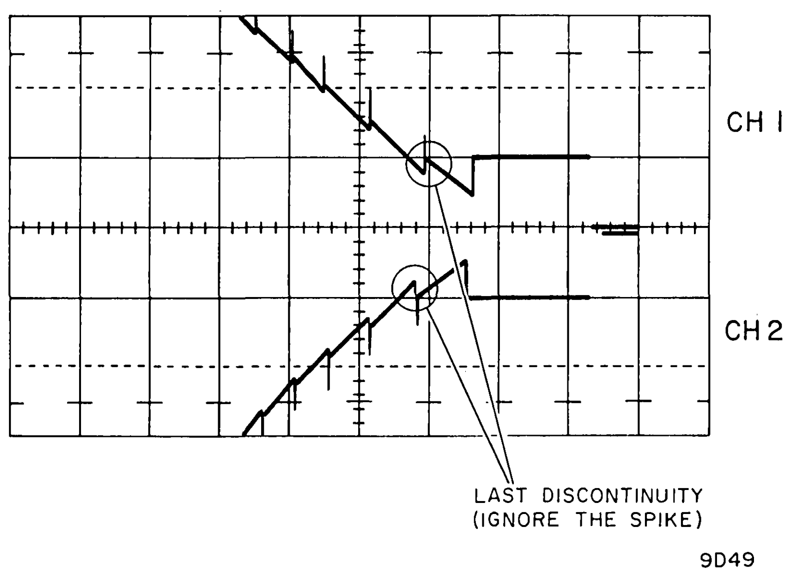


Figure 3-9. Coarse Velocity Integrator Waveform

OSCILLOSCOPE SETTINGS

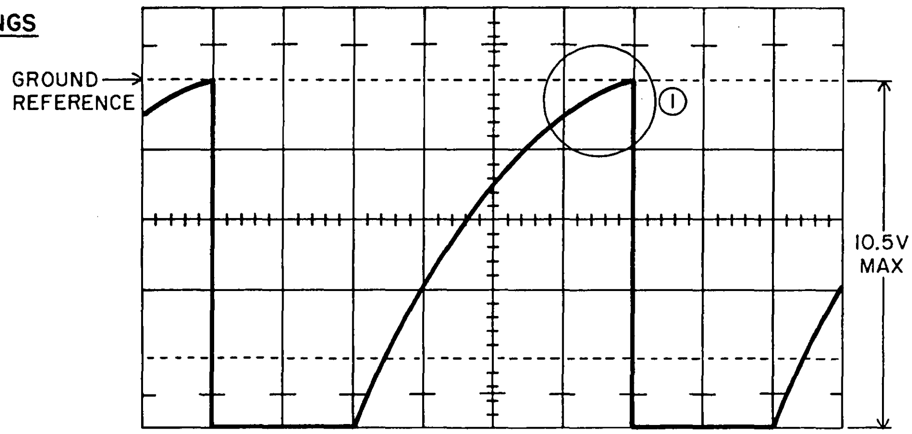
LOGIC GND TO SCOPE GND

VOLTS / DIV
- CH I - 2 V
- CH 2 - NOT USED

TIME / DIV
- A - 5 MS
- B - NOT USED

TRIGGERING
- A - EXT NEG, A04-08A
- B - NOT USED

PROBE CONNECTIONS
- CH I TO AI2-TPC
- CH 2 NOT USED



OSCILLOSCOPE SETTINGS

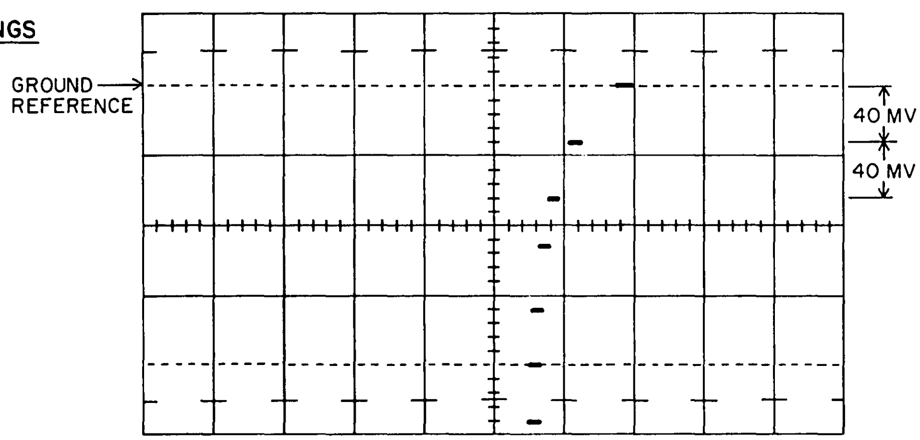
LOGIC GND TO SCOPE GND

VOLTS / DIV
- CH I - 0.05 V
- CH 2 - NOT USED

TIME / DIV
- A - 5 MS
- B - NOT USED

TRIGGERING
- A - EXT NEG, A04-08A
- B - NOT USED

PROBE CONNECTIONS
- CH I TO AI2-TPC
- CH 2 NOT USED



NOTE

(I) LOWER WAVEFORM IS EXPANDED VIEW OF THIS SECTION.

9D50

Figure 3-10. Digital to Analog Converter Output Waveform

5. Decalibrate horizontal sweep and adjust triggering control to observe both positive and negative ramps (see figure 3-11). Ramps represent integrated velocity sawtooth during last seven cylinders of seek. Positive ramps are forward seek, negative ramps are reverse seek.

6. Check voltages of second to last positive and negative ramps (refer to figure 3-11). Amplitude of each ramp should be 2.2 to 2.8 volts and difference in amplitudes between two ramps should be less than 0.4 volts. If these requirements are not met, either card A12 or velocity transducer is defective.

7. Prepare drive for on line operation.

FINE ENABLE SWITCHING LEVEL CHECK

This procedure verifies that Fine Enable switches in at proper level. This signal, along with T≤1, set Fine FF.

1. Prepare drive for use with test software or field test exerciser.

2. Trigger oscilloscope negative external at wirewrap pin A04-07A (Not Forward Seek).

3. Connect oscilloscope channel 2 to test point B on card A12 (velocity integrator output).

4. Connect oscilloscope channel 1 to wirewrap pin **A04-16B** (FINE).

5. Set oscilloscope trigger mode to chop.

6. Command continuous seeks between cylinders 000 and 001.

7. Check that Fine signal switches to a logical 1 when positive or negative velocity signal is between 1.3 and 1.5 volts (refer to figure 3-12). If these requirements are not met replace card in A11.

8. Prepare drive for on line operation.

TRACK SERVO AMPLITUDE CHECK

This test checks the amplitude of **track** servo signal output of servo preamp.

1. Prepare drive for use with test software or field test exerciser.

2. Trigger oscilloscope internal positive.

NOTE

> Insert spare wirewrap pin (or equivalent) into back of connector attached to backpanel so oscilloscope can be attached.

3. Connect oscilloscope channel 1 to wirewrap pin A10-25B (dibit signals from servo preamp).

4. Connect oscilloscope channel 2 to wirewrap pin A10-23B (dibit signals from servo preamp).

OSCILLOSCOPE SETTINGS

LOGIC GND TO SCOPE GND

VOLTS / DIV
CH I - IV/CM
CH 2 - NOT USED

TIME / DIV
A - .5 MS/CM
B - NOT USED

TRIGGERING
A - EXT POS, A09-26B
B - NOT USED

PROBE CONNECTIONS
CH I TO AI2-TPB
CH 2 NOT USED

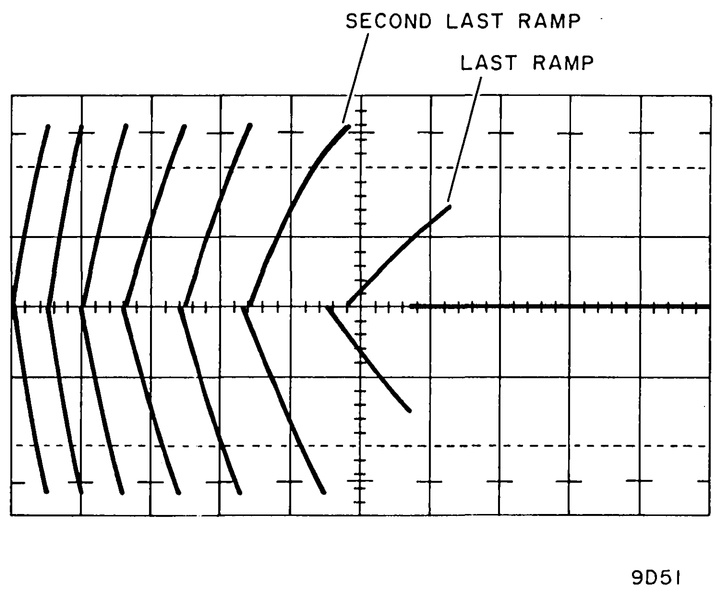


Figure 3-11. Integrated Velocity Waveform

OSCILLOSCOPE SETTINGS

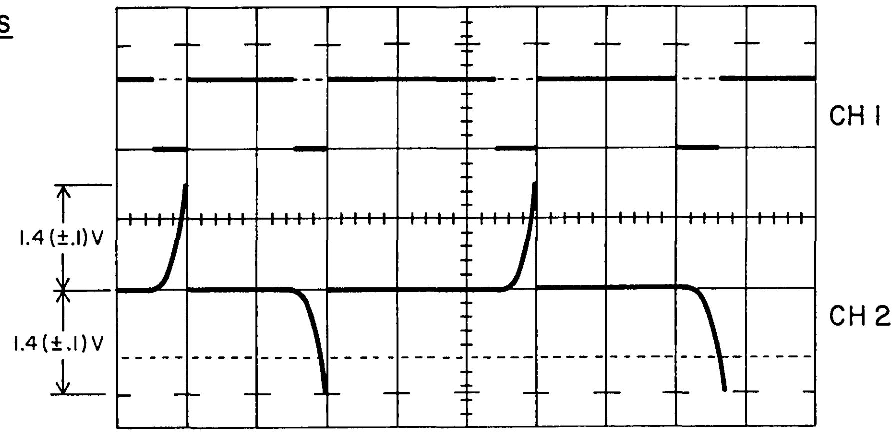
LOGIC GND TO SCOPE GND

VOLTS / DIV
CH 1 - 5V/CM
CH 2 - 1V/CM

TIME / DIV
A - 1MS/CM
B - 1MS/CM

TRIGGERING
A - EXT NEG, A04-07A
B - NA

PROBE CONNECTIONS
CH 1 TO A04-16B
CH 2 TO A12-TPB



9D52

Figure 3-12. Fine Enable Switching Waveform

5. Set oscilloscope trigger mode to add and invert either channel 1 or 2.

6. Command seek to cylinder 000 and observe amplitude of waveform (see figure 3-13).

7. Command seek to cylinder 822 and observe amplitude of waveform (see figure 3-13).

8. Check that waveforms observed in steps 6 and 7 are between 0.3 and 1.5 volts peak to peak (note that waveform in step 6 has largest amplitude).

9. If one side of servo head is shorted to ground, a waveform similar to that shown in figure 3-14 will be displayed. The servo will continue to function, but intermittent seek errors occur.

10. If track servo amplitude is not as specified in figure 3-13, replace servo head or servo preamp.

11. Prepare drive for on line operation.

OSCILLOSCOPE SETTINGS

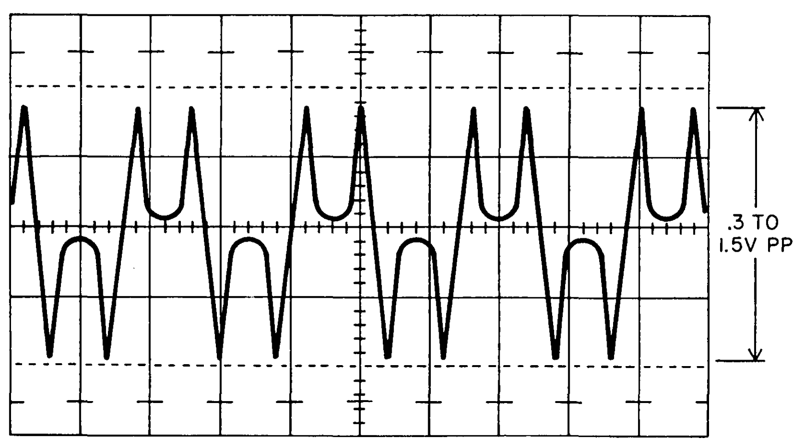
LOGIC GND TO SCOPE GND

VOLTS / DIV
CH 1 - .2V/CM
CH 2 - .2V/CM

TIME / DIV
A - 1μS/CM
B - NOT USED

TRIGGERING
A - INT NEG
B - NOT USED

PROBE CONNECTIONS
CH 1 TO A10-25B
CH 2 TO A10-23B



9D53

Figure 3-13. Track Servo Amplitude Waveform

OSCILLOSCOPE SETTINGS

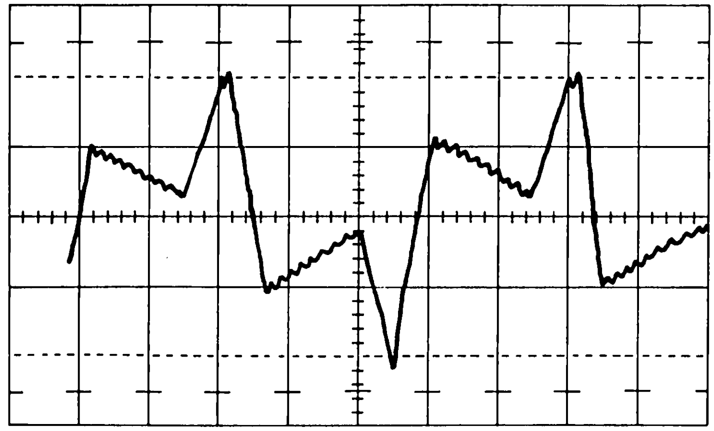
LOGIC GND TO SCOPE GND

VOLTS / DIV
CH 1 - .1V/CM
CH 2 - .1V/CM

TIME / DIV
A - .5μS/CM
B - NOT USED

TRIGGERING
A - INT NEG
B - NOT USED

PROBE CONNECTIONS
CH 1 TO A10-25B
CH 2 TO A10-23B



9D54

Figure 3-14. Shorted Servo Head Waveform

CYLINDER PULSE SWITCHING LEVEL CHECK

NOTE

If requirements of steps 1 through 7 are met it is not necessary to perform remainder of this procedure.

1. Prepare drive for use with test software or field test exerciser.
2. Trigger oscilloscope positive internal.
3. Connect oscilloscope channel 1 to wirewrap pin A04-22A (Cylinder Pulses).
4. Command continuous seeks between cylinders 000 and 004.
5. Check for series of positive-going 10 (±2.5) µsec cylinder pulses.
6. Trigger oscilloscope external positive at A04-03A (On Cylinder).
7. Check that last cylinder pulse (generated from leading edge of On Cylinder) is present and has pulses width of approximately 0.2 µsec.
8. Trigger oscilloscope negative external at wirewrap pin A04-28B (Cylinder Detect A).
9. Connect oscilloscope channel 1 to wirewrap pin A10-09B (Track Servo Signal).
10. Command continuous seeks between cylinders 000 and 004.
11. Set oscilloscope time per division to 50 µsec per cm and volts per division to 0.2V per cm.
12. Check that Track Servo signal is between -0.3 and -0.5 volts at beginning of sweep.
13. Trigger oscilloscope positive external at A04-28B (Cylinder Detect A) and check that track servo signal is between -0.1 and +0.1 at beginning of the sweep.
14. Trigger oscilloscope negative external at wirewrap pin A04-27B (Cylinder Detect B). Check that Track Servo signal is between +0.3 and +0.5 volts at beginning of sweep.
15. Trigger positive external and check that Track Servo signal is between -0.1 and +0.1 at beginning of sweep.
16. If levels are not met replace card A10.
17. Prepare drive for on line operation.

END OF TRAVEL CHECK

1. Prepare drive for use with test software or field test exerciser.

2. Remove logic control of voice coil by disconnecting black lead wire from voice coil.

3. Remove plastic shield from top of magnet assembly to gain access to voice coil.

4. Command a return to zero seek.

5. Trigger oscilloscope negative internal.

NOTE

Insert spare wirewrap pin (or equivalent) into back of connector attached to backpanel so oscilloscope probe can be attached.

6. Connect oscilloscope channel 1 to wirewrap pin A03-16A (Not Forward EOT Enable).

7. Set oscilloscope time per division control to 5 ms per cm and volts per division control to 2 volts per cm.

8. Slowly move positioner toward cylinder 822. After passing cylinder 822,signal goes low and will remain low as long as positioner is moving.

9. Trigger oscilloscope positive internal.

10. Connect oscilloscope channel 1 to wirewrap pin A03-10B (Reverse EOT Pulse).

11. Change oscilloscope time per division to 20 μsec per cm.

NOTE

Do not unload heads manually.

12. Slowly move carriage toward cylinder 000. After passing cylinder 000, Reverse EOT Pulses should appear (approximately 40 μsec in duration).

13. Unload heads manually (refer to procedure for manually positioning carriage).

14. Press START switch to stop drive motor.

15. Replace plastic shield removed in step 2.

16. Set POWER SUPPLY circuit breaker to off.

17. Restore logic control to voice coil by connecting black lead wire to voice coil.

18. Prepare drive for on line operation.

ON CYLINDER SWITCHING LEVEL CHECK

This procedure verifies that On Cylinder is enabled when Fine Position signal approaches null with Fine FF set.

1. Prepare drive for use with test software or field test exerciser.

2. Trigger oscilloscope positive external at wirewrap pin A04-15A (On Cylinder Sense).

3. Connect oscilloscope channel 1 to test point F on Card All (Fine Position Analog).

4. Command continuous seeks between cylinders 000 and 003.

5. Two erratic horizontal waveforms are displayed. Check that both positive and negative waveforms are between 0.88 and 1.08 volts peak at beginning of trace.

6. Command return to zero seek.

7. Remove logic control of voice coil by disconnecting black lead wire from voice coil.

8. Remove plastic shield from top of magnet assembly to provide access to voice coil.

9. Change oscilloscope trigger to negative internal.

10. Manually move carriage back and forth. Check that both positive and negative waveforms are between 1.45 and 1.77 volts peak at the beginning of trace.

11. If requirements of steps 5 or 8 are not met, replace card A09.

CAUTION

Refer to discussion on manually positioning carriage before manually unloading heads.

12. Manually unload heads.

13. Press START switch to stop drive motor.

14. Set POWER SUPPLY circuit breaker to off.

15. Replace plastic shield removed in step 8.

16. Restore logic control to voice coil by connecting black lead wire to voice coil.

17. Prepare drive for on line operation.

LOSS OF SERVO CONTROL CHECKS

If problems exist in servo system such that satisfactory results cannot be obtained through use of test software or field test exerciser, check out system by performing following procedures.

1. Prepare drive as follows:

   a. Press START switch to stop drive motor.

   b. Set POWER SUPPLY circuit breaker to off.

   c. Lift top cover to gain access to logic chassis.

   d. Put logic chassis in maintenance position.

   e. Loosen four screws securing logic chassis cover and remove cover.

   f. Remove logic control of voice coil by disconnecting black lead wire at voice coil.

   g. Remove plastic shield from top of magnet assembly to provide access to voice coil.

   CAUTION

   Make sure positioner is fully retracted (refer to procedure for manually positioning carriage).

2. Check that output of summing amplifier is at 0 volts before drive motor is energized by performing the following procedure.

   a. Set oscilloscope trigger control to auto (free running).

   b. Set oscilloscope volts per division control to 5 volts per cm.

   c. Connect oscilloscope channel 1 to test point E on card A12.

   d. Set POWER SUPPLY circuit breaker to on.

   e. Observe that voltage observed is 0 volts.

3. Check that output of summing amplifier goes to -10 volts when drive motor gets up to speed by performing the following procedure.

   a. Set oscilloscope controls as in step 2.

   b. Press START switch to start drive motor and observe that voltage drops to -10 volts when drive motor gets up to speed.

   CAUTION

   To avoid head crash, make certain drive motor is up to speed.

4. Manually load heads (refer to discussion on manually positioning carriage).

5. Check velocity transducer and velocity amplifier. If signals observed are as specified in the following, transducer and amplifier are functioning properly.

   a. Connect oscilloscope channel 1 to test point F on card A12 (output of velocity transducer circuit).

   b. Set oscilloscope trigger control to auto (free running).

   c. Set oscilloscope volts per division control to .5V per cm, set time per division control to 10 ms per cm.

   d. Manually move positioner toward cylinder 822 (forward direction). Signal should go negative and amplitude should increase as the speed of positioner increases.

   e. Manually move positioner toward cylinder 000 (reverse direction). Signal should go positive and amplitude should increase as speed of positioner increases.

6. Check Fine Position signal. If signals observed are as specified in following, it indicates that track servo, the A10 card and servo head are functioning properly.

   a. Connect oscilloscope channel 1 to test point F on card A11 (Fine Position Analog).

   b. Set oscilloscope trigger control to auto (free running).

   c. Set oscilloscope volts per division control to 2V per cm and time per division control to 10 ms per cm.

   d. Observe 10.6 (±2) volts peak to peak signal when moving positioner in either forward or reverse direction. When positioner is on cylinder, signal should stay at 0 volts.

7. Check summing amplifier output. If signals observed are as specified in

the following, it indicates that proper signal is being gated to summing amplifier, fine mode is enabled, and velocity amplifier and fine position signals are properly summed together.

a. Connect oscilloscope channel 1 to test point E (summing amplifier output) on card A12.

b. Set oscilloscope trigger control to auto (free running).

c. Set oscilloscope volts per division control to 5V per cm and time per division control to 20 ms per cm.

d. Signal observed should be that of step 6 superimposed on signal of step 5.

e. Signal should also clamp at approximately +10 volts.

8. Check power amplifier output. If signals observed are as specified in following, power amplifier is functioning properly.

   a. Connect oscilloscope channel 1 to black lead wire which was disconnected from voice coil.

   b. Set oscilloscope trigger control to auto (free running).

   c. Set oscilloscope volts per division control to 20V per cm and time per division control to 10 ms per cm.

   d. Move positioner in forward, then reverse direction and observe signal switching from +40 to -40 volts.

CAUTION

Refer to discussion on manually positioning carriage before manually unloading heads.

9. Manually unload heads.

10. Press START switch to stop drive motor.

11. Set POWER SUPPLY circuit breaker to off.

12. Reconnect black lead wire to voice coil and replace plastic shield removed in step 1g.

13. Replace cover on logic chassis and tighten four screws.

14. Place logic chassis back in normal operating position and close top cover.

15. Prepare drive for on line operation.

FINE POSITION OFFSET CHECK

1. Prepare drive for use with test software or field test exerciser.

2. Command direct seek to cylinder 400.

3. Set oscilloscope triggering to automatic. Set vertical sensitivity of each channel to 50 mV per cm.

4. Connect oscilloscope channels 1 and 2 to A11-TPF (Fine Position Analog).

5. Switch oscilloscope to Add mode and adjust the ground reference level to the horizontal centerline.

6. Set channel 1 input coupling to DC and set channel 2 input coupling to AC.

7. The dc value of the position signal should be -100 to +100 mV.

8. If the requirement of step 7 is out of tolerance, connect both channel 1 and 2 probes to A12-TPE (summing amp output) and reposition heads to a track where the dc value of the signal is -10 to +10 mV.

9. Repeat steps 3 through 7. If the dc offset is now within the range of -30 to +30 mV, the cause of the excessive dc offset at cylinder 200 is mechanical. Check the head cables, coil flex leads, velocity transducer and carriage for exerting excessive force. If the dc offset is greater than -30 to +30 mV, the excessive offset voltage is caused by an electrical problem possibly located in one of the logic cards at locations A09, A10, A11, A12 or a bad ground from the velocity transducer.

10. Prepare drive for on line operation.

READ/WRITE SYSTEM CHECK

Field-level tests of the read/write system require that signals with fast rise times be accurately measured. Make sure that the scope probe ground adapter is connected to ground (TA-A or TP-Z) of the card being tested. Connect secure ground lead between scope ground and GND jack on maintenance panel.

HEAD AMPLITUDE TEST

The procedure verifies that the read signal has sufficient amplitude to be reliably processed by the read logic. Since amplitude decreases as the recording frequency increases, the minimum amplitude in MFM recording is obtained when an all "0's" or all

"1's" pattern is being read. The minimum amplitude is tested first. Minimum record-ing frequency, therefore, the greatest amplitude, is obtained by a pattern of alternate "1010..." pattern. This amplitude is also tested.

Since read data is tested by the same heads that write the data pattern, head alignment is not verified by this test. If this test fails on only one head, replace that head. If it fails on all heads, replace read amplifier card (on deck) and repeat test.

Perform this test on all heads as follows:

1. Seek to cylinder 821.

2. Connect oscilloscope vertical inputs to J104 pins 1 and 3. Measure signal differentially by placing scope in Add mode and inverting channel B.

3. Sync positive on A03-TPC (Index).

4. Write data pattern of all "1's".

NOTE

The Field Test Exerciser (FTE) writes by syncing on negative-going edge of Index, then delaying 600 μsec and writing either low frequency (101010...) or high frequency (0000... or 1111...) until the leading edge of the next Index.

5. Measure and record peak to peak amplitude of read signal. It shall be at least 130 mv peak to peak.

6. Seek to cylinder 000.

7. Write data pattern of 101010...

8. Measure and record peak to peak amplitude of read signal. It shall not exceed 1100 mv peak to peak.

MISCELLANEOUS LOGIC CHECKOUT

START/STOP TIME

This procedure verifies correct operation of the spindle drive motor and hysteresis brake. Use a stopwatch or wristwatch with sweep second hand.

1. Connect oscilloscope to back panel pin A05-17B (Up to Speed).

2. Press START switch and start timer. Up to Speed should be "1" in 10 (±5) seconds.

3. Press START switch. Pack should come to complete stop in less than 25 seconds.

SPEED SENSING

This procedure verifies correct operation of the speed detection function. Proceed as follows with a pack installed.

1. Load heads.

2. Connect oscilloscope to back panel pin J202-1 (Speed Transducer Output). Sync negative internal. Calibrate scope trace to ground.

3. Observe waveform on oscilliscope. Signal should reach at least -1.0 vdc on negative swing and at least +1.0 to +4.5 vdc on positive swing. If not, check sensor gap as directed in Speed Sensor Adjustment procedure in section 3D.

POWER UP CLEAR

This procedure verifies that the internal Master Clear is operational during startup conditions. A pack need not be installed.

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Connect oscilloscope channel 1 to +5 vdc. Place channel 2 scope probe on Power Up Blanking signal at A05-25B.

3. Set AC POWER and POWER SUPPLY circuit breakers to ON while observing oscilloscope.

   a. Channel 1 (±5v) should reach +4.5v within 100 ms.

   b. Channel 2 pulse width ("0") should be 600 (±100) ms.

SECTION 3D

REPAIR AND REPLACEMENT PROCEDURES

GENERAL

Procedures in the following paragraphs outline in detail the adjustment, replacement, and checkout of the field-replaceable parts or assemblies of a drive. Not all procedures contain all three categories of information. For example, some replaceable items do not require a checkout procedure after replacement; others may not require an adjustment.

Before performing any of these procedures, read the entire procedure and become familiar with safety precautions and preliminary conditions specified at the beginning of this Corrective Maintenance section.

The drive tests and adjustments should be performed prior to replacing any parts. This ensures that apparent malfunctions are not caused simply by misadjustments. Also, these procedures should be performed whenever logic cards or other electrical components are repaired or replaced.

BLOWER MOTOR REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Remove ac power plug.
2. Raise case assembly.
3. Remove disk pack.
4. Raise deck assembly to maintenance position.
5. Identify blower motor leadwires and disconnect wires (figure 3-15).
6. Remove left side panel (left side as viewed from front).
7. Remove six screws and washers securing blower assembly to base assembly (screws are under base assembly) and remove defective blower.
8. Install replacement blower assembly in base assembly. Orient blower motor leadwires per figure 3-15.
9. Secure blower assembly to base assembly using six screws and washers. Tighten screws.
10. Connect blower motor leadwires per figure 3-15.
11. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.
12. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.
13. Set AC POWER and POWER SUPPLY circuit breakers to ON.

BRAKE PLATE REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Remove two screws and nylon bushings securing brake plate to deck assembly (figure 3-31).
4. Remove nylon bushings from faulty brake plate and install them on replacement brake plate.
5. Install brake plate and spring and secure to deck with two screws.
6. Restore drive to on-line operation.

CAM TOWER REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise case assembly.
4. Manually load heads per Power Off Manual Head Positioning procedure.

CAUTION

Use care not to touch heads or bump head arm assemblies during the following procedure.

5. Remove both cam towers.
6. On newer units, where the rail bracket assembly has four cam tower alignment pins, replace new cam towers in the reverse order of removal. Tighten mounting screws to a torque of 12 ±2 pounds-force-inch, and return unit to normal operation.

on older units, where the rail bracket assembly does not have cam tower alignment pins, proceed to step 7 and replace both cam towers simultaneously.

7. Remove stop block.

8. Position both replacement cam towers on cam tool so that cam towers are pressed onto the alignment pins of cam tool.

9. With cam towers held by cam tool, firmly press cam towers against rail bracket assembly so that pilot pin of each cam tower enters related pilot hole in rail bracket.

10. Insert cam tower mounting screws into threads of rail bracket assembly such that they pass through holes in cam tool and secure cam towers to rail bracket assembly. Tighten screws a torque of 12 ±2 pounds-force-inch.

11. Remove tool from cam towers.

12. Replace stop block.

13. Manually unload heads per Power Off Head Positioning procedure.

14. Lower case assembly.

15. Set AC POWER and POWER SUPPLY circuit breakers to ON.

CARRIAGE AND COIL ASSEMBLY

Because of the precision alignment of carriage bearings, and the special tools and training required to accomplish the alignment, the carriage and coil assembly cannot be replaced in the field. If either the carriage or coil is damaged or misaligned, call the factory maintenance representative for service.

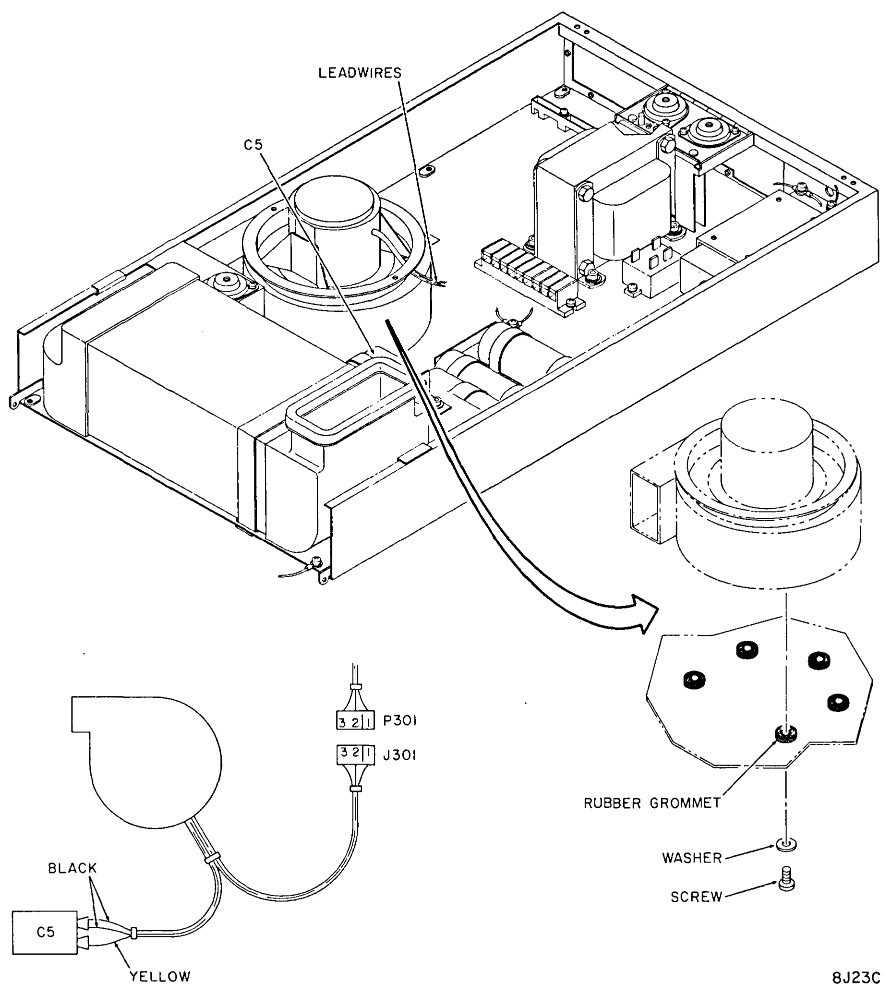


Figure 3-15. Blower Motor Replacement

CIRCUIT BREAKER REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.
2. Remove disk pack.
3. Raise case assembly
4. Remove six screws and spring lock washers securing circuit breaker mounting plate to base.
5. Remove screws and spring lock washers securing circuit breaker to mounting plate.
6. Identify wires to be removed from circuit breaker. Remove nylon covers and nuts securing wires to circuit breakers.
7. Remove defective circuit breaker.
8. Install replacement circuit breaker in mounting plate in reverse order of removal.
9. Install circuit breaker mounting plate on base being careful not to pinch electrical wires.
10. Lower case assembly.
11. Connect input power cable to external power source.
12. Set AC POWER and POWER SUPPLY circuit breakers to ON.
13. Perform Initial Checkout and Startup procedure.

DRIVE BELT

ADJUSTMENT

1. Raise case assembly.
2. Measure distance between end of spring hook and locking nut as shown in figure 3-16. If dimension is correct, restore drive to normal operation condition. If adjustment is required, proceed to next step.
3. Adjust idler spring tension by turning nut that secures spring hook at back of deck assembly. Clockwise rotation of nut increases spring length, counterclockwise rotation of nut decreases spring length.
4. Close cabinet top cover.

REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise deck to maintenance position.
4. On units with hysteresis brake, remove brake assembly as described in applicable Hysteresis Brake Replacement procedure.

CAUTION

To avoid damage to motor shaft, roll belt off drive motor pulley.

5. Remove drive belt from drive motor pulley by grasping and moving motor mounting plate (against idler spring force) towards spindle assembly. Remove belt from drive.
6. Install replacement belt on spindle pulley.
7. Grasp and move motor mounting plate (against idler spring force) towards spindle assembly.
8. Slip drive belt around drive motor pulley. Release motor mounting plate.
9. Manually rotate drive motor pulley several revolutions to make certain that the drive belt is properly tracking on drive motor and spindle pulley. Perform Drive Belt Adjustment procedure.
10. On units with hysteresis brake, replace brake assembly as described in applicable Hysteresis Brake Replacement procedure.
11. Lower deck from maintenance position and secure to base assembly.
12. Perform Drive Belt Adjustment procedure.
13. Restore drive to on-line operation.

DRIVE MOTOR REPLACEMENT

The following procedure may be used for motor replacement on all SMD units. Some SMD units have a circular section removed from the pack shroud which permits use of an alternate method (refer to Drive Motor Replacement, Alternate Method).

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Raise deck to maintenance position.

4. Disconnect drive motor leadwires.

5. On units with hysteresis brake, remove brake assembly as described in applicable Hysteresis Brake Replacement procedure.

6. Relax idler spring tension by turning adjustment nut on rear of deck until about two threads are visible on screw.

7. Roll drive belt off spindle pulley.

8. Disconnect idler spring from motor mounting plate.

9. Remove four screws, washers, and bushings securing motor mounting plate to deck casting (figure 3-16). Remove motor and motor mounting plate through bottom of deck.

10. Position drive motor and mounting plate beneath deck (figure 3-16) and secure to deck using four screws, washers, and nylon bushings. Torque screws to 10 (±2) inch-pounds.

11. Connect idler spring to motor mounting plate.

12. Position flat side of drive belt around spindle pulley. Hold belt taut around pulley while performing next step so belt does not slip off pulley.

13. While maintaining hand tension on belt, roll belt onto motor pulley while manually rotating spindle pack hub in a counterclockwise direction.

14. Rotate spindle pulley several revolutions to seat belt on pulley.

15. On units with hysteresis brake, replace brake assembly as described in Hysteresis Brake Replacement procedure.

16. Connect drive motor leadwires.

17. Lower deck from maintenance position. remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

18. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

19. Set AC POWER and POWER SUPPLY circuit breakers to ON.

20. Perform Drive Belt Adjustment procedure.

DRIVE MOTOR REPLACEMENT (ALTERNATE METHOD)

The following procedure may be used as a substitute for the preceding drive motor replacement procedure on all SMD units which have a circular section removed from the pack shroud directly above the motor.

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Raise deck to maintenance position.

4. Disconnect motor leadwires. For those units which include a quick disconnect connector on the motor leadwires, the remaining leadwire harness may remain installed and the motor leads disconnected at the connector.

5. Remove drive belt from motor pulley by rolling belt off motor pulley in a clockwise direction as viewed from under the deck. Remove belt from drive. (The belt adjustment screw does not need to be loosened unless easier removal and reinstallation of the belt is desired.)

6. On units with hysteresis brake, remove brake assembly as described in applicable Hysteresis Brake Replacement pro procedure.

7. Loosen motor pulley lock collar screw. Remove pulley and lock collar from motor shaft. If pulley seems to be seized on motor pulley, place two flat head type screwdrivers 180 degrees apart between pulley and motor plate and push pulley off motor with downward pressure on screwdrivers.

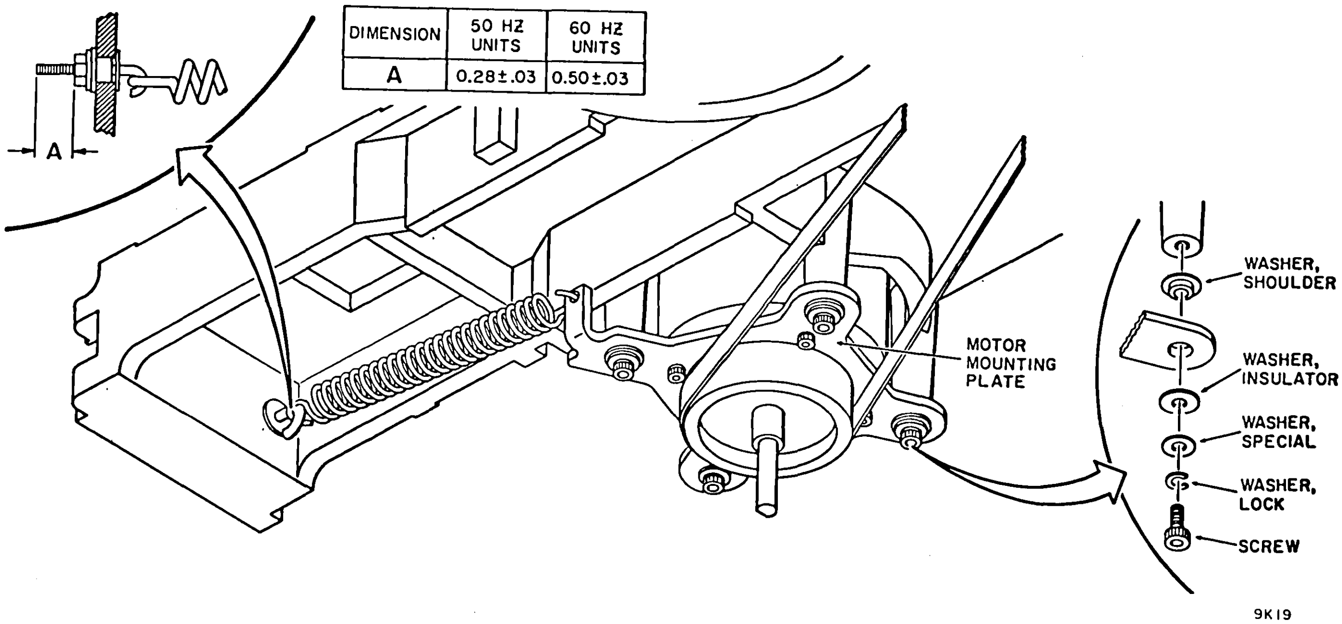


Figure 3-16. Drive Motor Assembly

8. Remove three remaining screws and hardware securing motor to motor pivot plate and retain for later use.

9. Remove motor through top of deck assembly.

10. Remove motor pulley, lock collar and motor pivot plate from replacement motor. Discard pivot plate. Disconnect and discard surplus leadwire harness on replacement motor if original one was left in drive (refer to step 4).

11. Insert motor (shaft end first) into access hole in deck assembly until it seats on pivot bracket.

12. Secure motor to motor pivot plate with three screws and hardware retained in step 8. Secure motor ground cable to motor plate (at hole located nearest tension spring) using internal tooth star washer.

13. Connect motor leadwires (if leadwire harness was retained in drive, install connector together).

14. Install replacement pulley and lock collar on motor shaft to dimension shown in figure 3-17. End of lock collar shall not extend beyond end of pulley after installation. Torque lock collar screw to 60 ±6 inch pounds.

15. Reinstall hysteresis brake assembly onto motor shaft using procedure from appropriate Hysteresis Brake Replacement procedure.

16. Reinstall drive belt directly over brake and onto spindle pulley. While holding belt on spindle pulley, roll belt onto motor pulley in a direction counterclockwise when viewed from above deck. Rotating spindle after belt is started, facilitates belt installation. Rotate spindle four to five revolutions to insure that belt is centered and tracking properly.

17. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

18. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

19. Set AC POWER and POWER SUPPLY circuit breakers to ON.

DECK INTERLOCK SWITCH (A154)

The deck interlock switch is illustrated in figure 6-14.

Adjustment

Adjustment of the deck interlock switch is not a critical adjustment. Should it be necessary to adjust the deck interlock switch, use the adjusting screw in the end of the plunger to increase or decrease the travel of the plunger.

Removal-Replacement

1. Remove power from the unit.
2. Remove the case assembly (top cover), raise the deck, and install a deck support bracket. (Refer to figure 3-2.)

   NOTE

   A six-inch long hex driver is recommended for easier removal of the front and rear deck mounting screws.

3. Remove the two front deck hold down screws located in the shroud area.
4. Remove the two wires from the deck interlock switch, located directly behind the transformer.
5. Remove the deck support bracket and return the deck to its original condition.
6. Unplug the velocity transducer and remove its mounting bracket, located at the rear of the magnet. This is necessary to allow removal of the two rear deck mounting screws.
7. Remove the velocity transducer cable clamp and lay the cable aside.
8. Remove the two rear deck mounting screws. The rear deck hold down screw and spacer should be in the keeper hole. All screws are located directly above the running time meter.
9. Unplug connector P200 from power amp card and remove the tie wrap closest to this connector to allow more harness movement.

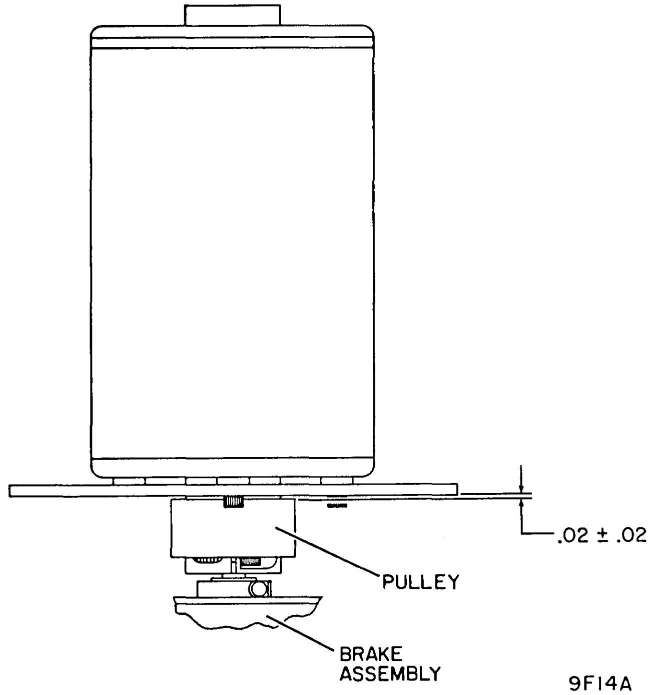


Figure 3-17. Pulley Installation

WARNING

Use care when reaching under the raised deck to avoid any accidents.

10. Raise the rear of the deck about four inches. Lift the hinged, shock-mount bracket containing the interlock switch away from the magnet until it stops. Slowly lower the rear deck assembly until it rests on the mounting bracket.
11. Remove the two mounting screws from the underside of the interlock switch, and remove the switch.

Repair

No repair of the deck interlock switch is possible.

HEAD ARM ASSEMBLIES

The various parts involved in the removal and replacement of the head arms are identified in figures 3-18 and 3-19. Repair of the head arm assemblies is limited to inspection and cleaning, refer to the Repair paragraph for details and limits.

ADJUSTMENT

Adjustment of the head arm assemblies is covered in section 3B, Test and Adjustment.

REMOVAL-REPLACEMENT

The following procedure covers removal and replacement of either the servo head or the read/write heads. Remove heads from the carriage only to perform head inspection and cleaning, or as directed by other procedures in this manual. When removing the servo head also remove read/write head number two. This allows room for the head cable and connectors to pass between the adjacent head arms with a lessened chance of doing damage.

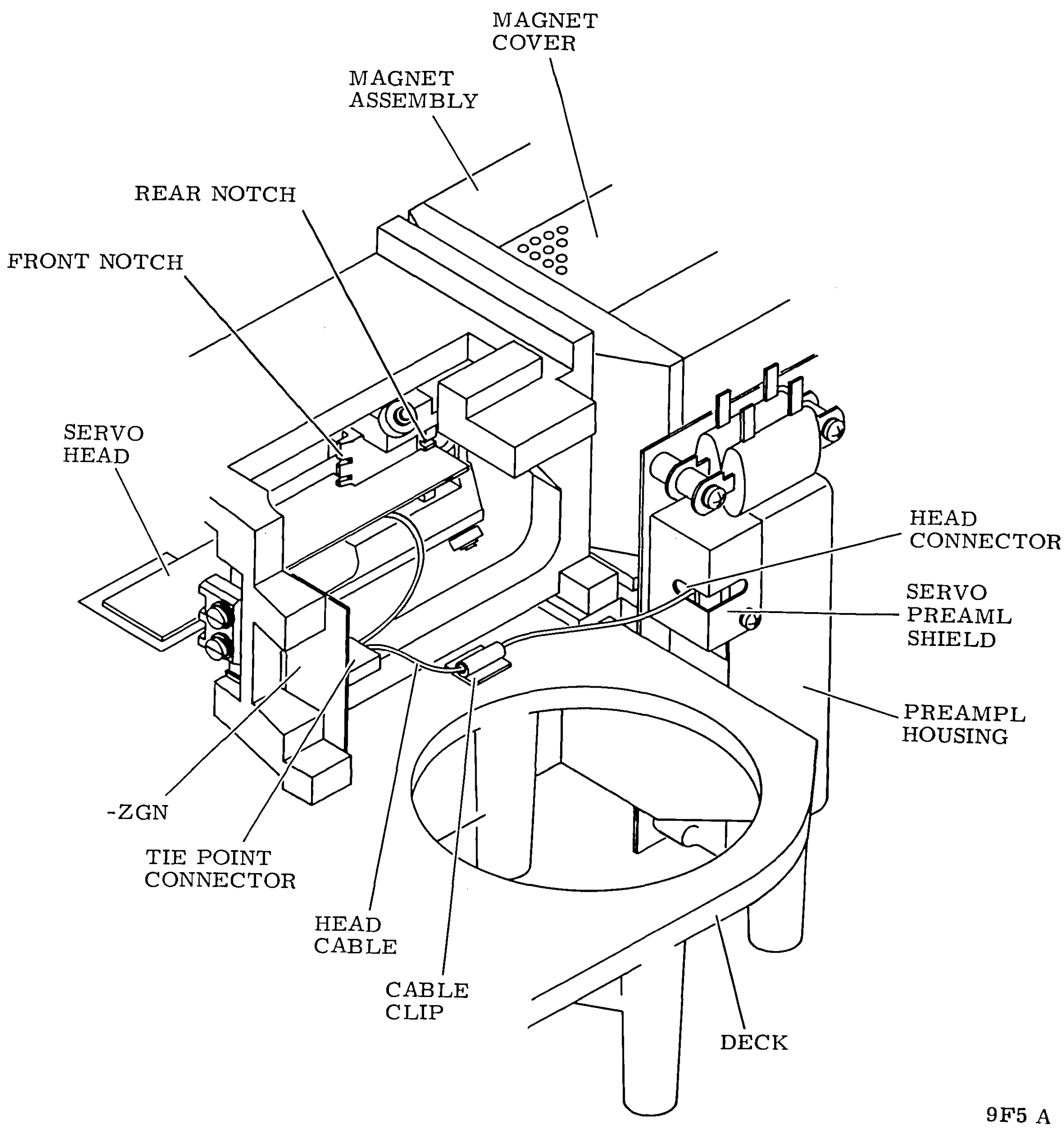


Figure 3-18. Head Replacement - Right Side View

1. Remove connector support bracket or servo pre-amplifier shield and disconnect head arm connector for subject head (for servo head, also remove head cable from cable clip and disconnect tie point connector).

2. Remove head mounting screw and associated hardware.

3. Manually extend heads far enough to be able to grasp front of head arm from inside pack area.

CAUTION

Head pads and gimbal springs are extremely delicate and easily damaged. Grasp head arms carefully and only by edges of head arm. If head pad is touched, perform head cleaning procedure.

4. Grasp entire stack of heads such that they are all held in alignment to one another. Carefully extend heads all the way into pack area.

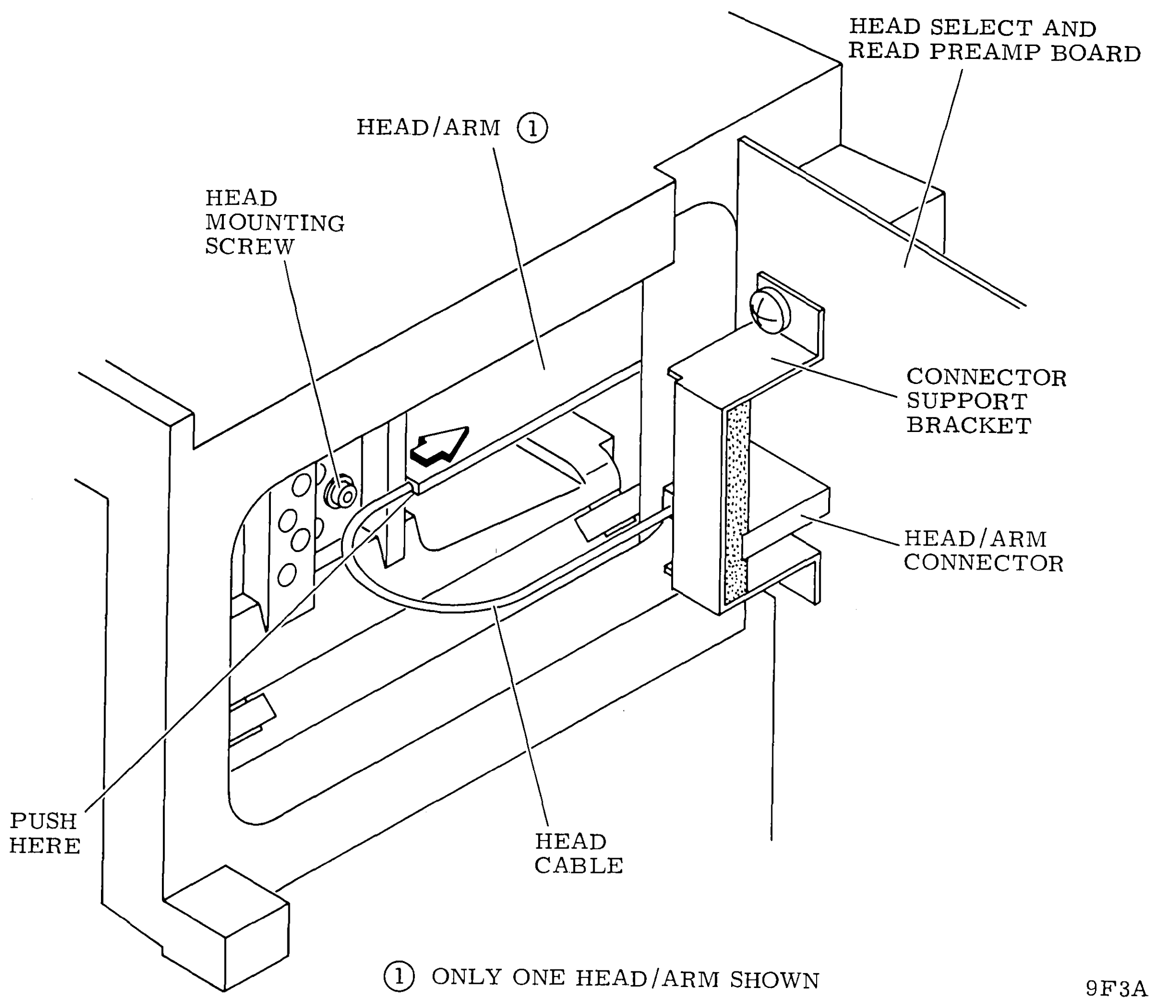


Figure 3-19. Head Replacement - Left Side View

5. Carefully grasp subject head arm at front and also push gently on rear of head arm as shown in figure 3-19. Guide head arm and connector(s) through adjacent head arms and into pack area.

6. Perform required maintenance procedure.

7. Install head arm assembly by fully extending heads into pack area, and guiding head arm connector between adjacent head arms. Use care not to damage adjacent heads.

8. Seat head arm in both front and rear notches on carriage.

9. Grasp entire stack of heads such that they are all held in alignment to one another. Carefully retract heads. Do not push on front of head arm assemblies while retracting heads.

10. Carefully position head arm as required in order to insert head mounting screw. Support head arm from opposite side when inserting head mounting screw or forward pressure of wrench may dislodge head arm.

11. Ensure that head arm assembly is aligned in relation to remainder of heads where they protrude into pack area.

12. Tighten screw, securing head arm assembly to carriage, until torque is 12 ±1/2 pounds-force-inch.

13. Carefully reconnect head arm connector and replace related hardware removed in step 1.

14. Perform Head Arm Adjustment procedure.

REPAIR

General

The drive has a positive pressure filtration system that eliminates the need for periodic inspection and cleaning of heads. The heads should be inspected for the following reasons only:

1. A problem is traced to a specific head or heads; for example, excessive data errors.

2. Head to disk contact is suspected. This may be indicated by an audible ping, scratching noise, or a burning odor when the heads are over the disk area.

3. Concentric scratches are observed on the disk surfaces.

4. Contamination of pack is suspected (possibly due to improper storage of the pack).

5. The pack has been physically damaged (possibly due to dropping or bumping).

CAUTION

Do not attempt to operate the media on another drive until full assurance is made that no damage or contamination has occurred to the media.

Do not attempt to operate the drive with another media until full assurance is made that no damage or contamination has occurred to the drive heads or to the shroud area.

Head Inspection

CAUTION

Do not smoke when inspecting or cleaning heads. Use extreme care not to damage the head.

Do not touch the head pad or gimbal spring with fingers or tools.

If head must be laid down, do not allow the head pad or gimbal spring to touch anything.

Remove suspected head as described in the read write or servo head arm replacement procedure. Refer to figure 3-20, observe the head arm assembly, and perform the suggested remedy as follows:

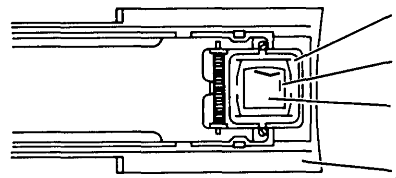


Figure 3-20. Typical Head Arm Components

1. If reddish-brown oxide deposits exist on the head, replace or clean the head arm assembly.

2. If head appears scratched, replace or clean the head arm assembly.

3. If head appears damaged, replace the head arm assembly.

4. If the gimbal spring (it holds the head pad to the arm) is bent or damaged, replace the head arm assembly.

Head Cleaning

CAUTION

Head cleaning is a delicate procedure which is not recommended. It should not be undertaken unless it is absolutely necessary and then it should be performed by properly trained personnel only.

Refer to figure 3-21 if head cleaning is required and perform the following procedure. Use care not to damage any part of the head arm assembly.

CAUTION

In the following step, hold the can of dust remover upright (vertical). If the can is not held upright, liquid propellant will be sprayed on the head.

1. Use super dry dust remover (see list of Maintenance Tools and Materials) to blow off all loose particles from the head pad (flying surface), from the edge of the head pad, and from the holes in the head pad. Hold the nossle one-fourth to one-half inch (6 to 12 mm) from the head pad. Spray with a back and forth motion across the head pad, making certain to hold the can only in a vertical position.

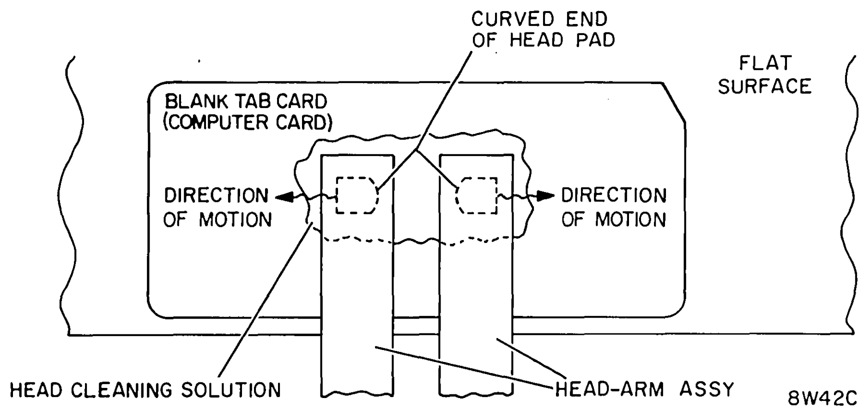


Figure 3-21. Head Cleaning Motion

2. Clean a smooth, flat working surface, for example, a glass or formica table top.

3. Place a blank tab card (see list of Maintenance Tools and Materials) or a new, unpunched, clean computer card with the back side up (printing down) on the clean flat working surface as shown in figure 3-21.

CAUTION

Care should be taken to avoid excess cleaning solution. Excess solution on the head cable may remove the plasticizer and make the cable stiff. A stiff cable reduces the flexibility of the head pad and could cause broken wires.

4. Moisten a small area in the center of the card with head cleaning solution. (Refer to the list of Maintenance Tools and Materials.)

CAUTION

Inspect the head cleaning solution for contamination, rust, dirt, etc. Do not use contaminated solution.

5. Very carefully place the head pad flying surface on moistened area and move head pad from moistened area to dry area in a zig-zag motion as shown in figure 3-21. Move head in a direction away from curved end of head pad. If it is moved in the opposite direction the sharp edge of the curved end will cut into the computer card and prevent movement and proper cleaning.

6. Blow off the head again using the super dry dust remover as in step 1.

NOTE

Discoloration of head cleaning solution and tab card indicate that oxide particles are being removed from head pad flying surface.

7. Repeat steps 3, 4, 5 and 6 using a clean computer card and clean head cleaning solution each time until no discoloration on card is present.

8. After discoloration has ceased, inspect head to determine that oxide deposits were removed. If deposits remain but show signs of being removed, repeat cleaning procedure until deposits are removed.

9. If oxide deposits cannot be removed, replace head arm assembly.

10. If oxide deposits were removed and head passes inspection according to the Head Arm Replacement Criteria, reinstall head.

11. Follow read/write or servo head arm replacement procedure to install cleaned head or a replacement head as required.

Head Arm Replacement Criteria

A head arm assembly requires replacement if any of the following conditions exist:

1. Consistent oxide buildup on the same head, indicating repeated head to disk contact.

2. Appreciable oxide buildup which cannot be removed.

3. Scratches on the head flying surface.

4. Imbedded particles in the head pad flying surface.

5. Bent or damaged gimbal spring.

6. Any apparent physical damage to head arm assembly.

HEADS LOADED SWITCH

ADJUSTMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Rais case assembly.

4. Remove magnet cover (figure 3-22) by prying cover open with a screwdriver.

5. Identify heads loaded switch leadwires. Disconnect leadwires at switch terminals.

6. Connect a multimeter (set to RX1) across switch terminals.

7. With carriage retracted, multimeter should indicate infinity.

CAUTION

> Do not move carriage forward far enough to allow heads to load against themselves.

8. Slowly move carriage towards spindle while observing multimeter. Multimeter must indicate zero ohms when carriage has traveled 0.07 (±0.04) inch from full retract stop. (Distance is measured from rear edge of coil to magnet.) If adjustment is needed, proceed to next step. If no adjustment is needed, proceed to step 10.

NOTE

> Make certain that carriage is fully retracted while performing next step.

9. Loosen screws securing heads loaded switch to mounting bracket. Adjust switch position until it actuates after 0.07 (±0.04) inch travel from full retract stop.

10. Disconnect multimeter leadwires from switch terminals.

11. Connect heads loaded switch leadwires to switch terminals.

12. Install magnet cover.

13. Lower case assembly.

14. Install disk pack.

15. Set AC POWER and POWER SUPPLY circuit breakers to ON.

REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Raise case assembly.

4. Remove magnet cover (figure 3-22) by prying cover open with a screwdriver.

5. Identify heads loaded switch leadwires. Disconnect leadwires at switch terminals.

6. Remove two screws and washers securing heads loaded switch to mounting bracket.

7. Position replacement switch on mounting bracket (pretravel adjustment bracket must be under switch actuator arm). Loosely secure switch to bracket using two screws and washers.

8. Perform Heads Loaded Switch Adjustment procedure starting at step 9.

HYSTERESIS BRAKE REPLACEMENT (S/C 08 W/O 37669 & BELOW)

The following procedure describes removal and reassembly of hysteresis supplied with units manufactured at S/C 08 W/O 37669 and below. If a new replacement is being installed, use the removal instructions from this procedure and the reassembly instructions described in Hysteresis Brake Replacement S/C 08 W/ 37669 and above.

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Raise case assembly.

4. Raise deck assembly to maintenance position.

5. Disconnect hysteresis braker leadwires. Remove cable ties as required, noting their locations.

6. Loosen two setscrews securing brake armature to drive motor shaft.

7. Remove two screws and washers securing brake assembly to drive motor mounting plate (figure 3-22.1). Remove brake assembly.

8. Apply one drop of Loctite to threads of screws used to mount brake assembly.

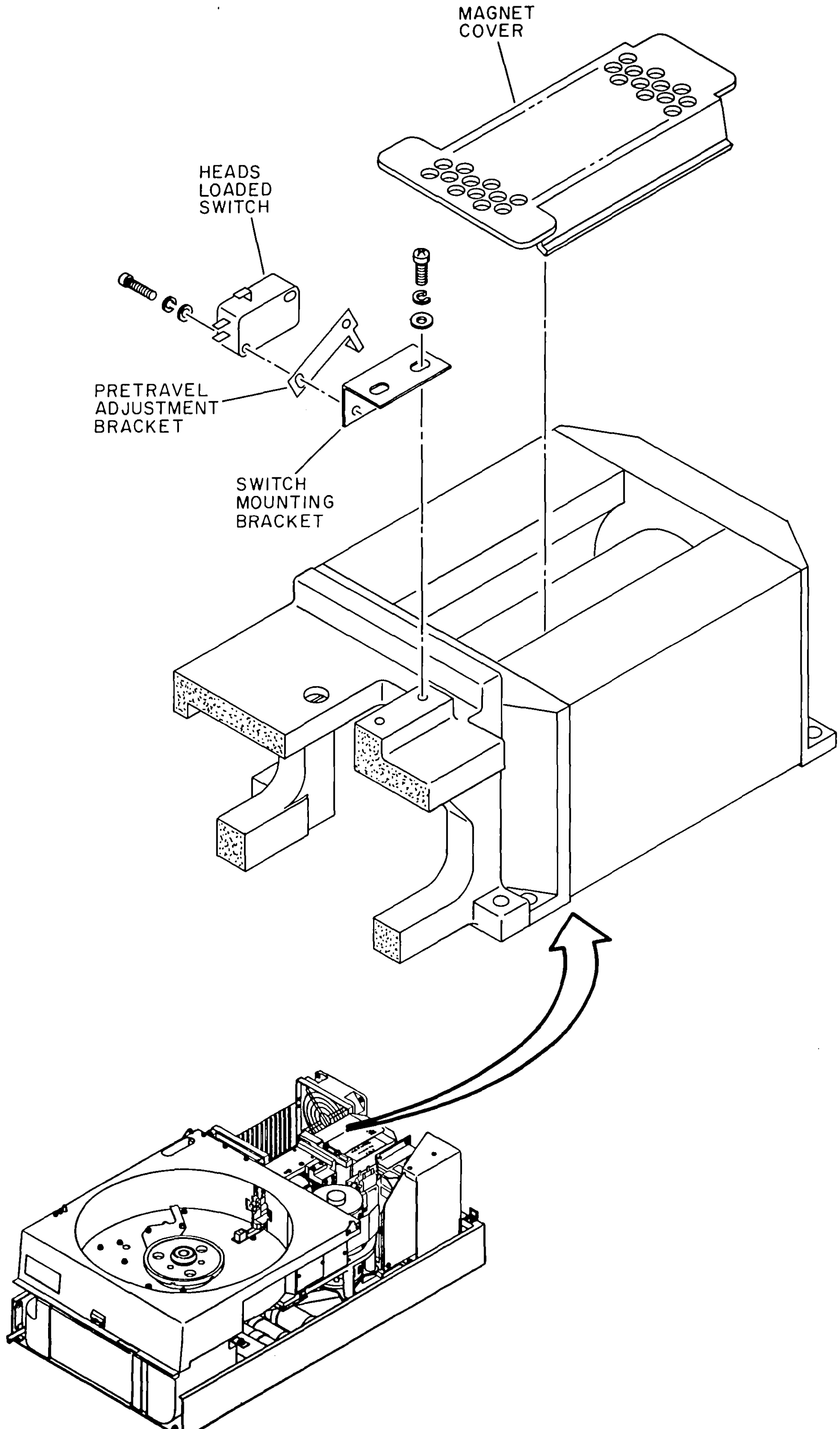


Figure 3-22. Heads Loaded Switch

9. Position replacement brake assembly over drive motor shaft. Secure brake assembly to motor mounting plate with two screws and washers. Tighten screws.

10. As viewed from drive motor end, position left most setscrew of brake over flat on motor shaft (refer to figure 3-22.1). Tighten both setscrews to a torque of 16(+2) pounds-force-inch.

11. Connect hysteresis brake leadwires.

12. Replace cable ties removed in step 5.

13. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

14. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

HYSTERESIS BRAKE REPLACEMENT (S/C 08 W/ 37669 & ABOVE)

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Raise case assembly.

4. Raise deck assembly to maintenance position.

5. Disconnect hysteresis brake leadwires.

6. Remove cable ties as required, noting their locations.

7. Refer to figure 3-22.1 and loosen hex head socket screw in brake collar that clamps brake armature to motor shaft.

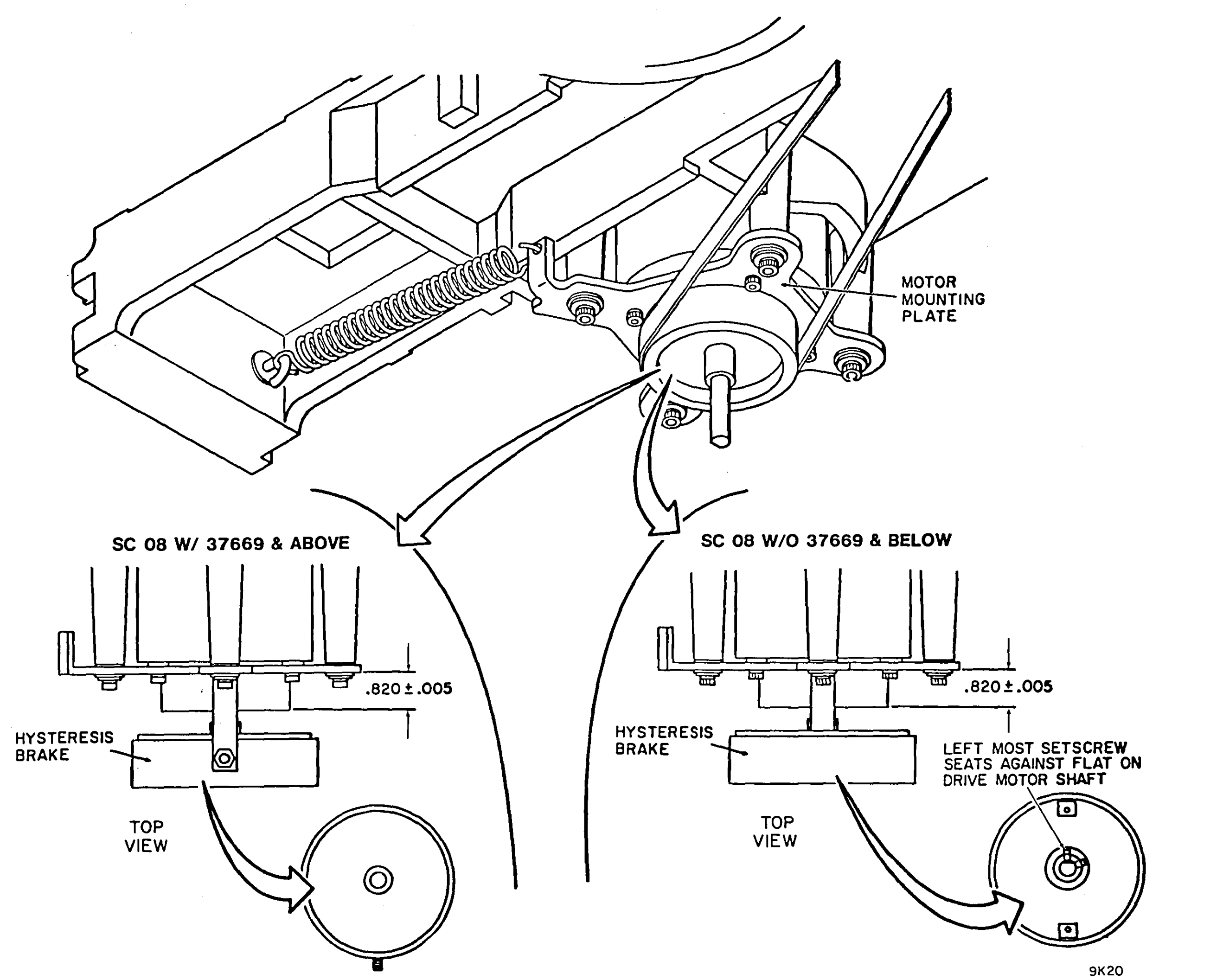


Figure 3-22.1. Hysteresis Brake Replacement

8. Loosen nut securing brake assembly to brake mounting bracket.

9. Remove brake assembly, including collar.

10. If a new brake is being installed, remove brake mounting bracket from it.

CAUTION

In order to prevent damage to drive motor shaft, brake replacement must be performed in the order specified.

11. Loosen screw that attaches brake mounting bracket to motor mounting plate; or if a new bracket is being installed, loosely install brake mounting bracket on motor mounting plate.

12. Install brake shaft collar on brake (ridge of collar to be facing away from drive motor) and then install brake on drive motor shaft.

13. Slide brake on motor shaft so that stud on brake contacts end of slot in mounting bracket. Tighten nut securing brake to brake mounting bracket.

14. Support brake to maintain centering on motor shaft while tightening screw securing brake mounting bracket to motor mounting plate.

15. While holding motor pulley to prevent shaft from turning, rotate hysteresis brake armature several turns to eliminate any misalignment between drive motor shaft and brake armature.

NOTE

To minimize motor and brake vibration, ensure that the socket head screw in the brake shaft collar is positioned opposite the set screw in the pulley shaft collar.

16. With brake shaft collar resting on brake, tighten hex head socket screw in collar as follows:

- On older units (use a 7/64-inch hex wrench) tighten screw to a torque of 20 ± pounds-force-inch.
- Newer units (use a 9/64-inch hex wrench) tighten screw to a torque 25 ± pounds-force-inch.

NOTE

Replacement brakes are supplied with extension cabling (required on older units). If extension cable is not required, discard it.

17. Connect brake leadwires.

18. Replace cable ties removed in step 6, being certain that all wires are secured so they will not be rubbed by drive belt.

19. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

20. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

POWER AMPLIFIER ASSEMBLY REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.

2. Remove disk pack.

3. Raise case assembly.

4. Raise logic chassis to maintenance position.

5. Raise desk to maintenance position.

6. Disconnect servo preamp connector (figure 3-23).

7. Remove screw and washer securing servo connector bracket to servo preamp housing (figure 3-24). Slide servo connector bracket carefully back along servo head cable.

NOTE

Observe connector orientation on pins.

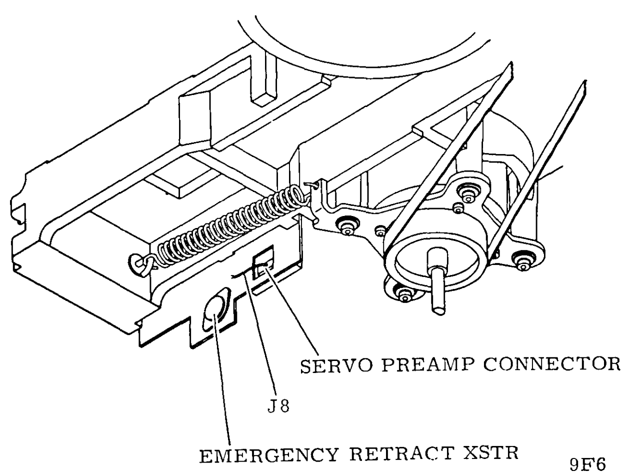


Figure 3-23. Servo Preamp Connector

8. Disconnect servo head connector from servo preamp.

9. Remove two screws and washers securing power resistors R3 and R4 to power amp mounting plate (figure 3-24).

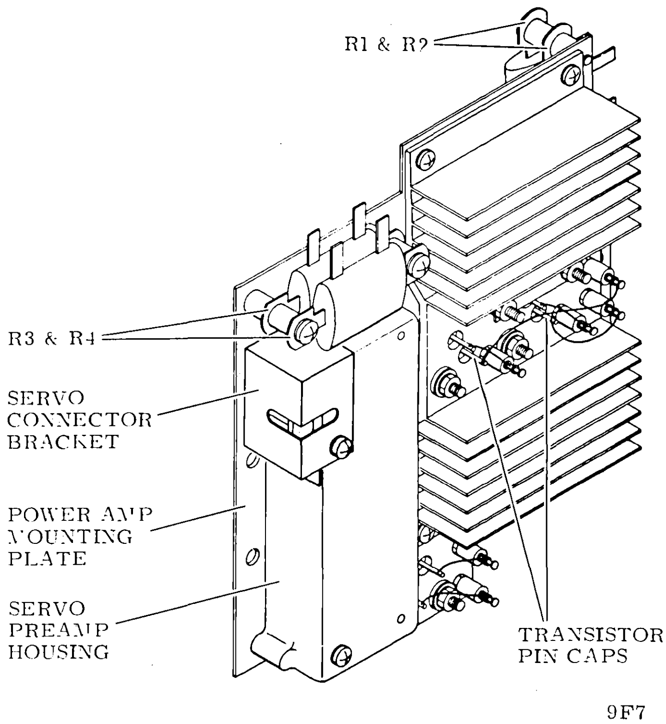


Figure 3-24. Servo Preamp Housing

10. Remove two screws and washers securing power resistors R1 and R2 to power amp mounting plate (figure 3-24).

11. Remove four screws and washers securing power amp mounting plate to deck.

12. Rotate power amp assembly up and out towards rear of unit (figure 3-25). On older units without ECO 37281 installed, requires power supply module removal to gain access to power amp assembly.

NOTE

Observe lead arrangement and assure leads can be replaced on appropriate connections.

13. Remove transistor pin caps from defective transistor (figure 3-24). The caps are somewhat delicate and care should be taken not to deform them.

14. Replace defective transistor as described in figure 3-26.

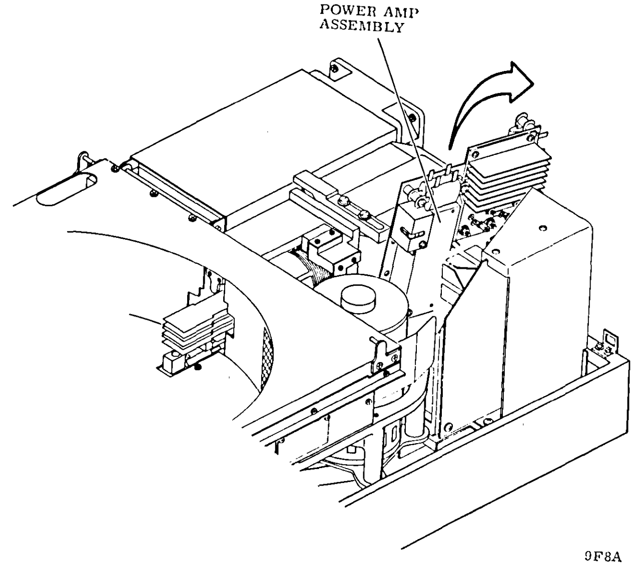


Figure 3-25. Power Amplifier Assembly

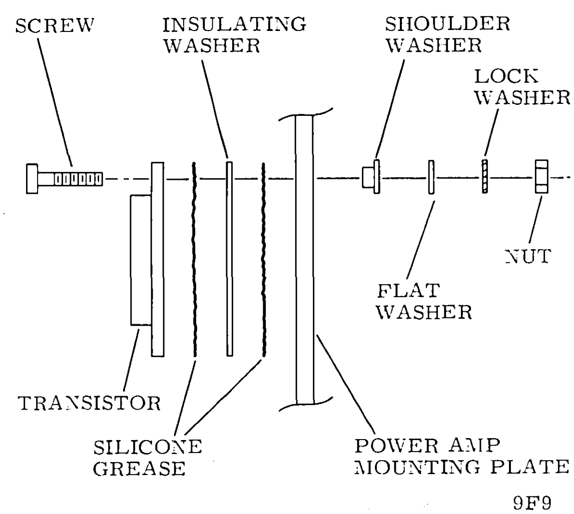


Figure 3-26. Transistor Assembly

15. Replace transistor pin caps (figure 3-24).

16. Reposition power amp assembly.

17. Secure power amp mounting plate to deck.
18. Secure power resistor R1 and R2 to power amp mounting plate (figure 3-24).
19. Secure power resistor R3 and R4 to power amp mounting plate (figure 3-24).
20. Connect servo head connector to servo preamp.
21. Replace servo connector bracket and secure to servo preamp housing (figure 3-24).
22. Connect servo preamp connector (figure 3-23).
23. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.
24. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.
25. Lower logic chassis to normal operating position.
26. Lower case assembly.
27. Connect input power cable to external power source.
28. Set AC POWER and POWER SUPPLY circuit breakers to ON.
29. Install disk pack.

POWER SUPPLY REPLACEMENT

The type of power supply found in the machine depends upon when the machine was built. Units built prior to series code 24 have a power supply module assembly. This module consists of two regulator assemblies and a printed circuit board assembly (PC board). The module can be repaired by replacing any of the subassemblies, or it can be replaced as an assembly.

Beginning at series code 24, the module was replaced with a single, two-sided component assembly (_XKV). Because component assemblies are generally not considered field repairable, the following procedure only covers removal and replacement of the assembly. However, the parts data manual/section does break this assembly down to its component parts. If repair is attempted, be careful not to damage foil paths or other components.

Since removing the power supply requires the removal of harnesses, components, and jumper wires, be sure to observe the arrangement of all leads to ensure that they can be replaced properly.

POWER SUPPLY MODULE REPAIR AND REPLACEMENT - S/C 23 AND BELOW

Refer to figure 3-27, sheets 1 and 2, and perform the following steps:

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.
2. Remove disk pack.
3. Raise case assembly.
4. Remove four screws securing power supply to base. These screws are located under the base.
5. Remove black and red wires (quick disconnect) from ±5 V regulators at ±SEN connections on terminal strip.
6. Cut cable tie securing ±5 V sense harness to power supply chassis.
7. Remove ground strap between power supply chassis and rear shock mount on deck.
8. Remove upper two nuts, lockwashers and flatwashers securing PC board assembly to power supply chassis.
9. Remove right and left fuse shields.
10. Raise deck to maintenance position.
11. Remove lower two nuts, lockwashers and flatwashers securing PC board assembly to power supply chassis.
12. Lift up on power supply and remove PC board by swinging toward front of drive around drive motor.
13. Remove four standoffs from PC board mounting studs.
14. Gain access to power supply by lifting power supply clear of base.
15. Remove wiring from terminal strip of defective regulator.
16. Remove six screws securing regulator assembly to power supply chassis (shown as "A" in figure 3-27 for the +5 V regulator). Pull regulator away from chassis.

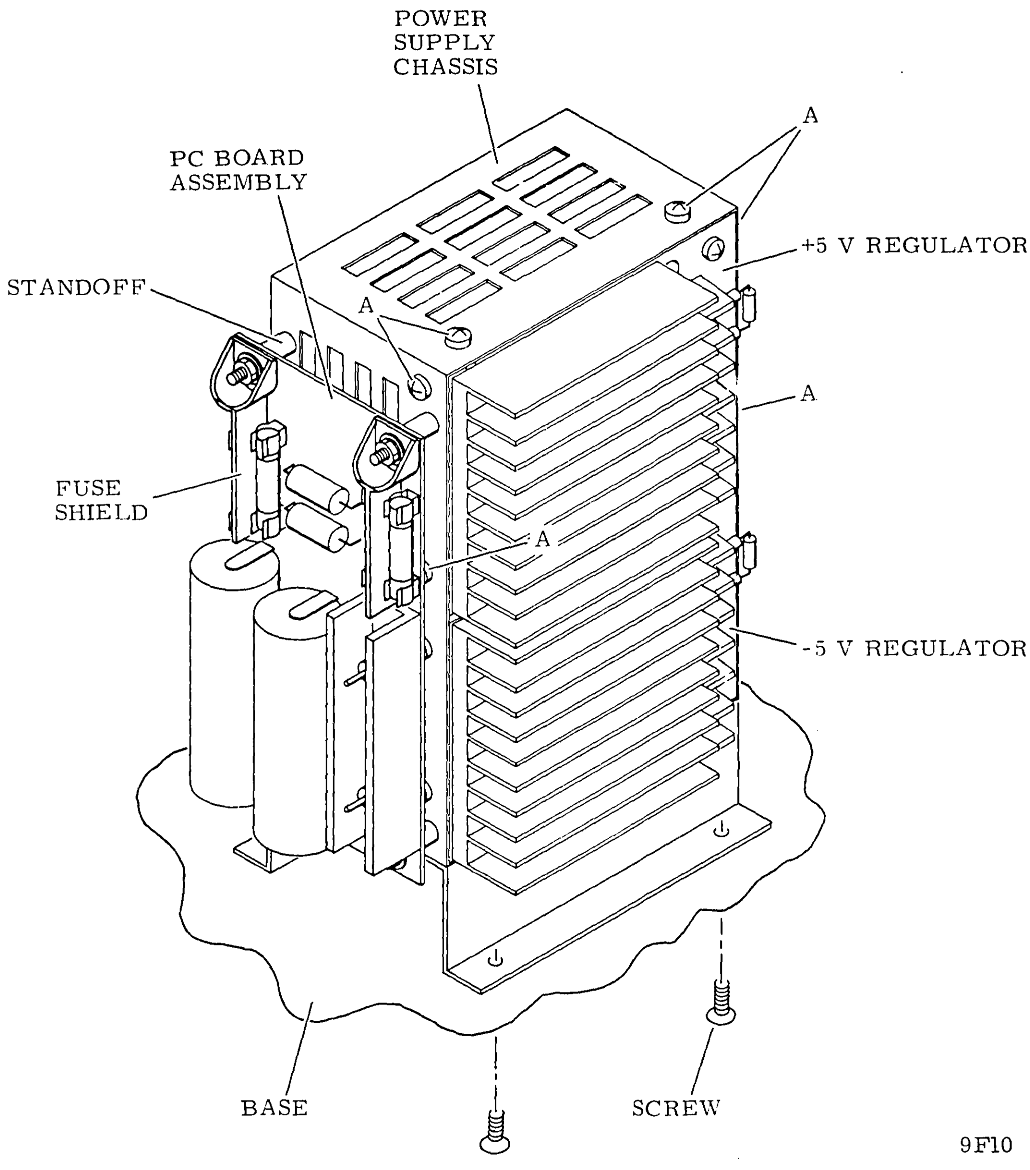
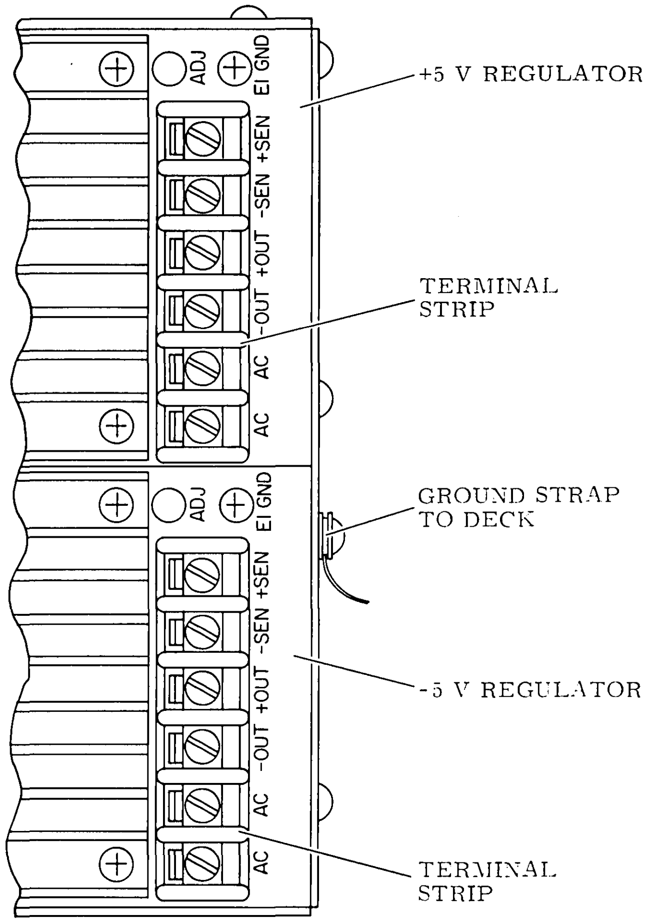


Figure 3-27. Power Supply Module Repair and Replacement
S/C 23 and Below (Sheet 1 of 2)



	A1 (+5 V)		A2 (-5 V)	
TERM	RING TONGUE	QUICK DISCONNECT	RING TONGUE	QUICK DISCONNECT
+SEN	RESISTOR	RED (+5 SENSE)	RESISTOR	**RED** (-5 SENSE)
-SEN	RESISTOR	BLACK (+5 SENSE)	RESISTOR	**BLACK** (-5 SENSE)
+OUT	RED	NONE	GND STRAP BLACK	BLK JUMPER
-OUT	BLACK BLACK	BLK JUMPER	BLUE	NONE
AC	BLACK	NONE	PURPLE	NONE
AC	WHITE	NONE	YELLOW	NONE

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Figure 3-27. Power Supply Module Repair and Replacement - S/C 23 and Below (Sheet 2)

17. Remove quick-disconnect jumper wire from -OUT terminal of +5 V regulator, or from +OUT terminal of -5 V regulator, depending upon which regulator is to be replaced.

18. Remove defective regulator assembly.

19. Remove 0.33 μF capacitor assembly from quick disconnect terminals on back of regulator and install in replacement regulator.

20. Slide regulator into power supply chassis.

21. Secure regulator to chassis using six screws.

22. Connect wiring harness to terminal strip.

23. Replace quick disconnect jumper wire removed in step 17.

24. Replace PC board assembly (refer to steps 8 thru 13).

25. Position power supply and secure to deck using four screws removed in step 4.

NOTE

Route wiring harness between power supply and side of base.

26. Connect black and red sense wires removed in step 5.

27. Secure sensing harness to power supply chassis with cable tie straps.

28. Reconnect ground strap to power supply chassis.

29. Lower case assembly.

30. Connect input power cable to external power source.

31. Set AC POWER and POWER SUPPLY circuit breakers to ON.

32. Perform Output Voltages Check. (See Trouble Analysis Aids section).

33. Install disk pack and return drive to online condition.

POWEP SUPPLY REPLACEMENT - S/C 24 AND ABOVE

Refer to figure 3-28 and perform the following steps:

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Disconnect input power cable from external power source.

3. Remove disk pack.

4. Raise case assembly.

5. Remove hardware securing power supply cover. Lift cover up and away from power supply.

6. Disconnect connectors A1J1 and A1J2.

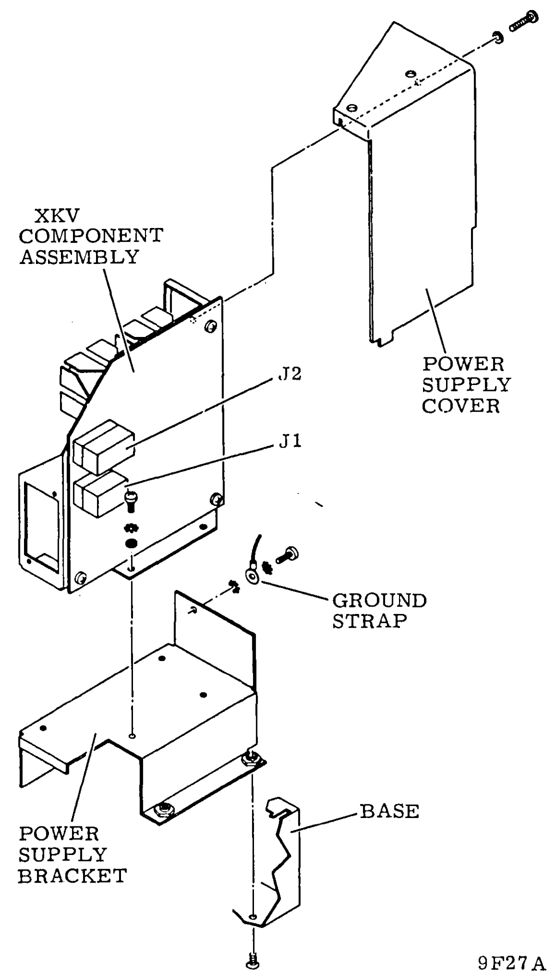


Figure 3-28. Power Supply Replacement S/C 24 and Above

7. Remove hardware securing ground strap to rear of power supply bracket.

NOTE

For cabinet mounted units, open rear door before proceeding to next step.

8. Remove screws (found on under side of base) that hold power supply to base.

9. Lift power supply up and away from base.

10. Remove four screws and associated hardware securing _XKV component assembly to power supply bracket.

11. Attach new _XKV component assembly to power supply bracket.

12. Secure bracket to base.

13. Reconnect connectors A1J1 and A1J2.

14. Replace ground strap.

15. Replace power supply cover.

16. Lower case assembly.

17. Connect input power cable to external power source.

18. Set AC POWER and POWER SUPPLY circuit breakers to ON.

19. Perform Output Voltage Checks. (See Trouble Analysis Aids section).

20. Install disk pack and return drive to online condition.

RAIL BRACKET ASSEMBLY

Because of the precision alignment, and the special tools and training required to accomplish the alignment, it is not possible to perform adjustment or replacement of the rails or the rail bracket assembly in the field. Under no circumstances should the screws securing the rails or the rail bracket to the deck be loosened. If either the rails or the rail bracket assembly are damaged or misaligned, contact the factor maintenance representative for service.

RELAY REPLACEMENT (K2)

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.

2. Remove disk pack.

3. Raise case assembly.

4. Raise deck assembly to maintenance position.

5. Identify and label relay leadwires. Disconnect leadwires.

6. Remove four screws and washers securing A9 assembly to deck.

7. Remove two screws and washers securing relay to A9 assembly. Remove relay.

8. Install new relay and assemble in reverse order of removal.

9. Inspect routing of wire harness to make sure it does not interfere with raising and lowering of logic chassis or rub on drive belt.

10. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

11. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

12. Connect input power cable to external power source.

13. Set AC POWER and POWER SUPPLY circuit breakers to ON.

14. Remove magnet shield to expose voice coil.

CAUTION

Do not move carriage forward far enough to allow heads to load against themselves.

WARNING

Emergency retract will engage and drive carriage toward rear of unit.

15. Move coil by applying a lateral (parallel to coil movement) pressure to coil just far enough to disengage heads loaded switch. Emergency retract should engage and drive carriage toward rear of unit.

16. Replace magnet shield.

17. Lower case assembly.

SERVO PREAMP BOARD REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.

2. Remove disk pack.

3. Raise case assembly.

4. Raise logic chassis to maintenance position.

5. Raise deck to maintenance position.

6. Disconnect servo preamp connector from servo preamp board (figure 3-23).

NOTE

It is necessary to raise the deck several times during the procedure. Do not remove deck rear holddown screw and spacer from rear shock mount bracket at this time.

7. Lower deck to normal operating position.

8. Remove two screws and washers securing power resistors to power amp mounting plate (figure 3-29).

9. Lift power resistors up and toward drive motor to allow removal of servo preamp housing.

10. Remove upper securing screw and washer (figure 3-29). Carefully slide servo connector bracket back along servo head cable.

11. Disconnect servo head connector from servo preamp board.

12. Remove servo preamp housing from power amp mounting plate as follows:

    a. Insert screwdriver as shown in figure 3-29.

    NOTE

    Deck will not be raised enough to install support bracket.

    b. Raise deck with left hand until lower securing screw is accessible.

    c. Loosen lower securing screw until housing is free. It is not necessary to remove the screw at this time.

    d. Remove screwdriver and lower deck.

    e. Lift housing up and out.

    f. Remove lower securing screw from housing.

13. Replace defective servo preamp board (figure 3-29). Servo preamp board is secured to housing by two screws.

14. Secure servo preamp housing to power amp mounting plate as follows:

    a. Insert lower securing screw and washer into housing (figure 3-29).

    b. Position housing against mounting plate.

    c. Using upper securing screw, loosely secure housing to mounting plate.

    d. Insert screwdriver as shown in figure 3-29.

    NOTE

    Deck will not be raised enough to install support bracket.

    e. Raise deck with left hand to gain access to lower securing screw and tighten screw to secure housing to mounting plate.

    f. Remove screwdriver and lower deck.

    g. Remove upper securing screw.

15. Connect servo head connector to servo preamp board. Note pin keying. Be careful not to bend pins.

16. Reposition servo connector bracket and secure to servo preamp housing using upper securing screw and washer (figure 3-29).

17. Replace power resistors (refer to steps 8 and 9) using two screws and washers.

18. Raise deck to maintenance position (install support bracket). Connect servo preamp connector to servo preamp board (figure 3-23). Note pin keying. Be careful not to bend pins.

19. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

20. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

21. Lower logic chassis to normal operating position.

22. Lower case assembly.

23. Connect input power cable to external power source.

24. Set AC POWER and POWER SUPPLY circuit breakers to ON.

25. Install disk pack.

SPEED TRANSDUCER

ADJUSTMENT

Speed transducer adjustment is required whenever the relative position of the spindle and the speed transducer has been changed, or as specified by other procedures in this manual.

1. Inside the pack area, place Go-NoGo tool across top of spindle face plate so that gauge extends out over top of speed transducer.

2. Check dimension from top of speed transducer to top of spindle face plate as shown in figure 3-30. If adjustment is required, proceed to step 3.

   NOTE

   On newer 60 Hz acoustical drawer or rack mount units using round I/O cables, remove I/O bracket from its mounting, prior to raising deck. This will allow strain relief when deck is raised.

3. Raise deck to maintenance position.

4. Loosen locknut on bottom of speed transducer. Disconnect connector J202 so that leads are free to turn during adjustment.

5. Rotate speed transducer until top of transducer makes contact with the Go surface of the Go-NoGo tool. Tighten locknut until torque is between 0.45 and 0.67 N·m (4 and 6 lbf·in). Recheck dimension with Go-NoGo tool.

6. When dimension is correct and locknut is tightened, install connector J202.

7. Lower deck to normal operating position (and secure I/O cable bracket if removed in step 3).

8. Install scratch pack and apply power to drive spindle. Ensure that the drive spindle gets up to speed and the heads load.

9. If the heads fail to load, perform the Speed Transducer Electrical Check in Tests and Adjustments, section 3B.

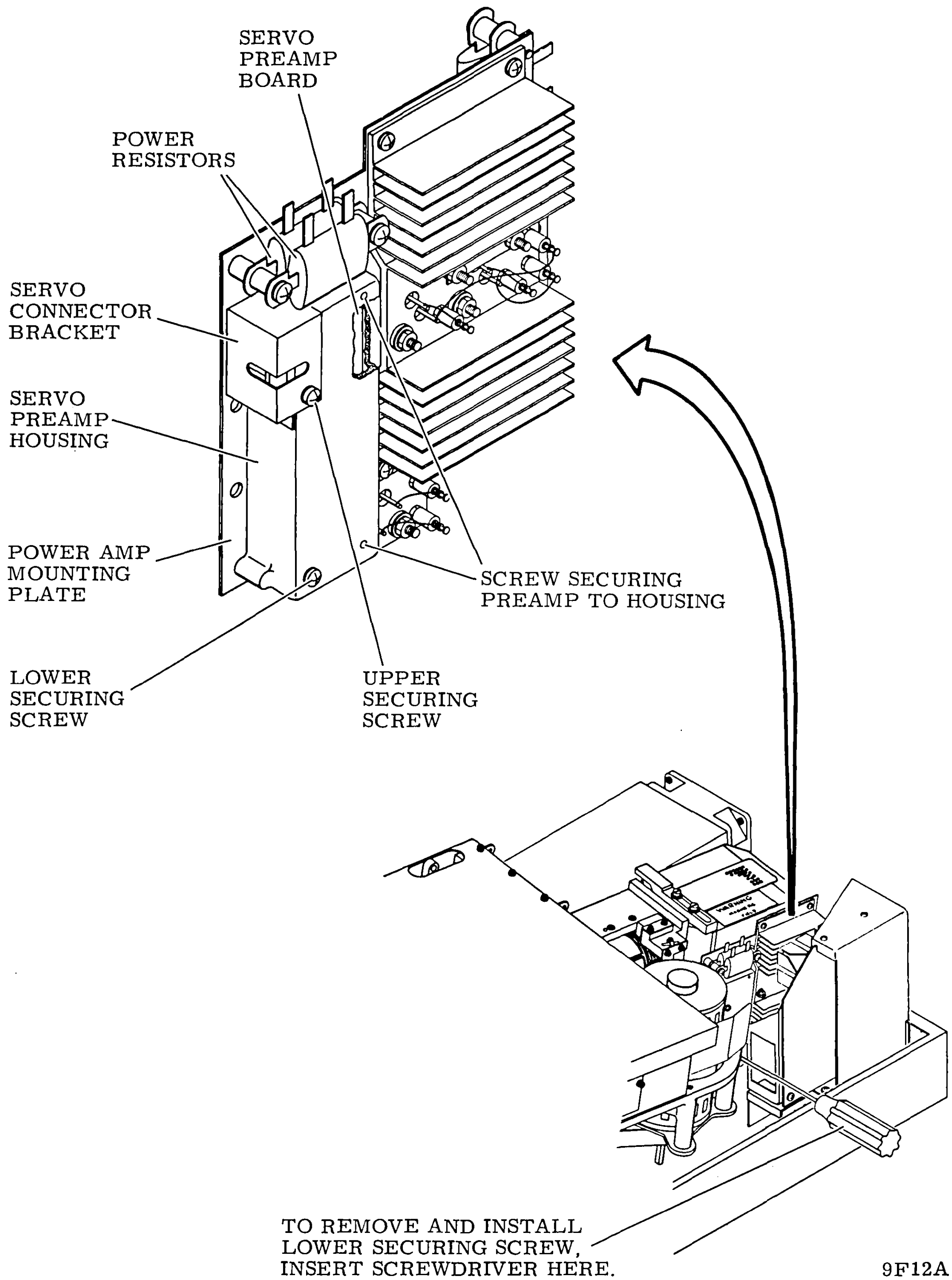


Figure 3-29. Servo Preamp Board Replacement

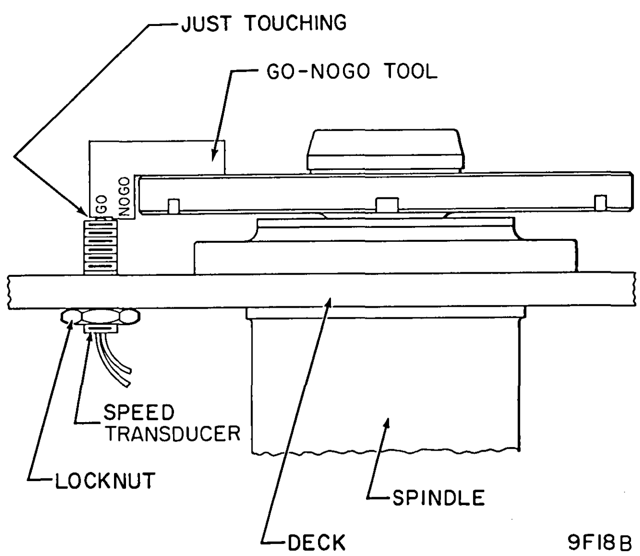


Figure 3-30. Speed Transducer Adjustment

REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise case assembly.
4. Raise deck assembly to maintenance position.
5. Disconnect speed transducer connector J202.
6. Loosen locknut on speed transducer (figure 3-30).
7. Remove faulty speed transducer by turning sensor counterclockwise.
8. Install replacement speed transducer until tip of speed sensor and adjustment tool are as shown in figure 3-30.
9. Tighten locknut on speed transducer.
10. Recheck speed transducer adjustment. Repeat adjustment if necessary
11. Connect speed transducer leadwires.
12. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.
13. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.
14. Perform Speed Transducer Check.

SPINDLE ASSEMBLY

SPINDLE REPLACEMENT

CAUTION

When spindle assembly is removed from drive or shipping container, do not allow it to rest on pulley end of assembly. When it must be set down, lay it on its side or on spindle face plate. Improper handling of spindle assembly may cause damage to spindle bearings which could result in premature failure of spindle or even damage to disks and heads.

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise case assembly.
4. Raise deck assembly to maintenance position.
5. Disconnect ground strap from ground spring.
6. Turn nut on belt spring tension screw (figure 3-16) until about two threads remain through nut.
7. Remove belt from spindle pulley by rolling belt off pulley in a counterclockwise direction.
8. Remove three button head screws securing spindle assembly to deck (figure 3-31). These screws are located under the spindle top surface and accessible through the three holes in top of the spindle.

NOTE

Notch in deck allows clearance for ground spring.

9. Carefully lift spindle assembly from deck to avoid damaging ground spring.

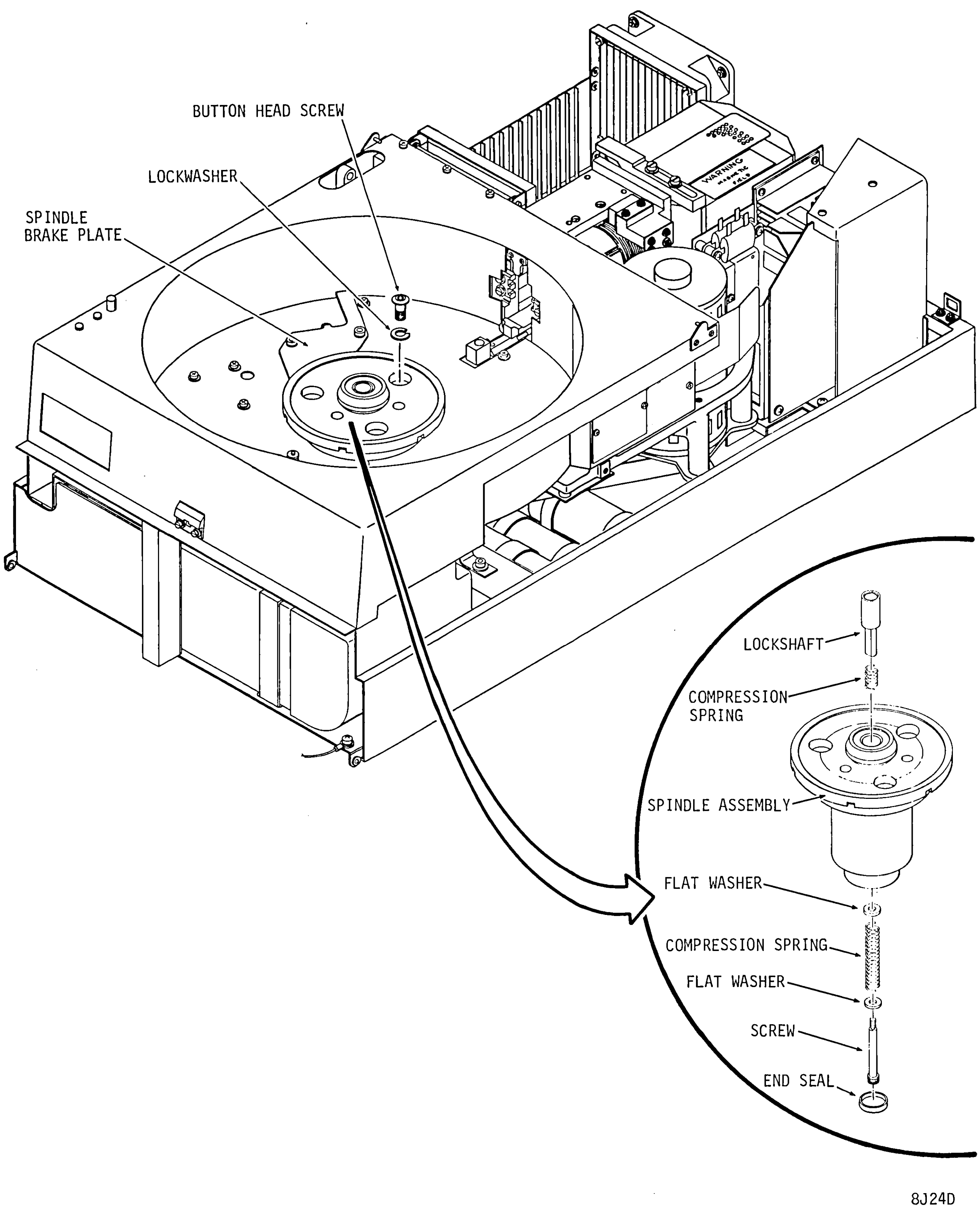


Figure 3-31 Spindle Replacement

10. Remove two screws, lockwashers and flat washers securing ground spring mounting boock to spindle assembly (figure 3-33).

11. Install ground spring mounting block on replacement spindle assembly using two screws, lockwashers and flat washers. Tighten screws.

12. Carefully lower replacement spindle assembly through deck opening in shroud. Orient spindle assembly so that ground spring mounting block faces drive motor.

13. Secure spindle assembly to deck using three socket head screws. Do not tighten screws.

14. Perform Spindle/Carriage Alignment procedure and then return to next step of this procedure.

15. Connect ground strap to ground spring terminal.

16. Perform Ground Spring Adjustment procedure.

17. Install and adjust drive belt (refer to Drive Belt Replacement and Adjustment procedures).

18. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

19. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

20. Perform Head/Arm Alignment procedure.

LOCKSHAFT REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.

2. Remove disk pack.

3. Raise case assembly.

4. Raise deck assembly to maintenance position.

5. Remove screw securing ground spring to mounting bracket (screw closest to ground spring contact). Loosen other screw in ground spring and rotate spring away from lockshaft end seal.

6. Remove lockshaft end seal by inserting a screwdriver tip between end seal and bottom of pulley and prying down until end seal falls off spindle shaft (two screwdrivers on opposite ends facilitate seal removal).

7. Insert a 1/8 inch Allen wrench into lockshaft screw inside spindle shaft.

7. Insert a 1/8 inch Allen wrench into lockshaft screw inside spindle shaft. Hold spindle pack mounting plate stationary with one hand and with the other hand loosen lockshaft screw.

8. Remove lockshaft screw, flat washers and compression spring from spindle (while removing parts, take note of how parts are assembled).

9. Remove lockshaft and compression spring from top of lockshaft.

10. Position compression spring on replacement lockshaft and install into top of spindle until lockshaft is seated inside spindle shaft.

11. Assemble lockwasher screw, one flat washer, spring, and other flat washer as shown in figure 3-30.

NOTE

Using Loctite Primer in next step reduces the setting time for Loctite from 24 to 12 hours.

12. Apply a very minute amount of Loctite, Grade C to the first three threads of the lockshaft screw (make sure that no Loctite contacts screw, washers, or the spring).

13. Guide lockshaft screw into bottom of spindle shaft and thread screw into lockshaft.

14. Torque lockshaft screw to 40 (±5) inch-pounds.

15. Position lockshaft end seal onto spindle shaft. Lightly tap seal onto shaft using a plastic faced hammer. Make sure that end seal is completely flush with bottom of pulley.

16. Rotate ground spring onto end seal and secure screw to mounting block using one screw. Tighten both screws securing spring to mounting block.

17. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.

18. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.

19. Clean spindle and shroud per procedure listed in Preventive Maintenance section.

20. Allow Loctite to cure for 24 hours (12 hours if primer was used) before starting spindle motor.

SPINDLE/CARRIAGE ALIGNMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise case assembly.
4. Raise logic chassis to maintenance position.
5. Remove belt from spindle pulley.
6. Remove number 3 (second from bottom) head/arm assembly (refer to Head/Arm Alignment procedure).
7. Refer to figure 3-32 and install carriage alignment tool in head number 3 slot on carriage. Secure tool to carriage with two screws and washers, Torque each screw to 4 inch-pounds.
8. Extend carriage until alignment tool is aligned as shown in figure 3-32.
9. Check that distance between alignment tool and spindle is as specified in figure 3-32. If adjustment is required, go to step 10. If requirement is met, go to step 16.
10. Retract carriage.
11. Rotate spindle until three holes in top of spindle are aligned with the three screws securing spindle to deck assembly.
12. Remove the screws and washers securing spindle to deck. Install screws (without washers) snug tight.
13. Extend carriage until alignment tool is positioned as shown in figure 3-32.
14. Gently tap spindle using a plastic hammer until dimension between alignment tool and spindle is as specified in figure 3-32.
15. Tighten one screw at a time and check dimension after tightening each screw. After tightening the last screw, remove the first screw tightened in step 12 and install one washer on screw and install screw. Tighten screw. Perform this procedure for the second screw and then the third. Recheck dimensional requirement after tightening each screw.
16. Remove alignment tool and install number 3 head/arm assembly.
17. Install belt onto spindle pulley.
18. Perform Head/Arm Alignment check and adjustment for head 3.

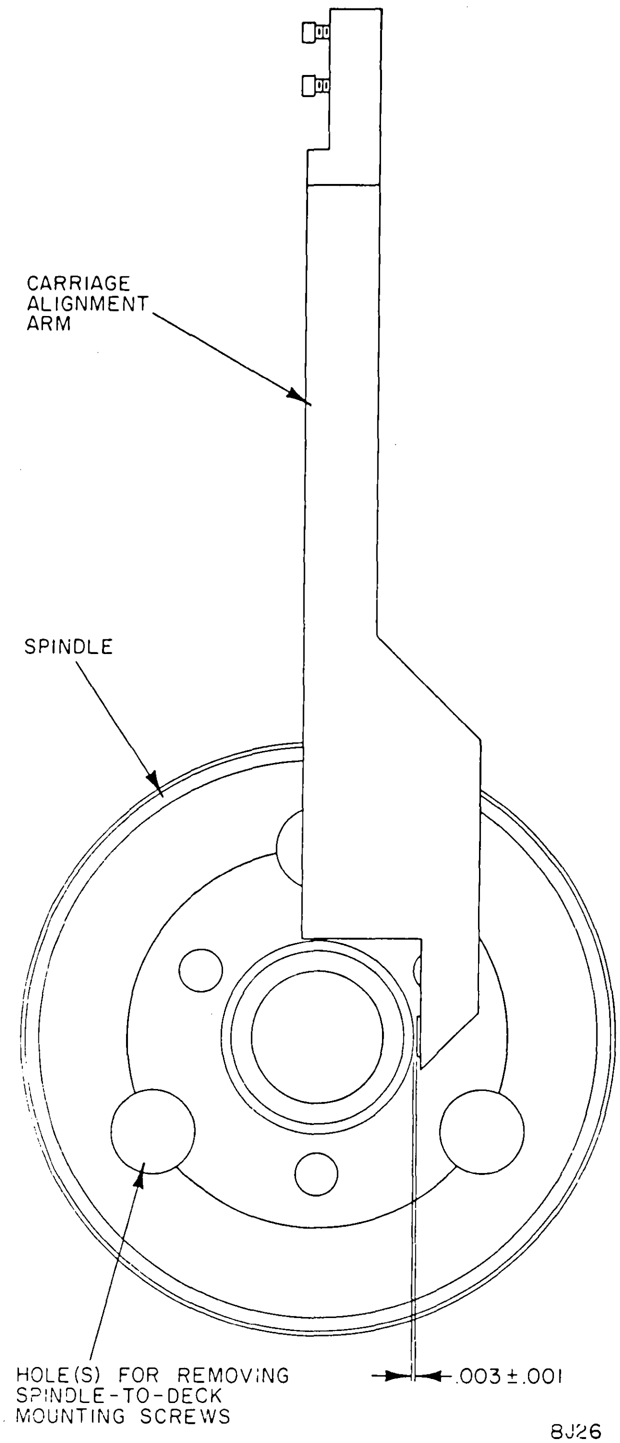


Figure 3-32. Spindle/Carriage Alignment

STATIC GROUND SPRING

ADJUSTMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise case assembly.
4. Raise deck assembly to maintenance position.
5. Connect a push-pull gauge to outer end of ground spring (figure 3-33).
6. Force (applied perpendicular to spring length) required to pull ground spring contact free of spindle lockshaft end seal should be within 90 (±25) grams.
7. If not within requirements of step 6, loosen two screws securing ground spring block to side of spindle assembly (figure 3-33). Reposition block. (Slide block towards deck to increase spring tension. Slide block away from deck to decrease spring tension.) Tighten screws and recheck requirements of step 6. Repeat adjustments until requirement is met.
8. Remove ground spring leadwire at ground spring mounting block terminal.
9. Connect multimeter (set to RX1) across ground spring leadwire and ground spring terminal. Meter should indicate zero ohms. If not, go to step 10. If OK go to step 11.
10. Clean lockshaft end seal with gauze slightly dampened with media clean-

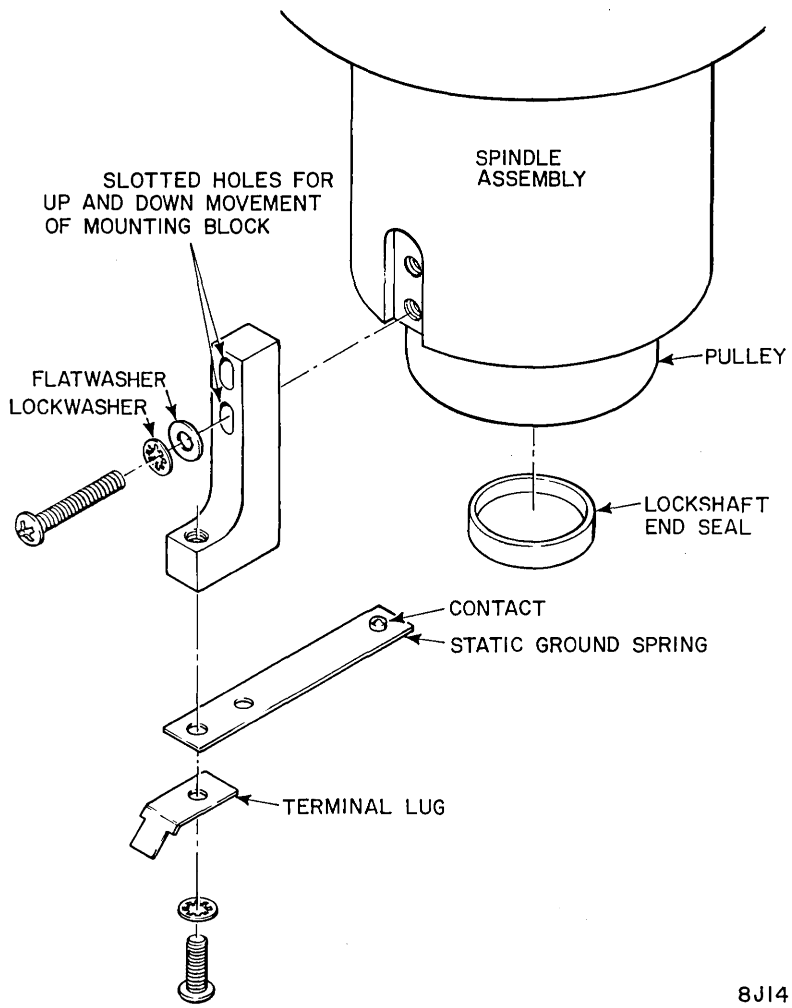


Figure 3-33. Static Ground Spring

ing solution. Repeat step 9, if requirement is not met replace ground spring. If OK go to step 11.

11. Disconnect multimeter leadwires.
12. Connect ground spring leadwire to ground spring terminal lug.
13. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.
14. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.
15. Lower case assembly.
16. Set AC POWER and POWER SUPPLY circuit breakers to ON.

REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF.
2. Remove disk pack.
3. Raise case assembly.
4. Raise deck assembly to maintenance position.
5. Disconnect ground spring leadwire from ground spring terminal lug.
6. Remove two screws, lockwashers, one flat washer and one terminal lug securing ground spring to mounting block.
7. Position replacement ground spring on mounting block as shown in figure 3-33.
8. Secure ground spring to mounting block, using two screws, lockwashers, one flat washer and one terminal lug (assemble hardware as shown in figure 3-33). Tighten screw.
9. Perform steps 5 through 16 of Static Ground Spring Adjustment procedure.

TIME METER REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.
2. Remove disk pack.
3. Raise case assembly.
4. Remove six screws and spring lock washers securing time meter mounting plate to base.
5. Remove screws and spring lock washers securing time meter to mounting plate.
6. Identify wires to be removed from time meter. Remove nylon covers and nuts securing wires to time meter.
7. Remove defective time meter.
8. Install replacement time meter in mounting plate in reverse order of removal.
9. Install time meter mounting plate on base being careful not to pinch electrical wires.
10. Lower case assembly.
11. Connect input power cable to external power source.
12. Set AC POWER and POWER SUPPLY circuit breakers to ON.
13. Perform initial Checkout and Startup procedure.

