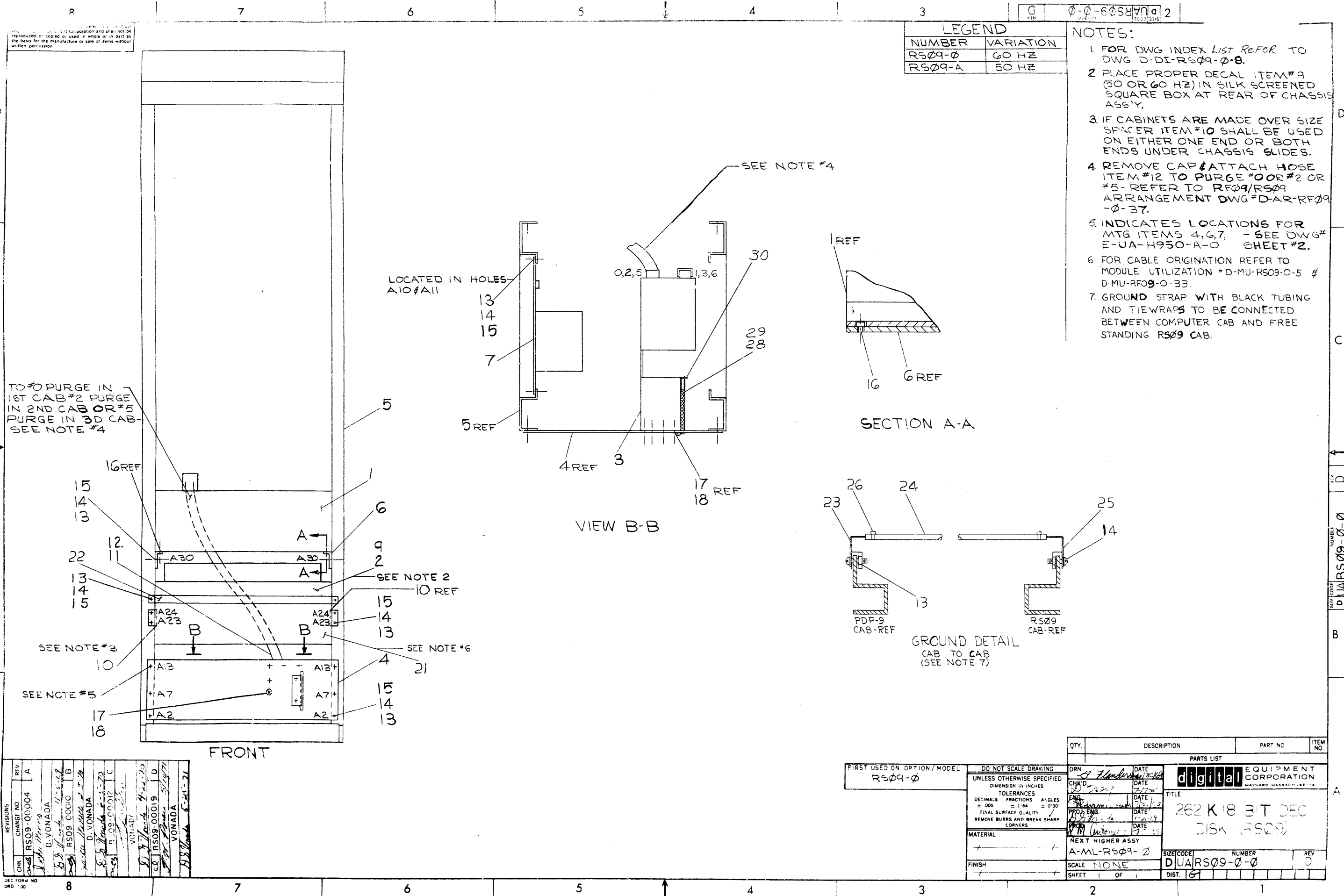


MASTER DRAWING LIST

MASTER DRAWING LIST

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A-PL-RS09-A-0		A	2	262 K 18 BIT DEC DISK PL	
D-DI-RS09-0-8		E	2	DWG INDEX LIST RS09-0	
A-ML-RS09-P-0		REF	1	CHASSIS ASSY WITH LOGIC	
A-ML-RS08-MA-0		REF	1	DISK ASSY 50 HZ	
D-BS-RS09-0-1		A	1	CONTROL 1	
D-BS-RS09-0-2			1	TRACK SELECT MATRIX 0	
D-BS-RS09-0-3			1	TRACK SELECT MATRIX 1	
D-BS-RS09-0-4		A	1	CONTROL UNIT CONNECTORS	
D-BS-RS09-0-5		A	1	CONTROL 2	
K-WL-RS09-0-WL		C		WIRE LIST	
D-MU-RS09-0- 9		A	1	MODULE UTILIZATION	
A-PL-RS09-0- 9		A	1	MODULE UTILIZATION LIST	
D-IC-RS09-0-7				LOC CHART-TRACK HEAD CABLE	
D-IC-RF09-0-35		REF	3	POWER WIRING AC/DC	
D-AR-RF09-0-37		REF	1	RF09/RS09 ARRANGEMENT	
A-WL-RS09-0-10			4	HAND WRAP WIRE LIST	
C-WD-RS09-0-11		A	1	HAND WRAP ROUTING	
A-SP-RS09-0-12			11	RS09 CALIBRATION PROCEDURE	

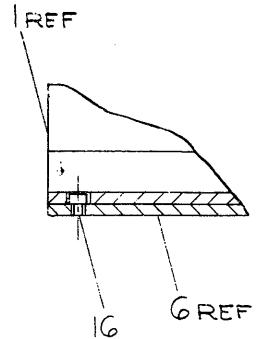


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TO #0 PURGE IN 1ST CAB #2 PURGE IN 2ND CAB OR #5 PURGE IN 3RD CAB - SEE NOTE #4

LOCATED IN HOLES A10 & A11

SEE NOTE #4



SECTION A-A

VIEW B-B

SEE NOTE 2
10 REF

SEE NOTE #6
21