TRIAC REPLACEMENT

1. Set AC POWER and POWER SUPPLY circuit breakers to OFF. Disconnect input power cable from external power source.
2. Remove disk pack.
3. Raise case assembly.
4. Raise deck assembly to maintenance position.
5. Locate bad triac.
6. Identify and label triac leadwires. Disconnect leadwires.
7. Remove two screws and washers securing triac. Remove triac.
8. Apply a light coat of dielectric to the base (bottom) of the new triac and install in reverse order of removal.
9. Lower deck from maintenance position. Remove deck rear holddown screw and spacer. Install screw and spacer in keeper hole on back of deck.
10. Secure deck assembly to base assembly using two screws through bottom of shroud. Tighten screws.
11. Connect input power cable to external power source.
12. Lower case assembly.
13. Set AC POWER and POWER SUPPLY circuit breakers to ON.

VELOCITY TRANSDUCER

The velocity transducer assembly consists of a transducer coil (complete with housing and connector), a transducer core, and an extension rod. Whenever it is necessary to change any part of the transducer assembly, all parts of the assembly must be changed.

NOTE

When ordering the velocity transducer assembly, also be certain to order the extension rod.

The following procedure first covers replacement of the transducer coil, aligning it to the old transducer core. It then covers replacement of the core.

Refer to figure 3-34 and:

1. Remove attaching hardware securing transducer coil to rear of magnet assembly. Unplug connector P22.
2. Carefully remove transducer coil, sliding it straight out rear of magnet assembly.
3. Slowly and carefully slide replacement transducer coil into rear of magnet assembly.
4. Align one of the three slots on back of transducer coil with mounting hole in magnet. Manually extend heads and slide carriage back and forth. Be aware of any drag or of any rubbing sound. Rotate coil and move carriage again for each of remaining two slots on back of transducer coil.
5. Select mounting slot that produced minimum drag and minimum rubbing. Orient this slot to mounting hole and install and tighten attaching hardware.
6. Reconnect connector P22. Extend heads and move carriage back and forth to verify alignment of transducer coil.
7. Reach in from logic chassis side of drive and disconnect extension rod from rear of carriage assembly using a 1/8-inch open end wrench.
8. Push extension rod and transducer core through coil and out rear of magnet assembly.
9. Apply light coat of Loctite grade C to threads of new extension rod and screw rod into end of replacement transducer core. Wipe off excessive Loctite.

NOTE

Do not apply Loctite to remaining end of extension rod until completing next step.

10. Slowly and carefully slide replacement transducer core and extension rod through coil from rear.

CAUTION

Use extreme care not to allow Loctite to get on carriage rails or bearings.

11. Very carefully apply a light coat of Loctite grade C to threads on end of extension rod. Thread extension rod into rear of carriage and lightly tighten. Wipe away excessive Loctite.
12. Manually extend heads and move carriage back and forth to verify that carriage moves freely and there is no excessive drag.

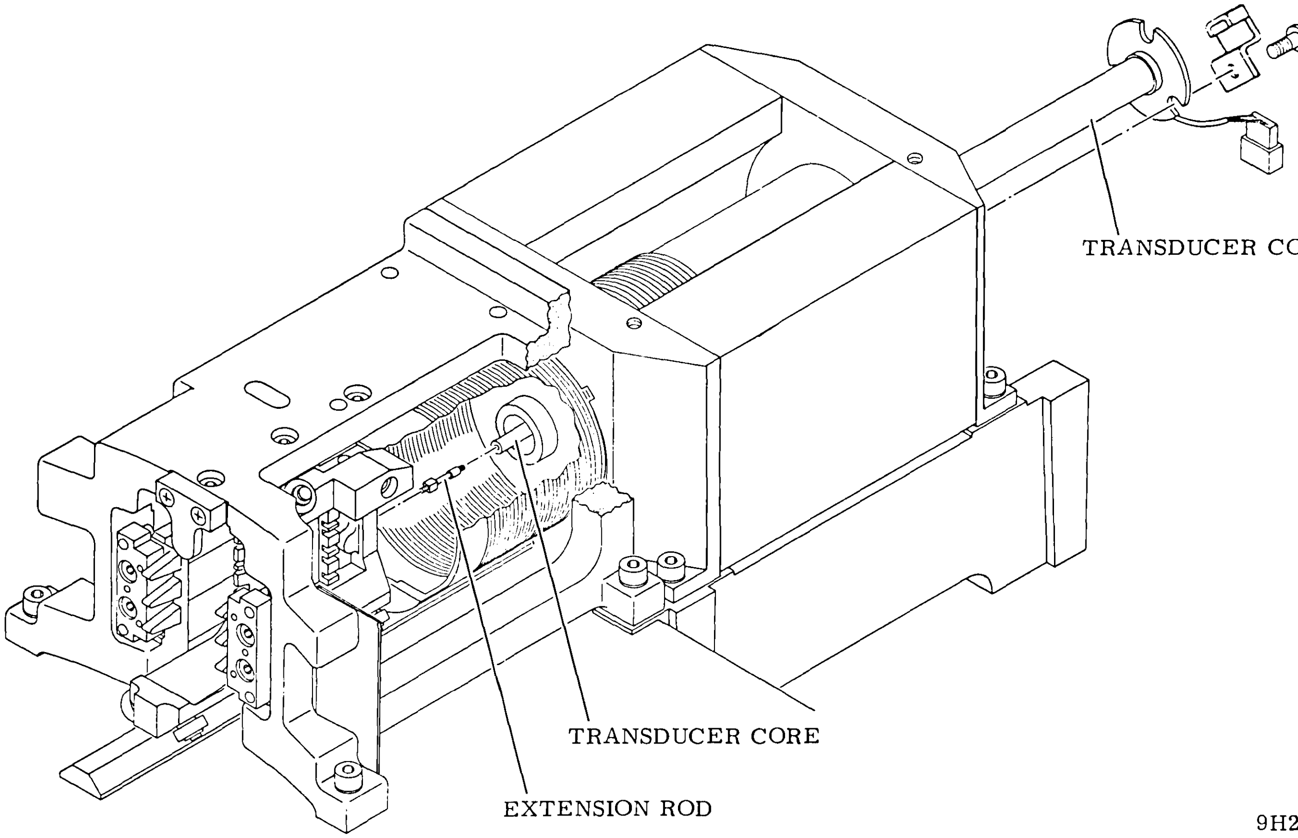


Figure 3-34. Velocity Transducer Replacement

SECTION 4

DIAGRAMS

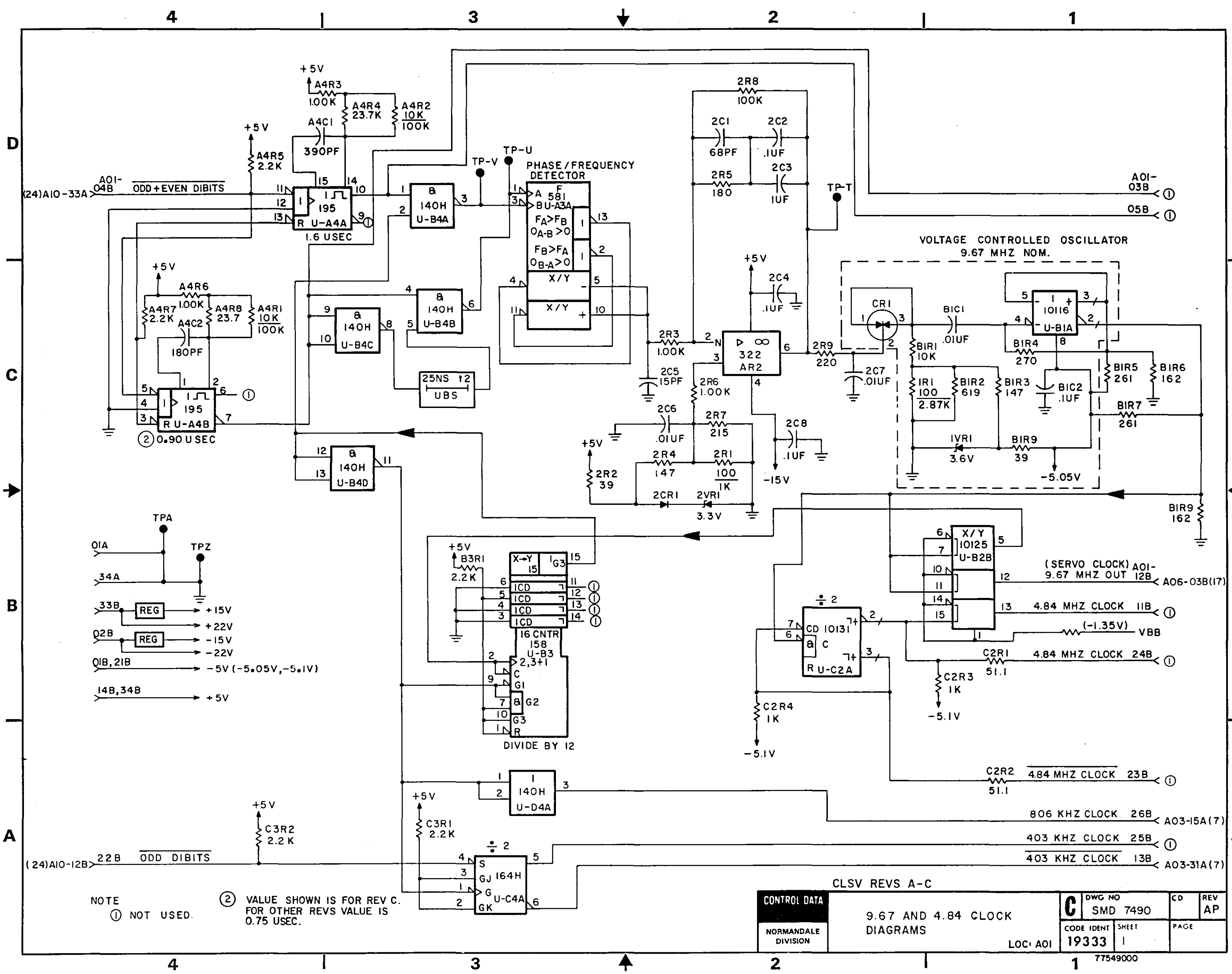
INTRODUCTION

This section contains the logic and power diagrams for the drive. These diagrams describe the drive in terms of the functions it performs.

The diagrams are grouped by card location with each sheet having a unique two digit cross reference number. This number is useful when following signals that go from one sheet to another. Each sheet in the diagrams has a title that is descriptive of the function the logic performs.

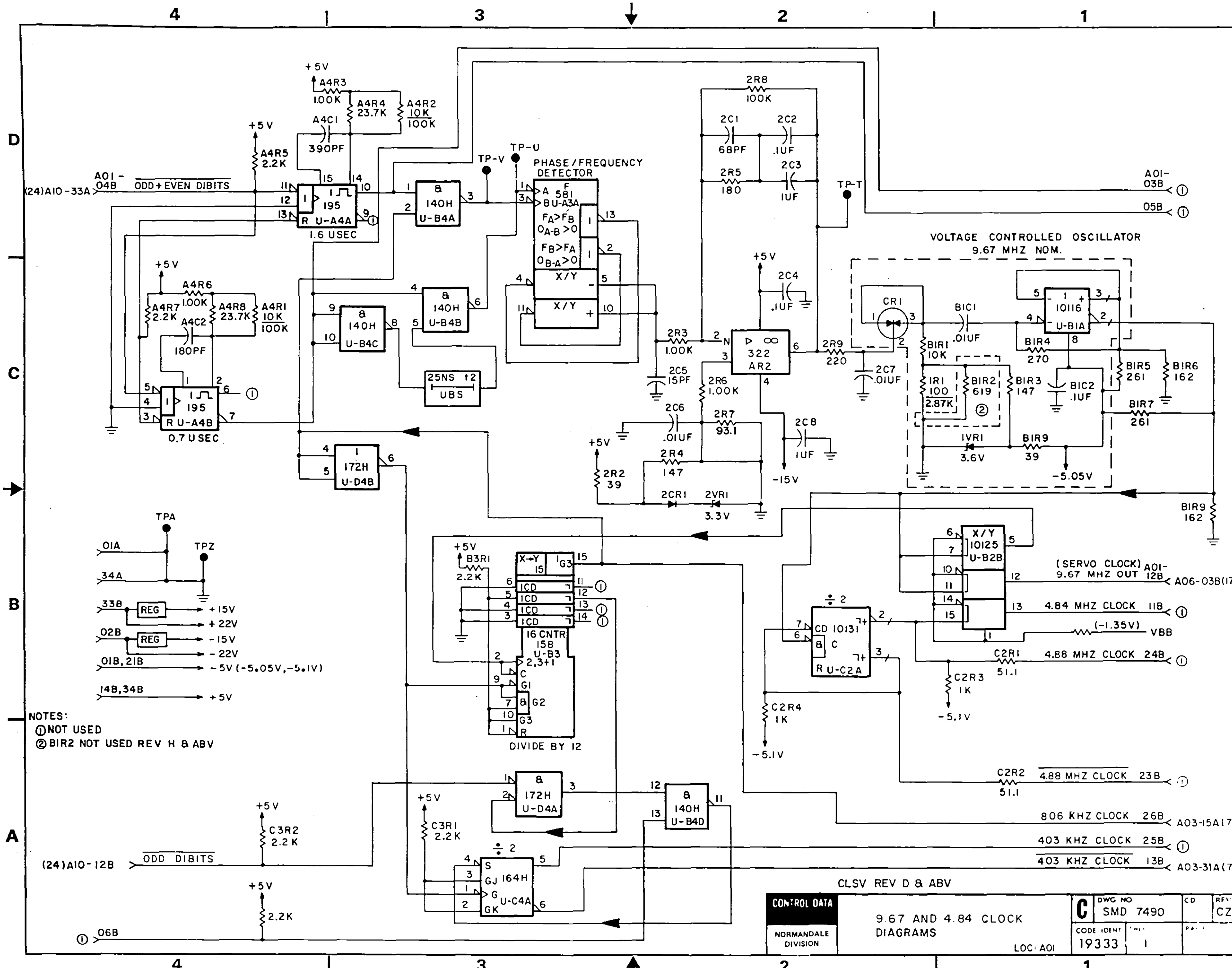
For descriptions of the discrete and integrated circuits found in the diagrams, refer to sections 4, 5 and 6 of the reference manual (Publication Number 83324220).

Flowcharts, simplified logic, and timing diagrams that describe various drive functions are found in section 3 (Theory of Operation) of the reference manual.

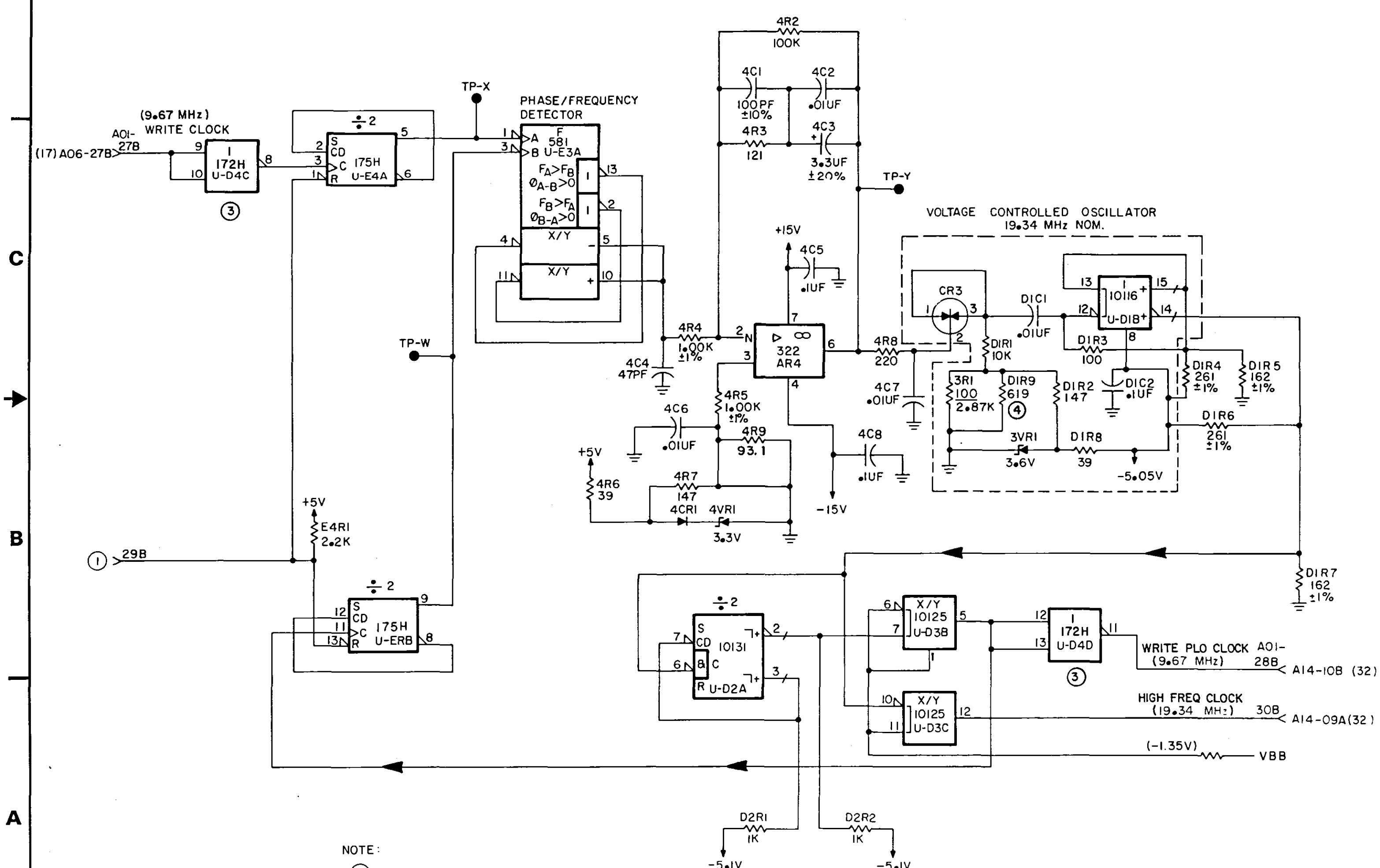


PHASE / FREQUENCY DETECTOR
VOLTAGE CONTROLLED OSCILLATOR 9.67 MHZ NOM.
ODD + EVEN DIBITS
1.6 USEC
0.90 USEC
DIVIDE BY 12
(SERVO CLOCK) 9.67 MHZ OUT 12B
4.84 MHZ CLOCK 11B
4.84 MHZ CLOCK 24B
4.84 MHZ CLOCK 23B
806 KHZ CLOCK 26B
403 KHZ CLOCK 25B
403 KHZ CLOCK 13B
ODD DIBITS
NOTE
① NOT USED.
② VALUE SHOWN IS FOR REV C. FOR OTHER REVS VALUE IS 0.75 USEC.
CLSV REVS A-C
CONTROL DATA
NORMANDALE DIVISION
9.67 AND 4.84 CLOCK DIAGRAMS
LOC: A01
DWG NO SMD 7490
CODE IDENT 19333
SHEET 1
REV AP
77549000

83311300 AF



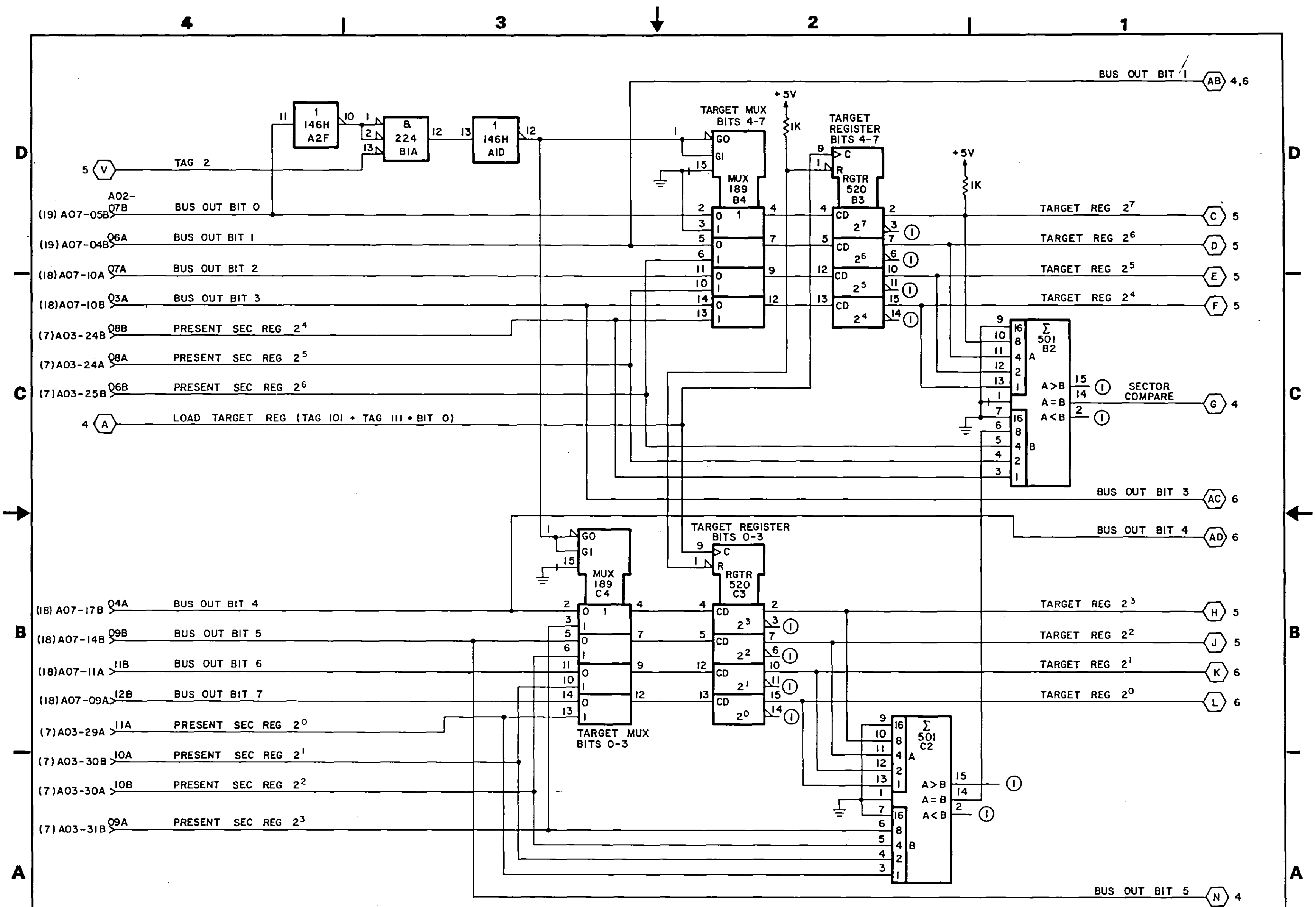
PHASE/FREQUENCY DETECTOR
VOLTAGE CONTROLLED OSCILLATOR 9.67 MHZ NOM.
DIVIDE BY 12
(SERVO CLOCK) 9.67 MHZ OUT
4.84 MHZ CLOCK
4.88 MHZ CLOCK
806 KHZ CLOCK
403 KHZ CLOCK
ODD+EVEN DIBITS
ODD DIBITS
NOTES:
①NOT USED
②BIR2 NOT USED REV H & ABV
CLSV REV D & ABV
CONTROL DATA
NORMANDALE DIVISION
9.67 AND 4.84 CLOCK DIAGRAMS
LOC: A01
DWG NO SMD 7490
REV CZ
CODE IDENT 19333



NOTE:

1. NOT USED.
2. FOR A01 VOLTAGE INPUT PINS SEE SHEET 1.
3. 140H CHIP USED ON CLSV REV C AND BELOW ONLY.
4. D1R9 REV H & ABV.

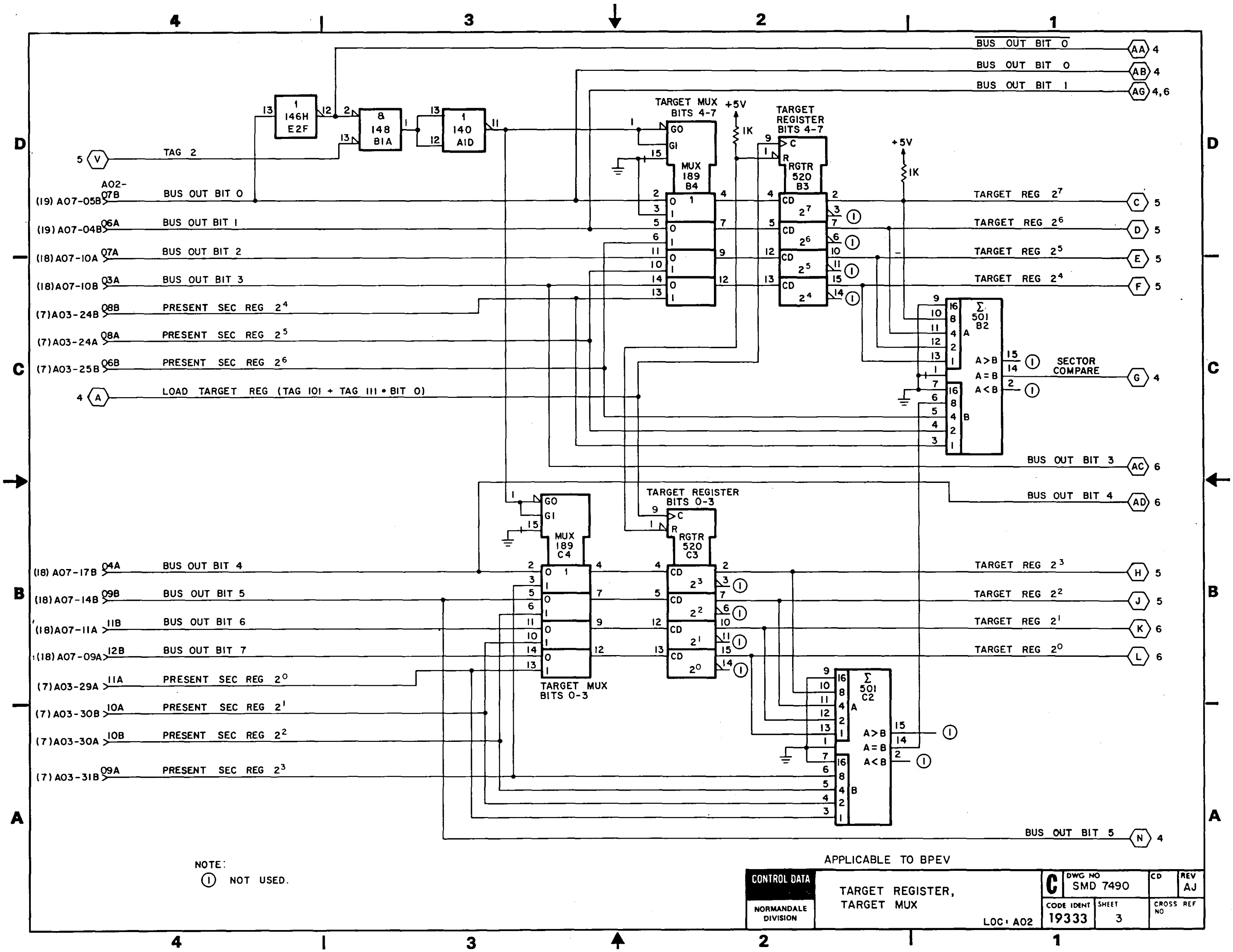
CONTROL DATA NORMANDALE DIVISION	9.67 MHZ, 19.34 MHZ CLOCKS LOC A01	C	DWG NO SMD 7490	CD	REV DM
		CODE IDENT 19333	SHEET 2		

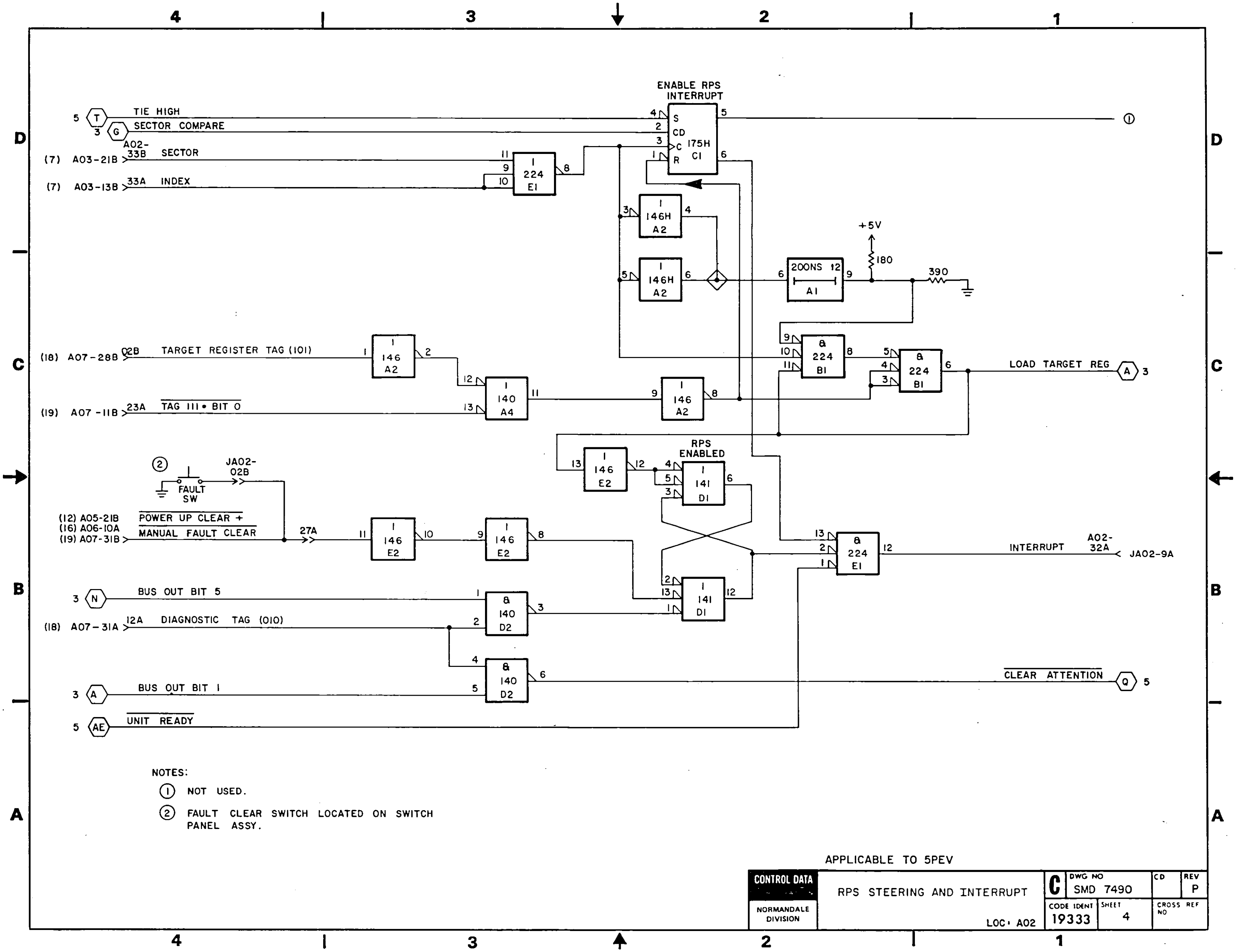


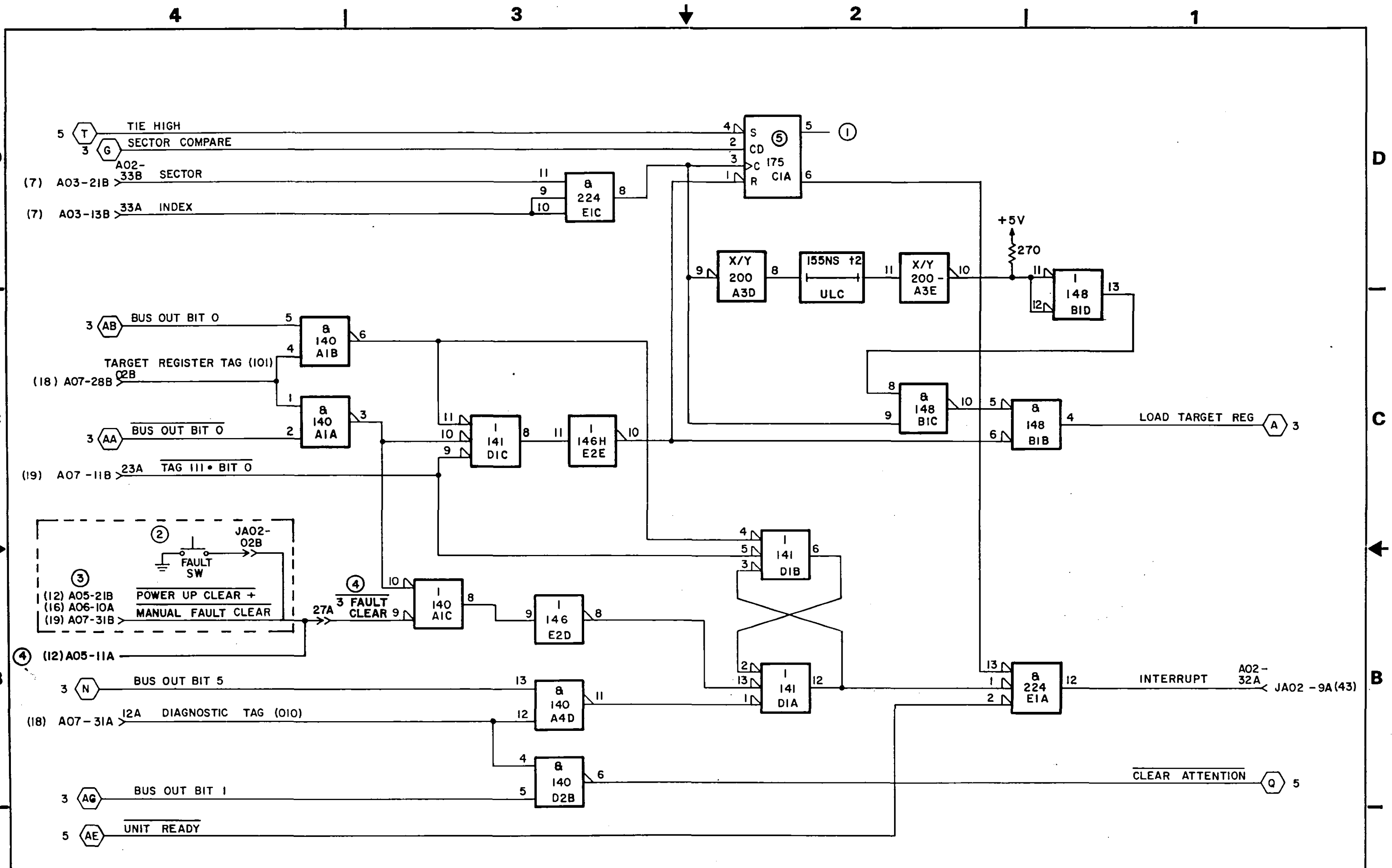
NOTE:
(1) NOT USED.

APPLICABLE TO 5PEV

CONTROL DATA NORMANDALE DIVISION	TARGET REGISTER, TARGET MUX LOC: A02	C	DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 3	CROSS REF NO	


TAG 2
BUS OUT BIT 0
BUS OUT BIT 1
BUS OUT BIT 2
BUS OUT BIT 3
PRESENT SEC REG 2^4
PRESENT SEC REG 2^5
PRESENT SEC REG 2^6
LOAD TARGET REG (TAG 101 + TAG 111 • BIT 0)
(19) A07-05B
(19) A07-04B
(18) A07-10A
(18) A07-10B
(7) A03-24B
(7) A03-24A
(7) A03-25B
146H E2F
148 B1A
140 A1D
TARGET MUX BITS 4-7
MUX 189 B4
TARGET REGISTER BITS 4-7
RGTR 520 B3
+5V
1K
Σ 501 B2
A>B
A=B
A<B
SECTOR COMPARE
TARGET REG 2^7
TARGET REG 2^6
TARGET REG 2^5
TARGET REG 2^4
BUS OUT BIT 3
BUS OUT BIT 4
TARGET MUX BITS 0-3
MUX 189 C4
TARGET REGISTER BITS 0-3
RGTR 520 C3
Σ 501 C2
BUS OUT BIT 4
BUS OUT BIT 5
BUS OUT BIT 6
BUS OUT BIT 7
PRESENT SEC REG 2^0
PRESENT SEC REG 2^1
PRESENT SEC REG 2^2
PRESENT SEC REG 2^3
(18) A07-17B
(18) A07-14B
(18) A07-11A
(18) A07-09A
(7) A03-29A
(7) A03-30B
(7) A03-30A
(7) A03-31B
TARGET REG 2^3
TARGET REG 2^2
TARGET REG 2^1
TARGET REG 2^0
BUS OUT BIT 5
NOTE:
(1) NOT USED.
APPLICABLE TO BPEV
CONTROL DATA
NORMANDALE DIVISION
TARGET REGISTER, TARGET MUX
LOC: A02
DWG NO SMD 7490
REV AJ
CODE IDENT 19333
SHEET 3


ENABLE RPS INTERRUPT
175H C1
TIE HIGH
SECTOR COMPARE
(7) A03-21B A02-33B SECTOR
(7) A03-13B 33A INDEX
224 E1
146H A2
200NS A1
+5V
180
390
(18) A07-28B 02B TARGET REGISTER TAG (101)
(19) A07-11B 23A TAG 111 • BIT 0
146 A2
140 A4
224 B1
LOAD TARGET REG
RPS ENABLED
146 E2
141 D1
FAULT SW
JA02-02B
(12) A05-21B POWER UP CLEAR +
(16) A06-10A MANUAL FAULT CLEAR
(19) A07-31B
27A
INTERRUPT A02-32A JA02-9A
BUS OUT BIT 5
(18) A07-31A 12A DIAGNOSTIC TAG (010)
140 D2
BUS OUT BIT 1
CLEAR ATTENTION
UNIT READY
NOTES:
(1) NOT USED.
(2) FAULT CLEAR SWITCH LOCATED ON SWITCH PANEL ASSY.
APPLICABLE TO 5PEV
CONTROL DATA
NORMANDALE DIVISION
RPS STEERING AND INTERRUPT
LOC: A02
C
DWG NO SMD 7490
REV P
CODE IDENT 19333
SHEET 4

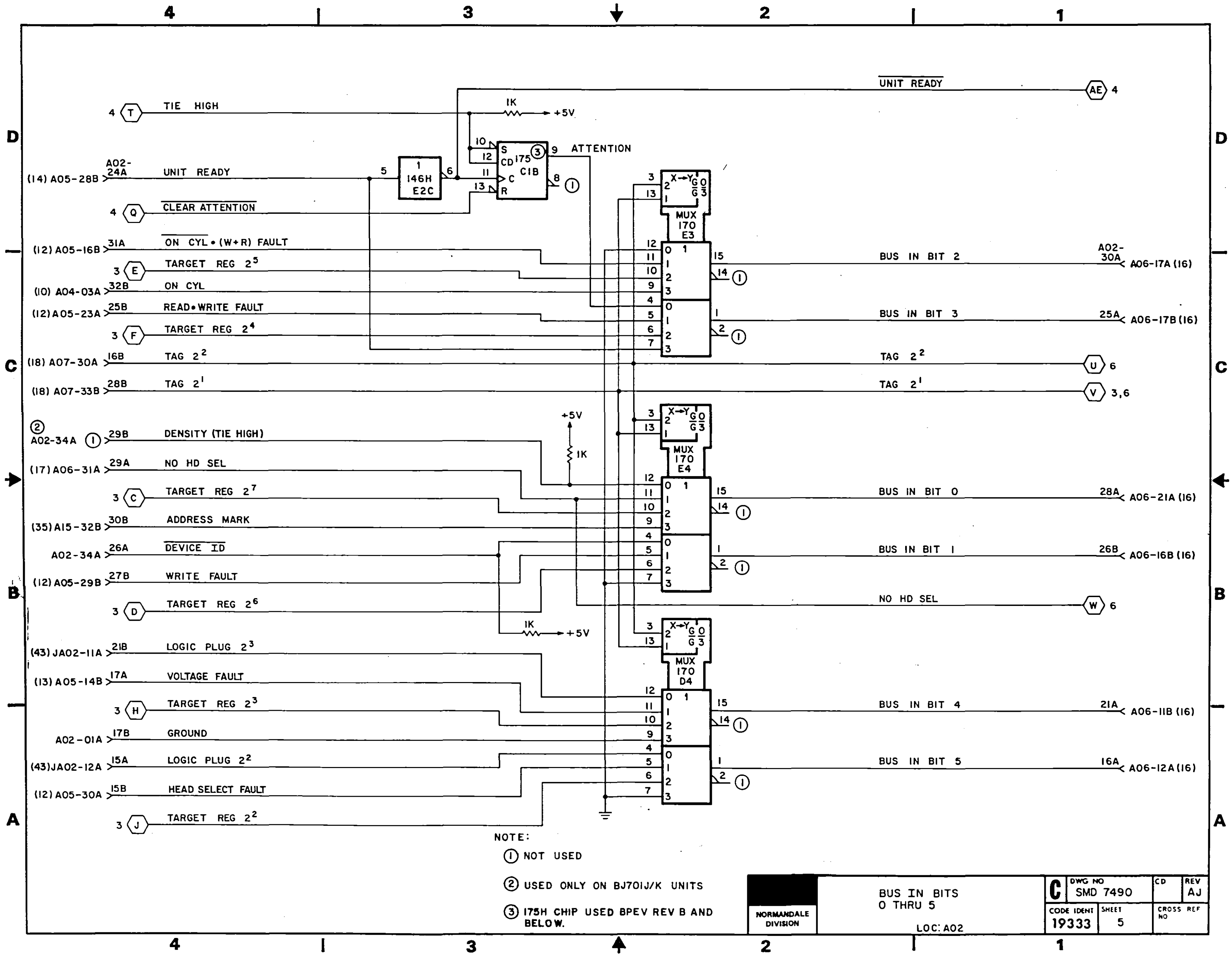


NOTES:

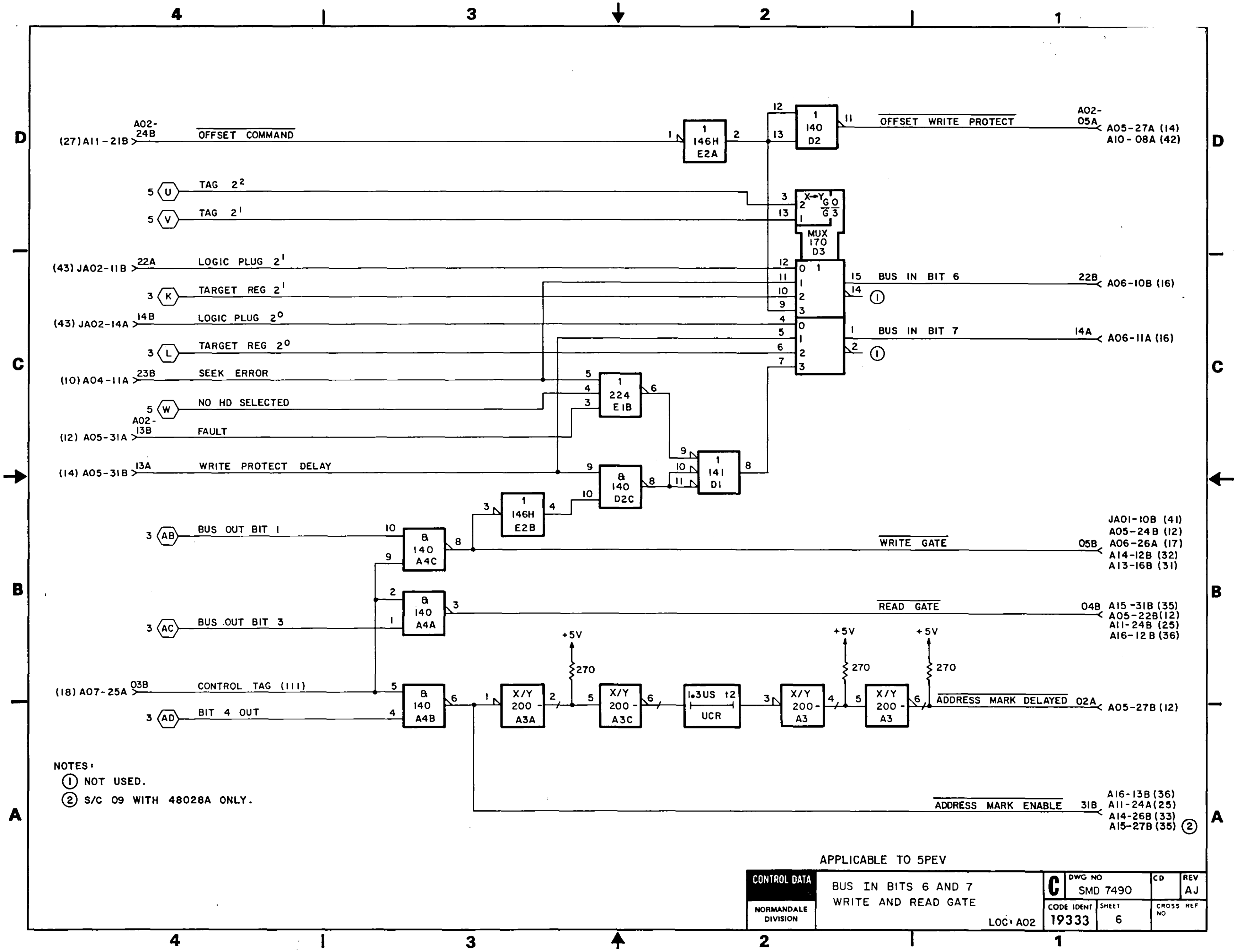
1. NOT USED.
2. FAULT CLEAR SWITCH LOCATED ON SWITCH PANEL ASSY.
3. S/C 10 WITHOUT 48140 AND BELOW.
4. S/C 10 WITH 48140 AND ABOVE.
5. 175H CHIP USED BPEV REV B AND BELOW.

APPLICABLE TO BPEV

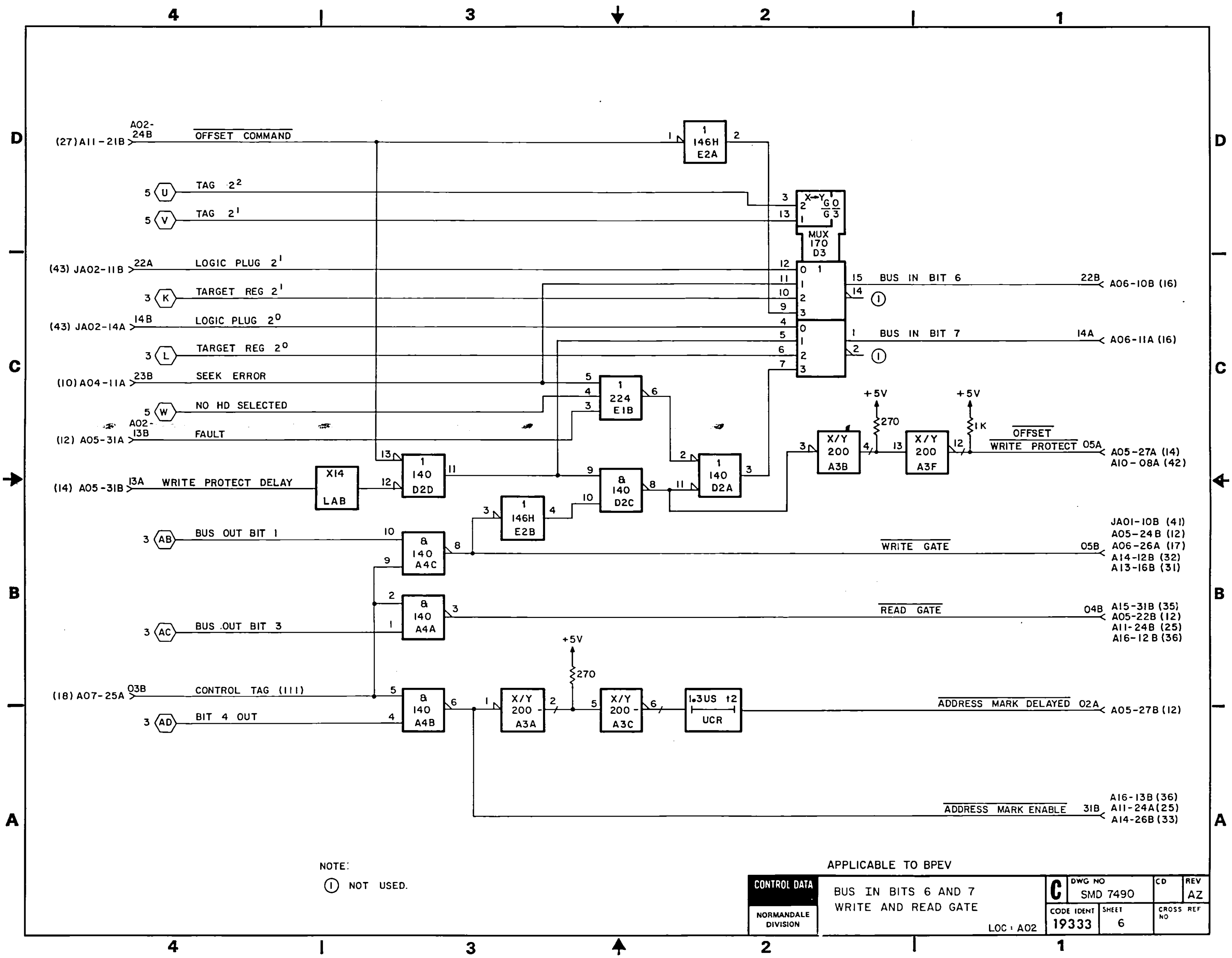
NORMANDALE DIVISION	RPS STEERING AND INTERRUPT LOC: A02	C DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 4	CROSS REF NO

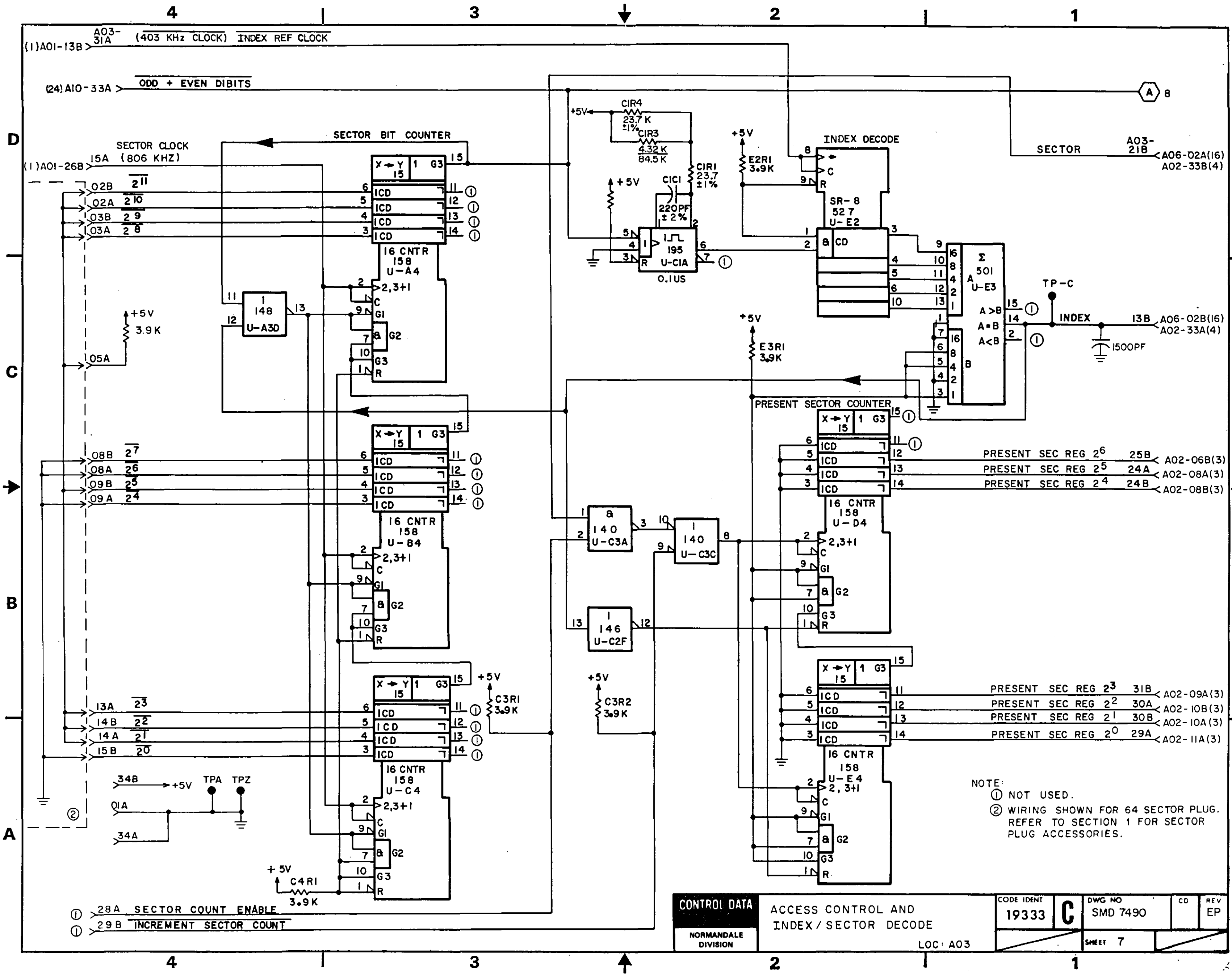


UNIT READY
AE 4
TIE HIGH
4 T
1K
+5V
ATTENTION
A02-24A
(14) A05-28B
UNIT READY
1 146H E2C
175 C1B
S CD C R
4 Q
CLEAR ATTENTION
(12) A05-16B 31A
ON CYL • (W+R) FAULT
3 E TARGET REG 2^5
(10) A04-03A 32B ON CYL
(12) A05-23A 25B READ • WRITE FAULT
3 F TARGET REG 2^4
(18) A07-30A 16B TAG 2^2
(18) A07-33B 28B TAG 2^1
MUX 170 E3
BUS IN BIT 2
A02-30A A06-17A (16)
BUS IN BIT 3
25A A06-17B (16)
TAG 2^2 U 6
TAG 2^1 V 3,6
A02-34A 29B DENSITY (TIE HIGH)
(17) A06-31A 29A NO HD SEL
3 C TARGET REG 2^7
(35) A15-32B 30B ADDRESS MARK
A02-34A 26A DEVICE ID
(12) A05-29B 27B WRITE FAULT
3 D TARGET REG 2^6
MUX 170 E4
BUS IN BIT 0
28A A06-21A (16)
BUS IN BIT 1
26B A06-16B (16)
NO HD SEL W 6
(43) JA02-11A 21B LOGIC PLUG 2^3
(13) A05-14B 17A VOLTAGE FAULT
3 H TARGET REG 2^3
A02-01A 17B GROUND
(43) JA02-12A 15A LOGIC PLUG 2^2
(12) A05-30A 15B HEAD SELECT FAULT
3 J TARGET REG 2^2
MUX 170 D4
BUS IN BIT 4
21A A06-11B (16)
BUS IN BIT 5
16A A06-12A (16)
NOTE:
1 NOT USED
2 USED ONLY ON BJ701J/K UNITS
3 175H CHIP USED BPEV REV B AND BELOW.
NORMANDALE DIVISION
BUS IN BITS 0 THRU 5
LOC: A02
C
DWG NO SMD 7490
REV AJ
CODE IDENT 19333
SHEET 5
CROSS REF NO

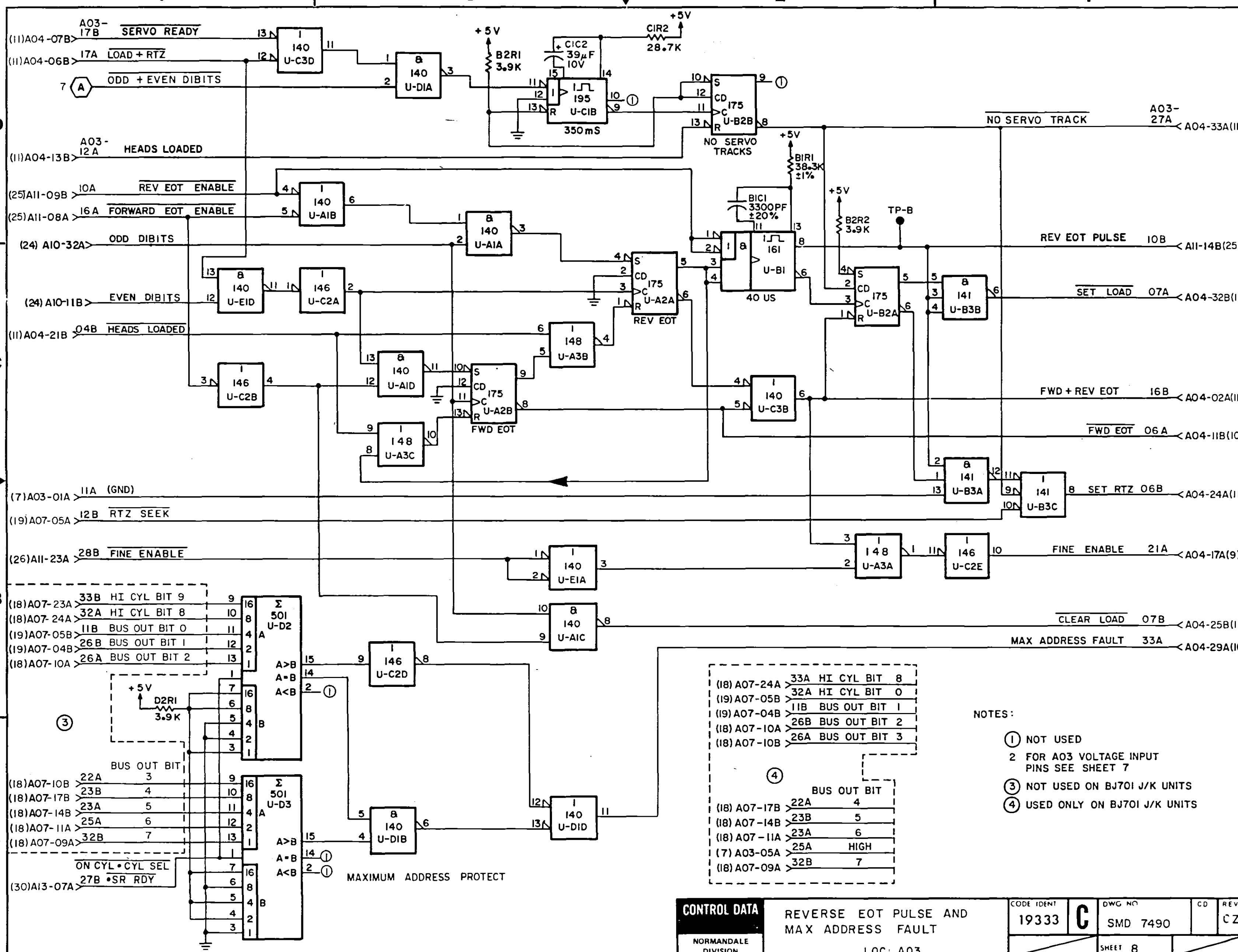


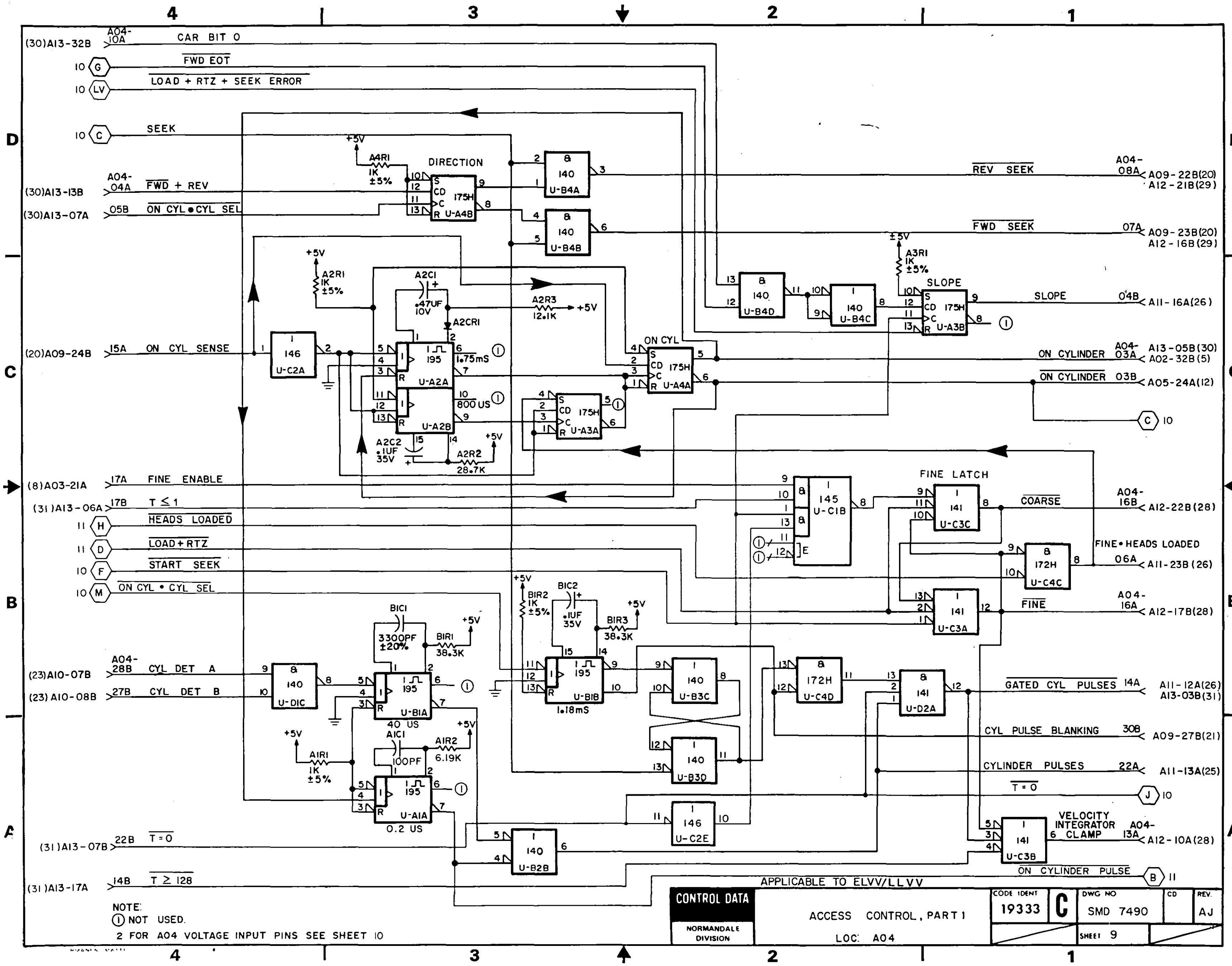
(27) A11-21B
A02-24B
OFFSET COMMAND
146H E2A
140 D2
OFFSET WRITE PROTECT
A02-05A
A05-27A (14)
A10-08A (42)
5 (U) TAG 2²
5 (V) TAG 2¹
X→Y
MUX 170 D3
(43) JA02-11B
22A
LOGIC PLUG 2¹
3 (K) TARGET REG 2¹
(43) JA02-14A
14B
LOGIC PLUG 2⁰
3 (L) TARGET REG 2⁰
BUS IN BIT 6
22B
A06-10B (16)
BUS IN BIT 7
14A
A06-11A (16)
(10) A04-11A
23B
SEEK ERROR
224 E1B
5 (W) NO HD SELECTED
(12) A05-31A
A02-13B
FAULT
(14) A05-31B
13A
WRITE PROTECT DELAY
140 D2C
141 D1
146H E2B
3 (AB) BUS OUT BIT 1
140 A4C
WRITE GATE
05B
JA01-10B (41)
A05-24B (12)
A06-26A (17)
A14-12B (32)
A13-16B (31)
3 (AC) BUS OUT BIT 3
140 A4A
READ GATE
04B
A15-31B (35)
A05-22B (12)
A11-24B (25)
A16-12B (36)
+5V
270
(18) A07-25A
03B
CONTROL TAG (111)
3 (AD) BIT 4 OUT
140 A4B
X/Y 200 A3A
X/Y 200 A3C
1.3US t2 UCR
X/Y 200 A3
ADDRESS MARK DELAYED
02A
A05-27B (12)
ADDRESS MARK ENABLE
31B
A16-13B (36)
A11-24A (25)
A14-26B (33)
A15-27B (35) (2)
NOTES:
(1) NOT USED.
(2) S/C 09 WITH 48028A ONLY.
APPLICABLE TO 5PEV
CONTROL DATA
NORMANDALE DIVISION
BUS IN BITS 6 AND 7
WRITE AND READ GATE
LOC: A02
C
DWG NO SMD 7490
REV AJ
CODE IDENT 19333
SHEET 6

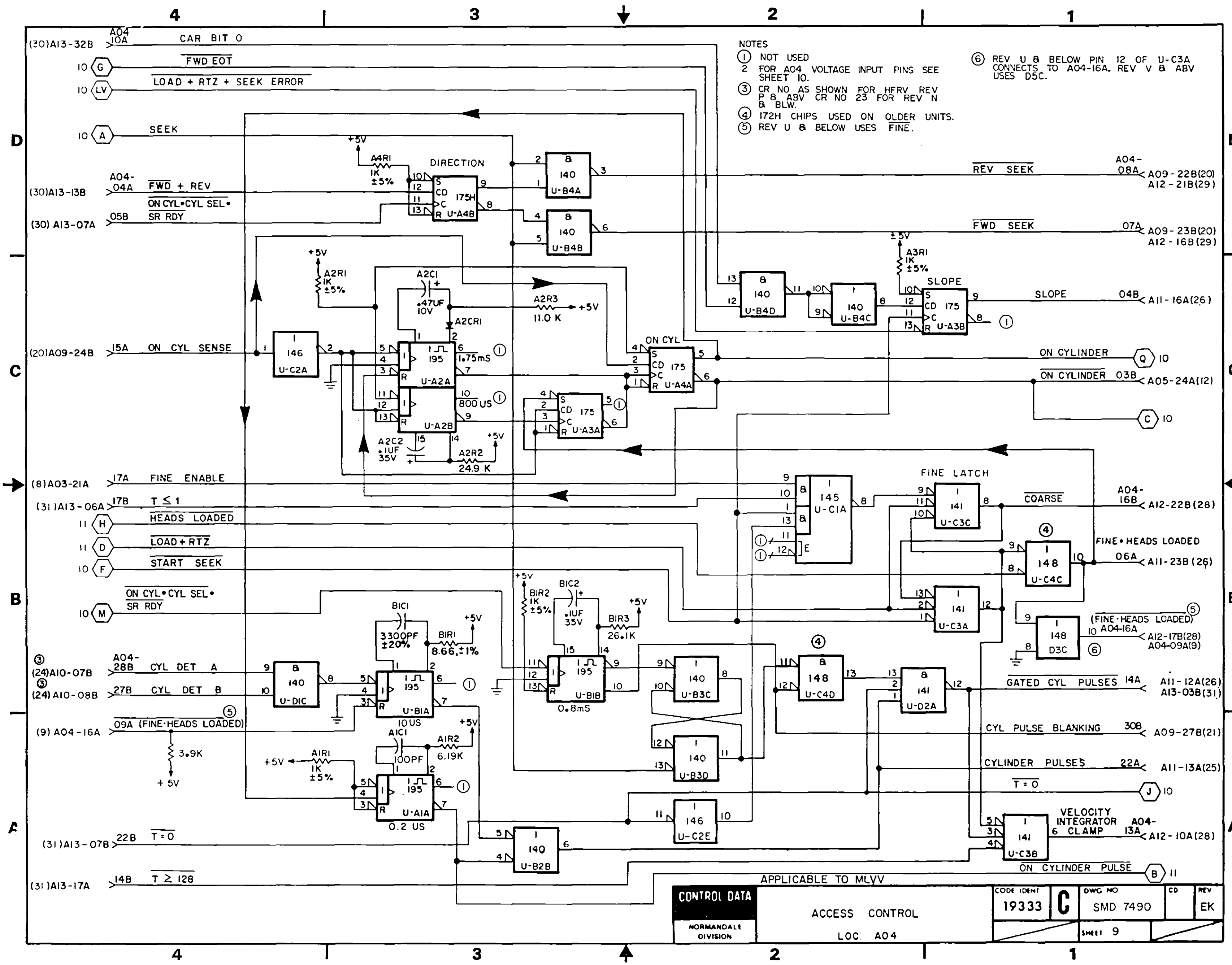

OFFSET COMMAND
TAG 2²
TAG 2¹
LOGIC PLUG 2¹
TARGET REG 2¹
LOGIC PLUG 2⁰
TARGET REG 2⁰
SEEK ERROR
NO HD SELECTED
FAULT
WRITE PROTECT DELAY
BUS OUT BIT 1
BUS OUT BIT 3
CONTROL TAG (111)
BIT 4 OUT
(27) A11-21B
(43) JA02-11B
(43) JA02-14A
(10) A04-11A
(12) A05-31A
(14) A05-31B
(18) A07-25A
146H E2A
MUX 170 D3
224 E1B
140 D2D
140 D2C
140 D2A
146H E2B
X14 LAB
140 A4C
140 A4A
140 A4B
X/Y 200 A3A
X/Y 200 A3C
1.3US UCR
X/Y 200 A3B
X/Y 200 A3F
+5V
270
1K
BUS IN BIT 6
BUS IN BIT 7
A06-10B (16)
A06-11A (16)
OFFSET WRITE PROTECT
A05-27A (14)
A10-08A (42)
WRITE GATE
JA01-10B (41)
A05-24B (12)
A06-26A (17)
A14-12B (32)
A13-16B (31)
READ GATE
A15-31B (35)
A05-22B (12)
A11-24B (25)
A16-12B (36)
ADDRESS MARK DELAYED
A05-27B (12)
ADDRESS MARK ENABLE
A16-13B (36)
A11-24A (25)
A14-26B (33)
NOTE:
(1) NOT USED.
APPLICABLE TO BPEV
CONTROL DATA
NORMANDALE DIVISION
BUS IN BITS 6 AND 7
WRITE AND READ GATE
LOC: A02
DWG NO SMD 7490
REV AZ
CODE IDENT 19333
SHEET 6

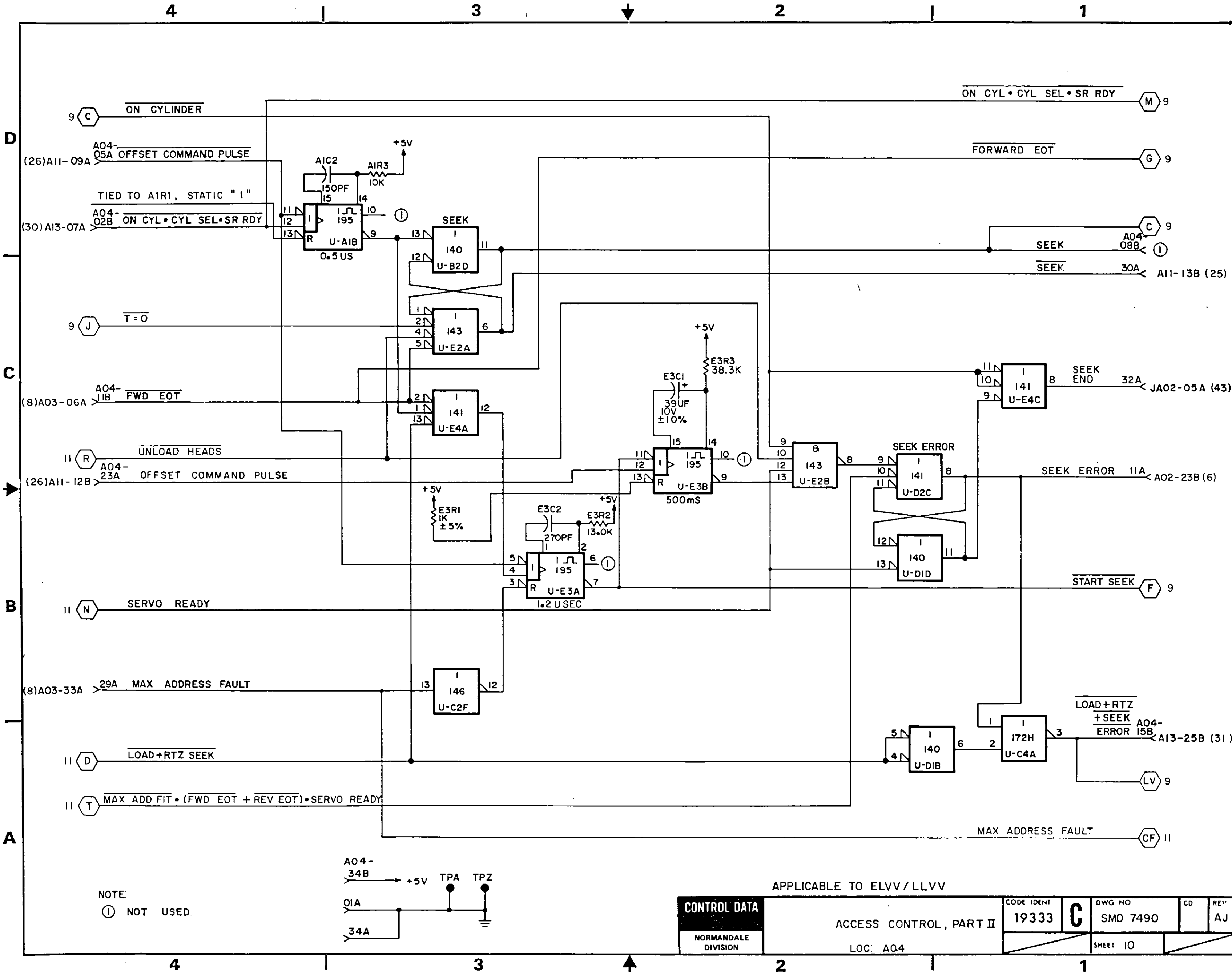


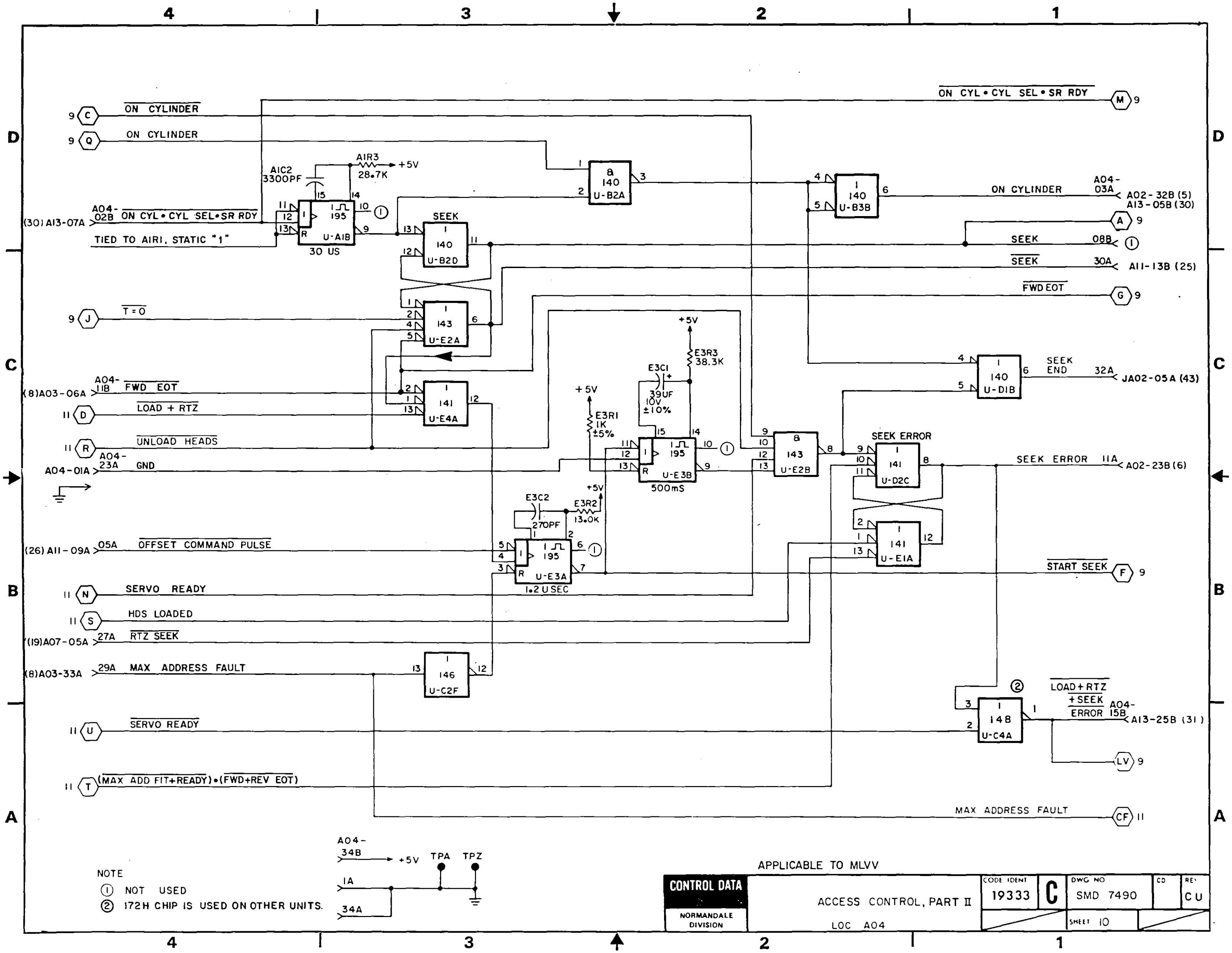
(403 KHz CLOCK) INDEX REF CLOCK
ODD + EVEN DIBITS
SECTOR BIT COUNTER
SECTOR CLOCK (806 KHZ)
INDEX DECODE
SR-8 527 U-E2
195 U-C1A 0.1US
Σ 501 U-E3
TP-C
INDEX
1500PF
SECTOR
148 U-A30
16 CNTR 158 U-A4
16 CNTR 158 U-B4
16 CNTR 158 U-C4
140 U-C3A
140 U-C3C
146 U-C2F
PRESENT SECTOR COUNTER
16 CNTR 158 U-D4
16 CNTR 158 U-E4
PRESENT SEC REG 2^6 25B A02-06B(3)
PRESENT SEC REG 2^5 24A A02-08A(3)
PRESENT SEC REG 2^4 24B A02-08B(3)
PRESENT SEC REG 2^3 31B A02-09A(3)
PRESENT SEC REG 2^2 30A A02-10B(3)
PRESENT SEC REG 2^1 30B A02-10A(3)
PRESENT SEC REG 2^0 29A A02-11A(3)
SECTOR COUNT ENABLE
INCREMENT SECTOR COUNT
TPA TPZ
NOTE:
① NOT USED.
② WIRING SHOWN FOR 64 SECTOR PLUG. REFER TO SECTION 1 FOR SECTOR PLUG ACCESSORIES.
CONTROL DATA
NORMANDALE DIVISION
ACCESS CONTROL AND INDEX/SECTOR DECODE
LOC: A03
CODE IDENT 19333
C
DWG NO SMD 7490
REV EP
SHEET 7


SERVO READY
LOAD + RTZ
ODD + EVEN DIBITS
HEADS LOADED
REV EOT ENABLE
FORWARD EOT ENABLE
ODD DIBITS
EVEN DIBITS
HEADS LOADED
(GND)
RTZ SEEK
FINE ENABLE
HI CYL BIT 9
HI CYL BIT 8
BUS OUT BIT 0
BUS OUT BIT 1
BUS OUT BIT 2
BUS OUT BIT
ON CYL • CYL SEL
• SR RDY
350 mS
NO SERVO TRACKS
40 US
REV EOT
FWD EOT
NO SERVO TRACK
REV EOT PULSE
SET LOAD
FWD + REV EOT
FWD EOT
SET RTZ
FINE ENABLE
CLEAR LOAD
MAX ADDRESS FAULT
TP-B
MAXIMUM ADDRESS PROTECT
HI CYL BIT 8
HI CYL BIT 0
BUS OUT BIT 1
BUS OUT BIT 2
BUS OUT BIT 3
BUS OUT BIT
HIGH
NOTES:
1 NOT USED
2 FOR A03 VOLTAGE INPUT PINS SEE SHEET 7
3 NOT USED ON BJ701 J/K UNITS
4 USED ONLY ON BJ701 J/K UNITS
CONTROL DATA
NORMANDALE DIVISION
REVERSE EOT PULSE AND MAX ADDRESS FAULT
LOC: A03
CODE IDENT 19333
C
DWG NO SMD 7490
REV CZ
SHEET 8


CAR BIT 0
FWD EOT
LOAD + RTZ + SEEK ERROR
SEEK
DIRECTION
FWD + REV
ON CYL • CYL SEL
REV SEEK
FWD SEEK
SLOPE
ON CYL SENSE
ON CYL
ON CYLINDER
FINE ENABLE
T ≤ 1
HEADS LOADED
LOAD + RTZ
START SEEK
ON CYL • CYL SEL
FINE LATCH
COARSE
FINE • HEADS LOADED
FINE
CYL DET A
CYL DET B
GATED CYL PULSES
CYL PULSE BLANKING
CYLINDER PULSES
T = 0
VELOCITY INTEGRATOR CLAMP
ON CYLINDER PULSE
T ≥ 128
APPLICABLE TO ELVV/LLVV
NOTE:
① NOT USED.
2 FOR A04 VOLTAGE INPUT PINS SEE SHEET 10
CONTROL DATA
NORMANDALE DIVISION
ACCESS CONTROL, PART 1
LOC: A04
CODE IDENT 19333
C
DWG NO SMD 7490
REV. AJ
SHEET 9


NOTES
1 NOT USED
2 FOR A04 VOLTAGE INPUT PINS SEE SHEET 10.
3 CR NO AS SHOWN FOR HFRV REV P & ABV CR NO 23 FOR REV N & BLW.
4 172H CHIPS USED ON OLDER UNITS.
5 REV U & BELOW USES FINE.
6 REV U & BELOW PIN 12 OF U-C3A CONNECTS TO A04-16A. REV V & ABV USES D5C.
CAR BIT 0
FWD EOT
LOAD + RTZ + SEEK ERROR
SEEK
DIRECTION
FWD + REV
ON CYL•CYL SEL• SR RDY
REV SEEK
FWD SEEK
SLOPE
ON CYL SENSE
ON CYL
ON CYLINDER
1.75mS
800 US
FINE ENABLE
T ≤ 1
HEADS LOADED
LOAD+RTZ
START SEEK
FINE LATCH
COARSE
FINE• HEADS LOADED
(FINE•HEADS LOADED)
CYL DET A
CYL DET B
09A (FINE•HEADS LOADED)
10US
0.2 US
0.8mS
GATED CYL PULSES
CYL PULSE BLANKING
CYLINDER PULSES
T = 0
VELOCITY INTEGRATOR CLAMP
T ≥ 128
ON CYLINDER PULSE
APPLICABLE TO MLVV
CONTROL DATA
NORMANDALE DIVISION
ACCESS CONTROL
LOC: A04
CODE IDENT 19333
C
DWG NO SMD 7490
REV EK
SHEET 9

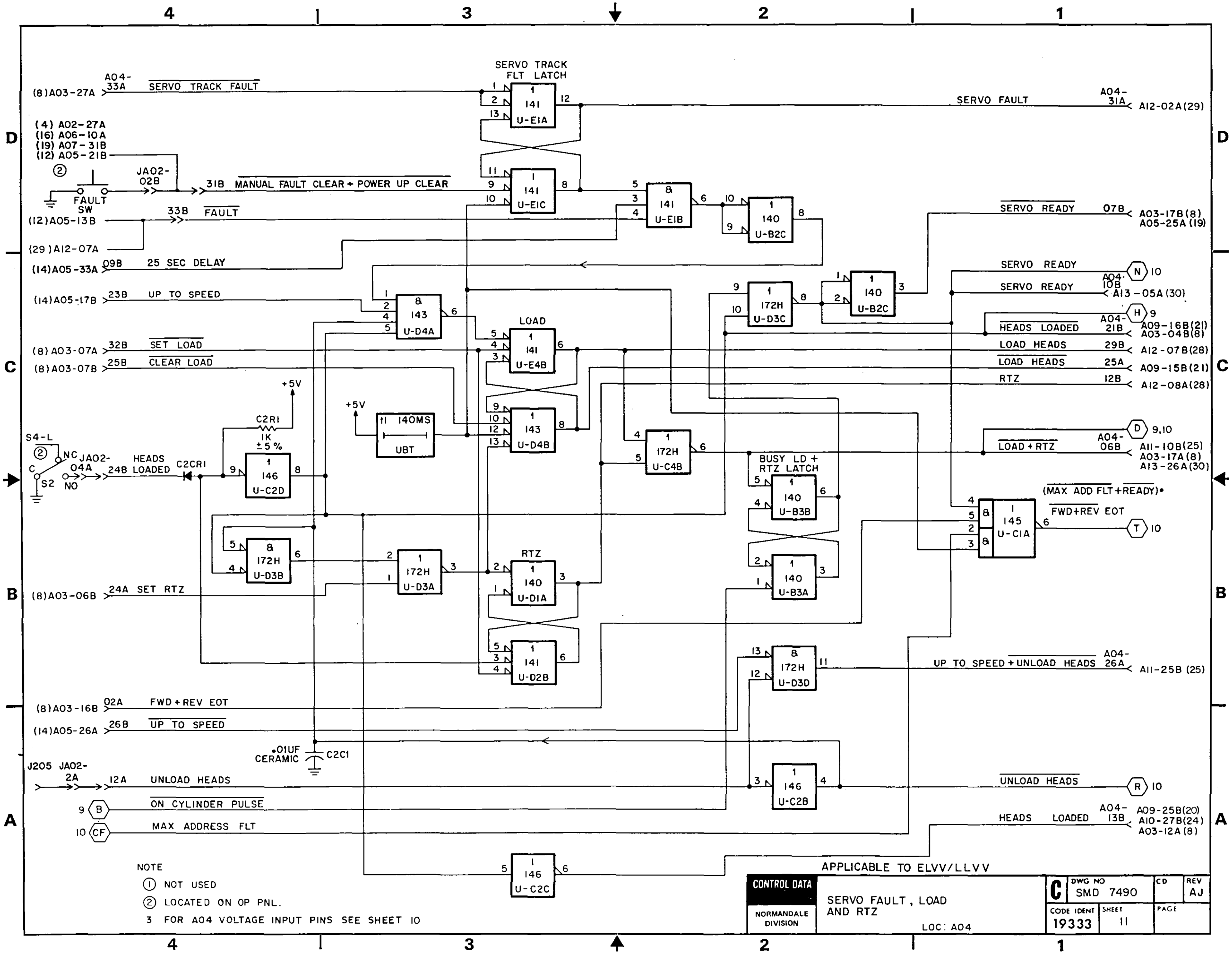

ON CYLINDER
A04-05A OFFSET COMMAND PULSE
(26)A11-09A
TIED TO A1R1, STATIC "1"
A04-02B ON CYL • CYL SEL • SR RDY
(30)A13-07A
A1C2 150PF
A1R3 10K
+5V
195 U-A1B 0.5US
SEEK
140 U-B2D
T=0
143 U-E2A
A04-11B FWD EOT
(8)A03-06A
141 U-E4A
UNLOAD HEADS
A04-23A OFFSET COMMAND PULSE
(26)A11-12B
E3R1 1K ±5%
E3C2 270PF
E3R2 13.0K
195 U-E3A 1.2USEC
SERVO READY
E3C1 39UF 10V ±10%
E3R3 38.3K
195 U-E3B 500mS
143 U-E2B
SEEK ERROR
141 U-D2C
140 U-D1D
141 U-E4C
SEEK END 32A JA02-05A (43)
SEEK ERROR 11A A02-23B (6)
ON CYL • CYL SEL • SR RDY
FORWARD EOT
SEEK A04-08B
SEEK 30A A11-13B (25)
START SEEK
29A MAX ADDRESS FAULT
(8)A03-33A
146 U-C2F
LOAD+RTZ SEEK
140 U-D1B
172H U-C4A
LOAD+RTZ +SEEK ERROR A04-15B A13-25B (31)
MAX ADD FLT • (FWD EOT + REV EOT) • SERVO READY
MAX ADDRESS FAULT
NOTE: 1 NOT USED.
A04-34B +5V
TPA TPZ
01A
34A
APPLICABLE TO ELVV/LLVV
CONTROL DATA
NORMANDALE DIVISION
ACCESS CONTROL, PART II
LOC: A04
CODE IDENT 19333
C
DWG NO SMD 7490
REV AJ
SHEET 10



NOTE
① NOT USED
② 172H CHIP IS USED ON OTHER UNITS.

APPLICABLE TO MLVV

CONTROL DATA NORMANDALE DIVISION	ACCESS CONTROL, PART II LOC A04	CODE IDENT 19333	C	DWG NO SMD 7490 SHEET 10	REV CU



NOTE
1 NOT USED
2 LOCATED ON OP PNL.
3 FOR A04 VOLTAGE INPUT PINS SEE SHEET 10

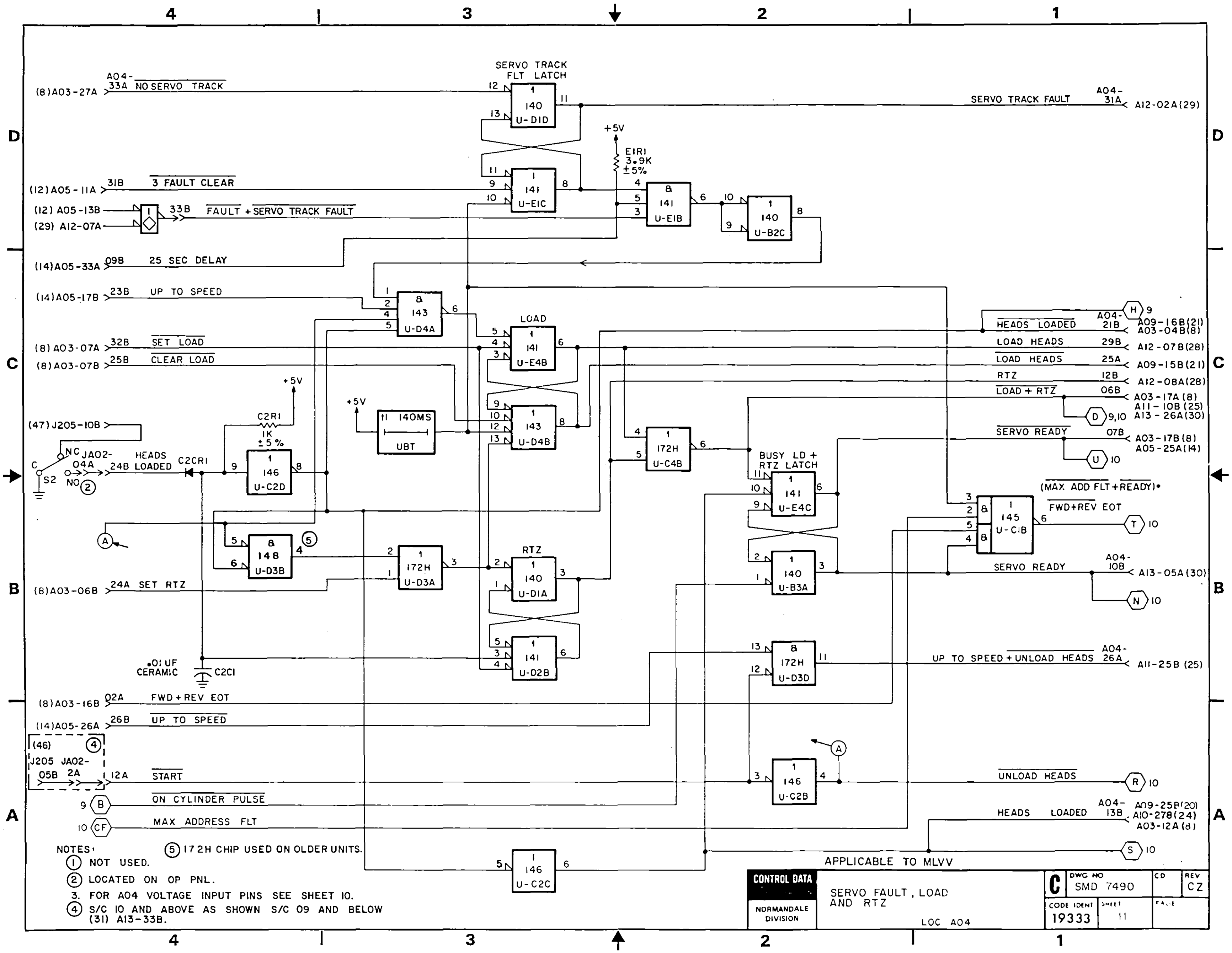
APPLICABLE TO ELVV/LLVV

CONTROL DATA NORMANDALE DIVISION

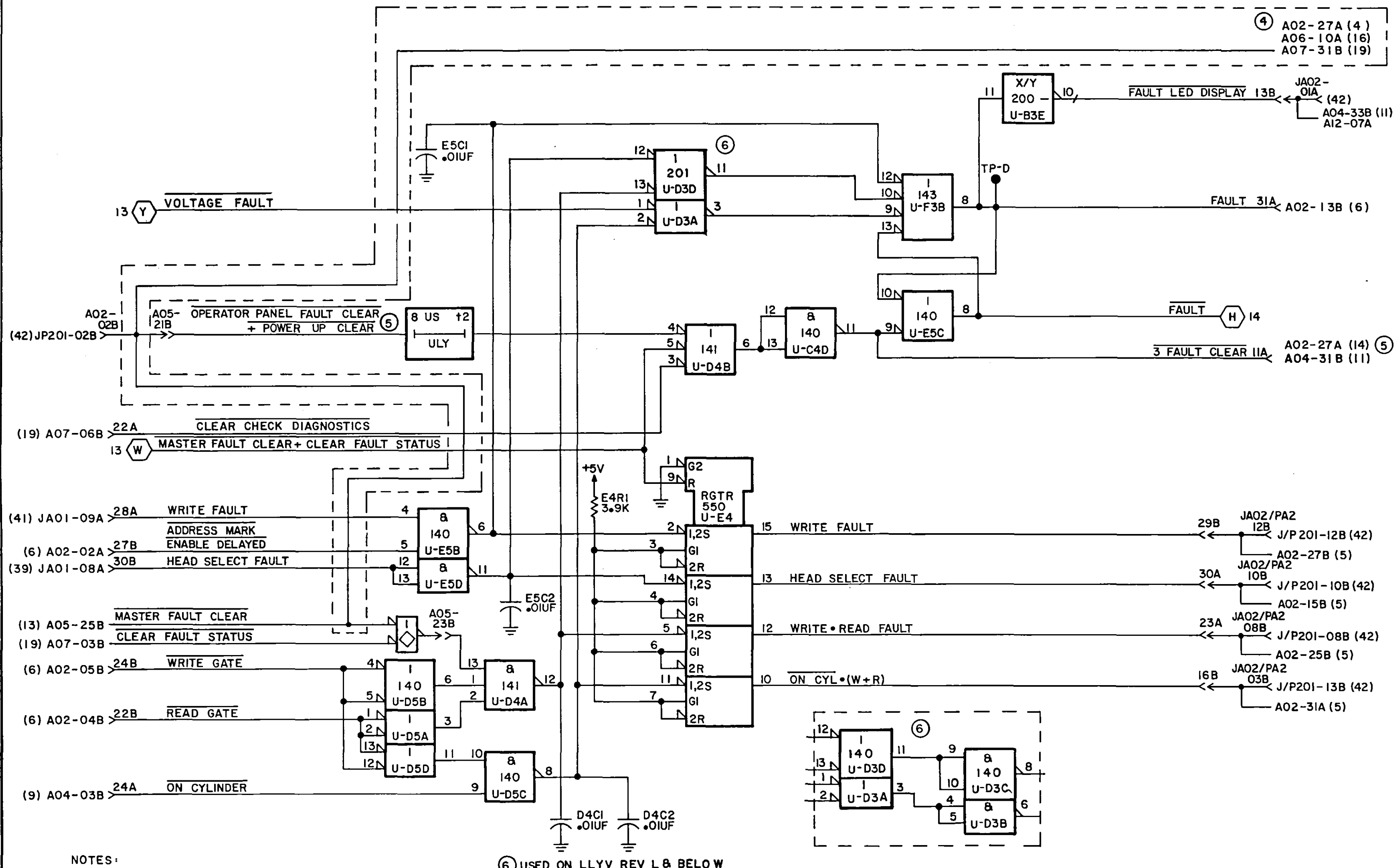
SERVO FAULT, LOAD AND RTZ

LOC: A04

C DWG NO SMD 7490 REV AJ
CODE IDENT 19333 SHEET 11



SERVO TRACK FLT LATCH
(8) A03-27A A04-33A NO SERVO TRACK
SERVO TRACK FAULT A04-31A A12-02A (29)
+5V E1R1 3.9K ±5%
(12) A05-11A 31B 3 FAULT CLEAR
(12) A05-13B
(29) A12-07A 33B FAULT + SERVO TRACK FAULT
(14) A05-33A 09B 25 SEC DELAY
(14) A05-17B 23B UP TO SPEED
LOAD
(8) A03-07A 32B SET LOAD
(8) A03-07B 25B CLEAR LOAD
HEADS LOADED A04-21B A09-16B (21) A03-04B (8)
LOAD HEADS 29B A12-07B (28)
LOAD HEADS 25A A09-15B (21)
RTZ 12B A12-08A (28)
LOAD + RTZ 06B A03-17A (8) A11-10B (25) A13-26A (30)
SERVO READY 07B A03-17B (8) A05-25A (14)
+5V C2R1 1K ±5%
+5V 140MS UBT
(47) J205-10B
NC JA02-04A HEADS LOADED 24B C2CR1
C S2 NO 2
BUSY LD + RTZ LATCH
(MAX ADD FLT + READY)•
FWD+REV EOT
SERVO READY A04-10B A13-05A (30)
(8) A03-06B 24A SET RTZ
RTZ
.01 UF CERAMIC C2C1
UP TO SPEED + UNLOAD HEADS A04-26A A11-25B (25)
(8) A03-16B 02A FWD + REV EOT
(14) A05-26A 26B UP TO SPEED
(46) J205 05B JA02-2A 12A START
ON CYLINDER PULSE
MAX ADDRESS FLT
UNLOAD HEADS
HEADS LOADED A04-13B A09-25B (20) A10-27B (24) A03-12A (8)
APPLICABLE TO MLVV
NOTES:
1 NOT USED.
2 LOCATED ON OP PNL.
3. FOR A04 VOLTAGE INPUT PINS SEE SHEET 10.
4 S/C 10 AND ABOVE AS SHOWN S/C 09 AND BELOW (31) A13-33B.
5 172H CHIP USED ON OLDER UNITS.
CONTROL DATA
NORMANDALE DIVISION
SERVO FAULT, LOAD AND RTZ
LOC A04
C DWG NO SMD 7490
REV CZ
CODE IDENT 19333
SHEET 11

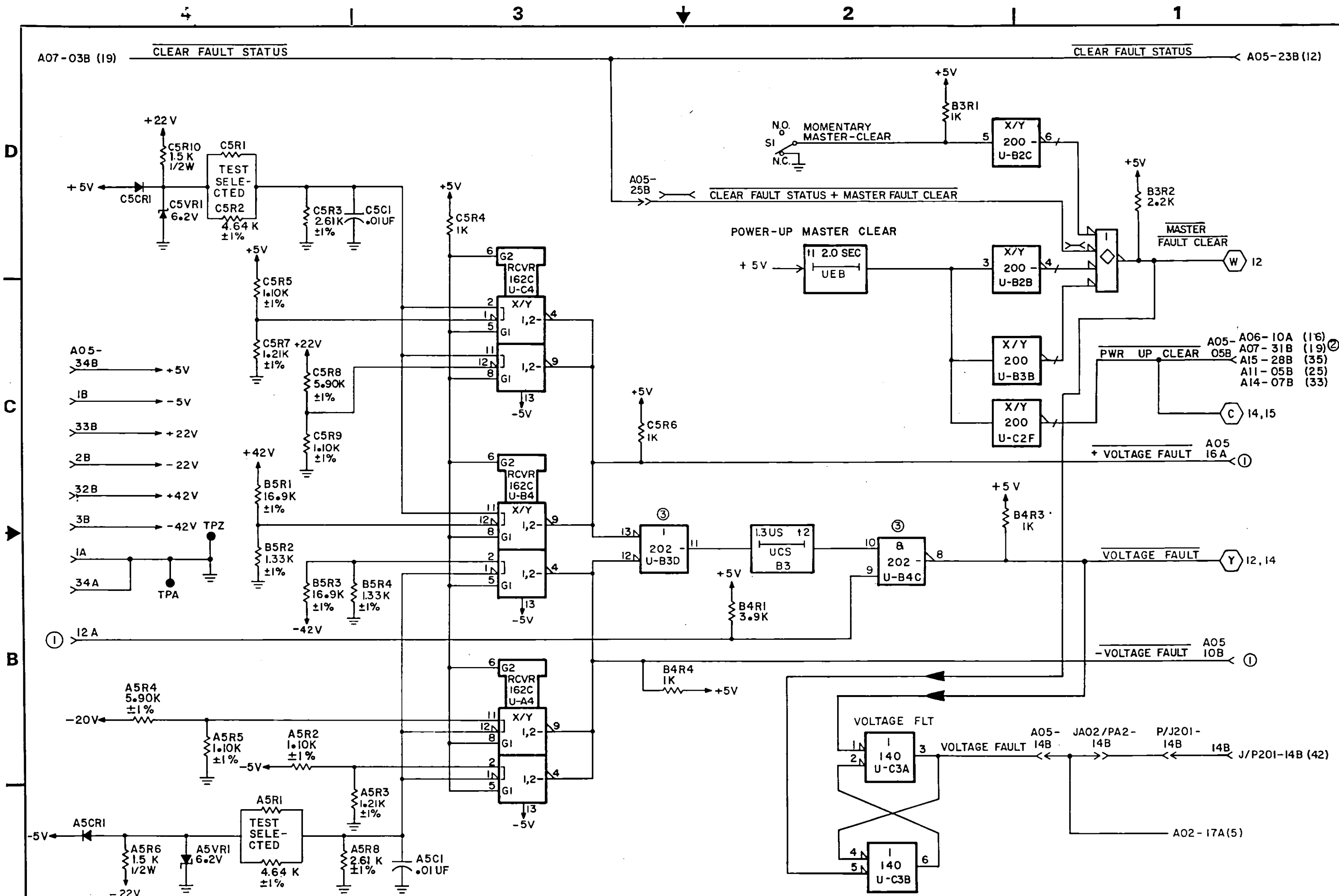


NOTES:

1. NOT USED.
2. FAULT CLEAR SWITCH LOCATED ON SWITCH PANEL ASSY.
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.
4. S/C 10 WITHOUT 48140 AND BELOW.
5. S/C 10 WITH 48140 AND ABOVE.

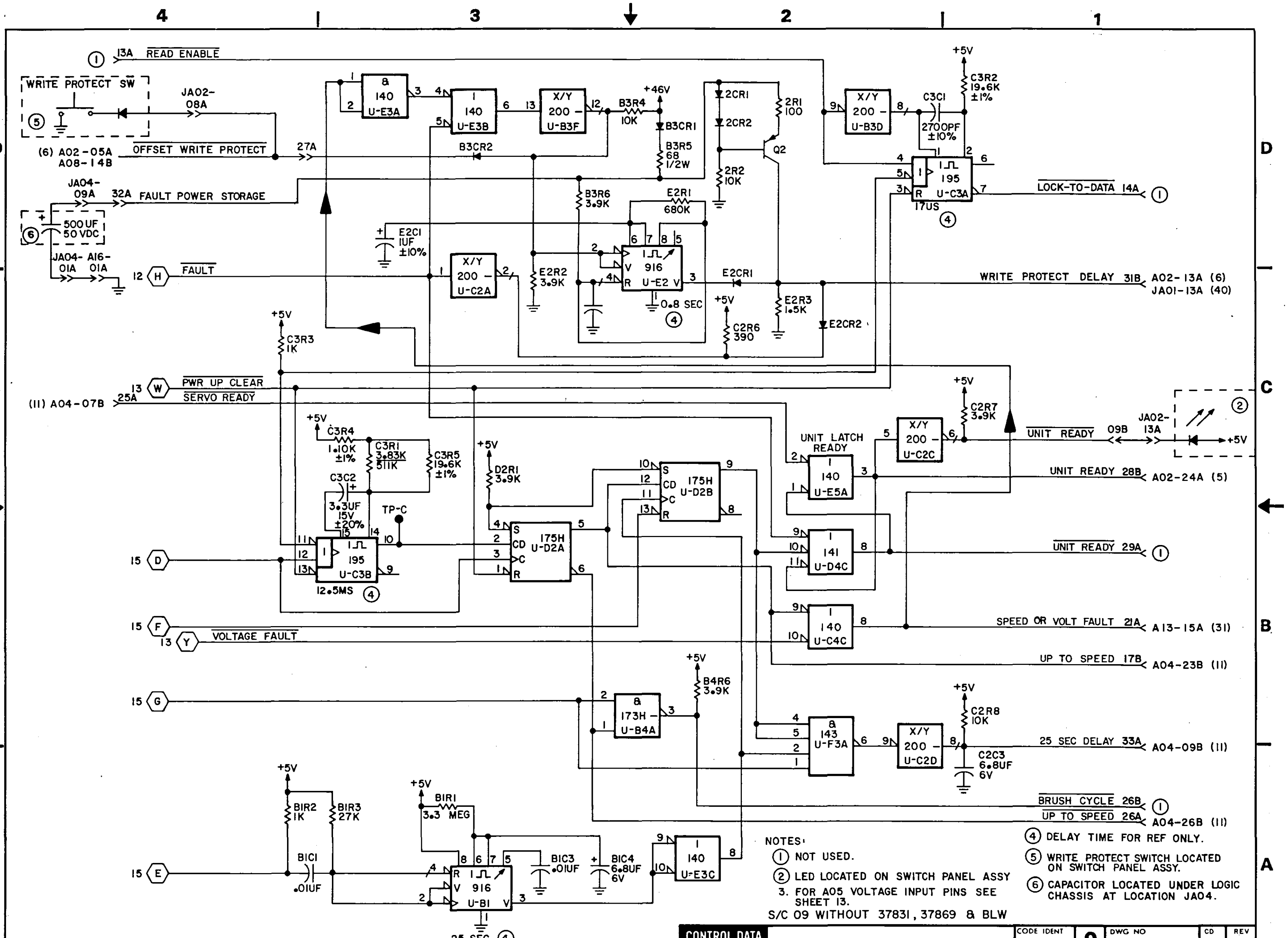
USED ON MLYV REV M & ABOVE.

CONTROL DATA NORMANDALE DIVISION	HEAD SELECT, R + W AND CYLINDER FAULT LOC: A05	CODE IDENT 19333	C	DWG NO SMD 7490	CD	REV DE
				SHEET 12		



NOTES:
① NOT USED.
② S/C 10 WITH 48140 AND ABOVE.
③ 173H CHIP USED LLYV REV E & BELOW

CONTROL DATA NORMANDALE DIVISION	POWER UP, MASTER CLEAR AND VOLTAGE FAULT LOC: A05	CODE IDENT 19333	C	DWG NO SMD 7490	CD	REV CV
				SHEET 13		

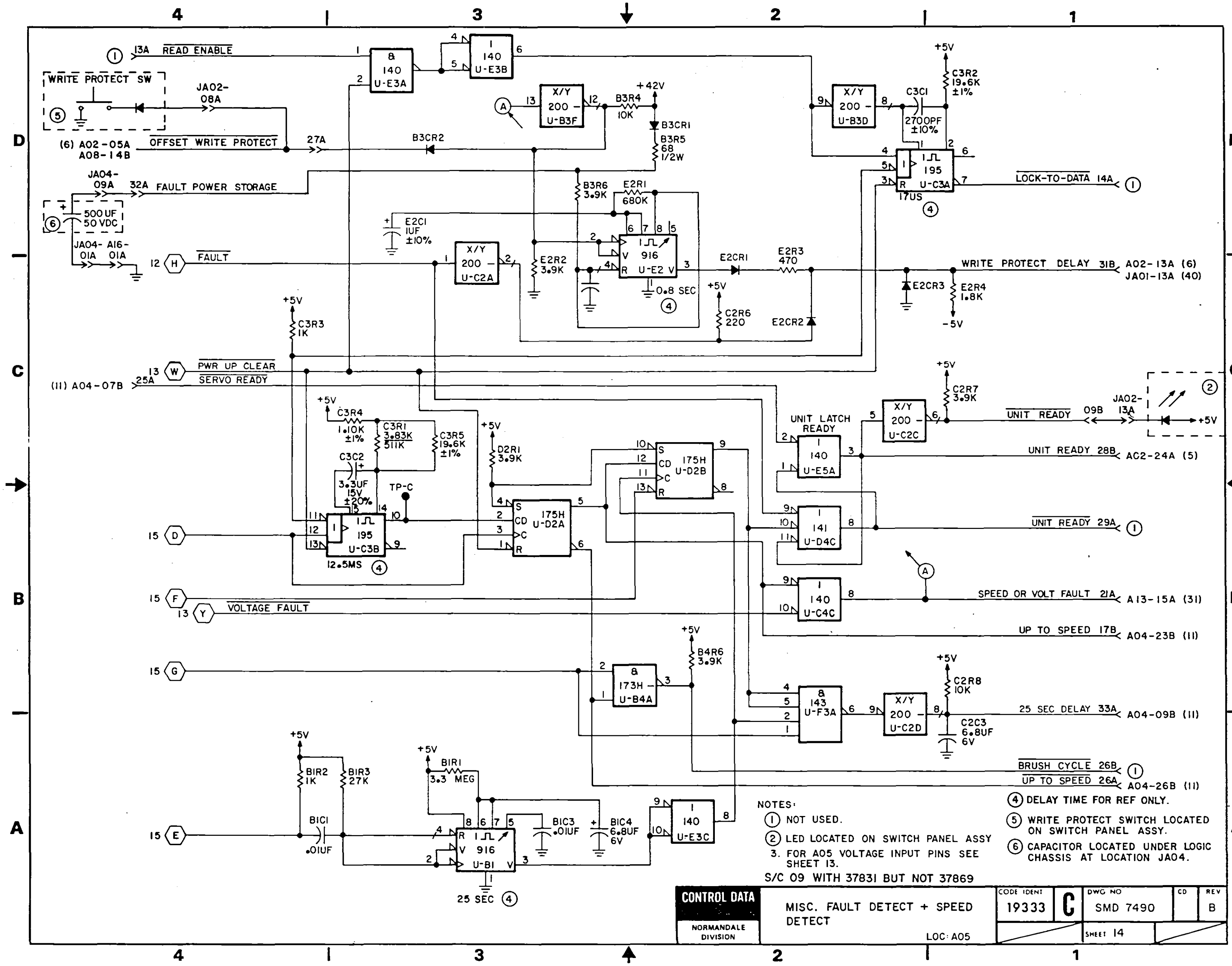


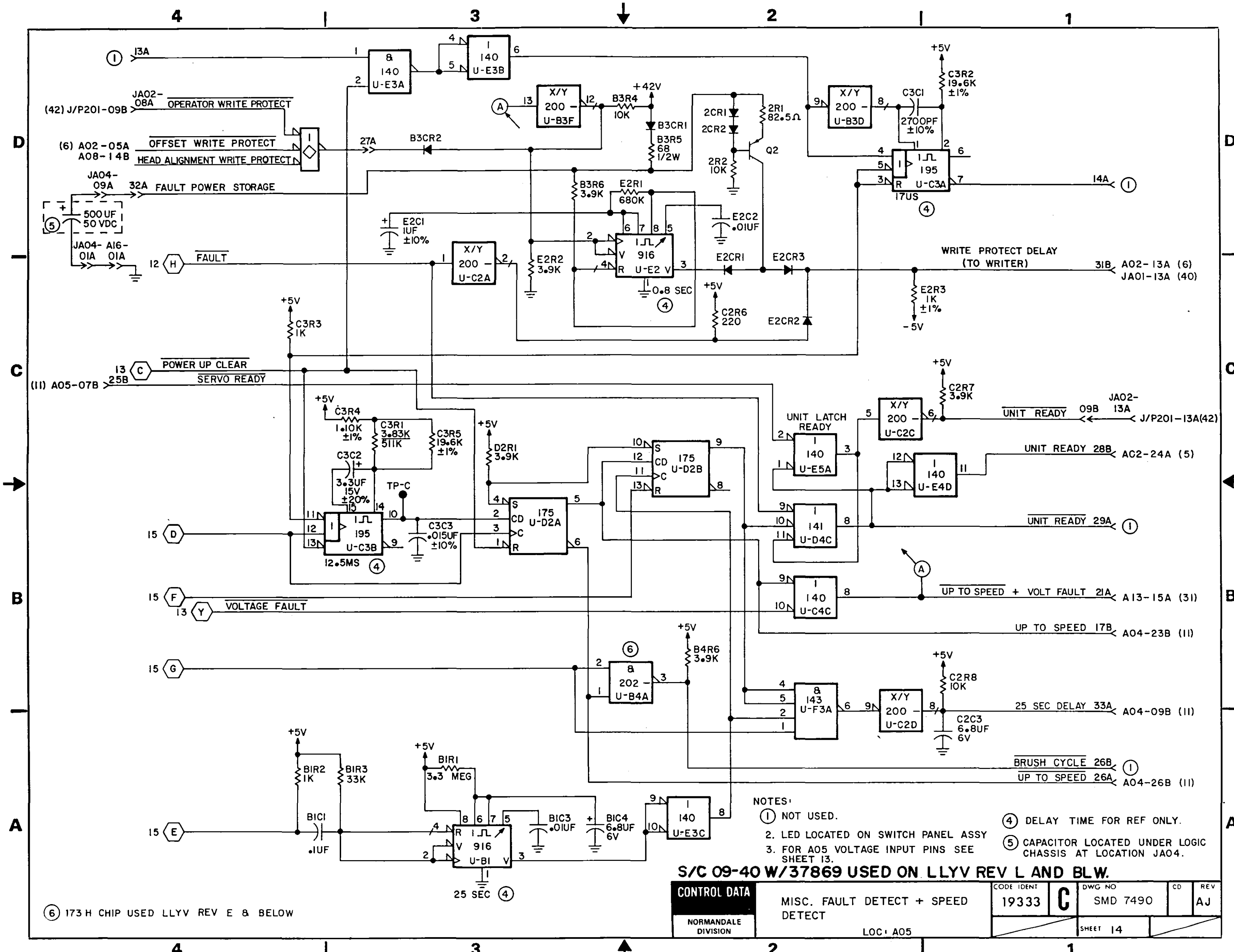
NOTES:

1. NOT USED.
2. LED LOCATED ON SWITCH PANEL ASSY
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.
4. DELAY TIME FOR REF ONLY.
5. WRITE PROTECT SWITCH LOCATED ON SWITCH PANEL ASSY.
6. CAPACITOR LOCATED UNDER LOGIC CHASSIS AT LOCATION JA04.

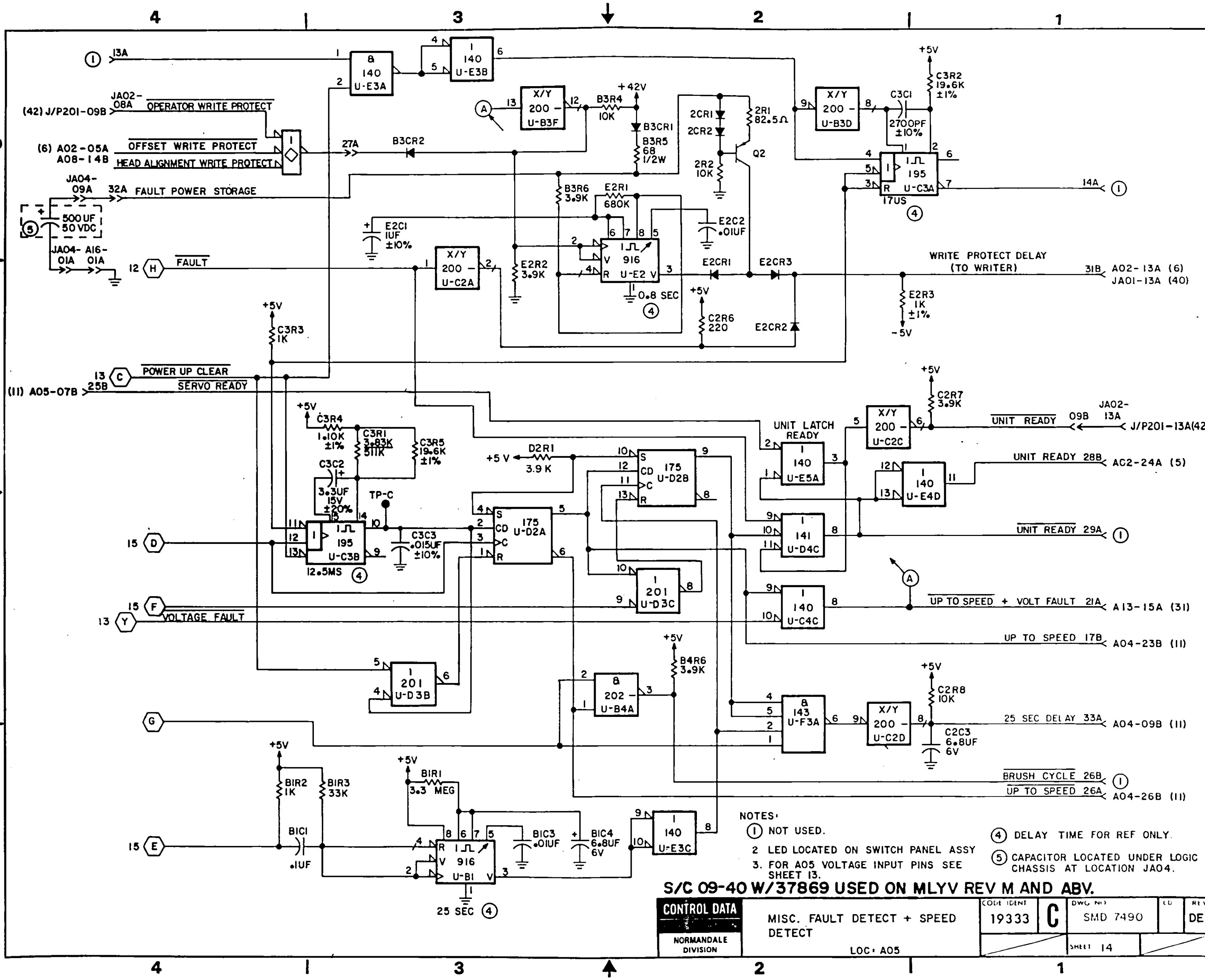
S/C 09 WITHOUT 37831, 37869 & BLW

CONTROL DATA NORMANDALE DIVISION	MISC. FAULT DETECT + SPEED DETECT LOC: A05	CODE IDENT 19333	C	DWG NO SMD 7490	CD	REV B
				SHEET 14		

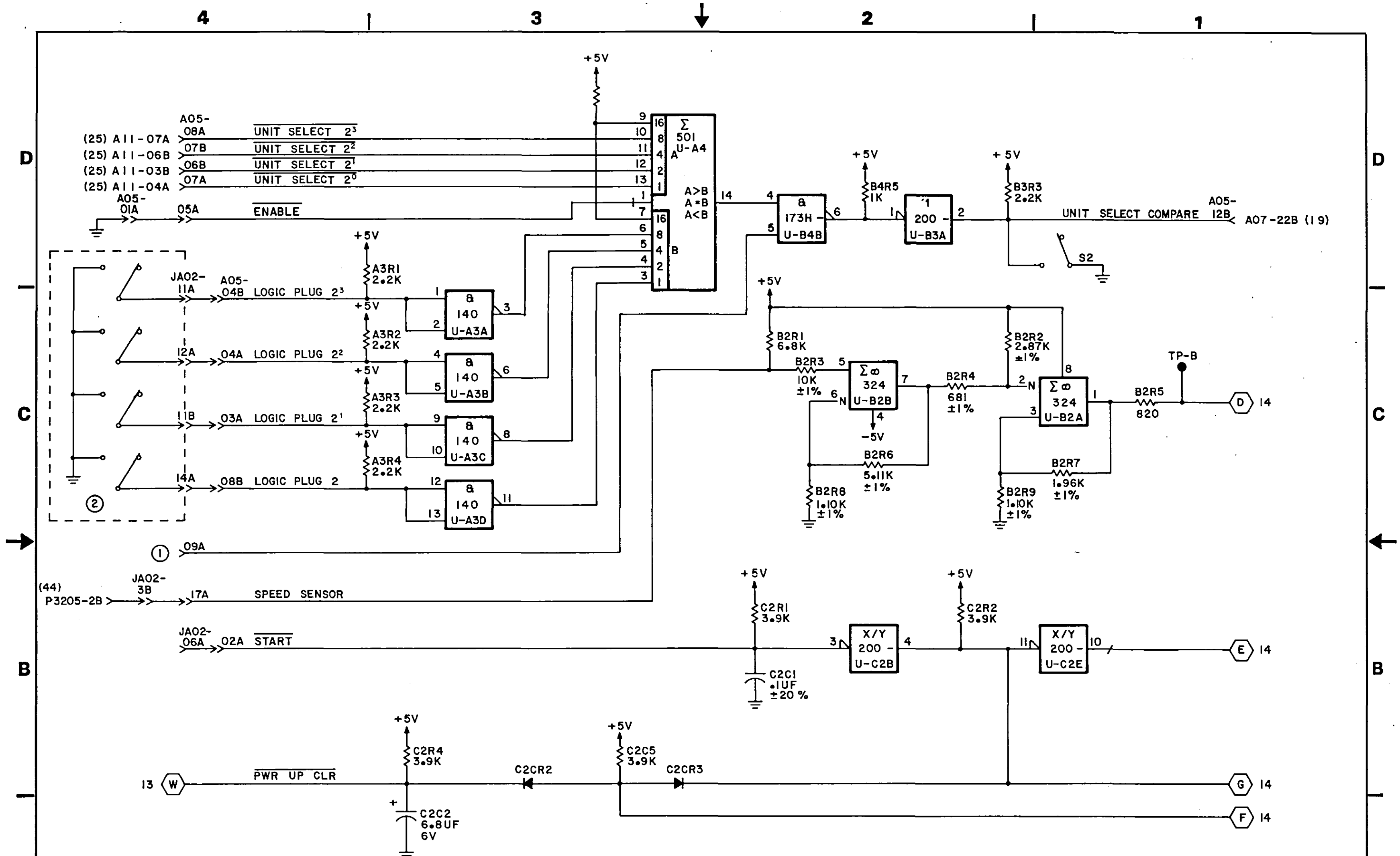

READ ENABLE
WRITE PROTECT SW
OFFSET WRITE PROTECT
FAULT POWER STORAGE
FAULT
PWR UP CLEAR
SERVO READY
VOLTAGE FAULT
LOCK-TO-DATA 14A
WRITE PROTECT DELAY 31B A02-13A (6) JA01-13A (40)
UNIT LATCH READY
UNIT READY
UNIT READY 28B AC2-24A (5)
UNIT READY 29A
SPEED OR VOLT FAULT 21A A13-15A (31)
UP TO SPEED 17B A04-23B (11)
25 SEC DELAY 33A A04-09B (11)
BRUSH CYCLE 26B
UP TO SPEED 26A A04-26B (11)
NOTES:
1 NOT USED.
2 LED LOCATED ON SWITCH PANEL ASSY
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.
4 DELAY TIME FOR REF ONLY.
5 WRITE PROTECT SWITCH LOCATED ON SWITCH PANEL ASSY.
6 CAPACITOR LOCATED UNDER LOGIC CHASSIS AT LOCATION JA04.
S/C 09 WITH 37831 BUT NOT 37869
CONTROL DATA
NORMANDALE DIVISION
MISC. FAULT DETECT + SPEED DETECT
LOC: A05
CODE IDENT 19333
C
DWG NO SMD 7490
REV B
SHEET 14



NOTES:
(1) NOT USED.
2. LED LOCATED ON SWITCH PANEL ASSY
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.
(4) DELAY TIME FOR REF ONLY.
(5) CAPACITOR LOCATED UNDER LOGIC CHASSIS AT LOCATION JA04.
(6) 173 H CHIP USED LLYV REV E & BELOW
S/C 09-40 W/37869 USED ON LLYV REV L AND BLW.
CONTROL DATA
NORMANDALE DIVISION
MISC. FAULT DETECT + SPEED DETECT
LOC: A05
CODE IDENT 19333
C
DWG NO SMD 7490
REV AJ
SHEET 14



OPERATOR WRITE PROTECT
OFFSET WRITE PROTECT
HEAD ALIGNMENT WRITE PROTECT
FAULT POWER STORAGE
500 UF 50 VDC
FAULT
POWER UP CLEAR
SERVO READY
VOLTAGE FAULT
WRITE PROTECT DELAY (TO WRITER)
A02-13A (6)
JA01-13A (40)
UNIT LATCH READY
UNIT READY
J/P201-13A(42)
UNIT READY 28B
AC2-24A (5)
UNIT READY 29A
UP TO SPEED + VOLT FAULT 21A
A13-15A (31)
UP TO SPEED 17B
A04-23B (11)
25 SEC DELAY 33A
A04-09B (11)
BRUSH CYCLE 26B
UP TO SPEED 26A
A04-26B (11)
0.8 SEC
12.5MS
25 SEC
17US
NOTES:
1 NOT USED.
2 LED LOCATED ON SWITCH PANEL ASSY
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.
4 DELAY TIME FOR REF ONLY.
5 CAPACITOR LOCATED UNDER LOGIC CHASSIS AT LOCATION JA04.
S/C 09-40 W/37869 USED ON MLYV REV M AND ABV.
CONTROL DATA
NORMANDALE DIVISION
MISC. FAULT DETECT + SPEED DETECT
LOC: A05
CODE IDENT 19333
C
DWG NO SMD 7490
REV DE
SHEET 14

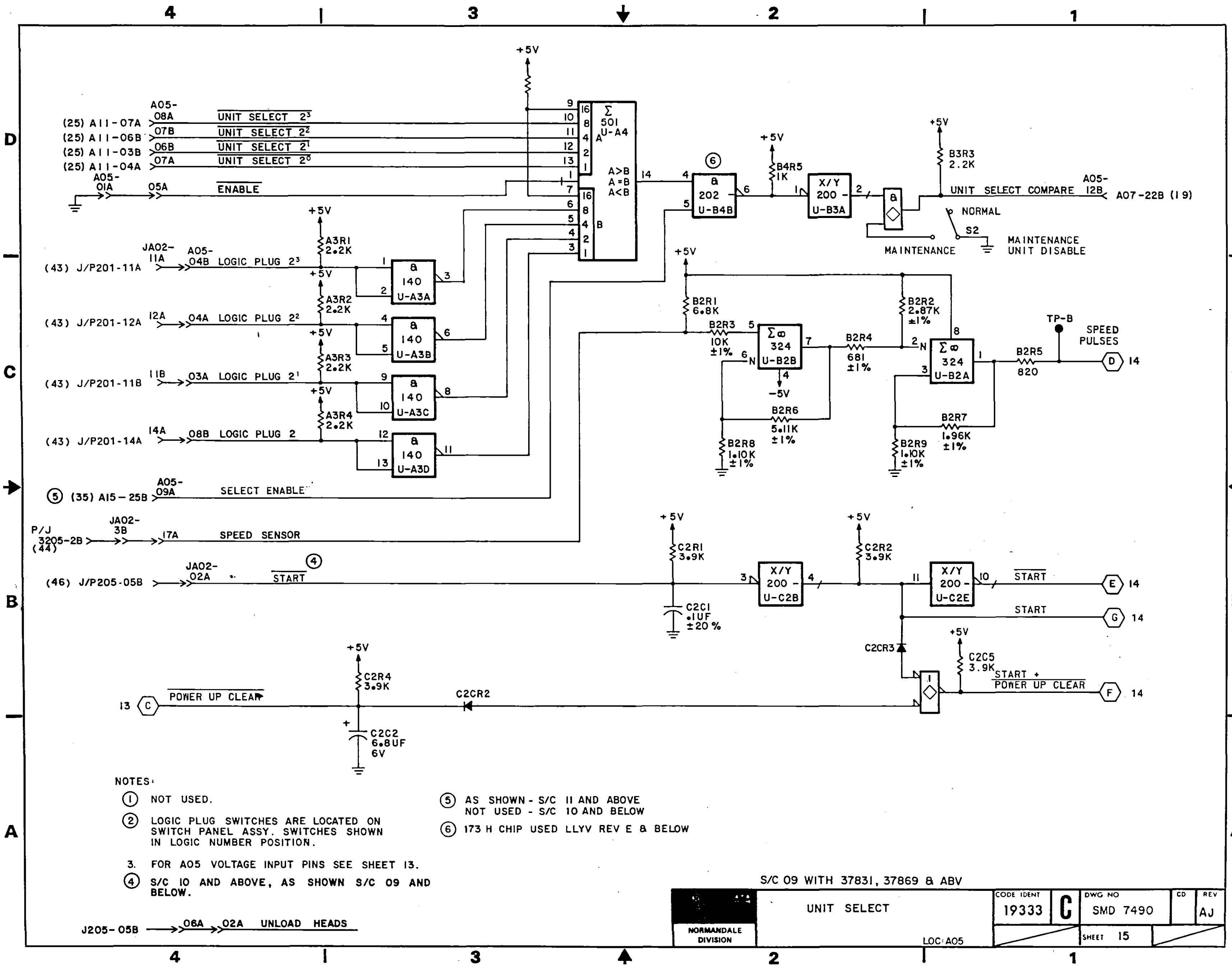


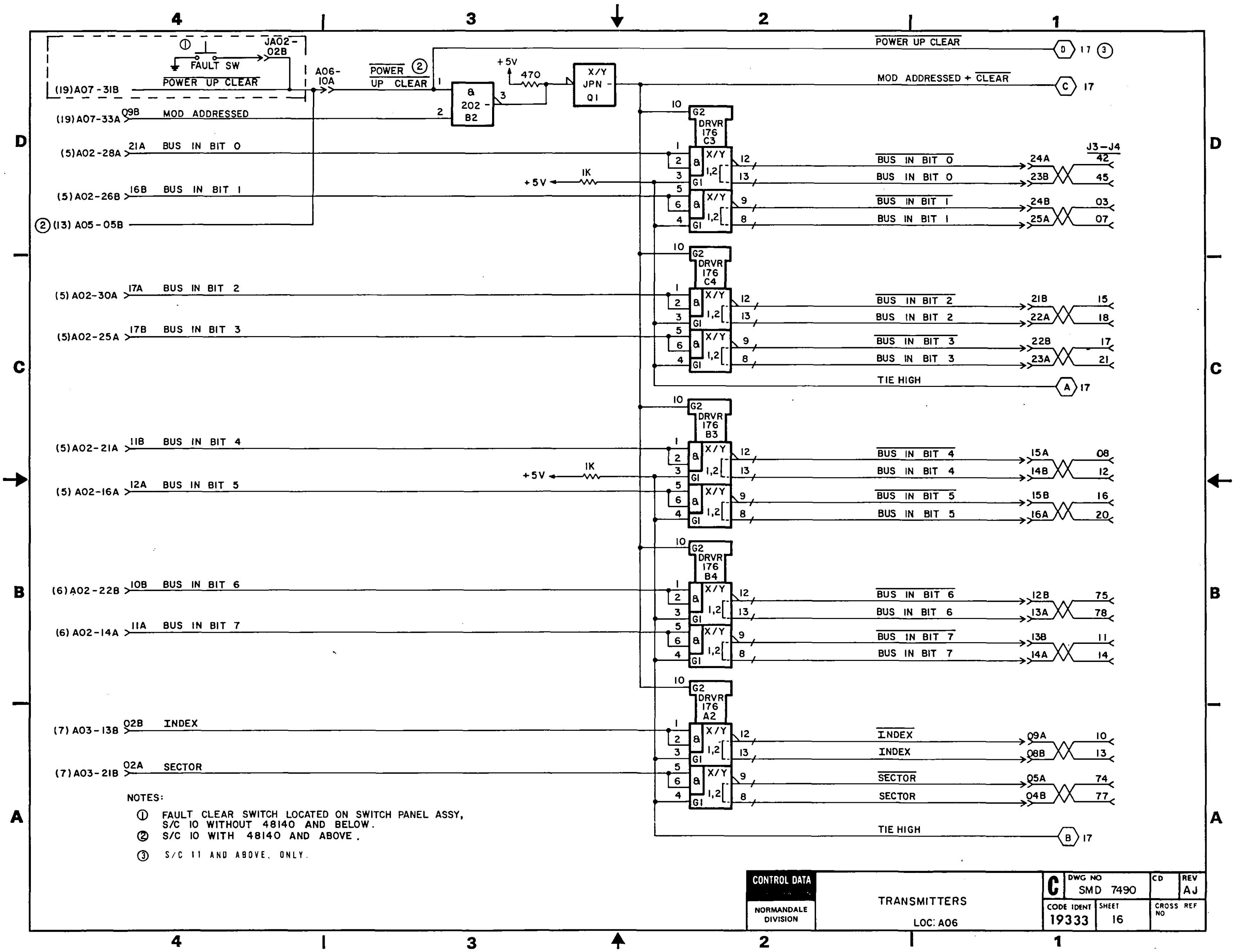
NOTES:

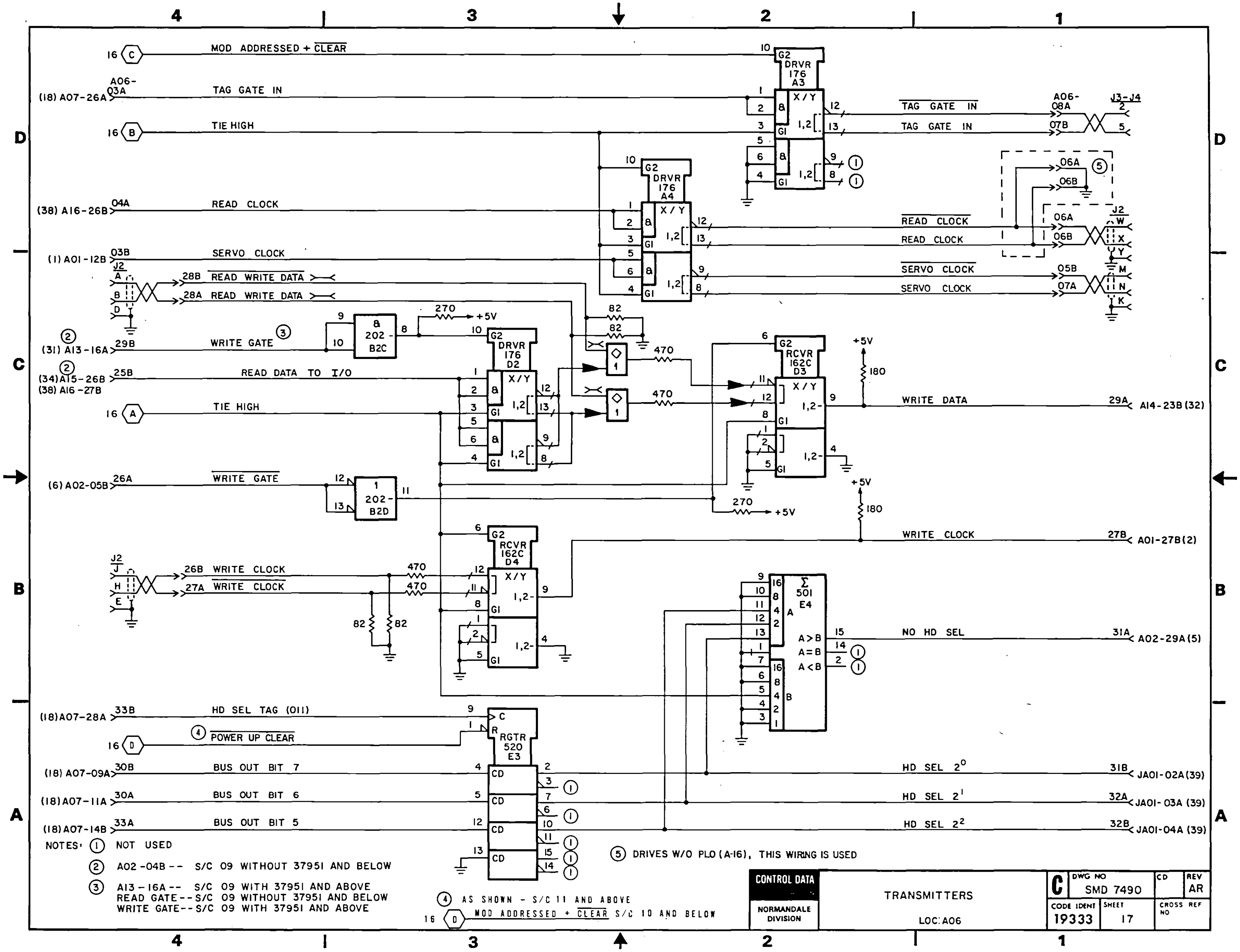
1. NOT USED.
2. LOGIC PLUG SWITCHES ARE LOCATED ON SWITCH PANEL ASSY. SWITCHES SHOWN IN LOGIC NUMBER POSITION.
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.

S/C 09 WITHOUT 37831, 37869 & BLW

CONTROL DATA CORPORATION NORMANDALE DIVISION	UNIT SELECT LOC: A05	CODE IDENT 19333	C	DWG NO SMD 7490 SHEET 15	REV B


(25) A11-07A
(25) A11-06B
(25) A11-03B
(25) A11-04A
A05-
08A
07B
06B
07A
UNIT SELECT 2³
UNIT SELECT 2²
UNIT SELECT 2¹
UNIT SELECT 2⁰
A05-
01A
05A
ENABLE
+5V
Σ
501
U-A4
A>B
A=B
A<B
(43) J/P201-11A
(43) J/P201-12A
(43) J/P201-11B
(43) J/P201-14A
JA02-
11A
12A
11B
14A
A05-
04B LOGIC PLUG 2³
04A LOGIC PLUG 2²
03A LOGIC PLUG 2¹
08B LOGIC PLUG 2
A3R1
2.2K
A3R2
2.2K
A3R3
2.2K
A3R4
2.2K
140
U-A3A
U-A3B
U-A3C
U-A3D
(5) (35) A15-25B
A05-
09A
SELECT ENABLE
P/J
3205-2B
(44)
JA02-
3B
17A
SPEED SENSOR
(46) J/P205-05B
JA02-
02A
START
(4)
(6)
202
U-B4B
B4R5
1K
X/Y
200
U-B3A
B3R3
2.2K
UNIT SELECT COMPARE
A05-
12B
A07-22B (19)
NORMAL
S2
MAINTENANCE
MAINTENANCE
UNIT DISABLE
B2R1
6.8K
B2R3
10K
±1%
Σ∞
324
U-B2B
-5V
B2R2
2.87K
±1%
B2R4
681
±1%
U-B2A
B2R6
5.11K
±1%
B2R7
1.96K
±1%
B2R8
1.10K
±1%
B2R9
1.10K
±1%
TP-B
SPEED
PULSES
B2R5
820
D 14
C2R1
3.9K
C2C1
.1UF
±20%
U-C2B
C2R2
3.9K
U-C2E
START
E 14
START
G 14
C2CR3
C2C5
3.9K
START +
POWER UP CLEAR
F 14
13 C
POWER UP CLEAR
C2R4
3.9K
C2CR2
C2C2
6.8UF
6V
NOTES:
(1) NOT USED.
(2) LOGIC PLUG SWITCHES ARE LOCATED ON SWITCH PANEL ASSY. SWITCHES SHOWN IN LOGIC NUMBER POSITION.
3. FOR A05 VOLTAGE INPUT PINS SEE SHEET 13.
(4) S/C 10 AND ABOVE, AS SHOWN S/C 09 AND BELOW.
(5) AS SHOWN - S/C 11 AND ABOVE NOT USED - S/C 10 AND BELOW
(6) 173 H CHIP USED LLYV REV E & BELOW
J205-05B 06A 02A UNLOAD HEADS
S/C 09 WITH 37831, 37869 & ABV
NORMANDALE DIVISION
UNIT SELECT
LOC: A05
CODE IDENT
19333
C
DWG NO
SMD 7490
REV
AJ
SHEET 15


FAULT SW
JA02-02B
(19) A07-31B
POWER UP CLEAR
A06-10A
POWER UP CLEAR ②
+5V
470
& 202-B2
X/Y JPN-Q1
(19) A07-33A 09B MOD ADDRESSED
POWER UP CLEAR Ⓓ 17 ③
MOD ADDRESSED + CLEAR Ⓒ 17
G2 DRVR 176 C3
(5) A02-28A 21A BUS IN BIT 0
(5) A02-26B 16B BUS IN BIT 1
② (13) A05-05B
+5V
1K
BUS IN BIT 0 24A
BUS IN BIT 0 23B
BUS IN BIT 1 24B
BUS IN BIT 1 25A
J3-J4
42
45
03
07
G2 DRVR 176 C4
(5) A02-30A 17A BUS IN BIT 2
(5) A02-25A 17B BUS IN BIT 3
BUS IN BIT 2 21B 15
BUS IN BIT 2 22A 18
BUS IN BIT 3 22B 17
BUS IN BIT 3 23A 21
TIE HIGH Ⓐ 17
G2 DRVR 176 B3
(5) A02-21A 11B BUS IN BIT 4
(5) A02-16A 12A BUS IN BIT 5
BUS IN BIT 4 15A 08
BUS IN BIT 4 14B 12
BUS IN BIT 5 15B 16
BUS IN BIT 5 16A 20
G2 DRVR 176 B4
(6) A02-22B 10B BUS IN BIT 6
(6) A02-14A 11A BUS IN BIT 7
BUS IN BIT 6 12B 75
BUS IN BIT 6 13A 78
BUS IN BIT 7 13B 11
BUS IN BIT 7 14A 14
G2 DRVR 176 A2
(7) A03-13B 02B INDEX
(7) A03-21B 02A SECTOR
INDEX 09A 10
INDEX 08B 13
SECTOR 05A 74
SECTOR 04B 77
TIE HIGH Ⓑ 17
NOTES:
① FAULT CLEAR SWITCH LOCATED ON SWITCH PANEL ASSY, S/C 10 WITHOUT 48140 AND BELOW.
② S/C 10 WITH 48140 AND ABOVE.
③ S/C 11 AND ABOVE, ONLY.
CONTROL DATA
NORMANDALE DIVISION
TRANSMITTERS
LOC: A06
C
DWG NO SMD 7490
CD
REV AJ
CODE IDENT 19333
SHEET 16
CROSS REF NO



NOTES: (1) NOT USED

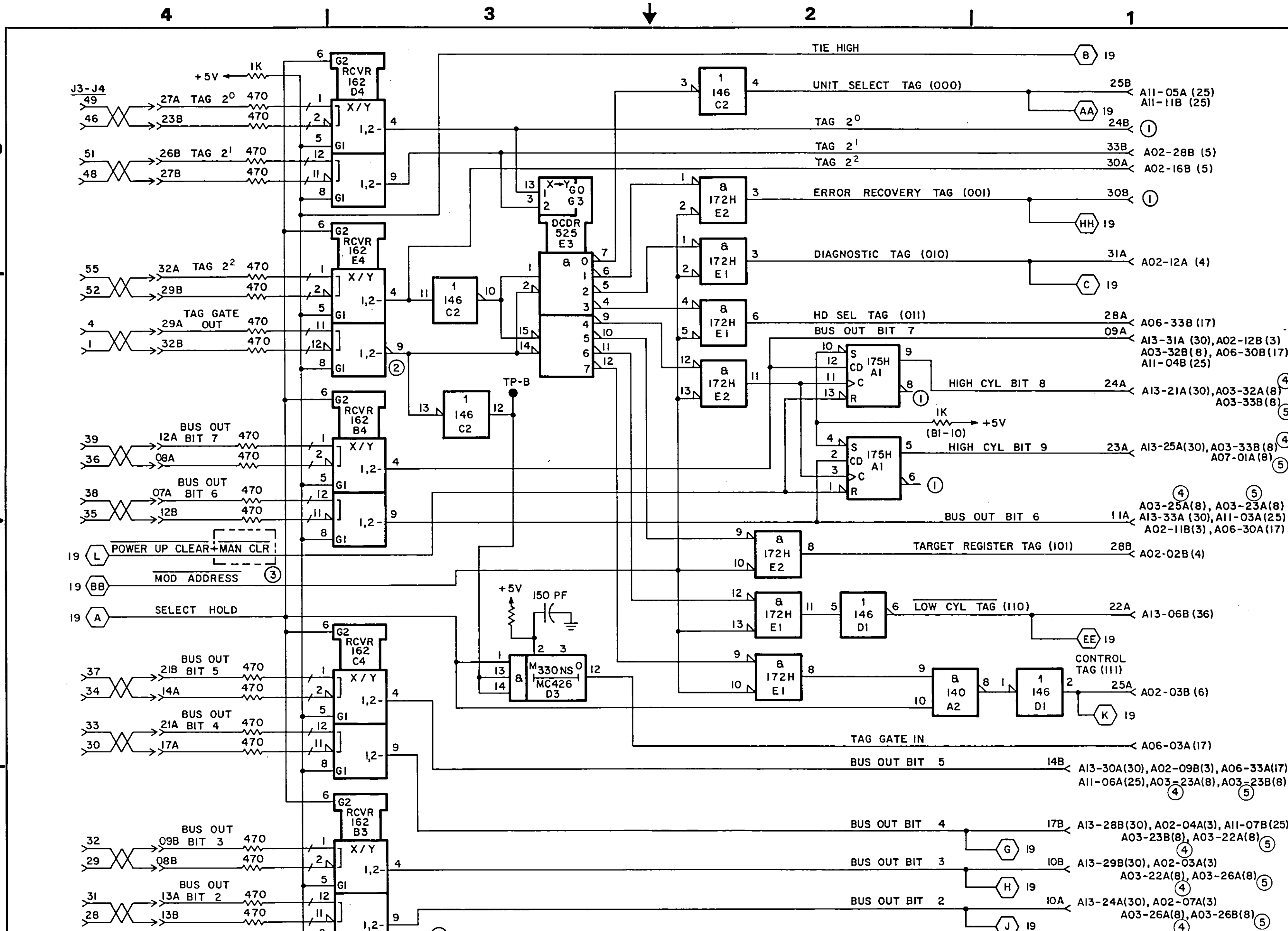
(2) A02-04B -- S/C 09 WITHOUT 37951 AND BELOW

(3) A13-16A -- S/C 09 WITH 37951 AND ABOVE
READ GATE -- S/C 09 WITHOUT 37951 AND BELOW
WRITE GATE -- S/C 09 WITH 37951 AND ABOVE

(4) AS SHOWN - S/C 11 AND ABOVE
16 (D) MOD ADDRESSED + CLEAR S/C 10 AND BELOW

(5) DRIVES W/O PLO (A-16), THIS WIRING IS USED

CONTROL DATA NORMANDALE DIVISION	TRANSMITTERS LOC: A06	C	DWG NO SMD 7490	CD	REV AR
			CODE IDENT 19333	SHEET 17	CROSS REF NO

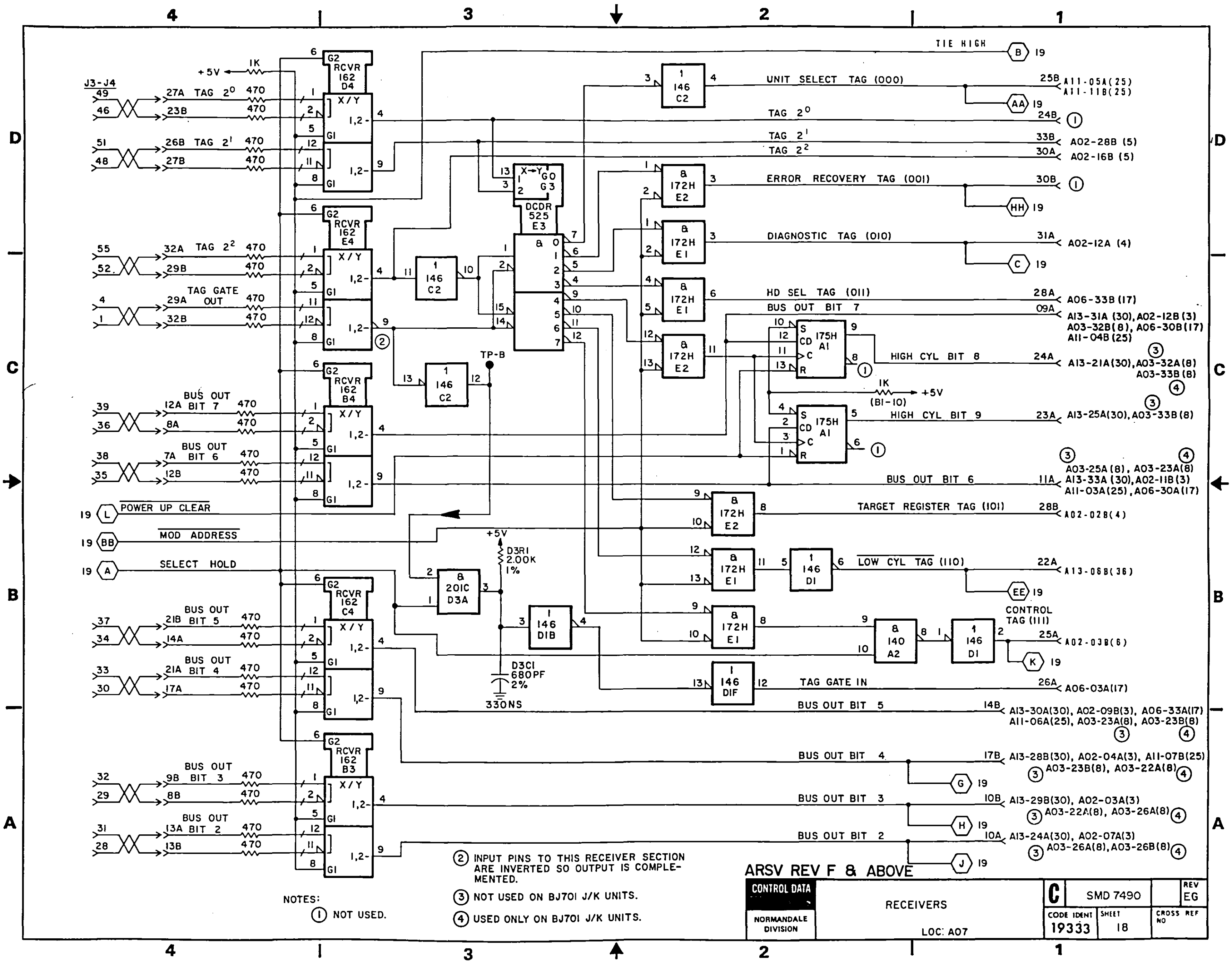


NOTES:

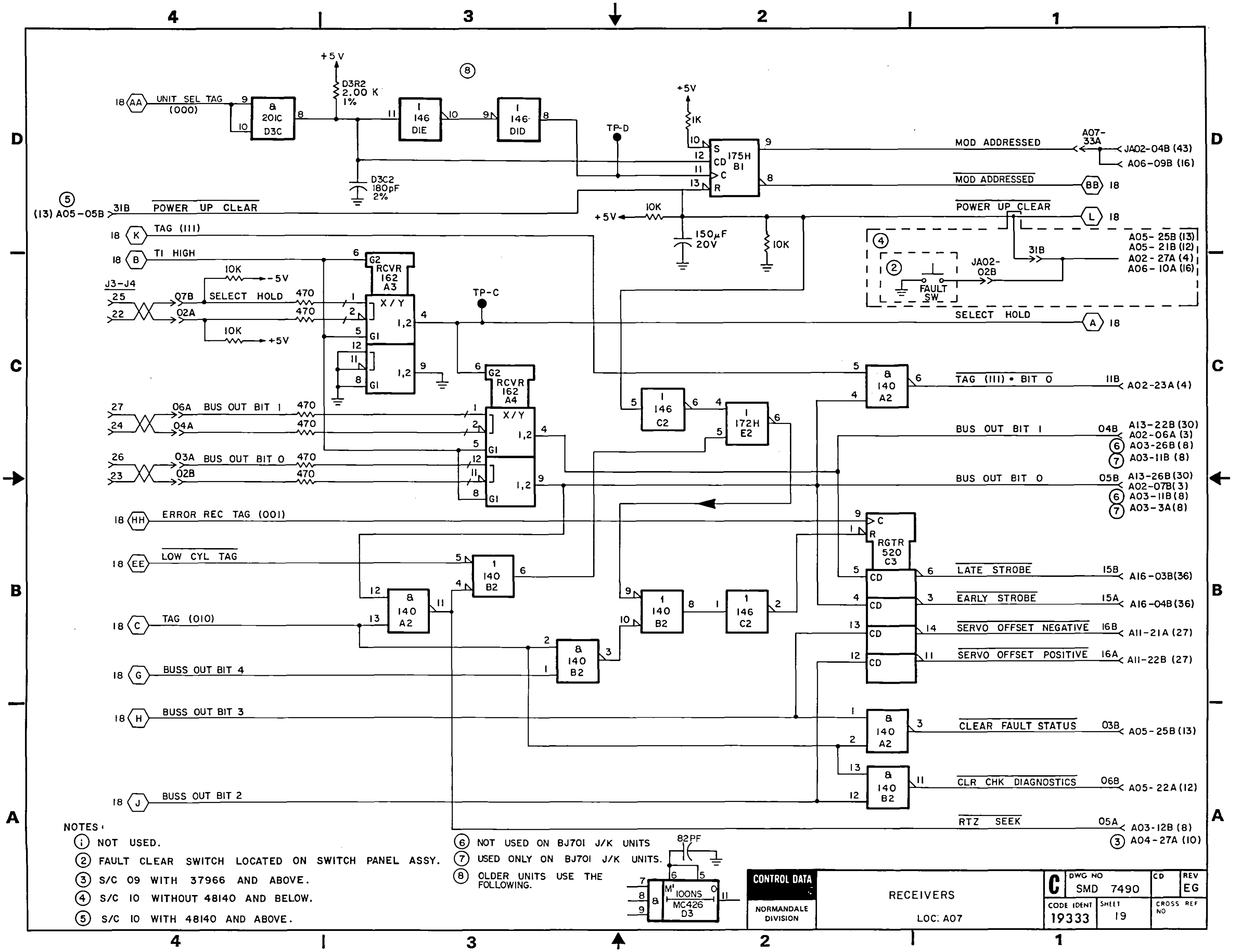
1. NOT USED.
2. INPUT PINS TO THIS RECEIVER SECTION ARE INVERTED SO OUTPUT IS COMPLEMENTED.
3. S/C 10 WITHOUT 48140 AND BELOW.
4. NOT USED ON BJ701 J/K UNITS
5. USED ONLY ON BJ701 J/K UNITS

ARSV REV E & BELOW

CONTROL DATA NORMANDALE DIVISION	RECEIVERS LOC: A07	C DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 18	CROSS REF NO



J3-J4
TAG 2^0
TAG 2^1
TAG 2^2
TAG GATE OUT
BUS OUT BIT 7
BUS OUT BIT 6
POWER UP CLEAR
MOD ADDRESS
SELECT HOLD
BUS OUT BIT 5
BUS OUT BIT 4
BUS OUT BIT 3
BUS OUT BIT 2
RCVR 162 D4
RCVR 162 E4
RCVR 162 B4
RCVR 162 C4
RCVR 162 B3
DCDR 525 E3
TP-B
D3R1 2.00K 1%
D3C1 680PF 2%
330NS
TIE HIGH
UNIT SELECT TAG (000)
ERROR RECOVERY TAG (001)
DIAGNOSTIC TAG (010)
HD SEL TAG (011)
HIGH CYL BIT 8
HIGH CYL BIT 9
TARGET REGISTER TAG (101)
LOW CYL TAG (110)
CONTROL TAG (111)
TAG GATE IN
A11-05A(25)
A11-11B(25)
A02-28B (5)
A02-16B (5)
A02-12A (4)
A06-33B (17)
A13-31A (30), A02-12B (3)
A03-32B(8), A06-30B(17)
A11-04B (25)
A13-21A(30), A03-32A(8)
A03-33B (8)
A13-25A(30), A03-33B (8)
A03-25A (8), A03-23A(8)
A13-33A (30), A02-11B (3)
A11-03A(25), A06-30A(17)
A02-02B(4)
A13-06B(36)
A02-03B(6)
A06-03A(17)
A13-30A(30), A02-09B(3), A06-33A(17)
A11-06A(25), A03-23A(8), A03-23B(8)
A13-28B(30), A02-04A(3), A11-07B(25)
A03-23B(8), A03-22A(8)
A13-29B(30), A02-03A(3)
A03-22A(8), A03-26A(8)
A13-24A(30), A02-07A(3)
A03-26A(8), A03-26B(8)
NOTES:
1 NOT USED.
2 INPUT PINS TO THIS RECEIVER SECTION ARE INVERTED SO OUTPUT IS COMPLEMENTED.
3 NOT USED ON BJ701 J/K UNITS.
4 USED ONLY ON BJ701 J/K UNITS.
ARSV REV F & ABOVE
CONTROL DATA
NORMANDALE DIVISION
RECEIVERS
LOC: A07
C
SMD 7490
REV EG
CODE IDENT 19333
SHEET 18
CROSS REF NO



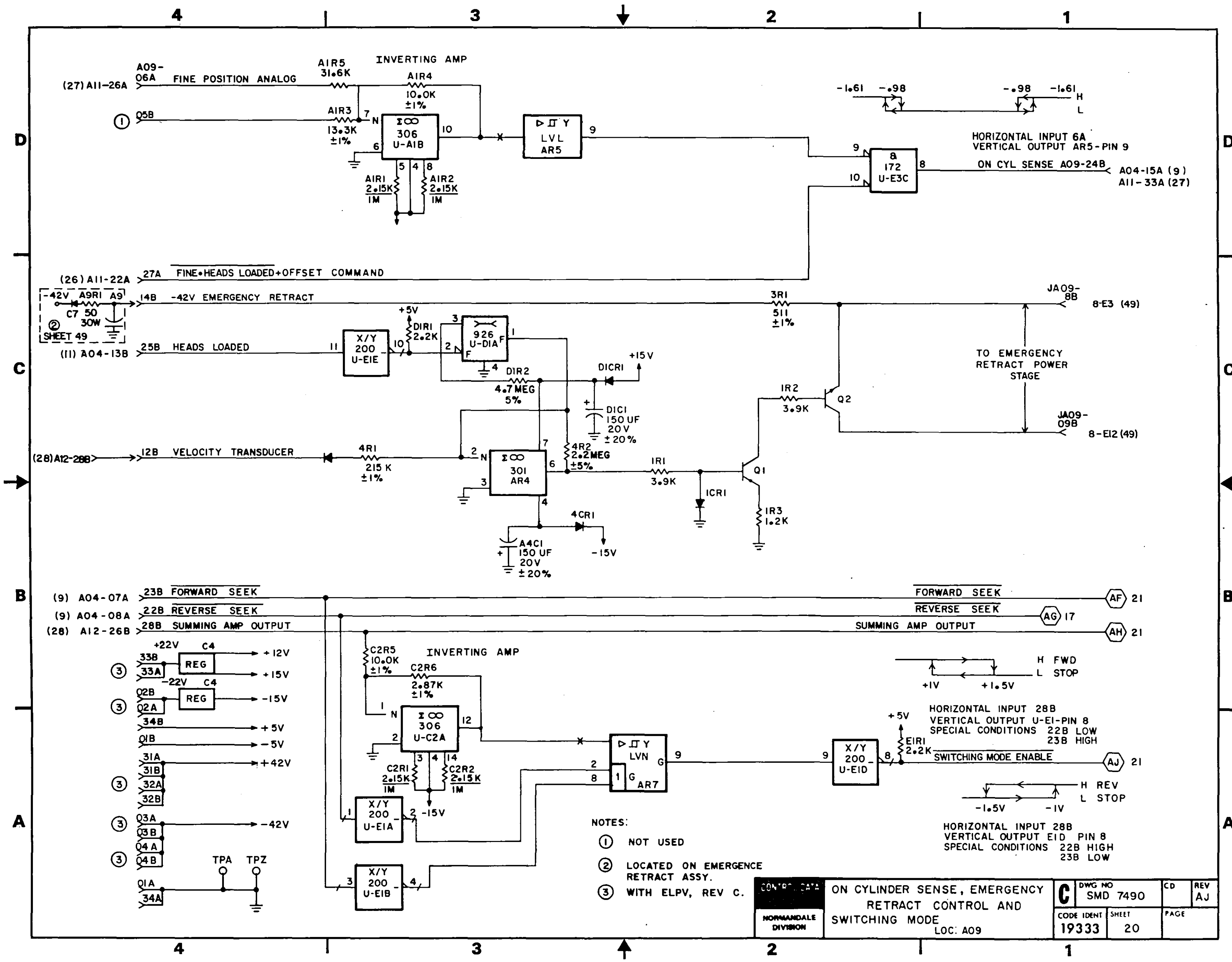
NOTES:
1. NOT USED.
2. FAULT CLEAR SWITCH LOCATED ON SWITCH PANEL ASSY.
3. S/C 09 WITH 37966 AND ABOVE.
4. S/C 10 WITHOUT 48140 AND BELOW.
5. S/C 10 WITH 48140 AND ABOVE.
6. NOT USED ON BJ701 J/K UNITS
7. USED ONLY ON BJ701 J/K UNITS.
8. OLDER UNITS USE THE FOLLOWING.

CONTROL DATA
NORMANDALE DIVISION

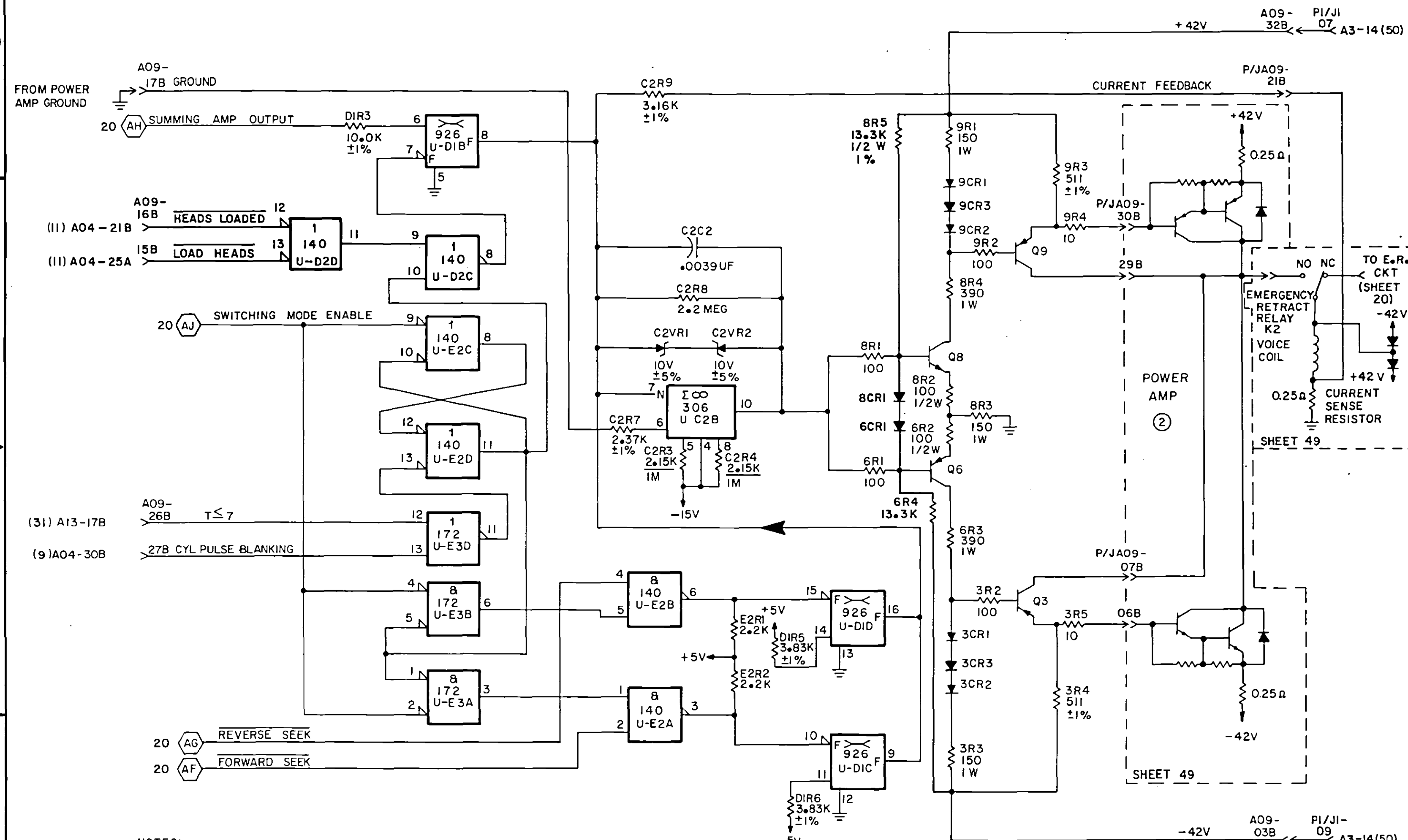
RECEIVERS

LOC: A07

SIZE	DWG NO	CD	REV
C	SMD 7490		EG
CODE IDENT 19333	SHEET 19	CROSS REF NO	



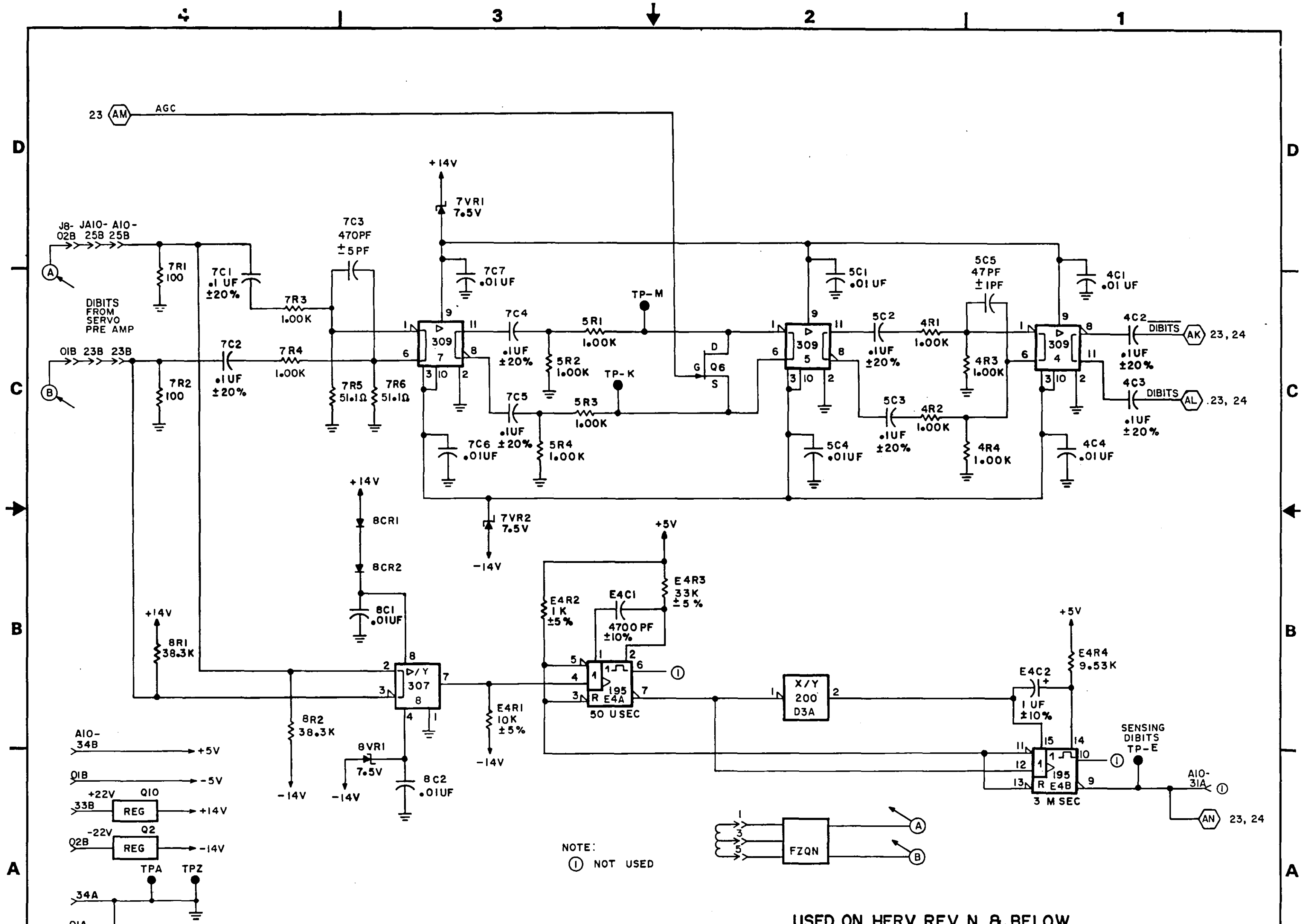
FINE POSITION ANALOG
INVERTING AMP
306 U-A1B
LVL AR5
172 U-E3C
HORIZONTAL INPUT 6A
VERTICAL OUTPUT AR5-PIN 9
ON CYL SENSE A09-24B
A04-15A (9)
A11-33A (27)
(27) A11-26A
(26) A11-22A
27A FINE•HEADS LOADED+OFFSET COMMAND
14B -42V EMERGENCY RETRACT
25B HEADS LOADED
(11) A04-13B
200 U-E1E
926 U-D1A
12B VELOCITY TRANSDUCER
(28) A12-28B
301 AR4
TO EMERGENCY RETRACT POWER STAGE
JA09-8B 8-E3 (49)
JA09-09B 8-E12 (49)
(9) A04-07A 23B FORWARD SEEK
(9) A04-08A 22B REVERSE SEEK
(28) A12-26B 28B SUMMING AMP OUTPUT
FORWARD SEEK
REVERSE SEEK
SUMMING AMP OUTPUT
INVERTING AMP
306 U-C2A
LVN AR7
200 U-E1D
200 U-E1A
200 U-E1B
SWITCHING MODE ENABLE
HORIZONTAL INPUT 28B
VERTICAL OUTPUT U-E1-PIN 8
SPECIAL CONDITIONS 22B LOW
23B HIGH
HORIZONTAL INPUT 28B
VERTICAL OUTPUT E1D PIN 8
SPECIAL CONDITIONS 22B HIGH
23B LOW
REG
TPA TPZ
NOTES:
① NOT USED
② LOCATED ON EMERGENCE RETRACT ASSY.
③ WITH ELPV, REV C.
CONTROL DATA
NORMANDALE DIVISION
ON CYLINDER SENSE, EMERGENCY RETRACT CONTROL AND SWITCHING MODE
LOC: A09
C
DWG NO SMD 7490
CD
REV AJ
CODE IDENT 19333
SHEET 20
PAGE



NOTES:

1. NOT USED
2. LOCATED ON POWER AMP
3. FOR A09 INPUT VOLTAGE PINS SEE SHEET 16.

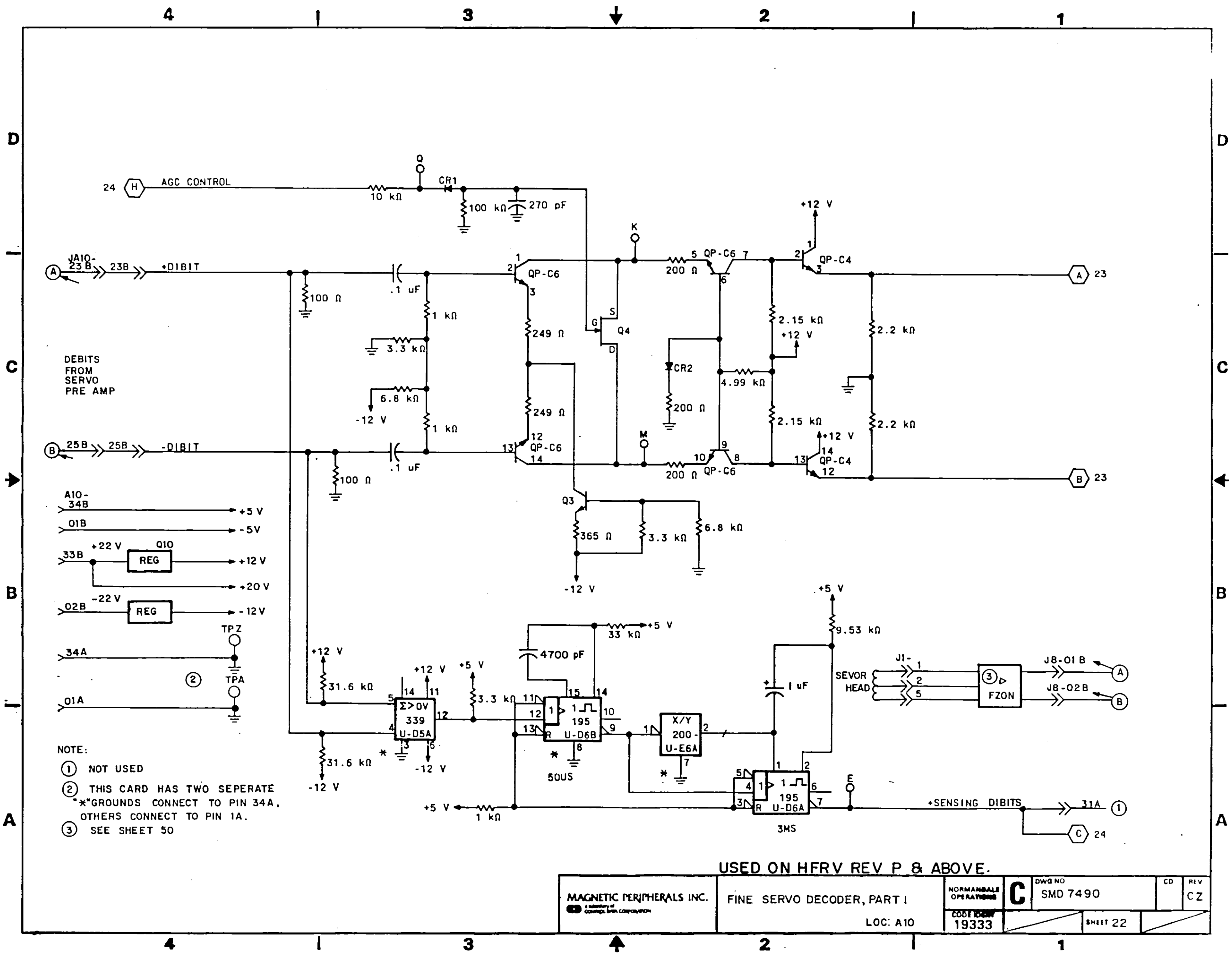
CONTROL DATA NORMANDALE DIVISION	POWER AMP CONTROL LOC: A09	C	DWG NO SMD 7490	CD	REV BK
			CODE IDENT 19333	SHEET 21	PAGE



USED ON HFRV REV N & BELOW.

CONTROL DATA / NORMANDALE DIVISION	FINE SERVO DECODER, PART 1 — LOC: A10	CODE IDENT 19333	C	DWG NO SMD 7490	REV. CP
				SHEET 22	

83311300 AF



USED ON HFRV REV P & ABOVE.

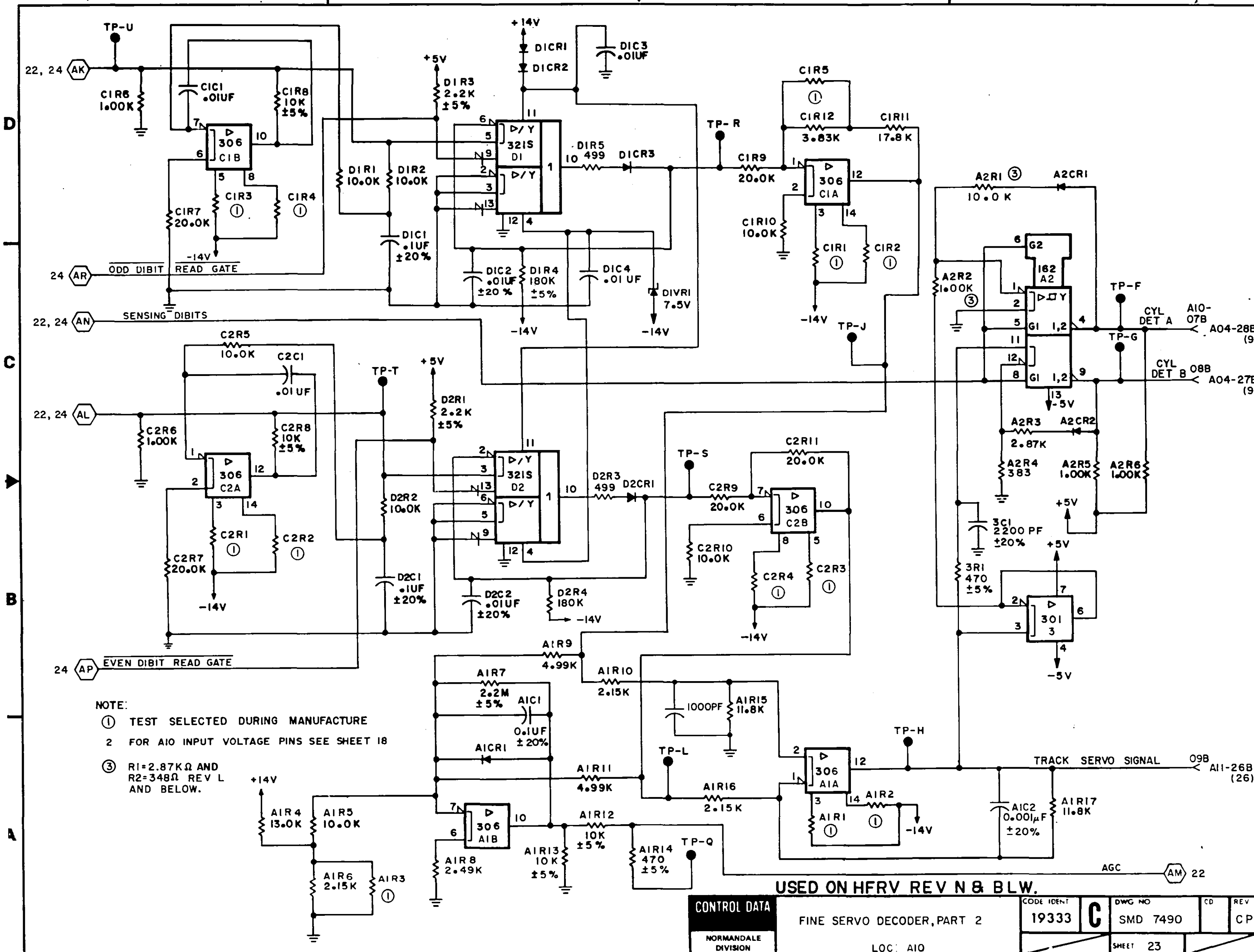
MAGNETIC PERIPHERALS INC.

FINE SERVO DECODER, PART I

LOC: A10

NORMANDALE OPERATIONS | C | DWG NO SMD 7490 | CD | REV CZ

CODE IDENT 19333 | SHEET 22

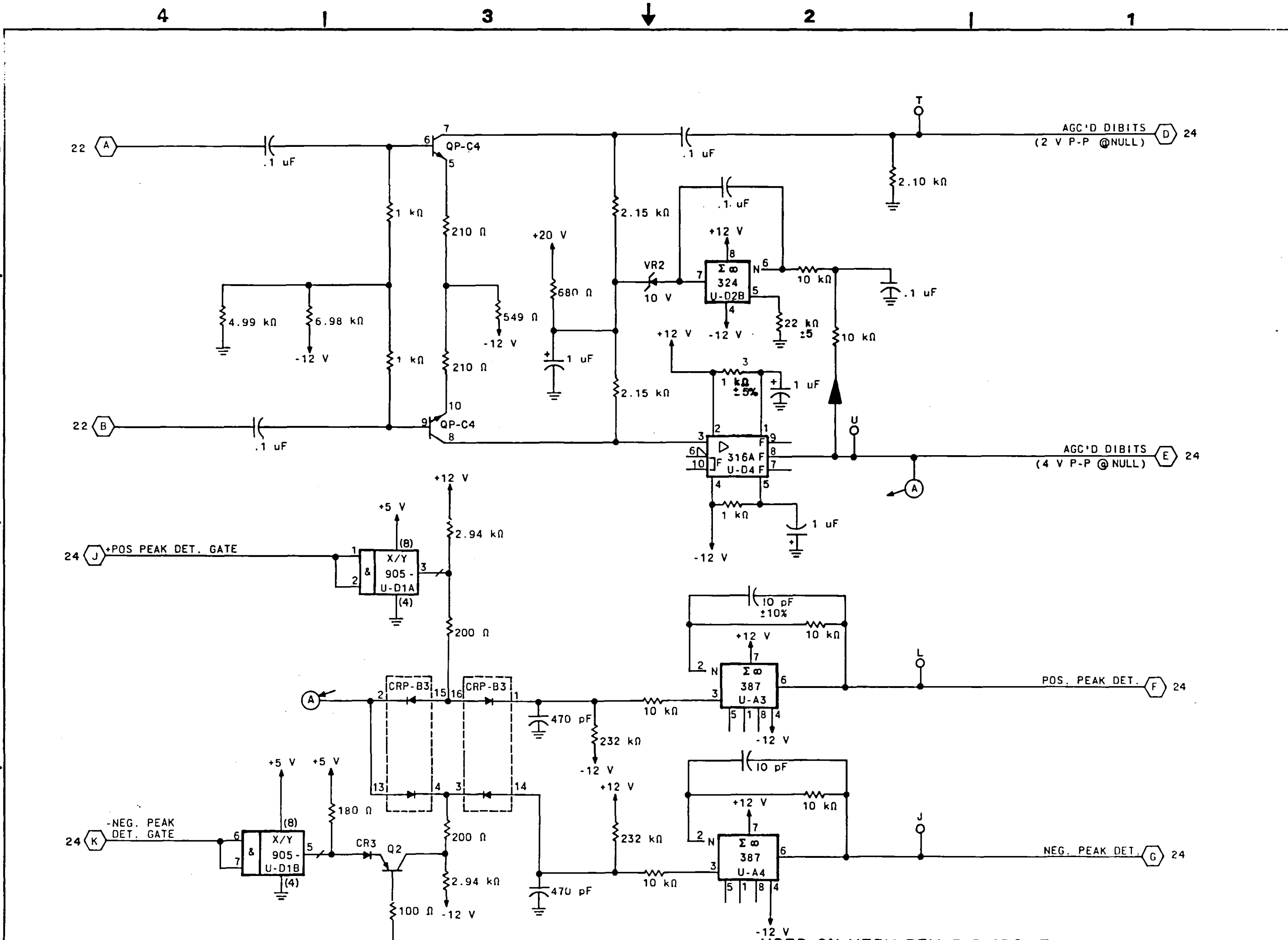


NOTE:
① TEST SELECTED DURING MANUFACTURE
2 FOR A10 INPUT VOLTAGE PINS SEE SHEET 18
③ R1=2.87KΩ AND R2=348Ω REV L AND BELOW.

USED ON HFRV REV N & BLW.

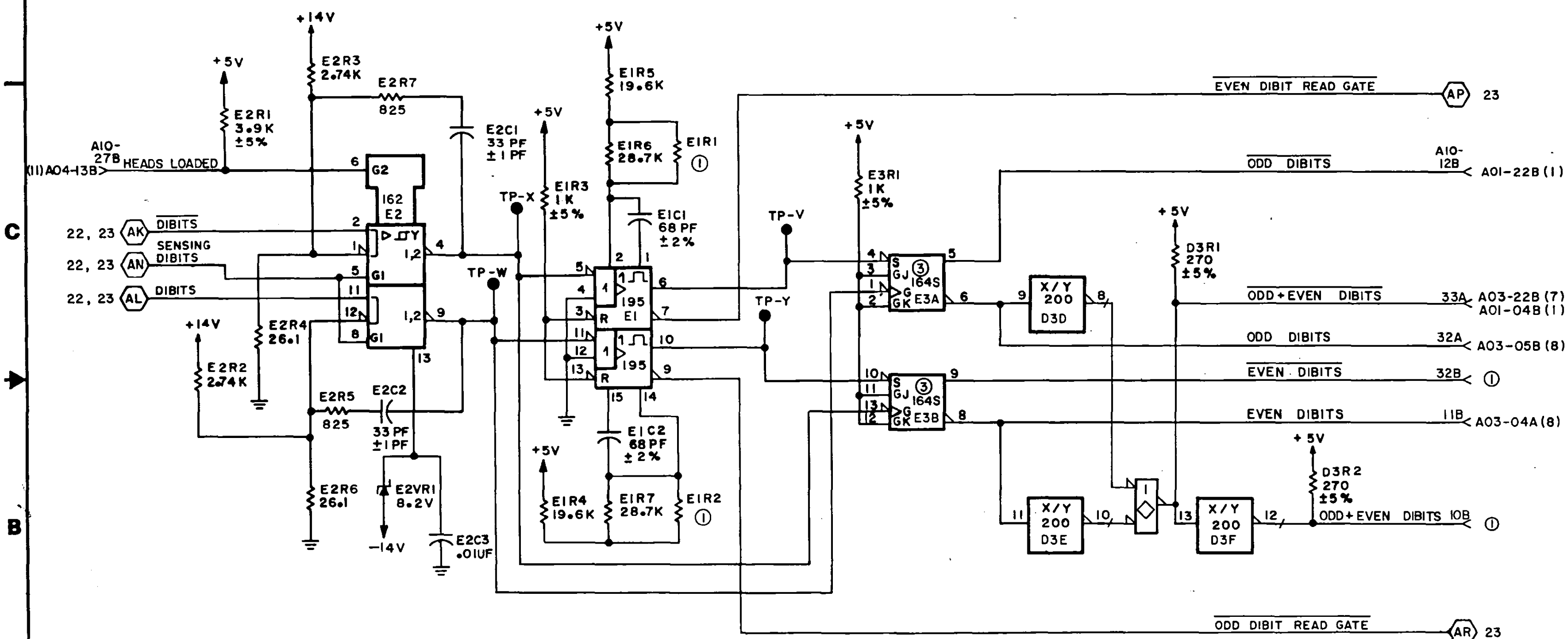
CONTROL DATA NORMANDALE DIVISION	FINE SERVO DECODER, PART 2 LOC: A10	CODE IDENT 19333	C	DWG NO SMD 7490	CD	REV CP
				SHEET 23		

83311300 AJ



USED ON HERV REV P & ABOVE.

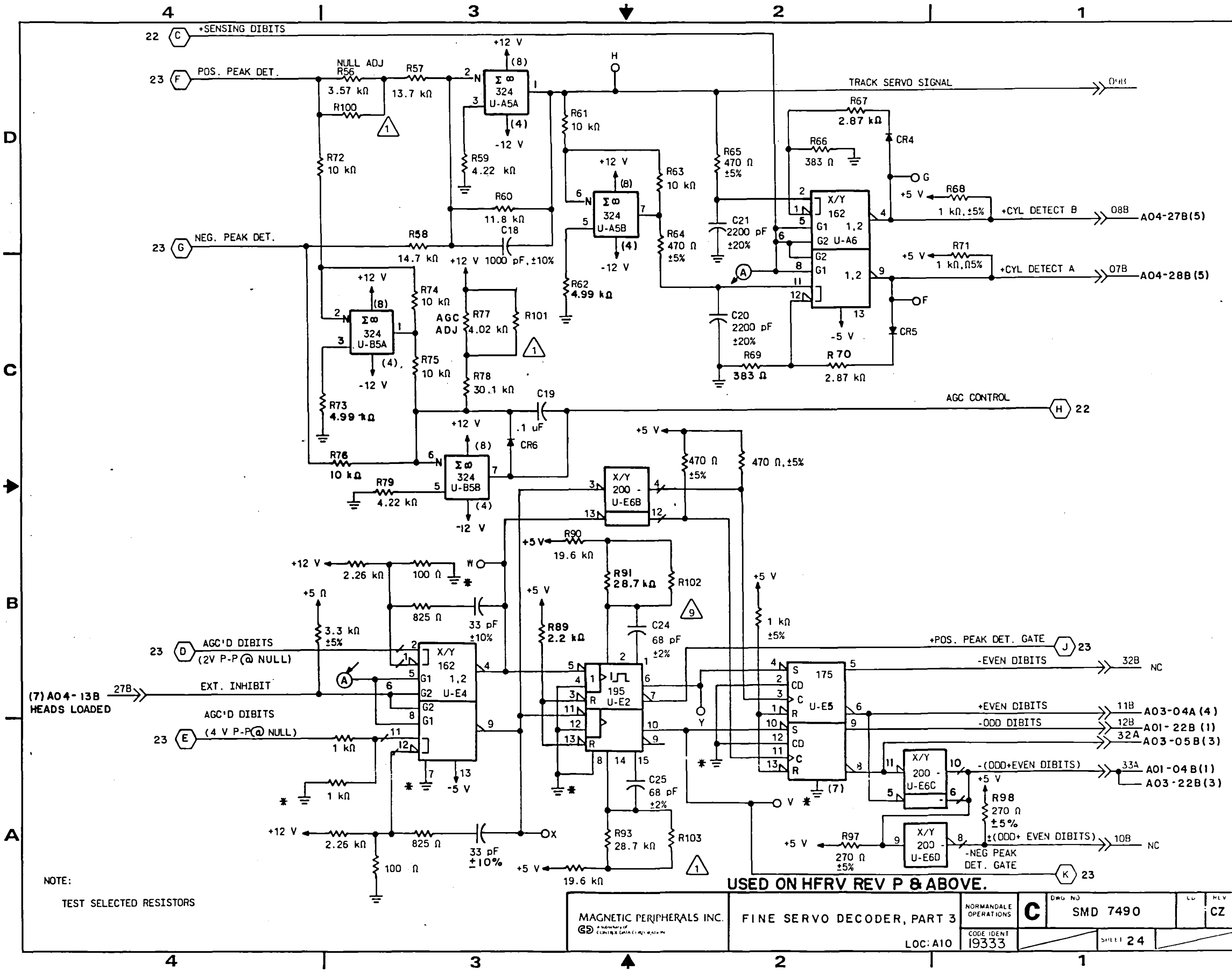
MAGNETIC PERIPHERALS INC.	FINE SERVO DECODER , PART 2	NORMANDALE OPERATIONS	C	DWG NO SMD 7490	REV DP
	LOC: A10	CODE IDENT 19333		SHEET 23	

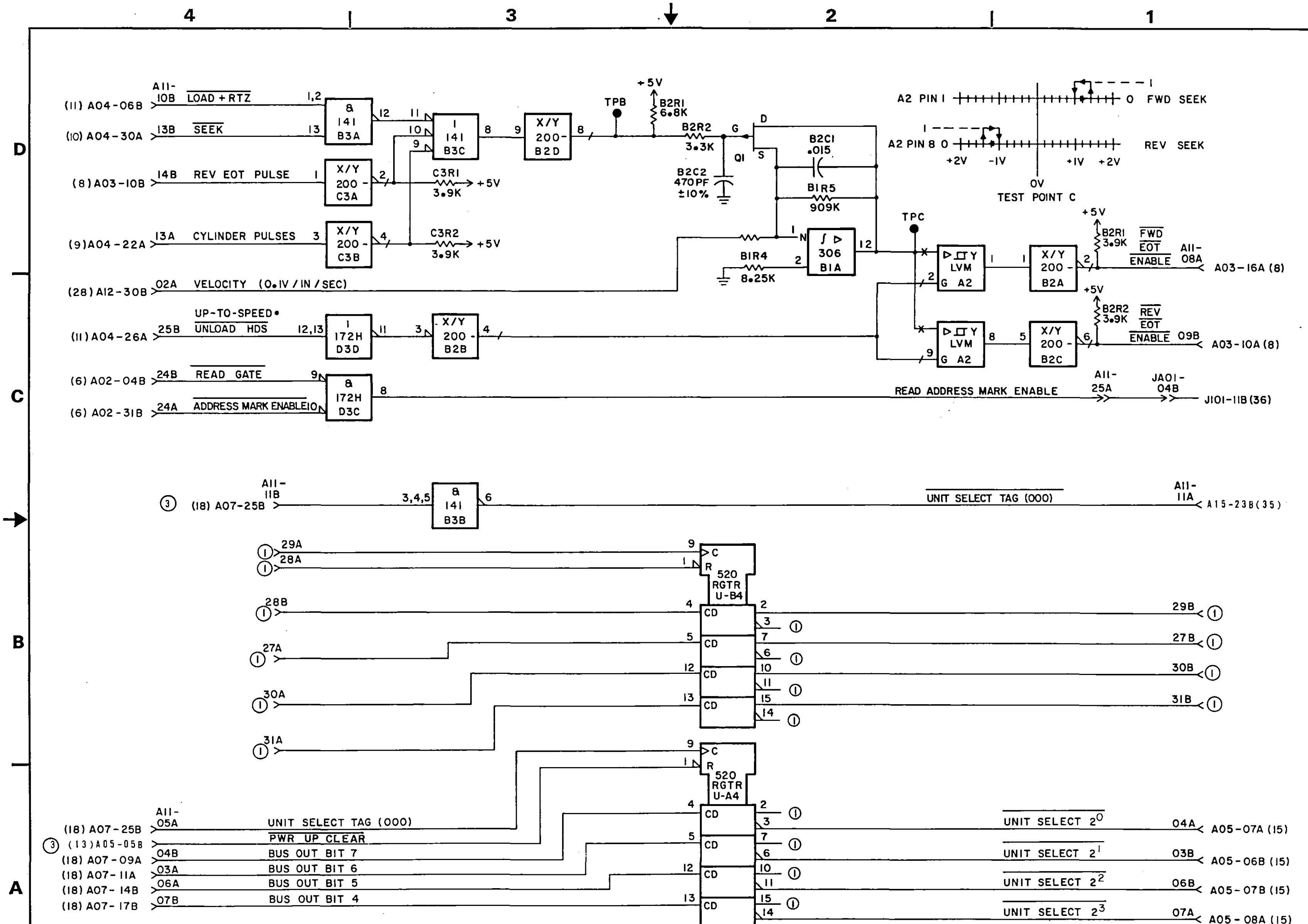


NOTE:
1. TEST SELECTED DURING MANUFACTURE.
2. FOR A10 INPUT VOLTAGE PINS SEE SHEET 18
3. 164H CHIP USED HFRV REV J AND BELOW.

USED ON HFRV REV N & BELOW.

NORMANDALE DIVISION	FINE SERVO DECODER, PART 3 LOC: A10	CODE IDENT 19333	C	DWG NO SMD 7490	CD	REV. CP
				SHEET 24		


+SENSING DIBITS
POS. PEAK DET.
NEG. PEAK DET.
NULL ADJ
TRACK SERVO SIGNAL
AGC ADJ
AGC CONTROL
+CYL DETECT B
+CYL DETECT A
A04-27B(5)
A04-28B(5)
AGC'D DIBITS (2V P-P @ NULL)
EXT. INHIBIT
(7) A04-13B HEADS LOADED
AGC'D DIBITS (4 V P-P @ NULL)
+POS. PEAK DET. GATE
-EVEN DIBITS
+EVEN DIBITS
-ODD DIBITS
-(ODD+EVEN DIBITS)
±(ODD+ EVEN DIBITS)
-NEG PEAK DET. GATE
A03-04A(4)
A01-22B(1)
A03-05B(3)
A01-04B(1)
A03-22B(3)
NOTE:
TEST SELECTED RESISTORS
USED ON HFRV REV P & ABOVE.
MAGNETIC PERIPHERALS INC.
FINE SERVO DECODER, PART 3
LOC: A10
NORMANDALE OPERATIONS
C
SMD 7490
CZ
19333
SHEET 24

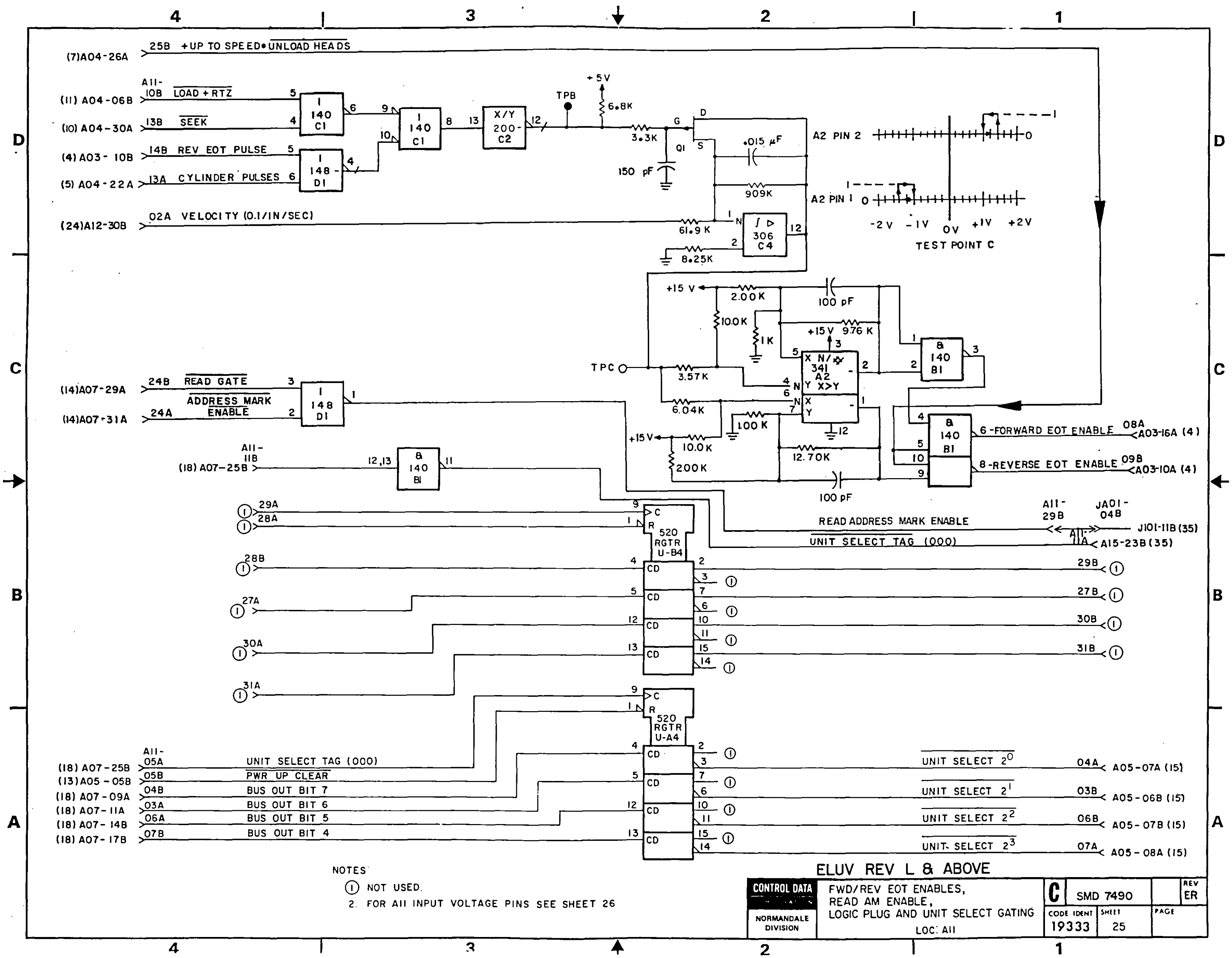


NOTES:
1. NOT USED.
2. FOR A11 INPUT VOLTAGE PINS SEE SHEET 26
3. S/C 11 AND ABOVE

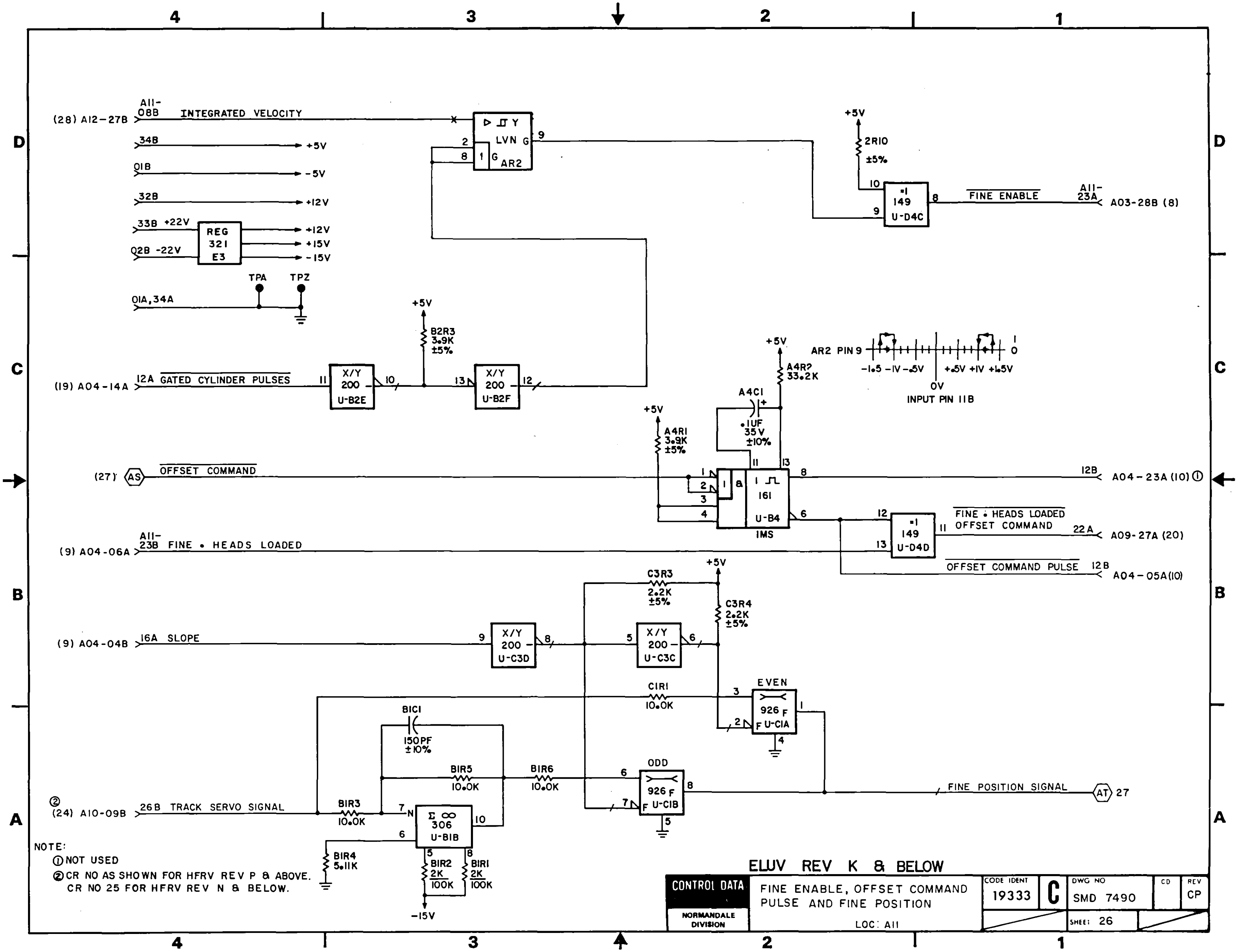
ELUV REV K & BELOW

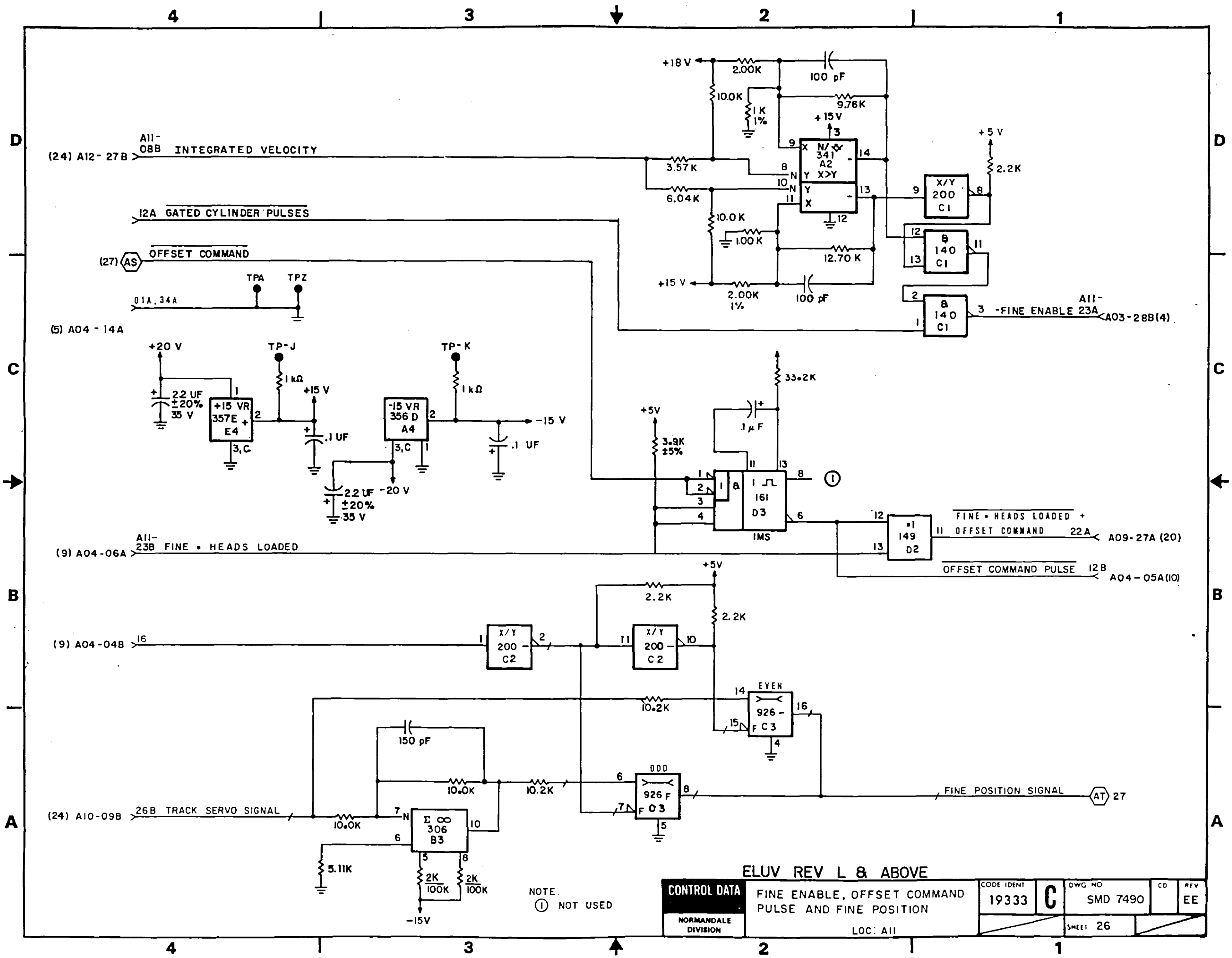
CONTROL DATA / NORMANDALE DIVISION	FWD/REV EOT ENABLES, READ AM ENABLE, LOGIC PLUG AND UNIT SELECT GATING. LOC: A11	C	DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 25	PAGE	

83311300 AK

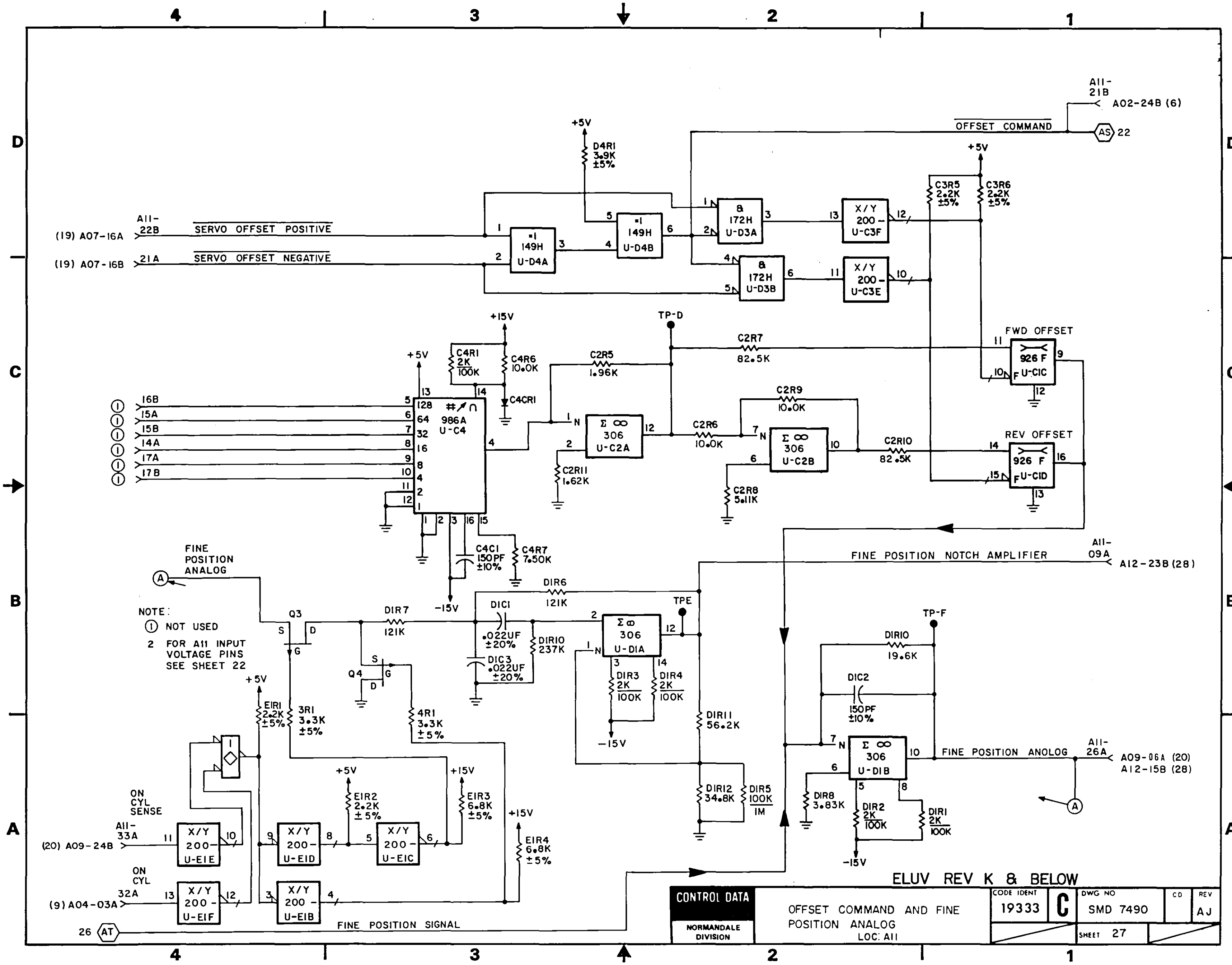


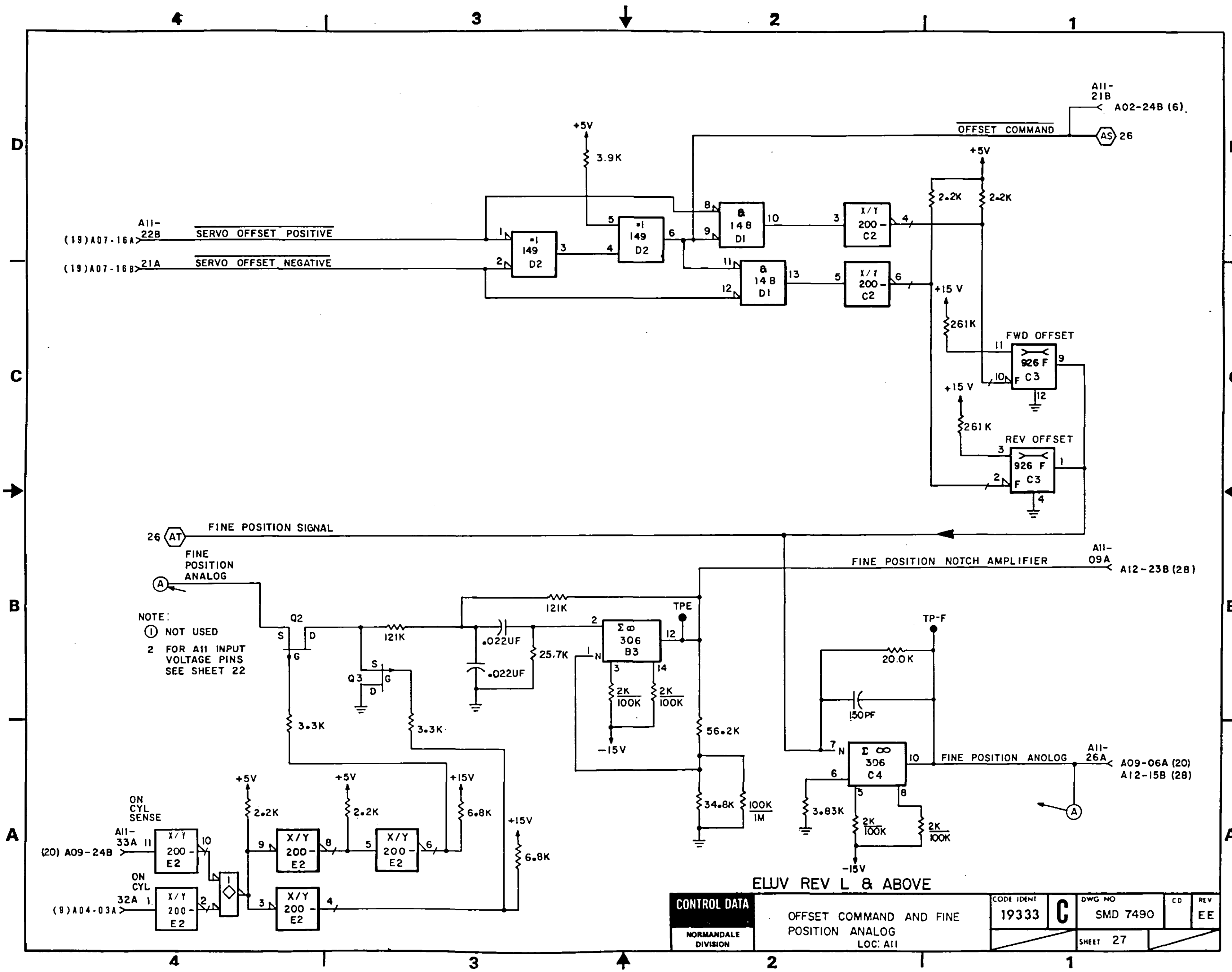
4-40.1


(28) A12-27B
A11-08B INTEGRATED VELOCITY
34B +5V
01B -5V
32B +12V
33B +22V
02B -22V
REG 321 E3
+12V
+15V
-15V
TPA
TPZ
01A,34A
LVN AR2
+5V
2R10 ±5%
149 U-D4C
FINE ENABLE
A11-23A
A03-28B (8)
(19) A04-14A
12A GATED CYLINDER PULSES
X/Y 200 U-B2E
B2R3 3.9K ±5%
X/Y 200 U-B2F
A4R? 33.2K
AR2 PIN 9
-1.5 -1V -.5V
+.5V +1V +1.5V
0V
INPUT PIN 11B
A4C1 .1UF 35V ±10%
A4R1 3.9K ±5%
(27) AS OFFSET COMMAND
161 U-B4
1MS
12B
A04-23A (10) ①
FINE • HEADS LOADED OFFSET COMMAND
149 U-D4D
22A
A09-27A (20)
(9) A04-06A
A11-23B FINE • HEADS LOADED
OFFSET COMMAND PULSE
12B
A04-05A (10)
C3R3 2.2K ±5%
C3R4 2.2K ±5%
(9) A04-04B
16A SLOPE
X/Y 200 U-C3D
X/Y 200 U-C3C
C1R1 10.0K
EVEN
926 U-C1A
B1C1 150PF ±10%
B1R5 10.0K
B1R6 10.0K
ODD
926 U-C1B
FINE POSITION SIGNAL
AT 27
②
(24) A10-09B
26B TRACK SERVO SIGNAL
B1R3 10.0K
306 U-B1B
B1R4 5.11K
B1R2 2K 100K
B1R1 2K 100K
-15V
NOTE:
① NOT USED
② CR NO AS SHOWN FOR HFRV REV P & ABOVE.
CR NO 25 FOR HFRV REV N & BELOW.
ELUV REV K & BELOW
CONTROL DATA
NORMANDALE DIVISION
FINE ENABLE, OFFSET COMMAND PULSE AND FINE POSITION
LOC: A11
CODE IDENT 19333
C
DWG NO SMD 7490
REV CP
SHEET 26



(24) A12-27B
A11-08B INTEGRATED VELOCITY
12A GATED CYLINDER PULSES
(27) AS OFFSET COMMAND
TPA
TPZ
01A, 34A
(5) A04-14A
+18 V
+15 V
+5 V
2.00K
100 pF
10.0K
1K 1%
9.76K
3.57K
6.04K
N/X 341 A2 X>Y
X/Y 200 C1
2.2K
140 C1
100K
12.70K
2.00K 1%
A11- 23A
-FINE ENABLE
A03-28B(4)
+20 V
TP-J
TP-K
22 UF ±20% 35 V
+15 VR 357E E4
1 kΩ
.1 UF
-15 VR 356D A4
-15 V
2.2 UF ±20% 35 V
-20 V
33.2K
.1 μF
3.9K ±5%
161 D3
1MS
149 D2
FINE • HEADS LOADED + OFFSET COMMAND 22A
A09-27A (20)
OFFSET COMMAND PULSE 12B
A04-05A(10)
(9) A04-06A
A11-23B FINE • HEADS LOADED
(9) A04-04B
X/Y 200 C2
2.2K
EVEN
926 C3
10.2K
150 pF
10.0K
ODD
926 F D3
FINE POSITION SIGNAL
AT 27
(24) A10-09B
26B TRACK SERVO SIGNAL
Σ ∞ 306 B3
5.11K
2K 100K
-15V
NOTE.
① NOT USED
ELUV REV L & ABOVE
CONTROL DATA
NORMANDALE DIVISION
FINE ENABLE, OFFSET COMMAND PULSE AND FINE POSITION
LOC: A11
CODE IDENT 19333
C
DWG NO SMD 7490
REV EE
SHEET 26

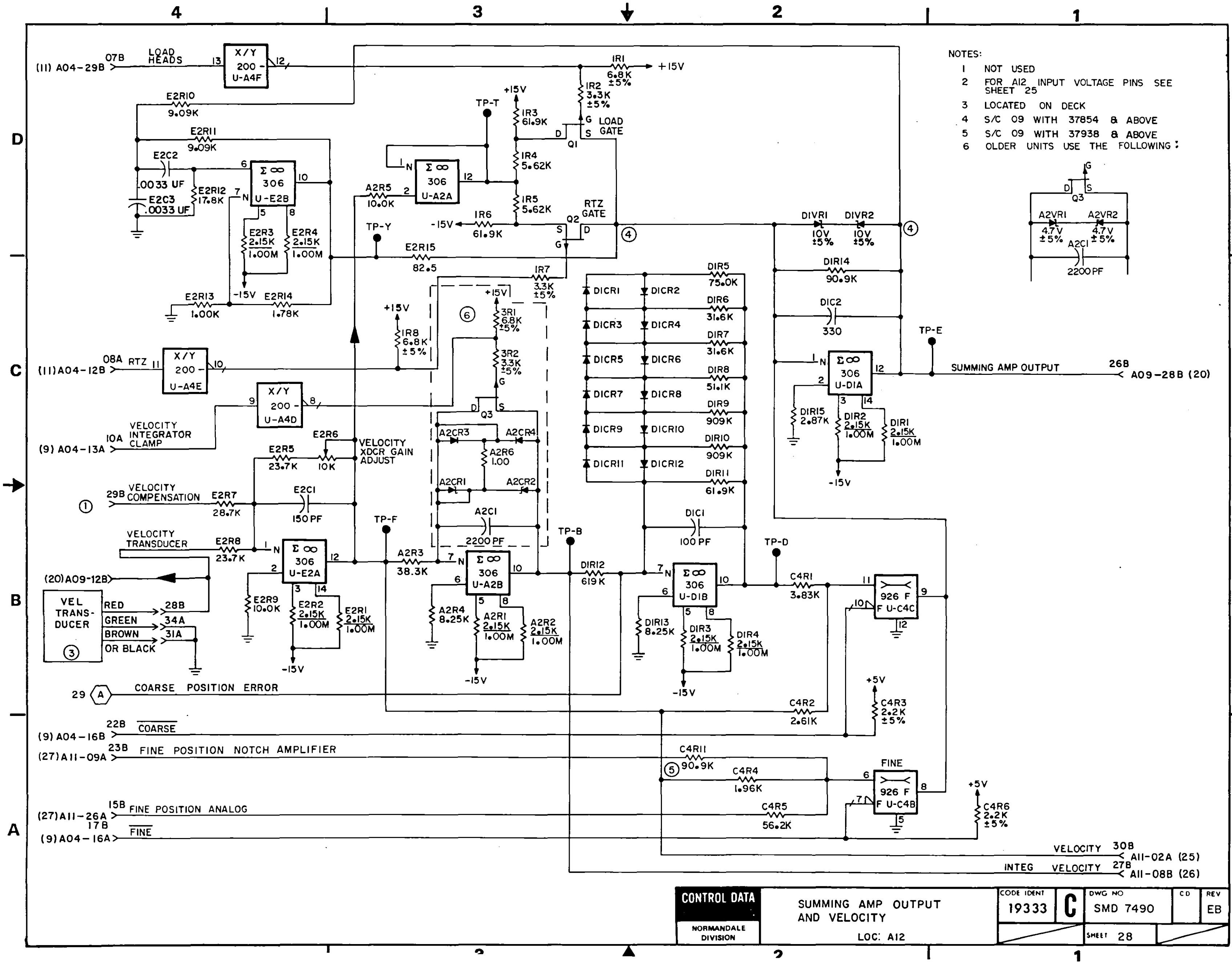

OFFSET COMMAND
SERVO OFFSET POSITIVE
SERVO OFFSET NEGATIVE
FWD OFFSET
REV OFFSET
FINE POSITION NOTCH AMPLIFIER
FINE POSITION ANALOG
FINE POSITION ANOLOG
FINE POSITION SIGNAL
ON CYL SENSE
ON CYL
NOTE:
1 NOT USED
2 FOR A11 INPUT VOLTAGE PINS SEE SHEET 22
ELUV REV K & BELOW
CONTROL DATA
NORMANDALE DIVISION
OFFSET COMMAND AND FINE POSITION ANALOG
LOC: A11
CODE IDENT 19333
C
DWG NO SMD 7490
REV AJ
SHEET 27



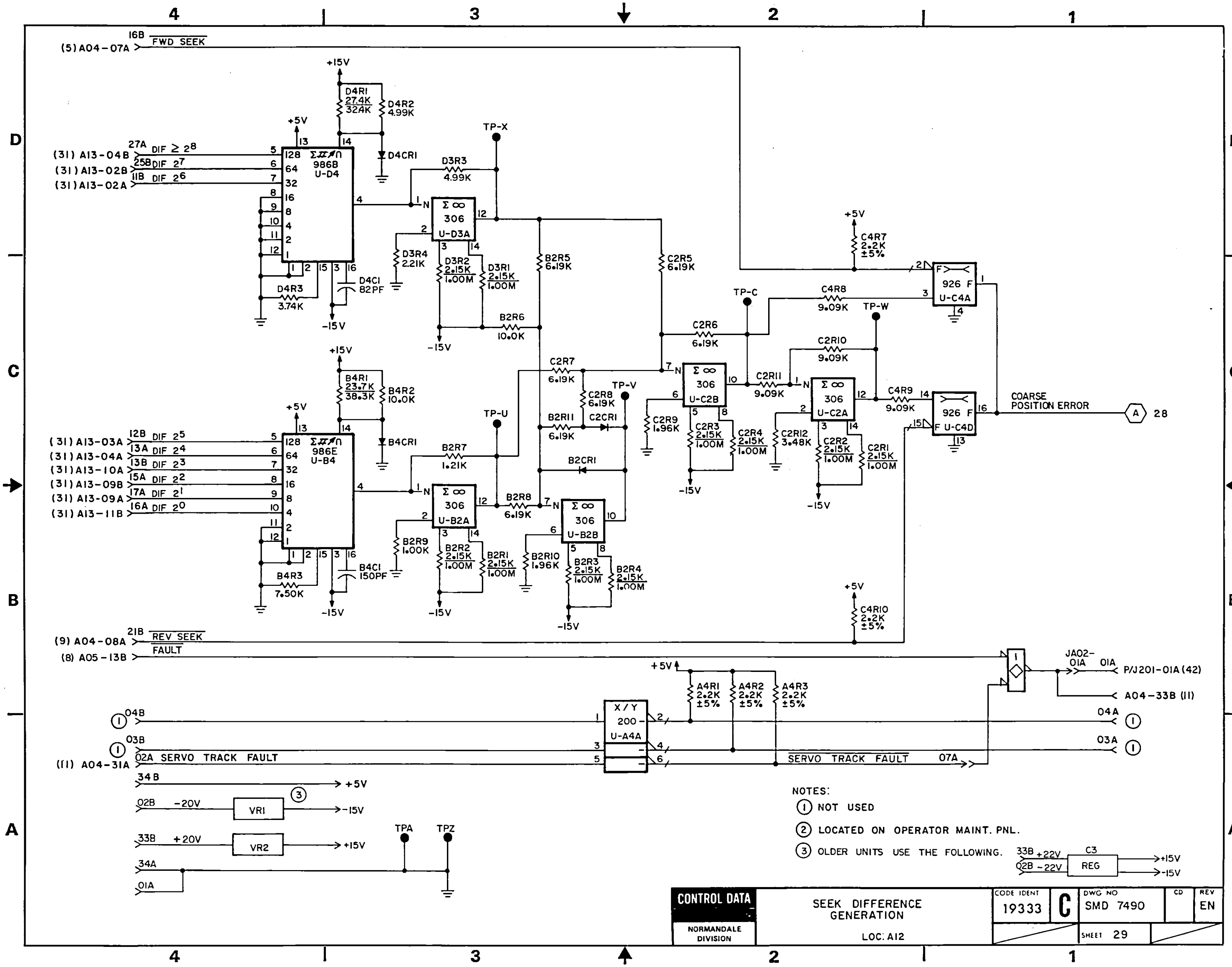
CONTROL DATA
NORMANDALE DIVISION

OFFSET COMMAND AND FINE POSITION ANALOG
LOC: A11

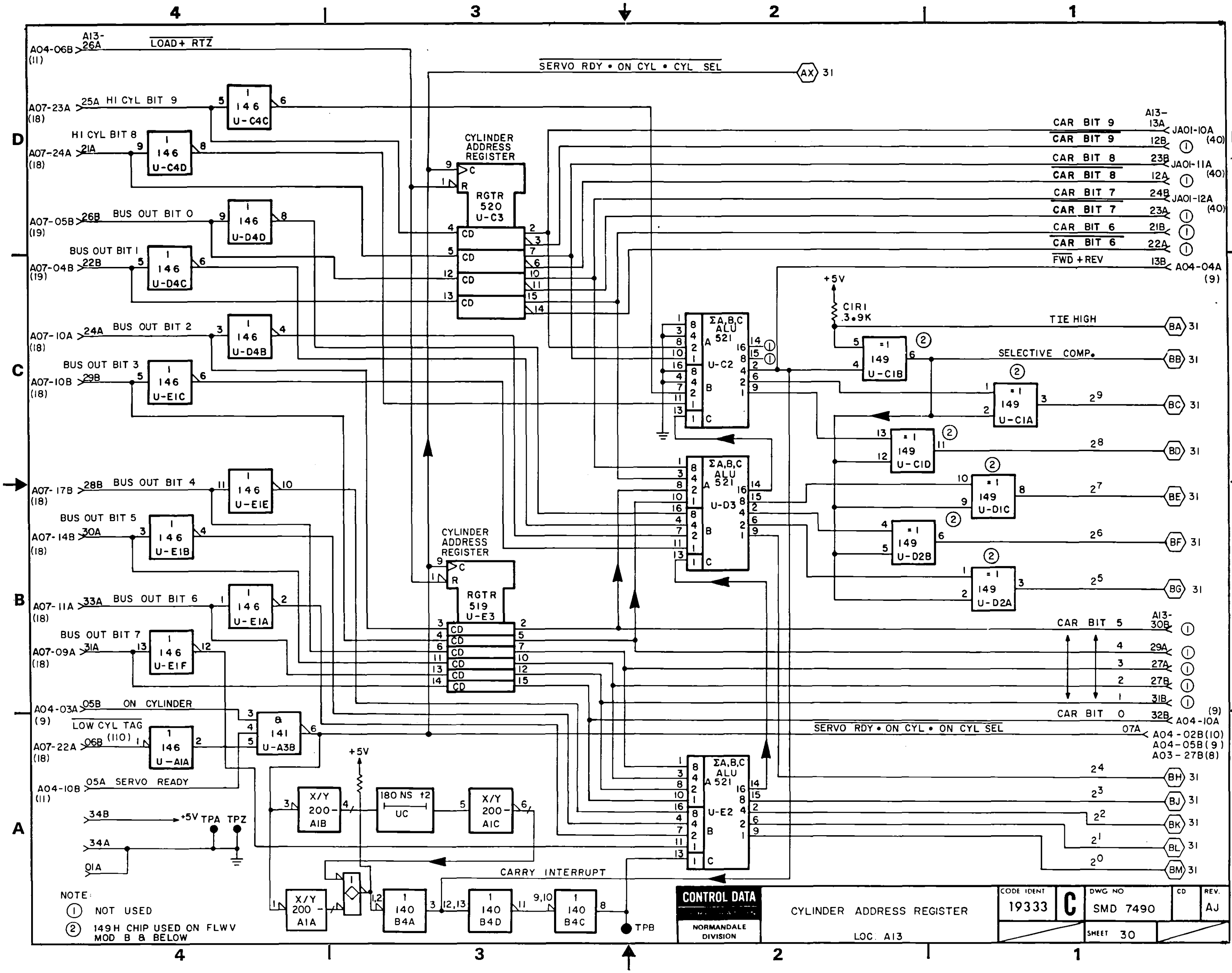
CODE IDENT 19333 C
DWG NO SMD 7490
REV EE
SHEET 27


NOTES:
1 NOT USED
2 FOR A12 INPUT VOLTAGE PINS SEE SHEET 25
3 LOCATED ON DECK
4 S/C 09 WITH 37854 & ABOVE
5 S/C 09 WITH 37938 & ABOVE
6 OLDER UNITS USE THE FOLLOWING:
(11) A04-29B
07B
LOAD HEADS
X/Y 200 - U-A4F
(11) A04-12B
08A RTZ
X/Y 200 - U-A4E
(9) A04-13A
10A VELOCITY INTEGRATOR CLAMP
X/Y 200 - U-A4D
VELOCITY XDCR GAIN ADJUST
29B VELOCITY COMPENSATION
VELOCITY TRANSDUCER
(20) A09-12B
VEL TRANS-DUCER
RED 28B
GREEN 34A
BROWN OR BLACK 31A
29 A COARSE POSITION ERROR
(9) A04-16B 22B COARSE
(27) A11-09A 23B FINE POSITION NOTCH AMPLIFIER
(27) A11-26A 15B FINE POSITION ANALOG
(9) A04-16A 17B FINE
LOAD GATE
RTZ GATE
SUMMING AMP OUTPUT
26B A09-28B (20)
TP-T
TP-Y
TP-F
TP-B
TP-D
TP-E
306 U-E2B
306 U-A2A
306 U-E2A
306 U-A2B
306 U-D1B
306 U-D1A
926 F U-C4C
926 F U-C4B
FINE
VELOCITY 30B A11-02A (25)
INTEG VELOCITY 27B A11-08B (26)
CONTROL DATA
NORMANDALE DIVISION
SUMMING AMP OUTPUT AND VELOCITY
LOC: A12
CODE IDENT 19333
C
DWG NO SMD 7490
REV EB
SHEET 28

83311300 AK

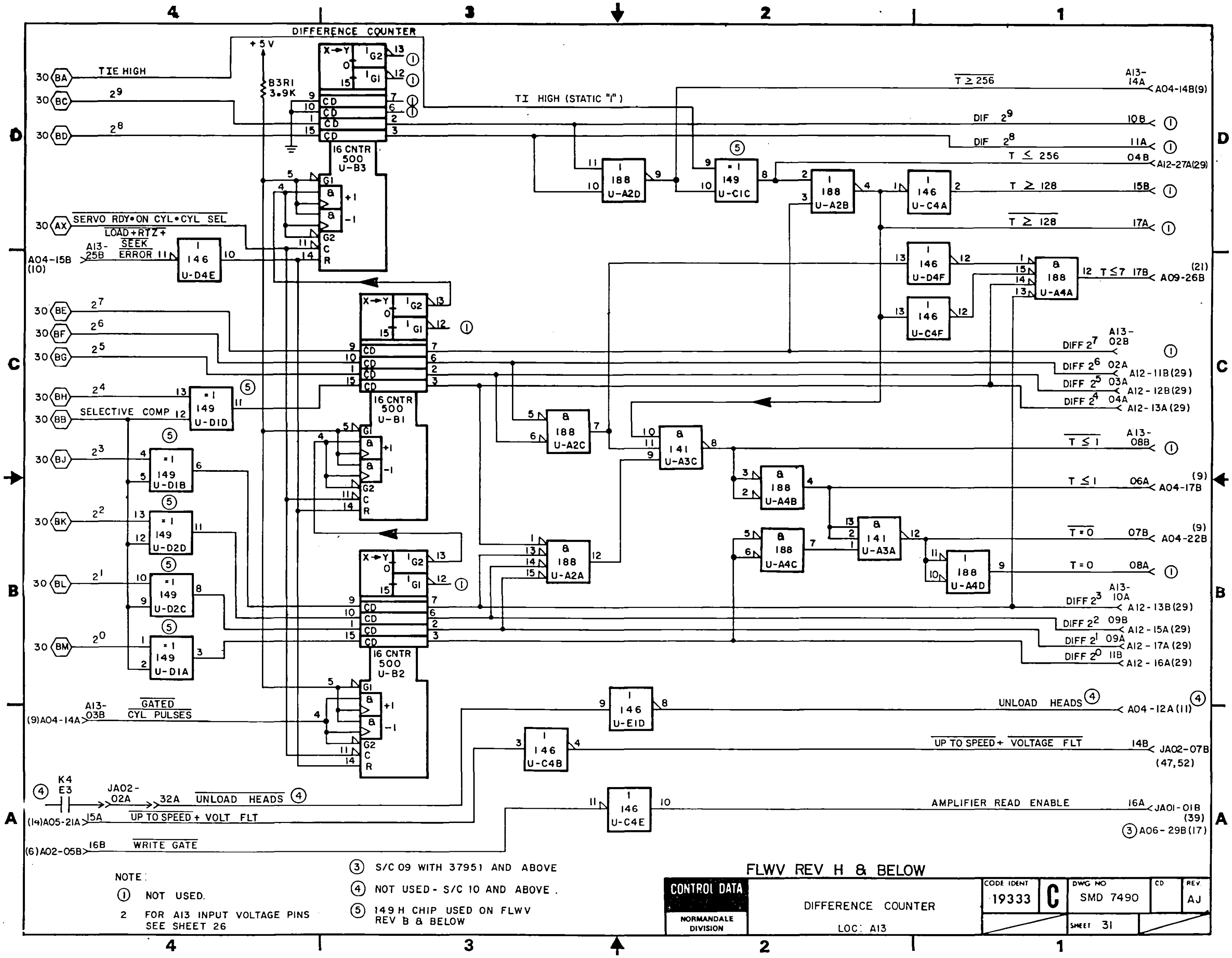


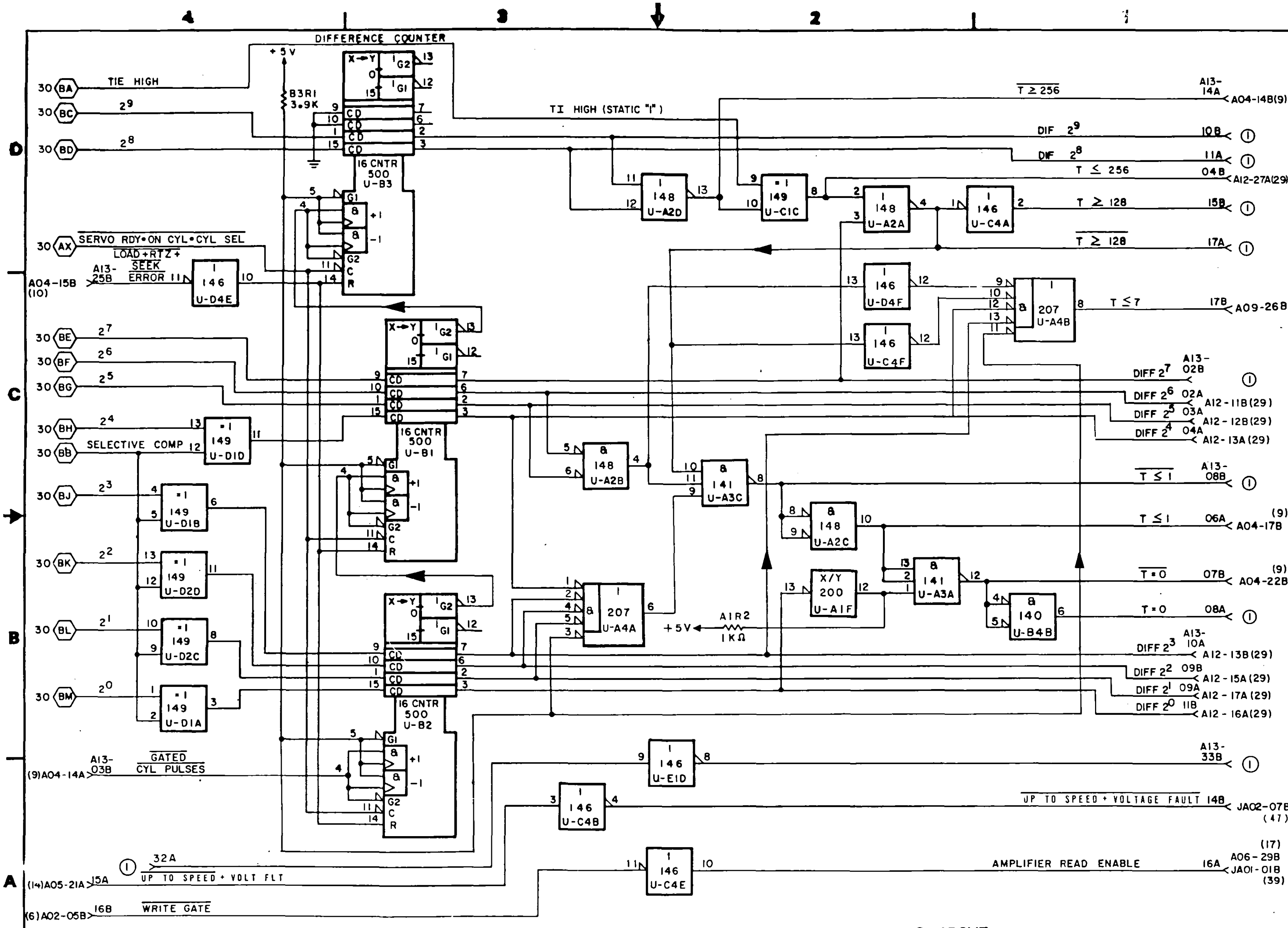
(5) A04-07A 16B FWD SEEK
+15V
D4R1 27.4K 32.4K
D4R2 4.99K
D4CR1
+5V
(31) A13-04B 27A DIF ≥ 2^8
(31) A13-02B 25B DIF 2^7
(31) A13-02A 11B DIF 2^6
986B U-D4
D4R3 3.74K
D4C1 82PF
-15V
TP-X
D3R3 4.99K
306 U-D3A
D3R4 2.21K
D3R2 2.15K 1.00M
D3R1 2.15K 1.00M
B2R6 10.0K
B2R5 6.19K
C2R5 6.19K
TP-C
C2R6 6.19K
C4R8 9.09K
TP-W
C4R7 2.2K ±5%
926 F U-C4A
C2R10 9.09K
C2R7 6.19K
C2R8 6.19K
TP-V
B2R11 6.19K
C2CR1
B2CR1
306 U-C2B
C2R9 1.96K
C2R3 2.15K 1.00M
C2R4 2.15K 1.00M
C2R11 9.09K
306 U-C2A
C2R12 3.48K
C2R2 2.15K 1.00M
C2R1 2.15K 1.00M
C4R9 9.09K
926 F U-C4D
COARSE POSITION ERROR
A 28
B4R1 23.7K 38.3K
B4R2 10.0K
B4CR1
TP-U
(31) A13-03A 12B DIF 2^5
(31) A13-04A 13A DIF 2^4
(31) A13-10A 13B DIF 2^3
(31) A13-09B 15A DIF 2^2
(31) A13-09A 17A DIF 2^1
(31) A13-11B 16A DIF 2^0
986E U-B4
B4R3 7.50K
B4C1 150PF
B2R7 1.21K
306 U-B2A
B2R9 1.00K
B2R2 2.15K 1.00M
B2R1 2.15K 1.00M
B2R8 6.19K
306 U-B2B
B2R10 1.96K
B2R3 2.15K 1.00M
B2R4 2.15K 1.00M
C4R10 2.2K ±5%
(9) A04-08A 21B REV SEEK
(8) A05-13B FAULT
JA02-01A 01A P/J201-01A (42)
A04-33B (11)
A4R1 2.2K ±5%
A4R2 2.2K ±5%
A4R3 2.2K ±5%
X/Y 200 U-A4A
(1) 04B
04A (1)
(1) 03B
03A (1)
(11) A04-31A 02A SERVO TRACK FAULT
SERVO TRACK FAULT 07A
34B +5V
02B -20V VR1 -15V (3)
33B +20V VR2 +15V
34A
01A
TPA
TPZ
NOTES:
(1) NOT USED
(2) LOCATED ON OPERATOR MAINT. PNL.
(3) OLDER UNITS USE THE FOLLOWING. 33B +22V 02B -22V C3 REG +15V -15V
CONTROL DATA
NORMANDALE DIVISION
SEEK DIFFERENCE GENERATION
LOC: A12
CODE IDENT 19333
C
DWG NO SMD 7490
REV EN
SHEET 29



LOAD + RTZ
SERVO RDY • ON CYL • CYL SEL
HI CYL BIT 9
HI CYL BIT 8
BUS OUT BIT 0
BUS OUT BIT 1
BUS OUT BIT 2
BUS OUT BIT 3
BUS OUT BIT 4
BUS OUT BIT 5
BUS OUT BIT 6
BUS OUT BIT 7
ON CYLINDER
LOW CYL TAG (110)
SERVO READY
CYLINDER ADDRESS REGISTER
RGTR 520 U-C3
RGTR 519 U-E3
CAR BIT 9
CAR BIT 8
CAR BIT 7
CAR BIT 6
FWD + REV
CAR BIT 5
CAR BIT 0
TIE HIGH
SELECTIVE COMP.
SERVO RDY • ON CYL • ON CYL SEL
CIRI 3.9K
+5V
180 NS
CARRY INTERRUPT
TPA TPZ
TPB
NOTE:
1 NOT USED
2 149H CHIP USED ON FLWV MOD B & BELOW
CONTROL DATA
NORMANDALE DIVISION
CYLINDER ADDRESS REGISTER
LOC. A13
CODE IDENT 19333
C
DWG NO SMD 7490
REV. AJ
SHEET 30

83311300 AK


DIFFERENCE COUNTER
TIE HIGH
TI HIGH (STATIC "1")
SERVO RDY•ON CYL•CYL SEL
LOAD+RTZ+
SEEK
ERROR
SELECTIVE COMP
GATED
CYL PULSES
UNLOAD HEADS
UP TO SPEED+ VOLT FLT
WRITE GATE
UP TO SPEED+ VOLTAGE FLT
AMPLIFIER READ ENABLE
16 CNTR 500 U-B3
16 CNTR 500 U-B1
16 CNTR 500 U-B2
FLWV REV H & BELOW
NOTE:
1 NOT USED.
2 FOR A13 INPUT VOLTAGE PINS SEE SHEET 26
3 S/C 09 WITH 37951 AND ABOVE
4 NOT USED - S/C 10 AND ABOVE.
5 149 H CHIP USED ON FLWV REV B & BELOW
CONTROL DATA
NORMANDALE DIVISION
DIFFERENCE COUNTER
LOC: A13
CODE IDENT 19333
C
DWG NO SMD 7490
REV AJ
SHEET 31

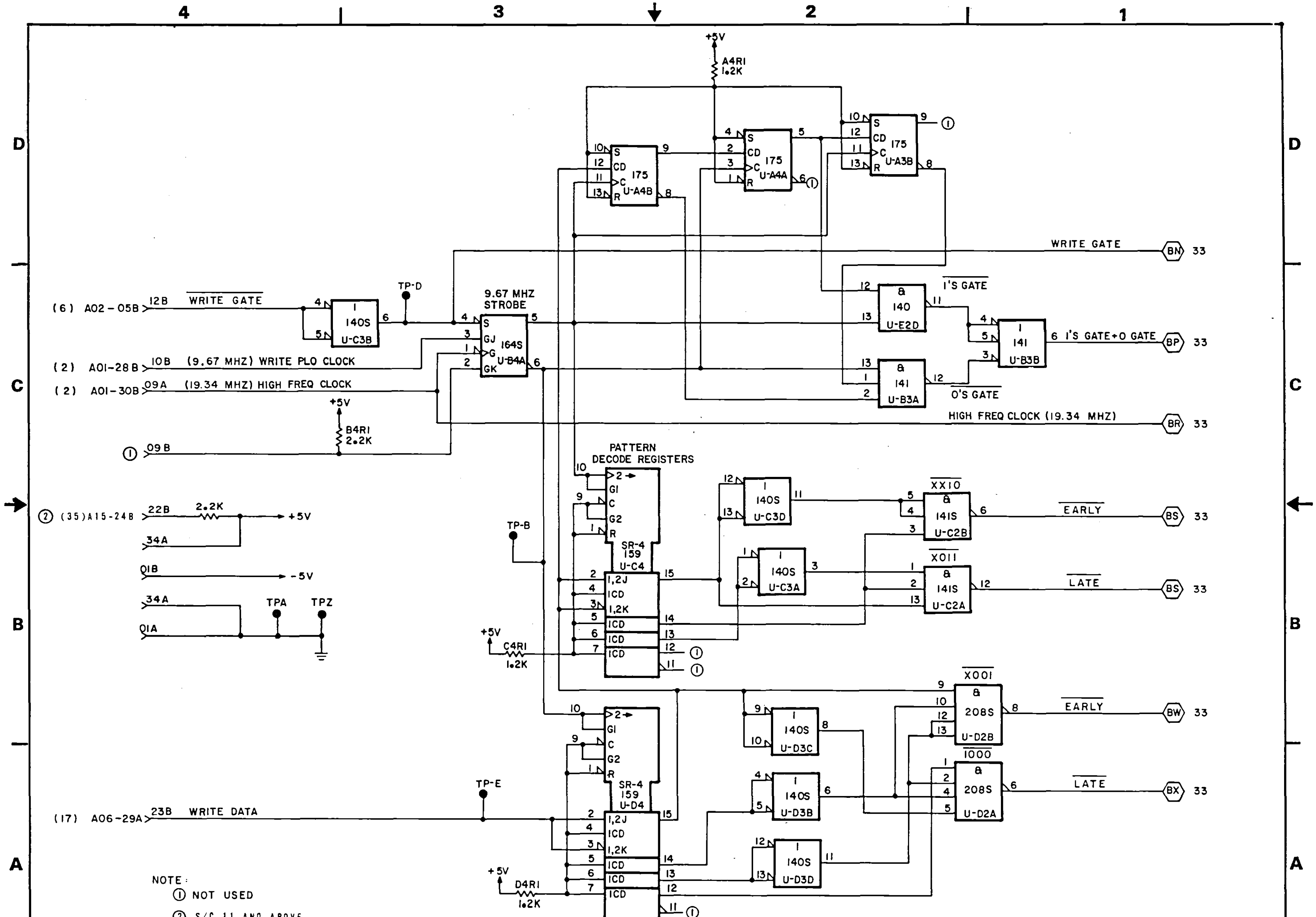


NOTE

1. (1) NOT USED.
2. FOR A13 INPUT VOLTAGE PINS SEE SHEET 26.

CONTROL DATA TWIN CITIES DISK DIVISION	DIFFERENCE COUNTER LOC: A13	CODE IDENT 19333	C	DWG NO SMD 7490	REV EM
				SHEET 31	

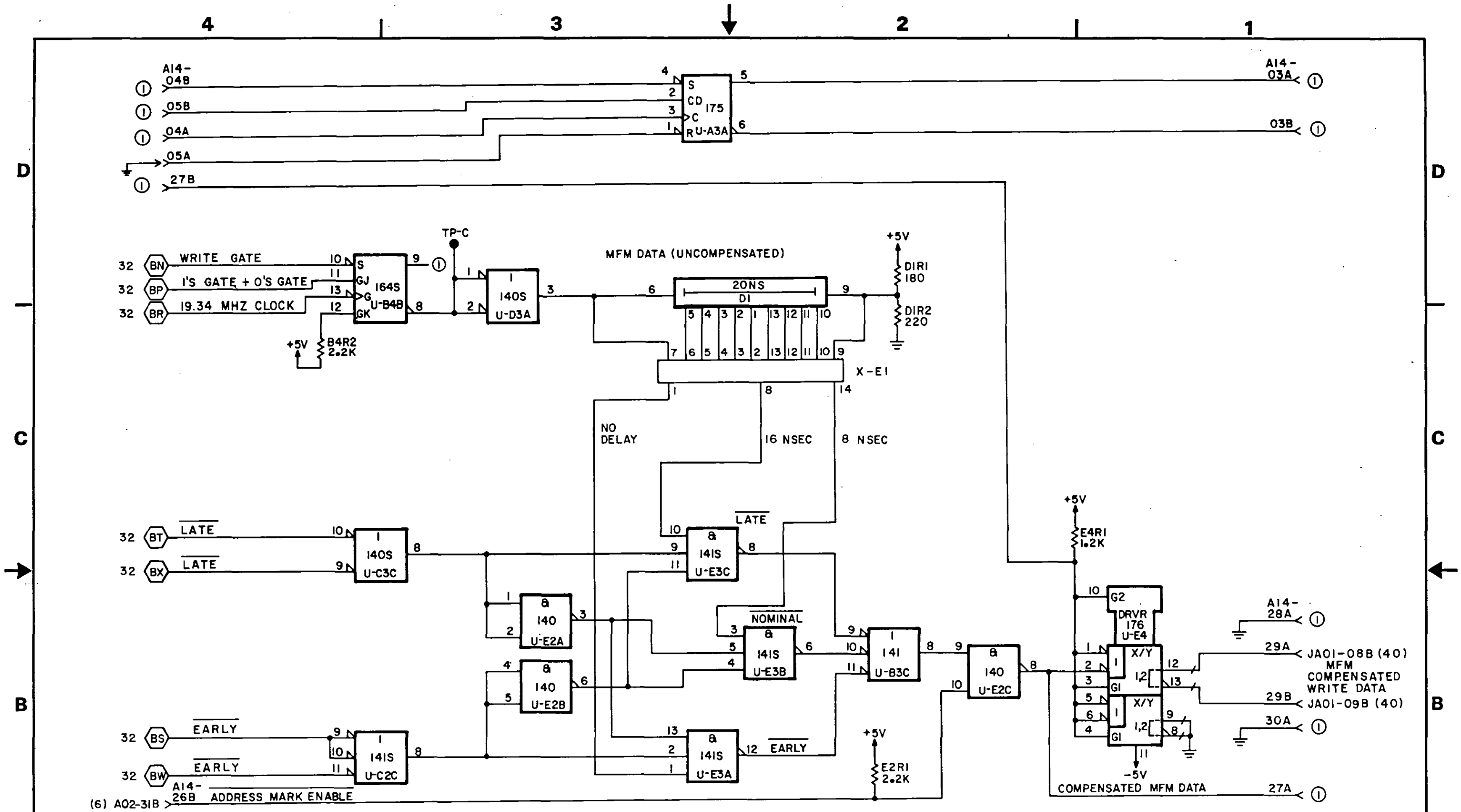
83311300 AC



CONTROL DATA
NORMANDALE DIVISION

WRITE COMPENSATION—CONVERTER, PATTERN REGISTER AND DECODE
LOC: A14

CODE IDENT 19333 C DWG NO SMD 7490 REV AJ
SHEET 32



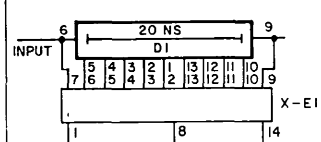
NOTE:

① NOT USED

② DELAY LINES ARE CONNECTED TO JUMPER BLOCK AS SHOWN IN DIAGRAM AT THE RIGHT. ACTUAL DELAYS ARE SELECTED DURING MANUFACTURING. THIS DIAGRAM SHOWS TYPICAL CONNECTIONS. DELAY TIME FOR EACH DELAY LINE PIN RELATIVE TO PIN 6 INPUT IS SHOWN IN CHART TO THE RIGHT.

3 FOR A14 INPUT VOLTAGE PINS SEE SHEET 32

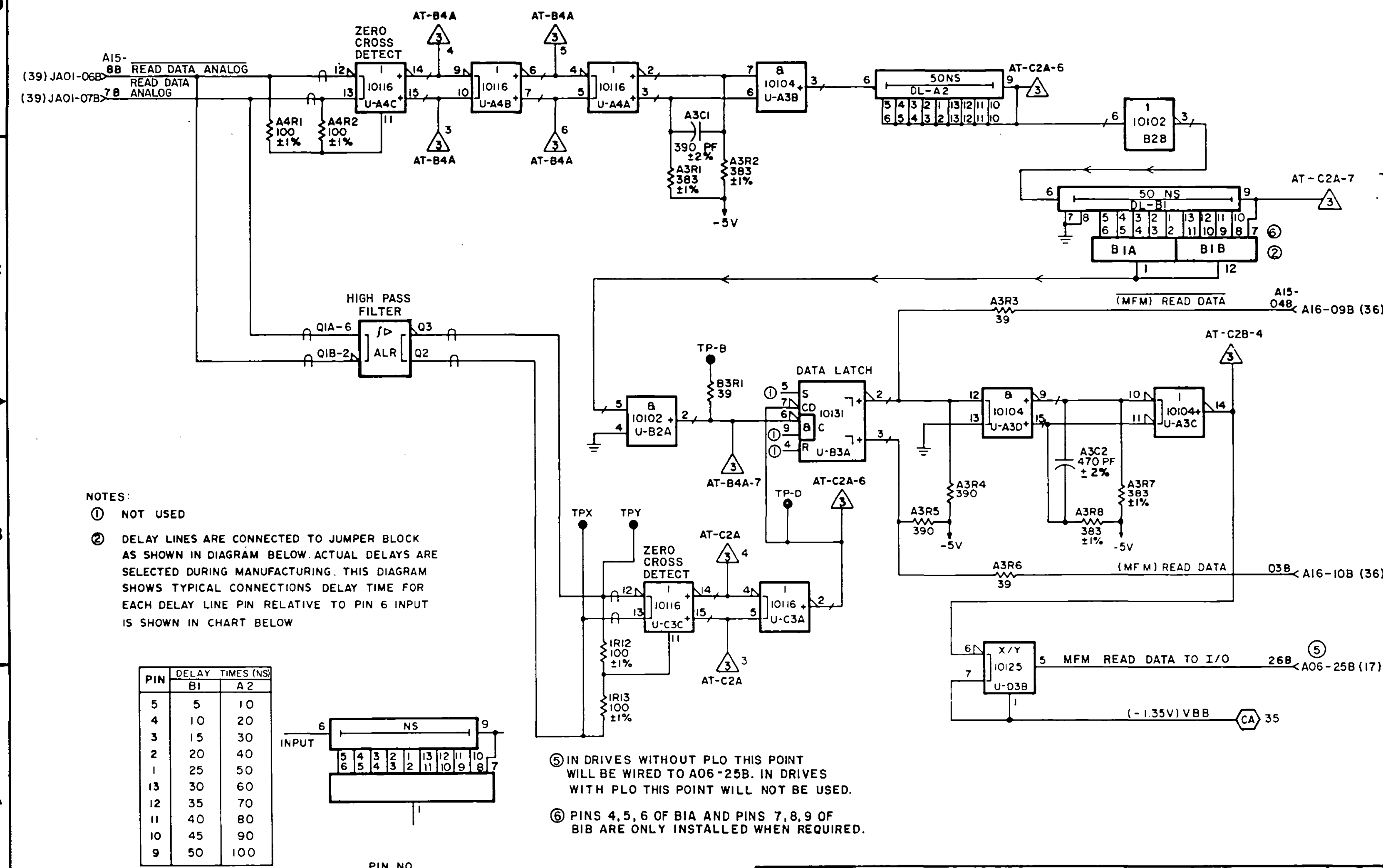
PIN	20NS DELAY
5	2 NS
4	4 NS
3	6 NS
2	8 NS
1	10 NS
13	12 NS
12	14 NS
11	16 NS
10	18 NS
9	20 NS



CONTROL DATA
NORMANDALE DIVISION

WRITE COMPENSATION–
COMPENSATED MFM DATA
LOC: A14

CODE IDENT 19333 C DWG NO SMD 7490 CD REV A SHEET 33



NOTES:

① NOT USED

② DELAY LINES ARE CONNECTED TO JUMPER BLOCK AS SHOWN IN DIAGRAM BELOW. ACTUAL DELAYS ARE SELECTED DURING MANUFACTURING. THIS DIAGRAM SHOWS TYPICAL CONNECTIONS DELAY TIME FOR EACH DELAY LINE PIN RELATIVE TO PIN 6 INPUT IS SHOWN IN CHART BELOW

PIN	DELAY TIMES (NS) B1	A2
5	5	10
4	10	20
3	15	30
2	20	40
1	25	50
13	30	60
12	35	70
11	40	80
10	45	90
9	50	100

3 TERMINATOR CONFIGURATION -5V 8 — 1 GND

4. FOR A15 INPUT VOLTAGE PINS SEE SHEET 31.

⑤ IN DRIVES WITHOUT PLO THIS POINT WILL BE WIRED TO A06-25B. IN DRIVES WITH PLO THIS POINT WILL NOT BE USED.

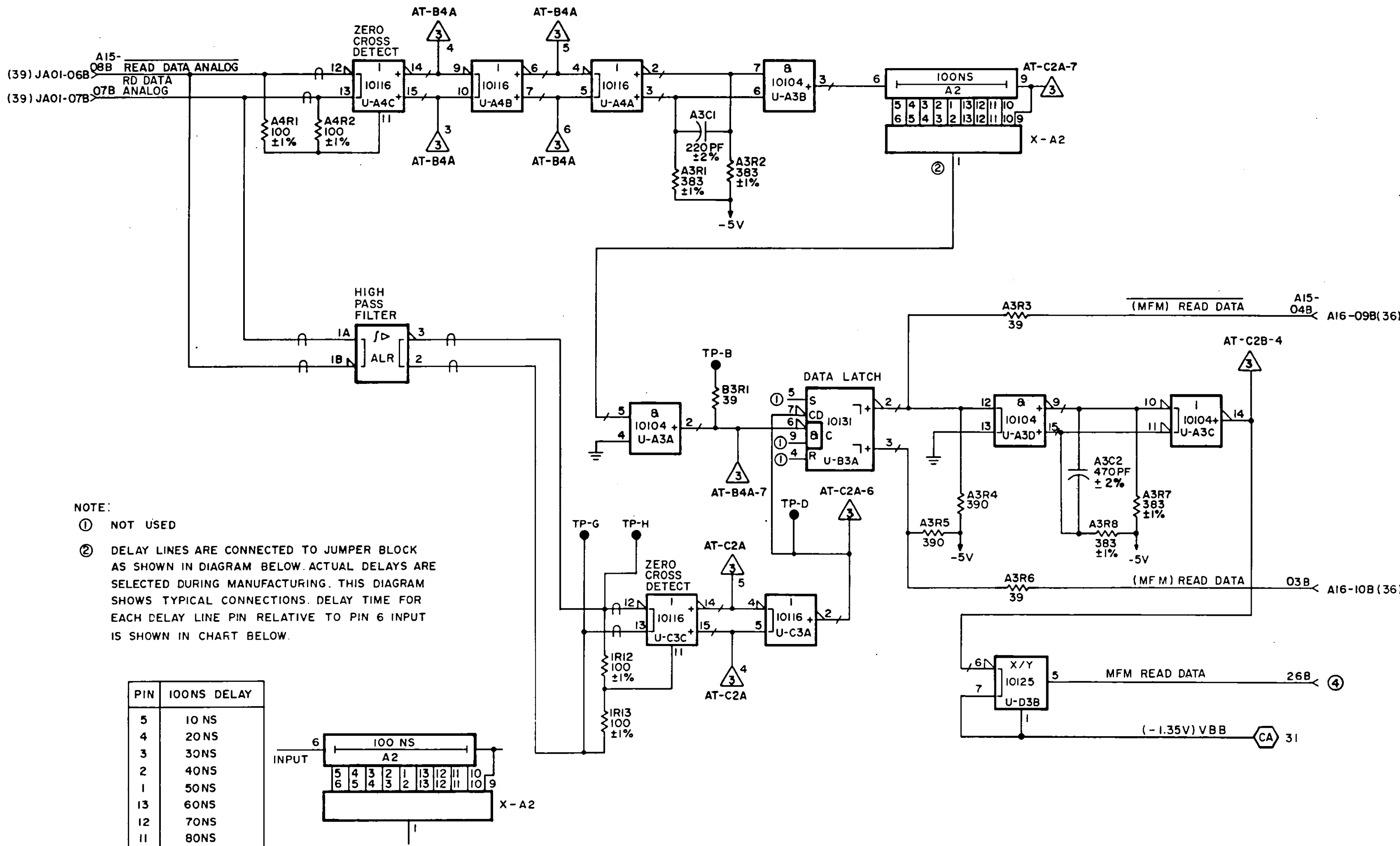
⑥ PINS 4, 5, 6 OF B1A AND PINS 7, 8, 9 OF B1B ARE ONLY INSTALLED WHEN REQUIRED.

CONTROL DATA NORMANDALE DIVISION

ANALOG TO DIGITAL CONVERTER

LOC: A15

CODE IDENT 19333 C DWG NO SMD 7490 REV DK SHEET 34



NOTE:

① NOT USED

② DELAY LINES ARE CONNECTED TO JUMPER BLOCK AS SHOWN IN DIAGRAM BELOW. ACTUAL DELAYS ARE SELECTED DURING MANUFACTURING. THIS DIAGRAM SHOWS TYPICAL CONNECTIONS. DELAY TIME FOR EACH DELAY LINE PIN RELATIVE TO PIN 6 INPUT IS SHOWN IN CHART BELOW.

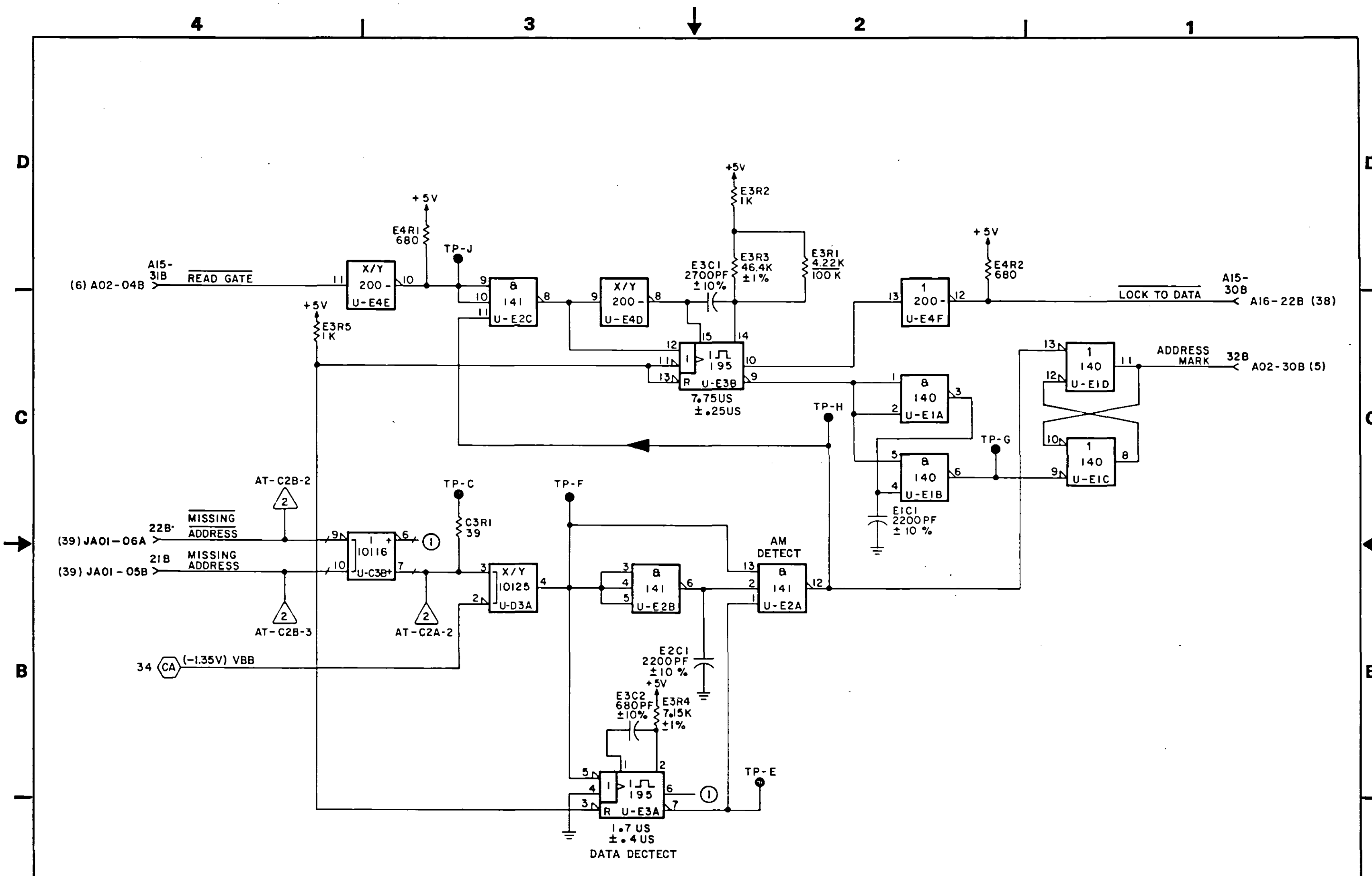
PIN	100NS DELAY
5	10 NS
4	20NS
3	30NS
2	40NS
1	50NS
13	60NS
12	70NS
11	80NS
10	90NS
9	100NS

③ TERMINATOR CONFIGURATION -5V 8 PIN NO. 1 GND

④ WITH PLO CARD, PIN 26B IS OPEN. WITHOUT PLO CARD, PIN 26B GOES TO A06-25B(17).

APPLICABLE TO ALRV & HLRV

CONTROL DATA NORMANDALE DIVISION	ANALOG DATA TO MFM DATA LOC: A15	CODE IDENT 19333	C	DWG. NO SMD 7490	CD	REV AJ
				SHEET 34		



NOTES:

(1) NOT USED.

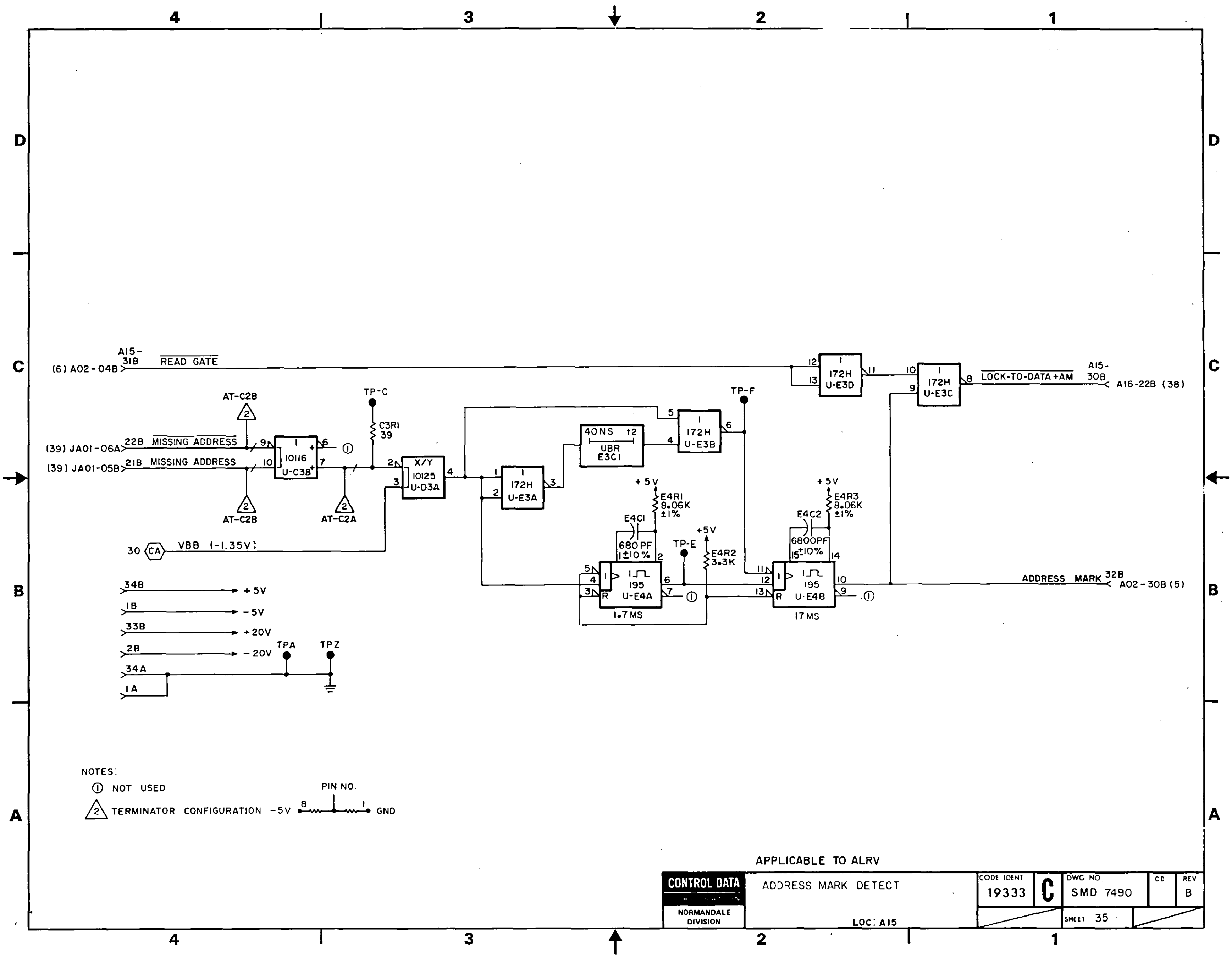
(2) TERMINATOR CONFIGURATION.

PIN NO.

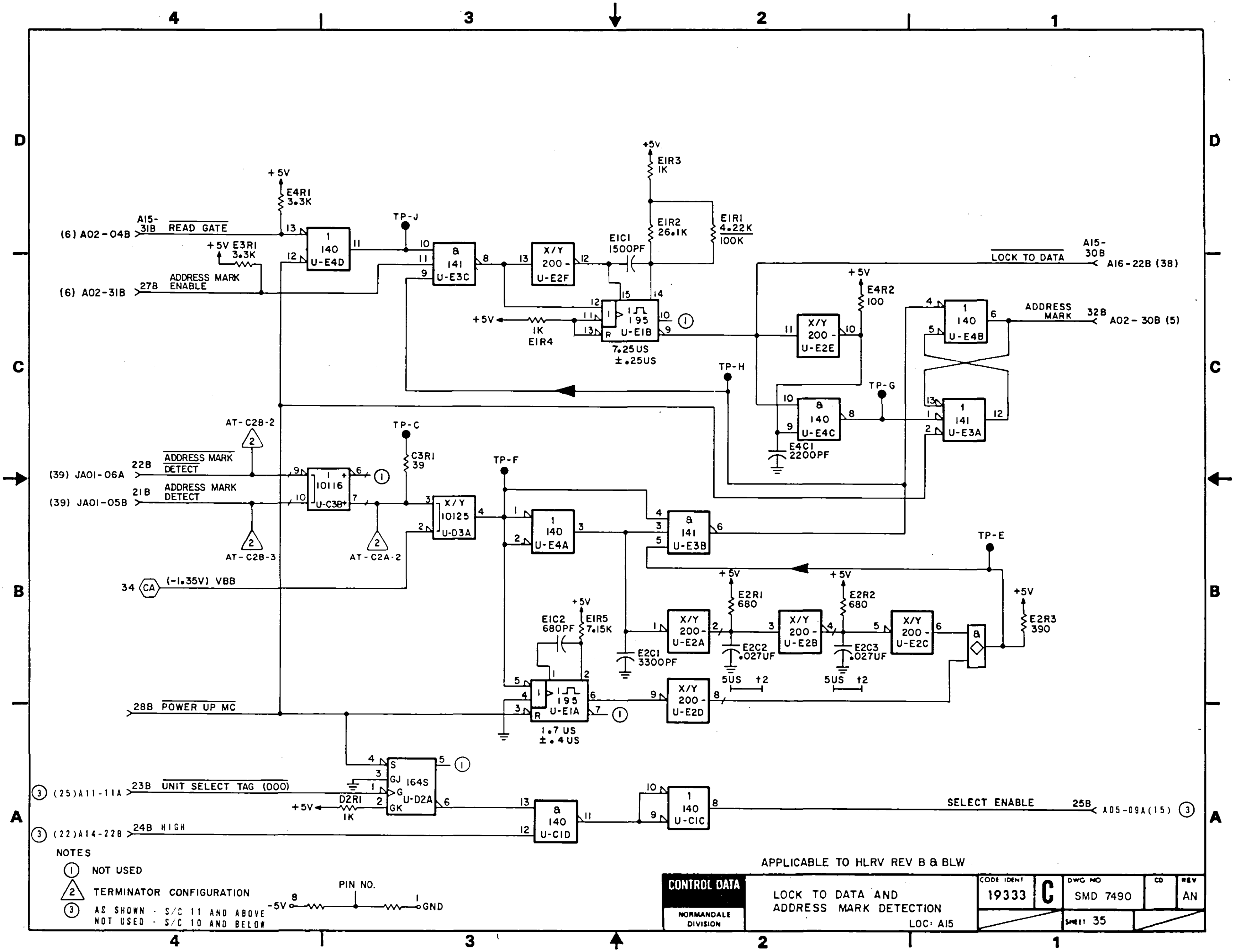
-5V 8 — 1 GND

APPLICABLE TO ELRV

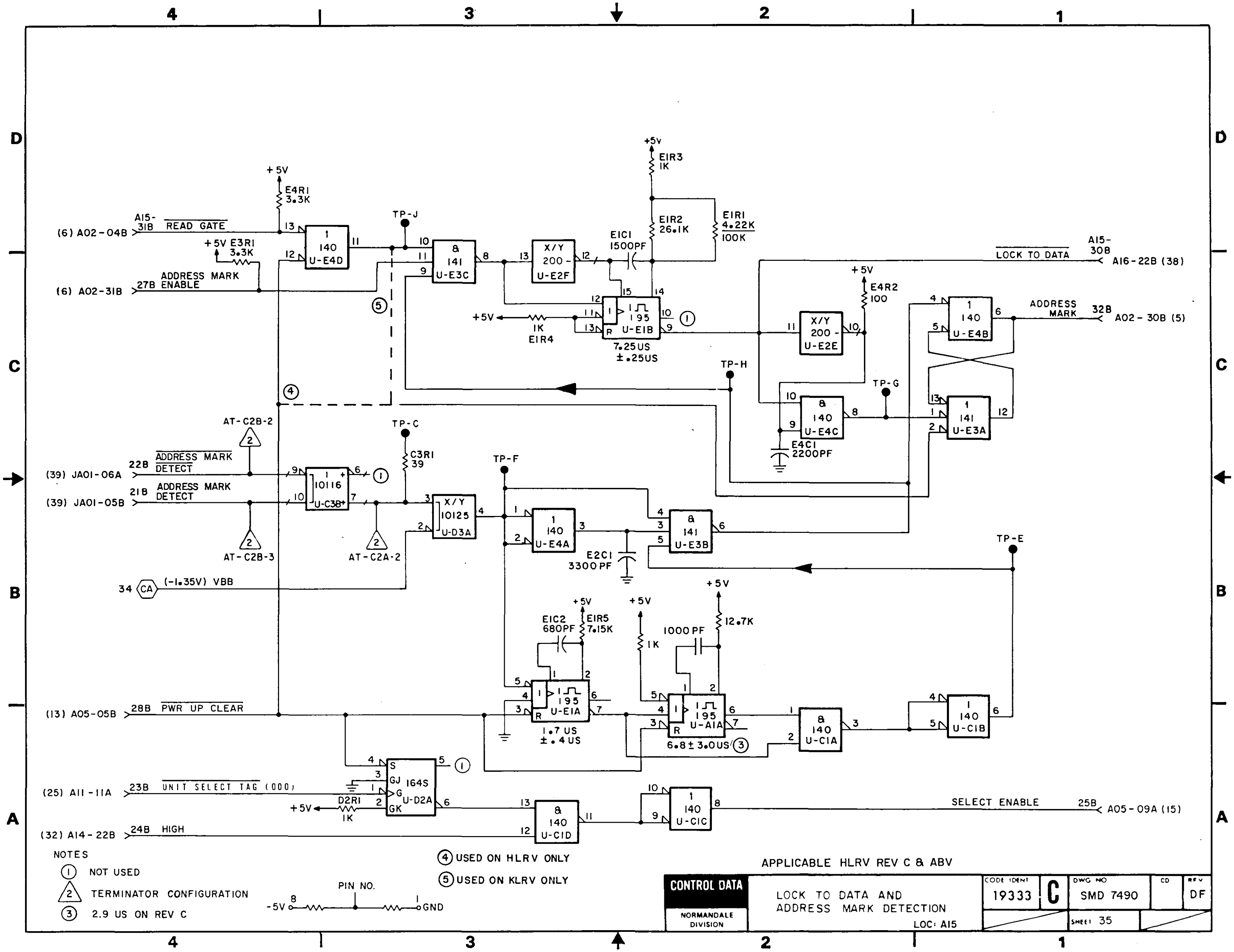
CONTROL DATA NORMANDALE DIVISION	LOCK TO DATA AND ADDRESS MARK DETECTION LOC: A15	CODE IDENT 19333	C	DWG NO SMD 7490 SHEET 35	REV B

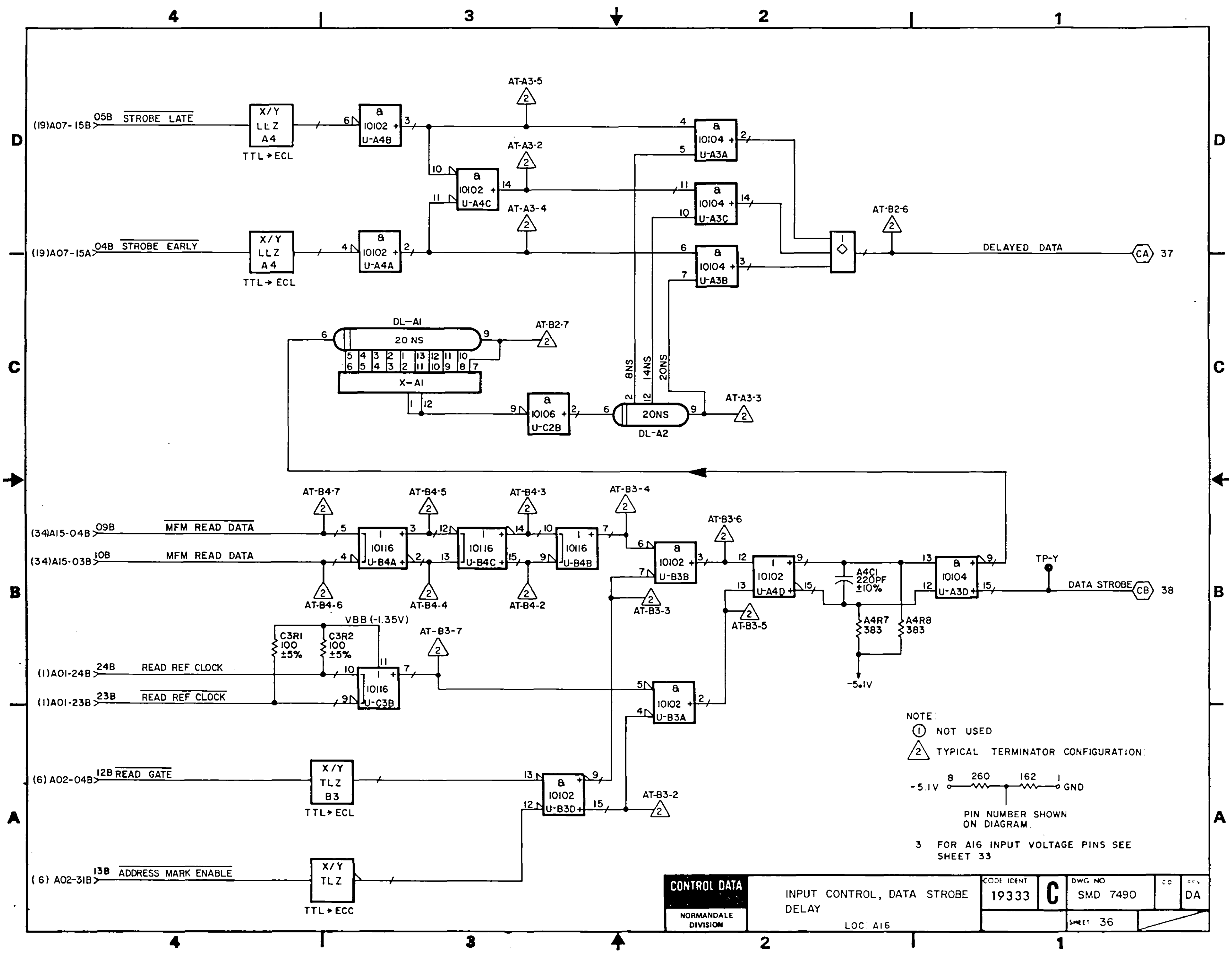

READ GATE
(6) A02-04B
A15-31B
(39) JA01-06A
22B MISSING ADDRESS
(39) JA01-05B
21B MISSING ADDRESS
AT-C2B
AT-C2A
10116 U-C3B
TP-C
C3R1 39
X/Y 10125 U-D3A
172H U-E3A
40NS t2 UBR E3C1
172H U-E3B
TP-F
172H U-E3D
172H U-E3C
LOCK-TO-DATA+AM
A15-30B
A16-22B (38)
30 CA VBB (-1.35V)
+5V
E4R1 8.06K ±1%
E4C1 680 PF ±10%
TP-E
E4R2 3.3K
195 U-E4A
1.7 MS
E4R3 8.06K ±1%
E4C2 6800PF ±10%
195 U-E4B
17 MS
ADDRESS MARK 32B
A02-30B (5)
34B +5V
1B -5V
33B +20V
2B -20V
TPA
TPZ
34A
1A
NOTES:
1 NOT USED
2 TERMINATOR CONFIGURATION -5V 8 PIN NO. 1 GND
APPLICABLE TO ALRV
CONTROL DATA
NORMANDALE DIVISION
ADDRESS MARK DETECT
LOC: A15
CODE IDENT 19333
C
DWG NO. SMD 7490
CD
REV B
SHEET 35

83311300 AC

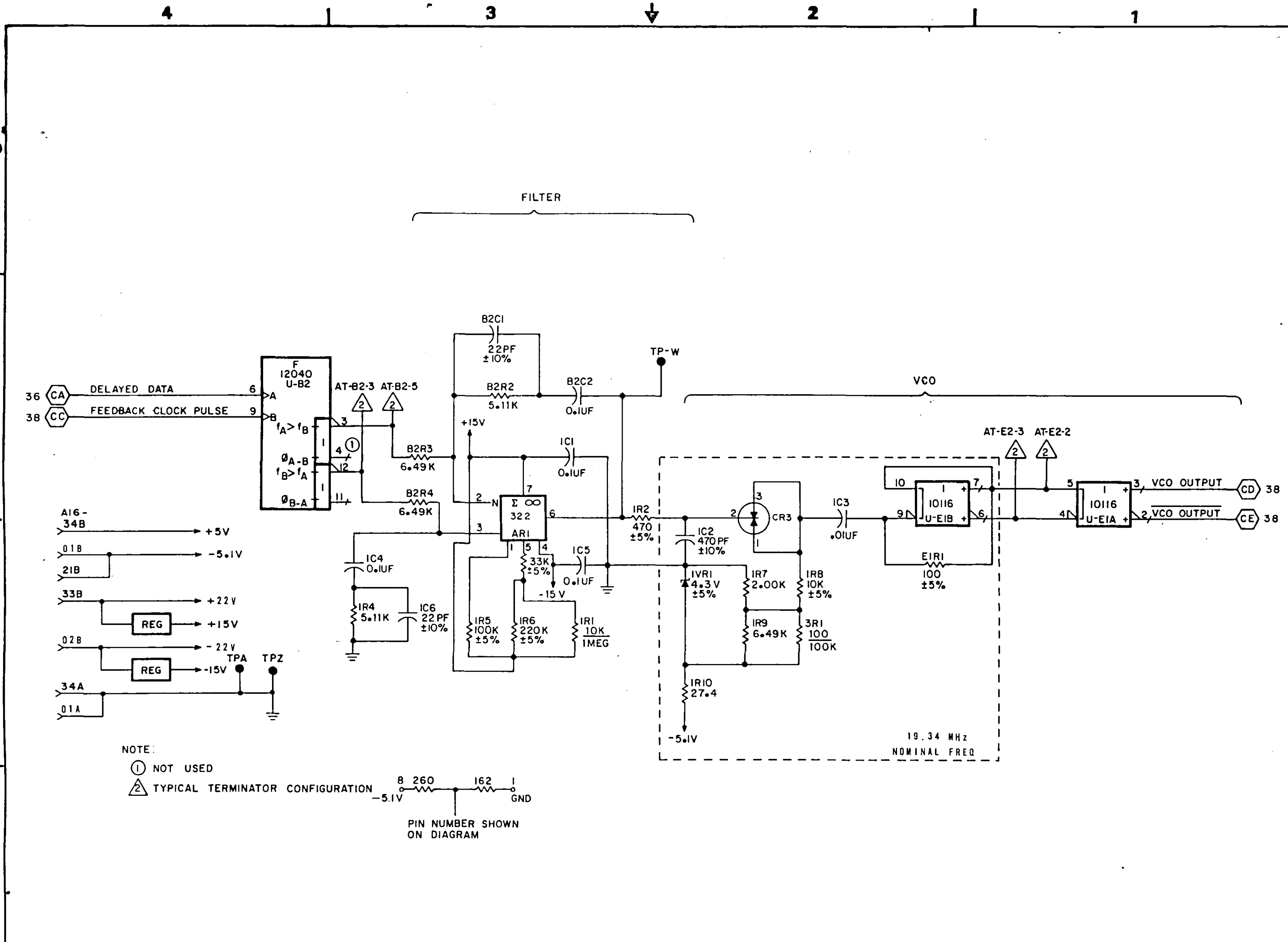


(6) A02-04B
A15-31B
READ GATE
+5V
E4R1 3.3K
+5V E3R1 3.3K
ADDRESS MARK ENABLE
(6) A02-31B 27B
1 140 U-E4D
TP-J
& 141 U-E3C
X/Y 200- U-E2F
E1C1 1500PF
E1R3 1K
E1R2 26.1K
E1R1 4.22K 100K
195 U-E1B
7.25US ±.25US
+5V E1R4 1K
LOCK TO DATA
A15-30B
A16-22B (38)
+5V E4R2 100
X/Y 200- U-E2E
1 140 U-E4B
ADDRESS MARK
32B A02-30B (5)
TP-H
TP-G
& 140 U-E4C
E4C1 2200PF
1 141 U-E3A
AT-C2B-2
ADDRESS MARK DETECT
(39) JA01-06A 22B
(39) JA01-05B 21B
ADDRESS MARK DETECT
1 10116 U-C3B
AT-C2B-3
TP-C
C3R1 39
X/Y 10125 U-D3A
AT-C2A-2
TP-F
1 140 U-E4A
& 141 U-E3B
TP-E
34 CA (-1.35V) VBB
+5V E2R1 680
+5V E2R2 680
+5V E2R3 390
X/Y 200- U-E2A
X/Y 200- U-E2B
X/Y 200- U-E2C
E2C1 3300PF
E2C2 .027UF
E2C3 .027UF
5US t2
5US t2
E1C2 680PF
+5V E1R5 7.15K
195 U-E1A
1.7 US ±.4 US
X/Y 200- U-E2D
28B POWER UP MC
164S U-D2A
(25)A11-11A 23B UNIT SELECT TAG (000)
+5V D2R1 1K
& 140 U-C1D
1 140 U-C1C
SELECT ENABLE
25B A05-09A(15)
(22)A14-22B 24B HIGH
NOTES
NOT USED
TERMINATOR CONFIGURATION
AS SHOWN - S/C 11 AND ABOVE
NOT USED - S/C 10 AND BELOW
PIN NO.
-5V 8 1 GND
APPLICABLE TO HLRV REV B & BLW
CONTROL DATA
NORMANDALE DIVISION
LOCK TO DATA AND ADDRESS MARK DETECTION
LOC: A15
CODE IDENT 19333
C
DWG NO SMD 7490
REV AN
SHEET 35

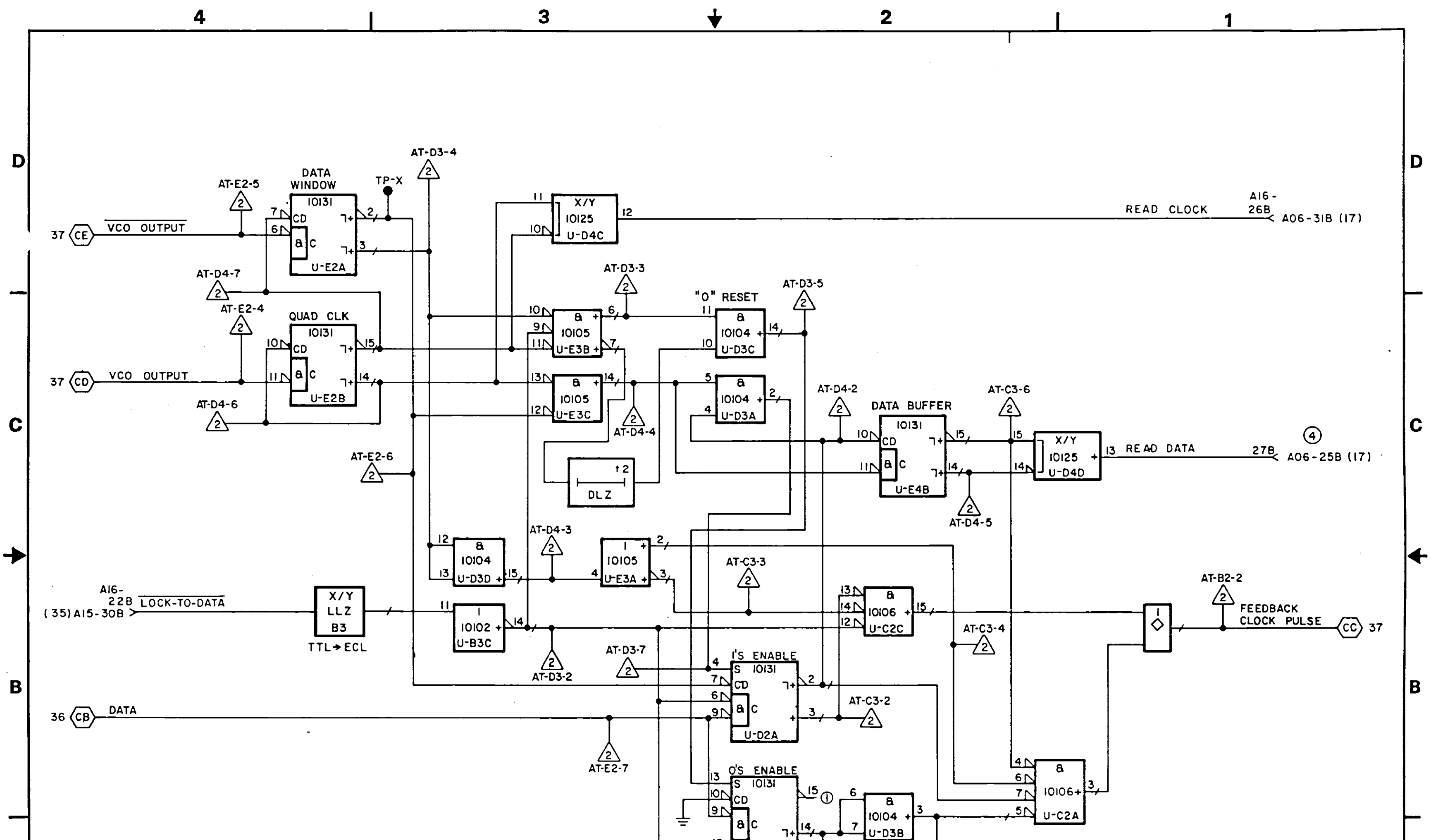

READ GATE
ADDRESS MARK ENABLE
LOCK TO DATA
ADDRESS MARK
ADDRESS MARK DETECT
PWR UP CLEAR
UNIT SELECT TAG (000)
HIGH
SELECT ENABLE
(6) A02-04B
(6) A02-31B
A16-22B (38)
A02-30B (5)
(39) JA01-06A
(39) JA01-05B
(-1.35V) VBB
(13) A05-05B
(25) A11-11A
(32) A14-22B
A05-09A (15)
7.25 US ± .25 US
1.7 US ± .4 US
6.8 ± 3.0 US
NOTES
1 NOT USED
2 TERMINATOR CONFIGURATION
3 2.9 US ON REV C
4 USED ON HLRV ONLY
5 USED ON KLRV ONLY
PIN NO.
-5V
GND
APPLICABLE HLRV REV C & ABV
CONTROL DATA
NORMANDALE DIVISION
LOCK TO DATA AND ADDRESS MARK DETECTION
LOC: A15
CODE IDENT 19333
C
DWG NO SMD 7490
REV DF
SHEET 35



(19)A07-15B 05B STROBE LATE
X/Y LLZ A4 TTL→ECL
10102 U-A4B
AT-A3-5
AT-A3-2
10102 U-A4C
AT-A3-4
(19)A07-15A 04B STROBE EARLY
X/Y LLZ A4 TTL→ECL
10102 U-A4A
10104 U-A3A
10104 U-A3C
10104 U-A3B
AT-B2-6
DELAYED DATA
CA 37
DL-A1 20 NS
AT-B2-7
X-A1
10106 U-C2B
8NS 14NS 20NS
20NS DL-A2
AT-A3-3
AT-B4-7
AT-B4-5
AT-B4-3
AT-B3-4
AT-B3-6
(34)A15-04B 09B MFM READ DATA
(34)A15-03B 10B MFM READ DATA
10116 U-B4A
10116 U-B4C
10116 U-B4B
10102 U-B3B
10102 U-A4D
A4C1 220PF ±10%
10104 U-A3D
TP-Y
DATA STROBE
CB 38
AT-B4-6
AT-B4-4
AT-B4-2
AT-B3-3
AT-B3-5
A4R7 383
A4R8 383
-5.1V
VBB (-1.35V)
C3R1 100 ±5%
C3R2 100 ±5%
AT-B3-7
(1)A01-24B 24B READ REF CLOCK
(1)A01-23B 23B READ REF CLOCK
10116 U-C3B
10102 U-B3A
(6) A02-04B 12B READ GATE
X/Y TLZ B3 TTL→ECL
10102 U-B3D
AT-B3-2
(6) A02-31B 13B ADDRESS MARK ENABLE
X/Y TLZ TTL→ECC
NOTE:
1 NOT USED
2 TYPICAL TERMINATOR CONFIGURATION:
-5.1V 8 260 162 1 GND
PIN NUMBER SHOWN ON DIAGRAM.
3 FOR A16 INPUT VOLTAGE PINS SEE SHEET 33
CONTROL DATA
NORMANDALE DIVISION
INPUT CONTROL, DATA STROBE DELAY
LOC: A16
CODE IDENT 19333
C
DWG NO SMD 7490
DA
SHEET 36



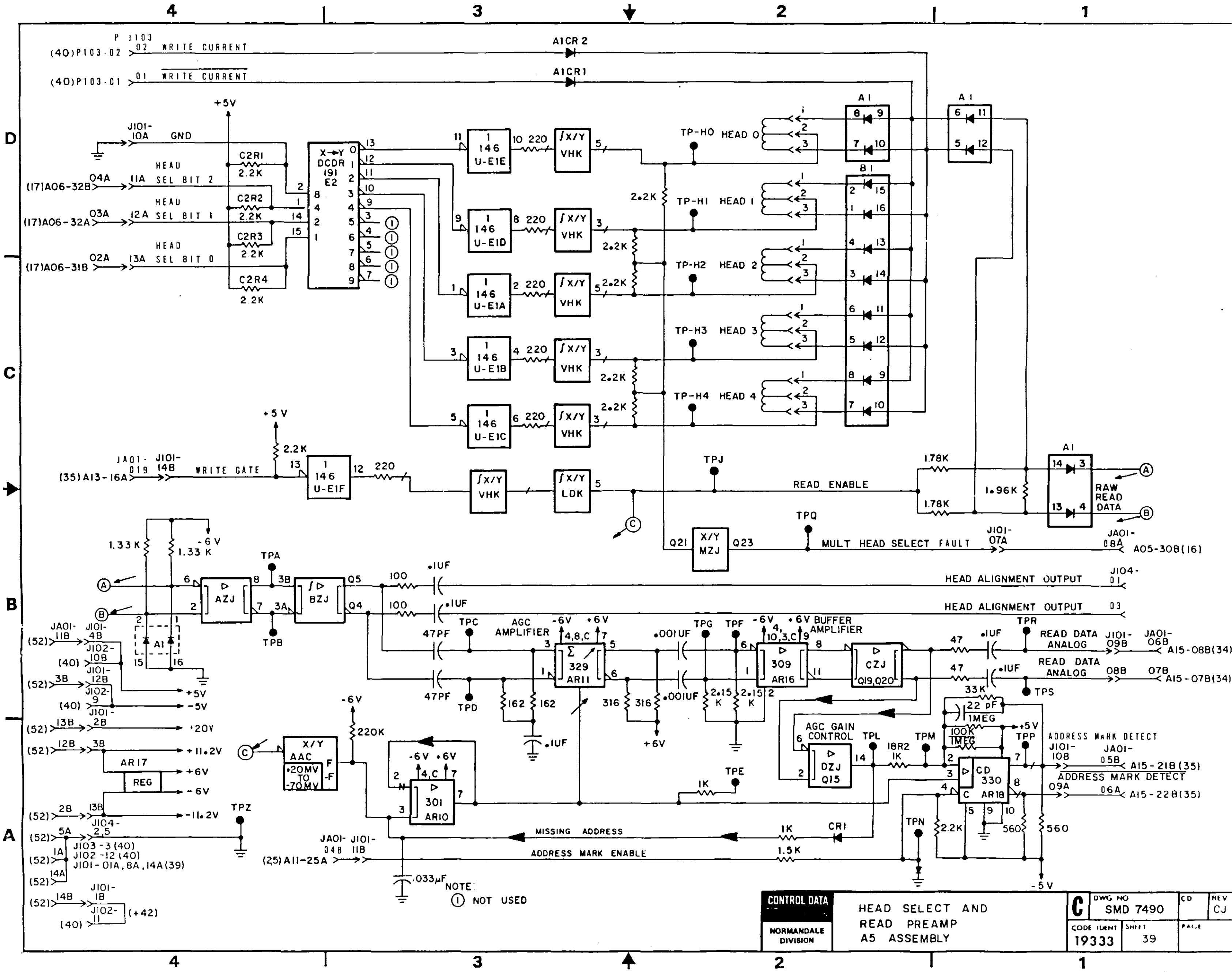
CONTROL DATA CORPORATION NORMANDALE DIVISION	PHASE/FREQ COMPTR, FILTER AND VCO LOC: A16	CODE IDENT 19333	C	DWG NO SMD 7490 REV ED SHEET 37



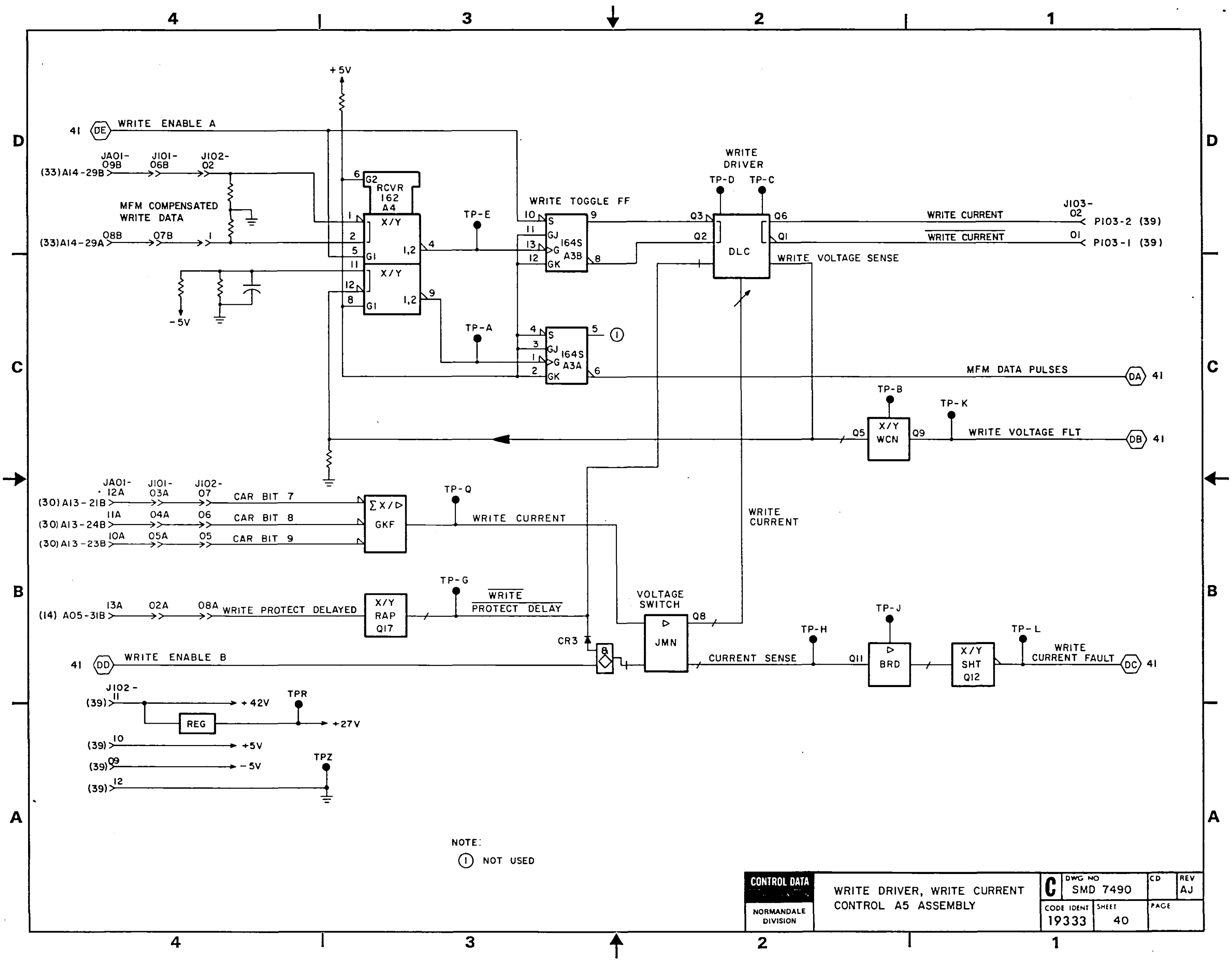
NOTE:

1. NOT USED
2. TYPICAL TERMINATOR CONFIGURATION: -5.1V 8 260 162 1 GND — PIN NUMBER SHOWN ON DIAGRAM
3. FOR A16 INPUT VOLTAGE PINS SEE SHEET 33.
4. IN DRIVES WITHOUT PLO THIS POINT IS NOT USED. IN DRIVES WITH PLO THIS POINT IS WIRED TO A06-25B.

CONTROL DATA NORMANDALE DIVISION	DATA SEPARATOR LOC: A16	CODE IDENT 19333	C	DWG NO SMD 7490	CD	REV DA
				SHEET 38		



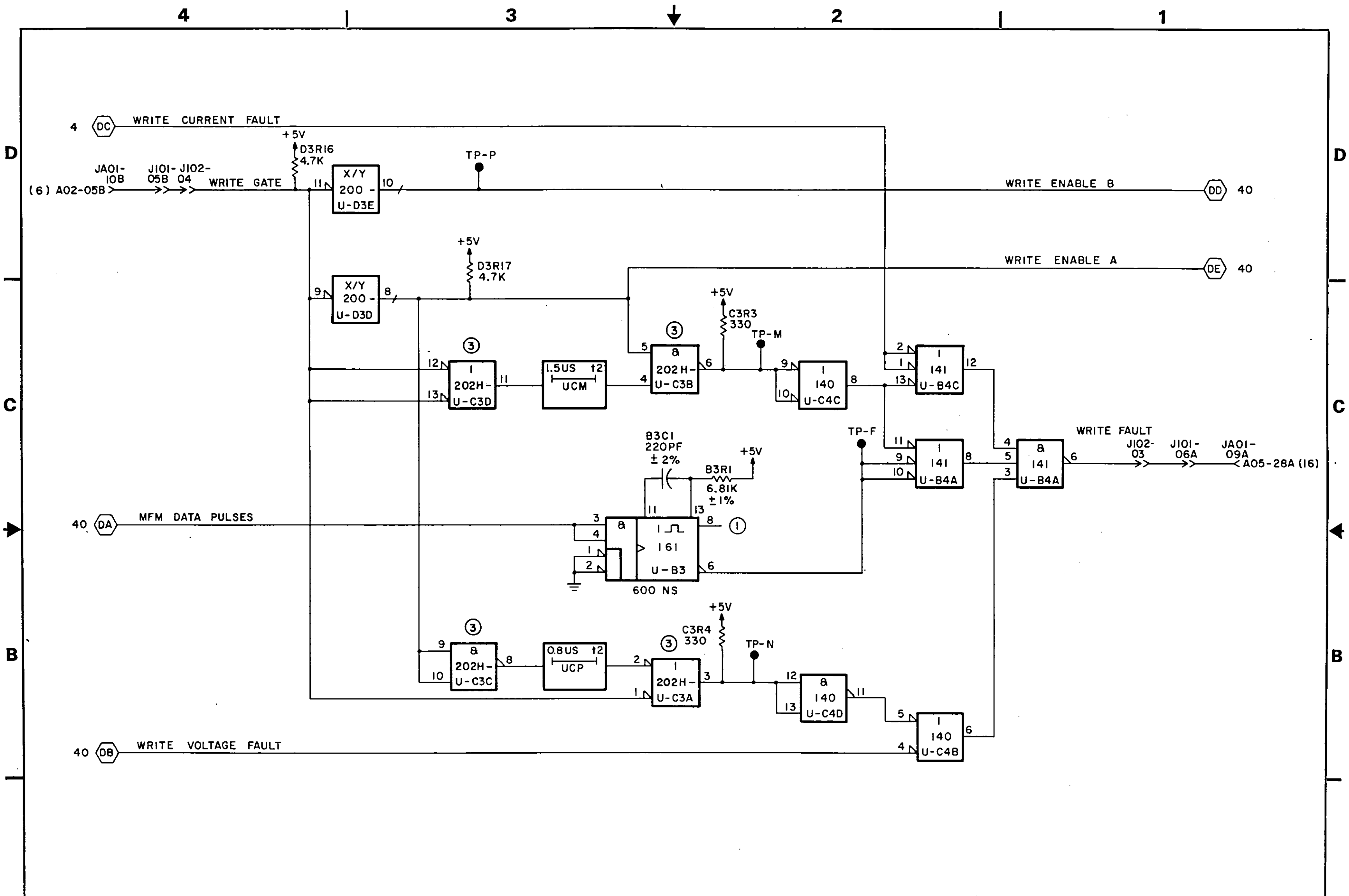
(40)P103-02 WRITE CURRENT
(40)P103-01 WRITE CURRENT
A1CR2
A1CR1
+5V
J101-10A GND
(17)A06-32B 04A 11A HEAD SEL BIT 2
(17)A06-32A 03A 12A HEAD SEL BIT 1
(17)A06-31B 02A 13A HEAD SEL BIT 0
C2R1 2.2K
C2R2 2.2K
C2R3 2.2K
C2R4 2.2K
X→Y DCDR 191 E2
146 U-E1E
146 U-E1D
146 U-E1A
146 U-E1B
146 U-E1C
146 U-E1F
VHK
LDK
TP-H0 HEAD 0
TP-H1 HEAD 1
TP-H2 HEAD 2
TP-H3 HEAD 3
TP-H4 HEAD 4
A1
B1
2.2K
(35)A13-16A JA01-019 J101-14B WRITE GATE
TPJ
READ ENABLE
1.78K
1.96K
RAW READ DATA
TPQ
X/Y MZJ
MULT HEAD SELECT FAULT
J101-07A
JA01-08A A05-30B(16)
1.33K
-6V
TPA
AZJ
BZJ
TPB
HEAD ALIGNMENT OUTPUT
J104-01
03
AGC AMPLIFIER
329 AR11
BUFFER AMPLIFIER
309 AR16
CZJ Q19,Q20
READ DATA ANALOG
J101-09B JA01-06B A15-08B(34)
08B 07B A15-07B(34)
TPC TPD TPG TPF TPR TPS
47PF
.001UF
.1UF
162 316 2.15K
33K 22 pF 1MEG 100K 1MEG
AGC GAIN CONTROL DZJ Q15
TPL TPM TPP
18R2 1K
CD 330 AR18
ADDRESS MARK DETECT
J101-10B JA01-05B A15-21B(35)
09A 06A A15-22B(35)
X/Y AAC +20MV TO -70MV
220K
301 AR10
TPE
MISSING ADDRESS
CR1
ADDRESS MARK ENABLE
(25)A11-25A JA01-04B J101-11B
.033μF
TPN
2.2K 560 560
-5V
AR17 REG
+5V -5V +20V +11.2V +6V -6V -11.2V
TPZ
J103-3(40) J102-12(40) J101-01A,8A,14A(39)
J102-11 (+42)
NOTE: 1 NOT USED
CONTROL DATA
NORMANDALE DIVISION
HEAD SELECT AND READ PREAMP A5 ASSEMBLY
C
DWG NO SMD 7490
REV CJ
CODE IDENT 19333
SHEET 39



CONTROL DATA
NORMANDALE DIVISION

WRITE DRIVER, WRITE CURRENT CONTROL A5 ASSEMBLY

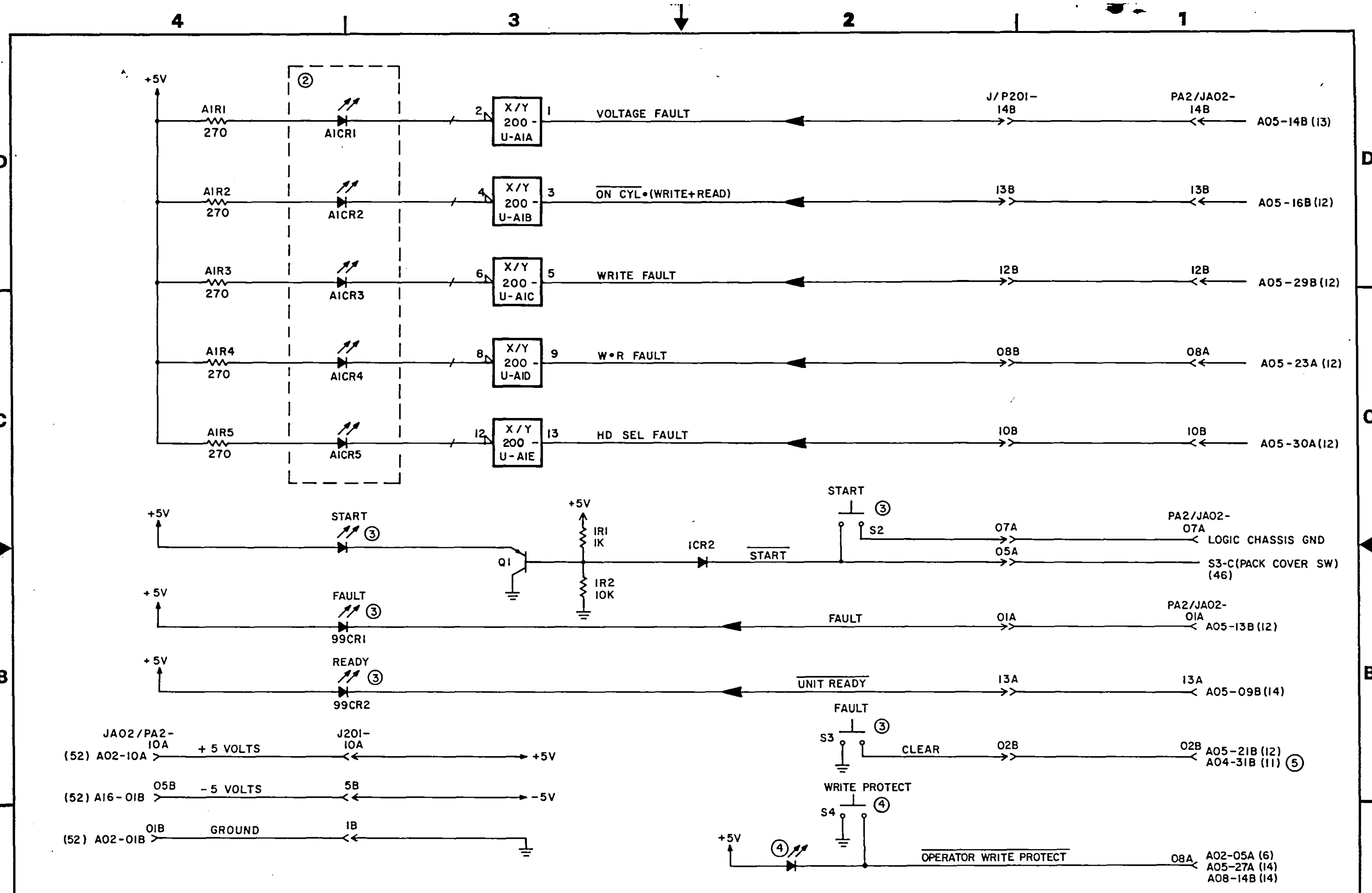
C	DWG NO SMD 7490	CD	REV AJ
CODE IDENT 19333	SHEET 40	PAGE	



NOTES:

1. NOT USED
2. REFER TO SHEET 37 FOR INPUT VOLTAGE PINS.
3. 149H CHIP USED ON FLWV REV B & BELOW

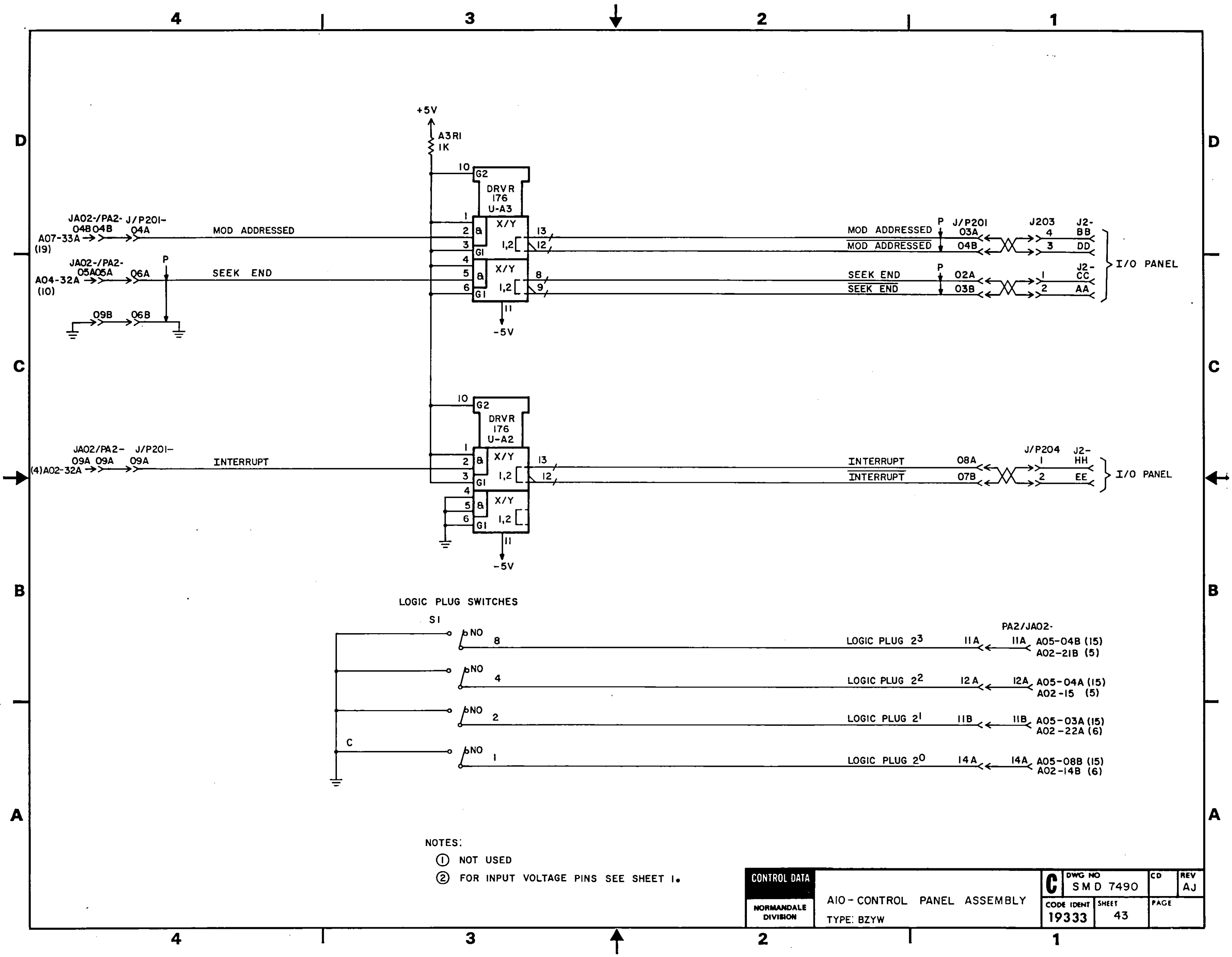
NORMANDALE DIVISION	WRITE ENABLE AND WRITE FAULT DETECT A5 ASSEMBLY	C	DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 41	PAGE	



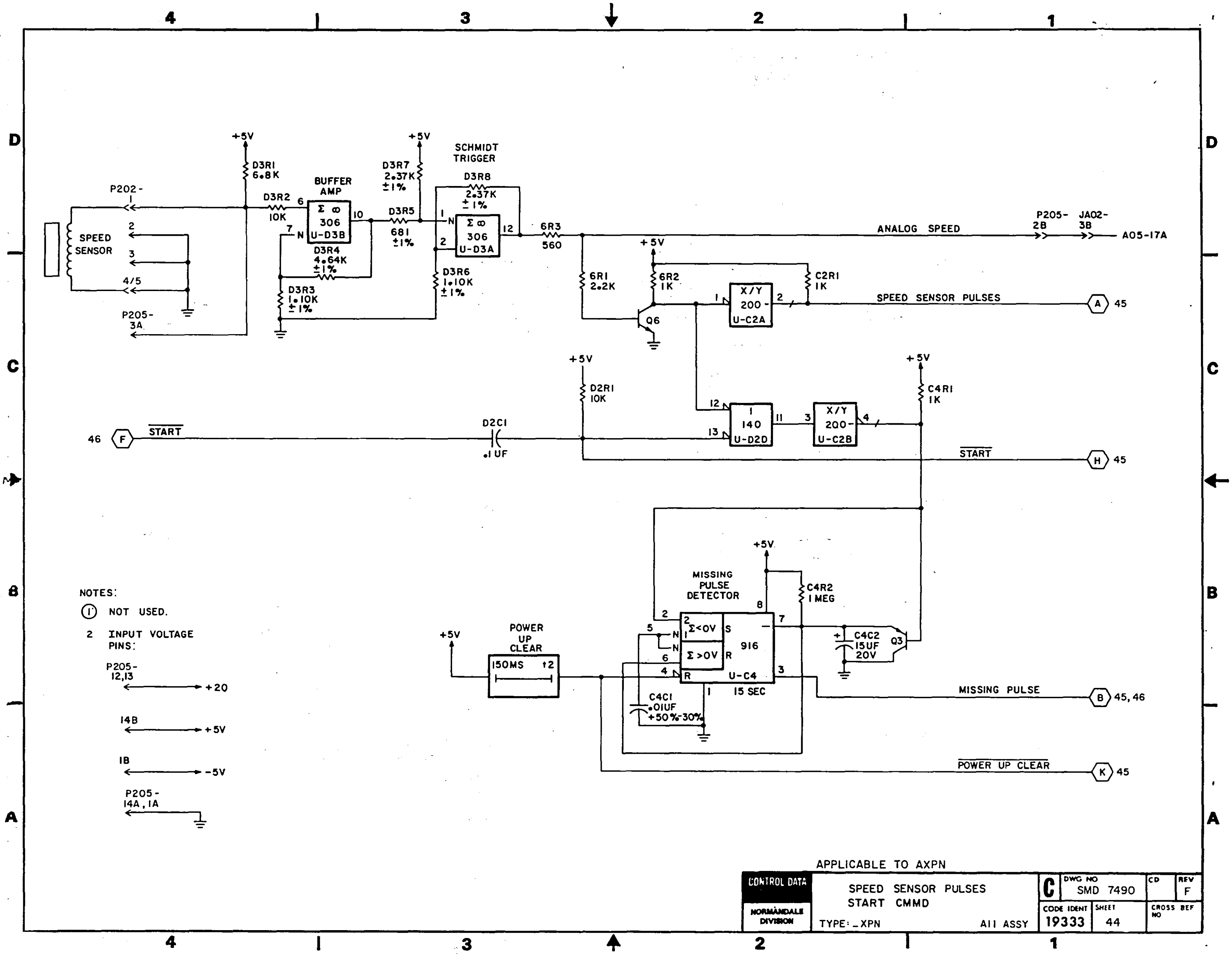
NOTES:

1. NOT USED
2. LOCATED ON BACK OF PC BOARD
3. LOCATED ON OPERATOR CONTROL PANEL FRONT
4. WRITE PROTECT OPTION (EZYN)
5. ELVV ONLY

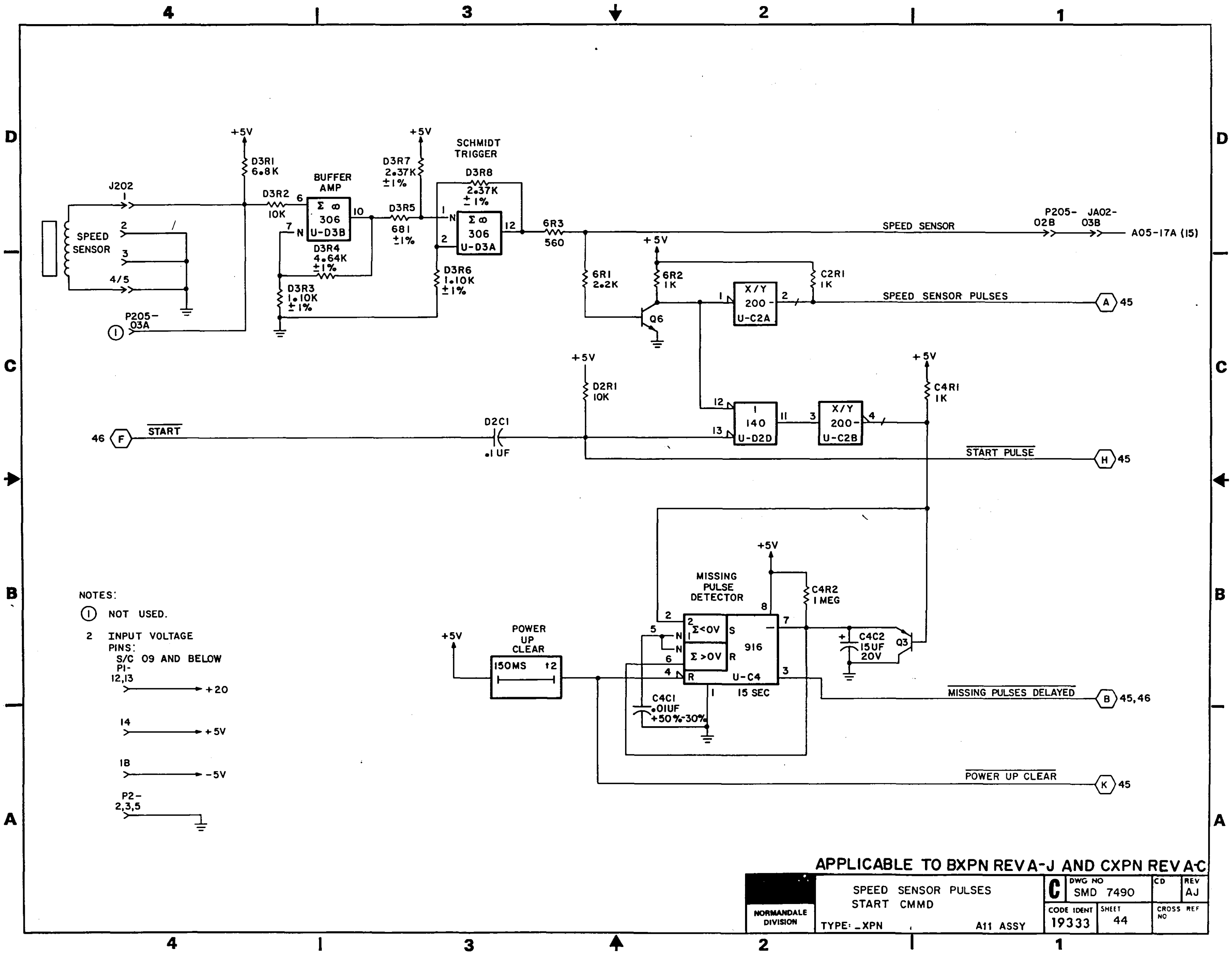
CONTROL DATA	A1O - CONTROL PANEL ASSEMBLY	C	DWG NO SMD 7490	CD	REV AJ
NORMANDALE DIVISION	TYPE: BZYN	CODE IDENT 19333	SHEET 42	PAGE	



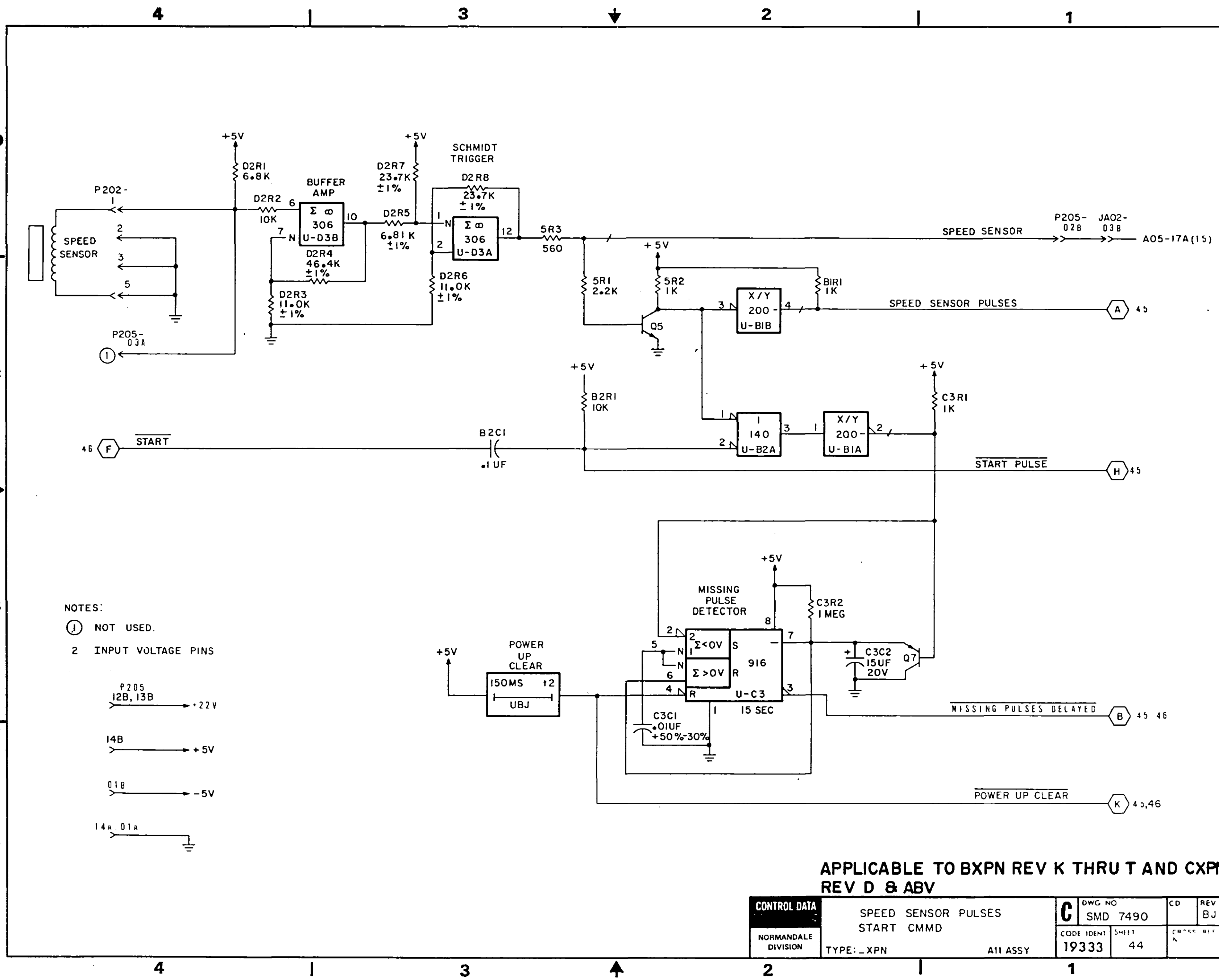
+5V
A3R1
1K
DRVR
176
U-A3
X/Y
G2
G1
1,2
JA02-/PA2-
04B 04B
J/P201-
04A
A07-33A
(19)
MOD ADDRESSED
JA02-/PA2-
05A 05A
06A
A04-32A
(10)
SEEK END
P
09B
06B
-5V
MOD ADDRESSED
P
J/P201
03A
04B
J203
J2-
BB
DD
SEEK END
02A
03B
J2-
CC
AA
I/O PANEL
DRVR
176
U-A2
JA02/PA2-
09A 09A
J/P201-
09A
(4)A02-32A
INTERRUPT
INTERRUPT
08A
07B
J/P204
J2-
HH
EE
I/O PANEL
LOGIC PLUG SWITCHES
S1
NO
C
PA2/JA02-
LOGIC PLUG 2^3
11A
11A
A05-04B (15)
A02-21B (5)
LOGIC PLUG 2^2
12A
12A
A05-04A (15)
A02-15 (5)
LOGIC PLUG 2^1
11B
11B
A05-03A (15)
A02-22A (6)
LOGIC PLUG 2^0
14A
14A
A05-08B (15)
A02-14B (6)
NOTES:
1 NOT USED
2 FOR INPUT VOLTAGE PINS SEE SHEET 1.
CONTROL DATA
NORMANDALE DIVISION
AIO-CONTROL PANEL ASSEMBLY
TYPE: BZYW
C
DWG NO
SMD 7490
CD
REV
AJ
CODE IDENT
19333
SHEET
43
PAGE

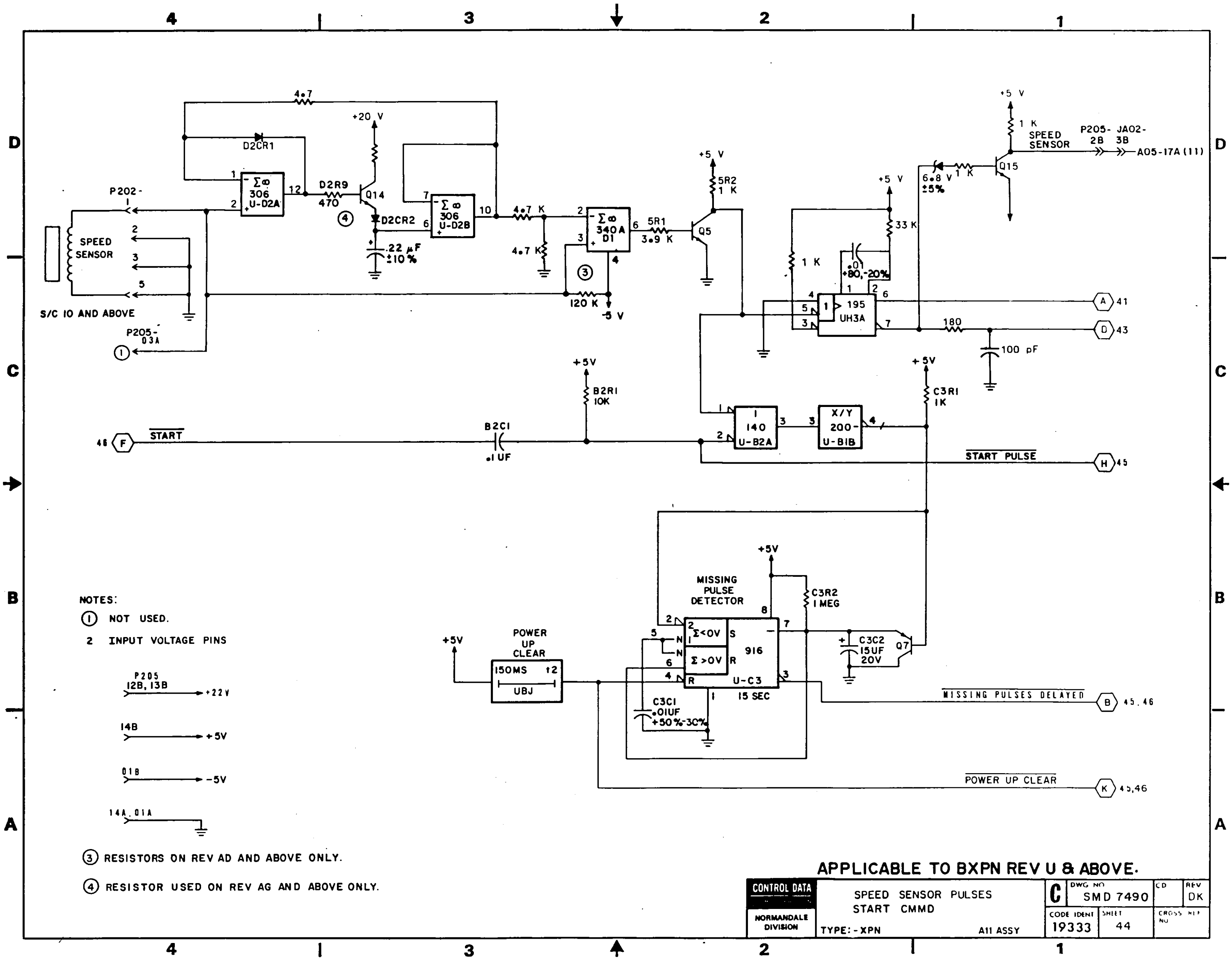


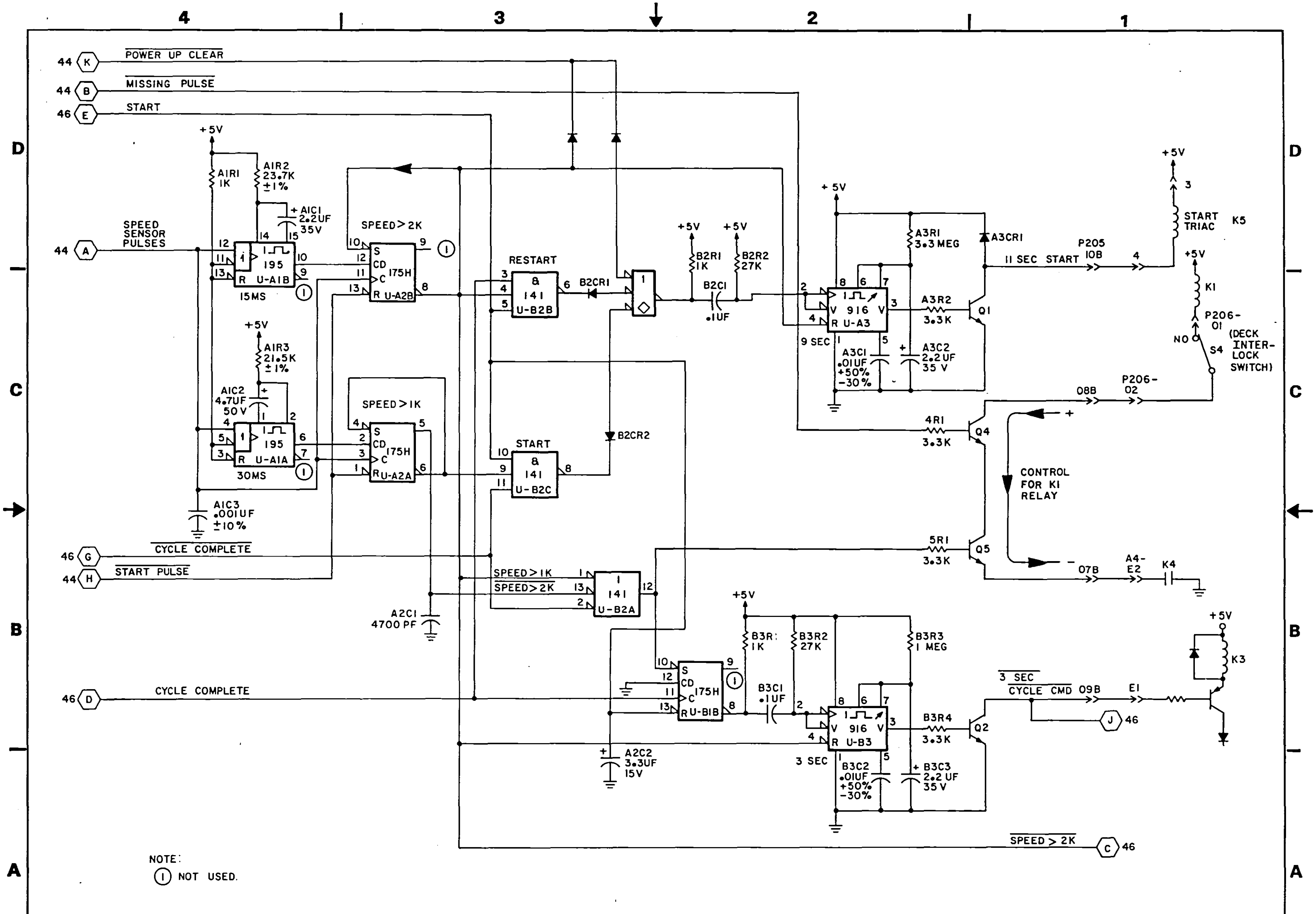
P202-
1
2
3
4/5
SPEED SENSOR
P205-
3A
+5V
D3R1
6.8K
D3R2
10K
BUFFER AMP
Σ ∞
306
U-D3B
D3R4
4.64K
±1%
D3R3
1.10K
±1%
+5V
D3R7
2.37K
±1%
D3R5
681
±1%
SCHMIDT TRIGGER
D3R8
2.37K
±1%
Σ ∞
306
U-D3A
D3R6
1.10K
±1%
6R3
560
ANALOG SPEED
P205-
2B
JA02-
3B
A05-17A
6R1
2.2K
6R2
1K
Q6
X/Y
200
U-C2A
C2R1
1K
SPEED SENSOR PULSES
A 45
+5V
D2R1
10K
46 F
START
D2C1
.1 UF
1
140
U-D2D
X/Y
200
U-C2B
+5V
C4R1
1K
START
H 45
+5V
MISSING PULSE DETECTOR
C4R2
1 MEG
Σ<0V
Σ>0V
916
U-C4
15 SEC
C4C2
15UF
20V
Q3
MISSING PULSE
B 45, 46
+5V
POWER UP CLEAR
150MS
C4C1
.01UF
+50%-30%
POWER UP CLEAR
K 45
NOTES:
1 NOT USED.
2 INPUT VOLTAGE PINS:
P205-
12,13
+20
14B
+5V
1B
-5V
P205-
14A, 1A
APPLICABLE TO AXPN
CONTROL DATA
NORMANDALE DIVISION
SPEED SENSOR PULSES
START CMMD
TYPE: XPN
A11 ASSY
C
DWG NO
SMD 7490
CD
REV
F
CODE IDENT
19333
SHEET
44
CROSS REF NO



SPEED SENSOR
J202
P205-03A
+5V
D3R1 6.8K
BUFFER AMP
D3R2 10K
Σ ∞ 306 U-D3B
D3R4 4.64K ±1%
D3R3 1.10K ±1%
D3R7 2.37K ±1%
D3R5 681 ±1%
SCHMIDT TRIGGER
D3R8 2.37K ±1%
Σ ∞ 306 U-D3A
D3R6 1.10K ±1%
6R3 560
6R1 2.2K
6R2 1K
Q6
X/Y 200 U-C2A
C2R1 1K
SPEED SENSOR
P205-02B
JA02-03B
A05-17A (15)
SPEED SENSOR PULSES
A 45
START
46 F
D2C1 .1 UF
D2R1 10K
1 140 U-D2D
X/Y 200 U-C2B
C4R1 1K
START PULSE
H 45
MISSING PULSE DETECTOR
Σ<0V
Σ>0V
916
U-C4
15 SEC
C4R2 1 MEG
C4C2 15UF 20V
Q3
C4C1 .01UF +50%-30%
POWER UP CLEAR
150MS
MISSING PULSES DELAYED
B 45,46
POWER UP CLEAR
K 45
NOTES:
1 NOT USED.
2 INPUT VOLTAGE PINS:
S/C 09 AND BELOW
P1-12,13 +20
14 +5V
18 -5V
P2-2,3,5
APPLICABLE TO BXPN REV A-J AND CXPN REV A-C
NORMANDALE DIVISION
SPEED SENSOR PULSES
START CMMD
TYPE: _XPN
A11 ASSY
C
DWG NO SMD 7490
CD
REV AJ
CODE IDENT 19333
SHEET 44
CROSS REF NO


SPEED SENSOR
P202-1
P205-03A
+5V
D2R1 6.8K
D2R2 10K
BUFFER AMP
306 U-D3B
D2R4 46.4K ±1%
D2R3 11.0K ±1%
D2R7 23.7K ±1%
D2R5 6.81K ±1%
SCHMIDT TRIGGER
D2R8 23.7K ±1%
306 U-D3A
D2R6 11.0K ±1%
5R3 560
5R1 2.2K
5R2 1K
Q5
X/Y 200 U-B1B
B1R1 1K
SPEED SENSOR
P205-02B
JA02-03B
A05-17A(15)
SPEED SENSOR PULSES
A 45
START
F 46
B2C1 .1 UF
B2R1 10K
140 U-B2A
X/Y 200 U-B1A
C3R1 1K
START PULSE
H 45
MISSING PULSE DETECTOR
C3R2 1 MEG
Σ<0V
Σ>0V
916
U-C3
15 SEC
C3C2 15UF 20V
Q7
C3C1 .01UF +50%-30%
POWER UP CLEAR
150MS
UBJ
MISSING PULSES DELAYED
B 45 46
POWER UP CLEAR
K 45,46
NOTES:
1 NOT USED.
2 INPUT VOLTAGE PINS
P205 12B, 13B +22V
14B +5V
01B -5V
14A, 01A
APPLICABLE TO BXPN REV K THRU T AND CXPN REV D & ABV
CONTROL DATA
NORMANDALE DIVISION
SPEED SENSOR PULSES
START CMMD
TYPE: _XPN
A11 ASSY
C
DWG NO SMD 7490
REV BJ
CODE IDENT 19333
SHEET 44


4.7
+20 V
D2CR1
P202-
1
1
Σ∞
306
U-D2A
12
D2R9
470
Q14
4
D2CR2
7
Σ∞
306
U-D2B
6
10
4.7 K
2
Σ∞
340A
D1
3
4
6
5R1
3.9 K
Q5
+5 V
5R2
1 K
4.7 K
3
120 K
-5 V
SPEED
SENSOR
2
3
5
S/C 10 AND ABOVE
P205-
03A
1
+5 V
33 K
1 K
.01
+80,-20%
195
UH3A
A 41
180
D 43
100 pF
+5 V
1 K
SPEED
SENSOR
P205- JA02-
2B 3B
A05-17A (11)
6.8 V
±5%
1 K
Q15
+5V
B2R1
10K
46 F
START
B2C1
.1 UF
140
U-B2A
X/Y
200
U-B1B
+5V
C3R1
1K
START PULSE
H 45
+5V
MISSING
PULSE
DETECTOR
C3R2
1 MEG
+5V
POWER
UP
CLEAR
150MS
UBJ
Σ<0V
Σ>0V
916
U-C3
15 SEC
S
R
N
C3C1
.01UF
+50%-30%
C3C2
15UF
20V
Q7
MISSING PULSES DELAYED
B 45,46
POWER UP CLEAR
K 45,46
NOTES:
1 NOT USED.
2 INPUT VOLTAGE PINS
P205
12B, 13B
+22V
14B
+5V
01B
-5V
14A, 01A
3 RESISTORS ON REV AD AND ABOVE ONLY.
4 RESISTOR USED ON REV AG AND ABOVE ONLY.
APPLICABLE TO BXPN REV U & ABOVE.
CONTROL DATA
NORMANDALE DIVISION
SPEED SENSOR PULSES
START CMMD
TYPE: -XPN
A11 ASSY
C
DWG NO
SMD 7490
REV
DK
CODE IDENT
19333
SHEET
44

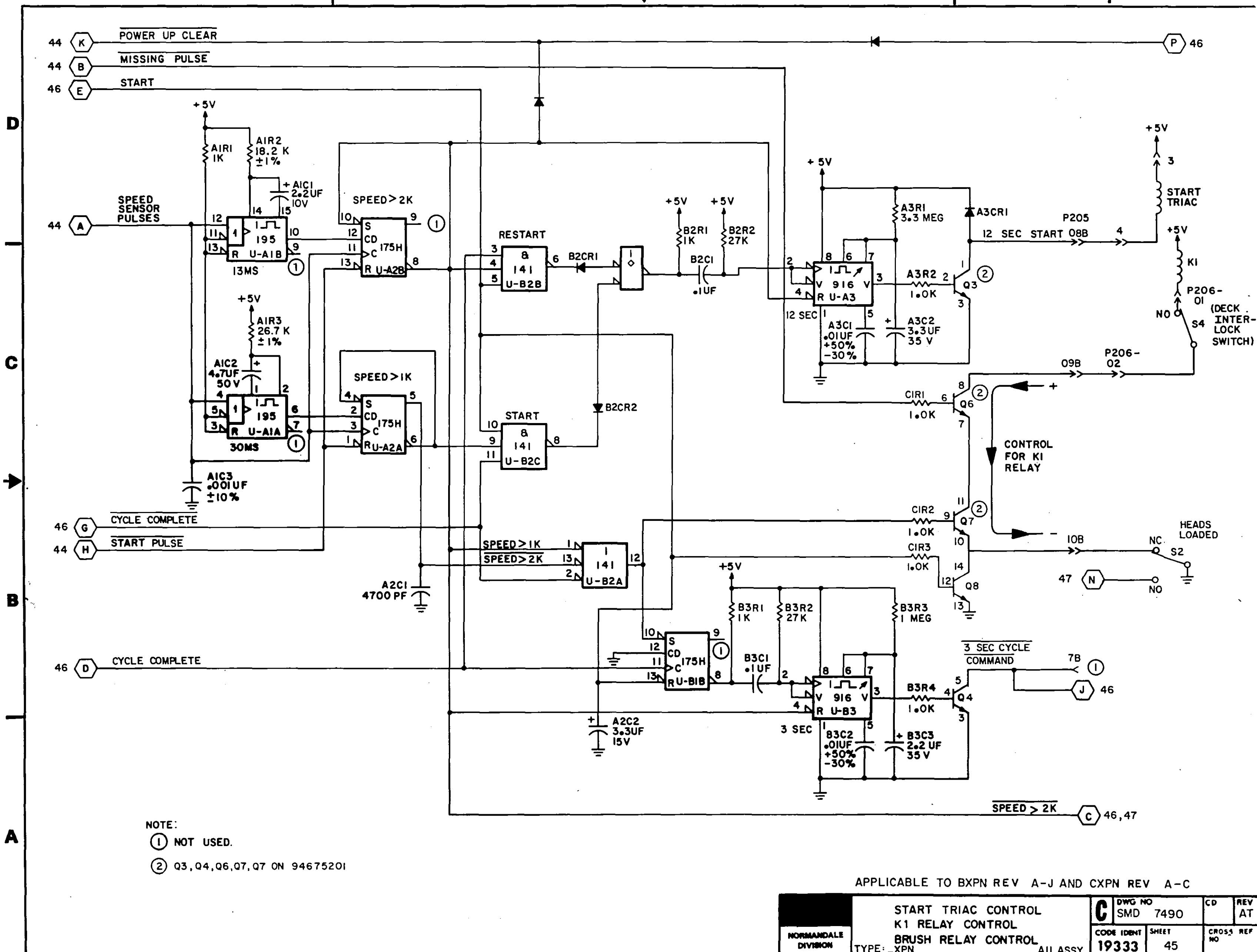


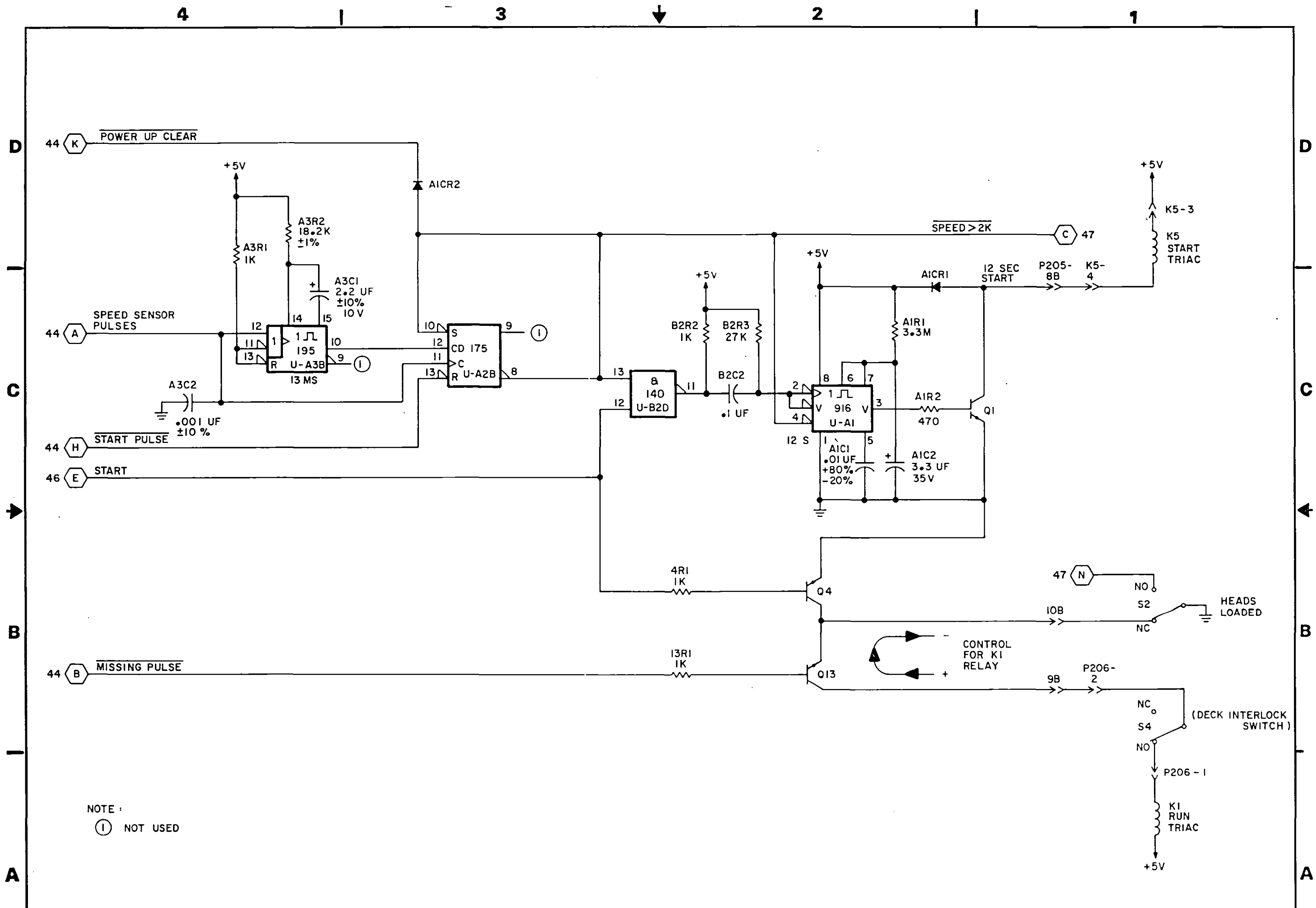
APPLICABLE TO AXPN

CONTROL DATA
NORMANDALE DIVISION

START TRIAC CONTROL
K1 RELAY CONTROL
BRUSH RELAY CONTROL
TYPE: _XPN A11 ASSY

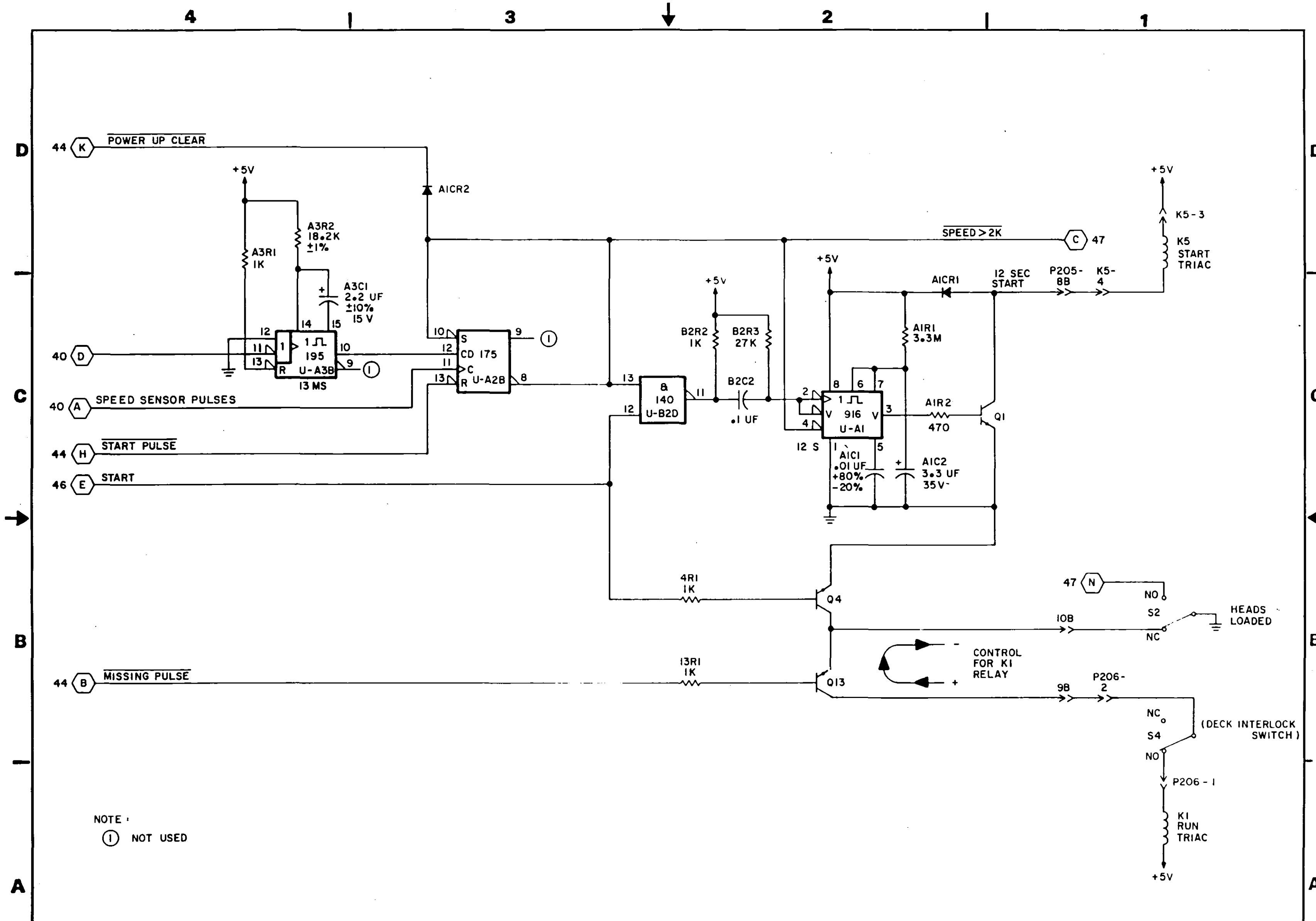
C DWG NO SMD 7490 REV AJ
CODE IDENT 19333 SHEET 45


POWER UP CLEAR
MISSING PULSE
START
SPEED SENSOR PULSES
+5V
A1R1 1K
A1R2 18.2 K ±1%
A1C1 2.2UF 10V
195 U-A1B
13MS
SPEED > 2K
175H U-A2B
RESTART
141 U-B2B
B2CR1
B2R1 1K
B2R2 27K
B2C1 .1UF
916 U-A3
12 SEC
A3C1 .01UF +50% -30%
A3C2 3.3UF 35 V
A3R1 3.3 MEG
A3CR1
A3R2 1.0K
Q3
P205
12 SEC START 08B
START TRIAC
K1
P206-01
(DECK INTER-LOCK SWITCH)
S4
NO
A1R3 26.7 K ±1%
A1C2 4.7UF 50V
195 U-A1A
30MS
SPEED > 1K
175H U-A2A
START
141 U-B2C
B2CR2
A1C3 .001UF ±10%
09B
P206-02
C1R1 1.0K
Q6
CONTROL FOR K1 RELAY
C1R2 1.0K
Q7
C1R3 1.0K
Q8
10B
HEADS LOADED
NC
S2
CYCLE COMPLETE
START PULSE
SPEED > 1K
SPEED > 2K
141 U-B2A
A2C1 4700 PF
175H U-B1B
B3R1 1K
B3R2 27K
B3R3 1 MEG
B3C1 .1UF
916 U-B3
3 SEC
B3C2 .01UF +50% -30%
B3C3 2.2 UF 35 V
B3R4 1.0K
Q4
3 SEC CYCLE COMMAND
7B
CYCLE COMPLETE
A2C2 3.3UF 15V
SPEED > 2K
46,47
NOTE:
1 NOT USED.
2 Q3,Q4,Q6,Q7,Q7 ON 94675201
APPLICABLE TO BXPN REV A-J AND CXPN REV A-C
NORMANDALE DIVISION
START TRIAC CONTROL
K1 RELAY CONTROL
BRUSH RELAY CONTROL
TYPE: _XPN
All ASSY
C
DWG NO SMD 7490
REV AT
CODE IDENT 19333
SHEET 45



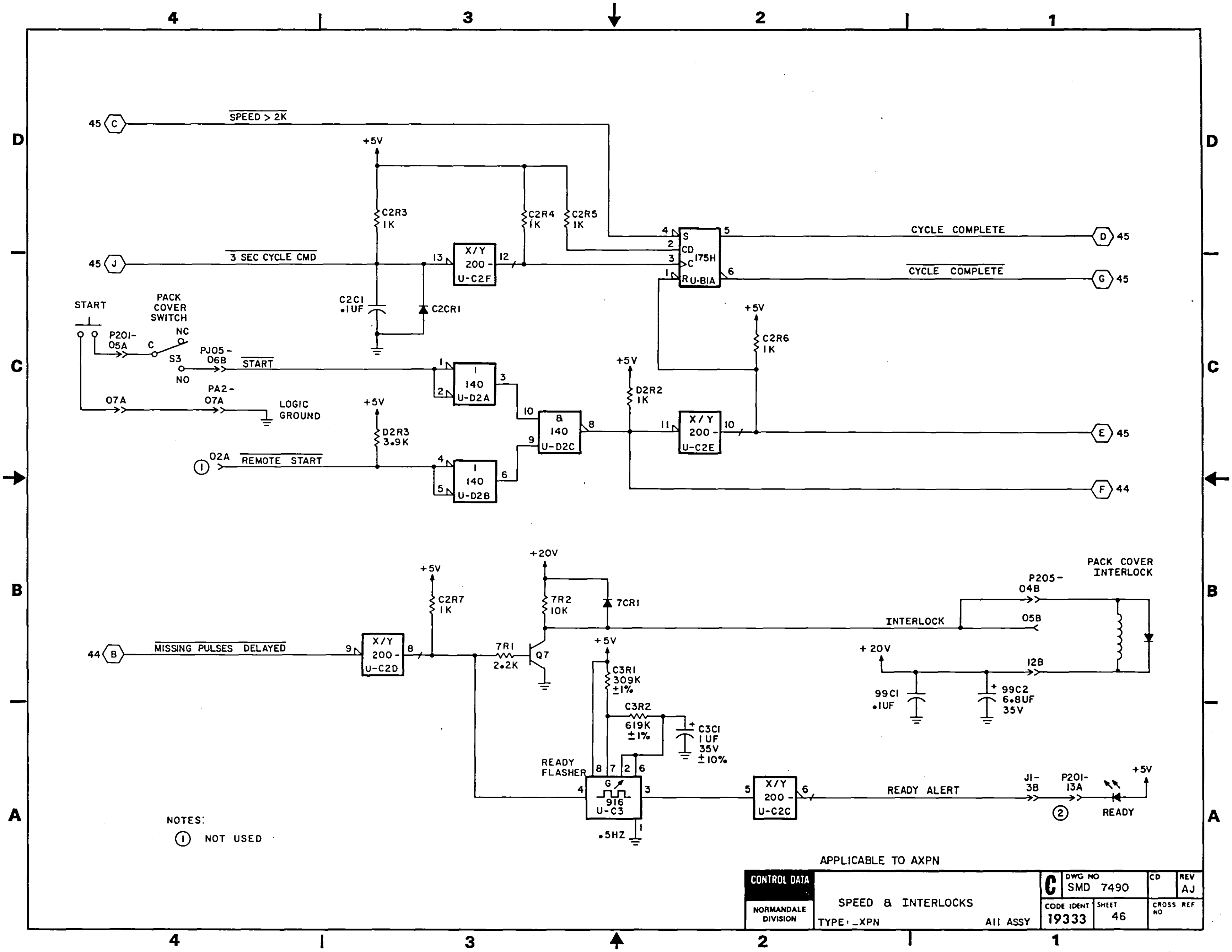
APPLICABLE TO BXPN REV K THRU T AND CXPN REV D & ABV

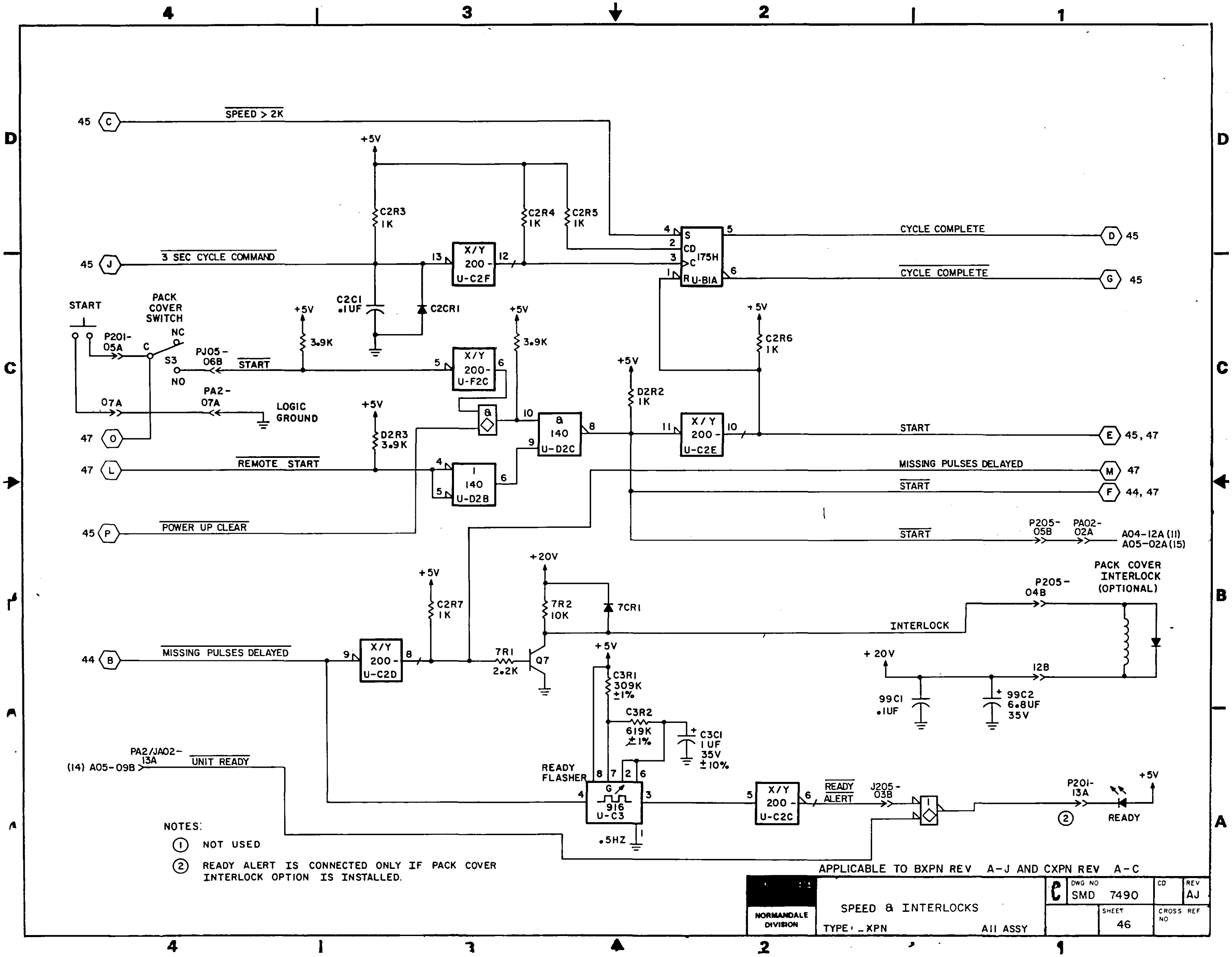
MAGNETIC PERIPHERALS INC.	START TRIAC CONTROL K1 RELAY CONTROL	NORMANDALE OPERATIONS	C	DWG NO SMD 7490	CD	REV BJ
	TYPE: _XPN A11 ASSY	CODE IDENT 19333		SHEET 45		

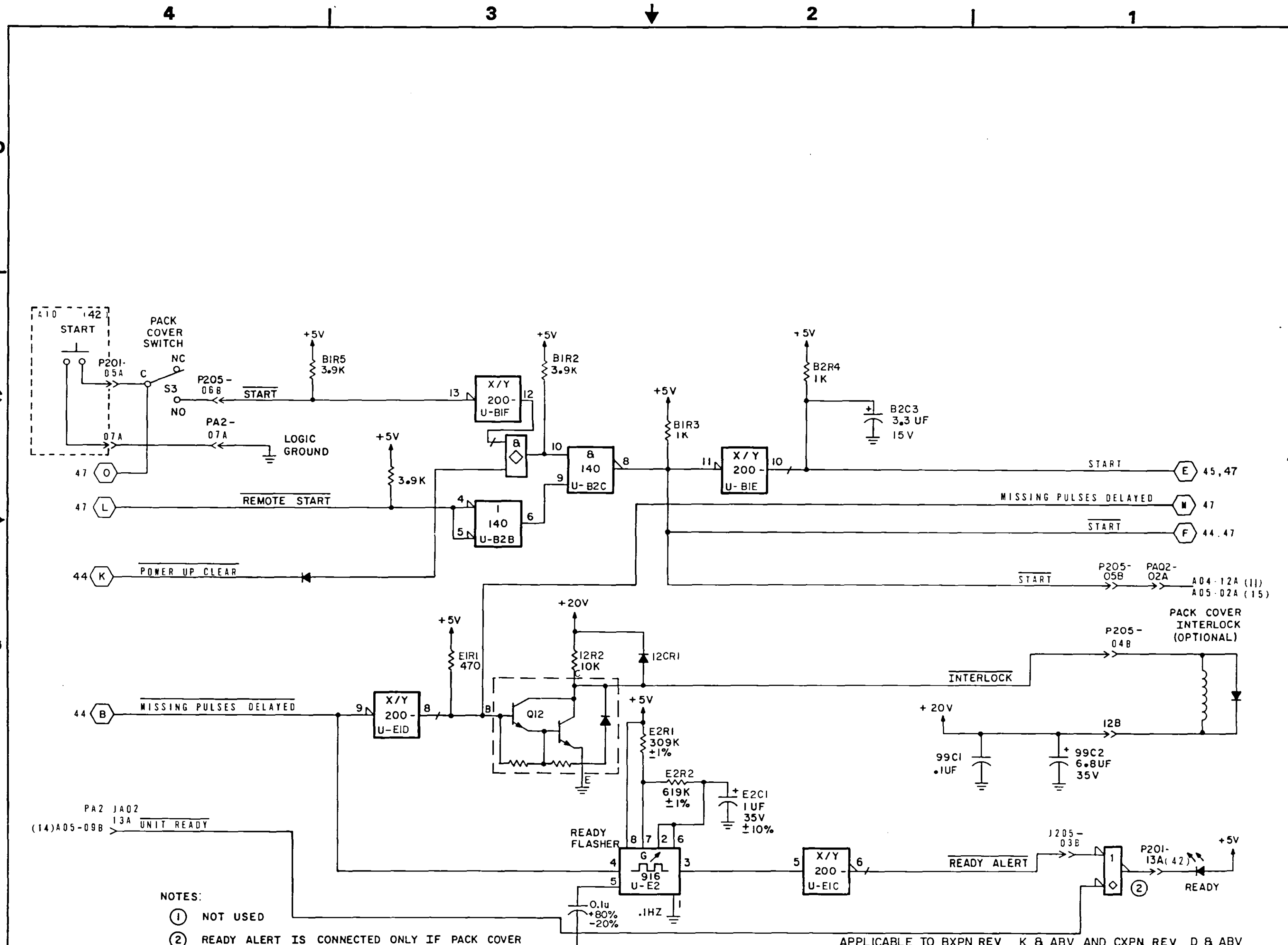


APPLICABLE TO 8XPN REV U & ABV

MAGNETIC PERIPHERALS INC. a subsidiary of CONTROL DATA CORPORATION	START TRIAC CONTROL K1 RELAY CONTROL TYPE: XPN A11 ASSY	NORMANDALE OPERATIONS	C	DWG NO SMD 7490	REV EM
		CODE IDENT 19333		SHEET 45	


SPEED > 2K
+5V
C2R3 1K
C2R4 1K
C2R5 1K
3 SEC CYCLE CMD
X/Y 200 - U-C2F
175H U-B1A
S CD C R
CYCLE COMPLETE
CYCLE COMPLETE
C2C1 .1UF
C2CR1
START
PACK COVER SWITCH
P201-05A
C NC
S3 NO
PJ05-06B
START
1 140 U-D2A
07A
PA2-07A
LOGIC GROUND
D2R3 3.9K
O2A
REMOTE START
1 140 U-D2B
8 140 U-D2C
D2R2 1K
X/Y 200 - U-C2E
C2R6 1K
+20V
C2R7 1K
7R2 10K
7CR1
PACK COVER INTERLOCK
P205-04B
05B
INTERLOCK
MISSING PULSES DELAYED
X/Y 200 - U-C2D
7R1 2.2K
Q7
C3R1 309K ±1%
C3R2 619K ±1%
C3C1 1 UF 35V ±10%
+20V
12B
99C1 .1UF
99C2 6.8UF 35V
READY FLASHER
G 916 U-C3
.5HZ
X/Y 200 - U-C2C
READY ALERT
J1-3B
P201-13A
READY
NOTES:
(1) NOT USED
APPLICABLE TO AXPN
CONTROL DATA
NORMANDALE DIVISION
SPEED & INTERLOCKS
TYPE: _XPN
A11 ASSY
C
DWG NO SMD 7490
CD
REV AJ
CODE IDENT 19333
SHEET 46
CROSS REF NO


SPEED > 2K
3 SEC CYCLE COMMAND
START
PACK COVER SWITCH
LOGIC GROUND
REMOTE START
POWER UP CLEAR
CYCLE COMPLETE
CYCLE COMPLETE
START
MISSING PULSES DELAYED
START
START
A04-12A (11)
A05-02A (15)
PACK COVER INTERLOCK (OPTIONAL)
INTERLOCK
MISSING PULSES DELAYED
READY FLASHER
UNIT READY
READY ALERT
READY
NOTES:
1 NOT USED
2 READY ALERT IS CONNECTED ONLY IF PACK COVER INTERLOCK OPTION IS INSTALLED.
APPLICABLE TO BXPN REV A-J AND CXPN REV A-C
NORMANDALE DIVISION
SPEED & INTERLOCKS
TYPE: _XPN
A11 ASSY
DWG NO SMD 7490
REV AJ
SHEET 46

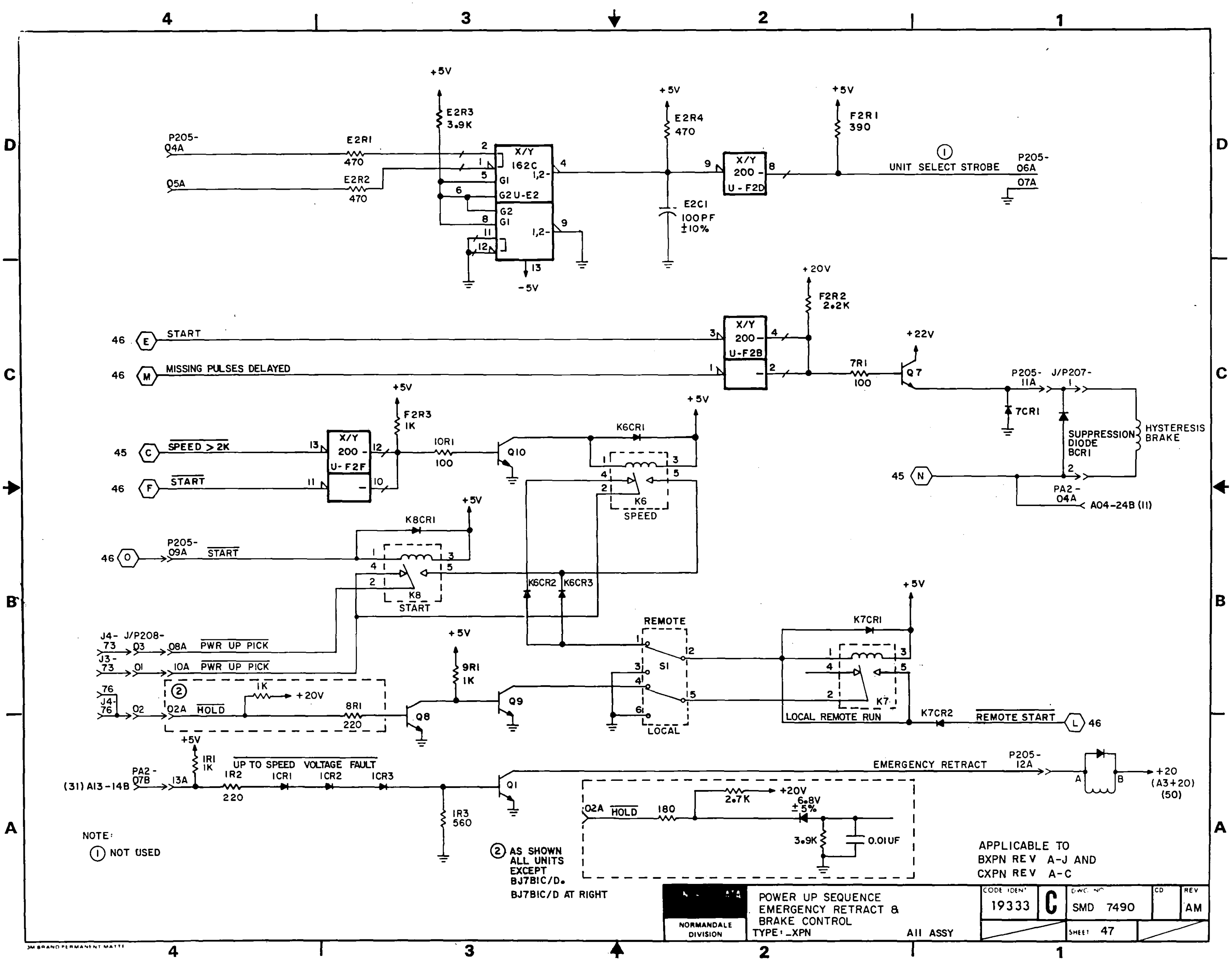


NOTES:

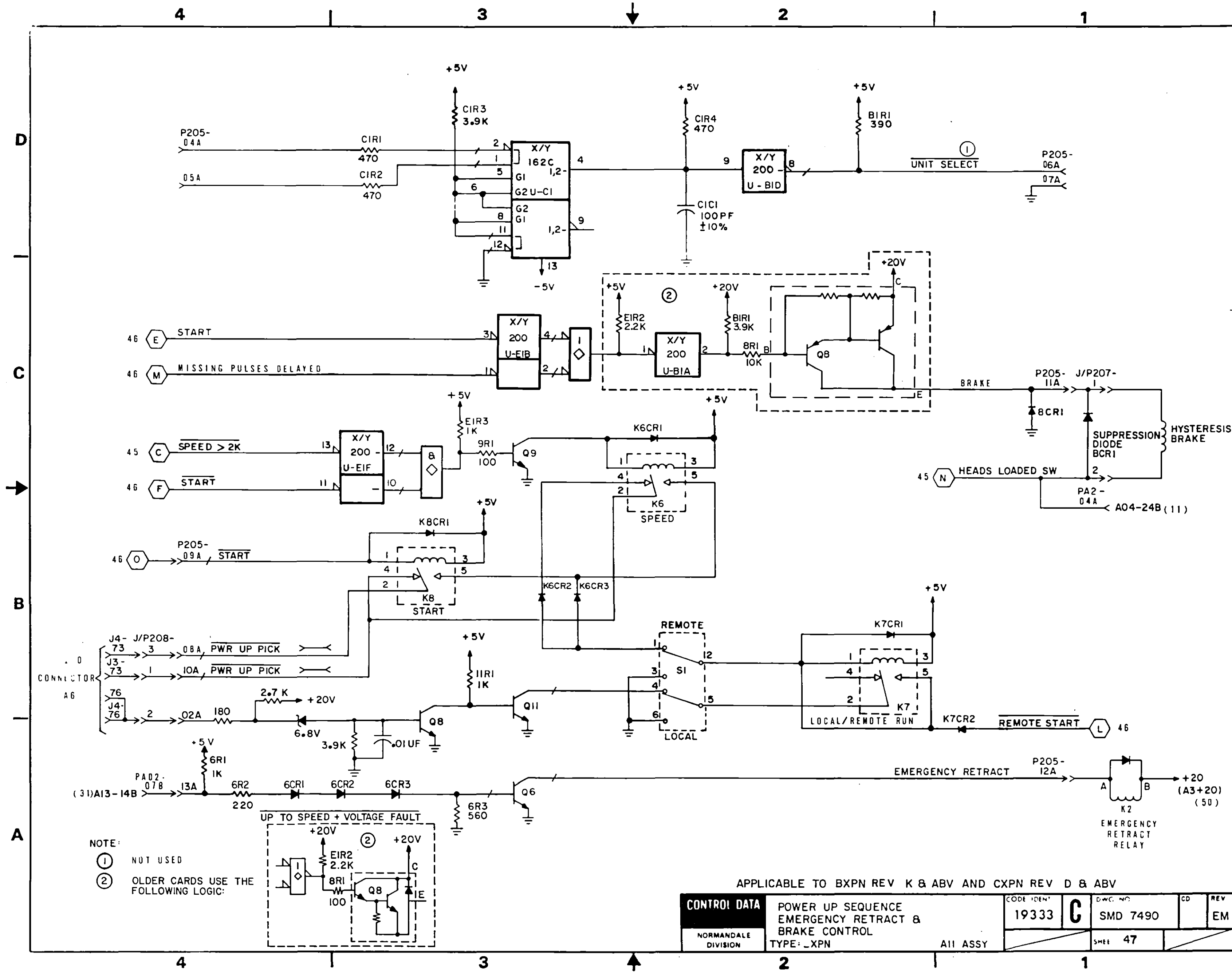
1. NOT USED
2. READY ALERT IS CONNECTED ONLY IF PACK COVER INTERLOCK OPTION IS INSTALLED.

APPLICABLE TO BXPN REV K & ABV AND CXPN REV D & ABV

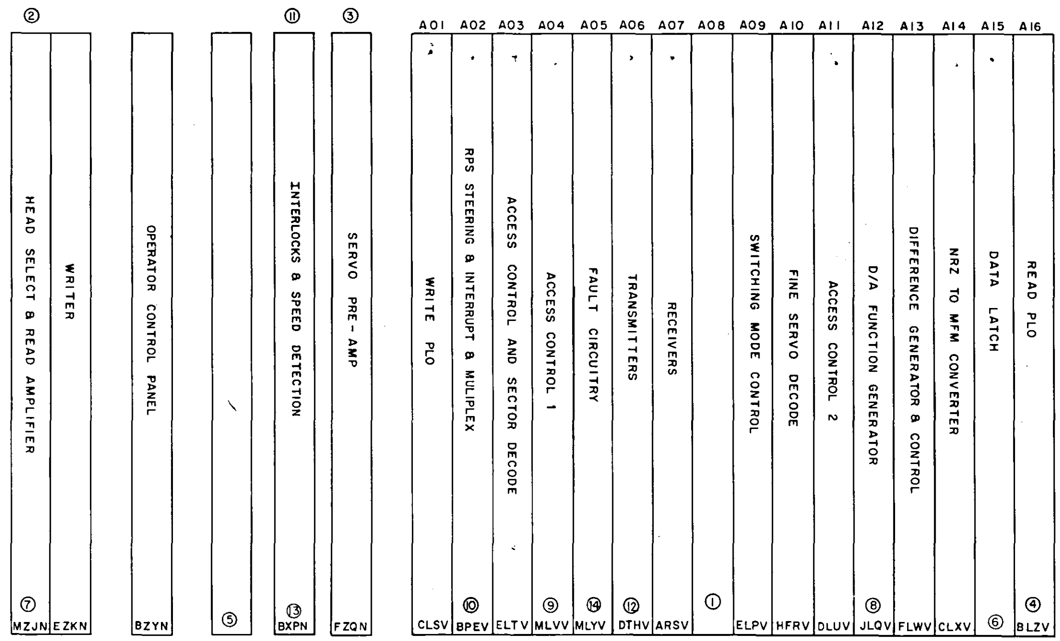
CONTROL DATA NORMANDALE DIVISION	SPEED & INTERLOCKS TYPE: _XPN A11 ASSY	C SMD 7490	EM
		SHEET 46	



POWER UP SEQUENCE
EMERGENCY RETRACT &
BRAKE CONTROL
TYPE: _XPN
A11 ASSY
NORMANDALE DIVISION
CODE IDENT 19333
C
DWG NO SMD 7490
REV AM
SHEET 47
APPLICABLE TO
BXPN REV A-J AND
CXPN REV A-C
NOTE:
1 NOT USED
2 AS SHOWN ALL UNITS EXCEPT BJ7B1C/D.
BJ7B1C/D AT RIGHT
UNIT SELECT STROBE
START
MISSING PULSES DELAYED
SPEED > 2K
HYSTERESIS BRAKE
SUPPRESSION DIODE BCR1
K6 SPEED
K8 START
REMOTE
LOCAL
LOCAL REMOTE RUN
REMOTE START
PWR UP PICK
HOLD
UP TO SPEED VOLTAGE FAULT
EMERGENCY RETRACT



+5V
CIR3
3.9K
P205-
04A
CIR1
470
05A
CIR2
470
X/Y
162C
G1
G2 U-C1
1,2-
+5V
CIR4
470
C1C1
100PF
±10%
X/Y
200
U-B1D
+5V
B1R1
390
UNIT SELECT
P205-
06A
07A
-5V
+20V
+5V
+20V
E1R2
2.2K
X/Y
200
U-B1A
B1R1
3.9K
8R1
10K
Q8
START
MISSING PULSES DELAYED
X/Y
200
U-E1B
BRAKE
P205-
11A
J/P207-
8CR1
SUPPRESSION DIODE BCR1
HYSTERESIS BRAKE
+5V
E1R3
1K
9R1
100
Q9
+5V
K6CR1
SPEED > 2K
START
X/Y
200
U-E1F
K6
SPEED
HEADS LOADED SW
PA2-
04A
A04-24B (11)
+5V
K8CR1
P205-
09A
START
K8
START
K6CR2
K6CR3
+5V
J4-
J/P208-
08A
PWR UP PICK
J3-
10A
PWR UP PICK
I O CONNECTOR A6
REMOTE
S1
LOCAL
K7CR1
K7
LOCAL/REMOTE RUN
K7CR2
REMOTE START
02A
180
2.7 K
+20V
6.8V
3.9K
.01UF
Q8
+5V
11R1
1K
Q11
+5V
6R1
1K
PA02-
07B
(31)A13-14B
13A
6R2
220
6CR1
6CR2
6CR3
6R3
560
Q6
EMERGENCY RETRACT
P205-
12A
+20
(A3+20)
(50)
K2
EMERGENCY RETRACT RELAY
UP TO SPEED + VOLTAGE FAULT
+20V
E1R2
2.2K
8R1
100
Q8
+20V
NOTE:
1 NOT USED
2 OLDER CARDS USE THE FOLLOWING LOGIC:
APPLICABLE TO BXPN REV K & ABV AND CXPN REV D & ABV
CONTROL DATA
NORMANDALE DIVISION
POWER UP SEQUENCE
EMERGENCY RETRACT &
BRAKE CONTROL
TYPE: _XPN
A11 ASSY
CODE IDENT 19333
C
DWG. NO. SMD 7490
REV EM
SHEET 47



① USED FOR HEAD ALIGNMENT.

② A5 ASSEMBLY LOCATED BEHIND LOGIC CHASSIS AND UNDER SHROUD.

③ LOCATED ON POWER AMP ASSEMBLY NEXT TO MAGNET.

④ OPTIONAL CARD WITH PLO OPTION

⑤ NOT USED

⑥ ELRV IN SC 08 WITHOUT PE37895 AND BELOW
ALRV IN SC 08 WITH PE37895; SC 09 WITHOUT 37979
HLRV IN SC 09 WITH 37979 AND ABOVE
KLRV IN SC 40 W/DJ00072 (B701 ONLY)

⑦ FZJN IN SC 09 WITHOUT 37925 AND BELOW
MZJN IN SC 09 WITH 37925 AND ABOVE

⑧ DLQV IN SC 08 WITHOUT 37854 AND BELOW
HLQV IN SC 08 WITH 37854; SC 09 WITHOUT 37938
JLQV IN SC 09 WITH 37938 AND ABOVE

⑨ ELVV IN SC 09 WITHOUT 37966 AND BELOW
MLVV IN SC 09 WITH 37966 AND ABOVE

⑩ 5PEV - S/C 09 AND BELOW. BPEV - S/C 10 AND ABOVE.

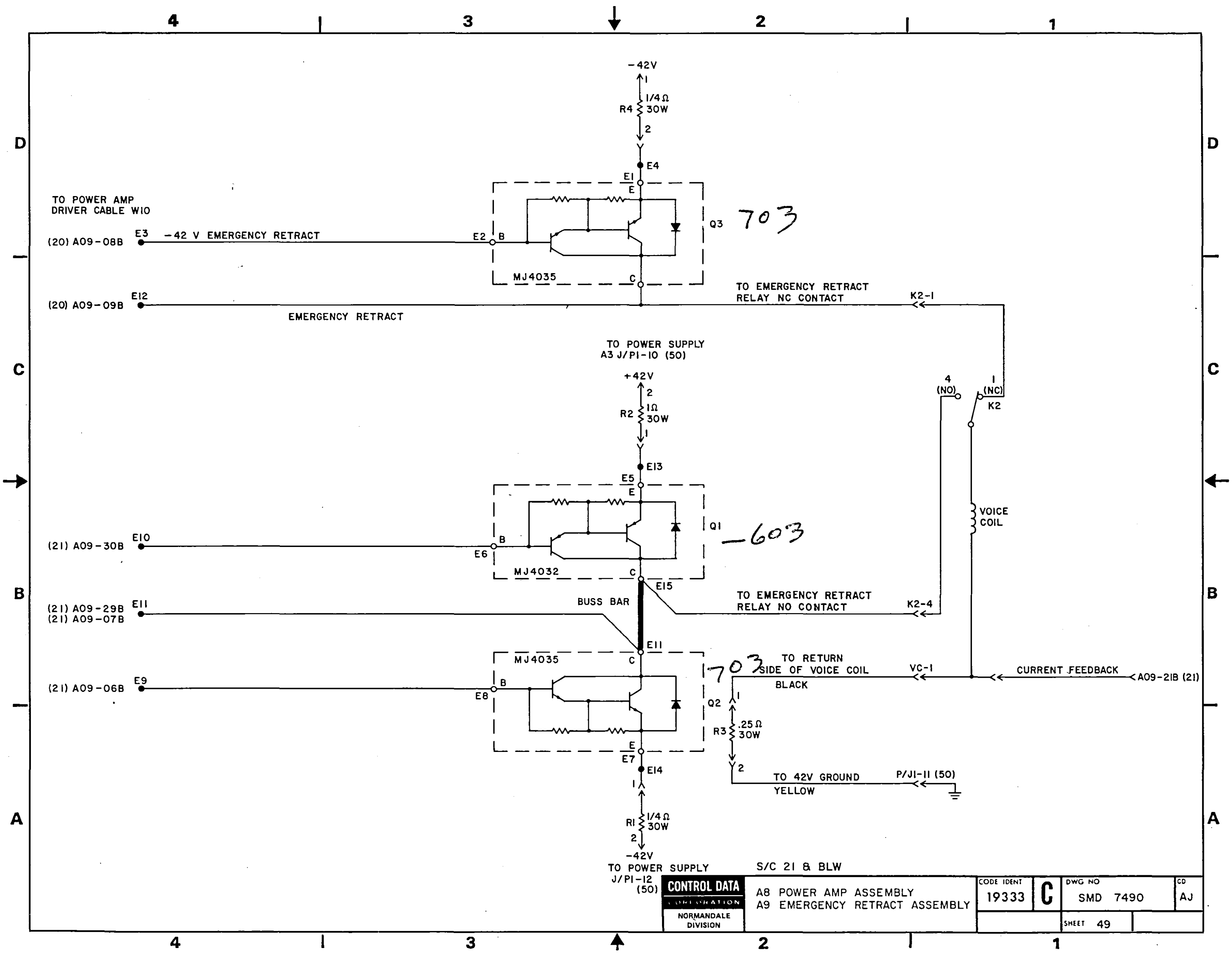
⑪ LOCATED UNDER DECK ASSEMBLY. (S/C 09 AND BELOW, AXPN; S/C 10 AND ABOVE, AS SHOWN.)

⑫ 4THV - S/C 10 AND BELOW.
ATHV - S/C 11 AND ABOVE.
DTHV - S/C 18 AND ABOVE.

⑬ IN ALL UNITS EXCEPT BJ7B1C/D USE:
AXPN - S/C 09 AND BELOW
BXPN - S/C 10 AND ABOVE
ON BJ7B1C/D USE CXPN

⑭ LLYV S/C 39 W/O DJ00044 & BELOW
MLYV S/C 40 W/DJ00044 & ABOVE

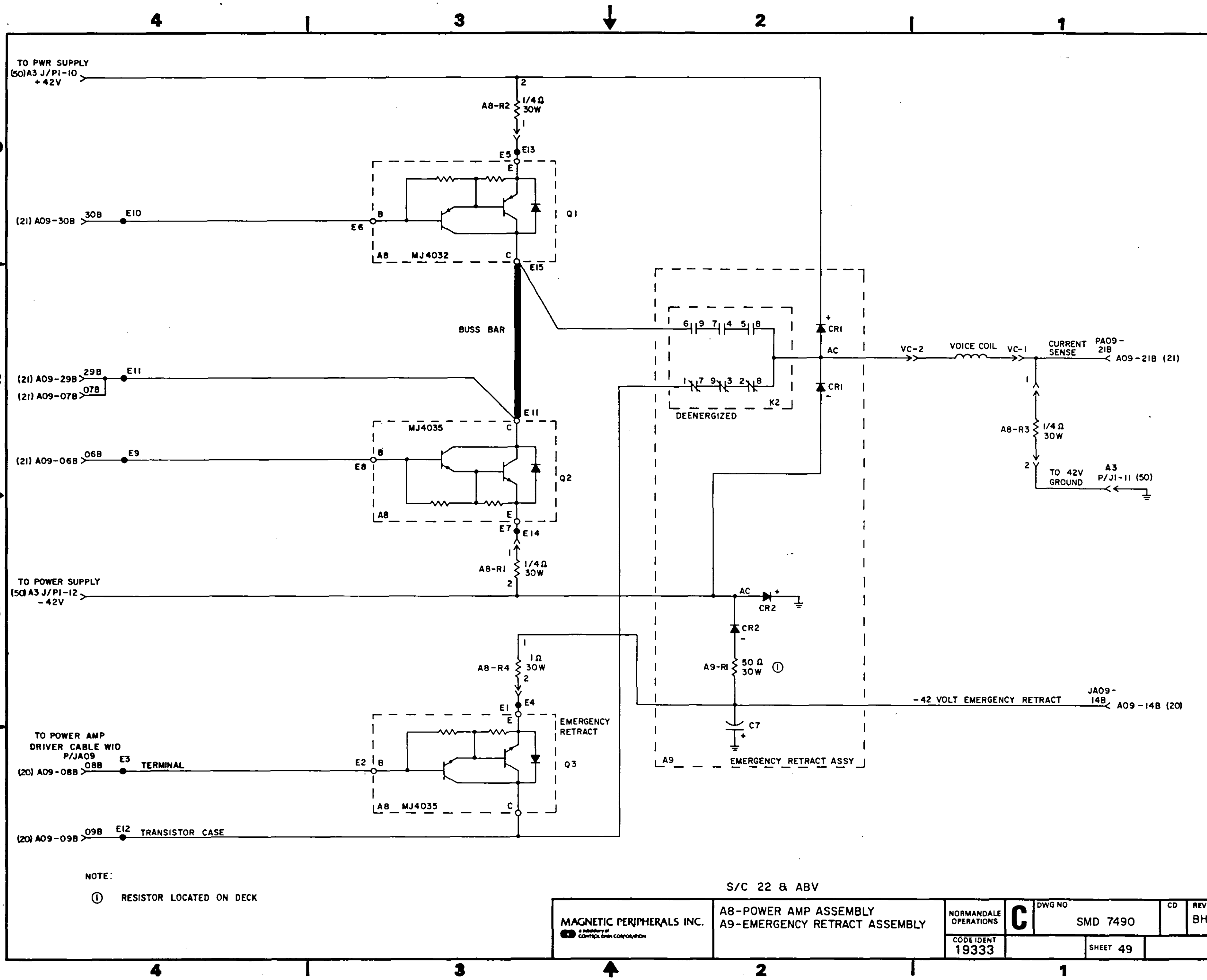
CONTROL DATA NORMANDALE DIVISION	CHASSIS MAP	C	DWG NO SMD 7490	CD	REV DF
		CODE IDENT 19333	SHEET 48	PAGE	



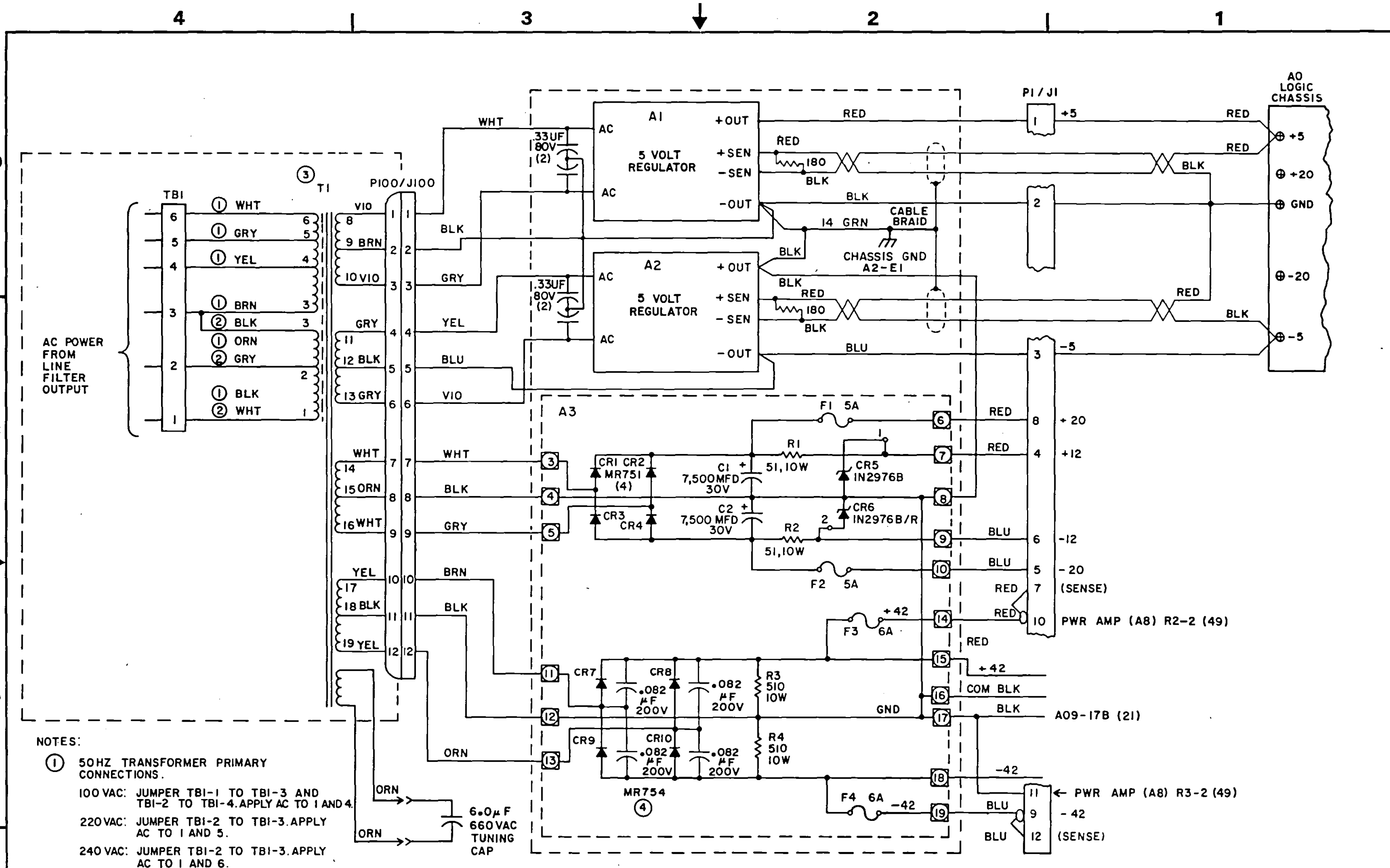
S/C 21 & BLW

CONTROL DATA CORPORATION NORMANDALE DIVISION	A8 POWER AMP ASSEMBLY A9 EMERGENCY RETRACT ASSEMBLY	CODE IDENT 19333	C	DWG NO SMD 7490 — CD AJ — SHEET 49

83311300 AF


TO PWR SUPPLY
(50) A3 J/P1-10
+42V
A8-R2
1/4 Ω
30W
E5
E13
E
A8 MJ4032
Q1
(21) A09-30B
30B
E10
E6
B
C
E15
BUSS BAR
(21) A09-29B
(21) A09-07B
29B
07B
E11
MJ4035
Q2
(21) A09-06B
06B
E9
E8
A8
E7
E14
A8-R1
1/4 Ω
30W
TO POWER SUPPLY
(50) A3 J/P1-12
-42V
A8-R4
1 Ω
30W
E1
E4
EMERGENCY
RETRACT
Q3
TO POWER AMP
DRIVER CABLE W10
P/JA09
E3
TERMINAL
(20) A09-08B
08B
E2
A8 MJ4035
(20) A09-09B
09B
E12
TRANSISTOR CASE
K2
DEENERGIZED
CR1
AC
VC-2
VOICE COIL
VC-1
CURRENT
SENSE
PA09-
21B
A09-21B (21)
A8-R3
1/4 Ω
30W
TO 42V
GROUND
A3
P/J1-11 (50)
CR2
A9-R1
50 Ω
30W
C7
-42 VOLT EMERGENCY RETRACT
JA09-
14B
A09-14B (20)
A9
EMERGENCY RETRACT ASSY
NOTE:
① RESISTOR LOCATED ON DECK
S/C 22 & ABV
MAGNETIC PERIPHERALS INC.
a subsidiary of CONTROL DATA CORPORATION
A8-POWER AMP ASSEMBLY
A9-EMERGENCY RETRACT ASSEMBLY
NORMANDALE OPERATIONS
C
DWG NO
SMD 7490
CD
REV
BH
CODE IDENT
19333
SHEET 49

83311300 AF



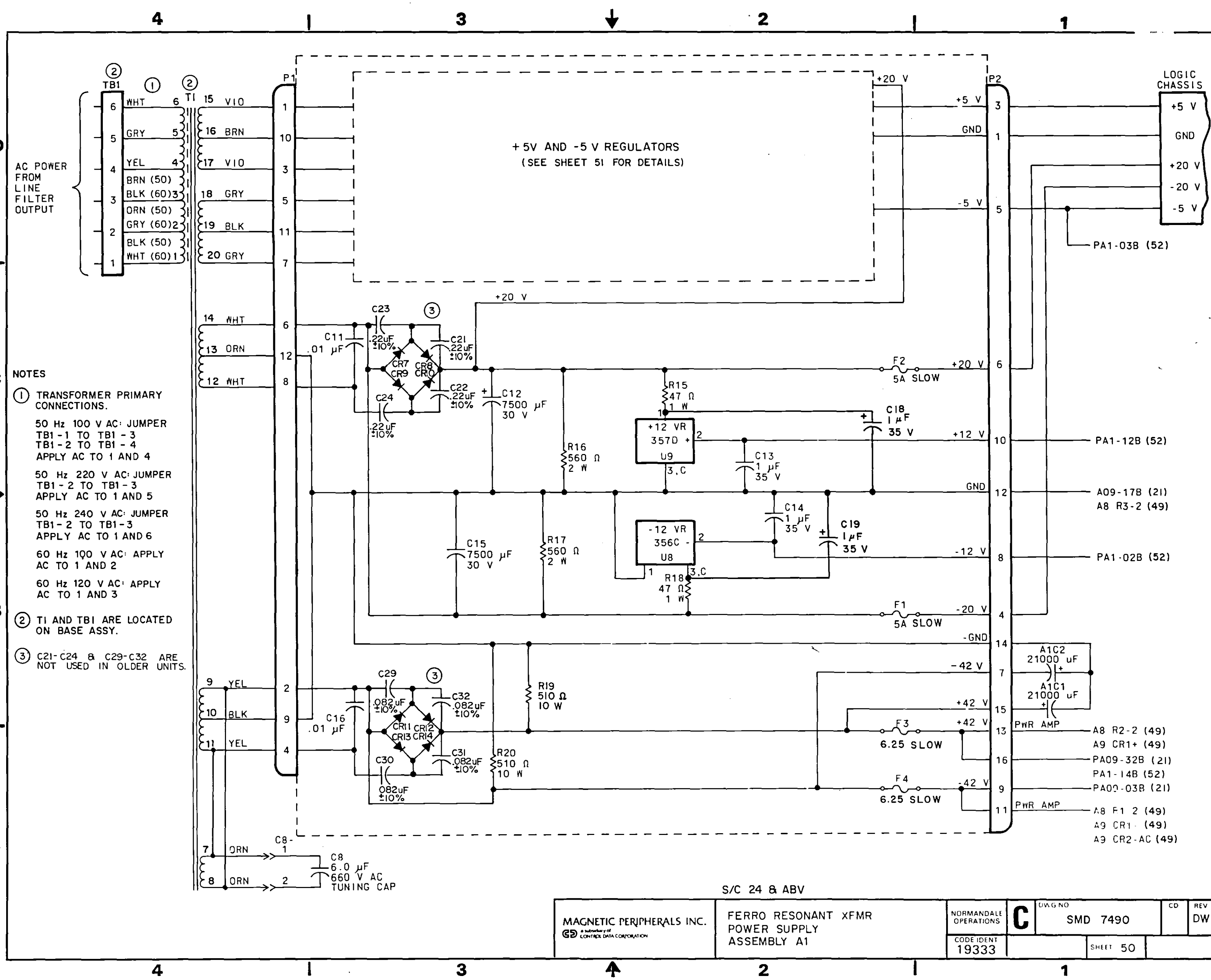
NOTES:

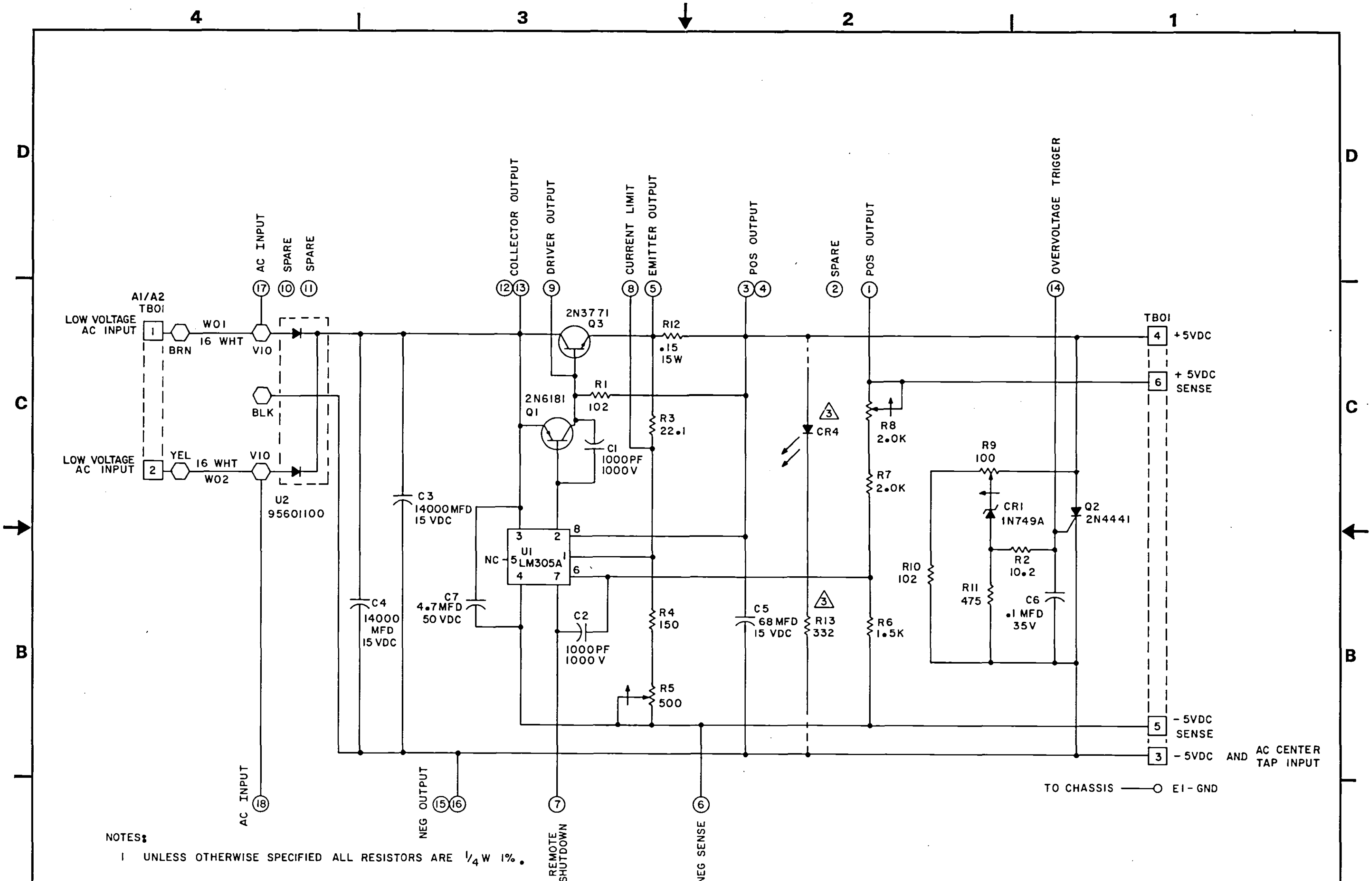
1. 50HZ TRANSFORMER PRIMARY CONNECTIONS.
   - 100 VAC: JUMPER TB1-1 TO TB1-3 AND TB1-2 TO TB1-4. APPLY AC TO 1 AND 4.
   - 220 VAC: JUMPER TB1-2 TO TB1-3. APPLY AC TO 1 AND 5.
   - 240 VAC: JUMPER TB1-2 TO TB1-3. APPLY AC TO 1 AND 6.
2. 60HZ TRANSFORMER PRIMARY CONNECTIONS.
   - 100VAC: APPLY AC TO 1 AND 2.
   - 120VAC: APPLY AC TO 1 AND 3.
3. T1 AND TB1 LOCATED ON BASE ASSY.
4. ▢ INDICATES WIRE SOLDERED TO BOARD.
5. O DENOTES TWO WIRES CRIMPED INTO ONE PIN.

S/C 23 & BLW

CONTROL DATA NORMANDALE DIVISION	FERRO RESONANT XFMR POWER SUPPLY SCHEMATIC A1, A2, A3 ASSEMBLIES	C	DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 50	PAGE	

4-79


+5V AND -5 V REGULATORS
(SEE SHEET 51 FOR DETAILS)
AC POWER FROM LINE FILTER OUTPUT
TB1
T1
P1
P2
LOGIC CHASSIS
+5 V
GND
+20 V
-20 V
-5 V
PA1-03B (52)
PA1-12B (52)
A09-17B (21)
A8 R3-2 (49)
PA1-02B (52)
+12 VR 357D U9
-12 VR 356C U8
F2 5A SLOW
F1 5A SLOW
F3 6.25 SLOW
F4 6.25 SLOW
A1C2 21000 uF
A1C1 21000 uF
PWR AMP
A8 R2-2 (49)
A9 CR1+ (49)
PA09-32B (21)
PA1-14B (52)
A8 F1 2 (49)
A9 CR2-AC (49)
C8 6.0 µF 660 V AC TUNING CAP
NOTES
1 TRANSFORMER PRIMARY CONNECTIONS.
50 Hz 100 V AC: JUMPER TB1-1 TO TB1-3 TB1-2 TO TB1-4 APPLY AC TO 1 AND 4
50 Hz 220 V AC: JUMPER TB1-2 TO TB1-3 APPLY AC TO 1 AND 5
50 Hz 240 V AC: JUMPER TB1-2 TO TB1-3 APPLY AC TO 1 AND 6
60 Hz 100 V AC: APPLY AC TO 1 AND 2
60 Hz 120 V AC: APPLY AC TO 1 AND 3
2 T1 AND TB1 ARE LOCATED ON BASE ASSY.
3 C21-C24 & C29-C32 ARE NOT USED IN OLDER UNITS.
S/C 24 & ABV
MAGNETIC PERIPHERALS INC.
FERRO RESONANT XFMR POWER SUPPLY ASSEMBLY A1
NORMANDALE OPERATIONS
C
DWG NO SMD 7490
REV DW
CODE IDENT 19333
SHEET 50



NOTES:

1 UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4 W 1%.

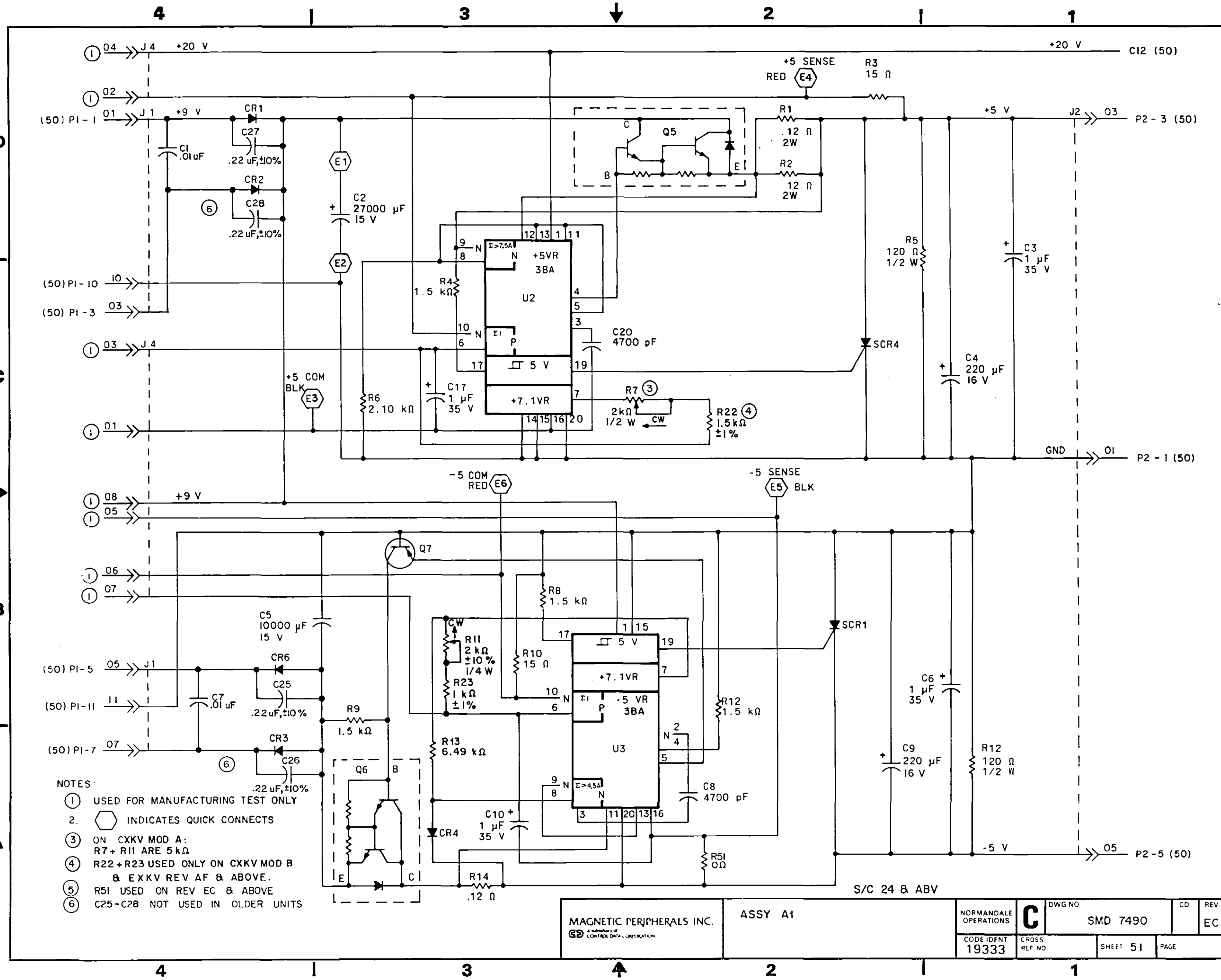
2 INPUT-OUTPUT TERMINATIONS ARE AS FOLLOWS:
- ○ INDICATES CARD EDGE CONNECTIONS.
- ⬡ INDICATES CARD QUICK-CONNECTS.
- □ INDICATES SUPPLY INPUT-OUTPUT TERMINAL STRIP CONNECTIONS.

△3 OPTIONAL OUTPUT INDICATOR CIRCUIT.

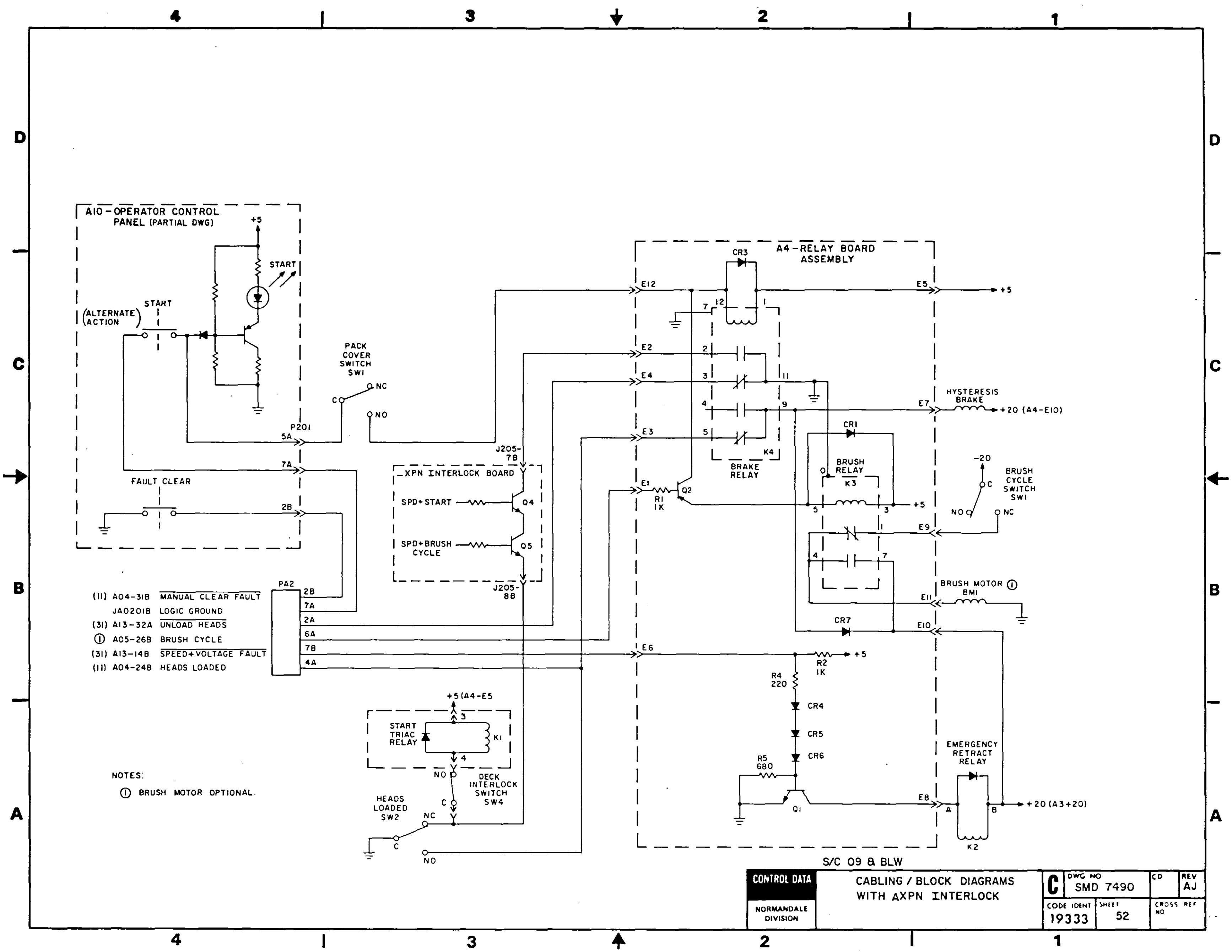
4 INDICATES INCREASE IN ADJUSTMENT CLOCKWISE DIRECTION.

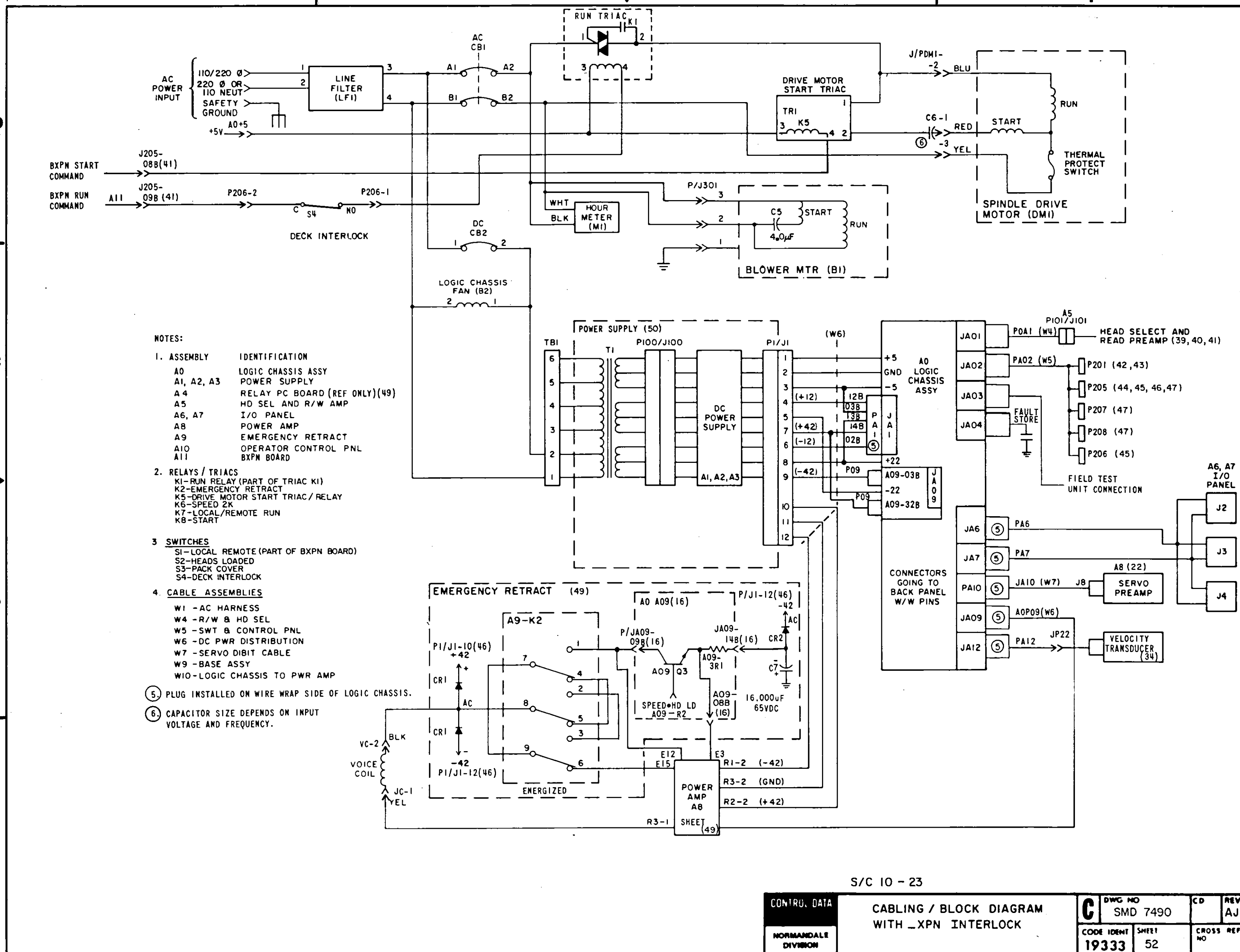
S/C 23 & BLW

CONTROL DATA NORMANDALE DIVISION	A1/A2 ASSEMBLIES +5,-5 VOLT REGULATOR	C	DWG NO SMD 7490	CD	REV AJ
		CODE IDENT 19333	SHEET 51	PAGE	



+20 V
C12 (50)
+5 SENSE
RED
E4
R3
15 Ω
(50) P1 - 1
+9 V
CR1
C27
.22 uF, ±10%
C1
.01uF
CR2
C28
.22 uF, ±10%
E1
C2
27000 μF
15 V
E2
Q5
R1
.12 Ω
2W
R2
.12 Ω
2W
+5 V
J2
P2 - 3 (50)
+5VR
3BA
U2
R4
1.5 kΩ
(50) P1 - 10
(50) P1 - 3
C20
4700 pF
R5
120 Ω
1/2 W
C3
1 μF
35 V
SCR4
C4
220 μF
16 V
+5 COM
BLK
E3
R6
2.10 kΩ
C17
1 μF
35 V
+7.1VR
R7
2kΩ
1/2 W
CW
R22
1.5kΩ
±1%
GND
P2 - 1 (50)
-5 COM
RED
E6
-5 SENSE
E5
BLK
+9 V
Q7
R8
1.5 kΩ
C5
10000 μF
15 V
R11
2 kΩ
±10%
1/4 W
R10
15 Ω
SCR1
(50) P1-5
CR6
C25
.22uF, ±10%
R23
1 kΩ
±1%
-5 VR
3BA
C6
1 μF
35 V
(50) P1-11
C7
.01 uF
R9
1.5 kΩ
R12
1.5 kΩ
(50) P1-7
CR3
C26
.22 uF, ±10%
Q6
R13
6.49 kΩ
U3
C9
220 μF
16 V
R12
120 Ω
1/2 W
C8
4700 pF
CR4
C10
1 μF
35 V
R51
0Ω
-5 V
P2-5 (50)
R14
.12 Ω
S/C 24 & ABV
NOTES:
1 USED FOR MANUFACTURING TEST ONLY
2. INDICATES QUICK CONNECTS
3 ON CXKV MOD A: R7 + R11 ARE 5kΩ
4 R22 + R23 USED ONLY ON CXKV MOD B & EXKV REV AF & ABOVE.
5 R51 USED ON REV EC & ABOVE
6 C25-C28 NOT USED IN OLDER UNITS
MAGNETIC PERIPHERALS INC.
ASSY A1
NORMANDALE OPERATIONS
C
DWG NO
SMD 7490
REV
EC
CODE IDENT
19333
SHEET 51


A10-OPERATOR CONTROL PANEL (PARTIAL DWG)
+5
START
(ALTERNATE ACTION)
START
P201
5A
7A
FAULT CLEAR
2B
PACK COVER SWITCH SW1
C
NC
NO
J205-7B
XPN INTERLOCK BOARD
SPD+START
Q4
SPD+BRUSH CYCLE
Q5
J205-8B
PA2
2B
7A
2A
6A
7B
4A
(11) A04-31B MANUAL CLEAR FAULT
JA0201B LOGIC GROUND
(31) A13-32A UNLOAD HEADS
(1) A05-26B BRUSH CYCLE
(31) A13-14B SPEED+VOLTAGE FAULT
(11) A04-24B HEADS LOADED
+5 (A4-E5
3
START TRIAC RELAY
K1
4
NO
DECK INTERLOCK SWITCH SW4
C
HEADS LOADED SW2
NC
C
NO
NOTES:
(1) BRUSH MOTOR OPTIONAL.
A4-RELAY BOARD ASSEMBLY
CR3
E12
E5
+5
7
12
1
E2
2
E4
3
11
4
9
E3
5
K4
BRAKE RELAY
HYSTERESIS BRAKE
E7
+20 (A4-E10)
CR1
BRUSH RELAY
K3
O
E1
R1 1K
Q2
5
3
+5
-20
C
BRUSH CYCLE SWITCH SW1
NO
NC
E9
1
4
7
BRUSH MOTOR (1)
BM1
E11
CR7
E10
E6
R2 1K
+5
R4 220
CR4
CR5
CR6
R5 680
Q1
E8
A
B
EMERGENCY RETRACT RELAY
K2
+20 (A3+20)
S/C 09 & BLW
CONTROL DATA
NORMANDALE DIVISION
CABLING / BLOCK DIAGRAMS WITH AXPN INTERLOCK
C
DWG NO SMD 7490
CD
REV AJ
CODE IDENT 19333
SHEET 52
CROSS REF NO
4
3
2
1
D
C
B
A



NOTES:

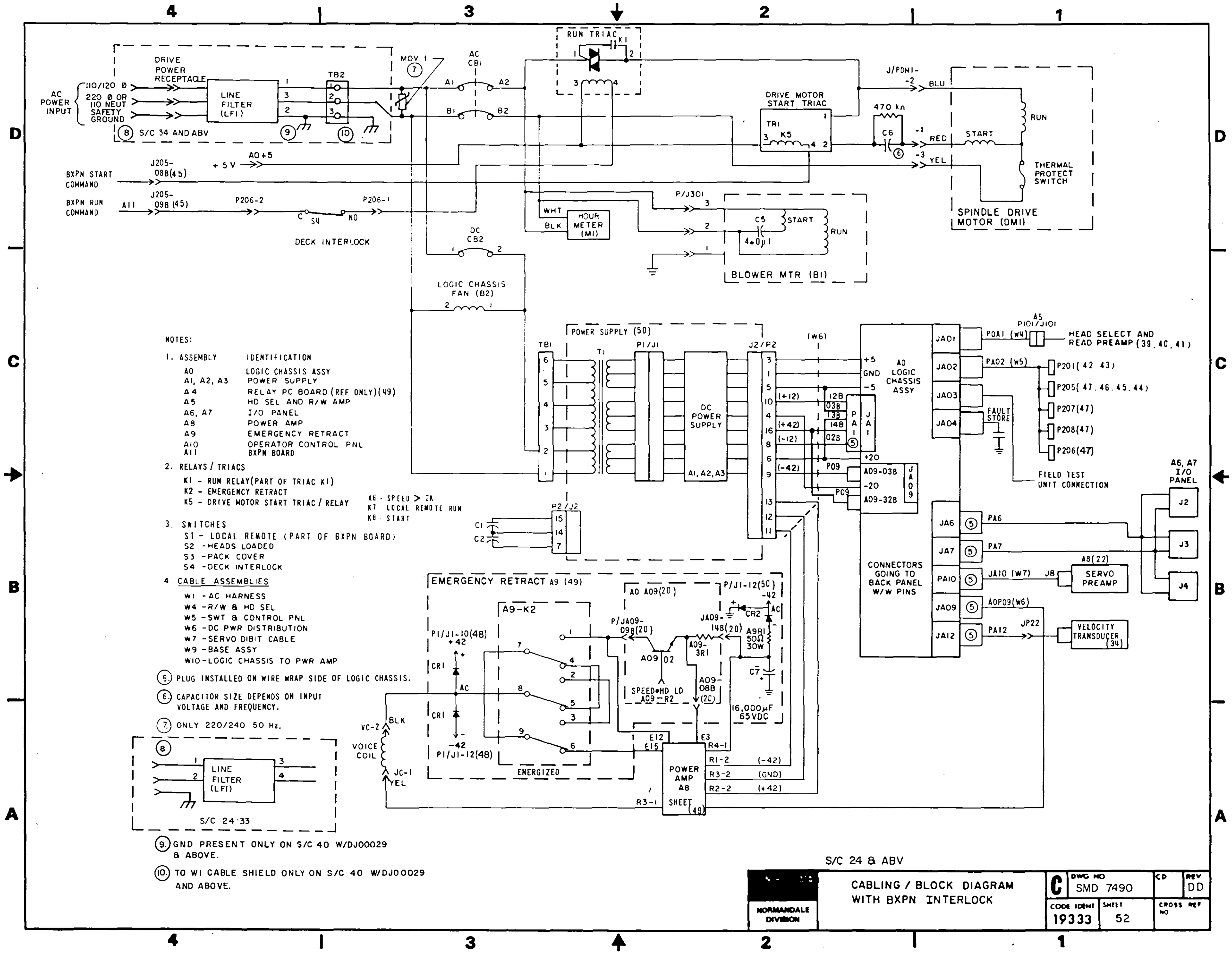
1. ASSEMBLY — IDENTIFICATION
   - A0 — LOGIC CHASSIS ASSY
   - A1, A2, A3 — POWER SUPPLY
   - A4 — RELAY PC BOARD (REF ONLY)(49)
   - A5 — HD SEL AND R/W AMP
   - A6, A7 — I/O PANEL
   - A8 — POWER AMP
   - A9 — EMERGENCY RETRACT
   - A10 — OPERATOR CONTROL PNL
   - A11 — BXPN BOARD
2. RELAYS / TRIACS
   - K1-RUN RELAY (PART OF TRIAC K1)
   - K2-EMERGENCY RETRACT
   - K5-DRIVE MOTOR START TRIAC/RELAY
   - K6-SPEED ZK
   - K7-LOCAL/REMOTE RUN
   - K8-START
3. SWITCHES
   - S1-LOCAL REMOTE (PART OF BXPN BOARD)
   - S2-HEADS LOADED
   - S3-PACK COVER
   - S4-DECK INTERLOCK
4. CABLE ASSEMBLIES
   - W1 -AC HARNESS
   - W4 -R/W & HD SEL
   - W5 -SWT & CONTROL PNL
   - W6 -DC PWR DISTRIBUTION
   - W7 -SERVO DIBIT CABLE
   - W9 -BASE ASSY
   - W10-LOGIC CHASSIS TO PWR AMP

(5) PLUG INSTALLED ON WIRE WRAP SIDE OF LOGIC CHASSIS.

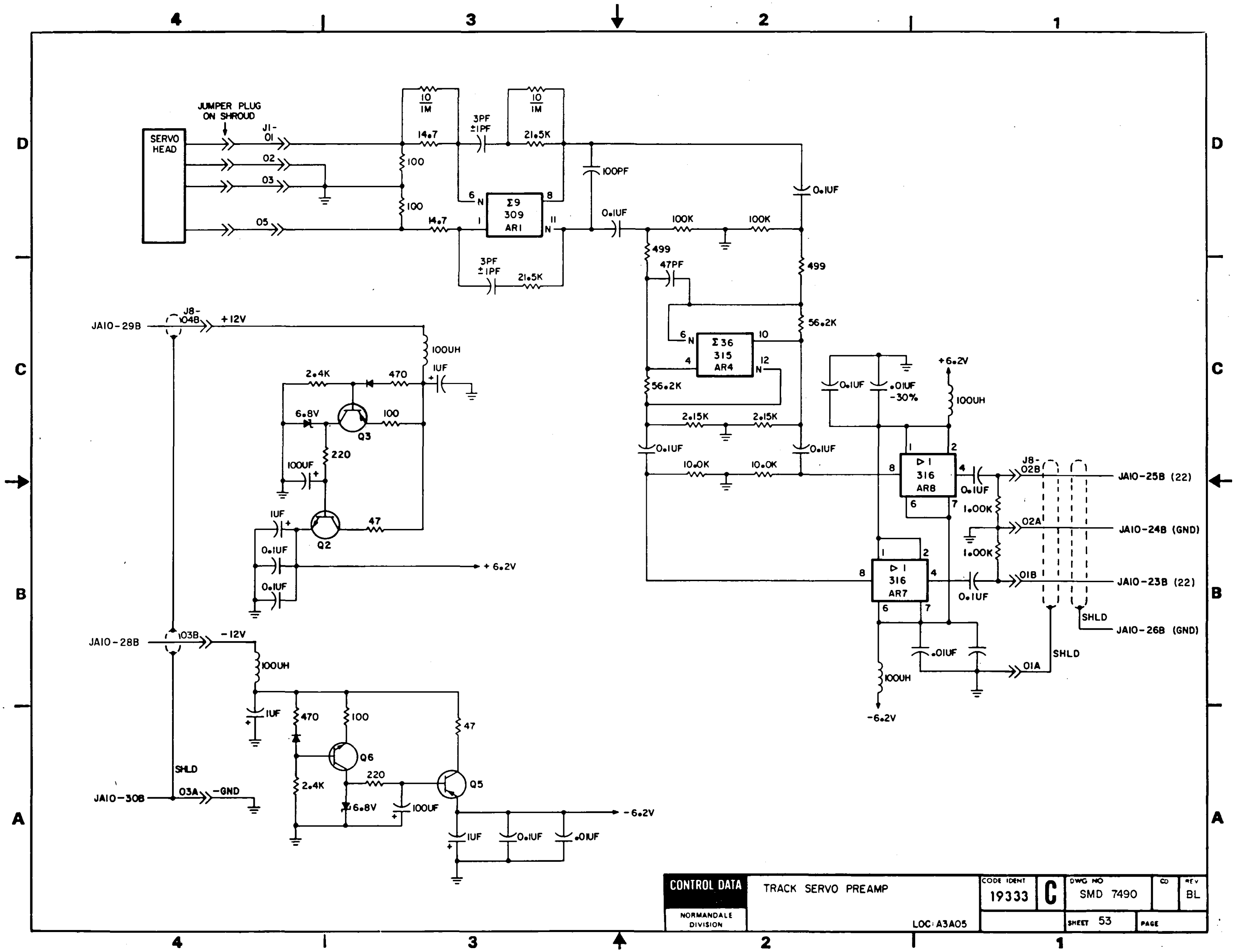
(6) CAPACITOR SIZE DEPENDS ON INPUT VOLTAGE AND FREQUENCY.

S/C 10 - 23

CONTROL DATA / NORMANDALE DIVISION	CABLING / BLOCK DIAGRAM WITH XPN INTERLOCK	C	DWG NO SMD 7490	CD	REV AJ
			CODE IDENT 19333	SHEET 52	CROSS REF NO



AC POWER INPUT
110/120 Ø
220 Ø OR 110 NEUT
SAFETY GROUND
DRIVE POWER RECEPTACLE
LINE FILTER (LFI)
TB2
8 S/C 34 AND ABV
MOV 1
AC CBI
RUN TRIAC K1
DRIVE MOTOR START TRIAC
TRI K5
470 kΩ
C6
J/PDMI-
BLU
RED
YEL
START
RUN
THERMAL PROTECT SWITCH
SPINDLE DRIVE MOTOR (DMI)
BXPN START COMMAND
J205-08B(45)
+5 V
A0+5
BXPN RUN COMMAND
A11
J205-09B (45)
P206-2
P206-1
S4
NO
DECK INTERLOCK
DC CB2
WHT
BLK
HOUR METER (MI)
P/J301
C5
4.0μf
BLOWER MTR (BI)
LOGIC CHASSIS FAN (B2)
POWER SUPPLY (50)
TB1
T1
P1/J1
DC POWER SUPPLY
A1, A2, A3
J2/P2
(W6)
+5
GND
-5
A0 LOGIC CHASSIS ASSY
JA01
JA02
JA03
JA04
A5 P101/J101
POA1 (W4)
HEAD SELECT AND READ PREAMP (39, 40, 41)
PA02 (W5)
P201 (42, 43)
P205 (47, 46, 45, 44)
P207 (47)
P208 (47)
P206 (47)
FAULT STORE
FIELD TEST UNIT CONNECTION
A6, A7 I/O PANEL
J2
J3
J4
JA6
JA7
PA10
JA09
JA12
PA6
PA7
JA10 (W7)
J8
A8 (22)
SERVO PREAMP
A0P09 (W6)
PA12
JP22
VELOCITY TRANSDUCER (34)
CONNECTORS GOING TO BACK PANEL W/W PINS
P2/J2
C1
C2
EMERGENCY RETRACT A9 (49)
A9-K2
ENERGIZED
P1/J1-10(48) +42
CR1
AC
-42 P1/J1-12(48)
VC-2
BLK
VOICE COIL
JC-1
YEL
A0 A09(20)
P/J1-12(50) -42
CR2
P/JA09-09B(20)
JA09-14B(20)
A09-3R1
A9R1 50Ω 30W
C7
A09-08B (20)
16,000μF 65VDC
SPEED HD LD A09-R2
E12
E15
E3
R4-1
POWER AMP A8 SHEET (49)
R1-2 (-42)
R3-2 (GND)
R2-2 (+42)
R3-1
NOTES:
1. ASSEMBLY IDENTIFICATION
A0 LOGIC CHASSIS ASSY
A1, A2, A3 POWER SUPPLY
A4 RELAY PC BOARD (REF ONLY)(49)
A5 HD SEL AND R/W AMP
A6, A7 I/O PANEL
A8 POWER AMP
A9 EMERGENCY RETRACT
A10 OPERATOR CONTROL PNL
A11 BXPN BOARD
2. RELAYS / TRIACS
K1 - RUN RELAY (PART OF TRIAC K1)
K2 - EMERGENCY RETRACT
K5 - DRIVE MOTOR START TRIAC / RELAY
K6 - SPEED > 2K
K7 - LOCAL REMOTE RUN
K8 - START
3. SWITCHES
S1 - LOCAL REMOTE (PART OF BXPN BOARD)
S2 - HEADS LOADED
S3 - PACK COVER
S4 - DECK INTERLOCK
4. CABLE ASSEMBLIES
W1 - AC HARNESS
W4 - R/W & HD SEL
W5 - SWT & CONTROL PNL
W6 - DC PWR DISTRIBUTION
W7 - SERVO DIBIT CABLE
W9 - BASE ASSY
W10 - LOGIC CHASSIS TO PWR AMP
5. PLUG INSTALLED ON WIRE WRAP SIDE OF LOGIC CHASSIS.
6. CAPACITOR SIZE DEPENDS ON INPUT VOLTAGE AND FREQUENCY.
7. ONLY 220/240 50 Hz.
8 LINE FILTER (LFI) S/C 24-33
9. GND PRESENT ONLY ON S/C 40 W/DJ00029 & ABOVE.
10. TO W1 CABLE SHIELD ONLY ON S/C 40 W/DJ00029 AND ABOVE.
S/C 24 & ABV
NORMANDALE DIVISION
CABLING / BLOCK DIAGRAM WITH BXPN INTERLOCK
C
DWG NO SMD 7490
REV DD
CODE IDENT 19333
SHEET 52
CROSS REF NO



CONTROL DATA NORMANDALE DIVISION	TRACK SERVO PREAMP LOC: A3A05	CODE IDENT 19333	C	DWG NO SMD 7490 SHEET 53	CO	REV BL PAGE

IF TAG OUT DECODE IS → AND BUS OUT IS → DRIVE PLACES ON BUS IN

NAME	DECODE	BUS OUT BITS 0	1	2	3	4	5	6	7	BUS IN BITS 0	1	2	3	4	5	6	7
SELECT	000					2^3	2^2	2^1	2^0	DEVICE I.D. ②	DEVICE I.D. ③	DEVICE I.D. ④	ATTENTION	2^3	2^2	2^1	2^0
ERROR RECOVERY	001	① EARLY STROBE	① LATE STROBE	+ OFFSET	− OFFSET					DEVICE I.D.	DEVICE I.D.	DEVICE I.D.	ATTENTION	2^3	2^2	2^1	2^0
DIAGNOSTIC	010	RTZ	CLEAR ATTENTION	CLEAR CHECK DIAGNOSTIC	CLEAR FAULT STATUS	CLEAR ERROR RECOVERY	CLEAR RPS			NO HEAD SELECT	WRITE FAULT	(W+R)• OFF CYLINDER	W.R. FAULT	VOLTAGE FAULT	HEAD SELECT FAULT	SEEK ERROR	WRITE PROTECTED
HEAD ADDRESS	011						2^2	2^1	2^0	NO HEAD SELECT	WRITE FAULT	(W+R)· OFF CYLINDER	W.R. FAULT	VOLTAGE FAULT	HEAD SELECT FAULT	SEEK ERROR	WRITE PROTECTED
HIGH CYLINDER	100							2^9	2^8	ECHO READ TARGET REGISTER	SECTOR 2^6	2^5	2^4	2^3	2^2	2^1	2^0
TARGET REGISTER	101	LOAD TARGET REGISTER	2^6	2^5	2^4	2^3	2^2	2^1	2^0	ECHO READ TARGET REGISTER	SECTOR 2^6	2^5	2^4	2^3	2^2	2^1	2^0
LOW CYLINDER	110	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	AM FOUND		ON CYLINDER	UNIT READY			OFFSET ACTIVE	CHECK DIAGNOSTIC
CONTROL	111	TRANSFER SECTOR COUNT	WRITE GATE		READ GATE	ADDRESS MARK ENABLE				AM FOUND		ON CYLINDER	UNIT READY			OFFSET ACTIVE	CHECK DIAGNOSTIC

NOTES:

① UNITS WITH PLO

② 0= LOW TRACK DENSITY
1= HIGH TRACK DENSITY

③ 0= LOW HEAD COUNT
1= HIGH HEAD COUNT

④ 0= SMD
1= RESERVED FOR FUTURE

CONTROL DATA / NORMANDALE DIVISION	TAG / BUS DECODES	C DWG NO SMD 7490	CD	REV AJ	
		CODE IDENT 19333	SHEET 54	CROSS REF NO	

SECTION 5

WIRE LISTS

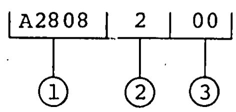
INTRODUCTION

Wire lists are divided into two basic categories; wire wrap wire lists and non-logic wire lists.

WIRE WRAP WIRE LISTS

Wire wrap wire lists provide wire origin/destination information for the logic back panel and the R/W pin and guide assembly.

Wires are referenced by logic term origin. The signal name is decoded as follows:



1. A2808; is the logic term of the inverter, multiplexer, op-amp, etc., found in the logic diagrams.
2. 2; denotes the various outputs of the same logic term.
3. 00; indicates daisy chain order of wires that go to various destinations from a single logic term.

Signal names that begin with a numeral, are miscellaneous wires. These wires generally originate at some point other than a logic term (switch, bus, test point, etc.).

Z level denotes the vertical position of a wire on a pin relative to the wire wrap board. Two vertical positions are possible. A numeral 1 in this column indicates the wire is closest to the wire wrap board. A numeral 2 indicates the wire is farthest from the wire wrap board. Both ends of a wire are always at the same Z level.

NON-LOGIC WIRE LISTS

Non-Logic wire lists provide wire origin/destination information for harness assemblies and various panels.

The number identification is used to sequence the wire list and provide engineering reference for change order activity.

Wire color coding is as follows:

0 - Black	5 - Green
1 - Brown	6 - Blue
2 - Red	7 - Violet
3 - Orange	8 - Gray
4 - Yellow	9 - White

In multi-digit color codes, the first digit denotes base color and the remaining digits denote tracer colors.

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A0101B	A0121B	1	
	A0102B	A0502B	2	
	A0104B	A0322B	2	
	A0112B	A0603B	1	
	A0113B	A0331A	1	
	A0114B	A0134B	1	
	A0121B	A0101B	1	
	A0122B	A1012B	1	
	A0123B	A1623B	1	
	A0124B	A1624B	1	
	A0126B	A0315A	1	
	A0127B	A0627B	1	
	A0128B	A1410B	1	
	A0130B	A1409A	1	
	A0133B	A0533B	2	
	A0134B	A0114B	1	
	A0201A	A0217B	1	
	A0202A	A0527B	1	
	A0202B	A0728B	1	
	A0203A	A0326A	2	
	A0203A	A0710B	1	
	A0203B	A0725A	1	
	A0204A	A0322A	2	
	A0204A	A0717B	1	
	A0204B	A0629B	1	S/C 09 W/O 37951 AND BELOW
	A0204B	A1531B	2	
	A0205A	A0527A	2	
	A0205B	A0524B	2	
	A0206A	A0704B	1	
	A0206A	A0311B	2	
	A0206B	A0325B	1	
	A0207A	A0326B	2	
	A0207B	A0705B	1	
	A0207B	A0332A	2	
	A0208A	A0324A	1	
	A0208B	A0324B	1	
	A0209A	A0331B	1	
	A0209B	A0633A	2	
	A0209B	A1106A	1	
	A0210A	A0330B	1	
	A0210B	A0330A	1	
	A0211A	A0329A	1	
	A0211B	A0323A	1	
	A0212A	A0731A	1	
	A0212B	A0332B	1	
	A0213A	A0531B	2	
	A0213B	A0531A	1	
	A0214A	A0611A	1	
	A0214B	A0508B	2	
	A0215A	A0504A	2	
	A0215B	A0530A	2	
	A0216A	A0612A	1	

TITLE	WL	DOCUMENT NO.	SHEET NO. 2	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A0216B	A0730A	1	
	A0217A	A0514B	2	
	A0217B	A0201A	1	
	A0221A	A0611B	1	
	A0221B	A0504B	2	
	A0222A	A0503A	2	
	A0222B	A0610B	1	
	A0223A	A0711B	1	
	A0223B	A0411A	1	
	A0224A	A0528B	2	
	A0224B	A1121B	1	
	A0225A	A0617B	1	
	A0225B	A0523A	2	
	A0226A	A0234A	1	S/C 09 W/ 37743 AND ABOVE
	A0226A	A0229B	2	
	A0226B	A0616B	1	
	A0227A	A0431B	1	S/C 10 W/ 48140 AND ABOVE
	A0227A	A0610A	2	S/C 10 W/O 48140 AND BELOW
	A0227B	A0529B	2	
	A0228A	A0621A	1	
	A0228B	A0733B	1	
	A0229A	A0631A	1	
	A0229B	A0226A	2	
	A0230A	A0617A	1	
	A0230B	A1532B	1	
	A0231A	A0516B	2	
	A0231B	A1124A	2	
	A0232A	JA0209A	1	
	A0232B	A1132A	2	
	A0232B	A0403A	1	
	A0233A	A0313B	1	
	A0233B	A0321B	1	
	A0234A	A0226A	1	S/C 09 W/ 37743 AND ABOVE
	A0301A	A0311A	1	
	A0304A	A1011B	1	
	A0304B	A0421B	1	
	A0305A	A0325A	1	
	A0305B	A1032A	1	
	A0306A	A0411B	1	
	A0306B	A0424A	1	
	A0307A	A0432B	1	
	A0307B	A0425B	1	
	A0310A	A1109B	1	
	A0310B	A1114B	1	
	A0311A	A0301A	1	
	A0311B	A0206A	2	
	A0311B	A1322B	1	
	A0312A	A0925B	2	
	A0312A	A0413B	1	
	A0312B	A0705A	1	
	A0312B	A0427A	2	S/C 09 W/ 37966 AND ABOVE
	A0313B	A0233A	1	
	A0313B	A0602B	2	
	A0315A	A0126B	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 3	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A0316A	A1108A	1	
	A0316B	A0402A	1	
	A0317A	A0406B	1	
	A0317B	A0407B	1	
	A0321A	A0417A	1	
	A0321B	A0602A	2	
	A0321B	A0233B	1	
	A0322A	A0204A	2	
	A0322B	A1033A	1	
	A0322B	A0104B	2	
	A0323A	A0630A	2	
	A0323A	A0211B	1	
	A0323B	A0714B	2	
	A0323B	A1330A	1	
	A0324A	A0208A	1	
	A0324B	A0208B	1	
	A0325A	A0305A	1	
	A0325B	A0206B	1	
	A0326A	A0203A	2	
	A0326B	A0710A	1	
	A0326B	A0207A	2	
	A0327A	A0433A	2	
	A0327B	A1307A	2	
	A0327B	A0405B	1	
	A0328B	A1123A	1	
	A0329A	A0211A	1	
	A0330A	A0210B	1	
	A0330B	A0210A	1	
	A0331A	A0113B	1	
	A0331B	A0209A	1	
	A0332A	A1326B	1	
	A0332A	A0207B	2	
	A0332B	A0212B	1	
	A0332B	A0630B	2	
	A0333A	A0429A	1	
	A0333B	A0724A	1	
	A0401A	A0423A	1	S/C 09 W/ 37867 AND ABOVE
	A0402A	A0316B	1	
	A0402B	A1307A	1	
	A0402B	A0405B	2	
	A0403A	A0232B	1	
	A0403A	A1305B	2	
	A0403B	A0524A	1	
	A0404A	A1313B	1	
	A0404B	A1116A	1	
	A0405A	A1109A	1	S/C 09 W/O 37867 AND BELOW
	A0405A	A1112B	1	S/C 09 W/ 37867 AND ABOVE
	A0405B	A0402B	2	
	A0405B	A0327B	1	
	A0406A	A1123B	1	
	A0406B	A1110B	2	
	A0406B	A0317A	1	
	A0407A	A1216B	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 4	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A0407A	A0923B	2	
	A0407B	A0525A	2	
	A0407B	A0317B	1	
	A0408A	A0922B	2	
	A0408A	A1221B	1	
	A0409A	A0416A	2	S/C 09 W/ 37966 AND ABOVE
	A0409B	A0533A	2	S/C 09 W/ 37743 AND ABOVE
	A0410A	A1332B	1	
	A0410B	A1305A	1	
	A0411A	A0223B	1	
	A0411B	A0306A	1	
	A0412A	A0502A	2	
	A0412A	A1333B	1	S/C 09 AND BELOW
	A0412A	JA0202A	1	S/C 10 AND ABOVE
	A0412B	A1208A	1	
	A0413A	A1210A	1	
	A0413B	A1027B	2	
	A0413B	A0312A	1	
	A0414A	A1112A	1	
	A0414B	A1314A	1	
	A0415A	A0924B	1	
	A0415B	A1325B	1	
	A0416A	A1217B	1	
	A0416A	A0409A	2	S/C 09 W/ 37966 AND ABOVE
	A0416B	A1222B	1	
	A0417A	A0321A	1	
	A0417B	A1306A	1	
	A0421B	A0916B	2	S/C 09 W/ 37867 AND ABOVE
	A0421B	A0304B	1	
	A0422A	A1113A	1	
	A0422B	A1307B	1	
	A0423A	A1112B	1	S/C 09 W/O 37867 AND BELOW
	A0423A	A0401A	1	S/C 09 W/ 37867 AND ABOVE
	A0423B	A0517B	1	
	A0424A	A0306B	1	
	A0424B	JA0204A	1	
	A0425A	A0915B	1	S/C 09 W/ 37867 AND ABOVE
	A0425B	A0307B	1	
	A0426A	A1125B	1	
	A0426B	A0526A	1	
	A0427A	A0705A	2	
	A0427A	A0312B	2	S/C 09 W/ 37966 AND ABOVE
	A0427B	A1008B	1	
	A0428B	A1007B	1	
	A0429A	A0333A	1	
	A0429B	A1207B	1	
	A0430A	A1113B	1	
	A0430B	A0927B	1	
	A0431A	A1202A	1	
	A0431B	A0227A	1	S/C 10 W/ 48140 AND ABOVE
	A0431B	A0511A	2	S/C 09 W/ 37743 AND ABOVE
	A0432A	JA0205A	1	
	A0432B	A0307A	1	
	A0433A	A0327A	2	
	A0433B	JA0201A	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 5	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A0433B	A0513B	2	
	A0501A	A0505A	1	
	A0501A	A0506A	2	
	A0502A	JA0206A	1	S/C 09 W/ 37743 AND ABOVE
	A0502A	A0412A	2	
	A0502B	A0802B	1	
	A0502B	A0102B	2	
	A0503A	JA0211B	1	
	A0503A	A0222A	2	
	A0503B	A0903B	1	
	A0504A	JA0212A	1	
	A0504A	A0215A	2	
	A0504B	JA0211A	1	
	A0504B	A0221B	2	
	A0505A	A0501A	1	
	A0505B	A1407B	1	
	A0505B	A1105B	2	S/C 11 AND ABOVE
	A0505B	A0731B	2	S/C 10 W/ 48140 AND ABOVE
	A0506A	A0501A	2	
	A0506A	JA0203A	1	
	A0506B	A1103B	1	
	A0507A	A1104A	1	
	A0507B	A1106B	1	
	A0508A	A1107A	1	
	A0508B	JA0214A	1	
	A0508B	A0214B	2	
	A0509A	A1525B	1	S/C 11 AND ABOVE
	A0509B	JA0213A	1	
	A0511A	A0431B	2	S/C 09 W/ 37743 AND ABOVE
	A0512B	A0722B	1	
	A0513B	A1207A	1	
	A0513B	A0433B	2	
	A0514B	JA0214B	1	
	A0514B	A0217A	2	
	A0516B	A0231A	2	
	A0516B	JA0213B	1	
	A0517A	JA0203B	1	
	A0517B	A0423B	1	
	A0521A	A1315A	1	
	A0521B	JA0202B	1	
	A0521B	A0523B	2	S/C 09 W/ 48028; S/C 10 W/O 48140
	A0522A	A0706B	1	
	A0522B	A1531B	1	
	A0522B	A1124B	2	
	A0522B	A1124B	2	S/C 09 W/ 37951 AND ABOVE
	A0523A	JA0208B	1	
	A0523A	A0225B	2	
	A0523B	A0525B	1	
	A0523B	A0521B	2	S/C 09 W/ 48028; S/C 10 W/O 48140
	A0524A	A0403B	1	
	A0524B	A0205B	2	
	A0524B	JA0110B	1	
	A0525A	A1027B	1	S/C 09 W/O 37743 AND BELOW
	A0525A	A0407B	2	
	A0525B	A0523B	1	
	A0525B	A0703B	2	
	A0526A	A0426B	1	
	A0526B	JA0206A	2	S/C 09 W/O 37743 AND BELOW
	A0527A	A0814B	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 6	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI- NATION	Z LEVEL	NOTES
	A0527A	A0205A	2	
	A0527B	A0202A	1	
	A0528A	JA0109A	1	
	A0528B	A0224A	2	
	A0529B	A0227B	2	
	A0529B	JA0212B	1	
	A0530A	A0215B	2	
	A0530A	JA0210B	1	
	A0530B	JA0108A	1	
	A0531A	A0213B	1	
	A0531B	A0213A	2	
	A0531B	JA0113A	1	
	A0532A	JA0409A	1	
	A0532B	A0932B	2	
	A0532B	JA0114B	1	
	A0533A	A0409B	2	S/C 09 W/ 37743 AND ABOVE
	A0533B	A0133B	2	
	A0533B	A0833B	1	
	A0601A	A0606A	1	
	A0602A	A0321B	2	
	A0602B	A0313B	2	
	A0603A	A0726A	1	
	A0603B	A0112B	1	
	A0604A	A1626B	1	
	A0606A	A0606B	2	
	A0606A	A0601A	1	
	A0606B	A0606A	2	
	A0609B	A0733A	1	
	A0610A	A0731B	1	
	A0610A	A0227A	2	S/C 10 W/O 48140 AND BELOW
	A0610B	A0222B	1	
	A0611A	A0214A	1	
	A0611B	A0221A	1	
	A0612A	A0216A	1	
	A0616B	A0226B	1	
	A0617A	A0230A	1	
	A0617B	A0225A	1	
	A0621A	A0228A	1	
	A0625B	A1526B	2	
	A0626A	A1412B	1	
	A0626A	A1316B	2	
	A0627B	A0127B	1	
	A0629A	A1423B	1	
	A0629B	A0204B	1	S/C 09 W/O 37951 AND BELOW
	A0629B	A1612B	2	S/C 09 W/O 37951 AND BELOW
	A0629B	A1316A	2	S/C 09 W/ 37951 AND ABOVE
	A0630A	A0711A	1	
	A0630A	A0323A	2	
	A0630B	A0709A	1	
	A0630B	A0332B	2	
	A0631A	A0229A	1	
	A0631B	JA0102A	1	
	A0632A	JA0103A	1	
	A0632B	JA0104A	1	
	A0633A	A0209B	2	

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SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI- NATION	Z LEVEL	NOTES
	A0633A	A0714B	1	
	A0633B	A0728A	1	
	A0701A	A0723A	2	BJ701J,K UNITS S/C 18 AND BELOW ONLY
	A0703B	A0525B	2	
	A0704B	A0206A	1	
	A0705A	A0427A	2	
	A0705A	A0312B	1	
	A0705B	A0207B	1	
	A0706B	A0522A	1	
	A0709A	A0630B	1	
	A0709A	A1104B	2	
	A0710A	A1324A	2	
	A0710A	A0326B	1	
	A0710B	A0203A	1	
	A0710B	A1329B	2	
	A0711A	A1103A	2	
	A0711A	A0630A	1	
	A0711B	A0223A	1	
	A0714B	A0323B	2	
	A0714B	A0633A	1	
	A0715A	A1604B	1	
	A0715B	A1603B	1	
	A0716A	A1122B	1	
	A0716B	A1121A	1	
	A0717B	A0204A	1	
	A0717B	A1107B	2	
	A0722A	A1306B	1	
	A0722B	A0512B	1	
	A0723A	A1325A	1	
	A0723A	A0701A	2	BJ701J,K UNITS S/C 18 AND BELOW ONLY
	A0724A	A0333B	1	
	A0724A	A1321A	2	
	A0725A	A0203B	1	
	A0725B	A1105A	1	
	A0726A	A0603A	1	
	A0728A	A0633B	1	
	A0728B	A0202B	1	
	A0730A	A0216B	1	
	A0731A	A0212A	1	
	A0731B	A0505B	2	S/C 10 W/ 48140 AND ABOVE
	A0731B	JA0202B	2	S/C 10 W/O 48140 AND BELOW
	A0731B	A0610A	1	
	A0733A	JA0204B	2	
	A0733A	A0609B	1	
	A0733B	A0228B	1	
	A0802B	A0502B	1	
	A0814B	JA0208A	2	
	A0814B	A0527A	1	
	A0833B	A0533B	1	
	A0901A	A0917B	1	
	A0902A	A0902B	1	ELPV, REV.C
	A0902B	A0902A	1	ELPV, REV.C
	A0903A	A0903B	2	ELPV, REV.C

TITLE	WL	DOCUMENT NO.	SHEET NO. 8	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A0903A	A0904A	1	ELPV, REV.C
	A0903B	A0903A	2	ELPV, REV.C
	A0903B	A0503B	1	
	A0904A	A0903A	1	ELPV, REV.C
	A0904A	A0904B	2	ELPV, REV.C
	A0904B	A0904A	2	ELPV, REV.C
	A0906A	A1126A	1	S/C 10 W/ 48226 AND ABOVE
	A0907B	A0929B	1	
	A0912B	A1228B	1	
	A0915B	A0425A	1	S/C 09 W/ 37867 AND ABOVE
	A0916B	A0421B	2	S/C 09 W/ 37867 AND ABOVE
	A0917B	A0901A	1	
	A0922B	A0408A	2	
	A0923B	A0407A	2	
	A0924B	A0415A	1	
	A0924B	A1133A	2	
	A0925B	A0312A	2	
	A0926B	A1317B	1	
	A0927A	A1122A	1	
	A0927B	A0430B	1	
	A0928B	A1226B	1	
	A0929B	A0907B	1	
	A0931A	A0932A	2	ELPV - REV.C
	A0931A	A0931B	1	ELPV - REV.C
	A0931B	A0931A	1	ELPV - REV.C
	A0932A	A0931A	2	ELPV - REV.C
	A0932A	A0932B	1	ELPV - REV.C
	A0932B	A0532B	2	
	A0932B	A0932A	1	ELPV - REV.C
	A0933A	A0933B	1	ELPV - REV.C
	A0933B	A0933A	1	ELPV - REV.C
	A1007B	A0428B	1	
	A1008B	A0427B	1	
	A1009B	A1126B	1	
	A1011B	A0304A	1	
	A1012B	A0122B	1	
	A1027B	A0525A	1	S/C 09 W/O 37743 AND BELOW
	A1027B	A0413B	2	
	A1028B	JA0102B	1	
	A1029B	JA0112B	1	
	A1032A	A0305B	1	
	A1033A	A0322B	1	
	A1102A	A1230B	1	
	A1102B	A1502B	1	
	A1103A	A1333A	1	
	A1103A	A0711A	2	
	A1103B	A0506B	1	
	A1104A	A0507A	1	
	A1104B	A1331A	1	
	A1104B	A0709A	2	
	A1105A	A0725B	1	
	A1105A	A1111B	2	S/C 11 AND ABOVE
	A1105B	A1528B	1	S/C 10 W/ 48140 AND ABOVE
	A1105B	A1407B	2	S/C 09 W/ 48028 AND ABOVE
	A1105B	A0505B	2	S/C 11 AND ABOVE

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TITLE	WL	DOCUMENT NO.	SHEET NO. 9	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A1106A	A0209B	1	
	A1106B	A0507B	1	
	A1107A	A0508A	1	
	A1107B	A1328B	1	
	A1107B	A0717B	2	
	A1108A	A0316A	1	
	A1108B	A1227B	1	
	A1109A	A0405A	1	S/C 09 W/O 37867 AND BELOW
	A1109A	A1223B	1	S/C 09 W/ 37867 AND ABOVE
	A1109B	A0310A	1	
	A1110B	A0406B	2	
	A1110B	A1326A	1	
	A1111A	A1523B	1	S/C 11 AND ABOVE
	A1111B	A1105A	2	S/C 11 AND ABOVE
	A1112A	A0414A	1	
	A1112A	A1303B	2	
	A1112B	A0423A	1	S/C 09 W/O 37867 AND BELOW
	A1112B	A0405A	1	S/C 09 W/ 37867 AND ABOVE
	A1113A	A0422A	1	
	A1113B	A0430A	1	
	A1114B	A0310B	1	
	A1116A	A0404B	1	
	A1121A	A0716B	1	
	A1121B	A0224B	1	
	A1122A	A0927A	1	
	A1122B	A0716A	1	
	A1123A	A0328B	1	
	A1123B	A0406A	1	
	A1124A	A0231B	2	
	A1124A	A1426B	1	
	A1124B	A1612B	1	
	A1124B	A0522B	2	S/C 09 W/ 37951 AND ABOVE
	A1125A	JA0104B	1	
	A1125B	A0426A	1	
	A1126A	A1215B	2	S/C 10 W/O 48226 AND BELOW
	A1126A	A0906A	1	S/C 10 W/ 48226 AND ABOVE
	A1126B	A1009B	1	
	A1132A	A0232B	2	
	A1133A	A0924B	2	
	A1133B	A1533B	1	
	A1202A	A0431A	1	
	A1207A	A0513B	1	
	A1207B	A0429B	1	
	A1208A	A0412B	1	
	A1210A	A0413A	1	
	A1211B	A1302A	1	
	A1212A	A1315B	1	
	A1212B	A1303A	1	
	A1213A	A1304A	1	
	A1213B	A1310A	1	
	A1215A	A1309B	1	
	A1215B	A1126A	2	S/C 10 W/O 48226 AND BELOW
	A1216A	A1311B	1	
	A1216B	A0407A	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 10	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A1217A	A1309A	1	
	A1217B	A0416A	1	
	A1221B	A0408A	1	
	A1222B	A0416B	1	
	A1223B	A1109A	1	S/C 09 W/ 37867 AND ABOVE
	A1225B	A1302B	1	S/C 09 W/ 37867 AND ABOVE
	A1226B	A0928B	1	
	A1227A	A1304B	1	
	A1227B	A1108B	1	
	A1228B	A0912B	1	
	A1230B	A1102A	1	
	A1231A	A1234A	1	
	A1234A	A1231A	1	
	A1302A	A1211B	1	
	A1302B	A1225B	1	S/C 09 W/ 37867 AND ABOVE
	A1303A	A1212B	1	
	A1303B	A1112A	2	
	A1304A	A1213A	1	
	A1304B	A1227A	1	
	A1305A	A0410B	1	
	A1305B	A0403A	2	
	A1306A	A0417B	1	
	A1306B	A0722A	1	
	A1307A	A0327B	2	
	A1307A	A0402B	1	
	A1307B	A0422B	1	
	A1309A	A1217A	1	
	A1309B	A1215A	1	
	A1310A	A1213B	1	
	A1311B	A1216A	1	
	A1313A	JA0110A	1	
	A1313B	A0404A	1	
	A1314A	A0414B	1	
	A1314B	JA0207B	1	
	A1315A	A0521A	1	
	A1315B	A1212A	1	
	A1316A	JA0101B	1	
	A1316A	A0629B	2	S/C 09 W/ 37951 AND ABOVE
	A1316B	A0626A	2	
	A1317B	A0926B	1	
	A1321A	A0724A	2	
	A1322B	A0311B	1	
	A1323B	JA0111A	1	
	A1324A	A0710A	2	
	A1324B	JA0112A	1	
	A1325A	A0723A	1	
	A1325B	A0415B	1	
	A1326A	A1110B	1	
	A1326B	A0332A	1	
	A1328B	A1107B	1	
	A1329B	A0710B	2	
	A1330A	A0323B	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 11	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A1331A	A1104B	1	
	A1332A	JA0202A	1	S/C 09 AND BELOW
	A1332B	A0410A	1	
	A1333A	A1103A	1	
	A1333B	A0412A	1	S/C 09 AND BELOW
	A1401A	A1405A	2	
	A1405A	A1401A	2	
	A1407B	A0505B	1	
	A1407B	A1105B	2	S/C 09 W/ 48028 AND ABOVE
	A1407B	A1528B	2	S/C 09 W/ 37979 AND ABOVE
	A1409A	A0130B	1	
	A1410B	A0128B	1	
	A1412B	JA0110B	2	
	A1412B	A0626A	1	
	A1422B	A1524B	1	S/C 11 AND ABOVE
	A1423B	A0629A	1	
	A1426B	A1124A	1	
	A1426B	A1613B	2	
	A1429A	JA0108B	1	
	A1429B	JA0109B	1	
	A1502B	A1102B	1	
	A1502B	A1602B	2	
	A1503B	A1610B	1	
	A1504B	A1609B	1	
	A1507B	JA0107B	1	
	A1508B	JA0106B	1	
	A1521B	JA0105B	1	
	A1522B	JA0106A	1	
	A1523B	A1111A	1	S/C 11 AND ABOVE
	A1524B	A1422B	1	S/C 11 AND ABOVE
	A1525B	A0509A	1	S/C 11 AND ABOVE
	A1526B	A0625B	2	
	A1527B	A1613B	1	S/C 09 W/ 37979 AND ABOVE
	A1528B	A1105B	1	S/C 10 W/ 48140 AND ABOVE
	A1528B	A1407B	2	S/C 09 W/ 37979 AND ABOVE
	A1530B	A1622B	1	
	A1531B	A0204B	2	
	A1531B	A0522B	1	
	A1532B	A0230B	1	
	A1533B	A1133B	1	
	A1533B	A1633B	2	
	A1601A	JA0401A	2	
	A1601B	JA0205B	1	
	A1602B	A1502B	2	
	A1603B	A0715B	1	
	A1604B	A0715A	1	
	A1609B	A1504B	1	
	A1610B	A1503B	1	
	A1612B	A1124B	1	
	A1612B	A0629B	2	S/C 09 W/O 37951 AND BELOW
	A1613B	A1527B	1	S/C 09 W/ 37979 AND ABOVE
	A1613B	A1426B	2	
	A1622B	A1530B	1	
	A1623B	A0123B	1	
	A1624B	A0124B	1	
	A1626B	A0604A	1	

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TITLE	WL	DOCUMENT NO.	SHEET NO. 12	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	A1633B	A1533B	2	
	A1634A	JA0105A	1	
	JA0101B	A1316A	1	
	JA0102A	A0631B	1	
	JA0102B	A1028B	1	
	JA0103A	A0632A	1	
	JA0104A	A0632B	1	
	JA0104B	A1125A	1	
	JA0105A	A1634A	1	
	JA0105B	A1521B	1	
	JA0106A	A1522B	1	
	JA0106B	A1508B	1	
	JA0107B	A1507B	1	
	JA0108A	A0530B	1	
	JA0108B	A1429A	1	
	JA0109A	A0528A	1	
	JA0109B	A1429B	1	
	JA0110A	A1313A	1	
	JA0110B	A0524B	1	
	JA0110B	A1412B	2	
	JA0111A	A1323B	1	
	JA0111B	JA0210A	1	ELPV - REV.C
	JA0112A	A1324B	1	
	JA0112B	A1029B	1	
	JA0113A	A0531B	1	
	JA0114B	A0532B	1	
	JA0201A	A0433B	1	
	JA0201B	JA0207A	1	
	JA0201B	JA0206B	2	
	JA0202A	A1332A	1	S/C 09 AND BELOW
	JA0202A	A0412A	1	S/C 10 AND ABOVE
	JA0202B	A0521B	1	
	JA0202B	A0731B	2	S/C 10 W/O 48140 AND BELOW
	JA0203A	A0506A	1	
	JA0203B	A0517A	1	
	JA0204A	A0424B	1	
	JA0204B	A0733A	2	
	JA0205A	A0432A	1	
	JA0205B	A1601B	1	
	JA0206A	A0502A	1	S/C 09 W/ 37743 AND ABOVE
	JA0206A	A0526B	2	S/C 09 W/O 37743 AND BELOW
	JA0206B	JA0201B	2	
	JA0207A	JA0201B	1	
	JA0207A	JA0209B	2	
	JA0207B	A1314B	1	
	JA0208A	A0814B	2	
	JA0208B	A0523A	1	
	JA0209A	A0232A	1	
	JA0209B	JA0207A	2	
	JA0210A	JA0111B	1	ELPV - REV.C
	JA0210B	A0530A	1	
	JA0211A	A0504B	1	
	JA0211B	A0503A	1	
	JA0212A	A0504A	1	
	JA0212B	A0529B	1	
	JA0213A	A0509B	1	

TITLE	WL	DOCUMENT NO.	SHEET NO. 13	REV. BA

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI-NATION	Z LEVEL	NOTES
	JA0213B	A0516B	1	
	JA0214A	A0508B	1	
	JA0214B	A0514B	1	
	JA0401A	A1601A	2	
	JA0409A	A0532A	1	

KOR-0542B-2

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
BASE ASSEMBLY WIRE LIST (Ref 77387400)		SMD 7874	1 of 2	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	4	S4-C	A4-E2	
2	9-60 HZ 0-50 HZ	T1-1	TB1-1	
3	0	M1	CB1-A2	
4	9	M1	CB1-B2	
5	3	T1	TUNING CAP-1	
6	3	T1	TUNING CAP-2	
7				
8	BLACK	CB1-A1	CB2-1	
9	8-60 HZ 3-50 HZ	T1-2	TB1-2	
10	0-60 HZ 1-50 HZ	T1-3	TB1-3	
11	4	T1-4	TB1-4	
12	8	T1-5	TB1-5	
13	9	T1-6	TB1-6	
14	RED	POWER SUPPLY	C1+	
15	BLUE	POWER SUPPLY	C2-	
16	BLACK	POWER SUPPLY	C1-	
17				
18				
19	BLACK	DM1 BRAKE	A4-E10	
20	BLACK	DM1 BRAKE	A4-E7	
21	YELLOW	SW1-NC	A4-E9	
22	RED	K5-2	C6-2	
23	BLUE	DM1-AC	K5-1	
24	YELLOW	DM1-AC	P302-1	
25	RED	DM1-AC	C6-1	
26	BLACK	TB1-2	TB1-3	220 V, 50 HZ 240 V, 50 HZ
27	BLACK	A9-K2-5	A9-K2-4	
28	BLACK	A9-K2-7	A9-K2-9	
29	BLACK	A9-K2-2	A9-K2-3	
30	BLACK	VC-2	A9-K2-8	
31	YELLOW	A9 (CR1 AC)	A9-K2-8	
32	YELLOW	S4-NO	J206-1	
33	YELLOW	S4-C	J206-2	
34	BLACK	TB1-1	TB1-3	100 V, 50 HZ

TITLE			WL	DOCUMENT NO.	SHEET NO.	REV.
BASE ASSEMBLY WIRE LIST				SMD 7874	2 of 2	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
35	BLACK	TB1-2	TB1-4	100 V, 50 HZ
36	YEL/BL	CB2-2	TB1-5	220 V, 50 HZ
37		CB2-2	TB1-6	240 V, 50 HZ
38		CB2-2	TB1-4	100 V, 50 HZ
39		CB2-2	TB1-3	120 V, 60 HZ
40	YEL/BL	CB1-B1	TB1-1	NEUTRAL

TITLE CABLE ASSEMBLY W4 WIRE LIST (Ref 75243700)	WL	DOCUMENT NO. SMD 7437	SHEET NO. 1 of 2	REV. B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1				
1A	5	JA1-1B	J101-14B	
1B	0	JA1-1A	J101-14A	
1C	4	JA1-2B	J101-13B	
1D	3	JA1-2A	J101-13A	
1E	3	JA1-3B	J101-12B	
1F	0	JA1-3A	J101-12A	
1G	2	JA1-4B	J101-11B	
1H	0	JA1-4A	J101-11A	
1J	1	JA1-5B	J101-10B	
1K	0	JA1-5A	J101-10A	
1L	0	JA1-6A	J101-9A	
1M	0	JA1-8A	J101-7A	
1N	0	JA1-9A	J101-6A	
1P	5	JA1-10B	J101-5B	
1R	0	JA1-10A	J101-5A	
1S	4	JA1-11B	J101-4B	
1T	0	JA1-11A	J101-4A	
1U	3	JA1-12B	J101-3B	
1V	0	JA1-12A	J101-3A	
1W	2	JA1-13B	J101-2B	
1X	0	JA1-13A	J101-2A	
1Y	1	JA1-14B	J101-1B	
1Z	0	JA1-14A	J101-1A	
2				
2A	6	JA1-6B	J101-9B	
2B	9	JA1-7B	J101-8B	
2C	SHLD	COND. IDENT. 3	COND. IDENT.	
3	0	JA1-7A	COND. IDENT. 2C	
4	0	COND. IDENT. 2C	J101-8A	
5				
5A	6	JA1-8B	J101-7B	
5B	9	JA1-9B	J101-6B	
5C	SHLD	COND. IDENT. 2C	COND. IDENT.	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
CABLE ASSEMBLY W4 WIRE LIST		SMD 7437	2 of 2	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
6	0	COND. IDENT. 2C	COND. IDENT. 5C	
7	0	COND. IDENT. 5C	COND. IDENT. 4	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
S/C 09 & BLW W-5 HARNESS WIRE LIST (Ref 77479300)	WL	SMD 7793	1 of 2	A

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1				
1A	0	PA2-1A	P201-1A	FAULT TO LED
2B	9	PA2-1B	P201-1B	GROUND
3	4	PA2-2A	A4-E4	UNLOAD HEADS
4	4	PA2-2B	P201-2B	FAULT CLEAR
5				
5A				
5B				
6	4	PA2-4A	A4-E3	HEADS LOADED
7	4	A4-E3	S2-NO	HEADS LOADED
8	4	P201-5A	S3-C	PACK ACCESS COVER SW.
9	4	P201-%a	PA2-6A	START
10	4	PA2-7A	P201-7A	GROUND TO START SW.
11	4	PA2-7B	A4-E6	SPEED + VOLT FLT
13	1	A4-E2	S2-NC	HEADS LOADED
14	4	PA2-10A	P201-10A	+5 VOLTS
15	4	PA2-11A	P201-11A	LOGIC PLUG BIT 3
16	4	PA2-11B	P201-11B	LOGIC PLUG BIT 1
17	4	PA2-12A	P201-12A	LOGIC PLUG BIT 2
18	4	PA2-13A	P201-13A	READY TO LED
19	4	PA2-14A	P201-14A	LOGIC PLUG BIT 0
20	4	S3-NO	A4-E12	PACK COVER SW.
21	0	S2-7	A4-GND	GROUND TO HDS. LOAD SW.
22	2	A0-+5	A4-E5	+5V TO A4 ASSY
23	2	A0-+20	K2-B	+20V TO K2 COIL
24	2	K2-B	A4-E10	+20V BUSS FROM K2 COIL TO A4 ASSY
25	2	A4-E5	K1-3	+5V BUSS FROM A4 ASSY TO SPINDLE MOTOR TRIAC
26	0	A0-GND	A4-GND	GROUND TO A4 ASSY
28	6	A0--20		-20V BUSS TO ASSY BRUSH TO OPTION
29	4	K2-A	A4-E8	UP TO SPEED TO K2 COIL
30	3	PA2-12B	P201-12B	WRITE FAULT
31	3	PA2-10B	P201-10B	HD. SEL. FAULT
32	4	PA2-8B	P201-8B	W • R FAULT
33	4	PA2-13B	P201-13B	ON CYL • (W+R)

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
W-5 HARNESS WIRE LIST		SMD 7793	2 of 2	A

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
34	4	PA2-14B	P201-14B	VOLTAGE FAULT
35	4	PA2-5B	P201-5B	-5 VOLTS
36				
36A	9	PA2-5A	P201-6A	SEEK END
36B	0	PA2-6B	P201-6B	GROUND
37				
37A	9	PA2-4B	P201-4A	MOD ADDRESSED
37B	0	PA2-9B	P201-6B	GND
38	4	PA2-9A	P201-9A	INTERRUPT
39				
39A	9	J203-1	P201-2A	SEEK END
39B	0	J203-2	P201-3B	$\overline{\text{SEEK END}}$
40				
40A	9	J203-4	P201-3A	MOD ADDRESSED
40B			P201-4B	$\overline{\text{MOD ADDRESSED}}$
41				
41A	9	P204-2	P201-7B	INTERRUPT
41B	0	P204-1	P201-8A	$\overline{\text{INTERRUPT}}$
42	4	PA2-8A	P201-9B	WRITE PROTECT SW.
43	4	P201-5B	P205-1B	
44	4	P201-13A	P205-3A	
45	4	A4-E1	P205-9B	
46	4	A4-E2	P205-7B	
47	2	A4-E5	P205-14B	
48	2	A4-E10	P205-12B	
49	4	A4-E12	P205-6B	
50	2	K5-3	P205-14B	
51	4	K5-4	P205-10B	
52		PA2-1B	P205	
52A	0	PA2-3A	P205-1A	
52B	2	PA2-3B	P205-2B	
53	0	P205-2A	P205-14A	
54	0	A4-GND	P205-14A	
55	4	P206-1	K1-4	
57	4	P206-2	P205-8B	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
(Ref. 40140801) W5 HARNESS WIRE LIST - S/C 10 + ABV		4408	1 of 2	B

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	WIRE COLOR	Z LEVEL	NOTES
1A	PA2-1A	P201-1A	9		$\overline{\text{FAULT}}$ TO LED
2B	PA2-1B	P201-1B	0		GROUND
3	PA2-2A	P205-53	4		UNLOAD HEADS
4	PA2-2B	P201-2B	4		$\overline{\text{FAULT CLEAR}}$
5	P205-11A	P207-1	4		BRAKE CONTROL
5A	S3-C	P205-9A	4		PACK ACCESS COVER SW
5B	PA2-4A	P207-2	4		HEADS LOADED
6	PA2-4A	S2-NO	4		HEADS LOADED
8	P201-5A	S3-C	4		PACK ACCESS COVER SW.
9	P201-5A	PA2-6A	4		START
10	PA2-7A	P201-7A	4		GROUND TO START SW.
11	PA2-7B	P205-13A	4		$\overline{\text{SPEED +VOLT FLT}}$
13	P205-103	S2-NC	4		$\overline{\text{HEADS LOADED}}$
14	PA2-10A	P201-10A	4		+5 VOLTS
15	PA2-11A	P201-11A	4		LOGIC PLUG BIT 3
16	PA2-11B	P201-11B	4		LOGIC PLUG BIT 1
17	PA2-12A	P201-12A	4		LOGIC PLUG BIT 2
18	PA2-13A	P201-13A	4		READY TO LED
19	PA2-14A	P201-14A	4		LOGIC PLUG BIT 0
20	S3-NO	P205-63	4		PACK COVER SW.
21	S2-C	A0-GND	0		GROUND TO HDS. LOAD SW.
22	A0-+5	K1-3	2		+5V TO K1 ASSY
23	A0-+20	K2	2		+20V TO K2 COIL
25	K1-3	K5-3	2		+5V BUSS TO SPINDLE MOTOR TRIACS
26	A3-GND	P205-14A	0		GROUND TO 3XPN ASSY
27	S2-NC	P205-10B	4		
29	K2-A	P205-12A	4		UP TO SPEED TO K2 COIL
30	PA2-12B	P201-12B	4		WRITE FAULT
31	PA2-10B	P201-10B	4		HD. SEL. FAULT
32	PA2-8B	P201-8B	4		W · R FAULT
33	PA2-13B	P201-13B	4		$\overline{\text{ON CYL}}$. (W+R)
34	PA2-14B	P201-14B	4		VOLTAGE FAULT
35	PA2-5B	P201-5B	4		-5 VOLTS
36A	PA2-5A	P201-6A	9		SEEK END

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
W5 HARNESS WIRE LIST		4408	2	B

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	WIRE COLOR	Z LEVEL	NOTES
36B	PA2-6B	P201-6B	0		GROUND
37A	PA2-4B	P201-4A	9		MOD ADDRESSED
37B	PA2-9B	P201-6B	0		GND
38	PA2-9A	P201-9A	4		INTERRUPT
39A	J2-CC	P201-2A	9		SEEK END
39B	J2-AA	P201-3B	0		$\overline{\text{SEEK END}}$
40A	J2-DD	P201-3A	9		MOD ADDRESSED
40B	J2-BB	P201-4B	0		$\overline{\text{MOD ADDRESSED}}$
41A	J2-EE	P201-7B	9		INTERRUPT
41B	J2-HH	P201-8A	0		$\overline{\text{INTERRUPT}}$
42	PA2-8A	P201-9B	4		WRITE PROTECT SW
43	P201-5B	P205-1B	4		
44	P201-13A	P205- 3B			
48	K2-B	P205-12B	2		
50	K5-3	P205-14B	2		+5 BUSS TO XPN
51	K5-4	P205-83	4		
52	PA2-1B	P205			
52A	PA2-3A	P205-1A	0		
52B	PA2-3B	P205-2B	2		
55	P206-1	K1-4			
57	P206-2	P205-95	4		
58	P208-3	P205-8A	4		
59	P208-1	P205-10A	4		
60	P208-2	P205-2A	4		
61	P205-1A	P205-4A	4		
62	P205-4A	P205-5A	4		

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
DC HARNESS W6 WIRE LIST (Ref 75258300)		SMD 7583	1 of 1	E

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	RED	J1-1	A0-+5	+ 5 VOLTS
2	BLACK	J1-2	A0-GND	GND
3	BLUE	J1-3	A0--5	-5 VOLTS
4	RED	J1-4	PA1-12B	+12 VOLTS
5	BLUE	J1-5	A0--20	-20 VOLTS
6	BLUE	J1-6	PA1-2B	-12 VOLTS
7	RED	J1-7	PA1-14B	+36 VOLTS
8	RED	J1-8	A0-+20	+20 VOLTS
9	BLUE	J1-9	A0 A09-3B	-36 VOLTS,ELPV - REV. B
9	BLUE	J1-9	A0 A09-3B	-42 VOLTS,ELPV - REV. C
10	RED	J1-10	A8-R2-2	+36 VOLTS,ELPV - REV. B
10	RED	J1-10	A8-R2-2	+42 VOLTS, ELPV - REV. C
11	BLACK	J1-11	A8-R3-2	±36 GND, ELPV - REV. B
11	BLACK	J1-11	A8-R3-2	+42 VOLTS, ELPV - REV. C
12	BLUE	J1-12	A8-R1-2	-36 VOLTS, ELPV - REV. B
12	BLUE	J1-12	A8-R1-2	-42 VOLTS, ELPV - REV. C
13	RED	A9 CR-+	A8-R2-2	
14	BLACK	A0 A09-17B	A8-R3-2	
15	BLUE	A9 CR1--	A8-R1-2	
16	BLUE	A9 CR1--	A9 CR2-A0	
17	BLUE	A0--5	PA1-3B	-5
18	RED	A3-+20	PA1-13B	+20
19	RED	J1-7	A3-A09-32B	+42 VOLTS, ELPV - REV. C
20	RED	A0 A09-XX	A0 A09-XX	+42 VOLTS, ELPV - REV. C
21	RED	A0 A09-XX	A0 A09-XX	+42 VOLTS, ELPV - REV. C
22	RED	A0 A09-XX	A0 A09-XX	+42 VOLTS, ELPV - REV. C
23	BLUE	A0 A09-XX	A0 A09-XX	-42 VOLTS, ELPV - REV. C
24	BLUE	A0 A09-XX	A0 A09-XX	-42 VOLTS, ELPV - REV. C
25	BLUE	A0 A09-XX	A0 A09-XX	-42 VOLTS, ELPV - REV. C

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
W10 CABLE ASSY WIRE LIST (Ref 77396500 B)	WL	SMD 7965	1 of 1	E

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	YELLOW	A0P09-XX	A8-E12	
2	YELLOW	A0P09-XX	A8-E15	
3	YELLOW	A0P09-XX	A8-E3	
4	YELLOW	A0P09-XX	A8-E10	
5	YELLOW	A0P09-XX	A8-E9	
6	YELLOW	A0P09-XX	A9-C7-	
7	BLUE	A0P09-XX	A8-R3-1	
8	YELLOW	VC-1	A8-R3-1	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
W12 CABLE ASSEMBLY WIRE LIST (Ref 77563500)	WL	SMD 7635	1 of 1	A

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1				
1A	0	P400-1	CB1-A2	
1B	9	P400-2	CB1-B2	
1C	STRAND	P400-3	GND OF BASE-GND	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
POWER AMP DRIVER WIRE LIST (Ref 77396400)		SMD 7964	1 of 1	A

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	RED	A8-R2-1	A8-E13	
2	WHITE	A8-R4-2	A8-E4	
3	YELLOW	A9-C7-	A8-R4-1	
4	BLUE	A8-R1-1	A8-E14	
5	YELLOW	A8-E11	A9-K2-6	
6				
7				
8				
9	WHITE	A8-E12	A9-K2-1	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
AC HARNESS WIRE LIST (S/C 31 & ABV, 50 Hz)		Ref. 77387300	1 of 1	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	4	CB1-A1	TB1-1	
2	4	CB1-B1	TB1-2	
3	5	GND	TB1-3	GND
4	4	CB1-A2	K1-1	
5	4	CB1-B2	J302-1	
6	5	GND	K5 BASE-GND	
7	4	CB1-A2	P301-3	
8	4	CB1-B2	P301-2	
9	5	GND	P301-1	
10	4	CB2-2	TB1-2	60 HZ, 100 VAC
11	4	CB1-B1	TB1-1	NEUTRAL OR PHASE
12	5	GND	CKT BKR BASE-GND	
13	4	K1-2	K5-1	
14	5	GND	TB1 BASE-GND	
15	4	CB2-2	TB1-3	60 HZ, 120 V
16	4	CB2-2	TB1-4	50 HZ, 100 V
17	4	CB2-2	TB1-5	50 HZ, 220 V
18	4	CB2-2	TB1-6	50 HZ, 240 V

TITLE AC HARNESS WIRE LIST (S/C 30 & BLW, 50 Hz; ALL 60 Hz)	WL	DOCUMENT NO. Ref. 77387300	SHEET NO. 1 of 1	REV. B

CON-DUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	4	CB1-A1	LF-3	
2	4	CB1-B1	LF-4	
3	5	GND	LF-GND	
4	4	CB1-A2	K1-1	
5	4	CB1-B2	J302-1	
6	5	GND	K5 BASE-GND	
7	4	CB1-A2	P301-3	
8	4	CB1-B2	P301-2	
9	5	GND	P301-1	
10	4	CB2-2	TB1-2	60 HZ, 100 V
11	4	CB1-B1	TB1-1	NEUTRAL OR PHASE
12	5	GND	CKT BKR BASE-GND	
13	4	K1-2	K5-1	
14	5	GND	TB1 BASE-GND	
15	4	CB2-2	TB1-3	60 HZ, 120 V
16	4	CB2-2	TB1-4	50 HZ, 100 V
17	4	CB2-2	TB1-5	50 HZ, 220 V
18	4	CB2-2	TB1-6	50 HZ, 240 V

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
I/O CABLE WIRE LIST (Ref 40139600 B)		SMD 7264	1 of 7	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1				
1A	0	J3-1	PA7-32B	
1B	1	J3-4	PA7-29A	
2				
2A	0	J4-1	PA7-32B	
2B	1	J4-4	PA7-29A	
3				
3A	0	J3-2	PA6-8A	
3B	2	J3-5	PA6-7B	
4				
4A	0	J4-2	PA6-8A	
4B	2	J4-5	PA6-7B	
5				
5A	3	J3-3	PA6-24B	
5B	0	J3-7	PA6-25A	
6				
6A	3	J4-3	PH6-24B	
6B	0	J4-7	PA6-25A	
7				
7A	4	J3-8	PA6-15A	
7B	0	J3-12	PA6-14B	
8				
8A	4	J4-8	PA6-15A	
8B	0	J4-12	PA6-14B	
9				
9A	0	J3-10	PA6-9A	
9B	5	J3-13	PA6-8B	
10				
10A	0	J4-10	PA6-9A	
10B	5	J4-13	PA6-8B	
11				
11A	0	J3-11	PA6-13B	
11B	6	J3-14	PA6-14A	
12				

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
I/O CABLE WIRE LIST		SMD 7264	2 of 7	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
12A	0	J4-11	PA6-13B	
12B	6	J≥-14	PA6-14A	
13				
13A	0	J3-15	PA6-21B	
13B	7	J3-18	PA6-22A	
14				
14A	0	J4-15	PA6-21B	
14B	7	J≥-18	PA6-22A	
15				
15A	0	J3-16	PA6-15B	
15B	8	J3-20	PA6-16A	
16				
16A	0	J4-16	PA6-15B	
16B	8	J4-20	PA6-16A	
17				
17A	0	J3-17	PA6-22B	
17B	9	J3-21	PA6-23A	
18				
18A	0	J4-17	PA6-22B	
18B	9	J4-21	PA6-23A	
19				
19A	0	J3-22	PA7-2A	UNIT SELECT
19B	1	J3-25	PA7-7B	UNIT SELECT
20				
20A	0	J4-22	PA7-2A	UNIT SELECT
20B	1	J4-25	PA7-7B	UNIT SELECT
21				
21A	0	J3-23	PA7-2B	
21B	2	J3-26	PA7-3A	
22				
22A	0	J4-23	PA7-2B	
22B	2	J4-26	PA7-3A	
23				
23A	0	J3-24	PA7-4A	

TITLE I/O CABLE WIRE LIST	WL	DOCUMENT NO. SMD 7264	SHEET NO. 3 of 7	REV. B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
23B	3	J3-27	PA7-6A	
24				
24A	0	J4-24	PA7-4A	
24B	3	J4-27	PA7-6A	
25				
25A	0	J3-28	PA7-13B	
25B	4	J4-31	PA7-13A	
26				
26A	0	J4-28	PA7-13B	
26B	4	J4-31	PA7-13A	
27				
27A	0	J3-29	PA7-8B	
27B	5	J3-32	PA7-9B	
28				
28A	0	J4-29	PA7-8B	
28B	5	J4-32	PA7-9B	
29				
29A	0	J3-30	PA7-17A	
29B	6	J3-33	PA7-21A	
30				
30A	0	J4-30	PA7-17A	
30B	6	J4-33	PA7-21A	
31				
31A	0	J3-34	PA7-14A	
31B	7	J3-37	PA7-21B	
32				
32A	0	J4-34	PA7-14A	
32B	7	J4-37	PA7-21B	
33				
33A	0	J3-35	PA7-12B	
33B	8	J3-38	PA7-7A	
34				
34A	0	J4-35	PA7-12B	
34B	8	J4-38	PA7-7A	

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
35				
35A	0	J3-36	PA7-8A	
35B	9	J3-39	PA7-12B	
36				
36A	0	J4-36	PA7-8A	
36B	9	J4-39	PA7-12A	
37				
37A				
37B				
38				
38A				
38B				
39				
39A				
39B				
40				
40A				
40B				
41				
41A	0	J3-42	PA6-24A	
41B	3	J3-45	PA6-23B	
42				
42A	0	J3-42	PA6-24A	
42B	3	J3-45	PA6-23B	
43				
43A	0	J3-46	PA7-23B	
43B	4	J3-49	PA7-27A	
44				
44A	0	J4-46	PA7-23B	
44B	4	J4-49	PA7-27A	
45				
45A	0	J3-48	PA7-27B	
45B	53	J3-51	PA7-26B	
46				

TITLE I/O CABLE WIRE LIST	WL	DOCUMENT NO. SMD 7264	SHEET NO. 5 of 7	REV. B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
46A	0	J4-48	PA7-27B	
46B	5	J4-51	PA7-26B	
47				
47A	0	J3-52	PA7-29B	
47B	6	J3-55	PA7-32A	
48				
48A	0	J4-52	PA7-29B	
48B	6	J4-55	PA7-32A	
49				
49A	0	J3-74	PA6-5A	
49B	7	J3-77	PA6-4B	
50				
50A	0	J4-74	PA6-5A	
50B	7	J4-77	PA6-4B	
51				
51A	0	J3-75	PA6-12B	
51B	8	J3-78	PA6-13A	
52				
52A	0	J4-75	PA6-12B	
52B	8	J4-78	PA6-13A	
53				
53A	0	J2-EE	J204-2	INTERRUPT
53B	9	J2-HH	J204-1	INTERRUPT
54				
54A	0			
54B	9			
55				
55A	0	J2-AA	P203-2	SEEK END , S/C 09 & BLW
55B	1	J2-CC	P203-1	SEEK END , S/C 09 & BLW
56				
56A	0	J2-BB	P203-3	S/C 09 & BLW
56B	1	J2-DD	P203-4	S/C 09 & BLW
57				
57A	0			

TITLE		DOCUMENT NO.	SHEET NO.	REV.
I/O CABLE WIRE LIST	WL	SMD 7264	6 of 7	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
57B				
58				
58A				
58B				
59				
59A	0	J3-80	PA7-34A	
59B	3			
60				
60A	0	J4-80	PA7-34A	
60B	3			
61				
61A	6	J2-A	PA6-28B	
61B	9	J2-B	PA6-28A	
61C	SHLD			
62				
62A	6	J2-M	PA6-5B	
62B	9	J2-N	PA6-7A	
62C	SHLD			
63				
63A				
63B				
64				
64A	6	J2-W	PA6-6A	
64B	9	J2-X	PA6-6B	
64C	SHLD			
65				
65A	6	J2-J	PA6-26B	
65B	9	J2-H	PA6-27A	
65C	SHLD			
66	0	COND. IDENT. 63C	COND. IDENT. 64C	5
67	0	COND. IDENT. 64C	COND. IDENT. 62C	
68	0	COND. IDENT. 62C	COND. IDENT. 65C	
69	0	COND. IDENT. 65C	COND. IDENT. 61C	
70	0	COND. IDENT. 61C	J2 CORNER GUIDE PIN	5
71	0	J2 CORNER GUIDE PIN 4	J2-D	
72	0	J2-D	J2-E	
73	0	J2-E	J2-K	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
I/O CABLE WIRE LIST		SMD 7264	7 of 7	B

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
74	0	J2-K	J2-T	
75	0	J2-T	J2-Y	
76	0	J208-1	J3-73	
77	0	J208-2	J3-76	
78	0	J208-2	J4-76	
79	0	J208-3	J4-73	
80	0	J2 Corner Guide Pin		BAS Ground

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
FAN CABLE WIRE LIST (Ref 76036200)		SMD 7362	1 of 1	A

CONDUCTOR ID	WIRE COLOR	ORIGIN	DESTINATION	NOTES
1	0	CB2-2	B2-1	
2	9	CB1-B1	B2-2	
3	CLEAR	CB1-GND	LOWER GRILL B2	

TITLE	WL	DOCUMENT NO.	SHEET NO.	REV.
TRANSDUCER CABLE W/L (REF: 76427200 A)		SMD 7272	1 of 1	A

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	WIRE COLOR	Z LEVEL	NOTES
1	P12 34A	J22 1	0		
2	P12 31A	J22 4	0		
3	P12 28B	J22 2	4		
4	P12 29B	J22 3	4		
5	J22 4	J22 SHLD			
6	P12 34A	BASE GND	0		

SECTION 6

PARTS DATA

INTRODUCTION

This section provides the information needed to order field replaceable parts for the BJ701 & BJ7B1 Storage Module Drive (SMD).

Information within this section is provided by representative illustrations and their companion parts lists. The parts shown on the illustrations are assigned index numbers. These numbers cross reference the illustrations to the associated parts lists. The first illustration in the manual shows the complete SMD. Subsequent illustrations progressively break the drive down into its component parts and assemblies.

The parts lists associated with each illustration are organized in four columns:

- The Index Number column cross references the applicable entry to the associated illustration. When more than one entry is given for a particular index number, the use of the particular part is defined in the Application column.
- The Part Number column provides the eight digit number by which a part may be ordered. In some cases the last two digits (referred to as Tab numbers) may be shown as "xx". This situation exists when an assembly (which is not normally considered field replaceable) changes tab numbers rapidly in the course of normal factory build. If it is necessary to order an assembly which is catalogued in this manner, the actual part number can usually be found on the part number label attached to the assembly. If the actual part number cannot be determined, be sure to include on the order the series code of the machine, and a listing of all the change orders installed. NFR in the part number column indicates that an assembly is not field replaceable. If repair of the NFR item is necessary, refer to the maintenance section of this manual for further information.
- The Description column provides the part nomenclature. This column also provides information on the relationship of parts and assemblies. This is accomplished by means of indentation within the column. An indented item is part of a previous assembly which is indented to a lesser degree.
- The Application column is used to show differences in configuration when more than one configuration of a machine is covered in the manual. This is shown by identifying a machine configuration (50 Hz), by identifying a machine series code and change order number (S/C 10 with 37900), or by identifying the last two digits of the eight digit assembly part number to which the particular part applies (Tab 17).

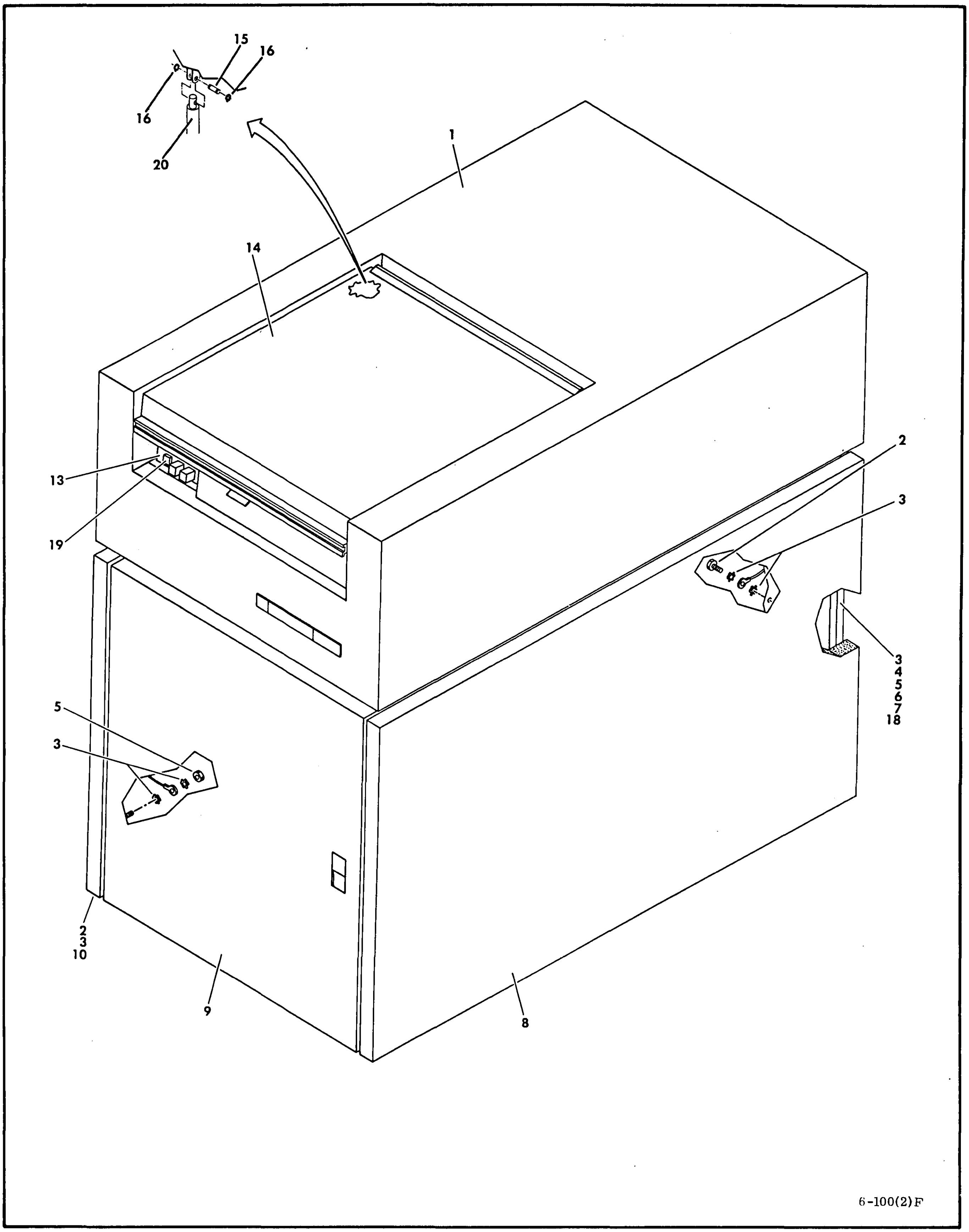

FIGURE 6-1. FINAL ASSEMBLY - 1X OPTION (SHEET 1 OF 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
1-	76420017	FINAL ASSEMBLY - 1X OPTION (SHEET 1 OF 2)	BJ701A
1-	76420018	FINAL ASSEMBLY	BJ701B
1-	76420019	FINAL ASSEMBLY	BJ701C
1-	76420020	FINAL ASSEMBLY	BJ701D
1-	76420025	FINAL ASSEMBLY	BJ7B1A
1-	76420026	FINAL ASSEMBLY	BJ7B1B
1-	76420042	FINAL ASSEMBLY	BJ7B1D
1-	76420047	FINAL ASSEMBLY	BJ7B1C
1-	76420067	FINAL ASSEMBLY	BJ7B1K
1-	76420068	FINAL ASSEMBLY	BJ7B1J
1-	76420072	FINAL ASSEMBLY	BJ701J
1-	76420073	FINAL ASSEMBLY	BJ701K
1-	76420085	FINAL ASSEMBLY	BJ7B1L
1		TOP CASE ASSEMBLY (SEE FIGURE 6-9)	
2	93592428	SCREW, TPG. HEX PNL, 10-32 x 3/8	
3	10126402	WASHERS, EXT. TOOTH LOCK, 8	
4		REAR DOOR ASSEMBLIES	
		REAR DOOR ASSEMBLY - 1X OPTION (SEE FIGURE 6-5)	S/C 27 & BLW
		REAR DOOR ASSEMBLY - 2X OPTION (SEE FIGURE 6-6)	S/C 28 & ABV
5	10125106	NUT-HEX, MACH, SCREW, 8-32	
6	10125606	WASHERS, PLAIN, 8	
7	92602002	CLAMP, CABLE-NYLON	
8		LEFT SIDE PANEL ASSEMBLY (SEE FIGURE 6-8)	
9		1X FRONT DOOR ASSEMBLY (SEE FIGURE 6-7)	
10		RIGHT SIDE PANEL ASSEMBLY (SEE FIGURE 6-8)	
11		NOT USED	
12		NOT USED	
13		CONTROL PANEL ASSEMBLY (SEE FIGURE 6-12)	
14		ACOUSTICAL PACK COVER ASSEMBLY (SEE FIGURE 6-11)	
15	75071700	PIN-PIVOT, COVER	
16	92033221	RETAINING RING	
17		NOT USED	
18	92373004	NYLINER-SNAP-IN	
19	82353600	LOGIC PLUG KIT	PACKED SEPARATELY AND SHIPPED WITH UNIT. PART NUMBER TAB CORRESPONDS TO KEY NUMBER.
	943724XX	(LOGICAL ADDRESS PLUG)(TAB 00-15)	
20		SPRING, GAS (SEE FIGURE 6-15)	

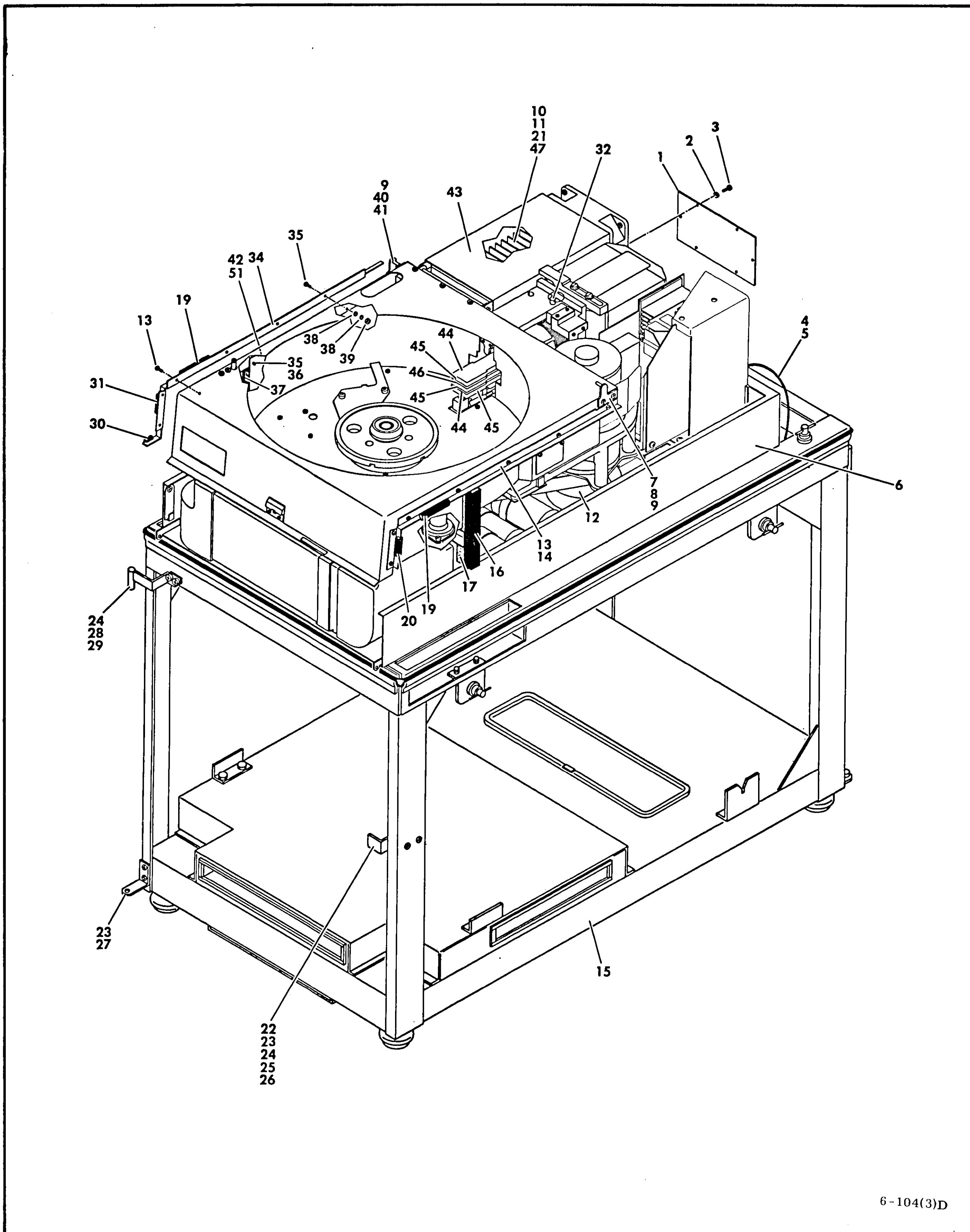

FIGURE 6-1. FINAL ASSEMBLY - 1X OPTION (SHEET 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
1-		FINAL ASSEMBLY - 1X OPTION (SHEET 2)	
1		I/O CABLE ASSEMBLY (SEE FIG. 6-13)	
2	10125801	WASHER, SPRING LOCK, 4	
3	10127104	SCREW, PAN HD, MACH, 4-40 x 3/8	
4	77562901	W12 CABLE ASSEMBLY	S/C 39 & BLW
4	77562906	W12 CABLE ASSEMBLY	S/C 40 & 41
4	77562909	W12 CABLE ASSEMBLY	S/C 42 & ABV
5	92602002	CLAMP, CABLE-NYLON	
6		BASE ASSEMBLY (SEE FIG. 6-14)	
7	77560300	PIVOT PIN-RIGHT, COVER	
8	75173315	PLATE-NUT	
9	10125724	SCREW, FLAT HD, CRS. RES, 8-32 x 3/8	
10		VARIABLE SECTOR OPTION (SEE CARD COMPLEMENT)	
11		CARD PLACEMENT (SEE CARD COMPLEMENT)	
12	76412701	HYSTERESIS BRAKE FEATURE	S/C 08 W/O 37669 & BLW
12	75241500	HYSTERESIS BRAKE FEATURE	S/C 08,09 W/ 37669
12	75241501	HYSTERESIS BRAKE FEATURE	S/C 10 & ABV
13	95655516	SCREW, SHEET METAL, 6-20 x 3/8	
14	77561100	FLANGE-SHROUD, RIGHT	
15		FRAME ASSEMBLY (SEE FIG. 6-3)	
16	76429318	SEAL-ACOUSTICAL	
17	94001133	TAPE, FOAM	
18		NOT USED	
19	76429327	SEAL-ACOUSTICAL	
20	76429328	SEAL-ACOUSTICAL	
21		DAISY CHAIN OPTION (SEE CARD COMPLEMENT)	
22	77561800	KEEPER-LATCH, DOOR, FRONT	
23	10125747	SCREW, FLAT HD, CRS. RES., 10-32 x 1/2	
24	10126403	WASHER, EXT. TOOTH LOCK, 10	
25	10125108	NUT-HEX, MACH., SCREW, 10-32	
26	10125607	WASHER, PLAIN, 10	
27	77561600	HINGE-DOOR, FRONT, LOWER	
28	77561700	HINGE-DOOR, FRONT, UPPER	
29	10127142	SCREW, PAN HEAD, MACH, 10-32 x 3/8	
30	76429329	SEAL-ACOUSTICAL	
31	76429328	SEAL-ACOUSTICAL	
32	76425201	SHIPPING PIN & RING ASSEMBLY	S/C 09 W/O 37910A & BLW
32	76425202	SHIPPING PIN & RING ASSEMBLY	S/C 09 W/ 37910A & ABV
33		NOT USED	
34	77561200	FLANGE, SHROUD, LEFT	
35	10127113	SCREW, PAN HD, MACH, 6-32 x 3/8	
36	10125803	WASHERS, SPRING LOCK, 6	
37	76429362	SEAL-ACOUSTICAL	
38	10126401	WASHERS, EXT TOOTH LOCK, 6	
39	10125105	NUT-HEX, MACH, 6-32	
40	77560400	PLATE, NUT-BRACKET, PIVOT	
41	77560200	PIVOT, PIN-LEFT, PACK COVER	
42		NOT USED	
43	76402600	COVER-CHASSIS, LOGIC	S/C 27 & ABV, W/ 55658.
44	75010103	HEAD ARM ASSEMBLY, DATA HEADS 0 AND 3	
45	75010102	HEAD ARM ASSEMBLY, DATA HEADS 1, 2, AND 4	
46	75010105	HEAD ARM ASSEMBLY, SERVO HEAD	
	75017500	SCREW, HEAD ARM	
47		NRZ TO MFM FEATURE (SEE CARD COMPLEMENT)	
		PHASE LOCK FEATURE (SEE CARD COMPLEMENT)	BJ7B1C/D ONLY

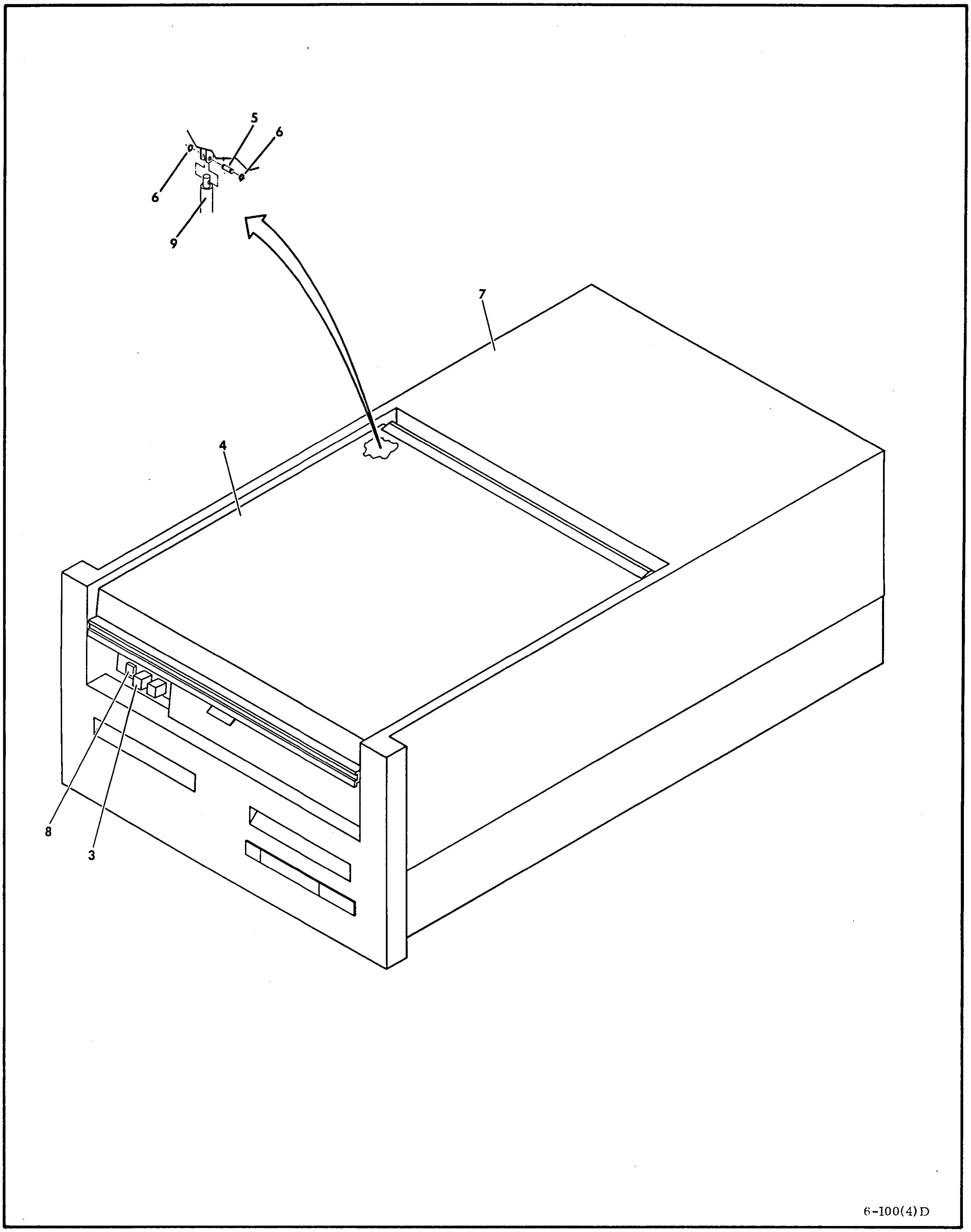

FIGURE 6-2. FINAL ASSEMBLY - 2X OPTION (SHEET 1 OF 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
2-	76420021	FINAL ASSEMBLY - 2X OPTION (SHEET 1 OF 2)	BJ701E
2-	76420022	FINAL ASSEMBLY	BJ701F
2-	76420027	FINAL ASSEMBLY	BJ7B1E
2-	76420028	FINAL ASSEMBLY	BJ7B1F
1		NOT USED	
2		NOT USED	
3		CONTROL PANEL ASSEMBLY (SEE FIG. 6-12)	
4		ACOUSTICAL PACK ACCESS COVER ASSEMBLY (SEE FIG. 6-11)	
5	75071700	PIN-PIVOT, COVER	
6	92033221	RETAINING RING	
7		LOWER CASE ASSEMBLY (SEE FIG. 6-10)	
8	82353600	LOGIC PLUG KIT	
	943724XX	(LOGIG ADDRESS PLUG)(TAB 00-15)	PACKED SEPARATELY AND SHIPPED WITH UNIT. PART NUMBER TAB CORRESPONDS TO KEY NUMBER.
9		SPRING, GAS (SEE FIGURE 6-15)	

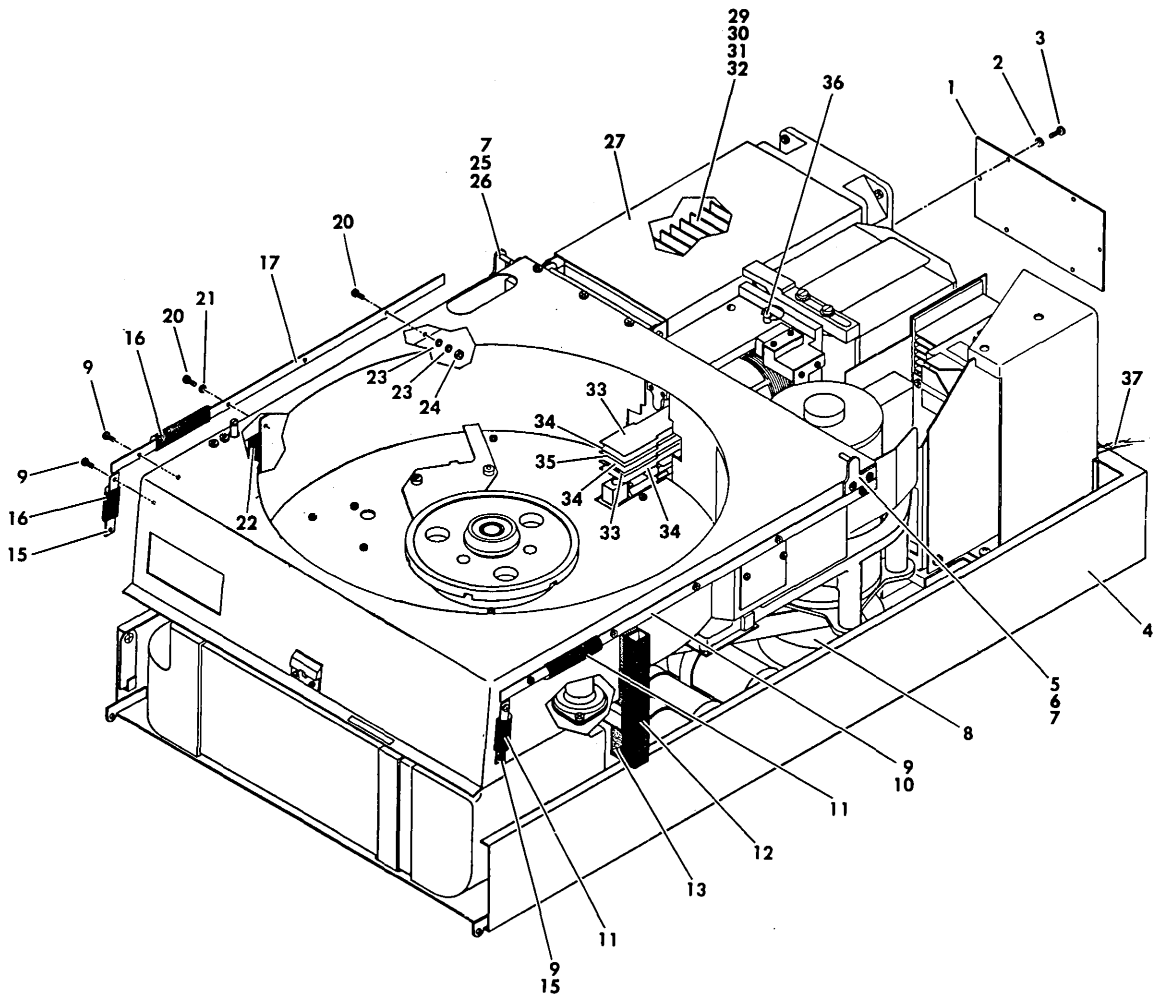

FIGURE 6-2. FINAL ASSEMBLY - 2X OPTION (SHEET 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
2-		FINAL ASSEMBLY - 2X OPTION (SHEET 2)	
1		I/O CABLE ASSEMBLY (SEE FIG. 6-13)	
2	10125801	WASHER, SPRING LOCK, 4	
3	10127104	SCREW, PAN HEAD, MACH, 4-40 x 3/8	
4		BASE ASSEMBLY (SEE FIG. 6-14)	
5	77560300	PIVOT PIN-RIGHT, COVER, PACK	
6	75173315	PLATE-NUT	
7	10125724	SCREW, FLAT HEAD, CRS. RES, 8-32 x 3/8	
8	76412701	HYSTERESIS BRAKE FEATURE	S/C 08 W/O 37669 & BLW
8	75241500	HYSTERSIS BRAKE FEATURE	S/C 08,09 W/ 37669
8	75241501	HYSTERESIS BRAKE FEATURE	S/C 10 & ABV
9	95655516	SCREW, SHEET METAL, 6-20 x 3/8	
10	76423401	STIFFENER-GASKET	
10	76423404	STIFFENER-GASKET	BJ701E/F; BJ7B1E/F
11	76423501	GASKET-SIDE, SHROUD	
12	76429330	SEAL, ACOUSTICAL	
13	94001133	TAPE, FOAM	
14		NOT USED	
15	76423400	STIFFENER-GASKET	
15	76423403	STIFFENER-GASKET	BJ701E/F; BJ7B1E/F
16	76423500	GASKET-SIDE, SHROUD	
17	76423402	STIFFENER-GASKET	
17	76423405	STIFFENER-GASKET	BJ701E/G; BJ7B1E/F
18		NOT USED	
19		NOT USED	
20	10127113	SCREW, PAN HEAD,MACH, 6-32 x 3/8	
21	10125803	WASHER, SPRING LOCK, 6	
22	76429331	SEAL-ACOUSTICAL	
23	10126401	WASHER, EXT. TOOTH LOCK, 6	
24	10125105	NUT-HEX, MACH, 6-32	
25	77560400	PLATE, NUT-BRACKET, PIVOT	
26	77560200	PIVOT PIN-LEFT, COVER, PACK	
27	76402600	COVER-CHASSIS, LOGIC	
28		NOT USED	
29		NRZ TO MFM FEATURE (SEE CARD COMPLEMENT)	S/C 31 W/O 60000 & BLW
30		VARIABLE SECTOR OPTION (SEE CARD COMPLEMENT)	
31		CARD PLACEMENT & CARD (SEE CARD COMPLEMENT)	
32		DAISY CHAIN FEATURE (SEE CARD COMPLEMENT)	
33	75010103	HEAD ARM ASSEMBLY, DATA HEADS 0 AND 3	
34	75010102	HEAD ARM ASSEMBLY, DATA HEADS 1, 2, AND 4	
35	75010105	HEAD ARM ASSEMBLY, SERVO HEAD	
	75017500	SCREW, HEAD ARM	
36	76425201	SHIPPING PIN & RING ASSEMBLY	S/C 09 W/O 37910A & BLW
36	76425202	SHIPPING PIN & RING ASSEMBLY	S/C 09 W/ 37910A & ABV
37	77562901	W12 CABLE ASSEMBLY	S/C 39 & BLW
37	77562904	W12 CABLE ASSEMBLY	S/C 40 & 41
37	77562906	W12 CABLE ASSEMBLY	S/C 42 & ABV

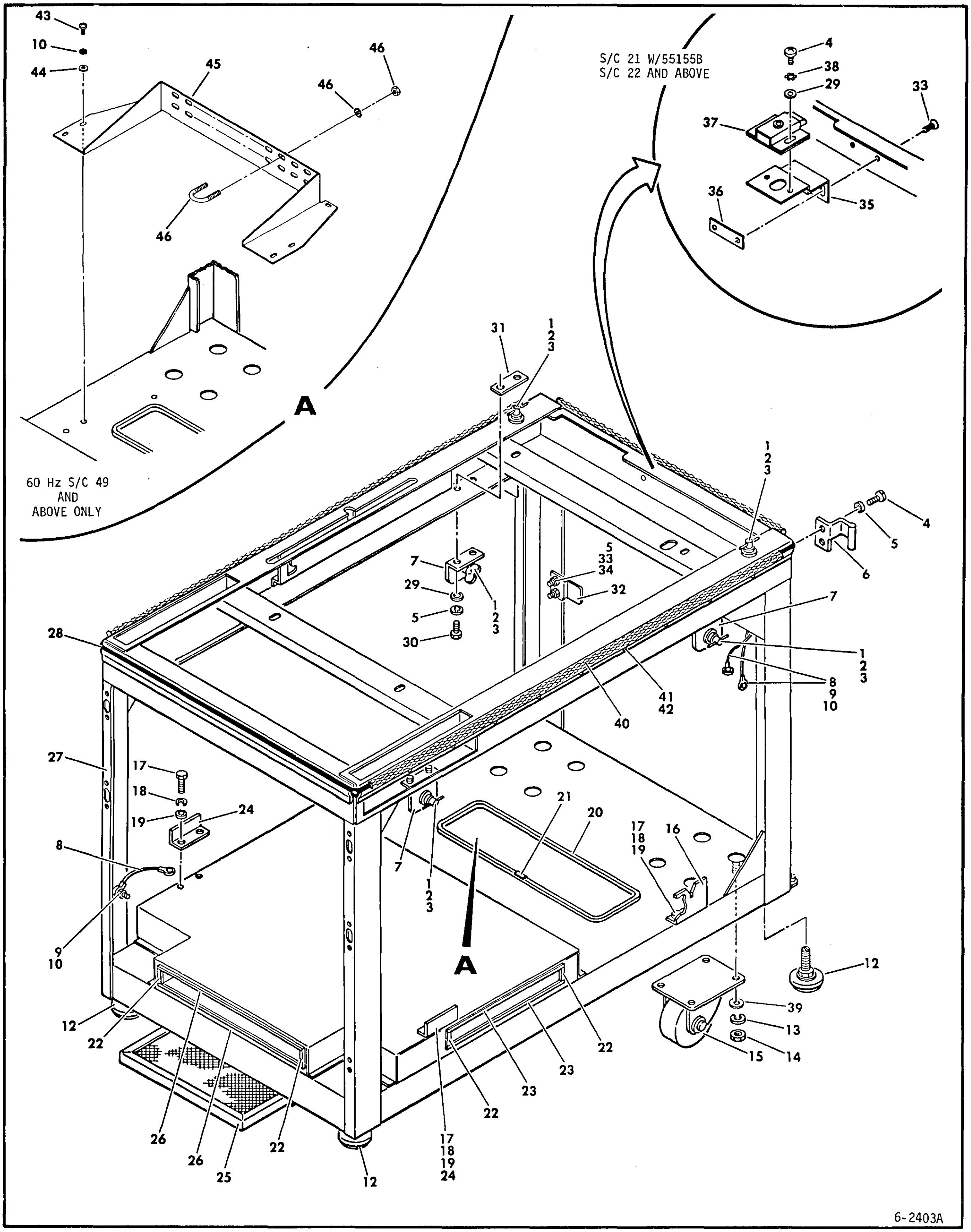

FIGURE 6-3. 1X FRAME ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
3-	77563200	1X FRAME ASSEMBLY	BJ701A/B/C/D, BJ7B1A/B/C/D/; S/C 21 & BLW
3-	47291400	1X FRAME ASSEMBLY	BJ701A/B/C/D/J/K; BJ7B1A/B/C/D/K/L, S/C 22 & ABV. 60 Hz S/C 22-48
3-	47291408	1X FRAME ASSEMBLY	60 Hz S/C 49 & ABV
1	93573004	STUD ASSEMBLY	
2	93571002	GROMMET	
3	93572001	RING, SNAP	
4	10127142	SCREW, PNH, MACH, 10-32 x 3/8	
5	10126105	WASHER, INTL TOOTH LOCK, 10	
6	76428300	HINGE-TOP	
7	40029500	BRACKET, STUD	
8	94281437	CABLE, GROUND	
9	10125106	NUT, HEX, MACH. SCREW, 8-32	
10	10126402	WASHERS, EXT. TOOTH LOCK, 8	
11		NOT USED	
12	93697021	LEVELLER	
13	10125807	WASHER, SPRING LOCK, 5/16	
14	10125302	NUT, HEX, 5/16-18	
15	92703005	CASTER	
16	75007400	BRACKET-PANEL, SIDE	
17	10126501	SCREW, PLAIN HEX-HD, 1/4-20 x 5/8	
18	10125608	WASHER, PLAIN, 1/4	
19	10125806	WASHER, SPRING LOCK, 1/4	
20	94237703	TRIM, SAFETY, BLACK	
21	41282100	CLIP, SAFETY TRIM	
22	76429302	SEAL, ACOUSTICAL	
23	76429300	SEAL, ACOUSTICAL	
24	75007300	BRACKET-PANEL	
25	00815481	FILTER, ALUMINUM	
26	76429301	SEAL, ACOUSTICAL	
27	83285600	FRAME, MAIN	S/C 21 W/O55155B; S/C 20 & BLW
27	92300600	FRAME, MAIN	50 HZ S/C 21 W/55155B & ABV
27	47291200	FRAME, MAIN	60 HZ S/C 49 & ABV
28	93993001	EXTRUSION, RUBBER	
29	10125607	WASHER, PLAIN, 10	
30	10125062	SCREW, HEX HD, MACH, 10-32 x 1/2	
31	75031800	PLATE-NUT, SIDE PANEL	
32	76428400	LATCH-DOOR	
33	10125736	SCREW, FLAT HD, CRS. RES., 10-24 x 1/2	
34	10125107	NUT-HEX, MACH. SCREW, 10-24	
35	73029700	BRACKET-MTG-LATCH	S/C 21 W/55155B; S/C 22 & ABV
36	75173313	PLATE NUT	S/C 21 W/55155B; S/C 22 & ABV
37	92008601	LATCH-SLIDE BOLT	S/C 21 W/55155B; S/C 22 & ABV
38	10126403	WASHER, EXT TOOTH, LK, 10	
39	10125609	WASHER FLAT, 5/16	
40	11060828	GASKET, RFI	)
41	81567700	GASKET, SIDE ANGLE	)
41	81567730	GASKET, END ANGLE (NOT SHOWN)	)60 HZ S/C 49 &
43	10127123	SCREW, PNH, MACH, 10-32 x 3/8	)ABV ONLY
44	10125606	WASHER, FLAT, #8	)
45	81914090	PANEL, GROUND	)
46	96785704	CLAMP, U-TYPE (WASHERS & NUTS FURNISHED WITH CLAMP)	) PACKAGED SEPARATELY &)SHIPPED WITH UNIT

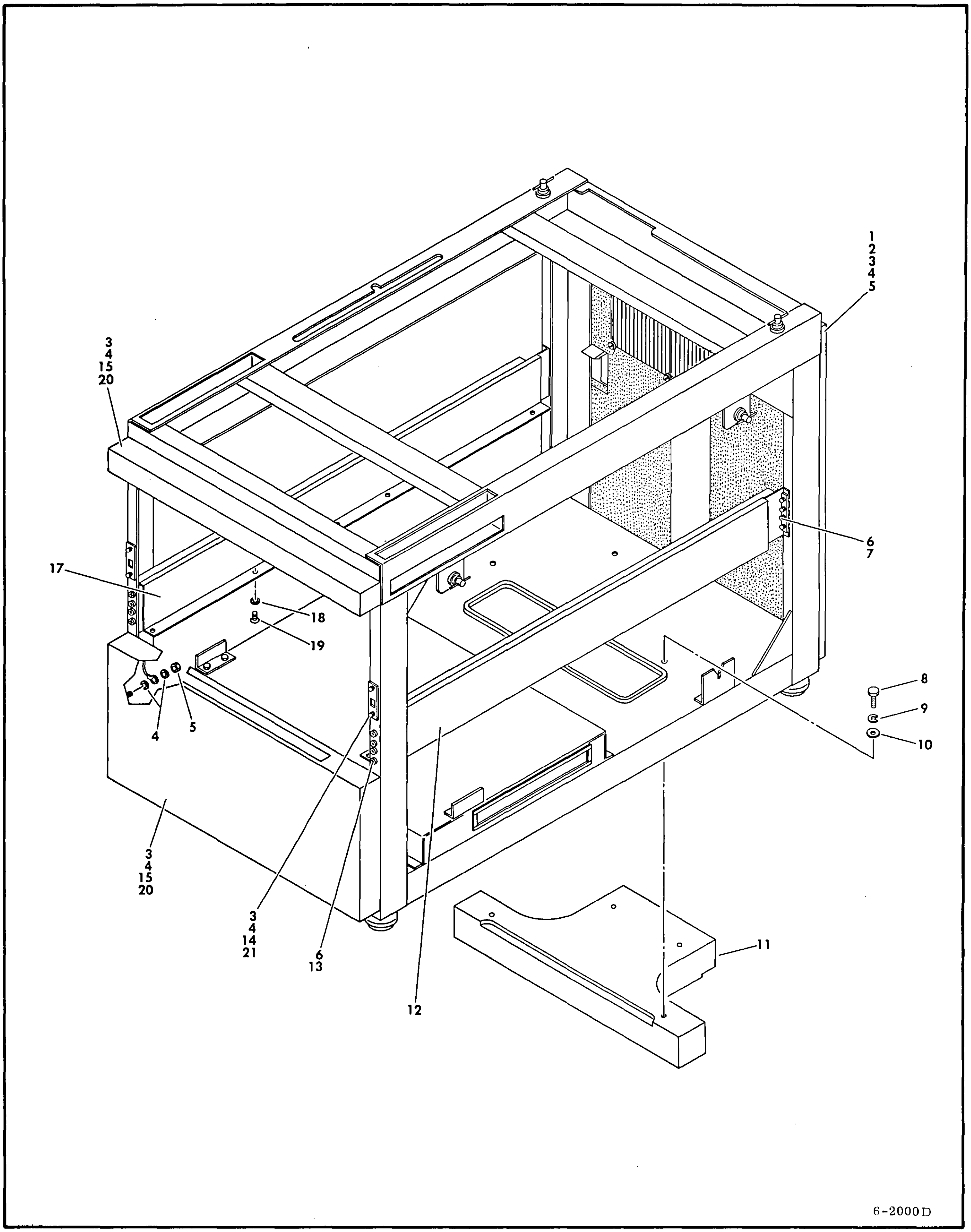

FIGURE 6-4. 2X ACOUSTIC OPTION

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
4-	77563914	2X ACOUSTIC OPTION	BJ701E, S/C 39 & BLW
	77563951	2X ACOUSTIC OPTION	BJ701E, S/C 40 & 41
	77563971	2X ACOUSTIC OPTION	BJ701E, S/C 42 - 48
	94415302	2X ACOUSTIC OPTION	BJ701E, S/C 49 & ABV
4-	77563915	2X ACOUSTIC OPTION	BJ701F, S/C 39 & BLW
	77563952	2X ACOUSTIC OPTION	BJ701F, S/C 40 & 41
	77563972	2X ACOUSTIC OPTION	BJ701F, S/C 42 & ABV
4-	77563916	2X ACOUSTIC OPTION	BJ7B1E, S/C 39 & BLW
	77563953	2X ACOUSTIC OPTION	BJ7B1E, S/C 40 & 41
	77563973	2X ACOUSTIC OPTION	BJ7B1E, S/C 42 & ABV
4-	77563917	2X ACOUSTIC OPTION	BJ7B1F, S/C 39 & BLW
	77563956	2X ACOUSTIC OPTION	BJ7B1F, S/C 40 & 41
	77563976	2X ACOUSTIC OPTION	BJ7B1F, S/C 42 & ABV
1		2X REAR DOOR ASSEMBLY (SEE FIG. 6-6)	
2	92602002	CLAMP, CABLE-NYLON	
3	10125606	WASHER, PLAIN, 8	
4	10126402	WASHER, EXT. TOOTH LOCK, 8	
5	10125106	NUT-HEX, MACH., SCREW, 8-32	
6	10126105	WASHER, INT. TOOTH LOCK, 10	
7	10126244	SCREW, HEX SOC. HD, CAP., 10-32 x 1/2	
8	10126502	SCREW, PLAIN, HEX HD, 1/4-20 x 3/4	
9	10125806	WASHER, SPRING LOCK, 1/4	
10	10125608	WASHER, PLAIN 1/4	
11	77563300	BALLAST	
12	94393001	SLIDE, QUICK DISCONNECT	
13	10127143	SCREW, PAN HEAD, MACH., 10-32 x 1/2	
14	76428100	KEEPER, LATCH	
15	10127122	SCREW, PAN HD, MACH., 8-32 x 3/8	
16		NOT USED	
17	94393000	SLIDE, QUICK DISCONNECT	
18	76422600	WASHER-SPECIAL	
19	10125746	SCREW, FLAT HD, CRS. RES, 10-32 x 3/8	
20	83663803	PANEL-FRONT, PAINTED SET	BJ701E/F
20	83663802	PANEL-FRONT, PAINTED SET	BJ7B1E/F
21	10127121	SCREW, PAN HEAD, 8-32 x 5/16	

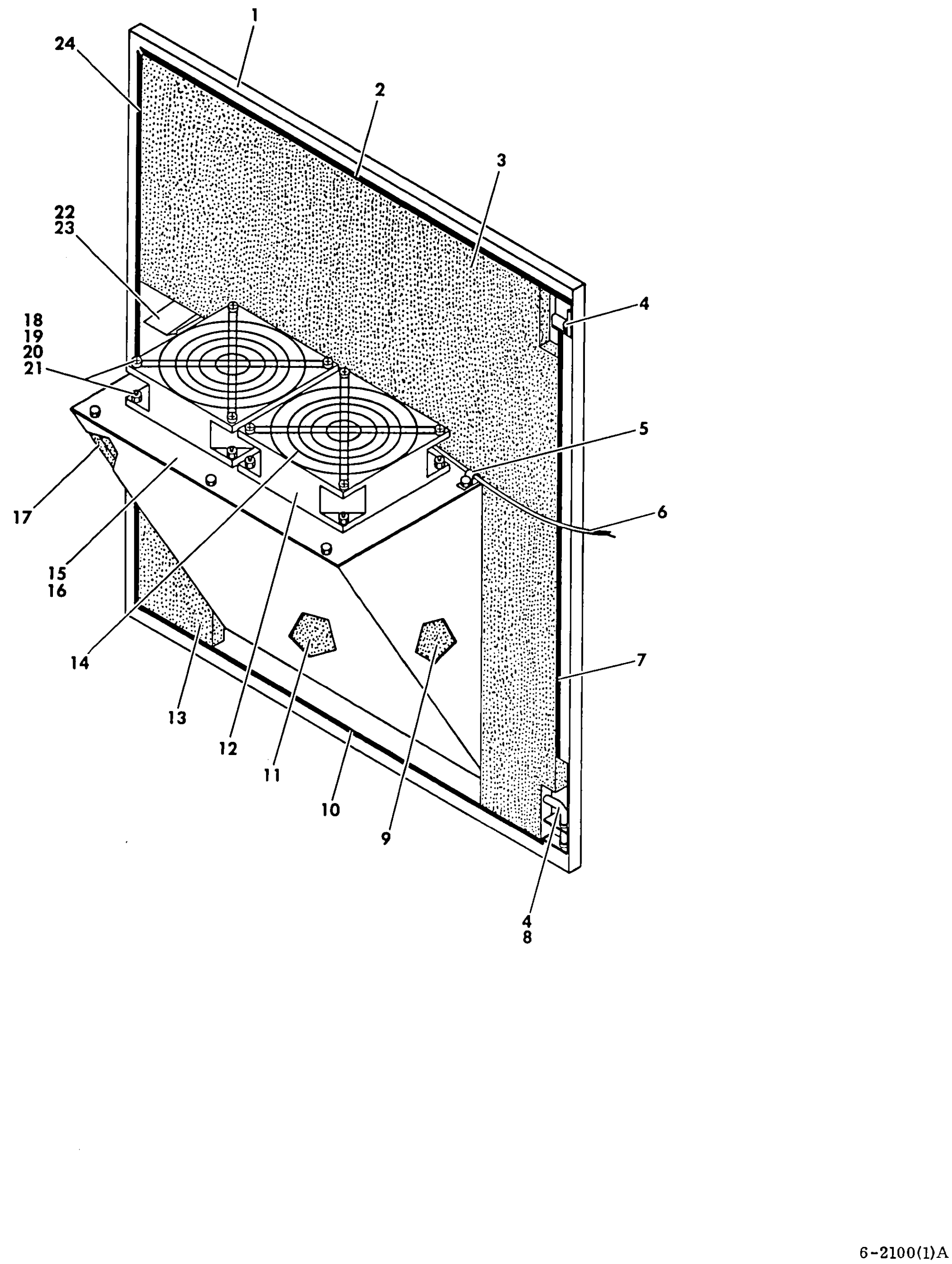

FIGURE 6-5. 1X REAR DOOR ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
5-	77562530	1X REAR DOOR ASSEMBLY	S/C 27 & BLW BJ701A/C
5-	77562521	1X REAR DOOR ASSEMBLY	S/C 27 & BLW BJ701B/D
5-	77562522	1X REAR DOOR ASSEMBLY	BJ7B1A/C, See Note
5-	77560118	2X REAR DOOR ASSEMBLY	BJ7B1A/C, S/C 39 & BLW, SEE NOTE
5-	82398805	2X REAR DOOR ASSEMBLY	BJ7B1A/C, S/C 40 & 41
5-	82399905	2X REAR DOOR ASSEMBLY	BJ7B1A/C, S/C 42 & ABV
5-	77562523	1X REAR DOOR ASSEMBLY	BJ7B1B/D, See Note
5-	77560119	2X REAR DOOR ASSEMBLY	BJ7B1B/D, S/C 39 & BLW, SEE NOTE
5-	82398806	2X REAR DOOR ASSEMBLY	BJ7B1B/D, S/C 40 & 41
5-	82399906	2X REAR DOOR ASSEMBLY	BJ7B1B/D, S/C 42 & ABV
5-	77562551	2X REAR DOOR ASSEMBLY	BJ7B1K/L, See Note
5-	77560147	2X REAR DOOR ASSEMBLY	BJ7B1K/L, S/C 39 & BLW, SEE NOTE
5-	82398834	2X REAR DOOR ASSEMBLY	BJ7B1K/L, S/C 40 & 41
5-	82399934	2X REAR DOOR ASSEMBLY	BJ7B1K/L, S/C 42 & ABV
1	77818004	DOOR, REAR	TABS 30,21
1	77818009	DOOR, REAR	TABS 22,23, See Note Below
1	77818109	DOOR, REAR	TABS 18,19, See Note
1	77818082	DOOR, REAR	TAB 51, See Note Below
1	77818182	DOOR, REAR	TAB 47, See Note
2	76429314	SEAL, ACOUSTICAL	
3	75040461	PANEL-FOAM, ACOUSTICAL	
4	92373003	NYLINER, SNAP-IN	
5	92602002	CLAMP, CABLE-NYLON	
6	77562001	W11 CABLE ASSEMBLY	S/C 39 & BLW
6	77562004	W11 CABLE ASSEMBLY	S/C 40 & 41
6	77562006	W11 CABLE ASSEMBLY	S/C 42 & ABV
7	76429316	SEAL, ACOUSTICAL	
8	70948500	PIN, HINGE	
9	75040467	PANEL-FOAM, ACOUSTICAL	
10	76429315	SEAL-ACOUSTICAL	
11	75040466	PANEL-FOAM, ACOUSTICAL	
12	94253100	FAN-VENTURI	TABS 30,22
12	94253102	FAN-VENTURI	TABS 21,23
12	94247101	FAN, AXIAL, MINIATURE	TAB 51
13	75040458	PANEL, FOAM, ACOUSTICAL	
14	40034600	GUARD, FINGER	
15	77561900	PANEL, FAN MOUNTING	
16	93592158	SCREW, TPG, HEX PNL, 6-32 x 1/4	
17	75040468	PANEL-FOAM, ACOUSTICAL	
18	10127115	SCREW, PAN HEAD, MACH., 6-32 x 5/8	
19	1012560	WASHER, PLAIN, 6	
20	10126401	WASHERS, EXT. TOOTH LOCK, 6	
21	10125105	NUT-HEX, MACH, SCREW, 6-32	
22	94221400	LATCH, FLUSH	
23	94224906	SPACER, LATCH	
24	76429313	SEAL, ACOUSTICAL	
		NOTE:	
		DOOR ASSEMBLY USED VARIES DEPENDING ON WHEN UNIT WAS BUILT. CHOOSE PROPER DOOR ASSEMBLY FROM EITHER FIGURE 6-5 or 6-6. IF ORDERING ENTIRE REAR DOOR ASSEMBLY ORDER DOOR SHOWN ON FIGURE 6-6.	

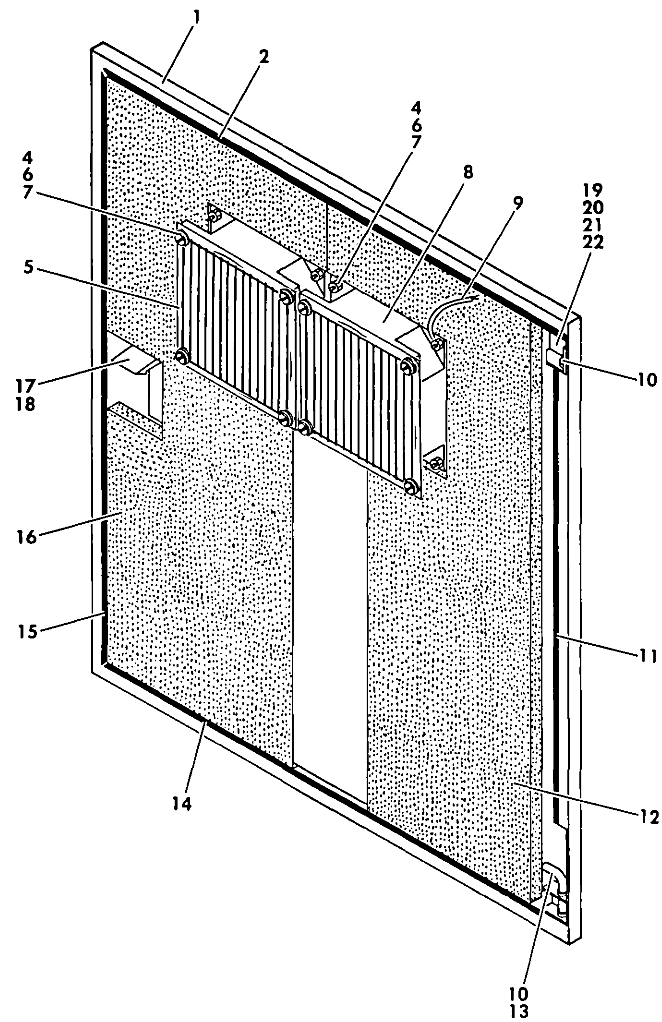

FIGURE 6-6. 2X REAR DOOR ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
6-	77560116	2X REAR DOOR ASSEMBLY	BJ701E. BJ701A/C/J, S/C 28 thru 39
6-	82398803	2X REAR DOOR ASSEMBLY	BJ701E. BJ701A/C/J, S/C 40 & 41
6-	82399903	2X REAR DOOR ASSEMBLY	BJ701E, BJ701A/C/J; S/C 42 & ABV
6-	77560117	2X REAR DOOR ASSEMBLY	BJ701F. BJ701B/D/K, S/C 28 thru 39
6-	82398804	2X REAR DOOR ASSEMBLY	BJ701F. BJ701B/D/K, S/C 40 & 41
6-	82399904	2X REAR DOOR ASSEMBLY	BJ701F, BJ701B/D/K; S/C 42 & ABV
6-	77560118	2X REAR DOOR ASSEMBLY	BJ7B1E, S/C 39 & BLW
6-	82398805	2X REAR DOOR ASSEMBLY	BJ7B1E, S/C 40 & 41
6-	82399905	2X REAR DOOR ASSEMBLY	BJ7B1F, S/C 42 & ABV
6-	77560119	2X REAR DOOR ASSEMBLY	BJ7B1F, S/C 39 & ABV
6-	82398806	2X REAR DOOR ASSEMBLY	BJ7B1F, S/C 40 & 41
6-	82399906	2X REAR DOOR ASSEMBLY	BJ7B1E, S/C 42 & ABV
1	77818104	DOOR, REAR	TABS 16, 17
1	77818109	DOOR, REAR	TABS 18, 19
2	76429314	SEAL-ACOUSTICAL	
3	94208500	LABEL	
4	10127115	SCREW, PAN HEAD. MACH., 6-32 x 5/8	
5	81417040	GUARD, FAN	
6	10126401	WASHERS, EXT. TOOTH LOCK, 6	
7	10125105	NUT-HEX, MACH. SCREW 6-32	
8	94253100	FAN, VENTURI	TABS 16, 18
8	94253102	FAN, VENTURI	TABS 17, 19
9	77562001	W11 CABLE ASSEMBLY	S/C 39 & BLW
9	77562004	W11 CABLE ASSEMBLY	S/C 40 & 41
9	77562006	W11 CABLE ASSEMBLY	S/C 42 & ABV
10	92373003	NYLINER, SNAP-IN	
11	76429316	SEAL, ACOUSTICAL	
12	75040470	PANEL-FOAM, ACOUSTICAL	
13	70948500	PIN, HINGE	
14	76429315	SEAL-ACOUSTICAL	
15	76429313	SEAL-ACOUSTICAL	
16	75040469	PANEL-FOAM, ACOUSTICAL	
17	94221400	LATCH, FLUSH	
18	94224906	SPACER, LATCH	
19	10125804	WASHER, SPRING LOCK 8	
20	10125606	WASHER, PLAIN, 8	
21	92602002	CLAMP	
22	10125106	NUT, HEX, 8-32	

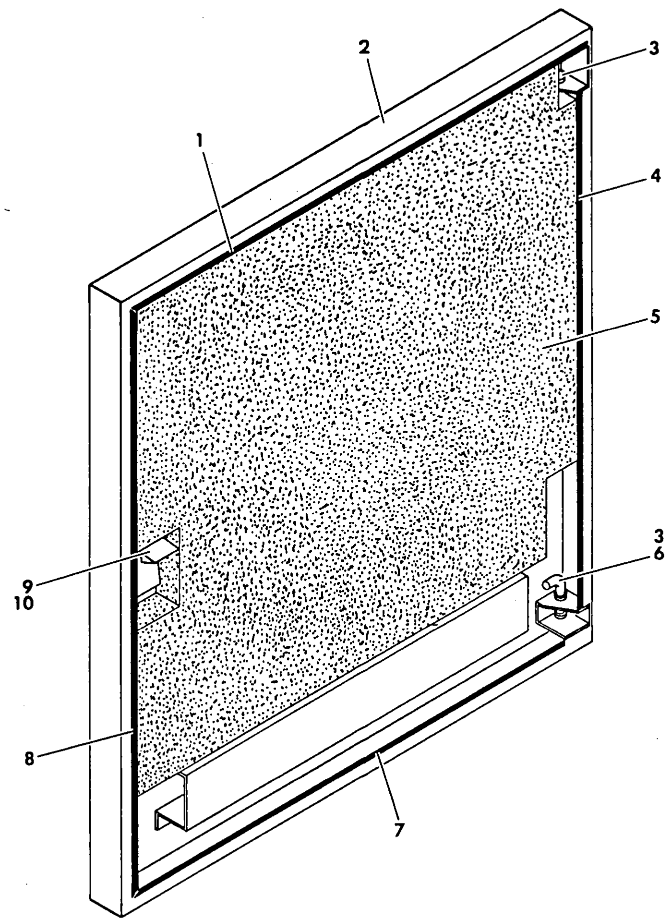

FIGURE 6-7. 1X FRONT DOOR ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
7-	77562400	1X FRONT DOOR ASSEMBLY	BJ701A/B/C/D
7-	77562401	1X FRONT DOOR ASSEMBLY	BJ7B1A/B/C/D
7-	77562416	1X FRONT DOOR ASSEMBLY	BJ7B1K/L
1	76429314	SEAL-ACOUSTICAL	
2	77561504	DOOR, FRONT	TAB 00
2	77561509	DOOR, FRONT	TAB 01
2	77561582	DOOR, FRONT	TAB 16
3	92373003	NYLINER, SNAP-IN	
4	76429317	SEAL-ACOUSTICAL	
5	75040460	PANEL-FOAM, ACOUSTICAL	
6	70948500	PIN, HINGE	
7	76429315	SEAL-ACOUSTICAL	
8	76429313	SEAL-ACOUSTICAL	
9	94221400	LATCH, FLUSH	
10	94224906	SPACER, LATCH	

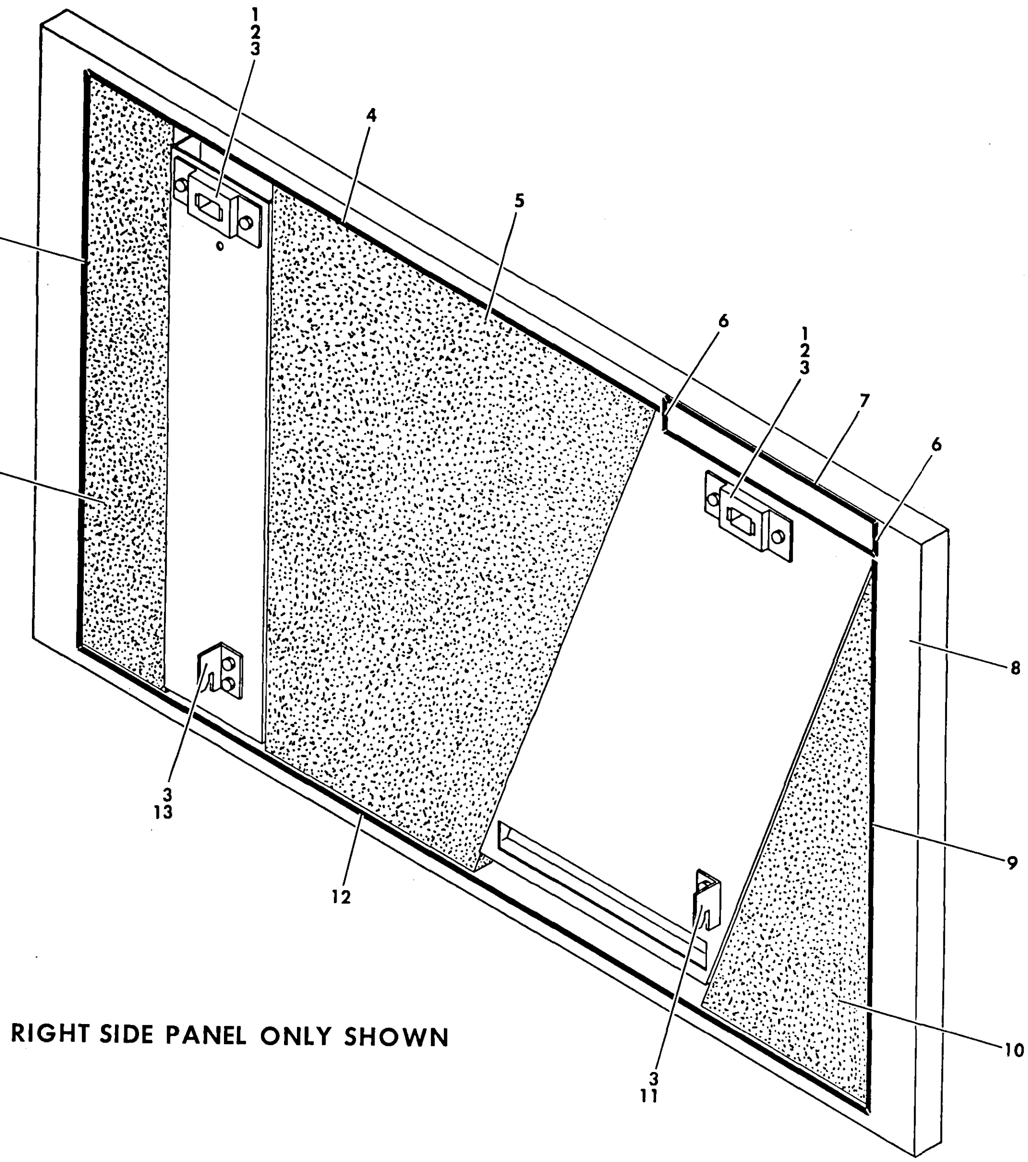

FIGURE 6-8. 1X SIDE PANEL ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
8-	77562200	1X SIDE PANEL ASSEMBLY	RIGHT SIDE, BJ701A/B/C/D
8-	77562201	1X SIDE PANEL ASSEMBLY	LEFT SIDE, BJ701A/B/C/D
8-	77562203	1X SIDE PANEL ASSEMBLY	RIGHT SIDE, BJ7B1A/B/C/D
8-	77562202	1X SIDE PANEL ASSEMBLY	LEFT SIDE, BJ7B1A/B/C/D
8-	77562233	1X SIDE PANEL ASSEMBLY	RIGHT SIDE, BJ7B1K/L
8-	77562232	1X SIDE PANEL ASSEMBLY	LEFT SIDE, BJ7B1K/L
1	77561300	BRACKET-RECEPTACLE	
2	94303500	RECEPTACLE, CLIP-IN	
3	93592428	SCREW, TPG, HEX PNL, 10-31 x 3/8	
4	76429306	SEAL, ACOUSTICAL	
5	75040465	PANEL-FOAM, ACOUSTICAL	TAB 00, 03,
5	75040464	PANEL-FOAM, ACOUSTICAL	TAB 01, 02,
6	76429311	SEAL, ACOUSTICAL	
7	76429312	SEAL, ACOUSTICAL	
8	76429202	PANEL, SIDE	TAB 00
8	76429002	PANEL, SIDE	TAB 01
8	76429003	PANEL, SIDE	TAB 02
8	76429203	PANEL, SIDE	TAB 03
8	76429282	PANEL, SIDE	TAB 33
8	76429082	PANEL, SIDE	TAB 32
9	76429307	SEAL-ACOUSTICAL	TAB 00, 21
9	76429308	SEAL-ACOUSTICAL	TAB 01, 02, 20
10	75040463	PANEL-FOAM, ACOUSTICAL	TAB 00, 03, 21
10	75040462	PANEL-FOAM, ACOUSTICAL	TAB 01, 02, 20
11	75194503	BRACKET-SUPPORT	
12	76429304	SEAL-ACOUSTICAL	
13	75194502	BRACKET-SUPPORT	
14	75040459	PANEL-FOAM, ACOUSTIC	
15	76429303	SEAL-ACOUSTICAL	

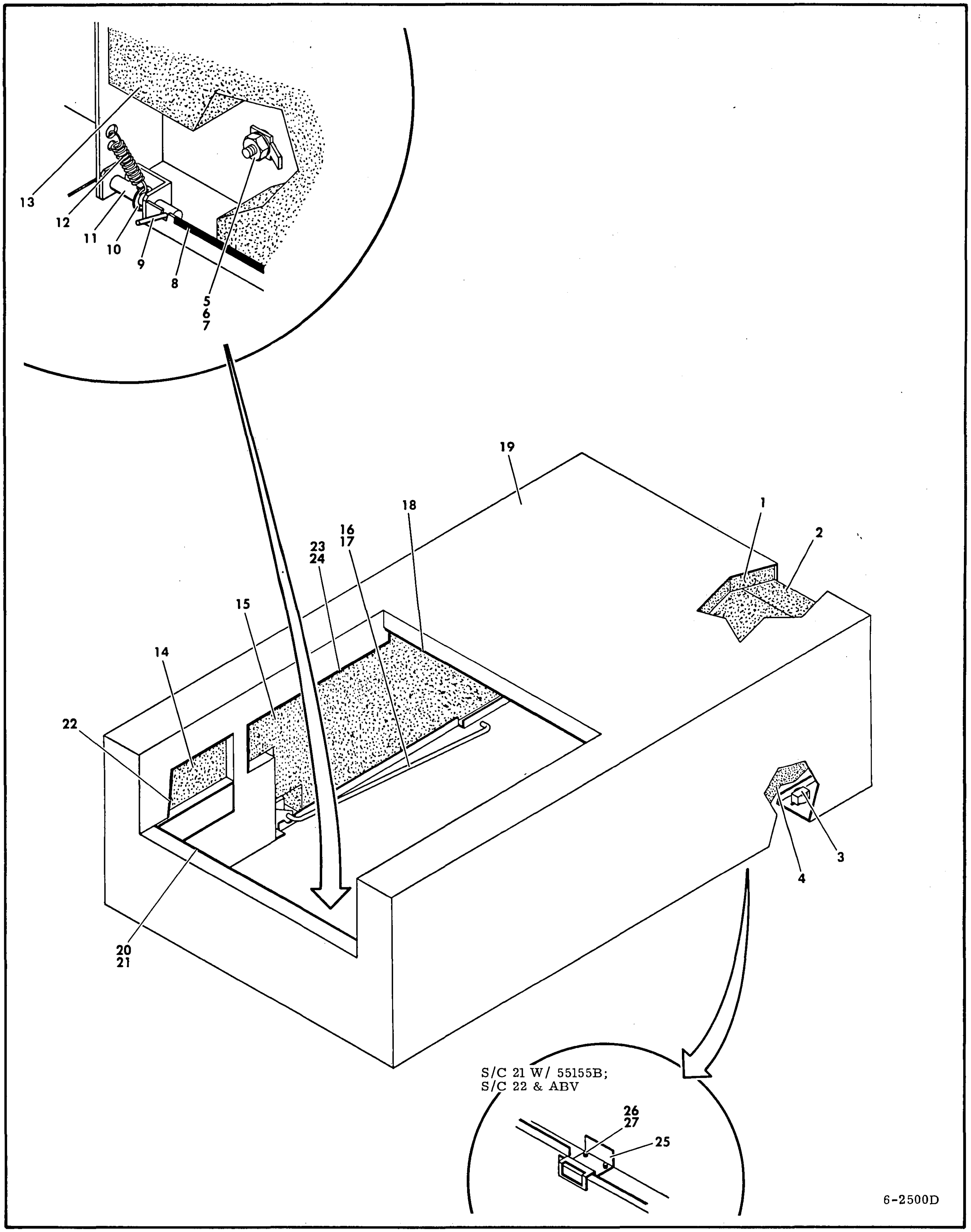

FIGURE 6-9. TOP CASE ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
9-	77562822	TOP CASE ASSEMBLY	BJ701A/B/C/D; S/C 21 W/O W/O 55155B; S/C 20 & BLW
9-	77562823	TOP CASE ASSEMBLY	BJ7B1A/B/C/D; S/C 21 W/O 5155B; S/C 20 & BLW
9-	77562831	TOP CASE ASSEMBLY	BJ7B1K; S/C 21 W/O 55155B; S/C 20 & BLW
9-	47291500	TOP CASE ASSEMBLY	BJ701B/C/D/K S/C 21 W/55155B & ABV, BJ701A/J S/C 21-48 W/55155
9-	47291554	TOP CASE ASSEMBLY	BJ701A/J S/C 49 W/O DJ00505
9-	47291577	TOP CASE ASSEMBLY	BJ701A/J S/C 49 W/ DJ00505 & ABV
9-	47291501	TOP CASE ASSEMBLY	BJ7B1B/D S/C 21 W/55155B & ABV, BJ7B1A/C S/C 21-48 W/55155
9-	47291555	TOP CASE ASSEMBLY	BJ7B1A/C S/C 49 W/O DJ00505
9-	47291578	TOP CASE ASSEMBLY	BJ7B1A/C S/C 49 W/ DJ00505 & ABV
9-	47291509	TOP CASE ASSEMBLY	BJB1K/L; S/C 21 W/55155B; S/C 22 & ABV
1	75040474	PANEL-FOAM, ACOUSTICAL	
2	75040478	PANEL-FOAM, ACOUSTICAL	
3	94303500	RECEPTACLE, CLIP-IN	S/C 21 W/055155B; S/C 20 & BLW
4	75040449	PANEL-FOAM, ACOUSTICAL	
5	10125106	NUT-HEX, MACHINE SCREW, 8-32	
6	10126402	WASHER, EXT. TOOTH LOCK, 8	
7	94274105	TERMINAL, QUICK DISCONNECT	
8	76429322	SEAL, ACOUSTICAL	
9	93530021	PIN, ROLL	
10	92033037	RETAINING RING	
11	75065200	PIN-PIVOT, CASE	
12	46819300-	SPRING, EXTENSION	
13	75040450	PANEL-FOAM, ACOUSTICAL	
14	75040451	PANEL-FOAM, ACOUSTICAL	
15	75040448	PANEL-FOAM, ACOUSTICAL	
16	77561000	ROD-SUPPORT	
17	92033087	RETAINING RING	
18	76429320	SEAL-ACOUSTIC	
19	47454855	CASE, ACOUSTICAL	TAB 22
19	47454803	CASE, ACOUSTICAL	TAB 23
19	77817382	CASE, ACOUSTICAL	TAB 31
19	47291302	CASE, ACOUSTICAL	TAB 00
19	95102901	CASE, ACOUSTICAL	TAB 54
19	81449900	CASE, ACOUSTICAL	TAB 77
19	47291303	CASE, ACOUSTICAL	TAB 01
19	95102902	CASE, ACOUSTICAL	TAB 55
19	81449901	CASE, ACOUSTICAL	TAB 78
19	47291382	CASE, ACOUSTICAL	TAB 09
20	76429321	SEAL, ACOUSTICAL	
21	76429326	SEAL, ACOUSTICAL	
22	76429325	SEAL, ACOUSTICAL	
23	76429323	SEAL, ACOUSTICAL	
24	76429324	SEAL, ACOUSTICAL	
25	73029800	KEEPER-LATCH	S/C 21 W/55155B; S/C 22 & ABV
26	10127141	SCREW, PAN HEAD, 10-32 x 5/16	S/C 21 W/55155B; S/C 22 & ABV
27	10126105	WASHER, INT TOOTH, 10	S/C 21 W/55155B; S/C 22 & ABV

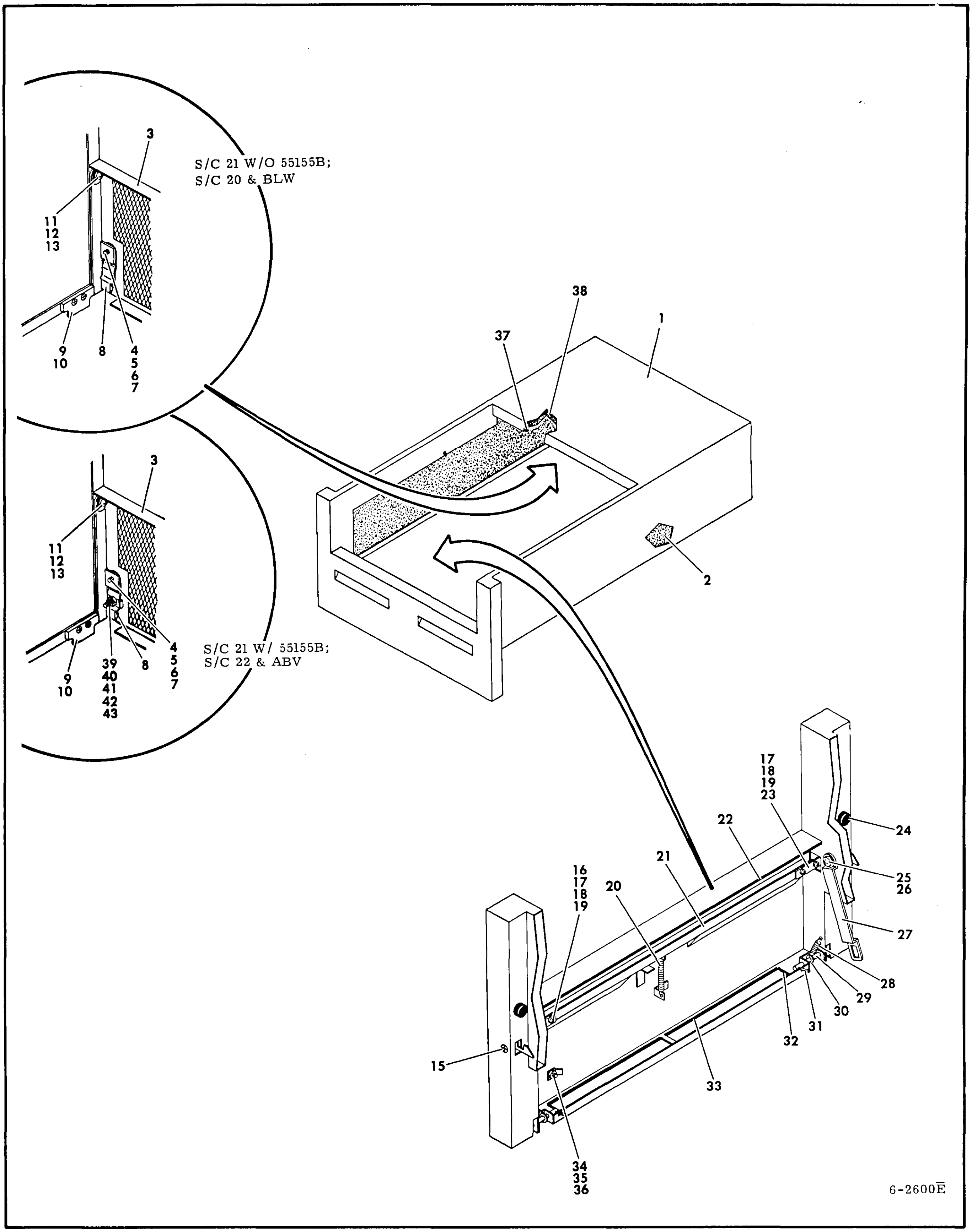

FIGURE 6-10. LOWER CASE ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
10-	77563600	LOWER CASE ASSEMBLY	BJ701E/F; S/C 08 W/O 37799 & BLW
10-	77563601	LOWER CASE ASSEMBLY	BJ7B1E/F; S/C 08 W/O 37799 & BLW
10-	77563609	LOWER CASE ASSEMBLY	BJ701E/F; S/C 08 W/ 37799 & ABV
10-	77563610	LOWER CASE ASSEMBLY	BJ7B1E/F; S/C 08 W/ 37799 & ABV
10-	47291000	LOWER CASE ASSEMBLY	BJ701F S/C 21 W/55155B & ABV BJ701E S/C 21-48 W/37799
10-	47291009	LOWER CASE ASSEMBLY	BJ701E S/C 49 & ABV
10-	47291001	LOWER CASE ASSEMBLY	BJB1E/F; S/C 21 W/55155B; S/C 22 & ABV
1	77541904	CASE, ACOUSTICAL	TAB 00
1	77541903	CASE, ACOUSTICAL	TAB 01
1	47451004	CASE, ACOUSTICAL	TAB 09
1	47451003	CASE, ACOUSTICAL	TAB 10
1	47290704	CASE, ACOUSTICAL	TAB 00
1	93405801	CASE, ACOUSTICAL	TAB 09
1	47290703	CASE, ACOUSTICAL	TAB 01
2	75040498	PANEL, FOAM, ACOUSTICAL	
3	76428504	DOOR, CASE	TABS 00, 09
3	76428503	DOOR, CASE	TABS 01, 10
4	10125606	WASHER, PLAIN, 8	
5	10125804	WASHER, SPRING LOCK, 8	
6	76424200	PLATE, NUT	
7	10127120	SCREW, PAN HEAD, MACH., 8-32 x 1/4	
8	94375602	CATCH-PUSH, RELEASE	
8	82353800	CATCH-PUSH, RELEASE	S/C 21 W/55155B; S/C 22 & ABV
9	76039700	CLIP-CASE	
10	10125714	SCREW, FLAT HD, CRS REC, 6-32 x 3/8	
11	92373001	NYLINER, SNAP-IN	
12	75257301	SCREW, MODIFIED	
13	10126105	WASHER, INT. TOOTH LK, 10	
14	75040428	PANEL, FOAM, ACOUSTICAL	
15	76427900	SCREW, MODIFIED, CRS REC.	
16	76428001	LATCH-RACK MOUNT	
17	10125605	WASHERS, PLAIN 6	
18	10126401	WASHERS, EXT. TOOTH LK, 6	
19	10127113	SCREW, PAN HEAD, MACH., 6-32 x 3/8	
20	40063200	SPRING, EXTENSION	
21	76428201	ACTUATOR-LATCH	
22	92628302	TAPE, ADHESIVE	
23	76428000	LATCH-RACK MOUNT	
24	92633021	BUMPER, GROMMET TYPE	
25	75062400	WASHER-INSULATOR	
26	10127142	SCREW, PAN HEAD, MACH, 10-32 x 3/8	
27	76427601	ARM, SUPPORT, CASE	
28	46819300	SPRING, EXTENSION	
29	75065200	PIN, PIVOT, CASE	
30	92033037	RETAINING RING	
31	93530021	PIN ROLL	
32	76429310	SEAL, ACOUSTICAL	
33	76429309	SEAL, ACOUSTICAL	
34	10125106	NUT-HEX, MACH., 8-32	
35	10126402	WASHERS, EXT. TOOTH LK, 8	
36	94271405	TERMINAL EDGE SLIDE ON	
37	76429320	SEAL, ACOUSTICAL	
38	75040426	PANEL, FOAM, ACOUSTICAL	
39	76424201	PLATE NUT	S/C 21 W/55155B; S/C 22 & ABV
40	10126246	SCREW, SOC HD CAP, 10-32 x 3/4	S/C 21 W/55155B; S/C 22 & ABV
41	10125607	WASHER, FLAT, 10	S/C 21 W/55155B; S/C 22 & ABV
42	10125805	WASHER, SP LK, 10	S/C 21 W/55155B; S/C 22 & ABV
43	94218005	NUT-SELF LOCK, 10-32	S/C 21 W/55155B; S/C 22 & ABV

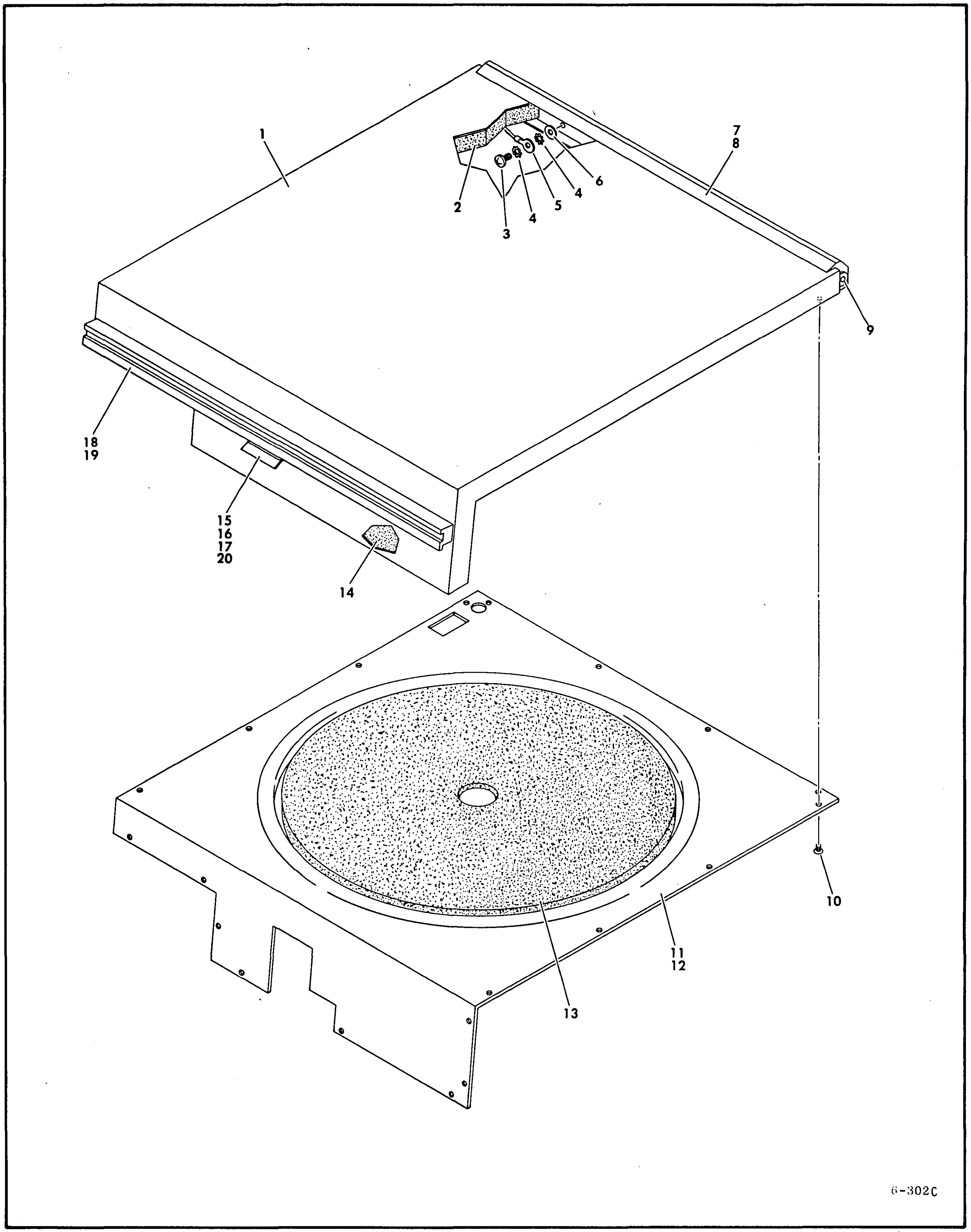

FIGURE 6-11. ACOUSTICAL PACK ACCESS COVER ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
11-	77563007	ACOUSTICAL PACK ACCESS COVER	BJ701A/B/C/D/E/F/, S/C 09 W/O 37825A & BLW
11-	77563030	ACOUSTICAL PACK ACCESS COVER	BJ701A/B/C/D/E/F, S/C 09 W/ 37825A
11-	77563008	ACOUSTICAL PACK ACCESS COVER	BJ7B1A/B/C/D/E/F, S/C 09 W/O 37825A & BLW
11-	77563031	ACOUSTICAL PACK ACCESS COVER	BJ7B1A/B/C/D/E/F, S/C 09 W/ 37825A & ABV
11-	77563029	ACOUSTICAL PACK ACCESS COVER	BJ7B1K
11-	77563036	ACOUSTICAL PACK ACCESS COVER	BJ7B1L
1	83285804	COVER, PACK ACCESS	TAB 07
1	83285809	COVER, PACK ACCESS	TAB 08
1	83285849	COVER, PACK ACCESS	TAB 24
1	76429983	COVER, PACK ACCESS	TAB 29
1	83285883	COVER, PACK ACCESS	TAB 36
2	75040454	PANEL-FOAM, ACOUSTICAL	
3	10127131	SCREW, PAN HD., MACH., 10-24 x 3/8	
4	10126403	WASHER, EXT TOOTH LOCK, 10	
5	94369526	CABLE, GROUND	
6	10125607	WASHERS, PLAIN, 10	
7	77560600	RETAINER-COVER PACK	
8	93749238	SCREW, PAN HEAD, MACHINE, 10-24 x 3/8	
9	76429600	BUSHING-COVER, PACK	
10	93725141	SCREW, MACH., TRUSS HD PHL, 6-32 x 1/4	
11	77820100	ACCESS COVER-INNER	09 W/O 37825A & BLW
	83227400	ACCESS COVER-INNER	S/C 09 W/ 37825A, S/C 10 & ABV
12	77561401	GASKET-EXTENDED SPONGE	
13	75040456	PANEL-FOAM, ACOUSTICAL	
14	75000455	PANEL-FOAM, ACOUSTICAL	
15	77563100	LATCH & SPRING ASSEMBLY	S/C 16 & BLW
15	77563101	LATCH ASSEMBLY	S/C 17 & ABV
16	75070900	ROD-PIVOT, LATCH	
17	92033107	RETAINING RING	
18	77462900	HANDLE-PACK ACCESS COVER	
19	93749138	SCREW, PAN HD, MACH, 6-32 x 1/4	
20	94206500	SPRING	

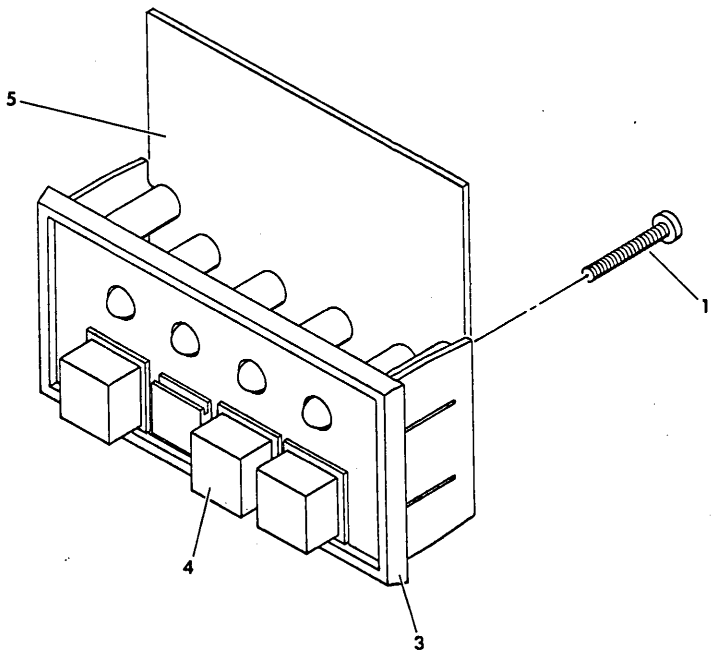

FIGURE 6-12. CONTROL PANEL ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
12-	76422500	CONTROL PANEL ASSEMBLY	
1	17901505	SCREW, THREAD ROLL, PHILLIPS, 4-40 x 3/4	
2	75072003	P.C. BOARD ASSEMBLY (BZYN)	
3	76422400	BEZEL-PANEL, FRONT	
4	75068300	BUTTON-FRONT, PANEL	

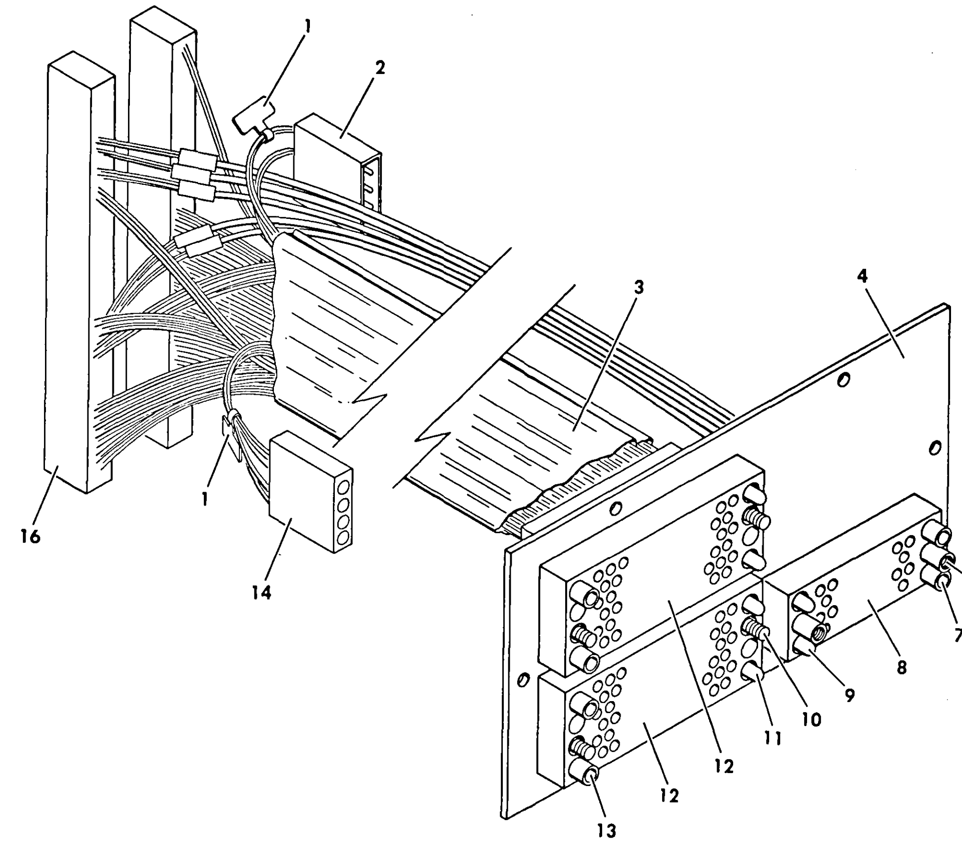

FIGURE 6-13. I/O CABLE ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
13-	76426201	I/O CABLE ASSEMBLY	S/C 09 & BELOW
1	94277409	STRAP, CABLE TIE	
2	93947009	CONNECTOR, SOCKET HOUSING	
3	95043900	CABLE-FLAT, TWISTED PAIR	
4	75073401	PLATE, CONNECTOR	
5		NOT USED	
6	93643007	CONNECTOR, JACKSCREW, FEMALE	
7	93643005	CONNECTOR, CORNER GUIDE SOCKET	
8	93643016	CONNECTOR BLOCK	
9	93643004	CONNECTOR, CORNER, GUIDE PIN	
10	93643006	CONNECTOR, JACKSCREW, MALE	
11	93642004	CONNECTOR, CORNER, GUIDE PIN	
12	94281201	CONNECTOR	
13	93642005	CONNECTOR, CORNER GUIDE SOCKET	
14	93948008	CONNECTOR, PIN HOUSING	
15		NOT USED	
16	94261811	BODY, CONNECTOR SKT. CABLE	

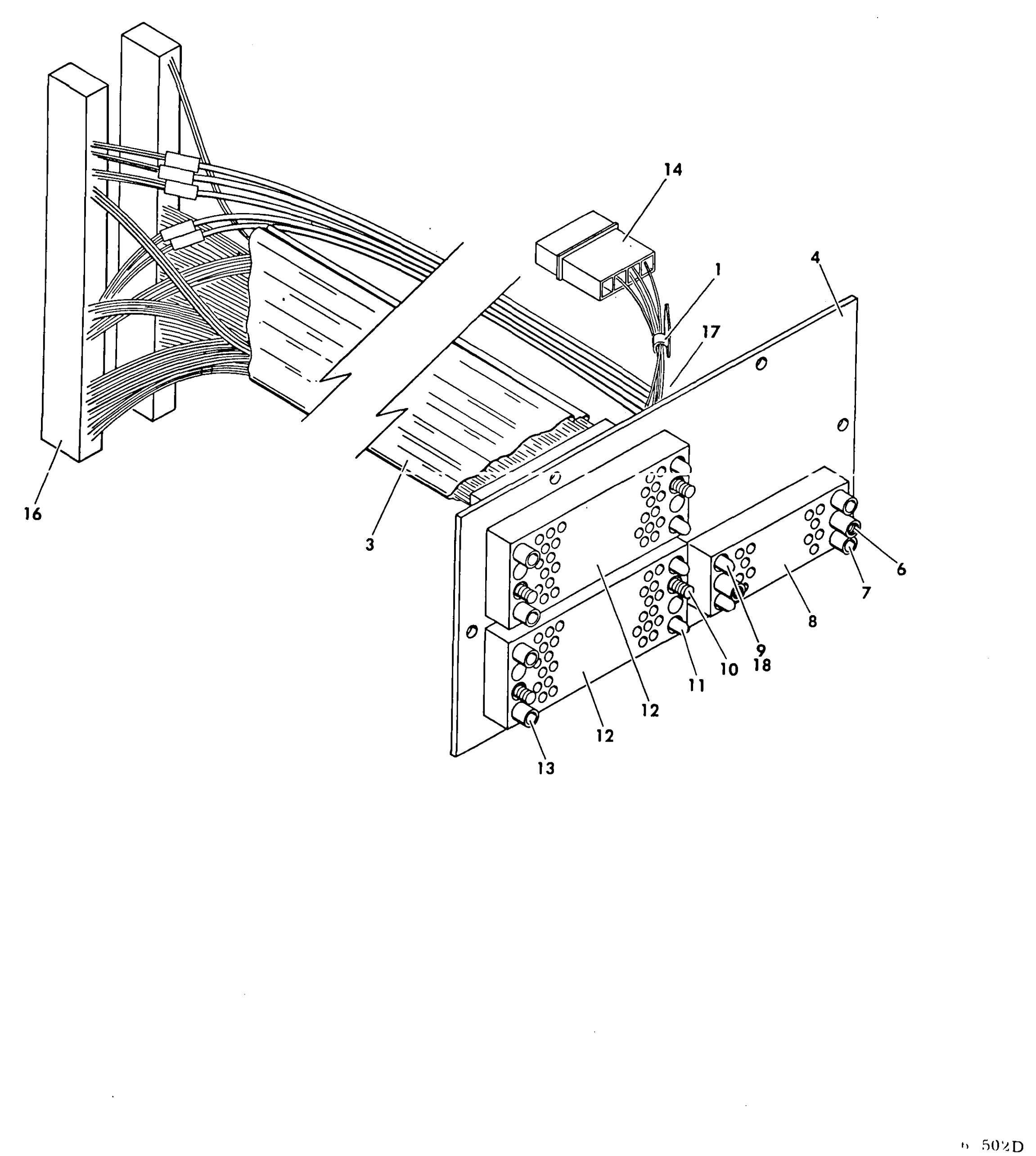

FIGURE 6-13. I/O CABLE ASSEMBLY (SHEET 2)
S/C 10 & ABOVE

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
13-	76426207	I/O CABLE ASSEMBLY	All units S/C 10 & ABV Except 60 HZ 1x aco. S/C 49 W/ DJ00493 & ABV
13-	76426213	I/O CABLE ASSEMBLY	60 HZ 1x aco. units S/C 49 W/DJ00493 & ABV
1	94277409	STRAP, CABLE TIE	
2		NOT USED	
3	95043900	CABLE-FLAT, TWISTED PAIR	I/O CABLE ASSY TAB 07
3	15013723	CABLE-SHIELDED	I/O CABLE ASSY TAB 13
4	75073401	PLATE, CONNECTOR	
5		NOT USED	
6	93643007	CONNECTOR, JACKSCREW, FEMALE	
7	93643005	CONNECTOR, CORNER GUIDE SOCKET	
8	93643016	CONNECTOR BLOCK	
9	93643004	CONNECTOR, CORNER, GUIDE PIN	
10	93643006	CONNECTOR, JACKSCREW, MALE	
11	93642004	CONNECTOR, CORNER, GUIDE PIN	
12	94281201	CONNECTOR	
13	93642005	CONNECTOR, CORNER, GUIDE SOCKET	
14	93948008	CONNECTOR, PIN HOUSING	
15		NOT USED	
16	94261811	BODY, CONNECTOR SKT. CABLE	
17	93541004	TERMINAL, RING TONGUE	
18	10126400	WASHER, EXT. TOOTH, 4	

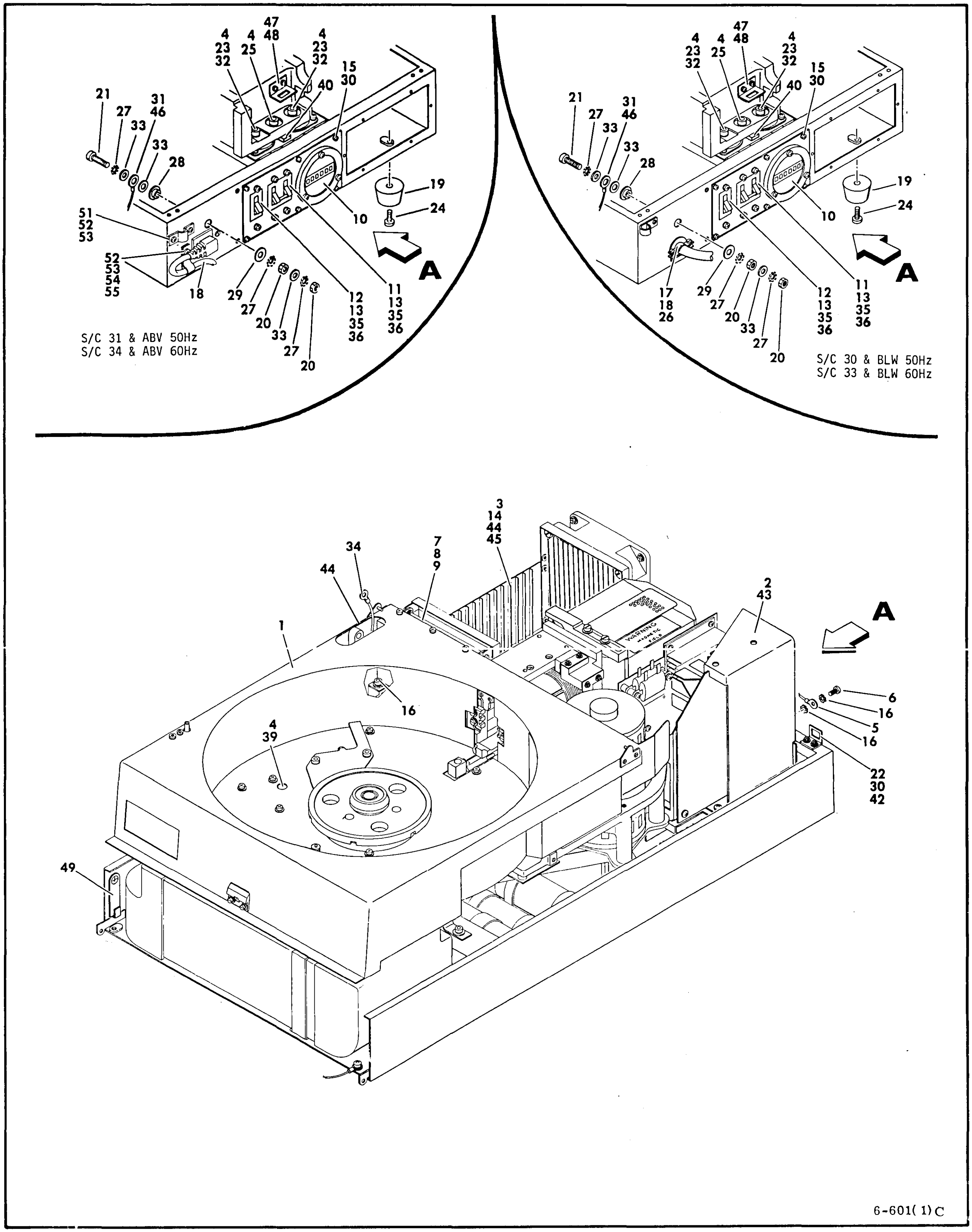

FIGURE 6-14. BASE ASSEMBLY (SHEET 1 OF 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
14-	752402XX	BASE ASSEMBLY (SHEET 1 OF 2)	
1		DECK ASSEMBLY (SEE FIGURE 6-15)	
2		POWER SUPPLY MODULE ASSEMBLY (SEE FIGURE 6-16)	
3		LOGIC CHASSIS ASSEMBLY (SEE FIGURE 6-17)	
4	10125806	WASHER, LOCK, SPRING, 1/4	
5	94369518	CABLE, GROUND	
6	17901516	SCREW, THREAD ROLL, 8-32 x 3/8	
7	75065300	PIN, PIVOT (LOGIC CHASSIS)	
8	92033237	RING, RETAINER	
9	93564001	WASHER, NYLON	
10	94313800	METER, HOUR	TABS 25,27
10	94313801	METER, HOUR	TAB 28
10	94313807	METER, HOUR	TAB 26
11	94245217	CIRCUIT BREAKER	TAB 25
11	94245205	CIRCUIT BREAKER	TAB 26
11	94245207	CIRCUIT BREAKER	TABS 27,28
12	92696065	CIRCUIT BREAKER	TAB 25 All; TAB 27, S/C 36 & BLW
12	92696081	CIRCUIT BREAKER	TAB 27, S/C 37 & ABV
12	92696069	CIRCUIT BREAKER	TAB 26, S/C 10 & BLW
12	92696079	CIRCUIT BREAKER	TAB 26, S/C 11 & ABV
12	92696081	CIRCUIT BREAKER	TAB 28
13	93749160	SCREW, PAN HEAD, WASHER, 6-32 x 3/8	
14	10125803	WASHER, LOCK, SPRING, 6	
15	75256100	PLATE, MOUNTING	
16	10126402	WASHER, EXTERNAL TOOTH, LOCK, 8	
17	92801010	CABLE, CLAMP	
18	75259400	POWER CABLE ASSEMBLY	60 Hz, S/C 33 & BLW
18	75168302	POWER CABLE ASSEMBLY	60 Hz, S/C 34 & ABV
18	75259401	POWER CABLE ASSEMBLY	50 Hz, S/C 30 & BLW
18	75168300	POWER CABLE ASSEMBLY	50 Hz, S/C 31 & ABV
19	95672701	BUMPER, MOLDED	
20	10125108	NUT, 10-32	
21	10125066	SCREW, HEXAGON HEAD, 10-32 x 1	
22	76424100	LATCH, KEEPER	
23	10126257	SCREW, SOCKET HEAD, 1/4-20 x 7/8	
24	93749162	SCREW, PAN HEAD, WASHER, 10-32 x 1/2	
25	10126259	SCREW, SOC. HD., CAP, 1/4-20 x 1 1/4	
26	75073100	SPACER, FLAT	S/C 30 & BLW 50 Hz, S/C 33 & BLW 60 Hz
27	10126403	WASHER, EXTERNAL TOOTH, 10	
28	75062803	WASHER, SHOULDER	
29	75062400	WASHER, INSULATOR	
30	93749086	SCREW, PAN HEAD, WASHER, 4-40 x 3/8	
31	94374140	TERMINAL, QUICK DISCONNECT	
32	10126106	WASHER, INTERNAL TOOTH, LOCK 1/4	
33	94047052	WASHER, SPECIAL	
34	94281467	CABLE, GROUND	
35	10126105	WASHER, INTERNAL TOOTH, 10	
36	76416500	INSULATOR, TERMINAL	
37		NOT USED.	
38		NOT USED	
39	10126264	SCREW, SOCKET HEAD CAP	
40	76420600	SPACER	
41		NOT USED	
42	10125603	WASHER, PLAIN, 4	
43	93826236	SCREW, FLAT HEAD, MACHINE, 10-32 x 5/16	
44	76426900	GASKET, TOP SHROUD	
45	10125607	WASHERS, PLAIN, 10	
46	94369504	CABLE, GROUND	

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
14-		BASE ASSEMBLY (Sheet 1 contd)	
47	76426700	BRACKET, CONNECTOR	
48	93749160	SCREW, PAN HEAD, WASHER, 6-32 x 5/16	
49	76427600	ARM-SUPPORT, CASE	
	76423200	REMOTE SENSE CABLE	S/C 23 & BLW ONLY
50		NOT USED	
51		NOT USED	
52	45584801	CLAMP, CABLE	S/C 31 & ABV, 50 Hz only S/C 34 & ABV, 60 Hz only
53	10127113	SCREW, PAN HEAD MACHINE, 6-32 x 3/8	S/C 31 & ABV, 50 Hz only S/C 34 & ABV, 60 Hz only
54	10126401	WASHER, EXTERNAL TOOTH LOCK, #8	S/C 31 & ABV, 50 Hz only S/C 34 & ABV, 60 Hz only
55	92602005	CLAMP, CABLE	S/C 31 & ABV, 50 Hz only S/C 34 & ABV, 60 Hz only
56	10125605	WASHER, FLAT #6	S/C 31 & ABV, 50 Hz only S/C 34 & ABV, 60 Hz only

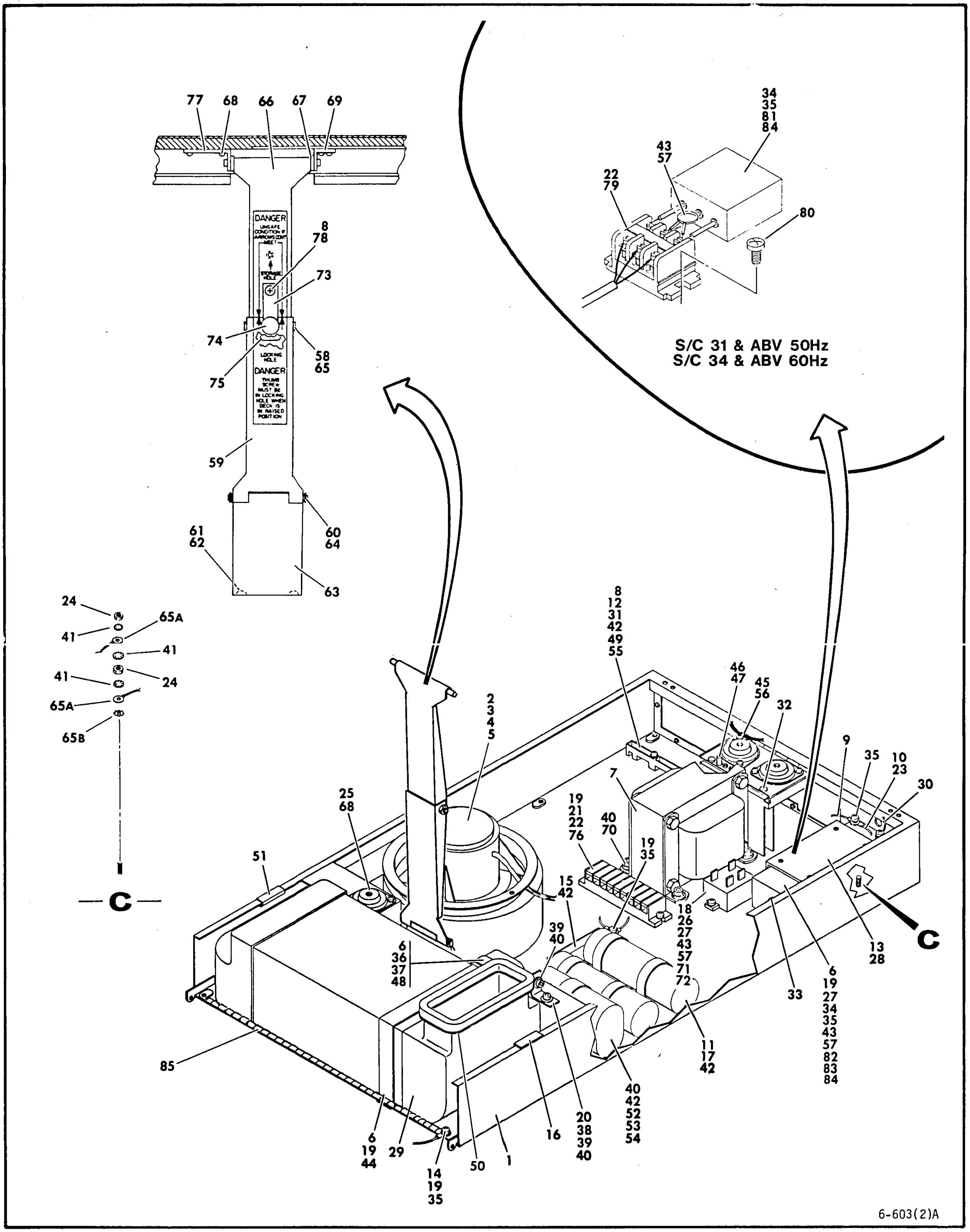

FIGURE 6-14. BASE ASSEMBLY (SHEET 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
14-		BASE ASSEMBLY (SHEET 2)	
1	77813900	BASE	S/C 08 W/O 37799 & BLW
1	77817600	BASE	S/C 08 W/ 37799; S/C 09-16
1	83284100	BASE	S/C 17
1	82329500	BASE	S/C 18-S/C 30, 50 Hz units S/C 18-33, 60 Hz units
1	73057401	BASE	S/C 31-40 W/O DJ00029, 50 Hz S/C 34-40 W/O DJ00029, 60 Hz
1	73057402	BASE	S/C 40 W/DJ00029 & ABV, 50 Hz S/C 40-48 W/DJ00029, 60 Hz
1	73057403	BASE	60 Hz S/C 49 & ABV
2	75240302	BLOWER ASSEMBLY	60 Hz
2	75240303	BLOWER ASSEMBLY	50 Hz
3	94364000	GROMMET, SQUARE SHOULDER	
4	76422601	WASHER, SPECIAL	
5	10125725	SCREW, PAN HEAD, 8-32 x 1/2	
6	20125804	WASHER, LOCK, SPRING, 8	
7	76791100	TRANSFORMER ASSEMBLY, 50 Hz	S/C 23 & BLW
7	47330000	TRANSFORMER ASSEMBLY, 50 Hz	S/C 24 & ABV
7	76791000	TRANSFORMER ASSEMBLY, 60 Hz	S/C 23 & BLW
7	47330200	TRANSFORMER ASSEMBLY, 60 Hz	S/C 24 & ABV
8	10125605	WASHER, FLAT, 6	
9	94281436	CABLE, GROUND	
10	94369504	CABLE, GROUND	
11	76417700	BRACKET, CAPACITOR	S/C 23 & BLW
12	10127114	SCREW, PAN HEAD, MACHINE, 6-32 x 1/2	
13	76500500	BRACKET, POWER SUPPLY	S/C 23 & Blw only
14	94281495	CABLE, GROUND	
15	75244802	BAR, BUS	
16	76423800	GASKET, SIDE RIGHT	
17	95578111	CAPACITOR, 50 VDC, 21000 MFD	
18	76427407	SWITCH, MODIFIED (RUN TRIAC)	All 60Hz units & BJ701D S/C 38 & ABV
18	76427408	SWITCH, MODIFIED (RUN TRIAC)	All 50Hz units (Except BJ701D) S/C 41 & BLW
18	76427411	SWITCH, MODIFIED (RUN TRIAC)	50Hz, S/C 42 & ABV
19	10117121	SCREW, PAN HEAD, 8-32 x 5/16	
20	10125805	WASHER, LOCK, SPRING, 10	
21	14501608	TERMINAL, BLOCK, TB1	
22	24501658	COVER, TERMINAL BLOCK	
23	94274105	TERMINAL, QUICK CONNECT	
24	10125106	NUT, 8-32	S/C 40 W/ DJ00029 & ABV only
25	94362600	MOUNT SHOCK	
26	10126401	WASHER, LOCK, EXTERNAL TOOTH, 6	
27	93541046	TERMINAL, RING TONGUE	50 Hz, 220/240 V
28	10125919	SCREW, FLAT HEAD, 8-32 x 3/8	S/C 23 & Blw only
29	94364700	FILTER, AIR	
30	94281467	CABLE, GROUND	
31	76426300	CLAMP, CABLE	
32	92633023	BUMPER, GROMMET	
33	92801010	CLAMP, CABLE	
34	94371200	FILTER, LINE	S/C 01-33, 60 Hz S/C 01-S/C 30, 50 Hz
34	92009801	FILTER, LINE	S/C 31 & ABV, 50 Hz S/C 34 & ABV, 50 Hz
35	10126402	WASHER, LOCK, EXTERNAL TOOTH	
36	76878900	CAPACITOR, C5	
37	92826001	BRACKET, CAPACITOR	
38	75244900	BRACKET, SHOCK, LOCK	
39	10126233	SCREW, SOCKET HEAD, 10-24 x 3/8	

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
14-		BASE ASSEMBLY (SHEET 2 CONTD)	
40	10125607	WASHER, FLAT	
41	10126104	WASHER, LOCK, INTERNAL TOOTH, 8	S/C 40 W/ DJ00029 & ABV ONLY
42	93749165	SCREW, PAN HEAD, WASHER, 10-32 x 5/16	
43	92261118	SLEEVING	50 Hz, 220/240 V
44	77475800	CLAMP, FILTER, AIR	
45	92602001	CLAMP, CABLE-NYLON	
46	93560003	SWITCH, INTERLOCK	
47	10125711	SCREW, FLAT HEAD, 6-32 x 82	
48	10127120	SCREW, PAN HEAD, 8-32 x 1/4	
49	10126103	WASHER, LOCK, INTERNAL TOOTH, 6	
50		NOT USED	
51	76423801	GASKET, SIDE, LEFT	
52	95686701	CAPACITOR	
53	95582501	BOOT, DOUBLE ENTRANCE	
54	76423700	BRACKET, CAPACITOR	
55	94276611	TAPE, FOAM	
56	76427001	CABLE, TRANSDUCER, W2	
	75242301	AC HARNESS ASSEMBLY, W1	S/C 30 & BLW 50 Hz, S/C 33 & BLW 60 Hz
	75242302	AC HARNESS ASSEMBLY, W1	S/C 31 & ABV 50 Hz, S/C 34 & ABV 60 Hz
	75243300	CABLE ASSEMBLY, W4	All units except 60 Hz 1x aco. units S/C 49 W/DJ00493 & ABV
	75243301	CABLE ASSEMBLY, W4	60 Hz 1x aco. units S/C 49 W/DJ00493 & ABV
		--ASSOCIATED PARTS--	
	10127111	SCREW, PAN HEAD, MACHINE, 6-32 x 1/4	
	83278003	STRAP, CABLE	
	10126401	WASHER, LOCK, EXTERNAL TOOTH, 6	
	76476006	HARNESS ASSEMBLY, W5	S/C 09 & BELOW
	76476010	HARNESS ASSEMBLY, W5	S/C 10 & ABOVE
	82349600	MAIN DECK HARNESS	S/C 22 & ABOVE
	75244601	SERVO DIBIT CABLE ASSEMBLY, W7	S/C 07 W/O 37653 & BELOW
	76036100	FAN CABLE ASSEMBLY	
57	94395600	VARISTOR	50 Hz, 220/240 V
58	94218000	NUT, SELF-LOCKING, 6-32	S/C 17 & ABV
59	83278400	ARM, LOWER DECK SUPPORT	W/O 48453, S/C 19 & BELOW
59	47443700	ARM, LOWER, DECK SUPPORT	W/ 48953, S/C 20 & ABOVE
60	92033037	RING, TERMINAL	S/C 17 & ABV
61	10127142	SCREW, MACHINE, PAN HEAD, 10-32 x 3/8	S/C 17 & ABV
62	10126403	WASHER, LOCK EXTERNAL TOOTH, 10	S/C 17 & ABV
63	83278500	PIVOT, LOWER, DECK SUPPORT	S/C 17 & ABV
64	83278700	SHAFT, GROOVED	S/C 17 & ABV
65	73085400	SCREW, HEX HEAD	S/C 17 & ABV
65A	93541018	TERMINAL, RING TONGUE	S/C 40 W/ DJ00029 & ABV ONLY
65B	10126402	WASHER, EXTERNAL TOOTH, 8	S/C 40 W/ DJ00029 & ABV ONLY
	75242302	AC HARNESS ASSEMBLY, W7	S/C 07 W/37653 & ABOVE

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
14-		BASE ASSEMBLY (SHEET 2 CONTD)	
66	83278300	ARM, UPPER DECK SUPPORT	W/O 48953, S/C 19 & BELOW
66	47443800	ARM, UPPER, DECK SUPPORT	W/ 48953, S/C 20 & ABOVE
67	94347107	WASHER, SHOULDER	S/C 17 & ABV
68	93749162	SCREW, MACHINE, PAN HEAD, 6-32 x 3/8	S/C 17 & ABV
69	83278600	PIVOT, UPPER, LEFT SIDE	S/C 17 & ABV
70	93755236	SCREW, MACHINE, PAN HEAD, PHILLIPS NC	
71	10127114	SCREW, MACHINE, PAN HEAD, 6-32 x 1/2	
72	10125105	NUT, HEX, 6-32	
73	82345100	RETAINER-THUMB SCREW	S/C 20 & ABOVE
74	82345000	SCREW-THUMB	S/C 20 & ABOVE
75	82345200	SPRING-TORSION	S/C 20 & ABOVE
76	92004200	STANDOFF-THREADED	
77	83278601	PIVOT, UPPER, RIGHT SIDE	S/C 17 & ABOVE
78	10127113	SCREW, PAN HEAD, MACHINE, 6-32 x 3/8	
79	24501602	TERMINAL, BLOCK	S/C 31 & ABV, 50 Hz, S/C 34 & ABV, 60 Hz
80	75070701	SCREW, PAN HEAD MACHINE, 8-32 x 5/16	S/C 31 & ABV, 50 Hz, S/C 34 & ABV, 60 Hz
81	10127122	BUMPER, STOP	S/C 31 & ABV, 50 Hz, S/C 34 & ABV, 60 Hz
82	10125106	NUT, 8-32	S/C 31 & ABV, 50 Hz, S/C 33 & BLW, 60 Hz
83	10127120	SCREW, PAN HEAD, 8-32 x 1/4	S/C 31 & ABV, 60 Hz, S/C 33 & BLW, 60 Hz
84	10125606	WASHER, #8	S/C 31 & ABV, 50 Hz ONLY
85	94374904	STRIP, CONTACT	60 Hz S/C 49 & ABV ONLY

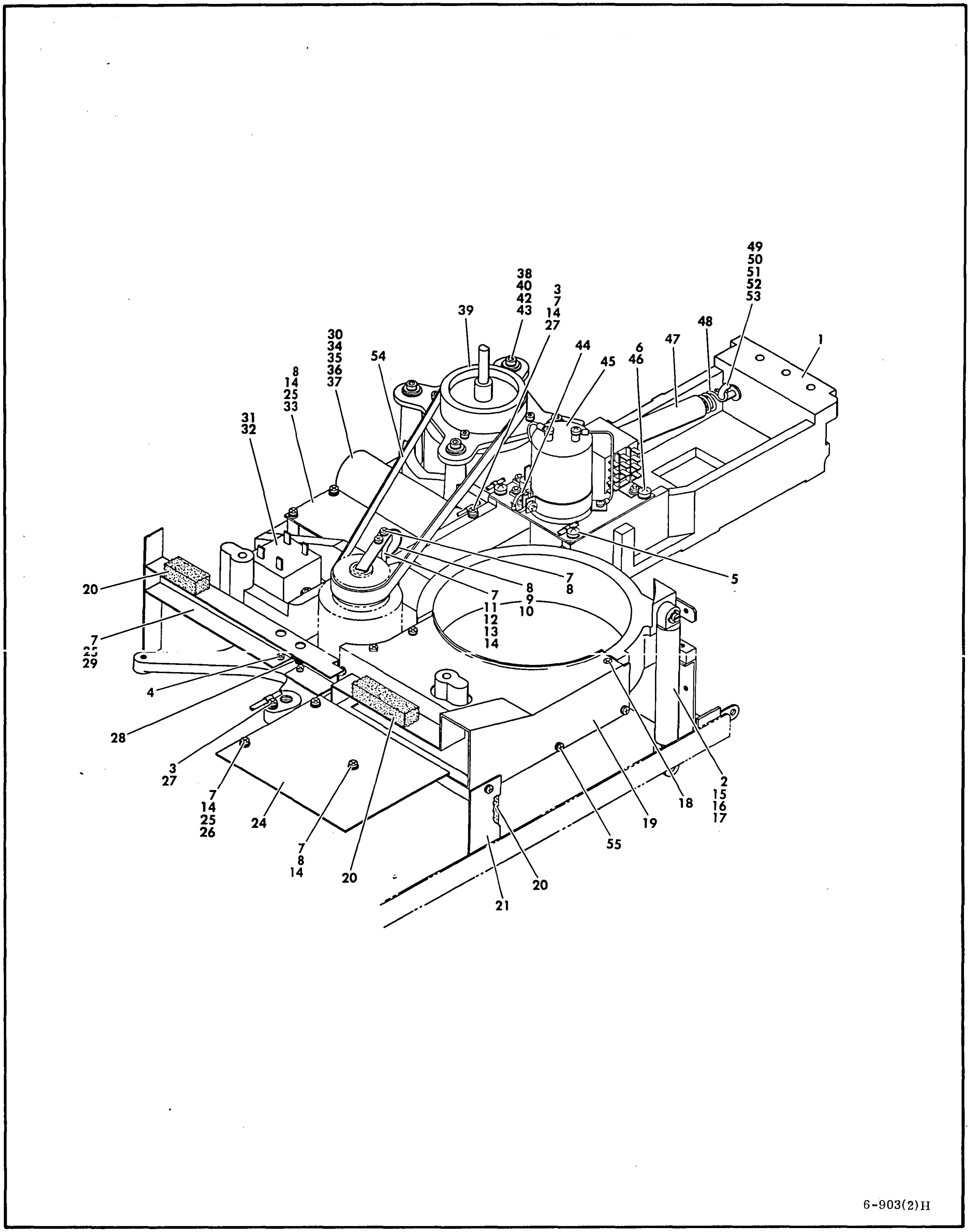

FIGURE 6-15. DECK ASSEMBLY (SHEET 1 OF 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
15-	750704XX	DECK ASSEMBLY (SHEET 1 OF 2)	
1	77393800	DECK	S/C 08 W/O 37807A & BLW
1	77825600	DECK	S/C 08 W/ 37807A & ABV
2	10126402	WASHER, EXT TOOTH LOCK, 8	
3	94277406	STRAP, CABLE TIE	
4	93749160	SCREW, PAN HEAD, MACHINE, 6-32 x 5/16	
5	92001708	SCREW, PAN HEAD, MACH, WASH, 10-24 x 5/8	
6	10125805	WASHER, SPRING LOCK, 10	
7	10125803	WASHER, SPRING LOCK, 6	
8	93749162	SCREW, PAN HEAD, MACH., 6-32 x 3/8	
9	94369522	CABLE, GROUND	
10	10126401	WASHER, EXT. TOOTH LOCK, 6	
11	75069800	HOLDER-SPRING, GROUND	
12	76408000	GROUND-SPRING	
13	10127115	SCREW, PAN HEAD, MACH., 6-32 x 5/8	
14	10125605	WASHERS, PLAIN, 6	
15	94354902	SPRING, GAS	S/C 08 W/O 37807A & BLW
15	94354901	SPRING, GAS	S/C 08 W/ 37807A & ABV
16	73229007	STUD	
17	92033221	RETAINING RING	
18	10125713	SCREW, FLAT HD, CRS. RES. 6-32 x 3/8	
19	76021200	INLET, BLOWER	S/C 16 & BLW
19	83277800	INLET, BLOWER	S/C 17 & ABV
20	94001133	TAPE, FOAM	
21	76424600	PLATE, SHROUD	
22		NOT USED	
23		NOT USED	
24	76423002	COMPONENT ASSEMBLY, TYPE AXPN	S/C 09 & BLW
24	76423003	COMPONENT ASSEMBLY, BXPN	S/C 10 & ABV
24	76423005	COMPONENT ASSEMBLY, TYPE CXPN	BJ7B1 C/D ONLY
25	10127112	SCREW, PAN HEAD, MACH., 6-32 x 5/16	
26	93114215	STANDOFF, TAPPED POST	
27	92001705	SCREW, PAN HEAD, MACH, WASH, 6-32 x 1/2	
28	95649704	GROMMET	
29	76429800	BAFFLE, AIR	S/C 16 & BLW
29	83277900	BAFFLE, AIR	S/C 17 & ABV
30	83245301	RESISTOR ASSEMBLY	
31	93660079	SCREW, PHILLIPS, MACHINE, 8-32 x 1/2	
32	94376501	SWITCH, SOLID STATE (START TRIAC)	220-240 V UNITS, ALL UNITS EXCEPT BJ701D, S/C 41 & BLW
32	94376503	SWITCH, SOLID STATE (START TRIAC)	220-240 V UNITS, ALL UNITS EXCEPT BJ701D, S/C 42 & ABV
32	94371305	SWITCH, SOLID STATE (START TRIAC)	220-240 V UNITS, BJ701D ONLY, S/C 38 & ABOVE
32	94371305	SWITCH, SOLID STATE (START TRIAC)	100 - 120 V UNITS
33	75242901	COMPONENT ASSEMBLY, TYPE 4ZFN	S/C 09 & BLW
34	10125735	SCREW, FLAT HEAD, CRS. RES. 10-24 x 3/8	
35	94255116	CAPACITOR-MOTOR	TAB 21,37, S/C 08 W/O 48002 & BLW
35	94255114	CAPACITOR-MOTOR	TAB 22, S/C 09 W/O 37787C & BLW
35	94255115	CAPACITOR-MOTOR	TAB 23,24, S/C 09 W/ 48002 & ABV
35	94255100	CAPACITOR-MOTOR	TAB 23, S/C 09 W/O 48002 & BLW
35	94255109	CAPACITOR-MOTOR	TAB 22, S/C 09 W/ 37787C thru S/C 19. TAB 32, S/C 29 & BLW.
35	94255111	CAPACITOR-MOTOR	TAB 24, S/C 09 W/O 48002 & BLW
35	94255101	CAPACITOR-MOTOR	TAB 22, S/C 20 W/ 48002 thru S/C 26.
35	94255120	CAPACITOR-MOTOR	TAB 22, S/C 27 & ABV TAB 32, S/C 30 & ABV
36	94260504	ACCESSORIES-CAPACITOR, PLASTIC	TAB 21, 22, 23, 24, 37, S/C 08 W/ 48002 & ABV
36	94260503	ACCESSORIES-CAPACITOR, PLASTIC	TAB 23, S/C 09 W/O 48002 & BLW

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
15-		DECK ASSEMBLY (SHEET 1 OF 2 CONTD)	
37	94260501	ACCESSORIES-CAPACITOR, STEEL	TAB 21; 23, 24, 37; S/C 09 W/ 48002 & ABV
37	94260502	ACCESSORIES-CAPACITOR, STEEL	TAB 22; 24, S/C 09 W/O 48002 & BLW
37	94260500	ACCESSORIES-CAPACITOR, STEEL	TAB 23,S/C 09 W/O 48002 & BLW
38	75062805	WASHER, SHOULDER	
39		DRIVE MOTOR ASSEMBLY (SEE FIG. 6-18)	
40	94047052	WASHER, SPECIAL	
41		NOT USED	
42	75062400	WASHER, INSULATOR	
43	10126235	SCREW, HEX, SCH, CAP, 10-24 x 5/8	
44	94277411	STRAP, CABLE TIE	
45		EMERGENCY RETRACT ASSEMBLY (SEE FIG. 6-24)	
46	10127131	SCREW, PAN HEAD, MACH, 10-24 x 3/8	
47	93154150	TUBING, HEAT SHRINKABLE	
48	75259300	SPRING, EXTENSION	
49	10125105	NUT-HEX MACH SCREW, 6-32	
50	75269000	HOOK-SPRING	
51	94047032	WASHER, SPECIAL	
52	75062804	WASHER, SHOULDER	
53	93564051	WASHER, NYLON	
54	92314113	BELT, DRIVE-FLAT	TAB 21, 22, 37
54	92314119	BELT, DRIVE-FLAT	TAB 22, 24
55	92001702	SCREW, PAN HEAD, WASHER, 6-32 x 5/16	

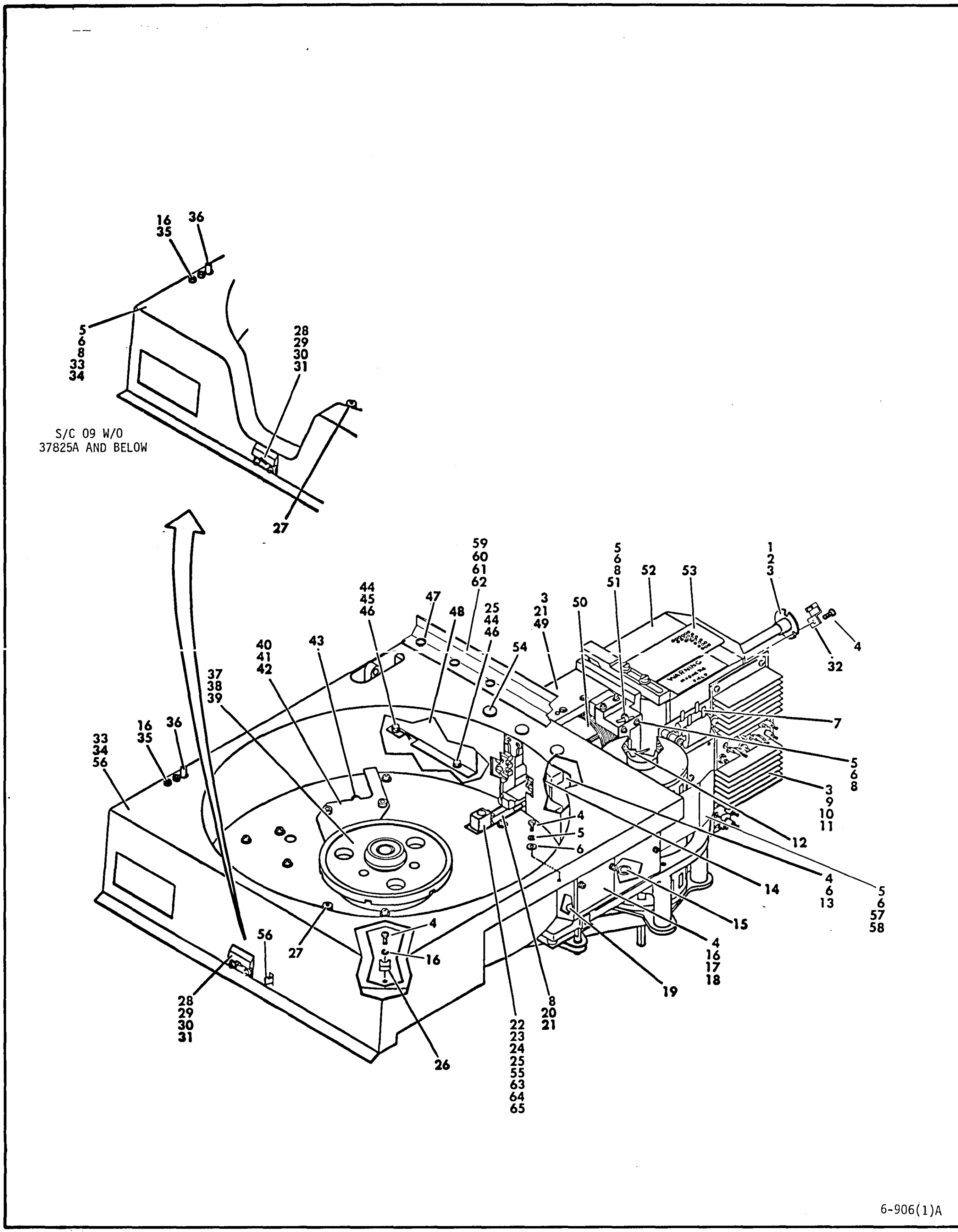

FIGURE 6-15. DECK ASSEMBLY (SHEET 2)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
15-		DECK ASSEMBLY (SHEET 2)	
1	76427300	TRANSDUCER ASSEMBLY	
2	10126234	SCREW, HEX, SCH, CAP, 10-24 x 1/2	
3	10125805	WASHER, SPRING LOCK, 10	
4	93749162	SCREW, PAN HEAD, MACH., 6-32 x 3/8	
5	10125803	WASHER, SPRING LOCK, 6	
6	10125605	WASHER, PLAIN, 6	
7	94309803	POD, TERMINAL	
8	10127112	SCREW, PAN HEAD, MACH, 6-32 x 5/16	
9		POWER AMP ASSEMBLY (SEE FIG. 6-20)	
10	10127131	SCREW, PAN HEAD, MACH, 10-24 x 3/8	
11	75259901	POWER AMP DRIVE CABLE	S/C 21 & BELOW
12	94241008	CLIP-CABLE	
13	72874270	HEAD RETAINER ASSEMBLY	
14	94001102	TAPE, FOAM	
15	15012412	BUSHING, SNAP-IN	
16	10126103	WASHER, INT TOOTH LOCK, 6	
17	77563700	WINDOW-SHROUD	S/C 08 W/ 37771 & ABV ONLY
18	77563800	GASKET-SHROUD WINDOW	S/C 08 W/ 37771 & ABV ONLY
19	94353204	CAPS & PLUGS-PLASTIC	
20	NFR	RAIL-BOTTOM	
21	10126235	SCREW, HEX SCH, CAP, 10-24 x 5/8	
22	75070802	BLOCK-STOP	
23	75070700	STOP-BUMPER	
24	10126226	SCREW, HEX SCH, CAP, 8-32 x 1/2	
25	10125804	WASHER, SPRING LOCK, 8	
26	76031600	BLOCK, STOP	
27	77387100	SPEED SENSOR ASSEMBLY	
28	76427700	CATCH-PACK ACCESS COVER	S/C 16 & BLW
28	73083500	CATCH, PACK ACCESS COVER	S/C 17 & ABV
29	92785084	SCREW, MACH., PAN HEAD, 4-40 x 5/16	
30	93211105	WASHER, FLAT	
31	10125801	WASHER, SPRING LOCK, 4	
32	73072900	STOP, TRANSDUCER SAFETY	
33	93569200	SHROUD, PACK	
34	77824500	GASKET, SHROUD	
35	92723196	SCREW-BUTTON, SOCKET HEAD, 6-32 x 1/4	
36	93560002	SWITCH, INTERLOCK	
37	92727396	SCREW-BUTTON, SOCKET HEAD, 3/4 x 5/16-18	
38	10125807	WASHER, SPRING LOCK, 5/16	
39		SPINDLE ASSEMBLY (SEE FIG. 6-19)	
40	75073700	LOCK-BRAKE, SPINDLE	
41	92541068	SCREW, SHOULDER, SOCKET HEAD	
42	92373005	NYLINER, SNAP-IN	
43	94205789	SPRING, COMPRESSION	
44	10125606	WASHER, PLAIN, 8	
45	94281467	CABLE, GROUND	
46	10126227	SCREW, HEX HD, MACH, 8-32 x 5/8	
47	93749158	SCREW, PAN HEAD, WASHER, 6-32 x 1/4	
48	77560800	BRACKET, PIVOT	
49		RAIL BRACKET ASSEMBLY (SEE FIG.6-23)	
50		CARRIAGE & COIL ASSEMBLY (SEE FIG. 6-21)	
51	92602001	CLAMP, CABLE-NYLON	
52		MAGNET ASSEMBLY (SEE FIGURE 6-22)	
53	75257100	COVER, MAGNET	
54	94279415	BUTTON PLUG	S/C 09 W/ 37825A & ABV, ONLY
55	10125603	WASHER, FLAT 4	

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
15-		DECK ASSEMBLY (Sheet 2 contd)	
56	92001702	SCREW, PAN HEAD, WASHER, 6-32 x 3/8	
57	82335100	DEFLECTOR, AIR	S/C 24 & ABV ONLY
58	10127111	SCREW, PAN HEAD, MACHINE, 6-32 x 1/4	S/C 24 & ABV ONLY
59	81567740	FLANGE, SHROUD	
60	10126401	WASHER, EXT. TOOTH LOCK, #6	)60 Hz, ACOUSTIC UNITS
61	10125105	NUT, HEX, 6-32	)S/C 49 & ABV ONLY
62	10127113	SCREW, PAN HEAD, MACH, 6-32 x 3/8	)
63	93913855	COVER, STOP BLOCK	
64	93276375	SCREW, BUTTON HEAD, 4-40 x 1/4	
65	10125801	WASHER, SPRING LOCK, #4	

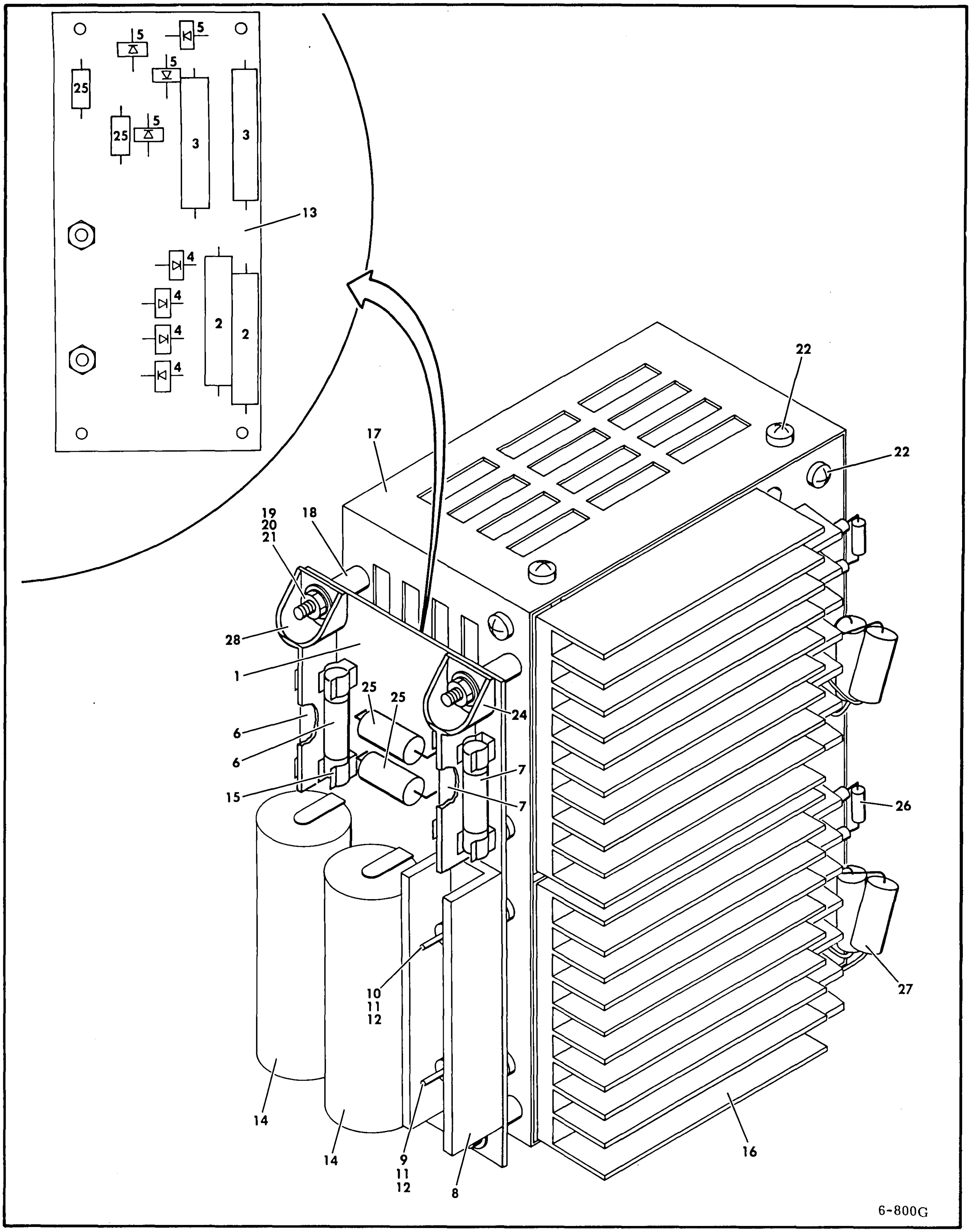

FIGURE 6-16. STORAGE MODULE PS ASSEMBLY KIT
(USE S/C 23 AND BELOW)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
16-	47476710	STORAGE MODULE PS ASSEMBLY KIT	USED S/C 23 & BLW; BJ701B/D/F, BJ7B1B/D/F
16-	47476711	STORAGE MODULE PS ASSEMBLY KIT	USED S/C 23 & BLW; BJ701A/C/E, BJ7B1A/C/E
	91790711	POWER SUPPLY ASSEMBLY	
1	91777000	PC BOARD ASSEMBLY	
2	95594112	RESISTOR, 10W, 51 OHMS	
3	95594119	RESISTOR, 1oW, 510 OHMS	
4	95575000	RECTIFIER	
5	95575001	RECTIFIER, SILICON	
6	95647604	FUSE, QUICK ACTING, 5 AMP	
7	95647605	FUSE, QUICK ACTING, 6 AMP	
8	47478600	HEATSINK	
9	50240515	DIODE, SILICON, 12 VOLT	
10	50240415	DIODE, SILICON, 12 VOLT	
11	10125108	NUT, HEXAGON, 10-32	
12	10125805	WASHER, SPRING, LOCK, 10	
13	91776900	PC BOARD	
14	95597401	CAPACITOR, 7.500 MFD, 30 VDC	
15	95588403	CLIP, FUSE	
16	47398200	REGULATOR ASSEMBLY	
17	47478400	CHASSIS	
18	95643952	SPACER, ROUND, NOT THREADED	
19	10125105	NUT, HEXAGON, 6-32	
20	10125803	WASHER, SPRING, LOCK, 6	
21	10125613	WASHER, FLAT, 6	
22	17901515	SCREW, THREAD ROLL. 8-32 x 1/4	
23		NOT USED	
24	77567300	SHIELD, FUSE, RIGHT	
25	92496185	CAPACITOR, .082 UF, 200 V	
26	91782100	RESISTOR ASSEMBLY	
27	92496263	CAPACITOR, .33 UF, 80 VDC	
28	77567200	SHIELD, FUSE, LEFT	
		(THE FOLLOWING ITEMS ARE NOT PART OF THE POWER SUPPLY)	
29	10125724	SCREW, FLAT HEAD	

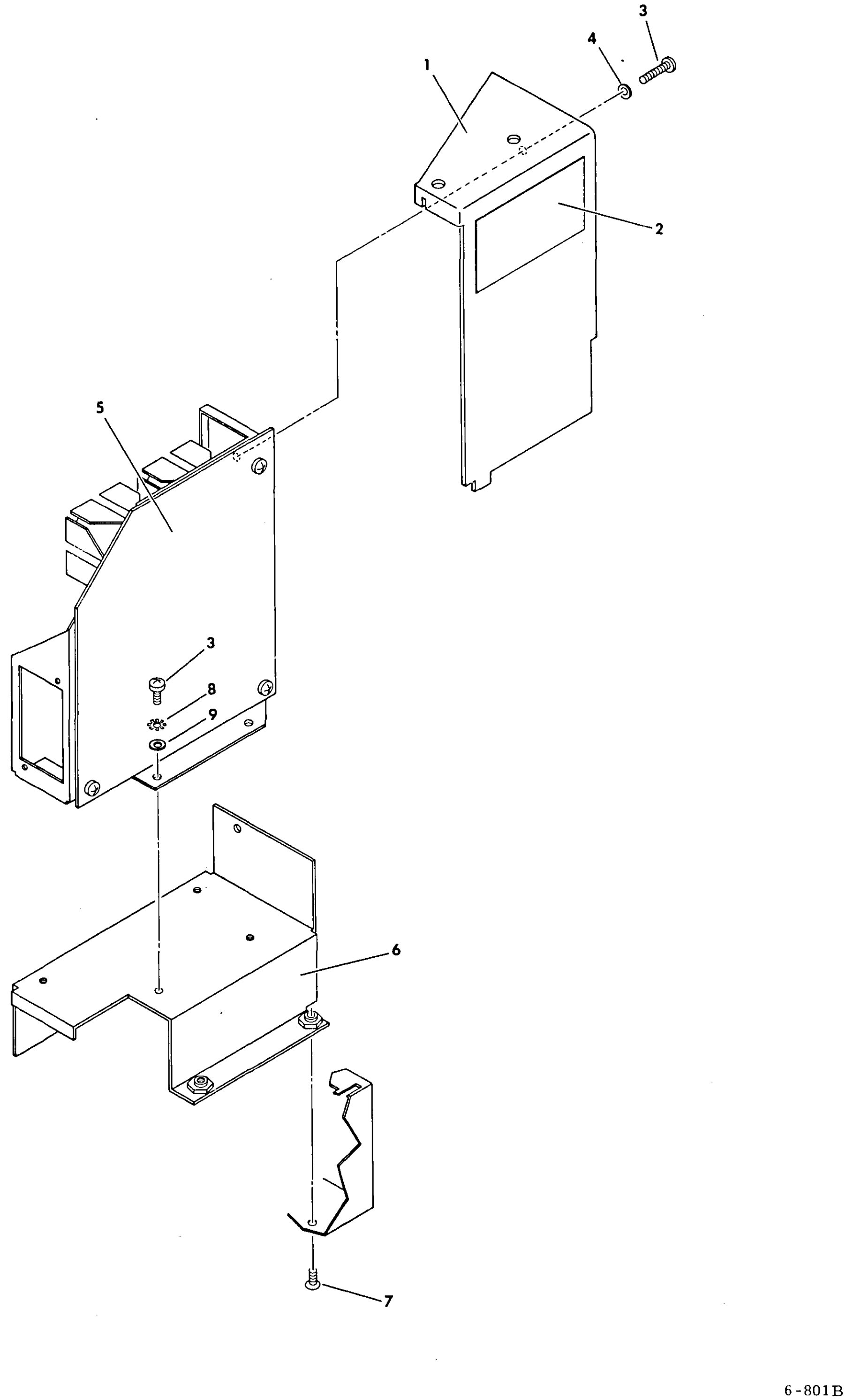

Figure 6-16.1. Storage Module PS Assembly
(Use S/C 24 and Above)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
6-16.1		POWER SUPPLY ASSEMBLY	USE S/C 24 & ABV
1	82335200	COVER, POWER SUPPLY	
2	92006900	PLATE, WARNING	
3	10127122	SCREW, MACHINE, PAN HEAD, 8-32 x 3/8	
4	10125804	WASHER, LOCK, SPRING, #8	
5		COMPONENT ASSEMBLY, _XKV (SEE FIG. 6-16.2)	
6	47289700	BASE, POWER SUPPLY	
7	10125909	SCREW, MACHINE, FLAT HEAD, 6-32 x 5/16 PAN HEAD	
8	10126402	WASHER, LOCK, EXTERNAL TOOTH, #8	
9	10125606	WASHER, FLAT	

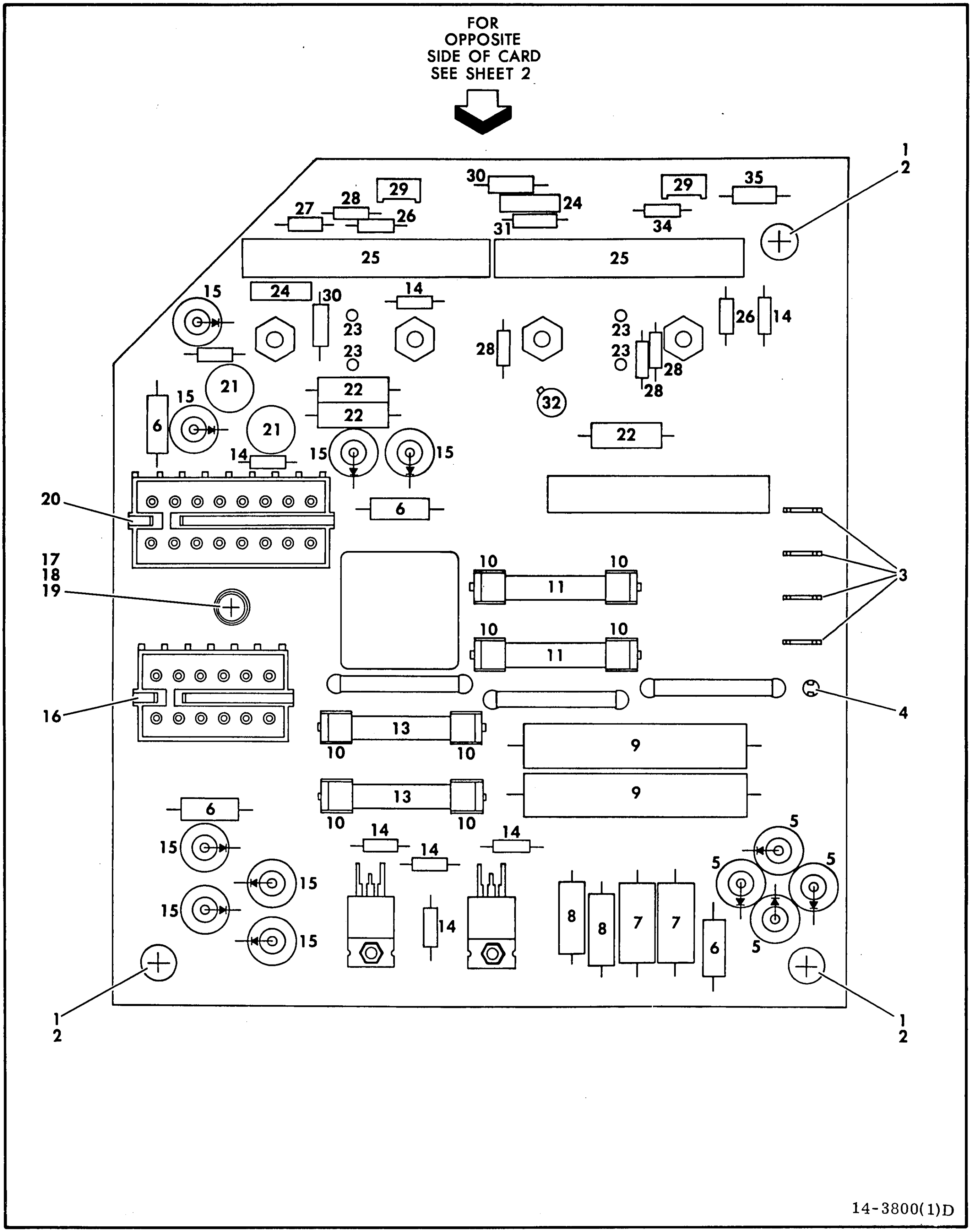

Figure 6-16.2. Component Assembly, Type _XKV (Sheet 2)
Used on S/C 24 and Above

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
6-16.2	75833708	COMPONENT ASSEMBLY, TYPE _XKV (Power Supply) (Sheet 1 of 2)	Used on S/C 24 & Above
1	95587700	NUT, Push-in Expansion	
2	95655530	SCREW, Pan Head, Sheet Metal, 8-18 x 1/2	
3	95524700	TERMINAL, Quick Connect	
4	93549019	BUMPER, Nylon	
5	95575001	RECTIFIER, Silicon, Hi Current	
6	92496127	CAPACITOR, Non-electrolytic, 0.01 μF, 200 V	
7	92512933	RESISTOR, 2 W, 560 Ω	
8	92512859	RESISTOR, 1/2 W, 47 Ω	
9	95594119	RESISTOR, Fixed, 10 W, 510 Ω	
10	95588400	CLIP, Fuse	
11	51650227	FUSE, Cartridge, 6.25 A	
12		NOT USED	
13	51650226	FUSE, Cartridge	
14	92427027	CAPACITOR, Electrolytic, 35 V, ±20%	
15	95575000	RECTIFIER, Silicon, Hi Current	
16	95882603	PIN HEADER ASSEMBLY	
17	95524401	WASHER, Lock	
18	94047078	WASHER, Special	
19	92751158	SCREW, Machine, Pan Head, 6-32 x 1/4	
20	95882804	PIN HEADER ASSEMBLY	
21	94395528	CAPACITOR, Electrolytic, 220 μF	
22	94389102	RESISTOR, Flameproof, 2 W	
23	95593201	RECEPTACLE, PC BOARD	
24	94825900	RECTIFIER, Silicon	
25	15162000	REGULATOR, Voltage Hybrid	
26	92512242	RESISTOR, 1/4 W, 15 Ω	
27	94360331	RESISTOR, 1/4 W, 2100 Ω	
28	94360317	RESISTOR, 1/4 W, 1500 Ω	
29	94391208	POTENTIOMETER	
30	92512807	RESISTOR, 1/2 W, 120 Ω	
31	24553500	DIODE, Silicon	
32	50211411	TRANSISTOR, SPNP, 40 V	
33		NOT USED	
34	94360378	RESISTOR, 1/4 W, 6490 Ω	
35	92496157	CAPACITOR, Non-Electrolytic, 4700 PH, 200 V	

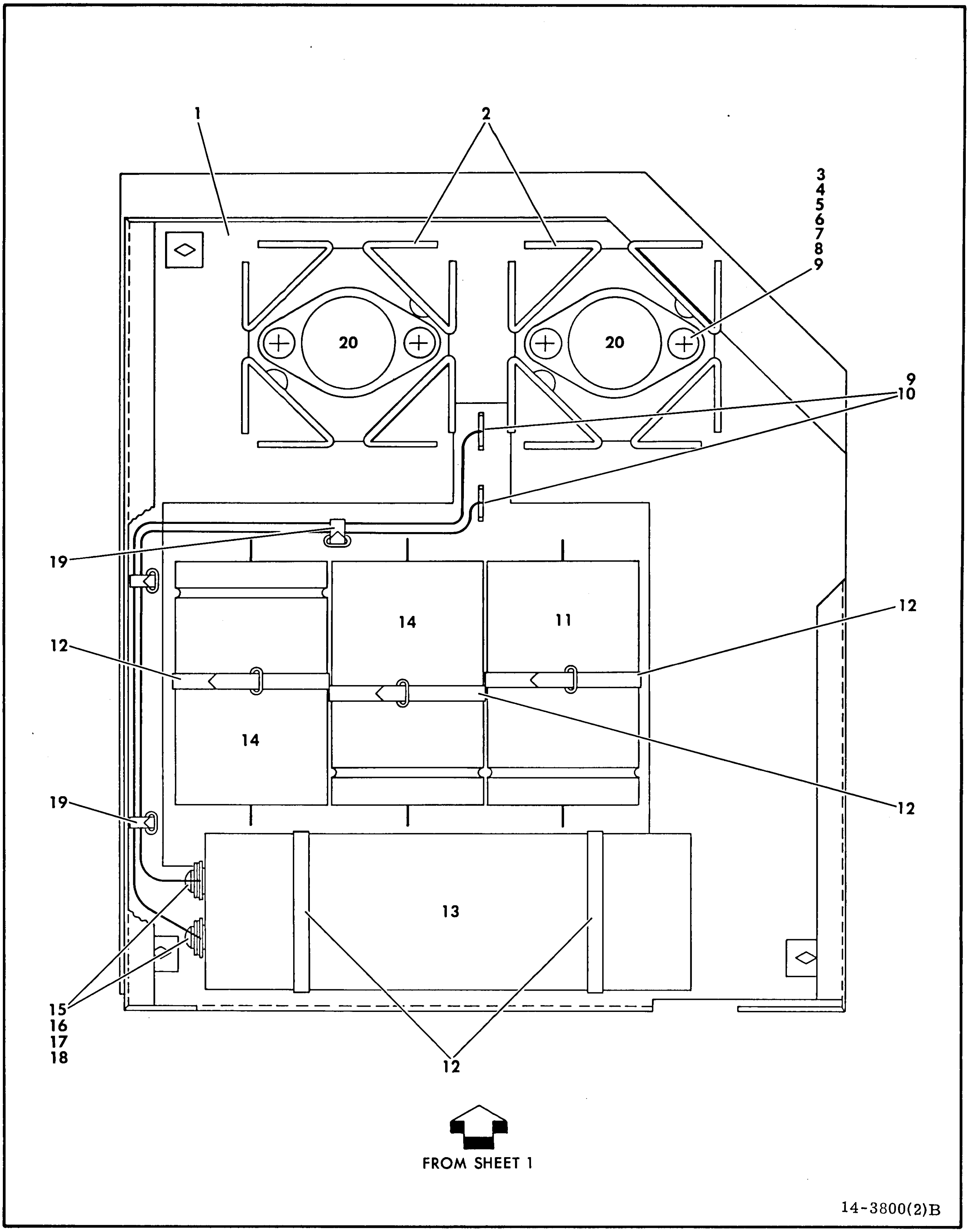

Figure 6-16.2. Component Assembly, Type _XKV (Sheet 1 of 2)
(Used on S/C 24 and Above)

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
6-16.2		COMPONENT ASSEMBLY, Type _XKV (Power Supply) (Sheet 2)	Used on S/C 24 & Above
1	76871500	CHASSIS, Power Supply	
2	94261000	HEAT SINK, Transistor	
3	92751168	SCREW, Machine, Phillips Head, 6-32 x 3/4	
4	95644205	BUSHING, Insulation	
5	94783900	WASHER, Mica	
6	95797301	WASHER, Phenolic	
7	95524401	WASHER, Lock	
8	94047078	WASHER, Special	
9	95524700	TERMINAL, Quick Connect	
10	95643216	CONNECTOR, Quick Connect	
11	94383709	CAPACITOR, Electrolytic (C5)	
12	94277424	STRAP, Cable Tie	
13	95661328	CAPACITOR, 18 V, 27 000 μF (C2)	
14	94383710	CAPACITOR, Electrolytic (C12, C15)	
15	95604039	CONNECT, Ring Tongue	
16	93234236	SCREW, Machine, Pan Head, 1-032 x 5/16	
17	95524408	WASHER, Lock	
18	94047081	WASHER, Special	
19	94277400	STRAP, Cable Tie	
20	50223800	TRANSISTOR, SNPN, Darington (Q5, Q6)	

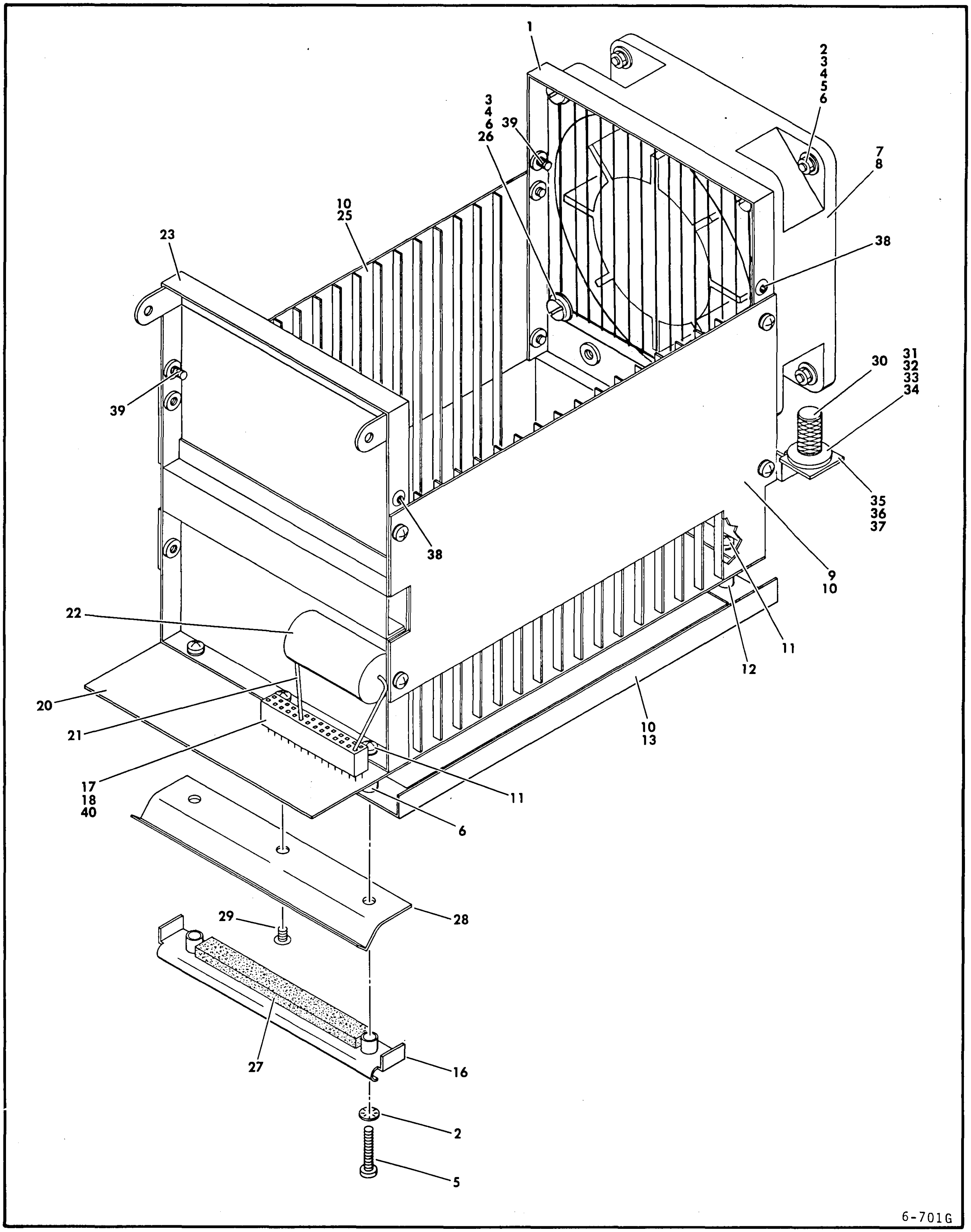

Figure 6-17. Logic Chassis Assembly

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
17-	750609XX	LOGIC CHASSIS ASSEMBLY	S/C 08 W/O 37867 & BLW
17-	774780XX	LOGIC CHASSIS ASSEMBLY	S/C 08 W/ 37840 & ABV
17-	832286XX	LOGIC CHASSIS ASSEMBLY	
1	75065600	PANEL, REAR, LOGIC	
2	10126103	WASHER, LOCK, INTERNAL TOOTH, 6	
3	10125605	WASHER, PLAIN, 6	
4	95510026	NUT, HEX, 6-32	
5	10127116	SCREW, PAN HEAD, 6-32 x 3/4	
6	81417040	GUARD, FAN	
7	94247100	FAN, AXIAL, MINIATURE	115 V
7	94247101	FAN, AXIAL, MINIATURE	208/230 V
8	76419700	INSULATOR, FAN	
9	76477901	RAIL GUIDE, 16 UNIT	
10	93749158	SCREW, PAN HEAD, MACHINE, 6-32 x 1/4	
11	93749162	SCREW, PAN HEAD, LOCKWASHER	
12	93114216	STANDOFF, TAPPED POST, HEX	
13	76477100	FRAME, BACK PANEL	
14	76417200	COVER-PIN, PROTECTIVE	
15	93109211	STANDOFF, SPACER, ROUND	
16	76426300	CLAMP, CABLE	
17	94261810	BODY, CONNECTOR, SOCKET, CABLE	
18	94245606	CONTACT-CRIMP, INSERT, SOCKET	
19		NOT USED	
20	764160XX	BACK PANEL ASSEMBLY	
21	93358810	SLEEVING, VINYL	
22	92427131	CAPACITOR, ELECTRO, 500 UFD, 50 VDC	
23	75065500	PANEL, FRONT, LOGIC	All units except 60 Hz 1x aco. S/C 49 W/ DJ00493 & ABV
23	75065501	PANEL, FRONT, LOGIC	60 Hz 1x aco. S/C 49 W/ DJ00493 & ABV
24		NOT USED	
25	76477900	RAIL, GUIDE, 16 UNIT	
26	93342166	SCREW, NYLON	
27	94276611	TAPE, FOAM	All units except 60 Hz 1x aco. S/C 49 W/ DJ00493 & ABV only
28	76426600	GUIDE-CABLE	
29	10125712	SCREW, FLAT HEAD, MACHINE, 6-32 x 1/4	
30	51911752	FASTENER-KNURLED BAIL HEAD	
31	94379800	1/4 TURN FASTENER ACCESSORIES	
32	94379801	1/4 TURN FASTENER ACCESSORIES	
33	94379802	1/4 TURN FASTENER ACCESSORIES	
34	93988002	RETAINER, SPLIT RING	
35	10127142	SCREW, PAN HEAD, MACHINE, 10-32 x 3/8	
36	10125805	WASHERS, LOCK, SPRING, 10	
37	76427501	ARM-SUPPORT	
38	93195234	SCREW, BUT HD, SELF LOCK, 6-32 x 1/4	
39	92001702	SCREW, PAN HD, CAP WASH, 6-32 x 5/16	
40	94245618	CONTACT - CRIMP, INSERT, SOCKET	

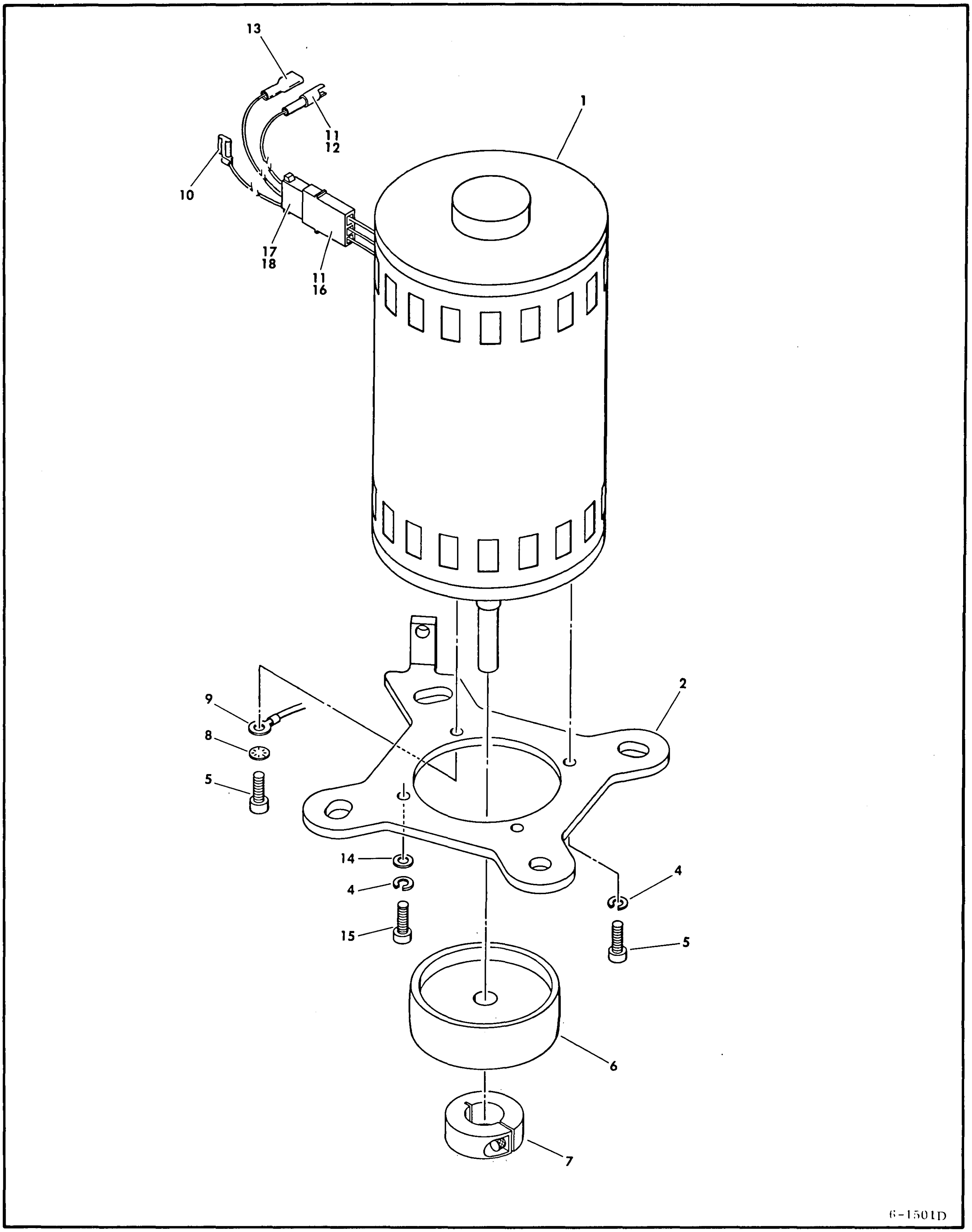

FIGURE 6-18. DRIVE MOTOR ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
18-	77398410	DRIVE MOTOR ASSEMBLY	BJ701A/E, BJ7B1A/C/E
	47204303	DRIVE MOTOR KIT, 60 Hz, 120 V	
18-	77398411	DRIVE MOTOR ASSEMBLY	BJ701B/F, BJ7B1B/D/F; S/C 09 W/O 37787C & BLW
18-	77398413	DRIVE MOTOR ASSEMBLY	BJ701B/F,BJ7B1B/D/F; S/C 09 W/37787C thru S/C 19.
18-	77398419	DRIVE MOTOR ASSEMBLY	BJ701B/F, BJ7B1B/D/K/F S/C 20 & ABV
	47204318	DRIVE MOTOR KIT, 50 Hz 220/240 V	
18-	77398408	DRIVE MOTOR ASSEMBLY	BJ701C
	47204302	DRIVE MOTOR KIT, 60 Hz, 100 V	
18-	77398409	DRIVE MOTOR ASSEMBLY	BJ701D, S/C 08 W/O 37840 & BLW
18-	77398414	DRIVE MOTOR ASSEMBLY	BJ701D, S/C 08 W/ 37840 & BLW
	47204306	DRIVE MOTOR KIT, 50 Hz, 100 V	
1	77398000	MOTOR, END MOUNTED	TAB 10
1	77398001	MOTOR, END MOUNTED	TAB 11
1	77398200	MOTOR, END MOUNTED	TAB 13
1	77398100	MOTOR, END MOUNTED	TAB 08, 09
1	77398101	MOTOR, END MOUNTED	TAB 14
1	92003700	MOTOR, END MOUNTED	TAB 19
2	76409200	PLATE, MOUNTING, MOTOR	
3		NOT USED	
4	10125804	WASHER, LOCK, SPRING, 8	
5	10126226	SCREW, HEX, SOCKET HEAD, CAP, 8-32 x 1/2	
6	76051302	PULLEY, MOTOR	TABS 08, 10
6	76051303	PULLEY, MOTOR	TABS 09, 11
7	93287014	COLLAR, SHAFT	
8	10126104	WASHER, LOCK, INTERNAL TOOTH, 8	
9	94281404	CABLE, GROUND	
10	95643208	TERMINAL, QUICK DISCONNECT	
11	93942002	CONTACT, PIN	
12	93948009	CONNECTOR, PIN HOUSING	
13	95643232	CONNECTOR, QUICK CONNECT	
14	10125606	WASHERS, PLAIN, 8	
15	10126227	SCREW, HEX SOC HD, 8-32 x 5/8	
16	93948003	CONNECTOR, PIN HOUSING	
17	93947004	CONNECTOR, SOCKET HOUSING	
18	93943002	CONNECTOR, SOCKET	
		NOTE: THE DRIVE MOTOR KIT CONSISTS OF A DRIVE MOTOR, A CAPACITOR, AND THE NECESSARY HARNESSING. WHEN REPLACING THE DRIVE MOTOR ASSEMBLY, IT IS NECESSARY TO ORDER THE DRIVE MOTOR KIT.	

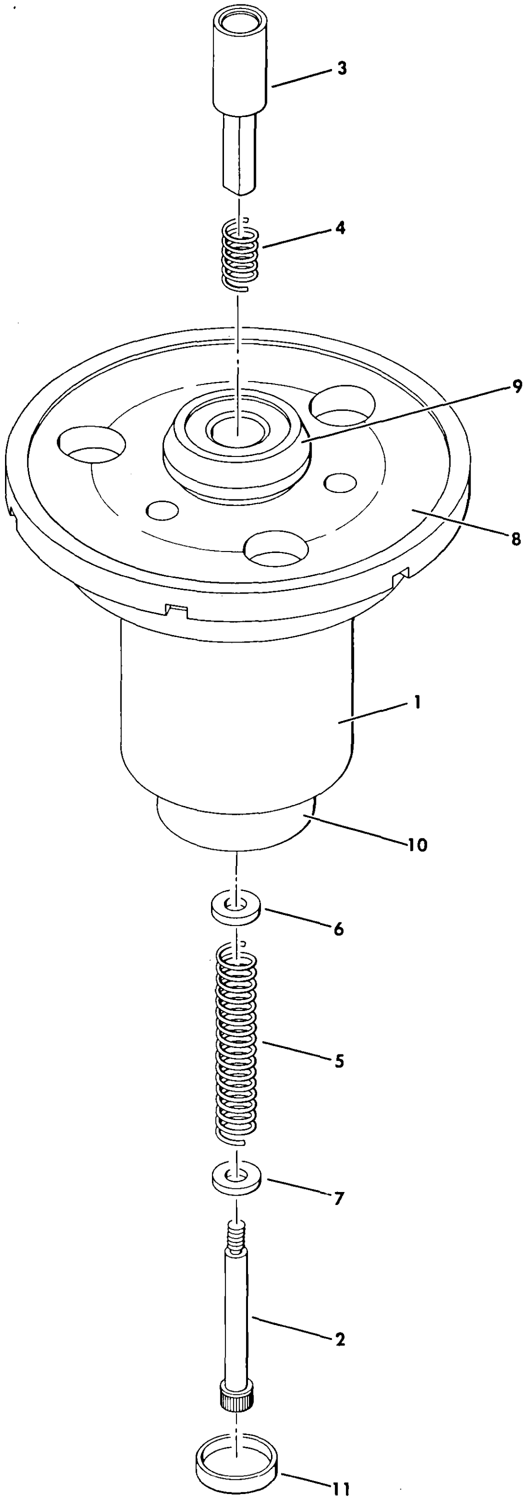

Figure 6-19. Spindle Assembly

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
6-19-	75074712	SPINDLE ASSEMBLY	S/C 08 W/O 37700A & BLW
6-19-	75074714	SPINDLE ASSEMBLY	S/C 08 W/ 37700A & ABV
1	47336900	HOUSING, SPINDLE MACHINING	
2	92541059	SCREW, SHOULDER	
3	76425601	LOCKSHAFT, SPINDLE	
4	75074600	SPRING, COMPRESSION, LOCKSHAFT	
5	75072700	SPRING, COMPRESSION	
6	75074000	WASHER, LOCKSHAFT	
7	75074001	WASHER, LOCKSHAFT, BRASS	
8	47341600	SHAFT, SPINDLE	
9	73587500	LOCATOR, PACK	
10	75074100	PULLEY, SPINDLE	S/C 08 W/ O 37700A & BLW
10	75074102	PULLEY, SPINDLE	S/C 08 W/ 37700A & ABV
11	75259000	SEAL, END, SHAFT	
	73587600	COVER, DUST, SPINDLE	

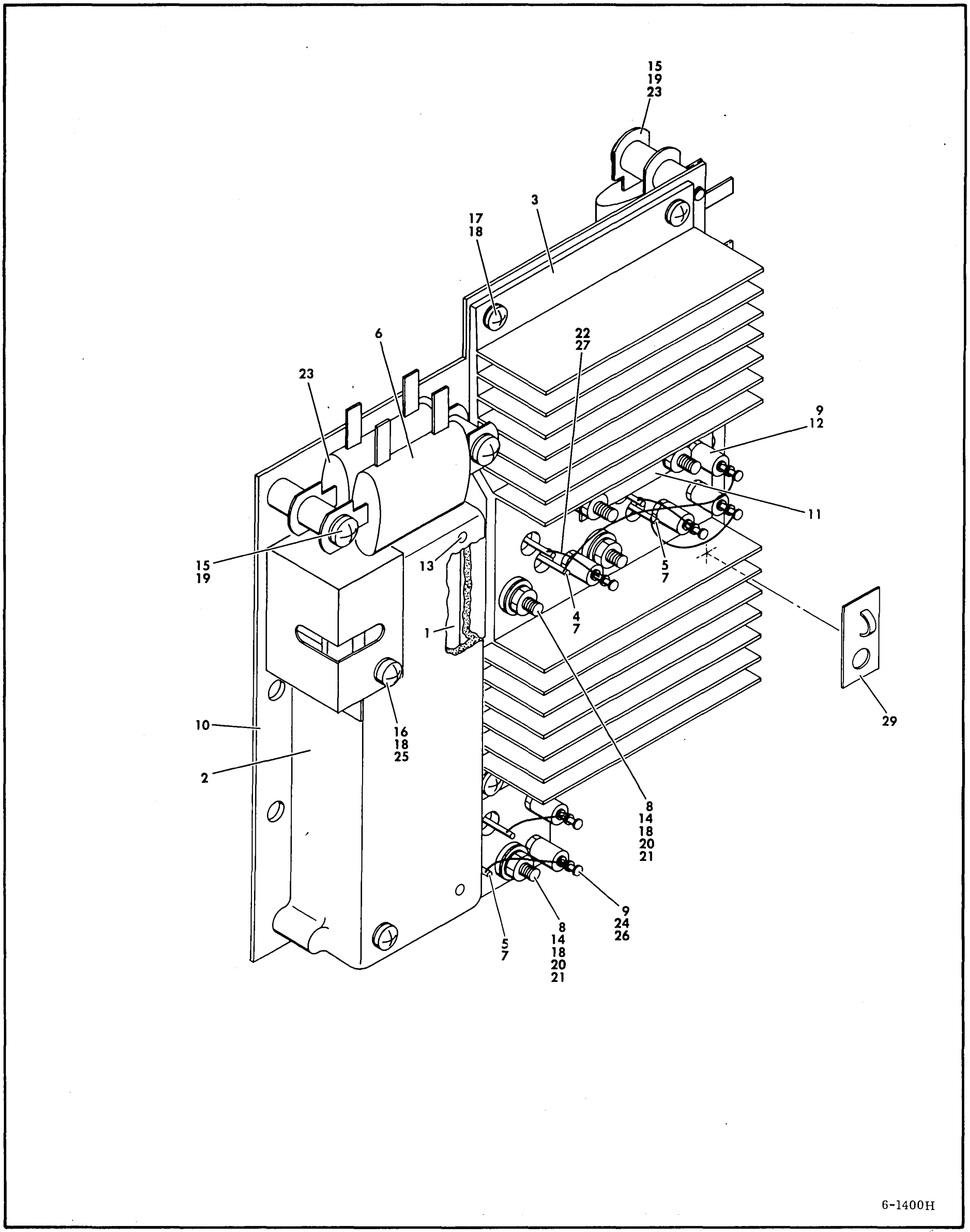

FIGURE 6-20. POWER AMP ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
20-	76500111	POWER AMP ASSEMBLY	
1	73485311	TYPE FZQN COMP ASSY	
2	73479800	HOUSING - PREAMPLIFIER	
3	75068200	HEATSINK SERVO AMP	
4	50223603	TRANSISTOR, PNP, POWER	
5	50223703	TRANSISTOR, NPN, POWER	
6	94237046	RESISTOR, POWER, 30W, 1 OHM	
7	94311904	INSULATOR, SEMI CONDUCTOR	
8	95643808	WASHER, SHOULDER	
9	92707001	INSULATOR, TERMINAL	
10	75065900	PLATE, MOUNTING	
11	75244100	BAR, BUS	
12	10125702	SCREW, HEAD, 4-40 x 3/16	
13	93592082	SCREW, SELF TAP, 4-40 x 1/4	
14	10127116	SCREW, PAN HEAD, 6-32 x 3/4	
15	92750211	SCREW, PAN HEAD, 8-32 x 1 1/8	
16	10127119	SCREW, PAN HEAD, 6-32 x 1-1/4	
17	10127112	SCREW, PAN HEAD, 6-32 x 5/16	
18	10126401	WASHER, LOCK, EXTERNAL, 6	
19	10126402	WASHER, LOCK, EXTERNAL, 8	
20	10125605	WASHER, FLAT, 6	
21	10125105	NUT, 6	
22	92261022	SLEEVING	
23	94237045	RESISTOR, 30W, 1/4 OHM	
24	10127320	SCREW, PAN HEAD, 4-40 x 1/4	
25	76425300	SHIELD, PREAMP	
26	10125801	WASHER, LOCK, SPRING, 4	
27	95691000	SOCKET, PIN	
28		NOT USED	
29	94277503	BASE, MOUNTING	

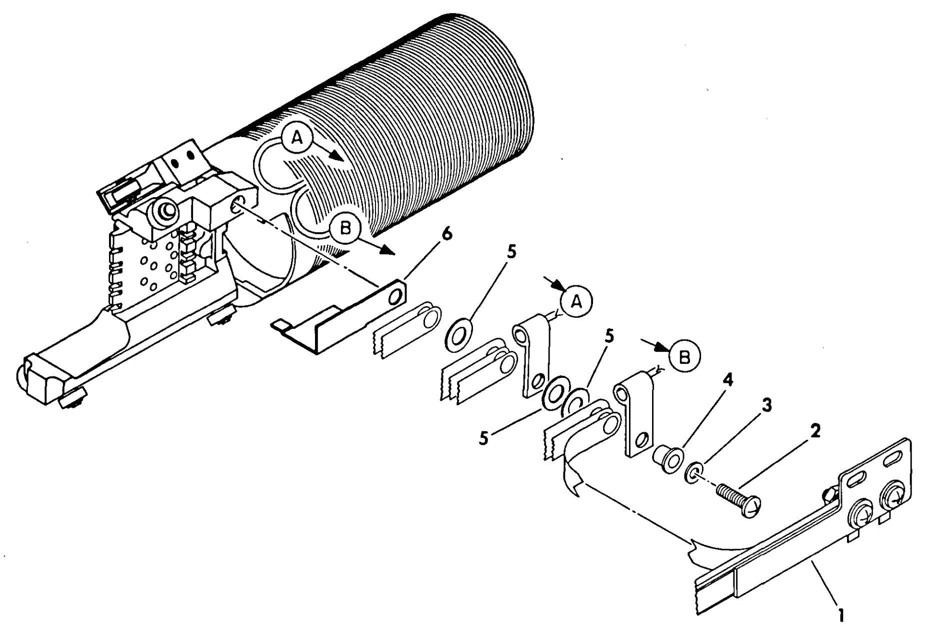

FIGURE 6-21. CARRIAGE AND COIL ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
3-10	NFR	CARRIAGE AND COIL ASSEMBLY	
1	# #	FLEX LEAD ASSEMBLY	
2	10127124	SCREW, MACHINE, PAN HEAD, 8-32 x 5/8	
3	94047048	WASHER, PLAIN #8	
4	70738902	SPACER	
5	93564002	WASHER, NYLON	
6	82375800	RETAINER, FLEX LEAD	

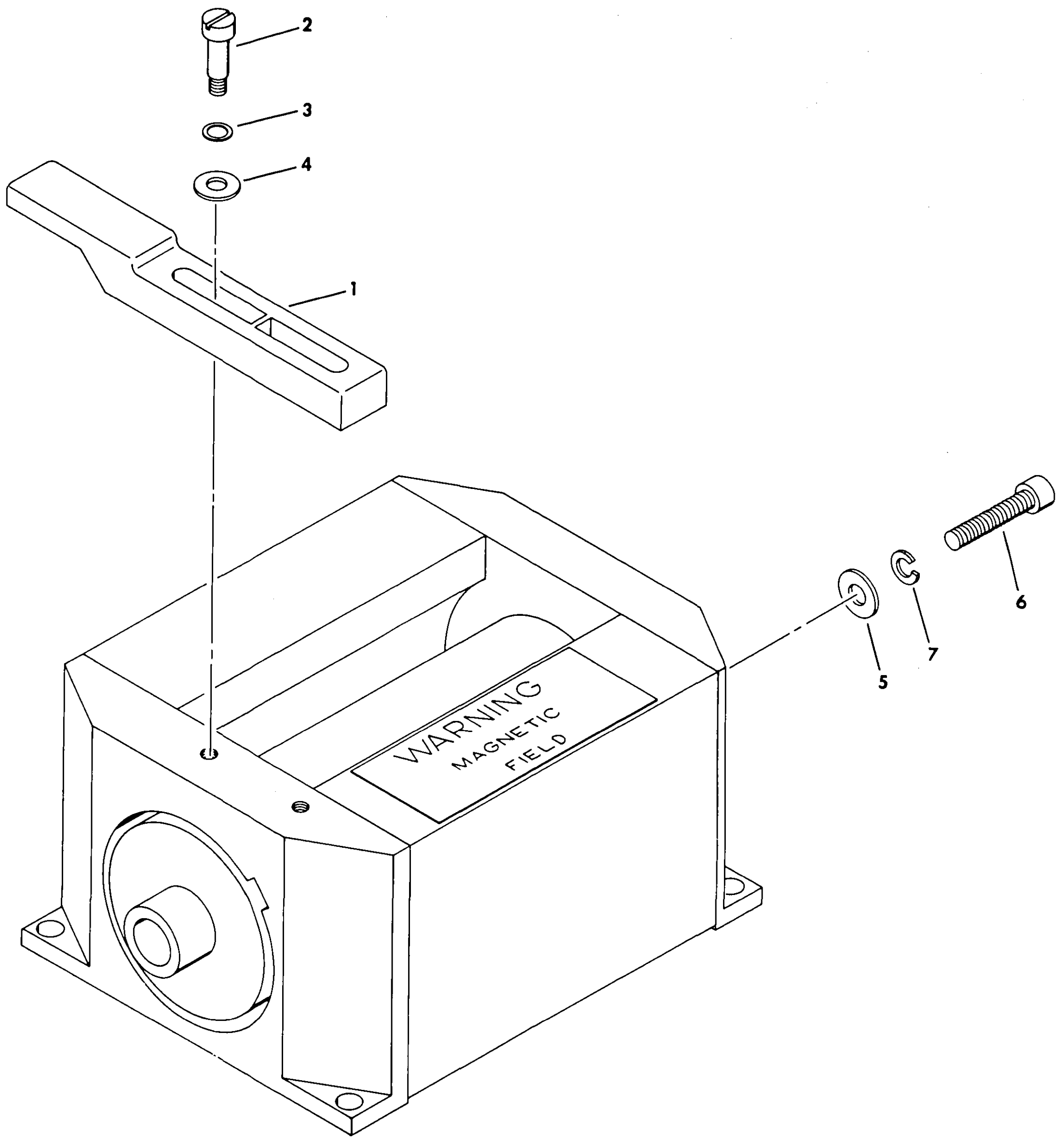

FIGURE 6-22. MAGNET ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
22-	47200702	MAGNET ASSEMBLY	
1	75269100	BAR, SLIDE	
2	92541063	SCREW, SHOULDER, 8-32 x 1/2	
3	93529032	WASHER, WAVE, SPRING	
4	94279113	WASHER, SPECIAL	
5	10125607	WASHER, FLAT, 10	
6	10126238	SCREW, HEXAGON, SOCKET HEAD, 10-24 x 1	
7	10125805	WASHER, LOCK, SPLIT, 10	

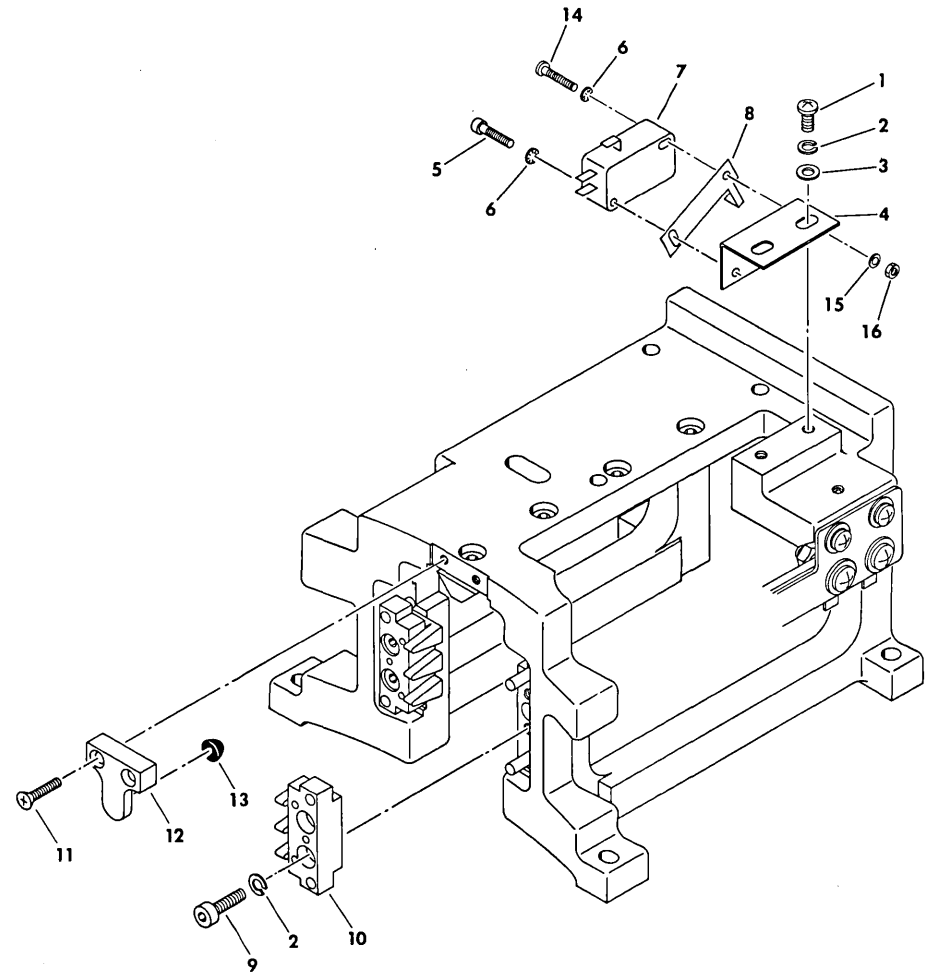

FIGURE 6-23. RAIL BRACKET ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
6-23-	NFR	RAIL BRACKET ASSEMBLY	
1	10127112	SCREW, PAN HEAD, MACHINE, 6-32 x 1/4	
2	10125803	WASHER, LOCK, SPRING, 6	
3	10125605	WASHER, PLAIN, 6	
4	76420400	BRACKET, SWITCH, MOUNTING	S/C 24 & BLW
4	82376300	BRACKET, SWITCH, MOUNTING	S/C 25 & ABV
5	10127105	SCREW, PAN HEAD, MACHINE, 4-40 x 1/2	
6	10126101	WASHER, LOCK, INTERNAL TOOTH, 4	
7	93786026	SWITCH, MINI-INTEGRAL ACTUATOR	
8	46807000	BRACKET, ADJUSTMENT, PRE-TRAVEL	
9	10126219	SCREW, HEX SOC. HD, CAP, 6-32 x 1/2	
10	75015600	CAM, TOWER	
11	10125705	SCREW, FLAT HEAD, 4-40 x 1/2	
12	75071100	BLOCK, STOP, UPPER	
13	75070700	STOP, BUMPER	
14	10127106	SCREW, PAN HEAD, 4-40 x 5/8	S/C 25 & ABV ONLY
15	10125603	WASHERS, PLAIN, 4	S/C 25 & ABV ONLY
16	10125103	NUT, 4-40	S/C 25 & ABV ONLY

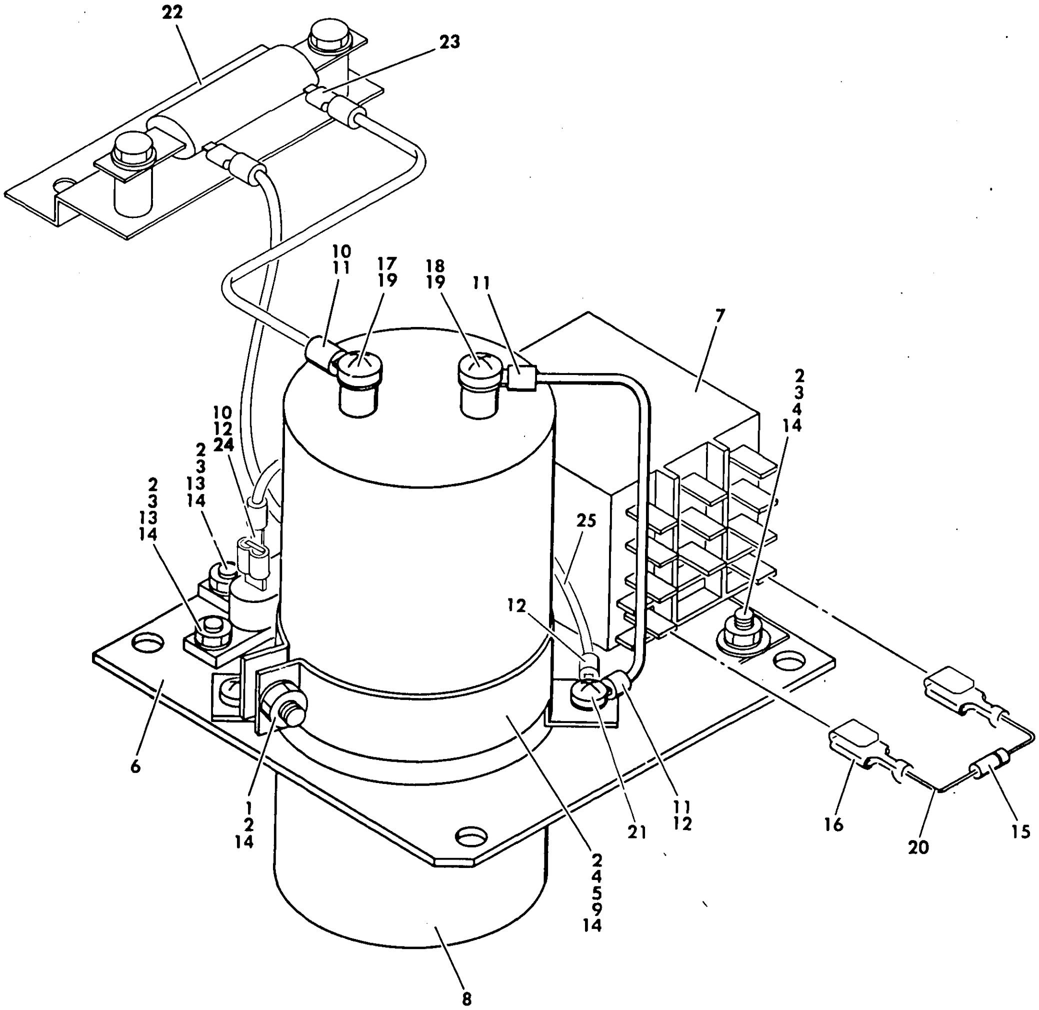

FIGURE 6-24. EMERGENCY RETRACT ASSEMBLY

INDEX NO.	PART NUMBER	PART DESCRIPTION	NOTES
24-	47297103	EMERGENCY RETRACT ASSEMBLY	S/C 22 & ABOVE
24-	75244702	EMERGENCY RETRACT ASSEMBLY	S/C 08-17
24-	75244703	EMERGENCY RETRACT ASSEMBLY	S/C 17-21
1	10127115	SCREW, PAN HEAD, 6-32 x 5/8	
2	10125105	NUT, 6-32	
3	10125714	SCREW, FLAT HEAD, 6-32 x 3/8	
4	10125605	WASHER, FLAT, 6	
5	92691009	CLAMP, MOUNTING, CAPACITOR	
6	76416900	BRACKET, CAPACITOR	
7	94365705	RELAY, K2	
8	95578108	CAPACITOR, C7	
9	10127113	SCREW, PAN HEAD, 6-32 x 3/8	
10	93747025	RECEPTACLE, SLIDE ON	
11	93541018	TERMINAL, RING TONGUE	
12	93541016	TERMINAL, RING TONGUE	
13	95583503	RECTIFIER, CR1 and CR2	
14	10126401	WASHER, LOCK, EXTERNAL, 6	
15	93935000	DIODE	
16	94130004	TERMINAL, FASTON, PIGGYBACK	
17	10127143	SCREW, 10-32 x 1/2	
18	10127142	SCREW, 10-32 x 3/8	
19	10126105	WASHERS, INTERNAL TOOTH, #10	
20	92261120	TUBING, INSULATING HI-TEMP. TEFLON	
21	10127114	SCREW, PAN HEAD, MACHINE, 6-32 x 1/2	
22	83289900	RESISTOR AND BRACKET ASSEMBLY	
	95667412	RESISTOR, POWER, 30 W, 50 OHM	
	83288300	BRACKET, RESISTOR	
	93592204	SCREW, HEX, WASHER HD, 8-32 x 5/8	
23	95643226	TERMINAL, INSULATED	
24	94309802	POD, TERMINAL INSULATING	
25	15003200	WIRE, ELECT, HOOK UP 16 GAUGE	

CARD COMPLEMENT

LOCATION	LOGIC CARD TYPE	PART NUMBER	NOTES	LOCATION	LOGIC CARD TYPE	PART NUMBER	NOTES
A1	CLSV	54276503					
A2	(1) 5PEV	54121701	W/ DAISY CHAIN				
A2	(2) 4PEV	54121700	W/ DAISY CHAIN				
A2	BPEV	54121703	S/C 10 & ABV				
A3	ELTV	54276906					
A4	(4) LLVV	54277712					
A4	MLVV	54277713					
A5	LLYV	54278912	S/C 40 W/O DJ00044 & BLW				
A5	MLYV	54278915	S/C 40 W/ DJ00044 & ABV				
A6	4THV	54162900	W/ DAISY CHAIN IN ALL UNITS, S/C 10 & BLW				
A6	DTHV	54162907					
A7	(1) ARSV	54146502	W/ DAISY CHAIN				
A7	(2) 4RSV	54146500	W/ DAISY CHAIN				
A8							
A9	ELPV	54275306					
A10	HFRV	54226113					
A11	ELUV	54277306					
A12	DLQV	54275705	S/C 08 W/O37854 & BLW				
A12	HLQV	54275709	S/C 08 W/ 37854 & S/C 09 W/O 37938				
A12	JLQV	54275710	S/C 09 W/ 37938 & S/C 10-40 W/O DJ00075				
A12	NLQV	54275715	S/C 40 W/ DJ00075 & ABOVE				
A13	FLWV	54278107					
A14	CLXV	54278503	W/ NRZ TO MFM FEATURE				
A15	GLRV	54276107	W/ VARIABLE SECTOR, S/C 08 W/O 37895 & BLW				
A15	ALRV	54276101	S/C 08 W/ 37895; S/C 09 W/O37979				
A15	HLRV	54276108	S/C 09 W/ 37979 & ABV, BJ701 S/C 09 thru 39				
A15	KLRV	54276111	BJ701 S/C 40 W/ DJ00072 & ABOVE				
A16	BLZV	54279303	W/ PHASE DOCK FEATURE ON BJ71B C/D ONLY				
	(3) FZJN	75061708	HD SEL & RD AMP 3				
	MZJN	75061714	HD SEL & RD AMP 3				

NOTES

(1) IN UNITS: BJ701A/B/C/D
BJ7B1A/B/C/D

(2) IN UNITS: BJ701E/F
BJ7B1E/F

(3) FZJN - S/C 09 W/O 37925 & BLW
MZJN - S/C 09 W/ 37925 & ABV

(4) LLVV - S/C 09 W/O 37966 & BLW
MLVV - S/C 09 W/ 37966 & ABV

APPENDIX A

DECISION LOGIC TABLES (DLTs)

for SMDs with Series Code 24 (S/C 24) and above

CONTENTS

FIGURES

TABLES

APPENDIX A
DECISION LOGIC TABLES (DLTs)

INTRODUCTION

Decision logic tables help the maintenance technician to organize his thinking when problems occur in the drive. For a given fault condition (or set of conditions), actions are recommended to locate and correct the fault. The actions are arranged so that the corrective measures that are easiest to perform (checking a fuse or changing a card in the logic chassis, for example) are listed before the more difficult tasks such as replacing the head/arm assembly or drive motor.

A section called Useful Troubleshooting Aids precedes the DLT section and is separated from it by a divider page. This section contains two general-interest maintenance procedures, as well as tables and figures that should prove useful throughout the troubleshooting effort, particularly to personnel not familiar with the SMD.

The DLT section consists of ten tables, described briefly below.

- DLT 1 shows how to correct problems that occur while attempting to "power up" the drive.
- DLT 2 isolates dc power distribution problems either to the power supply loads or to the power supply module, and tells how to cure those that occur within the power supply module itself.
- DLT 3 shows how to locate power faults in the dc loads, defining cures for those encountered in the unfused loads (±5 V, ±12 V).
- DLT 4 shows how to locate and correct faults in the ±20 V loads.
- DLT 5 shows how to locate and correct faults in the ±42 V loads.
- DLTs 6 through 9 are to be used with the FTU (TB303) to correct various seek and read/write errors.
- DLT 10 shows what to do when a drive does not "power down" properly.

The procedures referred to in the DLTs form the last section in this appendix.

USING THE DLT

The DLT is divided into four quadrants. The upper-left quadrant, CONDITIONS, contains the various test conditions that can be answered "yes" or "no". The CONDITIONS quadrant is prefaced by any ASSUMPTIONS (that is, preconditions) that must be observed if the test results are to be valid. Sometimes, prerequisite actions other than the ASSUMPTIONS must be taken before the test for a given condition is made. Such steps are included in the CONDITIONS quadrant. The yes (Y) or no (N) answers to each condition are shown in numbered columns in the top-right Situations quadrant.

To use the DLT, first determine whether the result of a condition tested is Y or N. If two or more conditions exist simultaneously, look for a situations column that combines the appropriate Y-N answers for those conditions. A dash (-) in the top-right Situations quadrant means that the related Condition is not a factor in determining what actions are to be taken for that situation.

Next, determine what action should be taken for a given test result (i.e., situation) by following down the selected column to the row marked "1" in the lower-right Sequence quadrant. (If there is only one recommended action for a given situation, an "X" appears instead of the "1".) The recommended action is then located by moving across to the lower-left ACTIONS quadrant. A dash in a column of the Sequence quadrant indicates that the related Action isn't applicable.

After taking the first recommended action, repeat the test that gave rise to the situation. If the test results haven't changed (same situation), try recommended action 2, and so on, being sure to repeat the test after each such action.

Column 1 is generally reserved for an "everything OK" situation. If a DLT requires more than one sheet, this "no problem" column is repeated on each sheet. Similarly, the last ACTION on each sheet is a recommendation to "call field support". Don't brood over your inadequacy if you reach this last entry; not every situation can be covered in a DLT!

USEFUL TROUBLESHOOTING AIDS

USING A VOM TO CHECK A CAPACITOR

1. Remove power from the equipment.
2. Discharge capacitor by momentarily shorting the leads with a jumper wire. (Use screwdriver for large capacitors.)
3. Isolate the capacitor by disconnecting one lead from the circuit.
4. Set VOM to X1000 (ohms) scale.
5. Connect the VOM across the capacitor leads. The condition of the capacitor is interpreted as follows:

Meter reading	Interpretation
Needle goes rapidly to full scale (0Ω), then regresses to infinity (∞). (See NOTE.)	Capacitor OK
Needle goes rapidly to full scale and remains there.	Capacitor shorted
Needle deflects slightly or not at all.	Capacitor open

NOTE

Speed with which needle returns to infinity (∞) is a function of capacity rating. Return swing is rapid for small capacitors, becoming slower as capacity increases. To a lesser degree, return swing is also dependent upon which meter scale is used.

IN-CIRCUIT DIODE CHECKING WITH A VOM

A diode that is suspect can be given a preliminary check without disconnecting it from the circuit. Merely check the diode twice, reversing the meter leads between the two readings. Of course, power should be off, and for your own peace of mind any capacitors in the circuit should be discharged.

Keep in mind that the forward drop across a good diode is in the range 5 - 15Ω; the reverse drop is on the order of 1 MΩ. Parallel resistances in the circuit will, of course, significantly reduce the higher of these two readings, but if one is low and the other high, chances are the diode is OK. If both are low, the diode is probably shorted; if both are high, it's probably open.

This check can also be used for a bridge rectifier. You'll probably want to check at least two diodes in the bridge, because back-circuits may give different readings across different diodes.

TABLE A-1. DC VOLTAGES USED BY LOGIC-CHASSIS CARDS

Loc.	+5 V	-5 V	+12 V	+20 V	-20 V	+42 V	-42 V
A01	√	√		√	√		
A02	√						
A03	√						
A04	√						
A05	√	√		√	√	*	*
A06	√	√					
A07	√	√					
A09	√	√		√	√	*	*
A10	√	√		√	√		
A11	√	√	√	√	√		
A12	√			√	√		
A13	√						
A14	√	√					
A15	√	√					
A16	√	√		√	√		

√ = Used
* = Brought in via back-panel connector

TABLE A-2. VOLTAGES USED BY ELECTRONIC ASSEMBLIES

Ass'y	Name	+5 V	-5 V	+12 V	-12 V	+20 V	+42 V	-42 V
A4	Motor Relay Brd (with AXPN only)	√						
A5	Hd Select, R/W Amp	√	√	√	√	√	√	
A8	Power Amp						√	√
A8	Servo Preamp			√	√			
A9	Emergency Retract						√	√
A10	Operator Panel	√	√					
A11	_XPN Board	√	√			√		

√ = Used

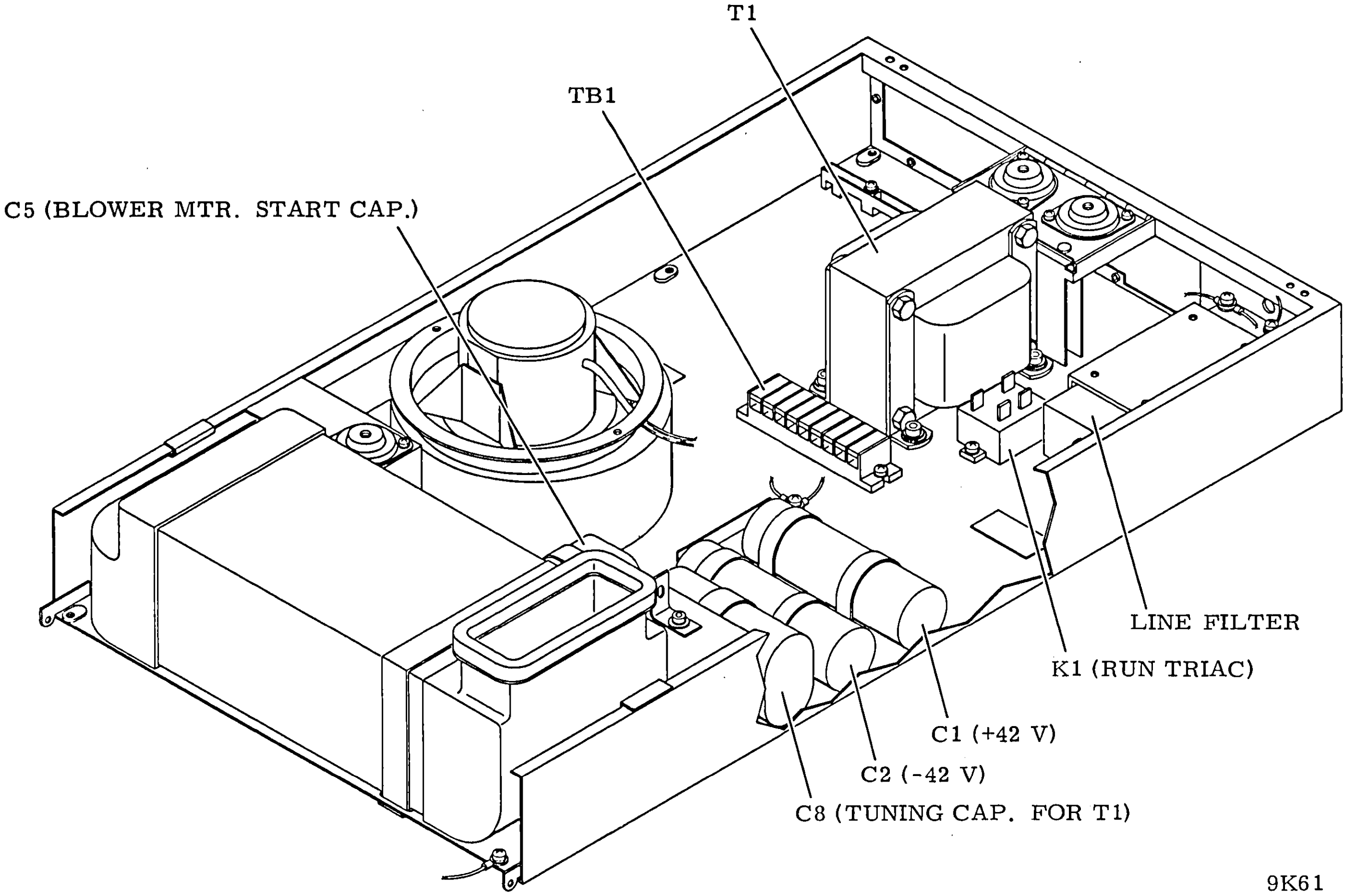

Figure A-1. Electronic Components on Base

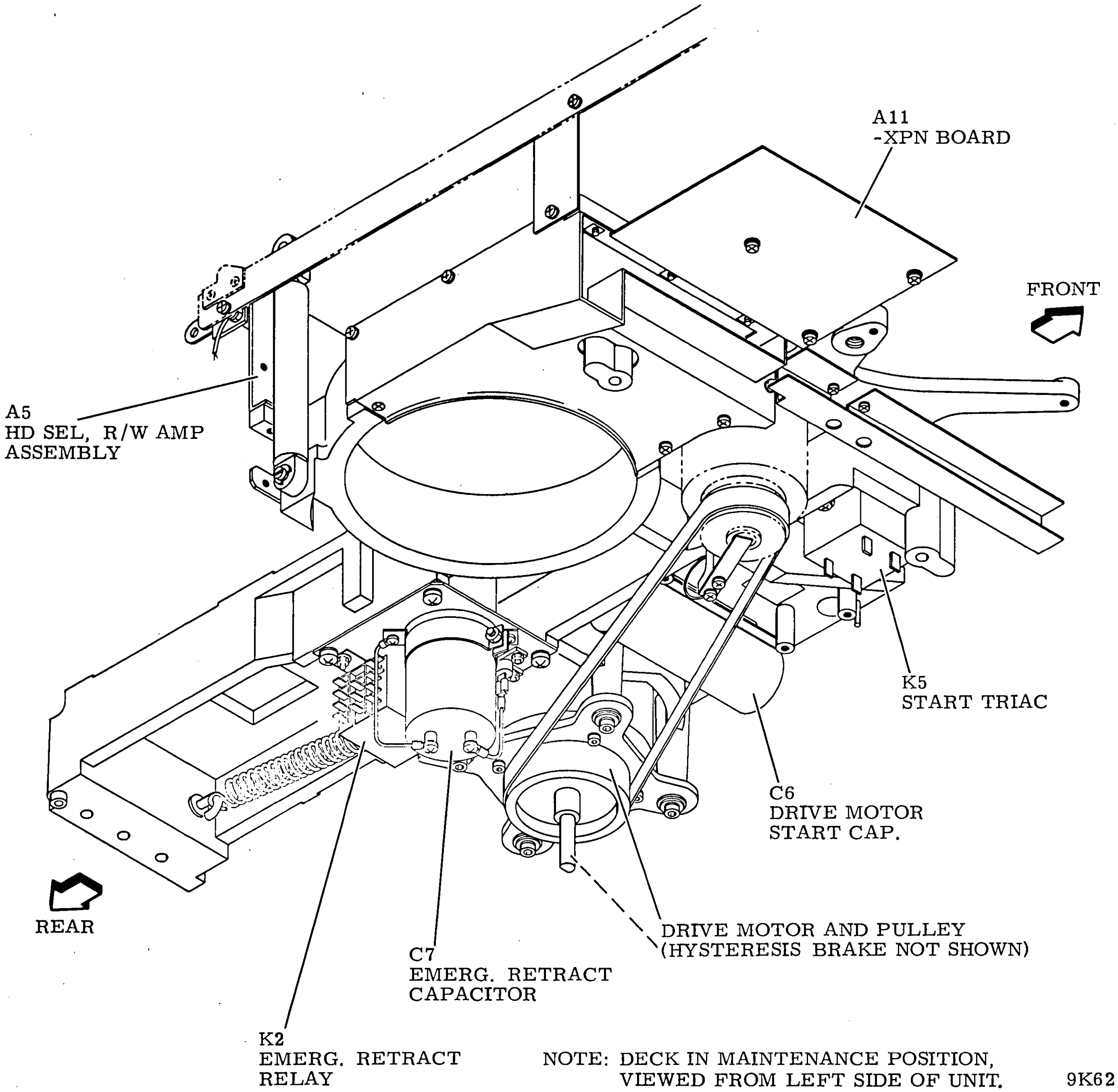

Figure A-2. Electronic Components on Deck

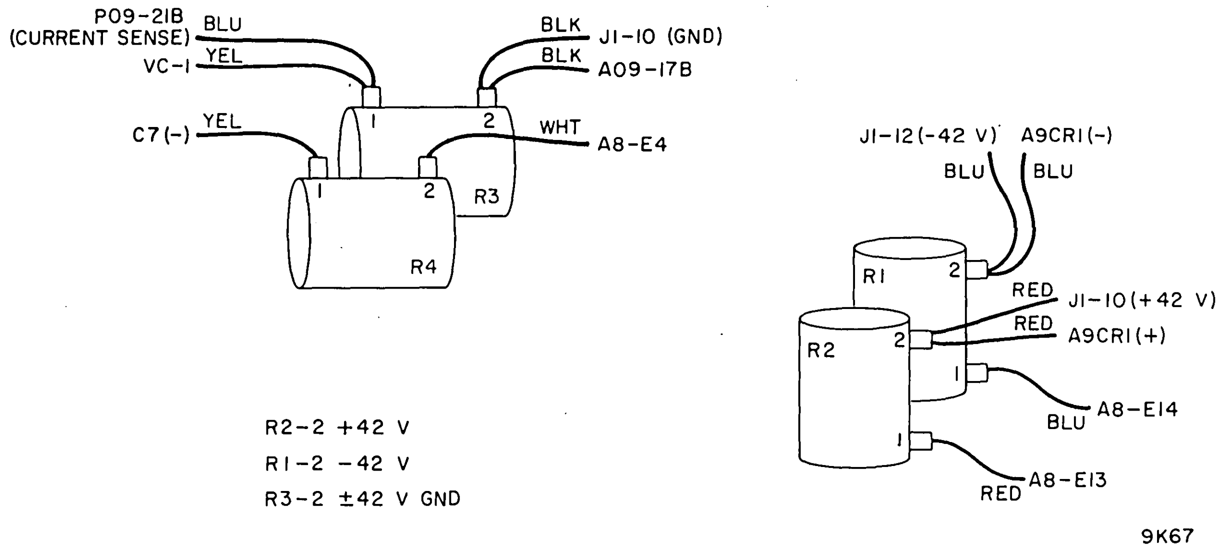

Figure A-3. 30-W Resistor Locations for Assembly A8

DECISION LOGIC TABLES

DLT 1 POWER UP (sheet 1 of 2)

Warning: Tuning capacitor C8 is charged to 440 volts. Treat it with respect!

Enters from: Assumptions

Procedures: B

References: Logic Diagrams

Exits to: DLT 2 or sheet 2 of this DLT

Assumption:
1. Drive connected to ac power
2. Disk pack installed
3. Attempt to power up and start drive from SMD panel (LOCAL mode).

CONDITIONS	1	2	3	4	5	6	7	8
1. Turn on AC POWER breaker (CB1). Does CB1 trip?	N	Y	N	-	-	-	-	
2. Does blower start when CB1 is actuated?	Y	-	N	-	-	-	-	
3. Turn on POWER SUPPLY breaker (CB2). Does CB2 trip?	N	-	-	Y	-	-	-	
4. Does logic fan start when CB2 is actuated?	Y	-	-	-	N	-	-	
5. Does CB1 or drive motor thermal brkr trip when CB2 is actuated?	N	-	-	-	-	Y	-	
6. Is smell of burning insulation detected soon after turning on CB2?	N	-	-	-	-	-	Y	
ACTIONS								
1. Continue with Condition 7 on sheet 2.	X	-	-	-	-	-	-	
2. Suspect blower. Separate P/J301; if trouble persist, blower is OK.	-	1	-	-	-	-	-	
3. Suspect short/gnd in blower cable or connector.	-	2	-	-	-	-	-	
4. Suspect time meter. Disconnect; if trouble persists, meter is OK.	-	3	-	-	-	-	-	
5. Suspect CB1.	-	4	2	-	-	-	-	
6. If pwr plug customer-provided, check phase and gnd connections.	-	-	1	-	-	-	-	
7. Check for ac at line filter.	-	-	3	-	-	-	-	
8. Chk for open blower, cable, or blower motor capacitor.	-	-	4	-	-	-	-	
9. Suspect shorted C8. See WARNING, above.	-	-	-	1	-	-	-	
10. Suspect shorted logic fan or cable.	-	-	-	2	-	-	-	
11. Problem may be the -XKV (p.s.) brd. Do steps 1-5 in Procedure B.	-	-	-	3	-	-	-	
12. Suspect short in T1 or T1 wiring. Go to step 6 in Procedure B.	-	-	-	4	-	-	-	
13. Suspect open logic fan or cable.	-	-	-	-	1	-	-	
14. Chk CB2 for ac input. If ac present, replace CB2.	-	-	-	-	2	-	-	
15. Cause: Run triac energized before START switch has been pressed. Suspect Run logic (-XPN board).	-	-	-	-	-	1	-	
16. Chk Run triac for shorted LOAD contacts (terminals 1,2).	-	-	-	-	-	2	-	
17. You have lost +5 V power. IMMEDIATELY TURN OFF CB2 TO PREVENT BURNING UP THE VOICE COIL. To check for loss of voltage, go to DLT 2.	-	-	-	-	-	-	X	
18. Call Field Support.	-	5	5	5	3	3	-	

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DLT 1	POWER UP	(sheet 2 of 2)

Warning: None
Enters from: Sheet 1
Procedures: C
References: Logic Diagrams, DLT 6
Exits to: DLT 2, DLT 7

Assumption:
1. Drive connected to ac power
2. Disk pack installed
3. Attempt to power up and start drive from SMD panel (LOCAL mode).

CONDITIONS	1	8	9	10	11	12	13	14
7. Press START sw. Does either CB1 or drive mtr thermal brkr trip?	N	Y	N	N	N	N	N	N
8. Does START light come on when START switch is pressed?	Y	-	N	N	Y	Y	Y	Y
9. Does drive motor start when START switch is pressed?	Y	-	Y	N	N	Y	Y	Y
10. Does drive motor come up to speed?	Y	-	-	-	-	N	Y	Y
11. Do heads load? (READY light comes on.)	Y	-	-	-	-	-	N	Y
12. Does drive mtr cut out after up-to-speed timeout expires?	N	-	-	-	-	Y	-	N
13. Does CB2 trip after drive has been operating normally?	N	-	-	-	-	-	-	Y
ACTIONS								
19. Power-up and First Seek completed properly. Go to DLT 7.	X	-	-	-	-	-	-	-
20. Suspect shorted Start triac.	-	1	-	-	-	-	-	-
21. Suspect shorted drive motor start capacitor.	-	2	-	-	5	-	-	-
22. Suspect open Start winding in drive motor.	-	3	-	-	8	-	-	-
23. START indicator burned out. Replace ind/sw.	-	-	1	-	-	-	-	-
24. Check all interlocks.	-	-	-	1	-	-	-	-
25. Go to DLT 2 to check for presence of +5 volts.	-	-	-	2	-	-	-	-
26. Chk that Local/Remote sw (BXPN brd only) is set to LOCAL.	-	-	-	-	1	-	-	-
27. Chk drive mtr thermal brkr. If tripped, find out why.	-	-	-	-	2	-	-	-
28. Suspect Run logic. Start with -XPN board.	-	-	-	-	3	-	-	-
29. Suspect Run triac.	-	-	-	-	4	1	-	-
30. Chk hysteresis brake for mechanical binding.	-	-	-	-	6	2	-	-
31. Suspect brake logic continuously energized (-XPN board).	-	-	-	-	7	3	-	-
32. Suspect speed sensor, or attendant logic on -XPN board.	-	-	-	-	-	4	-	-
33. Suspect open Run winding in drive motor.	-	-	-	-	9	-	-	-
34. Refer to DLT 6--First Seek.	-	-	-	-	-	-	X	-
35. Suspect overloaded (overheated) pwr supply. Chk per Procedure C.	-	-	-	-	-	-	-	1
36. Call Field Support.	-	4	2	3	10	5	-	2

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DLT 2 — DC VOLTAGE CHECK

Warning: Tuning capacitor C8 is charged to 440 volts. Treat it with respect!

Enters from: DLT 1 or when a dc voltage is suspect.

Procedures: A

References: Logic Diagrams

Exits to: DLTs 3,4,5; or DLT 1 if this table was entered from Actions 17 or 25 of that DLT.

Assumption: Lack of one or more dc voltages is noticed or suspected. Initial voltage measurements are made with all dc loads connected, using Procedure A.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. Are ±5 voltages OK with load?	Y	N	N	N	N							
2. With ±5 V loads disconnected (P/J2 separated), is there +5 V at J2-03 and -5 V at J2-05? (Use J2-01 as ground.) (1)	-	-	Y	N	N	-	-	-	-	-	-	-
3. Are ±12, ±20, ±42 voltages significantly low?	N	-	-	-	Y	-	-	-	-	-	-	-
4. Are ±20 voltages OK?	Y	-	-	-	-	N	N	-	-	-	-	-
5. 20 V fuse(s) blown? (2)	N	-	-	-	-	N	Y	-	-	-	-	-
6. Are ±12 voltages OK with load?	Y	-	-	-	-	-	-	N	-	-	-	-
7. With ±12 V loads disconnected, is there +12 V at J2-10 and -12 V at J2-08? (Use J2-01 as ground.) (1) (3)	-	-	-	-	-	-	-	-	N	Y	-	-
8. Are ±42 voltages OK?	Y	-	-	-	-	-	-	-	-	-	N	N
9. 42 V fuse(s) blown? (2)	N	-	-	-	-	-	-	-	-	-	N	Y
ACTIONS												
1. DC voltages are OK.	X	-	-	-	-	-	-	-	-	-	-	-
2. Separate P/J2 (on -XKV brd) and try Condition 2.	-	X	-	-	-	-	-	-	-	-	-	-
3. Trouble is in the ±5 V loads. Go to DLT 3.	-	-	X	-	-	-	-	-	-	-	-	-
4. Replace -XKV brd or, optionally, the entire p.s. assembly.	-	-	-	1	-	1	-	-	1	-	1	-
5. Suspect open tuning capacitor (see WARNING, above).	-	-	-	-	1	-	-	-	-	-	-	-
6. Trouble is in the ±20 V loads. Go to DLT 4.	-	-	-	-	-	-	X	-	-	-	-	-
7. Separate P/J2 and try Condition 7.	-	-	-	-	-	-	-	X	-	-	-	-
8. Trouble is in the ±12 V loads. Go to DLT 3.	-	-	-	-	-	-	-	-	-	X	-	-
9. Trouble is in the ±42 V loads. Go to DLT 5.	-	-	-	-	-	-	-	-	-	-	-	X
10. Call Field Support.	-	-	-	2	2	2	-	-	2	-	2	-

(1) Reconnect P/J2 to reestablish loads before going to next Condition.

(2) Check with VOM. Fuse is bad if supply voltage does not appear on each side of fuse (use board foil as gnd).

(3) If no voltage, check 39Ω resistors R15 and R18 (figure A-4). Open resistor indicates drastic overload. Be sure to check out the loads (DLT 5) after replacing the supply.

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DLT 3 LOCATING FAULTS IN THE ±5 V, ±12 V LOADS (sheet 1 of 2)

Warning: Discharge C8 each time you turn off CB2 to separate or mate connectors

Enters from: DLT 2

Procedures: D

References: Figures A-1,A-2,A-3; tables A-1,A-2; Procedure A for dc voltages

Exits to: DLT 1, if required to complete Power Up diagnostic

Assumption: DLT 2 has pointed to a load fault in either the ±5 V or the ±12 V networks. Precede each of the listed Conditions by turning off CB2.

CONDITIONS	1	2	3	4	5	6	7	8
1. Limit ±5 V load to logic chassis only:								
a) Remove ±20 V and ±42 V fuses (4).								
b) Remove PA1 from w/w side of logic chassis.								
c) Remove PA10 from w/w side of logic chassis.								
d) Remove P101 from connector on assembly A5.								
e) Remove P201 from connector on operator panel (ass'y A10).								
f) Remove P205 from connector on -XPN brd (ass'y A11).								
g) Reconnect P/J2 to establish power supply loads.								
h) Turn on CB2. Are ±5 voltages OK? (1)	Y	N	-	-	-	-	-	-
2. Restore ±12 V to logic chassis:								
a) Reconnect PA1 to w/w side of logic chassis.								
b) Turn on CB2. Are ±12 voltages OK? (1)	-	-	Y	N	-	-	-	-
3. Add control panel (ass'y A10) to +5 V load:								
a) Reconnect P/J201 on operator panel.								
b) Turn on CB2. Are ±5 voltages OK? (1)	-	-	-	-	Y	N	-	-
4. Add -XPN brd (ass'y A11) to ±5 V load:								
a) Reconnect P/J205 on -XPN board.								
b) Turn on CB2. Are ±5 voltages OK? (1)	-	-	-	-	-	-	Y	N

ACTIONS	1	2	3	4	5	6	7	8
1. Go to Condition 2.	X	-	-	-	-	-	-	-
2. Go to Procedure D to pinpoint ±5 V fault in logic chassis.	-	X	-	-	-	-	-	-
3. Go to Condition 3.	-	-	X	-	-	-	-	-
4. Turn off CB2, remove card A11, and try again. If trouble persists, examine w/w from PA1 to location A11 for +12 V short to gnd. If trouble disappears when A11 is removed, replace card A11.	-	-	-	1	-	-	-	-
5. Go to Condition 4.	-	-	-	-	X	-	-	-
6. Replace operator panel.	-	-	-	-	-	1	-	-
7. Go to Condition 5 on sheet 2.	-	-	-	-	-	-	X	-
8. Replace -XPN board.	-	-	-	-	-	-	-	1
9. Call Field Support.	-	-	-	2	-	2	-	2

(1) As given in Procedure A.

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DLT 3	LOCATING FAULTS IN THE ±5 V, ±12 V LOADS (sheet 2 of 2)
Warning:	Discharge C8 each time you turn off CB2 to separate or mate connectors
Enters from:	DLT 2
Procedures:	D
References:	Figures A-1,A-2,A-3; tables A-1, A-2; Procedure A for dc voltages
Exits to:	DLT 1, if required to complete Power Up diagnostic
Assumption:	DLT 2 has pointed to a load fault in either the ±5 V or the ±12 V networks. Precede each of the listed Conditions by turning off CB2.

CONDITIONS	9	10	11	12
5. Add servo preamp assembly to ±12 V load:				
a) Reconnect PA10 to w/w side of logic chassis backpanel.				
b) Turn on CB2. Are ±12 voltages OK? (1)	Y	N	-	-
6. Add assembly A5 to ±5 V, ±12 V loads:				
a) Reconnect P/J101 on assembly A5.				
b) Turn on CB2. Are any voltages below spec? (1)	-	-	Y	N
ACTIONS				
10. Go to Condition 6.	X	-	-	-
11. Replace the servo preamp assembly.	-	1	-	-
12. Replace assembly A5.	-	-	1	-
13. The ±5 V and ±12 V loads are OK. Return to DLT 1, if required, to complete the Power Up diagnostic.	-	-	-	X
14. Call Field Support.	-	2	2	-
(1) As given in Procedure A.				

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DLT 4 LOCATING FAULTS IN THE ±20 V LOADS

Warning: Discharge C8 each time you turn off CB2 to separate or mate connectors

Enters from: DLT 2

Procedures: None

References: Logic Diagrams; tables A-1, A-2

Exits to: DLT 1, if required to complete Power Up diagnostic.

Assumption: F1 or F2 blows when ±20 V loads connected. Be sure that F1 and F2 are good, then precede each Condition listed below by turning off CB2.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. Restrict ±20 V distribution to the logic chassis:												
a) Remove P101 from assembly A5.												
b) Remove P205 from -XPN brd (assembly A11).												
c) Turn on CB2. Does either F1 or F2 blow?	Y	N	-	-	-	-	-	-	-	-		
2. Add assembly A5 to +20 V load:												
a) Reconnect P/J101.												
b) Turn on CB2. Does F1 (+20 V) blow?	-	-	Y	N	-	-	-	-	-	-		
3. Add -XPN board (assembly A11) to +20 V load:												
a) Reconnect P/J205 to -XPN board.												
b) Turn on CB2. Does F1 (+20 V) blow?	-	-	-	-	Y	N	-	-	-	-		
4. Check out ±20 V wiring on logic chassis:												
a) Remove cards A01, A05, A09, A10, A11, A12, A16. (All												
use ±20 V.)												
b) Turn on CB2 and check F1 and F2. Did either fuse blow?	-	-	-	-	-	-	Y	N	-	-		
5. Check individual ±20 V cards:												
a) Select a ±20 V card and insert it in the proper card												
slot.												
b) Turn on CB2. Did either F1 or F2 blow?	-	-	-	-	-	-	-	-	Y	N		

ACTIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. Problem is in the logic chassis. Go to Condition 4.	Y	-	-	-	-	-	-	-	-	-		
2. Go to Condition 2.	-	X	-	-	-	-	-	-	-	-		
3. Chk P101 cable for shorts/gnds. If OK, replace assembly A5.	-	-	1	-	-	-	-	-	-	-		
4. Go to Condition 3.	-	-	-	X	-	-	-	-	-	-		
5. Chk P205 cable for shorts/gnds. If OK, replace -XPN board.	-	-	-	-	1	-	-	-	-	-		
6. Check logic chassis backpanel wiring: +20 V is on pin 33B,	-	-	-	-	-	-	X	-	-	-		
-20 V is on pin 02B. If problem cannot be located, special-												
order a new logic chassis.												
7. Go to (or repeat) Condition 5. When all cards OK, go to	-	-	-	-	-	-	-	X	-	X		
Action 9.												
8. Replace the defective card and try Condition 5 again.	-	-	-	-	-	-	-	-	1	-		
9. The ±20 V loads now check out to be OK. Return to DLT 1, if	-	-	-	-	-	X	-	-	-	-		
required, to complete the Power Up diagnostic.												
10. Call Field Support.	-	-	2	-	2	-	-	-	2	-		

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DLT 5 LOCATING FAULTS IN THE ±42 V LOADS (sheet 1 of 2)

Caution: Ensure that any leads you disconnect are clear of grounds or electrical elements.
Enters from: DLT 2
Procedures: None
References: Logic Diagrams; tables A-1,A-2; figure A-3
Exits to: DLT 1, if required, to complete Power Up diagnostic

Assumption: F3 and/or F4 blow when ±42 V load is connected. This DLT involves alternately disconnecting ass'ys A8,A9,A5 and A0 (locations A05 and A09 only) until fault is found. Be sure F3 and F4 are good, then precede each Condition below by turning off CB2.

CONDITIONS	1	2	3	4	5	6
1. Is F3 (+42 V) the only fuse blown?	Y	N	-	-	-	-
2. Disconnect ±42 V from assembly A8: (refer to figure A-3).						
a) Remove the two red wires (+42 V) from R2-2.						
b) Remove the two blue wires (-42 V) from R1-2.						
c) Remove the two black wires (gnd) from R3-2.						
d) Turn on CB2. Did either F3 or F4 blow?	-	-	Y	N	-	-
3. Disconnect ±42 V from emergency retract assembly A9:						
a) Discharge tuning capacitor C8. (WARNING: 440 volts!)						
b) Remove red wire from + terminal of dual-diode package CR1.						
c) Remove two blue wires from - terminal of CR1.						
d) Remove single blue wire from AC terminal of dual-diode CR2.						
e) Turn on CB2. Did either F3 or F4 blow?	-	-	-	-	Y	N

ACTIONS	1	2	3	4	5	6
1. Turn off CB2, then remove Fault Store capacitor (500 μF) from JA04. Replace F3 and turn on CB2. If fuse holds, replace capacitor. If fuse blows, reinstall capacitor and take next recommended Action.	1	-	-	-	-	-
2. Go to Condition 2.	2	X	-	-	-	-
3. Ass'y A8 is OK. Restore wires removed in Condition 1, then go to Condition 3.	-	-	X	-	-	-
4. Replace assembly A8 and try Condition 2 again.	-	-	-	1	-	-
5. Ass'y A9 is OK. Restore wires removed in Condition 3, then go to Condition 4 on sheet 2.	-	-	-	-	X	-
6. Replace assembly A9 and try Condition 3 again.	-	-	-	-	-	1
7. Call Field Support.	3	-	-	2	-	2

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DLT 5 LOCATING FAULTS IN THE ±42 V LOADS (sheet 2 of 2)

Caution: Ensure that any leads you disconnect are clear of grounds or electrical elements.

Enters from: DLT 2

Procedures: None

References: Logic Diagrams; tables A-1,A-2; figure A-3

Exits to: DLT 1, if required, to complete Power Up diagnostic

Assumption: F3 and/or F4 blow when ±42 V load is connected. This DLT involves alternately disconnecting ass'ys A8,A9,A5 and A0 (locations A05 and A09 only) until fault is found. Be sure F3 and F4 are good, then precede each Condition below by turning off CB2.

CONDITIONS	7	8	9	10	11	12	13	14
4. Check out head sel/R-W assembly A5:								
a) Disconnect P101 from assembly A5.								
b) Turn on CB2. Did F3 blow? (A5 does not use -42 V.)	Y	N	-	-	-	-	-	-
5. Check out ±42 V wiring on logic chassis backpanel:								
a) Remove cards at locations A05 and A09 of logic chassis.								
b) Turn on CB2. Did F3 or F4 blow?	-	-	Y	N	-	-	-	-
6. Install card A05 and turn on CB2. Did F3 or F4 blow?	-	-	-	-	Y	N	-	-
7. Install card A09 and turn on CB2. Did F3 or F4 blow?	-	-	-	-	-	-	Y	N
ACTIONS								
8. Assembly A5 is OK. Reconnect P/J101 and go to Condition 5.	X	-	-	-	-	-	-	-
9. Replace Piggy-back-ZKN board (Writer) in assembly A5 and try Condition 4 again.	-	1	-	-	-	-	-	-
10. Check backpanel wiring between locations A09 and A05. +42 V is on pin 33B, -42 V on pin 03B. Voltages come in on W5 harness attaching to A09 w/w pins via PA09.	-	-	1	-	-	-	-	-
11. Go to Condition 6.	-	-	-	X	-	-	-	-
12. Replace card A05 and try Condition 6 again.	-	-	-	-	1	-	-	-
13. Go to Condition 7.	-	-	-	-	-	X	-	-
14. Replace card A09 and try Condition 7 again.	-	-	-	-	-	-	1	-
15. The ±42 V distribution check out OK. Go to DLT 1, if required, to complete Power Up diagnostic.	-	-	-	-	-	-	-	X
16. Call Field Support.	-	2	2	-	2	-	2	-

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DLT 6 FIRST SEEK (sheet 1 of 2)

Warning: None

Enters from: DLTs 1 through 5

Procedures: See sheet 2

References: Logic Diagrams

Exits to: DLT 7 or sheet 2 of this DLT

Assumption:

START light is on, drive is up to speed.

CONDITIONS	1	2	3	4	5	6	7	8
1. READY light comes on, signifying successful First Seek?	Y	N	N	N	N	N		
2. First Seek attempted?	-	N	N	N	N	N		
3. Check that Heads Loaded switch is transferring:								
a) Press START sw to stop disk. Do not turn off breakers.								
b) Manually push voice coil forward to move heads off unloading ramp. Does voice coil attempt to retract?	-	-	N	Y	Y	Y		
4. Check forward drive to voice coil:								
a) Disconnect wire from term. 2 of v.c. (one closest to magnet assy).								
b) Attach + lead of VOM to disconnected wire, com. lead to logic gnd.								
c) Press START.								
d) Wait for 15-20 second up-to-speed timeout to expire and then chk VOM. Does VOM read approx +40 V?	-	-	-	-	N	Y		
ACTIONS								
1. No problem. Go to DLT 7.	X	-	-	-	-	-		
2. Go to Condition 3.	-	X	-	-	-	-		
3. Suspect leads to (or contacts in) Em. Retract Relay.	-	-	1	-	-	-		
4. Suspect open voice coil.	-	-	2	-	-	-		
5. Replace Heads Loaded switch.	-	-	3	-	-	-		
6. Replace power amp.	-	-	4	-	6	-		
7. Hds Loaded sw OK. Go to Condition 4 to chk fwd drive on v.c.	-	-	-	X	-	-		
8. Suspect card A09 (pwr amp control).	-	-	-	-	1	-		
9. Suspect cards A11, A03 (direction control).	-	-	-	-	2	-		
10. Suspect card A12 (summing amp).	-	-	-	-	3	-		
11. Suspect card A13 (diff cntr, CAR).	-	-	-	-	4	-		
12. Suspect card A05 (speed control) and -XPN board.	-	-	-	-	5	-		
13. Voice coil should attempt First Seek when up-to-speed timeout expires. Go to Condition 5 on sheet 2.	-	-	-	-	-	X		
14. Call Field Support.	-	-	5	-	7	-		

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DLT 6 FIRST SEEK (sheet 2 of 2)

Warning: None

Enters from: Sheet 1

Procedures: Trk Servo Amplitude Check (section 3C); Hd-Arm Repl.(3D), Hd Alignment(3B)

References: Logic Diagrams

Exits to: DLT 7

Assumption: START light is on, drive is up to speed.

CONDITIONS	7	8	9	10	11	12	13
1. READY light signifies successful First Seek? (From sheet 1.)	N	N	N	N	N	N	N
2. First Seek attempted? (From sheet 1.)	Y	Y	Y	Y	Y	Y	Y
5. Drive attempts First Seek, then unloads?	Y	Y	Y	Y	-	-	-
6. Servo preamp input to card A10 OK?	-	N	Y	Y	-	-	-
7. Track Servo signal present at A10-09B (output pin)?	-	-	N	Y	-	-	-
8. Drive seeks to forward mechanical stop, FAULT light comes on (+42 fuse blows), but heads don't unload--unit cannot power down?	-	-	-	-	Y	-	-
9. Drive seeks to fwd mech stop, waits for FAULT light (+42 fuse blows), then retracts?	-	-	-	-	-	Y	-
10. Drive loads heads, hesitates, then creeps to fwd EOT?	-	-	-	-	-	-	Y
ACTIONS							
15. Not sensing dibits. Chk servo preamp input to A10 (Trk Servo Ampl Chk), then go to Condition 6.	X	-	-	-	-	-	-
16. Chk for continuity/gnds in servo preamp cable (input to A10).	-	1	-	-	-	-	-
17. Replace servo preamp.	-	2	-	-	-	-	-
18. Replace and align servo head (see Procedures, above).	-	3	-	-	-	-	-
19. Suspect card A10.	-	-	1	-	-	-	-
20. Suspect propagation of Track Servo signal through cards A11, A09, A12, A04.	-	-	-	1	-	-	-
21. Replace power amp.	-	-	-	-	3	2	-
22. Suspect velocity transducer and attendant logic on card A12 (cards A04, A11 also involved, but checked in Action 23).	-	-	-	-	2	-	-
23. Suspect Fine Enable logic on cards A11, A04.	-	-	-	-	1	-	1
24. Suspect cards A12, A10, A09.	-	-	-	-	-	1	2
25. Call Field Support.	-	4	2	2	4	3	3

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DLT 7 RTZ/CONTINUOUS SEEKS

Warning: None

Enters from: DLT 6

Procedures: None

References: Logic Diagrams

Exits to: DLT 8

Assumption:
1. FTU connected to drive via A and B cables
2. Remote/Local switch on drive (if present) set to REMOTE
3. LAP installed and drive selected from FTU.

CONDITIONS	1	2	3	4	5	6	7	8
1. Actuate RTZ switch on FTU. RTZ successful?	Y	N	-	-	-			
2. Set up and perform continuous seeks:								
a) Set FTU Auto Function switch to CONT.								
b) Set all FTU cylinder address switches "off" (down).								
c) Actuate FTU's START switch.								
d) Sequentially select/deselect cyl addr switches (1,2,4...256, 512) to step actuator between track 0 and the track indicated by the active cyl addr switch.								
Is Continuous Seek successful?	Y	-	N	-	-			
3. Select track (cyl) 822:								
• Set cyl addr switches to 366_{16} (1466_8).								
Is seek to track 822 successful?	Y	-	-	N	-			
4. Select track (cyl) 823:								
• Set cyl addr switches to 367_{16} (1467_8).								
Does Seek Error occur when attempting to go to track 823?	Y	-	-	-	N			

ACTIONS	1	2	3	4	5	6	7	8
1. Seeks executed properly--proceed to DLT 8.	X	-	-	-	-			
2. Replace A03 card (Access Control and Sector Decode).	-	1	1	1	1			
3. Replace A04 card (Access Control 1).	-	2	-	-	-			
4. Replace A11 card (Access Control 2).	-	3	-	-	-			
5. Replace A12 card (D/A Function Generator).	-	4	3	3	3			
6. Replace A07 card (Receivers).	-	5	4	4	4			
7. Replace A13 card (Difference Counter and Control).	-	-	2	2	2			
8. Replace A02 card (RPS Steering, et al).	-	6	5	5	5			
9. Call Field Support.	-	7	6	6	6			

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DLT 8 WRITE

Warning: None

Enters from: DLT 7

Procedures: None

References: Logic diagrams

Exits to: DLT 9

Assumption: TB303 FTU connected to drive (REMOTE operation). FTU's RD/ACC/WR switch set to WR position.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. FAULT indication given when drive is connected to controller but not when connected to FTU?	N	Y	N	N	N	N	N	N	N	N		
2. FAULT light on FTU panel comes on?	N	-	Y	Y	Y	Y	Y	Y	Y	Y		
3. FAULT light on SMD panel comes on?	N	-	N	Y	Y	Y	Y	Y	Y	Y		
4. Is Fault limited to certain groups of contiguous addresses?	-	-	-	-	Y	N	-	-	-	-		
5. Check LEDs on back of Operator panel (Ass'y A10):												
a) WRT FLT on?	-	-	-	-	-	-	Y	-	-	-		
b) HD SEL FLT on?	-	-	-	-	-	-	-	Y	-	-		
c) W · R FLT on?	-	-	-	-	-	-	-	-	Y	-		
d) $\overline{\text{ON CYL}}$ · (W + R) on?	-	-	-	-	-	-	-	-	-	Y		
ACTIONS												
1. No problem--proceed to DLT 9.	X	-	-	-	-	-	-	-	-	-		
2. Check that Write Protect switches are OFF.	-	X	-	-	-	-	-	-	-	-		
3. Chk that +5 V is available. If voltage OK, replace Operator Panel.	-	-	X	-	-	-	-	-	-	-		
4. Go to Condition 4.	-	-	-	X	-	-	-	-	-	-		
5. Replace A13 card (CAR bits).	-	-	-	-	1	-	-	-	-	-		
6. Go to Condition 5.	-	-	-	-	-	X	-	-	-	-		
7. Check that the OFFSET switch on FTU panel is "off" (Center position).	-	-	-	-	-	-	1	1	1	1		
8. Replace A01 card (Write PLO).	-	-	-	-	-	-	2	-	-	-		
9. Replace A14 card (NRZ → MFM).	-	-	-	-	-	-	3	-	-	-		
10. Replace A07 card (Rcurs).	-	-	-	-	2	-	4	2	2	-		
11. Replace A02 card (RPS et al).	-	-	-	-	3	-	5	3	3	2		
12. REplace A06 card (Xmtrs).	-	-	-	-	-	-	6	4	4	3		
13. Replace A05 card (Write Protect).	-	-	-	-	-	-	7	-	5	4		
14. Replace A04 card (On Cyl).	-	-	-	-	-	-	-	-	-	5		
15. Replace Write Driver card on assembly A5.	-	-	-	-	-	-	8	-	6	6		
16. Replace Read Amp card on assembly A5.	-	-	-	-	-	-	-	5	-	-		
17. Call Field Support.	-	-	-	-	4	-	9	6	7	7		

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DLT 9	READ
Warning:	None
Enters from:	DLT 7
Procedures:	Head Alignment
References:	Logic diagrams
Exits to:	DLT 10
Assumption:	TB303 FTU connected to drive (REMOTE operation). FTU's RD/ACC/WR switch set to RD position.

CONDITIONS	1	2	3	4	5	6	7	8
1. Was data read properly?	Y	N	N	N	N			
2. Is ALT/ONES switch on FTU set to read the data pattern previously written on the disk?	-	N	Y	-	-			
3. Is NRZ/MFM switch on FTU set correctly for data being received from drive under test?	-	-	Y	N	-			
4. Are errors head-related?	-	-	N	-	Y			
ACTIONS								
1. No problem--proceed to DLT 10.	X	-	-	-	-			
2. Change switch to agree with data being read and try again.	-	X	-	X	-			
3. Replace A16 card (Read PLO)--for NRZ interface only.	-	-	1	-	-			
4. Replace A15 card (Data Latch).	-	-	2	-	-			
5. Replace A14 card (NRZ → MFM).	-	-	3	-	-			
6. Replace A11 card (Offset).	-	-	4	-	-			
7. Replace A07 card (Rcurs).	-	-	5	-	-			
8. Replace A06 card (Xmtrs).	-	-	6	-	1			
9. Replace A02 card (RPS et al).	-	-	7	-	2			
10. Check head alignment per maintenance procedures.	-	-	8	-	3			
11. Replace Hd Sel/Rd Amp card on assembly A5.	-	-	9	-	-			
12. Replace Faulty Head(s) and perform Head Alignment.	-	-	-	-	4			
13. Call Field Support.	-	-	10	-	5			

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DLT 10	POWER DOWN
Warning:	None
Enters from:	DLT 9
Procedures:	None
References:	Logic diagrams
Exits to:	None (diagnostics completed)
Assumption:	Remote operation--Attempt to power-down the drive from the FTU Local operation--Press START switch to extinguish START light and power-down the drive.

CONDITIONS	1	2	3	4	5	6	7	8
1. START light on SMD goes out? (LOCAL mode only.)	Y	Y	Y	Y	N			
2. Heads unload?	Y	Y	Y	N	-			
3. Drive motor brakes to a stop.	Y	N	N	-	-			
4. Drive motor coasts to a stop.	N	N	Y	-	-			

ACTIONS	1	2	3	4	5	6	7	8
1. None req'd--diagnostics completed satisfactorily.	X	-	-	-	-			
2. Chk deck interlock switch (or wiring) for grounds.	-	1	-	-	-			
3. Chk that Heads Loaded switch has transferred (PA02-4A should be at ground).	-	2	-	-	-			
4. Replace BXPN brd (ass'y A11) or relay brd (ass'y A4) as applicable.	-	3	2	-	-			
5. Chk hysteresis brake and intervening connectors (see logic diagrams); if OK, go to next recommended Action.	-	-	1	-	-			
6. Replace A03 card (RTZ Latch).	-	-	-	1	-			
7. Replace A12 card (Summing Amp).	-	-	-	2	-			
8. Replace A09 card (Power Amp Control).	-	-	-	3	-			
9. Suspect base of Q1 on operator panel (-ZYN card) grounded. Check associated components on -ZYN card.	-	-	-	-	1			
10. Call Field Support.	-	4	3	4	2			

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PROCEDURES

PROCEDURE A: CHECKING DC VOLTAGES

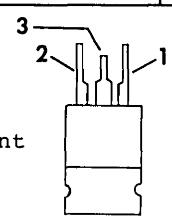
This procedure defines dc-voltage checkpoints on the drive for both load and no-load conditions. It is used in conjunction with DLT2 or whenever a dc voltage is suspect.

The voltage readings in table A-3 may be obtained by using either a standard (needle-type) or digital volt-ohmmeter. Table A-4 gives the usual symptoms for a malfunctioning power supply. Because spare parts for the components in the various supplies are not usually provided, a power supply is not normally repaired in the field, but simply replaced by substituting either a new power supply board or an entire power supply assembly.

TABLE A-3. CHECKING DC VOLTAGES

Voltage to be Checked	Volt-Ohmmeter Connections				Voltage Readings
	Normal Load (A1P/J2 Mated)		No Load (A1P/J2 Separated)		
	+ Probe	- Probe	+ Probe	- Probe	
+5	+5 Faston	Either of the GND Fastons on logic chassis or the ground-plane foil of the -XKV brd (see figure A-4).	J2-03	J2-01 or J2-02 or J2-12 or J2-14	+5.1 (±0.05)
-5	-5 Faston		J2-05		-5.1 (±0.05)
+12	U9-2 ①②		J2-10		+12 (±2)
-12	U8-2 ①②		J2-08		-12 (±2)
+20	+20 Faston		J2-06		+20 (±2)
-20	-20 Faston		J2-04		-20 (±2)
+42	A1F3		J2-13		+42 (±2)
-42	A1F4		J2-09		-42 (±2)

① U8, U9 Pin Arrangement



② If ± 12 voltages remain in the range 7-9 V (±) or fluctuate between ±12 V and 0 V, suspect a fault in the dc loads. Verify with no-load readings. Heavy overloads such as a dead short will cause the regulator's thermal protect feature to drop the output voltage to zero.

TABLE A-4. FAILURE SYMPTOMS IN POWER SUPPLIES

Symptom	Probable Cause
1. Noticeable ripple at output (checked with oscilloscope)	Open diode or open filter capacitor
2. Less than specified output (ac input ok)	Shorted diode or shorted filter capacitor
3. Output decreases significantly when load is connected.	Open bleeder resistor

PROCEDURE:

1. Turn off POWER SUPPLY breaker (CB2)

2. Raise logic chassis to maintenance position to give access to voltage Fastons.

3. Be sure that P/J2 is mated to provide loads for the supplies to be checked.

4. Turn on CB2

5. Using the VOM probe connections from the NORMAL LOAD columns of table A-3, check each supply voltage.

6. If any voltage is outside the tolerance given in table A-3, or is nonexistent, proceed to check the no-load voltages by separating P/J2 and using the probe connections specified in the NO LOAD columns of the table. (Turn off CB2 before separating P/J2)

7. If the ±5 V readings are outside the tolerances of table A-3, adjust those voltages as described under the Plus and Minus 5 Volt Regulators procedure in section 3B.

8. If further maintenance is not to be performed at this time:

   a. turn off CB2

   b. reconnect P/J2

   c. return the logic chassis to its normal position and secure the 1/4-turn fastener.

   d. turn on CB2 to restore normal drive functions.

PROCEDURE B: CHECKING AC INPUTS TO POWER SUPPLIES

This procedure verifies that a given secondary winding of ferroresonant transformer T1 has sufficient voltage to drive its associated power supply. The procedure should be performed whenever T1 is suspected as the cause for a lower-than-normal dc voltage, as measured using Procedure A. Steps 6 through 16 should also be performed whenever either the power supply assembly or the -XKV power supply board has been replaced, to assure that the previously malfunctioning supply did not damage the transformer.

NOTE

The ±5, ±20, and ±42 V supplies constitute the load for T1 and its tuning capacitor, A1C8. Without a load, T1 would oscillate and produce meaningless voltage readings. For this reason, do not separate P/J1 in an attempt to measure the ac input voltages directly at the pin-sockets of P1.

The first five steps in the procedure, along with the resistance readings in table A-5, assure that the -XKV board itself is not shorted. This ensures that the subsequent ac input readings will be a valid indication of the transformer's performance. Table A-6 shows the oscilloscope connections for monitoring the ac input to each supply. Figure A-4 gives the location of those monitoring points on the -XKV board. Figure A-5 shows the square-wave input (secondary-winding output) and the nominal ac voltages, the latter given more precisely in table A-6.

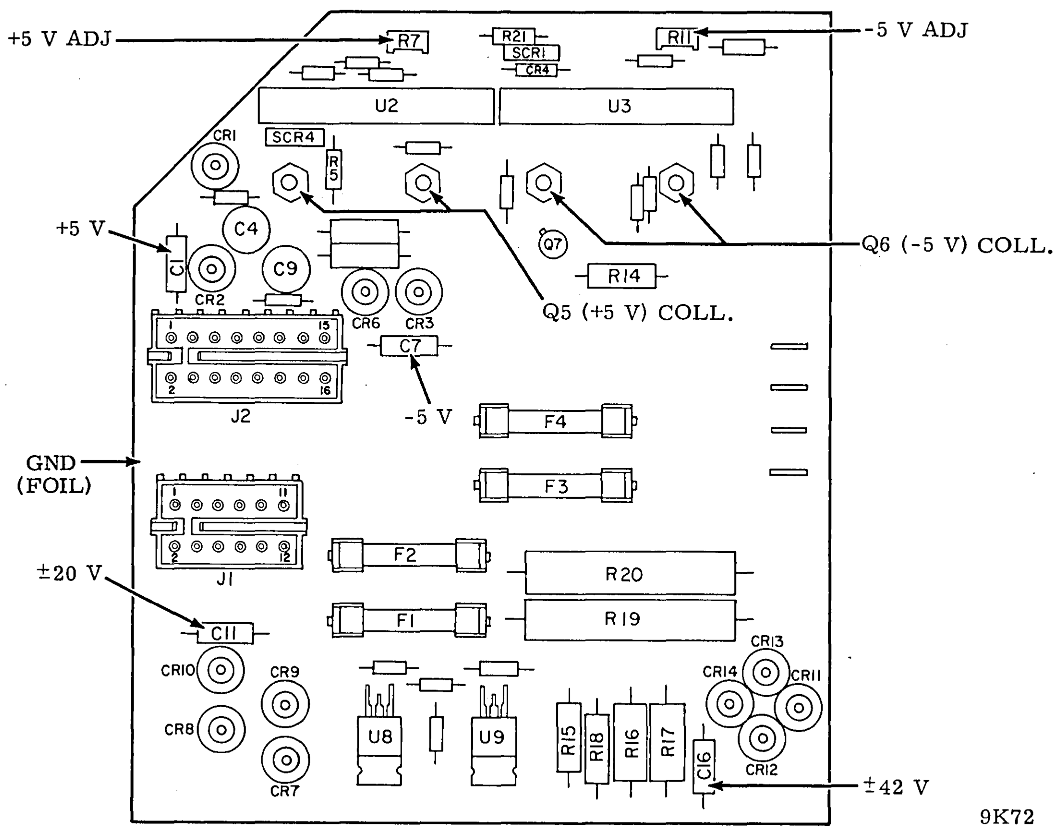


Figure A-4. AC-Input Probe Points on -XKV Board

OSCILLOSCOPE SETTINGS

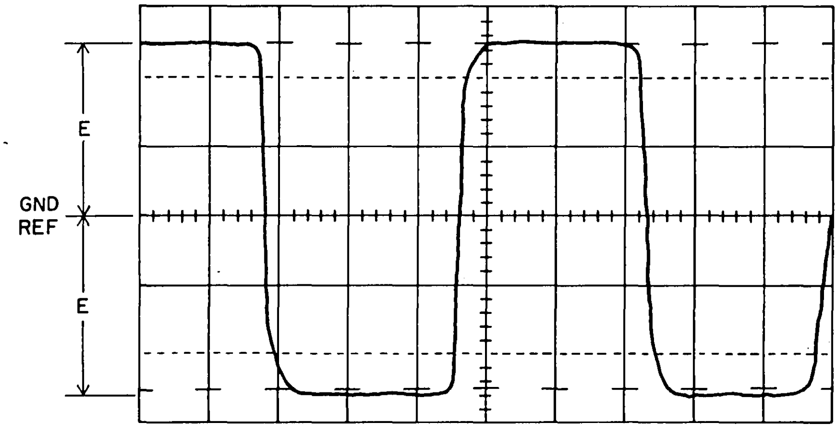
SCOPE GND TO LOGIC GND

VOLTS/DIV
CH 1 - (1)
CH 2 - NA

TIME/DIV
A- VARY FOR CONVENIENT TRACE
B - NA

TRIGGERING
A (USE X1 PROBE)- LINE
B (USE X PROBE)- NA

PROBE CONNECTIONS
CH 1 (USE X1 PROBE)- (2)
CH 2 (USE X PROBE)- NA



(1) ±5 V: E=11 V
±20 V: E=22 V
±42 V: E=44 V

(2) SEE TABLE

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Figure A-5. T1 Inputs to Power Supply (-XKV Board

PROCEDURE:

Steps 1 through 5 ensure that there are no shorts in the power supplies on the -XKV board that might give the erroneous impression that T1 was at fault rather than the board itself.

1. Turn off CB2 (Power Supply breaker)

2. Remove the plastic cover protecting the -XKV board.

3. Isolate the -XKV board by separating connectors P/J1 (to T1) and P/J2 (to dc loads).

4. Referring to table A-5, check the input resistance of each supply. Allow time for the input capacitor to charge before determining the final reading.

TABLE A-5. CHECKING FOR SHORTED -XKV BOARD

Power Supply	VOM Connections to J1	Resistance (VOM Scale: Rx100)
+5 V	1,3	Inf.
-5 V	5,7	Inf.
±20 V	6,8	4300Ω
±42 V	2,4	4300Ω

5. If any of the four readings are significantly lower than those given in table A-5, the -XKV board should be replaced.

Steps 6 through 16 check the ac input to the -XKV board.

6. Reconnect P/J1

7. Plug in the test scope and set the trigger control to LINE. Turn on the scope and when the horizontal trace becomes visible, center it on the graticule.

8. Connect the scope's ground probe to the ground-plane foil of the -XKV board (refer to figure A-4).

9. Turn on CB2.

10. Connect the scope's + probe (i.e., CH1 or CH2, depending upon scope set-up) to either lead of the input filter capacitor listed in table A-6 for the voltage to be checked. (Refer to figure A-4 for capacitor locations.)

11. Adjust scope's TIME/DIV control to secure a stable square-wave trace (ref: figure A-5).

TABLE A-6. CHECKING AC INPUTS TO -XKV BOARD

Supply to be Checked for AC Input	Scope Connections (Refer to Figure A-1)		AC Input Voltages (Check each Side of Input Capacitor)
	+ Probe (AC Input)	- Probe (Ground)	
+5 V	C1	Ground-plane foil of -XKV board (see fig. A-1)	11 V ±1 V
-5 V	C7		11 V ±1 V
±20 V	C11		22 V ±1 V
±42 V	C16		44 V ±2 V

12. Adjust scope's VOLTS/DIV control to allow easy mental reckoning of the voltage represented by the trace, as shown against the graticule lines.

13. Record the voltage (or make a mental note, if you trust your visual memory) from the ground reference line on the graticule to the top and bottom plateaus of the trace, as indicated by "E" in figure A-5 (two readings).

14. Repeat step 13 with the + probe connected to the other lead of the input capacitor.

15. If both steps 13 and 14 show a symmetrical waveshape about the ground reference line (that is, all four voltage readings are the same), and are within the tolerance specified in table A-6, the T1 winding for that particular supply is ok.

NOTE

If you suspect a disparity between the sets of readings taken in steps 10 and 11, check the probe points again with a VOM, which will make any difference more distinguishable. Keep in mind that the VOM readings will be less because they are effective, not peak, voltages.

16. If the voltage readings are not the same, or if they are the same but not within the tolerances given in table A-6, the problem has to be a shorted winding in T1. You may be able to confirm this by sniffing the transformer for evidence of burned insulation, although this is not a definite test. Proceed to step 17.

WARNING

Tuning capacitor A1C8 is charged to 440 volts. Be sure to discharge it before starting step 17.

17. Replace transformer T1, using the procedure given in section 2D.

18. Check the newly installed transformer by repeating steps 6 through 14.

PROCEDURE C: TROUBLESHOOTING HEAT-GENERATED PROBLEMS

CAUTION

> If the heads perform an unscheduled retract and the START and FAULT lights are both off, immediately turn off the POWER SUPPLY breaker; you have dropped +5 V and run the risk of burning up the voice coil. Only after you've shut off dc power should you check to see if the power-down resulted from a failure on the ac line. (Hint: is the blower still on?)

If you commit the above CAUTION to memory and act instinctively upon it, you may one day save yourself a lot of trouble; failure of the +5 V supply is a common cause for abnormal shut-downs.

Heat-related problems are easy to diagnose: they occur only when the drive gets hot, and they disappear when the drive has had a chance to cool off. If you suspect a problem is heat-related, let the drive cool down, then note the failure (or more accurately, the absence of the failure) when the drive is started up again. Often the troubleshooting period can be shortened by applying artificial heat to the suspected area (a hair dryer is useful here). Once you've diagnosed the problem, correct it as you would any other malfunction.

Heat problems are of two types -- those originating in the power supplies and those developing in the various loads. Should a load fault take out a 20 V or 42 V fuse, the course is clear: simply refer to the applicable "load" DLT. If the load does not pop a fuse but merely brings up a FAULT light (on the back of the operator panel), the table below should offer a starting point for correcting the problem. (If the +5 V supply goes, of course, the fault lights won't work.)

FAULT	PROBLEM RELATED TO
Voltage (except +5 V)	A05
On Cyl•(W+R)	A05, A02, A04
Write	A05, A02, A13, A14, A5 assy (Write Driver board)
W•R	A05, A02, A07
Hd Sel	A05, A06, A5 assy (Hd Sel/Rd Amp board)

Losing ±5 V can be bothersome because those supplies maintain a uniform output voltage right up to their current limit, and then drop to 0 V when that limit is exceeded. Should this happen, check to see if the supply itself is the culprit by disconnecting the 5 V load. If the voltage returns to 5 V, the fault lies in the load, not the supply.

PROCEDURE D: PIN-POINTING VOLTAGE FAULTS IN THE LOGIC CHASSIS

This procedure locates ±5 V, ±20 V, and ±42 V faults on cards in the logic chassis or in the logic chassis backpanel wiring. (There is no ±12 V load in logic chassis assembly A2.)

The test procedure may be conducted in either of two ways. The first method is to check the ±5 V, ±20 V, and ±42 V loads individually by entering Procedure D from the applicable DLT:

±5 V -- Condition 1 of DLT 3

±20 V -- Condition 1 of DLT 4

±42 V -- Condition 3 of DLT 6

The second method is to check all three loads at the same time. The test for load faults in each voltage is made by adding cards to the logic chassis one at a time, so it is more efficient to check all three loads on a given card at one time. (Of course, some cards will not require all three checks.)

The second method is the one described below, and requires that the tests for Conditions 1 and 2 of DLT 6 have been satisfactorily completed before entering the procedure.

NOTE

It should be pointed out that, as shown in table A-1, only +5 V is used on every card. If there is no +5 V fault in the logic chassis, only the cards using the faulted voltage(s) need to be removed.

1. Be certain that Conditions 1 and 2 of DLT 6 have been tested with satisfactory results before proceeding to step 2. (Condition 1 checks the servo capacitors, Condition 2 the power amplifier.)
2. Turn off the POWER SUPPLY (PS) breaker.
3. Separate PA80 and PA81 from their jacks on the logic chassis.
4. Ensure that all other connectors are properly mated.
5. Remove all cards from the logic chassis. (See NOTE, above, for possible exception to this "all cards" rule.)
6. Turn on the PS breaker.
7. Load faults caused by wiring errors in (or damage to) the logic chassis backpanel will show up as a blown fuse. Check the integrity of each fuse as described in DLT 2. If a fuse blows, carefully raise the logic chassis to the maintenance position and check backpanel for grounds caused by bent pins or dangling wires. After clearing the fault, restore the logic chassis to its normal position.
8. Turn off the PS breaker. You are now ready to start putting the cards back in the logic chassis one at a time, checking for faults after each one has been inserted.
9. Before inserting a card, examine both sides for evidence of arcing across the foil. Often the carbon residue around an arc area can be removed with an alcohol swab and the card won't give any more trouble.
10. Insert the selected card properly.
11. Turn on the PS breaker.
12. Using table A-1 to determine which voltages are present on the card, check the integrity of the applicable fuses.
13. If step 12 shows a blown fuse, turn off the PS breaker, replace the card just installed with a fresh one from the spare parts bin and try the test again.
14. If step 12 shows that the fuses are OK, turn off the PS breaker and, selecting another card, repeat steps 9 through 14.
15. When all cards have been checked good, return to the applicable "load fault" DLT to continue the dc-load checkout on the additional assemblies.

APPENDIX B

DECISION LOGIC TABLES (DLTs)

for SMDs with Series Code 23 (S/C 23) and below

CONTENTS

FIGURES

TABLES

APPENDIX B
DECISION LOGIC TABLES (DLTs)

INTRODUCTION

Decision logic tables help the maintenance technician to organize his thinking when problems occur in the drive. For a given fault condition (or set of conditions), actions are recommended to locate and correct the fault. The actions are arranged so that the corrective measures that are easiest to perform (checking a fuse or changing a card in the logic chassis, for example) are listed before the more difficult tasks such as replacing the head/arm assembly or drive motor.

A section called Useful Troubleshooting Aids precedes the DLT section and is separated from it by a divider page. This section contains two general-interest maintenance procedures, as well as tables and figures that should prove useful throughout the troubleshooting effort, particularly to personnel not familiar with the SMD.

The DLT section consists of ten tables, described briefly below.

- DLT 1 shows how to correct problems that occur while attempting to "power up" the drive.
- DLT 2 isolates dc power distribution problems either to the power supply loads or to the power supply module, and tells how to cure those that occur within the power supply module itself.
- DLT 3 shows how to locate power faults in the dc loads, defining cures for those encountered in the unfused loads (±5 V, ±12 V).
- DLT 4 shows how to locate and correct faults in the ±20 V loads.
- DLT 5 shows how to locate and correct faults in the ±42 V loads.
- DLTs 6 through 9 are to be used with the FTU (TB303) to correct various seek and read/write errors.
- DLT 10 shows what to do when a drive does not "power down" properly.

The procedures referred to in the DLTs form the last section in this appendix.

USING THE DLT

The DLT is divided into four quadrants. The upper-left quadrant, CONDITIONS, contains the various test conditions that can be answered "yes" or "no". The CONDITIONS quadrant is prefaced by any ASSUMPTIONS (that is, preconditions) that must be observed if the test results are to be valid. Sometimes, prerequisite actions other than the ASSUMPTIONS must be taken before the test for a given condition is made. Such steps are included in the CONDITIONS quadrant. The yes (Y) or no (N) answers to each condition are shown in numbered columns in the top-right Situations quadrant.

To use the DLT, first determine whether the result of a condition tested is Y or N. If two or more conditions exist simultaneously, look for a situations column that combines the appropriate Y-N answers for those conditions. A dash (-) in the top-right Situations quadrant means that the related Condition is not a factor in determining what actions are to be taken for that situation.

Next, determine what action should be taken for a given test result (i.e., situation) by following down the selected column to the row marked "1" in the lower-right Sequence quadrant. (If there is only one recommended action for a given situation, an "X" appears instead of the "1".) The recommended action is then located by moving across to the lower-left ACTIONS quadrant. A dash in a column of the Sequence quadrant indicates that the related Action isn't applicable.

After taking the first recommended action, repeat the test that gave rise to the situation. If the test results haven't changed (same situation), try recommended action 2, and so on, being sure to repeat the test after each such action.

Column 1 is generally reserved for an "everything OK" situation. If a DLT requires more than one sheet, this "no problem" column is repeated on each sheet. Similarly, the last ACTION on each sheet is a recommendation to "call field support". Don't brood over your inadequacy if you reach this last entry; not every situation can be covered in a DLT!

USEFUL TROUBLESHOOTING AIDS

USING A VOM TO CHECK A CAPACITOR

1. Remove power from the equipment.
2. Discharge capacitor by momentarily shorting the leads with a jumper wire. (Use screwdriver for large capacitors.)
3. Isolate the capacitor by disconnecting one lead from the circuit.
4. Set VOM to X1000 (ohms) scale.
5. Connect the VOM across the capacitor leads. The condition of the capacitor is interpreted as follows:

Meter reading	Interpretation
Needle goes rapidly to full scale (0Ω), then regresses to infinity (∞). (See NOTE.)	Capacitor OK
Needle goes rapidly to full scale and remains there.	Capacitor shorted
Needle deflects slightly or not at all.	Capacitor open

NOTE

Speed with which needle returns to infinity (∞) is a function of capacity rating. Return swing is rapid for small capacitors, becoming slower as capacity increases. To a lesser degree, return swing is also dependent upon which meter scale is used.

IN-CIRCUIT DIODE CHECKING WITH A VOM

A diode that is suspect can be given a preliminary check without disconnecting it from the circuit. Merely check the diode twice, reversing the meter leads between the two readings. Of course, power should be off, and for your own peace of mind any capacitors in the circuit should be discharged.

Keep in mind that the forward drop across a good diode is in the range 5 - 15Ω; the reverse drop is on the order of 1 MΩ. Parallel resistances in the circuit will, of course, significantly reduce the higher of these two readings, but if one is low and the other high, chances are the diode is OK. If both are low, the diode is probably shorted; if both are high, it's probably open.

This check can also be used for a bridge rectifier. You'll probably want to check at least two diodes in the bridge, because back-circuits may give different readings across different diodes.

TABLE B-1. DC VOLTAGES USED BY LOGIC-CHASSIS CARDS

Loc.	+5 V	-5 V	+12 V	+20 V	-20 V	+42 V	-42 V
A01	√	√		√	√		
A02	√						
A03	√						
A04	√						
A05	√	√		√	√	*	*
A06	√	√					
A07	√	√					
A09	√	√		√	√	*	*
A10	√	√		√	√		
A11	√	√	√	√	√		
A12	√			√	√		
A13	√						
A14	√	√					
A15	√	√					
A16	√	√		√	√		

√ = Used
* = Brought in via back-panel connector

TABLE B-2. VOLTAGES USED BY ELECTRONIC ASSEMBLIES

Ass'y	Name	+5 V	-5 V	+12 V	-12 V	+20 V	+42 V	-42 V
A4	Motor Relay Brd (with AXPN only)	√						
A5	Hd Select, R/W Amp	√	√	√	√	√	√	
A8	Power Amp						√	√
A8	Servo Preamp			√	√			
A9	Emergency Retract						√	√
A10	Operator Panel	√	√					
A11	_XPN Board	√	√			√		

√ = Used

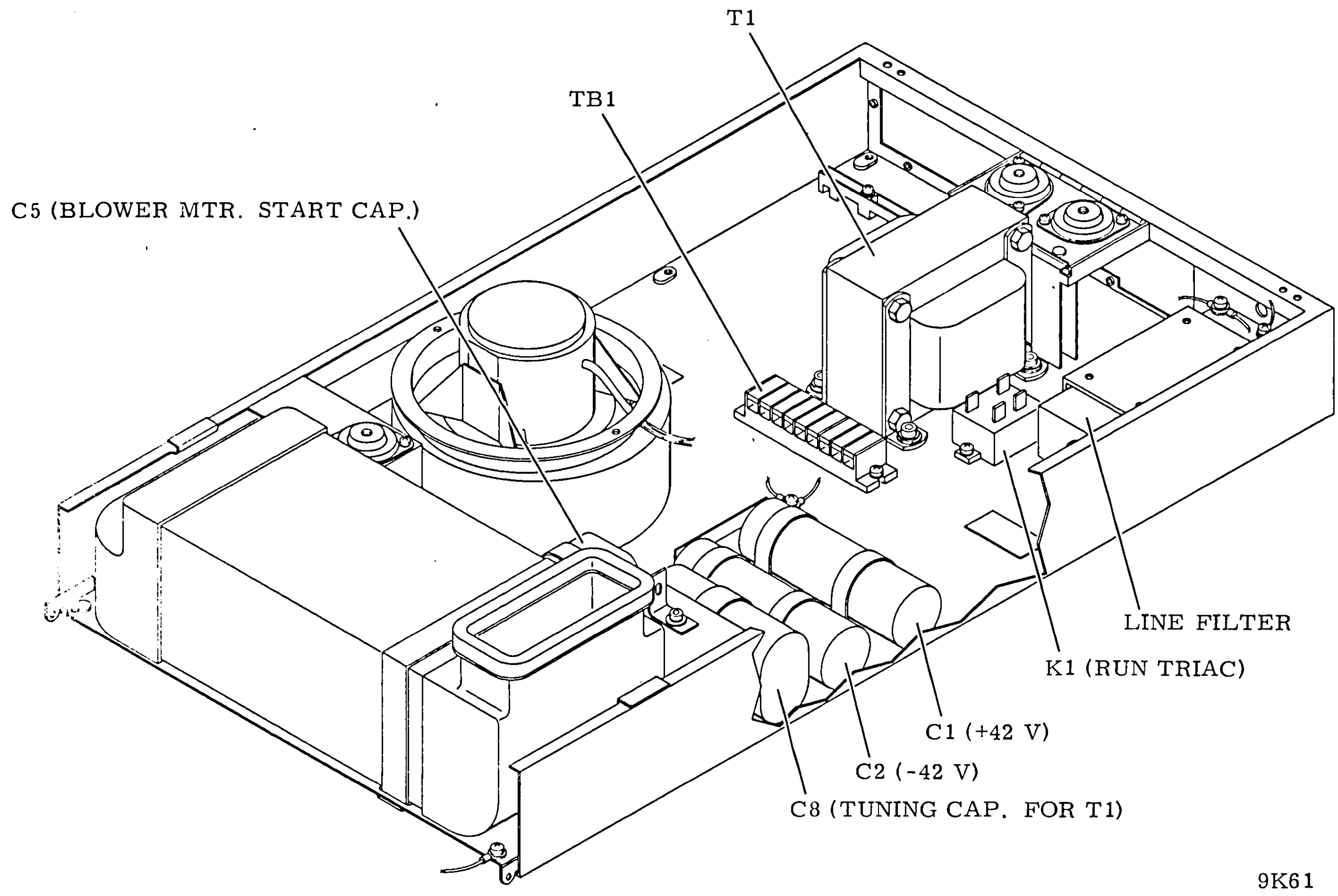


Figure B-1. Electrical Components on Base

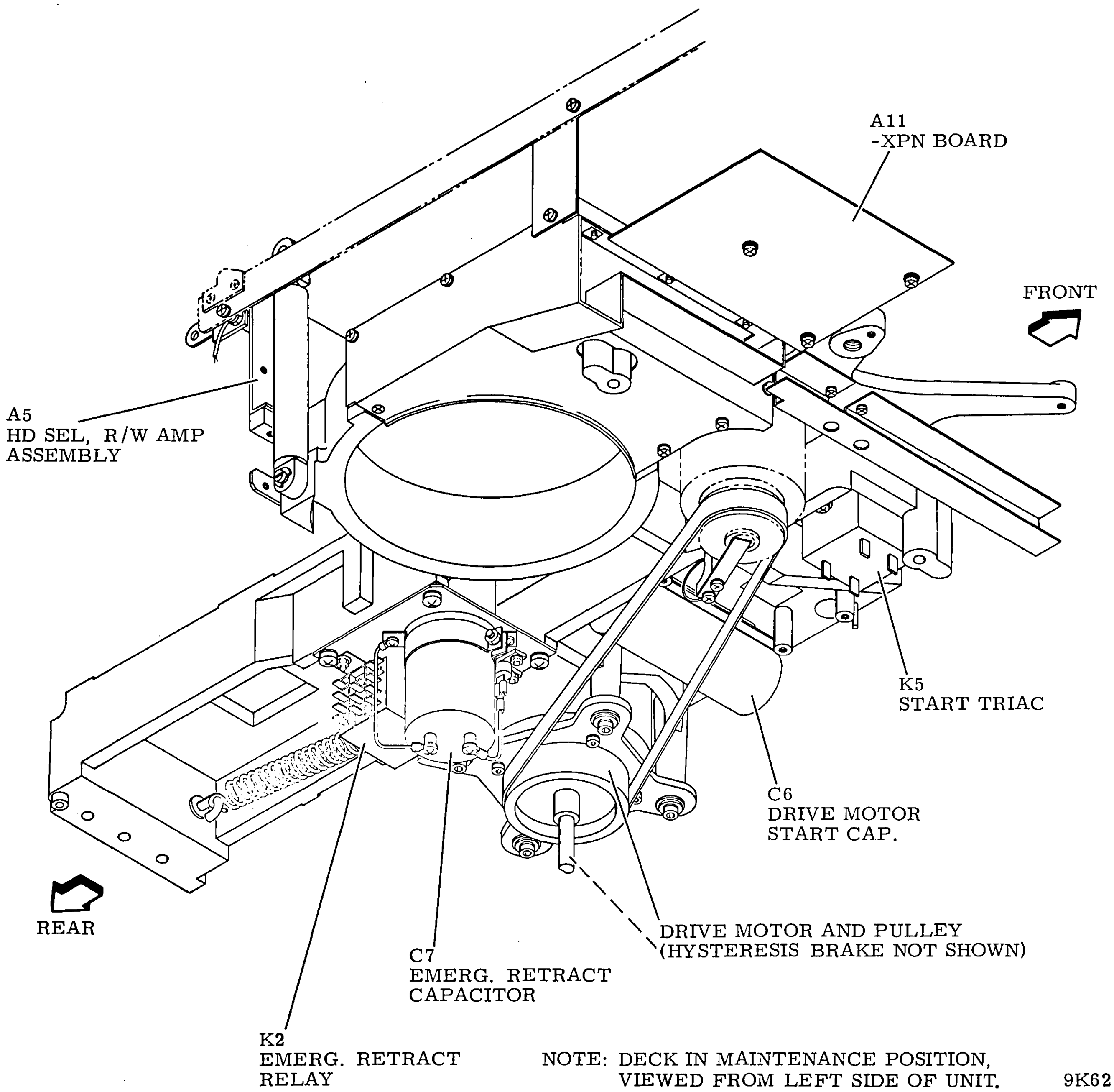
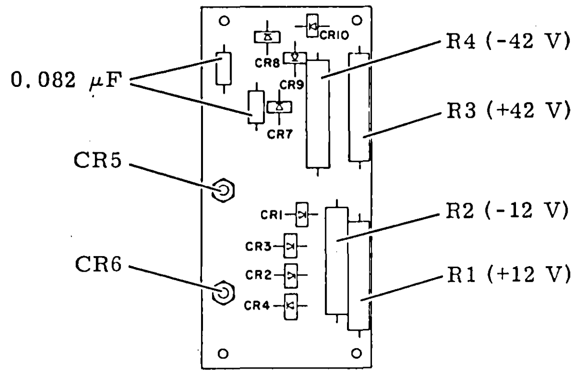


Figure B-2. Electrical Components on Deck



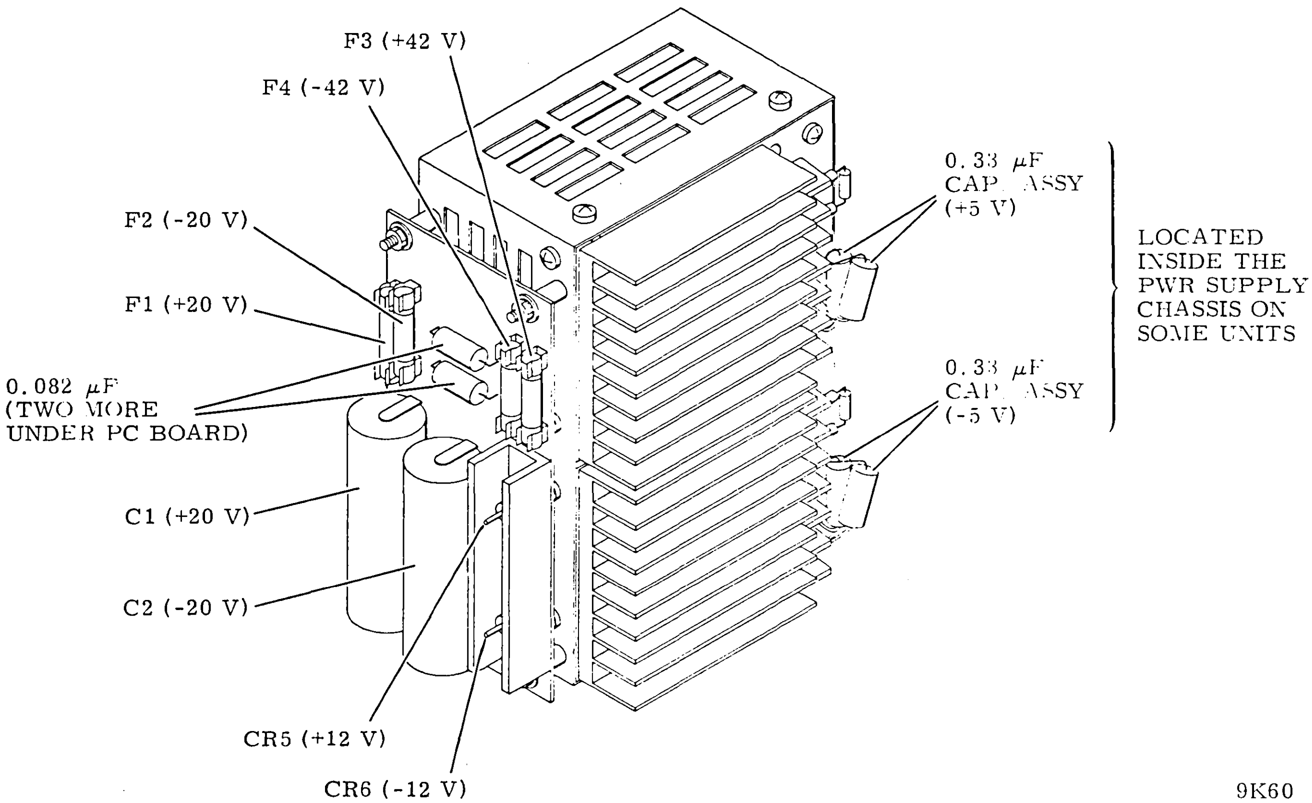


Figure B-3. External Components on Power Supply Module

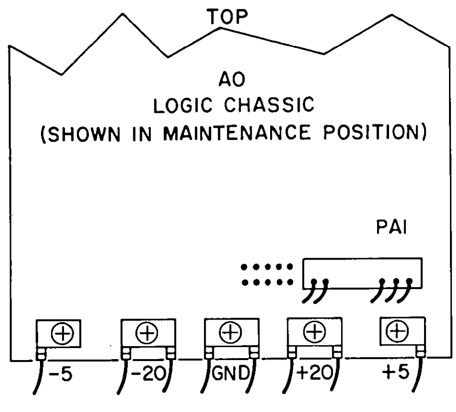
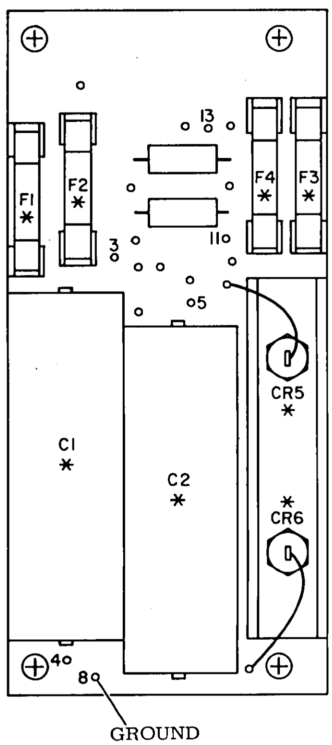


Figure B-4. DC Connections to Logic Chassis



POINTS	MEASURE (±10%)
3, 5	20 VAC TO POINT 8
11, 13	40 VAC TO POINT 8
F1	+20 V TO POINT 8
F2	-20 V TO POINT 8
F3	+42 V TO POINT 8
F4	-42 V TO POINT 8
CAP OF CR5	+12 V TO POINT 8
CAP OF CR6	-12 V TO POINT 8

NOTE: ASTERISKED COMPONENTS ARE RECOMMENDED SPARE PARTS, AS ARE THE EIGHT DIODES ON BACK OF PC BOARD.

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Figure B-5. Voltage Checkpoints on Assembly A3

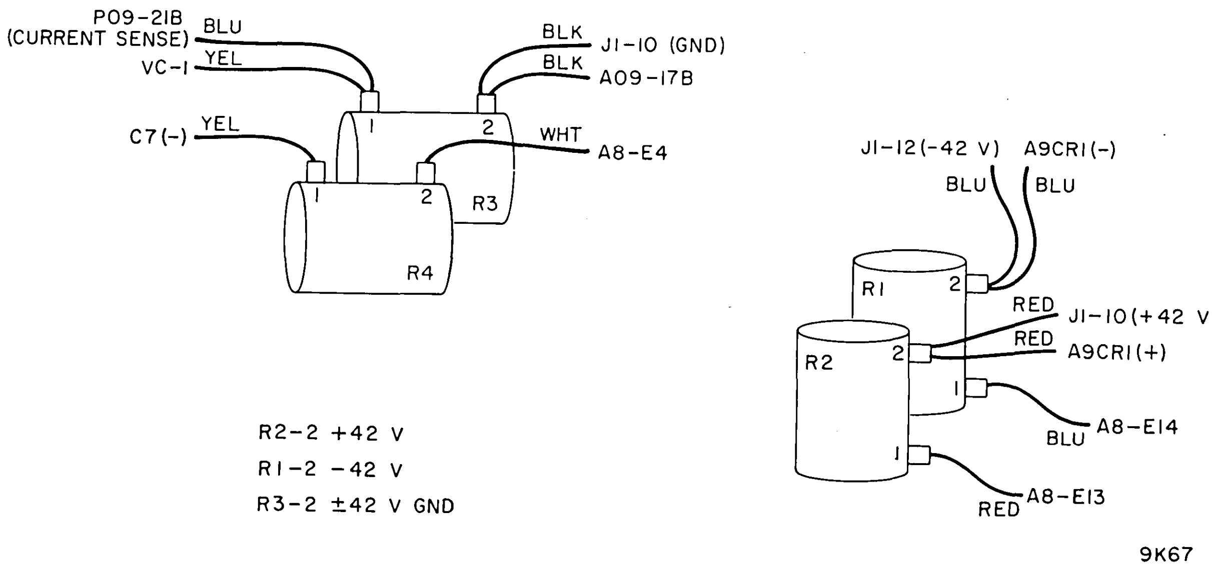

Figure B-6. 30 W Resistor Locations for Assembly A8

DECISION LOGIC TABLES

DLT 1 POWER UP (sheet 1 of 2)

Warning: Tuning capacitor C8 is charged to 440 volts. Treat it with respect!

Enters from: Assumptions

Procedures: A, B

References: Figures A-1 through A-3

Exits to: DLTs 2,4,5; or sheet 2 of this DLT

Assumption:
1. AC power connected
2. Disk pack installed on drive
3. Attempt to power-up and start drive from SMD panel.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. Blower starts when AC POWER breaker is actuated?	Y	N	N	-	-	-	-	-	-	-	-	
2. AC POWER breaker trips when actuated?	N	N	Y	-	-	-	-	-	-	-	-	
3. POWER SUPPLY (PS) breaker trips when actuated?	N	-	-	Y	N	N	N	N	N	N	N	
4. Logic fan starts when PS breaker is actuated?	Y	-	-	-	N	Y	Y	Y	Y	Y	Y	
5. ±5 V OK? (Use Procedure A to check all dc voltages.)	Y	-	-	-	-	N	N	-	-	-	-	
6. No ±5 V; ±12, ±20, ±42 voltages significantly low?	N	-	-	-	-	-	Y	-	-	-	-	
7. ±12, ±20 voltages OK?	Y	-	-	-	-	-	-	N	-	Y	-	
8. ±42 V OK?	Y	-	-	-	-	-	-	-	N	-	Y	
9. 20 V fuse(s) blown? (Either or both.)	N	-	-	-	-	-	-	-	-	Y	-	
10. 42 V fuse(s) blown? (Either or both.)	N	-	-	-	-	-	-	-	-	-	Y	
ACTIONS												
1. Continue with Condition 11 on sheet 2.	X	-	-	-	-	-	-	-	-	-	-	
2. If pwr plug customer-provided, chk phase and gnd connections.	-	1	1	-	-	-	-	-	-	-	-	
3. Pull blower connector. If trouble persists, blower is OK.	-	-	2	-	-	-	-	-	-	-	-	
4. Disconnect hour meter. If trouble persists, meter is OK.	-	-	3	-	-	-	-	-	-	-	-	
5. Check/replace AC POWER breaker.	-	2	4	-	-	-	-	-	-	-	-	
6. Check for ac at line filter; replace line filter if required.	-	3	-	-	-	-	-	-	-	-	-	
7. Check for open blower, blower capacitor, or blower cable.	-	4	-	-	-	-	-	-	-	-	-	
8. Suspect shorted logic fan or cable.	-	-	-	1	-	-	-	-	-	-	-	
9. Suspect shorted tuning capacitor. See WARNING, above.	-	-	-	2	-	-	-	-	-	-	-	
10. Check PS brkr for short/gnd to frame.	-	-	-	3	-	-	-	-	-	-	-	
11. Suspect short in dc network. Troubleshoot per DLT 2.	-	-	-	4	-	-	-	-	-	-	-	
12. Suspect open circuit in logic fan or cabling.	-	-	-	-	1	-	-	-	-	-	-	
13. Chk PS brkr for ac input. If input present replace brkr.	-	-	-	-	2	-	-	-	-	-	-	
14. Troubleshoot per Procedure B.	-	-	-	-	-	1	-	1	1	-	-	
15. Suspect open tuning capacitor. See WARNING, above.	-	-	-	-	-	-	1	-	-	-	-	
16. Fault is in ±20 V load. Go to DLT 4.	-	-	-	-	-	-	-	-	-	X	-	
17. Fault is in ±42 V load. Go to DLT 5.	-	-	-	-	-	-	-	-	-	-	X	
18. Call Field Support.	-	5	5	5	3	2	2	2	2	-	-	

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DLT 1	POWER UP	(sheet 2 of 2)

Warning: None

Enters from: Sheet 1

Procedures: A, C

References: Figures A-1 through A-3; DLT 6; Logic Diagrams

Exits to: DLT 7

Assumption:
1. AC power connected
2. Disk pack installed on drive
3. Attempt to power-up and start drive from SMD panel.

CONDITIONS	1	12	13	14	15	16	17	18	19
11. AC POWER or drive thermal brkr trips when PS brkr is actuated?	N	Y	N	N	N	N	N	N	N
12. AC POWER or drive thermal brkr trips when START sw is pressed?	N	-	Y	N	N	N	N	N	N
13. START light comes on when START switch is pressed?	Y	-	-	N	N	Y	Y	Y	Y
14. Drive motor starts when START switch is pressed?	Y	-	-	Y	N	N	Y	Y	Y
15. Drive motor comes up to speed?	Y	-	-	-	-	-	N	Y	Y
16. Heads load? (READY light comes on.)	Y	-	-	-	-	-	-	N	Y
17. Drive motor cuts out after 15-second timeout expires?	N	-	-	-	-	-	Y	-	-
18. PS brkr trips after drive has been operating for a time?	N	-	-	-	-	-	-	-	Y
ACTIONS									
19. Power Up and First Seek completed properly. Go to DLT 7.	X	-	-	-	-	-	-	-	-
20. Suspect Run triac.	-	1	-	-	-	6	-	-	-
21. Suspect Run logic. Chk logic diagrams, beginning with -XPN brd.	-	2	-	-	-	-	1	-	-
22. Suspect Start triac.	-	-	1	-	-	-	-	-	-
23. Suspect drive motor start capacitor (C6).	-	-	2	-	-	5	-	-	-
24. Suspect open Start winding in drive motor.	-	-	3	-	-	9	-	-	-
25. Suspect START switch/indicator.	-	-	-	1	-	-	-	-	-
26. Chk for presence of +5 V per Procedure A.	-	-	-	-	1	-	-	-	-
27. Chk for +20 V to motor relay brd (if Assembly A4 is present in drive).	-	-	-	-	-	4	-	-	-
28. Local/Remote sw (BXPN board only) not in LOCAL.	-	-	-	-	-	1	-	-	-
29. Check all interlocks.	-	-	-	-	2	2	-	-	-
30. Chk drive mtr thermal brkr. If tripped, determine cause.	-	-	-	-	-	3	-	-	-
31. Chk hysteresis brake for mechanical binding.	-	-	-	-	-	7	2	-	-
32. If brake energized, chk logic (motor relay brd or -XPN brd).	-	-	-	-	-	8	3	-	-
33. Suspect speed sensor or attendant logic, starting with -XPN brd.	-	-	-	-	-	-	4	-	-
34. Suspect open Run winding in drive motor.	-	-	-	-	-	10	-	-	-
35. Refer to DLT 6, First Seek.	-	-	-	-	-	-	-	X	-
36. Suspect overloaded (overheated?) power supply. Troubleshoot per Procedure C.	-	-	-	-	-	-	-	-	1
37. Call Field Support.	-	3	4	2	3	11	5	-	2

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DLT 2 ISOLATING PROBLEMS IN THE DC NETWORK (sheet 1 of 2)

Warning: None

Enters from: DLT 1

Procedures: B

References: Figures A-1,A-2,A-3,A-5

Exits to: DLT 3

Assumption: POWER SUPPLY (PS) breaker trips immediately upon being actuated. Breaker, C8, logic fan are all OK.

CONDITIONS	1	2	3	4	5	6	7	8
1. Isolate p.s. module from dc loads: Separate P/J1 (be sure not to isolate module from T1 by separating P/J100)--both connectors are in same harness. Turn on PS brkr. Does PS brkr trip?	N	Y	-	-	-	-		
2. Isolate +5 V supply: Remove ring-tongue leads from AC terminals of ass'y A1. Turn on PS brkr. Does PS brkr trip?	-	-	N	Y	-	-		
3. Isolate -5 V supply: Remove ring-tongue leads from AC terminals of ass'y A2. Turn on PS brkr. Does PS brkr trip?	-	-	-	-	N	Y		

ACTIONS	1	2	3	4	5	6	7	8
1. Problem is in a power supply load. To isolate, go to DLT 3.	X	-	-	-	-	-		
2. Problem is in the power supply module. Go to Condition 2.	-	X	-	-	-	-		
3. Check ac input to supply as given in Procedure B.	-	-	1	-	1	-		
4. Replace ass'y A1 (+5 V supply) or take next recommended Action.	-	-	2	-	-	-		
5. +5 V supply is OK. Reconnect A1 leads and go to Condition 3.	-	-	-	X	-	-		
6. Replace ass'y A2 (-5 V supply) or take next recommended Action.	-	-	-	-	2	-		
7. -5 V supply is OK. Reconnect A2 leads. Then replace assembly A3 or take next recommended Action.	-	-	-	-	-	1		
8. In lieu of assembly replacement, replace entire p.s. module or, if applicable, go to next recommended Action.	-	-	3	-	3	2		
9. If assembly A3 is suspected, the specific supply may be pinpointed by the procedure given on sheet 2. The procedure requires unsoldering leads on the A3 board so as to individually test the two supplies. Such action generally voids the warranty on the A3 assembly, and should be attempted only as a "last resort" fix.	-	-	-	-	-	3		
10. Call Field Support.	-	-	4	-	4	4		

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DLT 2 ISOLATING PROBLEMS IN THE DC NETWORK (sheet 2 of 2)

Warning: None

Enters from: Sheet 1

Procedures: Using a VOM to Check a Capacitor; In-Circuit Diode Checking With a VOM;A

References: Figure A-5

Exits to:

Assumption: Assembly A3 has been determined as the cause of the power supply module failure. The procedure below is being attempted in an effort to repair, rather than replace, assembly A3.

CONDITIONS	1	2	3	4	5	6	7	8
1. Isolate ±20 V supply:								
a) Turn off PS breaker.								
b) Carefully unsolder leads to solder points 3 and 5 on PC assembly A3. (Refer to figure A-5 for solder points.)								
c) Turn on PS breaker. Does PS breaker trip?	N	Y						

ACTIONS	1	2	3	4	5	6	7	8
1. Fault has to be in the ±42 V supply. Proceed as follows:	1	-						
a) Turn off PS breaker.								
b) Carefully resolder leads to solder points 3 and 5.								
c) Carefully unsolder leads to solder points 11 and 13.								
d) With p.s. schematic as a reference (Sheet 48 in diagrams section), check for faulty diodes/capacitors using the two procedures in the "Useful Troubleshooting Aids" section of this appendix.								
2. Replace the defective component(s).	2	2						
3. Fault is in the ±20 V supply. With p.s. schematic as a reference, check for faulty diodes/capacitors as directed in Action 1d.	-	1						
4. Turn on PS brkr and chk for proper dc voltages per Procedure A.	3	3						
5. Reconnect P/J1 (for full load) and repeat voltage measurements to verify the fix.	4	4						

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DLT 3 LOCATING FAULTS IN THE DC LOADS (sheet 1 of 2)

Warning: Discharge C8 each time you turn off the POWER SUPPLY (PS) breaker

Enters from: DLT 2

Procedures: D

References: Figures A-1,A-2,A-3; Tables A-1,A-2

Exits to: DLT 4, DLT 5

Assumption: With P/J1 separated to isolate the dc loads from the power supply module, the PS breaker holds when actuated, indicating a fault in one or more of the power supply loads.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. Examine ±20 V fuses (F1,F2) on A3. Is either fuse blown?	N	Y	-	-	-	-	-	-	-	-	-	
2. Examine ±42 V fuses (F3,F4) on A3. Is either fuse blown?	N	-	Y	-	-	-	-	-	-	-	-	
3. Restrict dc load to ±5 V on logic chassis:												
a) Remove ±20 V and ±42 V fuses (4).												
b) Remove P101 from assembly A5 (ref: figure A-3).												
c) Remove PA10 from logic backpanel (to isolate servo preamp).												
d) Remove P201 from operator panel, ass'y A10.												
e) Remove P205 from -XPN brd, ass'y A11 (ref: figure A-3).												
f) Remove PA1 from backpanel (±12 V, et al).												
g) Reconnect P/J1, then turn on PS brkr. Does PS brkr trip?	-	-	-	N	Y	-	-	-	-	-	-	
4. Restore ±12 V to logic chassis: Turn off PS brkr, reconnect												
PA1 to backpanel, turn on PS brkr. Does PS brkr trip?	-	-	-	-	-	N	Y	-	-	-	-	
5. Restore +5 V to operator panel: Turn off PS brkr, reconnect												
P/J201, turn on PS brkr. Does PS brkr trip?	-	-	-	-	-	-	-	N	Y	-	-	
6. Restore ±5 V to assembly A5:												
a) Turn off PS brkr.												
b) Remove PA1 from backpanel (to keep ±12 V from A5).												
c) Reconnect P/J101 and turn on PS brkr. Does PS brkr trip?	-	-	-	-	-	-	-	-	-	N	Y	
ACTIONS												
1. Go to Condition 3.	X	-	-	-	-	-	-	-	-	-	-	
2. Go to DLT 4 to locate ±20 V load fault.	-	X	-	-	-	-	-	-	-	-	-	
3. Go to DLT 5 to locate ±42 V load fault.	-	-	X	-	-	-	-	-	-	-	-	
4. ±5 V to logic chassis is OK. Go to Condition 4.	-	-	-	X	-	-	-	-	-	-	-	
5. Go to Procedure D to locate ±5 V fault in logic chassis.	-	-	-	-	1	-	-	-	-	-	-	
6. ±12 V to logic chassis is OK. Go to Condition 5.	-	-	-	-	-	X	-	-	-	-	-	
7. Chk PA1 cable for shorts/grounds. If cable is OK, go to	-	-	-	-	-	-	1	-	-	-	-	
Procedure D to locate ±12 V fault in logic chassis.												
8. Operator panel OK. Go to Condition 6.	-	-	-	-	-	-	-	X	-	-	-	
9. Chk P/J201 cable for shorts/grounds. If OK, replace ass'y A10.	-	-	-	-	-	-	-	-	1	-	-	
10. ±5 V to A5 is OK. Go to Condition 7 on sheet 2.	-	-	-	-	-	-	-	-	-	X	-	
11. Chk P/J101 cable for shorts/grounds. If OK, replace ass'y A5.	-	-	-	-	-	-	-	-	-	-	1	
12. Call Field Support.	-	-	-	-	2	-	2	-	2	-	2	

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DLT 3	LOCATING FAULTS IN THE DC LOADS (sheet 2 of 2)
Warning:	Discharge C8 each time you turn off the PS breaker
Enters from:	Sheet 1
Procedures:	None
References:	Figures A-1,A-2,A-3; tables A-1,A-2
Exits to:	None
Assumption:	The dc fault has been localized to one of the following unfused loads: ±5 V in assy A11; ±12 V in assy A11; ±12 V in assy A5

CONDITIONS	12	13	14	15	16	17		
7. Restore ±12 V to A5: Turn off PS brkr, reconnect PA1 to backpanel, turn on PS brkr. Does PS brkr trip?	N	Y	-	-	-	-		
8. Restore ±5 V to ass'y A11: Turn off PS brkr, reconnect P/J205, turn on PS brkr. Does PS brkr trip?	-	-	N	Y	-	-		
9. Restore ±12 V to servo preamp: Turn off PS brkr, reconnect PA10 to backpanel, turn on PS brkr. Does PS brkr trip?	-	-	-	-	N	Y		
ACTIONS								
13. ±12 V to A5 is OK. Go to Condition 8.	X	-	-	-	-	-		
14. Recheck cables for PA1 and P101. If still OK, ±12 V is bad on assembly A5. Replace A5.	-	1	-	-	-	-		
15. ±5 V to -XPN brd is OK. Go to Condition 9.	-	-	X	-	-	-		
16. Check P205 cable for shorts/grounds. If OK, replace -XPN board.	-	-	-	1	-	-		
17. ±5 V and ±12 V distribution is OK.	-	-	-	-	X	-		
18. Check PAID cable for shorts/grounds. If OK, replace servo preamp.	-	-	-	-	-	1		
19. Call Field Support.	-	2	-	2	-	2		

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DLT 4	LOCATING FAULTS IN THE ±20 V LOADS
Warning:	Discharge C8 each time you turn off CB2 to separate or mate connectors
Enters from:	DLT 2
Procedures:	None
References:	Logic Diagrams; tables
Exits to:	DLT 1, if required to complete Power Up diagnostic.
Assumption:	F1 or F2 blows when ±20 V loads connected. Be sure that F1 and F2 are good, then precede each Condition listed below by turning off CB2.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. Restrict ±20 V distribution to the logic chassis:												
a) Remove P101 from assembly A5.												
b) Remove P205 from -XPN brd (assembly A11).												
c) Turn on CB2. Does either F1 or F2 blow?	Y	N	-	-	-	-	-	-	-	-		
2. Add assembly A5 to +20 V load:												
a) Reconnect P/J101.												
b) Turn on CB2. Does F1 (+20 V) blow?	-	-	Y	N	-	-	-	-	-	-		
3. Add -XPN board (assembly A11) to +20 V load:												
a) Reconnect P/J205 to -XPN board.												
b) Turn on CB2. Does F1 (+20 V) blow?	-	-	-	-	Y	N	-	-	-	-		
4. Check out ±20 V wiring on logic chassis:												
a) Remove cards A01,A05,A09,A10,A11,A12,A16. (All use ±20 V.)												
b) Turn on CB2 and check F1 and F2. Did either fuse blow?	-	-	-	-	-	-	Y	N	-	-		
5. Check individual ±20 V cards:												
a) Select a ±20 V card and insert it in the proper card slot.												
b) Turn on CB2. Did either F1 or F2 blow?	-	-	-	-	-	-	-	-	Y	N		
ACTIONS												
1. Problem is in the logic chassis. Go to Condition 4.	X	-	-	-	-	-	-	-	-	-		
2. Go to Condition 2.	-	X	-	-	-	-	-	-	-	-		
3. Chk P101 cable for shorts/gnds. If OK, replace assembly A5.	-	-	1	-	-	-	-	-	-	-		
4. Go to Condition 3.	-	-	-	X	-	-	-	-	-	-		
5. Chk P205 cable for shorts/gnds. If OK, replace -XPN board.	-	-	-	-	1	-	-	-	-	-		
6. Check logic chassis backpanel wiring: +20 V is on pin 33B, -20 V is on pin 02B. If problem cannot be located, special-order a new logic chassis.	-	-	-	-	-	-	X	-	-	-		
7. Go to (or repeat) Condition 5. When all cards OK, go to Action 9.	-	-	-	-	-	-	-	X	-	X		
8. Replace the defective card and try Condition 5 again.	-	-	-	-	-	-	-	-	1	-		
9. The ±20 V loads now check out to be OK. Return to DLT 1, if required, to complete the Power Up diagnostic.	-	-	-	-	-	X	-	-	-	-		
10. Call Field Support.	-	-	2	-	2	-	-	-	2	-		

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DLT 5 LOCATING FAULTS IN THE ±42 V LOADS (sheet 1 of 2)

Warning: Ensure that any leads you disconnect are clear of grounds or electrical elements.

Enters from: DLT 2

Procedures: None

References: Logic Diagrams; tables B-1,B-2; figure B-6

Exits to: DLT 1, if required, to complete Power Up diagnostic

Assumption: F3 and/or F4 blow when ±42 V load is connected. This DLT involves alternately disconnecting ass'ys A8,A9,A5 and A0 (locations A05 and A09 only) until fault is found. Be sure F3 and F4 are good, then precede each Condition below by turning off CB2.

CONDITIONS	1	2	3	4	5	6	7	8
1. Is F3 (+42 V) the only fuse blown?	Y	N	-	-	-	-		
2. Disconnect ±42 V from assembly A8: (refer to figure B-6).								
a) Remove the two red wires (+42 V) from R2-2.								
b) Remove the two blue wires (-42 V) from R1-2.								
c) Remove the two black wires (gnd) from R3-2.								
d) Turn on CB2. Did either F3 or F4 blow?	-	-	Y	N	-	-		
3. Disconnect ±42 V from emergency retract assembly A9:								
a) Discharge tuning capacitor C8. (WARNING: 440 volts!)								
b) Remove red wire from + terminal of dual-diode package CR1.								
c) Remove two blue wires from - terminal of CR1.								
d) Remove single blue wire from AC terminal of dual-diode CR2.								
e) Turn on CB2. Did either F3 or F4 blow?	-	-	-	-	Y	N		

ACTIONS	1	2	3	4	5	6	7	8
1. Turn off CB2, then remove Fault Store capacitor (500 μF) from JA04. Replace F3 and turn on CB2. If fuse holds, replace capacitor. If fuse blows, reinstall capacitor and take next recommended Action.	1	-	-	-	-	-		
2. Go to Condition 2.	2	X	-	-	-	-		
3. Ass'y A8 is OK. Restore wires removed in Condition 1, then go to Condition 3.	-	-	X	-	-	-		
4. Replace assembly A8 and try Condition 2 again.	-	-	-	1	-	-		
5. Ass'y A9 is OK. Restore wires removed in Condition 3, then go to Condition 4 on sheet 2.	-	-	-	-	X	-		
6. Replace assembly A9 and try Condition 3 again.	-	-	-	-	-	1		
7. Call Field Support.	3	-	-	2	-	2		

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DLT 5 LOCATING FAULTS IN THE ±42 V LOADS (sheet 2 of 2)

Warning: Ensure that any leads you disconnect are clear of grounds or electrical elements.

Enters from: DLT 2

Procedures: None

References: Logic Diagrams; tables B-1,B-2; figure B-6

Exits to: DLT 1, if required, to complete Power Up diagnostic

Assumption: F3 and/or F4 blow when ±42 V load is connected. This DLT involves alternately disconnecting ass'ys A8,A9,A5 and A0 (locations A05 and A09 only) until fault is found. Be sure F3 and F4 are good, then precede each Condition below by turning off CB2.

CONDITIONS	7	8	9	10	11	12	13	14
4. Check out head sel/R-W assembly A5:								
a) Disconnect P101 from assembly A5.								
b) Turn on CB2. Did F3 blow? (A5 does not use -42 V.)	Y	N	-	-	-	-	-	-
5. Check out ±42 V wiring on logic chassis backpanel:								
a) Remove cards at locations A05 and A09 of logic chassis.								
b) Turn on CB2. Did F3 or F4 blow?	-	-	Y	N	-	-	-	-
6. Install card A05 and turn on CB2. Did F3 or F4 blow?	-	-	-	-	Y	N	-	-
7. Install card A09 and turn on CB2. Did F3 or F4 blow?	-	-	-	-	-	-	Y	N
ACTIONS								
8. Assembly A5 is OK. Reconnect P/J101 and go to Condition 5.	X	-	-	-	-	-	-	-
9. Replace piggy-back -ZKN board (Writer) in assembly A5 and try Condition 4 again.	-	1	-	-	-	-	-	-
10. Check backpanel wiring between locations A09 and A05. +42 V is on pin 33B, -42 V on pin 03B. Voltages come in on W5 harness attaching to A09 w/w pins via PA09.	-	-	1	-	-	-	-	-
11. Go to Condition 6.	-	-	-	X	-	-	-	-
12. Replace card A05 and try Condition 6 again.	-	-	-	-	1	-	-	-
13. Go to Condition 7.	-	-	-	-	-	X	-	-
14. Replace card A09 and try Condition 7 again.	-	-	-	-	-	-	1	-
15. The ±42 V distribution checks out OK. Go to DLT 1, if required, to complete Power Up diagnostic.	-	-	-	-	-	-	-	X
16. Call Field Support.	-	2	2	-	2	-	2	-

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DLT 6	FIRST SEEK	(sheet 1 of 2)

Warning: None

Enters from: DLTs 1 through 5

Procedures: See sheet 2

References: Logic Diagrams

Exits to: DLT 7 or sheet 2 of this DLT

Assumption:

START light is on, drive is up to speed.

CONDITIONS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. READY light comes on, signifying successful First Seek?	Y	N	N	N	N	N		
2. First Seek attempted?	-	N	N	N	N	N		
3. Check that Heads Loaded switch is transferring:								
a) Press START sw to stop disk. Do not turn off breakers.								
b) Manually push voice coil forward to move heads off unloading ramp. Does voice coil attempt to retract?	-	-	N	Y	Y	Y		
4. Check forward drive to voice coil:								
a) Disconnect wire from term. 2 of v.c. (one closest to magnet assy).								
b) Attach + lead of VOM to disconnected wire, com. lead to logic gnd.								
c) Press START.								
d) Wait for 15-20 second up-to-speed timeout to expire and then chk VOM. Does VOM read approx +40 V?	-	-	-	-	N	Y		

ACTIONS								
1. No problem. Go to DLT 7.	X	-	-	-	-	-		
2. Go to Condition 3.	-	X	-	-	-	-		
3. Suspect leads to (or contacts in) Em. Retract Relay A9K2.	-	-	1	-	-	-		
4. Suspect open voice coil.	-	-	2	-	-	-		
5. Replace Heads Loaded switch.	-	-	3	-	-	-		
6. Replace power amp.	-	-	4	-	6	-		
7. Hds Loaded sw OK. Go to Condition 4 to chk fwd drive on v.c.	-	-	-	X	-	-		
8. Suspect card A09 (pwr amp control).	-	-	-	-	1	-		
9. Suspect cards A11, A03 (direction control).	-	-	-	-	2	-		
10. Suspect card A12 (summing amp).	-	-	-	-	3	-		
11. Suspect card A13 (diff cntr, CAR).	-	-	-	-	4	-		
12. Suspect card A05 (speed control) and -XPN board.	-	-	-	-	5	-		
13. Voice coil should attempt First Seek when up-to-speed timeout expires. Go to Condition 5 on sheet 2.	-	-	-	-	-	X		
14. Call Field Support.	-	-	5	-	7	-		

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DLT 6 FIRST SEEK (sheet 2 of 2)

Warning: None

Enters from: Sheet 1

Procedures: Trk Servo Amplitude Check (section 3C); Hd-Arm Repl.(3D), Hd Alignment(3B)

References: Logic Diagrams

Exits to: DLT 7

Assumption: START light is on, drive is up to speed.

CONDITIONS	7	8	9	10	11	12	13
1. READY light signifies successful First Seek? (From sheet 1.)	N	N	N	N	N	N	N
2. First Seek attempted? (From sheet 1.)	Y	Y	Y	Y	Y	Y	Y
5. Drive attempts First Seek, then unloads?	Y	Y	Y	Y	-	-	-
6. Servo preamp input to card A10 OK?	-	N	Y	Y	-	-	-
7. Track Servo signal present at A10-09B (output pin)?	-	-	N	Y	-	-	-
8. Drive seeks to forward mechanical stop, FAULT light comes on (+42 fuse blows), but heads don't unload--unit cannot power down?	-	-	-	-	Y	-	-
9. Drive seeks to fwd mech stop, waits for FAULT light (+42 fuse blows), then retracts?	-	-	-	-	-	Y	-
10. Drive loads heads, hesitates, then creeps to fwd EOT?	-	-	-	-	-	-	Y
ACTIONS							
15. Not sensing dibits. Chk servo preamp input to A10 (Trk Servo Ampl Chk), then go to Condition 6.	X	-	-	-	-	-	-
16. Chk for continuity/gnds in servo preamp cable (input to A10).	-	1	-	-	-	-	-
17. Replace servo preamp.	-	2	-	-	-	-	-
18. Replace and align servo head (see Procedures, above).	-	3	-	-	-	-	-
19. Suspect card A10.	-	-	1	-	-	-	-
20. Suspect propagation of Track Servo signal through cards A11, A09, A12, A04.	-	-	-	1	-	-	-
21. Replace power amp.	-	-	-	-	3	2	-
22. Suspect velocity transducer and attendant logic on card A12 (cards A04, A11 also involved, but checked in Action 23).	-	-	-	-	2	-	-
23. Suspect Fine Enable logic on cards A11, A04.	-	-	-	-	1	-	1
24. Suspect cards A12, A10, A09.	-	-	-	-	-	1	2
25. Call Field Support.	-	4	2	2	4	3	3

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DLT 7 RTZ/CONTINUOUS SEEKS

Warning: None

Enters from: DLT 6

Procedures: None

References: Logic Diagrams

Exits to: DLT 8

Assumption:
1. FTU connected to drive via A and B cables
2. Remote/Local switch on drive (if present) set to REMOTE
3. LAP installed and drive selected from FTU.

CONDITIONS	1	2	3	4	5	6	7	8
1. Actuate RTZ switch on FTU. RTZ successful?	Y	N	-	-	-			
2. Set up and perform continuous seeks:								
a) Set FTU Auto Function switch to CONT.								
b) Set all FTU cylinder address switches "off" (down).								
c) Actuate FTU's START switch.								
d) Sequentially select/deselect cyl addr switches (1,2,4...256,								
512) to step actuator between track 0 and the track indicated								
by the active cyl addr switch.								
Is Continuous Seek successful?	Y	-	N	-	-			
3. Select track (cyl) 822:								
• Set cyl addr switches to 366_{16} (1466_8).								
Is seek to track 822 successful?	Y	-	-	N	-			
4. Select track (cyl) 823:								
• Set cyl addr switches to 367_{16} (1467_8).								
Does Seek Error occur when attempting to go to track 823?	Y	-	-	-	N			
ACTIONS								
1. Seeks executed properly--proceed to DLT 8.	X	-	-	-	-			
2. Replace A03 card (Access Control and Sector Decode).	-	1	1	1	1			
3. Replace A04 card (Access Control 1).	-	2	-	-	-			
4. Replace A11 card (Access Control 2).	-	3	-	-	-			
5. Replace A12 card (D/A Function Generator).	-	4	3	3	3			
6. Replace A07 card (Receivers).	-	5	4	4	4			
7. Replace A13 card (Difference Counter and Control).	-	-	2	2	2			
8. Replace A02 card (RPS Steering, et al).	-	6	5	5	5			
9. Call Field Support.	-	7	6	6	6			

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DLT 8	WRITE
Warning:	None
Enters from:	DLT 7
Procedures:	None
References:	Logic diagrams
Exits to:	DLT 9
Assumption:	TB303 FTU connected to drive (REMOTE operation). FTU's RD/ACC/WR switch set to WR position.

CONDITIONS	1	2	3	4	5	6	7	8	9	10	11	12
1. FAULT indication given when drive is connected to controller but not when connected to FTU?	N	Y	N	N	N	N	N	N	N	N		
2. FAULT light on FTU panel comes on?	N	-	Y	Y	Y	Y	Y	Y	Y	Y		
3. FAULT light on SMD panel comes on?	N	-	N	Y	Y	Y	Y	Y	Y	Y		
4. Is Fault limited to certain groups of contiguous addresses?	-	-	-	-	Y	N	-	-	-	-		
5. Check LEDs on back of Operator panel (Ass'y A10):												
a) WRT FLT on?	-	-	-	-	-	-	Y	-	-	-		
b) HD SEL FLT on?	-	-	-	-	-	-	-	Y	-	-		
c) W · R FLT on?	-	-	-	-	-	-	-	-	Y	-		
d) $\overline{\text{ON CYL}}$ · (W + R) on?	-	-	-	-	-	-	-	-	-	Y		
ACTIONS												
1. No problem--proceed to DLT 9.	X	-	-	-	-	-	-	-	-	-		
2. Check that Write Protect switches are OFF.	-	X	-	-	-	-	-	-	-	-		
3. Chk that +5 V is available. If voltage OK, replace Operator Panel.	-	-	X	-	-	-	-	-	-	-		
4. Go to Condition 4.	-	-	-	X	-	-	-	-	-	-		
5. Replace A13 card (CAR bits).	-	-	-	-	1	-	-	-	-	-		
6. Go to Condition 5.	-	-	-	-	-	X	-	-	-	-		
7. Check that the OFFSET switch on FTU panel is "off" (Center position).	-	-	-	-	-	-	1	1	1	1		
8. Replace A01 card (Write PLO).	-	-	-	-	-	-	2	-	-	-		
9. Replace A14 card (NRZ → MFM).	-	-	-	-	-	-	3	-	-	-		
10. Replace A07 card (Rcurs).	-	-	-	-	2	-	4	2	2	-		
11. Replace A02 card (RPS et al).	-	-	-	-	3	-	5	3	3	2		
12. REplace A06 card (Xmtrs).	-	-	-	-	-	-	6	4	4	3		
13. Replace A05 card (Write Protect).	-	-	-	-	-	-	7	-	5	4		
14. Replace A04 card (On Cyl).	-	-	-	-	-	-	-	-	-	5		
15. Replace Write Driver card on assembly A5.	-	-	-	-	-	-	8	-	6	6		
16. Replace Read Amp card on assembly A5.	-	-	-	-	-	-	-	5	-	-		
17. Call Field Support.	-	-	-	-	4	-	9	6	7	7		

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DLT 9	READ
Warning:	None
Enters from:	DLT 7
Procedures:	Head Alignment
References:	Logic diagrams
Exits to:	DLT 10
Assumption:	TB303 FTU connected to drive (REMOTE operation). FTU's RD/ACC/WR switch set to RD position.

CONDITIONS	1	2	3	4	5	6	7	8
1. Was data read properly?	Y	N	N	N	N			
2. Is ALT/ONES switch on FTU set to read the data pattern previously written on the disk?	-	N	Y	-	-			
3. Is NRZ/MFM switch on FTU set correctly for data being received from drive under test?	-	-	Y	N	-			
4. Are errors head-related?	-	-	N	-	Y			

ACTIONS	1	2	3	4	5	6	7	8
1. No problem--proceed to DLT 10.	X	-	-	-	-			
2. Change switch to agree with data being read and try again.	-	X	-	X	-			
3. Replace A16 card (Read PLO)--for NRZ interface only.	-	-	1	-	-			
4. Replace A15 card (Data Latch).	-	-	2	-	-			
5. Replace A14 card (NRZ → MFM).	-	-	3	-	-			
6. Replace A11 card (Offset).	-	-	4	-	-			
7. Replace A07 card (Rcurs).	-	-	5	-	-			
8. Replace A06 card (Xmtrs).	-	-	6	-	1			
9. Replace A02 card (RPS et al).	-	-	7	-	2			
10. Check head alignment per maintenance procedures.	-	-	8	-	3			
11. Replace Hd Sel/Rd Amp card on assembly A5.	-	-	9	-	-			
12. Replace Faulty Head(s) and perform Head Alignment.	-	-	-	-	4			
13. Call Field Support.	-	-	10	-	5			

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DLT 10	POWER DOWN
Warning:	None
Enters from:	DLT 9
Procedures:	None
References:	Logic diagrams
Exits to:	None (diagnostics completed)
Assumption:	Remote operation--Attempt to power-down the drive from the FTU Local operation--Press START switch to extinguish START light and power-down the drive.

CONDITIONS	1	2	3	4	5	6	7	8
1. START light on SMD goes out? (LOCAL mode only.)	Y	Y	Y	Y	N			
2. Heads unload?	Y	Y	Y	N	-			
3. Drive motor brakes to a stop.	Y	N	N	-	-			
4. Drive motor coasts to a stop.	N	N	Y	-	-			
ACTIONS								
1. None req'd--diagnostics completed satisfactorily.	X	-	-	-	-			
2. Chk deck interlock switch (or wiring) for grounds.	-	1	-	-	-			
3. Chk that Heads Loaded switch has transferred (PA02-4A should be at ground).	-	2	-	-	-			
4. Replace BXPN brd (ass'y A11) or relay brd (ass'y A4) as applicable.	-	3	2	-	-			
5. Chk hysteresis brake and intervening connectors (see logic diagrams); if OK, go to next recommended Action.	-	-	1	-	-			
6. Replace A03 card (RTZ Latch).	-	-	-	1	-			
7. Replace A12 card (Summing Amp).	-	-	-	2	-			
8. Replace A09 card (Power Amp Control).	-	-	-	3	-			
9. Suspect base of Q1 on operator panel (-ZYN card) grounded. Check associated components on -ZYN card.	-	-	-	-	1			
10. Call Field Support.	-	4	3	4	2			

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PROCEDURES

PROCEDURE A: CHECKING DC VOLTAGES

Procedure A is a supplement to the Power System Checks procedure given in section 3C of this manual. In addition to defining voltage checkpoints for a normal-load situation, procedure A also defines checkpoints on the power supply module only. These are useful in the event that the dc loads have been disconnected (by separating P/J1) for checking, repairing, or replacing a power supply.

NOTE

Output voltage from the +5 V and -5 V regulated supplies will fall to 0 V when the load is removed. As implied in table B-3, no-load readings on these two supplies will prove fruitless.

Bear in mind that the ±5 and ±12 voltages, the latter being derived from the basic ±20 V supply, are not fused. Overloads or shorts in these networks (or the supplies themselves) may trip the POWER SUPPLY breaker, killing all dc voltages.

Voltage readings in table B-3 may be obtained by using either a standard (needle-type) or digital volt-ohmmeter.

The usual symptoms for a malfunctioning power supply are given in table B-4.

TABLE B-3. CHECKING DC VOLTAGES

Voltage to be Checked	Volt-Ohmmeter Connections								Voltage Readings
	Normal Load (P/J1 Mated)				No Load (P/J1 Separated)				
	+ Probe		- Probe		+ Probe		- Probe		
	Ass'y	Point	Ass'y	Point	Ass'y	Point	Ass'y	Point	
+5	A0	+5	A0	GND	Cannot be checked				+5.0 V (±0.05 V)
-5	A0	GND	A0	-5	Cannot be checked				+5.0 V (±0.05 V)
+12	A3	CR5	A0	GND	A3	CR5	A3	8	+12.0 V (±0.3 V)
-12	A0	GND	A3	CR6	A3	8	A3	CR6	+12.0 V (±0.3 V)
+20	A0	+20	A0	GND	A3	F1	A3	8	+20.0 V (±1.0 V)
-20	A0	GND	A0	-20	A3	8	A3	F2	+20.0 V (±1.0 V)
+42	A8	R2-2	A8	R3-2	A3	F3	A3	8	+42.0 V (±2.0 V)
-42	A8	R3-2	A8	R1-2	A3	8	A3	F4	+42.0 V (±2.0 V)

PROCEDURE:

1. Turn off POWER SUPPLY breaker (CB2).

2. Raise logic chassis (assembly A0) to maintenance position to give access to voltage Fastons.

3. Be sure that P/J1 is mated to provide loads for the supplies to be checked.

4. Turn on CB2.

5. Using the VOM probe connections from the NORMAL LOAD columns of table B-3, check each supply voltage.

6. If any voltage is outside the tolerance given in table B-3, or is non-existent, proceed to check the no-load voltages by separating P/J1 and using the probe connections shown in the NO LOAD columns of the table. (Turn off CB2 before separating P/J1.)

7. If the ±5 V readings are outside the tolerances given in table B-3, adjust those voltages as described under the Plus and Minus 5 Volt Regulators procedure in section 3B.

8. If further maintenance is not to be performed at this time:

   a. turn off CB2

   b. reconnect P/J1

   c. return logic chassis to its normal position

   d. turn on CB2 to restore normal drive functions.

TABLE B-4. FAILURE SYMPTOMS IN POWER SUPPLY

Symptom	Probable Cause	Remedy
1. Noticeable ripple at output (checked with oscilloscope)	Open diode or open filter capacitor	If in A1 or A2, replace errant regulator. If in ±20 V or ±42 V supply, troubleshoot using procedures from Useful Troubleshooting Aids section and repair the supply, or replace assembly A3.
2. Less than specified output (ac input OK)	Shorted diode or shorted filter capacitor	
3. Output decreases significantly when load is connected	Open bleeder register	Bleeders are not spare-parts item; replace the affected assembly.

PROCEDURE B: CHECKING AC INPUTS TO POWER SUPPLIES

This procedure verifies that a given secondary winding of ferroresonant transformer T1 has the requisite voltage to drive its associated power supply. The procedure should be performed whenever a power supply voltage failure is encountered, in order to ascertain whether the supply or the transformer is at fault. The procedure should also be performed after a supply has been repaired or replaced, and before the ac input leads to that supply have been reconnected, to ensure that the previously malfunctioning supply did not damage the transformer.

SPECIAL NOTE

The ±5 V, ±20 V, and ±42 V power supplies constitute the load for transformer T1 and its tuning capacitor, C8. When using procedure B to check the ac input to these supplies, do not disconnect more than one set of ac input leads at a time. To do so may cause T1 to go into oscillation, producing meaningless readings. Under no circumstances should you attempt these ac readings by separating P/J100 and checking the transformer side of that connector.

Table B-5 shows the oscilloscope connections for monitoring the ac input to the supplies (output from T1); figure B-7 shows the square-wave input and specified voltages, the latter also given in the table.

1. Turn off the POWER SUPPLY breaker.

2. Assure that the T1 leads to be monitored for ac level are disconnected from their power supply input points. (Remove the ring-tongue leads from the AC terminals of assembly A1 or A2, as required, or unsolder the leads to the ±20 V or ±42 V supplies on PC-board assembly A3 as shown in figure B-5.)

3. Plug in the test scope and set the trigger control to LINE. Turn on the scope and when the horizontal trace becomes visible, center it on the graticule.

4. If the ac input to the -5V supply is to be checked, connect the scope's ground probe to the -OUT terminal of assembly

TABLE B-5. CHECKING AC INPUTS TO POWER SUPPLIES

Supply To Be Checked For AC Input	Scope Connections				AC Input Voltage (±5%)
	+ Probe		GND Probe		
	Ass'y	Point	Ass'y	Point	
+5	A1	AC (either)	A1	-OUT	11 V
-5	A2	AC (either)	A2	-OUT	11 V
±20	A3	3 or 5	A1	-OUT	22 V
±42	A3	11 or 13	A1	-OUT	44 V

OSCILLOSCOPE SETTINGS

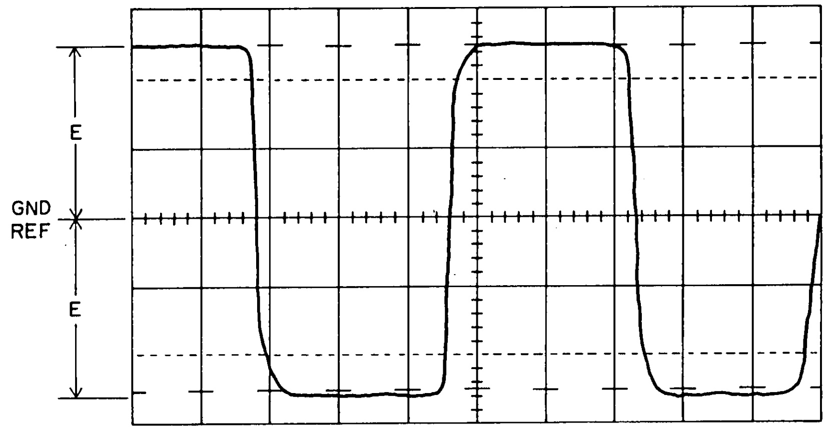
SCOPE GND TO LOGIC GND (1)

VOLTS/DIV
CH 1 - (2)
CH 2 - NA

TIME/DIV
A- VARY FOR CONVENIENT TRACE
B - NA

TRIGGERING
A (USE X1 PROBE)- LINE
B (USE X PROBE)- NA

PROBE CONNECTIONS
CH 1 (USE X1 PROBE)- (3)
CH 2 (USE X PROBE)- NA



(1) SCOPE GROUND ON -OUT TERMINAL OF A2 FOR -5 V, ON -OUT TERMINAL OF A1 FOR OTHERS.

(2) ±5 V: E=11 V
±20 V: E=22 V
±42 V: E=44 V

(3) USE AC TERMINALS FOR ± 5 V SUPPLIES; SEE FIGURE A-5 FOR OTHERS.

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Figure B-7. T1 Input to Power Supplies

A2. For all other supplies, connect the ground probe to -OUT of the +5 V regulator (assembly A1).

5. Turn on the POWER SUPPLY breaker.

6. Connect the scope's + probe (i.e., CH1 or CH2, depending upon scope set-up) to either of the ac input leads from T1.

7. Adjust scope TIME/DIV control to secure a stable square-wave trace (ref: figure B-7).

8. Adjust scope VOLTS/DIV control to allow easiest mental reckoning of the voltage represented by the trace, as shown against the graticule lines.

9. Record the voltage (or make a mental note, if you trust your visual memory) from the ground reference line on the graticule to the top and bottom of the trace (two readings) as indicated by "E" in figure B-7.

10. Repeat step 9 with the + probe connected to the other ac input lead from T1.

11. If both steps 9 and 10 show a symmetrical waveshape about the ground reference line (that is, all four voltage readings are the same), and are within the 5% input voltage margin specified in table B-5, T1 is OK. Replace the errant power supply as indicated by the first applicable Action in DLT 2, then go to procedure A as specified by Action 14 in DLT 2.

12. If the readings are not the same, or if they are the same but not up to the 5% margin of table B-5, the problem has to be a shorted winding in T1. (You may be able to confirm the conclusion by sniffing the transformer for evidence of burned insulation, although this is not a definitive test.)

WARNING

Tuning capacitor C8 is charged with 440 volts. Treat it with respect!

13. Replace T1: Turn off POWER SUPPLY breaker, remove scope leads, discharge C8 and remove leads from T1, separate P/J100, disconnect T1 leads (two) from TB1. Install the new transformer by reversing the procedure.

14. Check the new transformer by repeating steps 5 through 11.

NOTE

Replacing T1 does not mean you're home free. A bad power supply could have caused the transformer failure. Therefore, continue with procedure A.

PROCEDURE C: TROUBLESHOOTING HEAT-GENERATED PROBLEMS

CAUTION

If the heads perform an unscheduled retract and the START and FAULT lights are both off, immediately turn off the POWER SUPPLY breaker; you have dropped +5 V and run the risk of burning up the voice coil. Only after you've shut off dc power should you check to see if the power-down resulted from a failure on the ac line. (Hint: is the blower still on?)

If you commit the above CAUTION to memory and act instinctively upon it, you may one day save yourself a lot of trouble; failure of the +5 V supply is a common cause for abnormal shut-downs.

Heat-related problems are easy to diagnose: they occur only when the drive gets hot, and they disappear when the drive has had a chance to cool off. If you suspect a problem is heat-related, let the drive cool down, then note the failure (or more accurately, the absence of the failure) when the drive is started up again. Often the troubleshooting period can be shortened by applying artificial heat to the suspected area (a hair dryer is useful here). Once you've diagnosed the problem, correct it as you would any other malfunction.

Heat problems are of two types -- those originating in the power supplies and those developing in the various loads. Should a load fault take out a 20 V or 42 V fuse, the course is clear: simply refer to the applicable "load" DLT. If the load does not pop a fuse but merely brings up a FAULT light (on the back of the operator panel), the table below should offer a starting point for correcting the problem. (If the +5 V supply goes, of course, the fault light won't work.)

FAULT	PROBLEM RELATED TO
Voltage (except +5 V)	A05
On Cyl·(W+R)	A04, A05, A07
Write	A05, A07, A13, A14, A5 assy (Write Driver board)
W·R	A05, A07
Hd Sel	A05, A06 A5 assy (Hd Sel/Rd Amp board)

Losing ±5 V can be bothersome because those supplies, being unfused, can't tell you whether the source of the problem is in the supply or the load. Moreover, they maintain a uniform output voltage right up to their current limit, and then drop to 0V when that limit is exceeded. Should this happen, check to see if the supply itself is the culprit by disconnecting the 5 V load. If the voltage returns to 5 V, the fault lies in the load, not the supply. (Refer to DLT 3 for locating specific faults in the dc load.)

PROCEDURE D: PIN-POINTING VOLTAGE FAULTS IN LOGIC CARDS

This procedure has been written for checking out the ±5 V and +12 V loads in the logic chassis (see DLT 3), but is just as applicable to the -12 V, ±20 V, and ±42 V circuits on any PC board, be it in the logic chassis or one of the other assemblies.

1. Turn off the POWER SUPPLY breaker.
2. Raise logic chassis to upright (maintenance) position if this has not already been done.
3. Remove all cards from the logic chassis.

You are now ready to start putting the cards back in, checking for load faults after each has been reinstalled. You'll probably find it easiest to install the top card (A01) first.

4. Before inserting the card, examine both sides for evidence of arcing across the foil. (Since you've come to this procedure because there is a voltage fault, visual examination can't but help in detecting the miscreant board.) Often the carbon residue around an arc area can be removed with an alcohol swab and the card won't give any more trouble.
5. Insert the card properly (especially important for the first one!) and turn on the POWER SUPPLY breaker to check the integrity of the load.
6. If the breaker trips, replace the card just installed with a fresh one from the spare parts bin and try the test again.
7. If the breaker holds (card is OK), turn it off, and selecting the next card, repeat steps 4 through 7.
8. When all cards have been checked (and replaced as required), return to Condition 5 in DLT 3 to complete the dc-load checkout.

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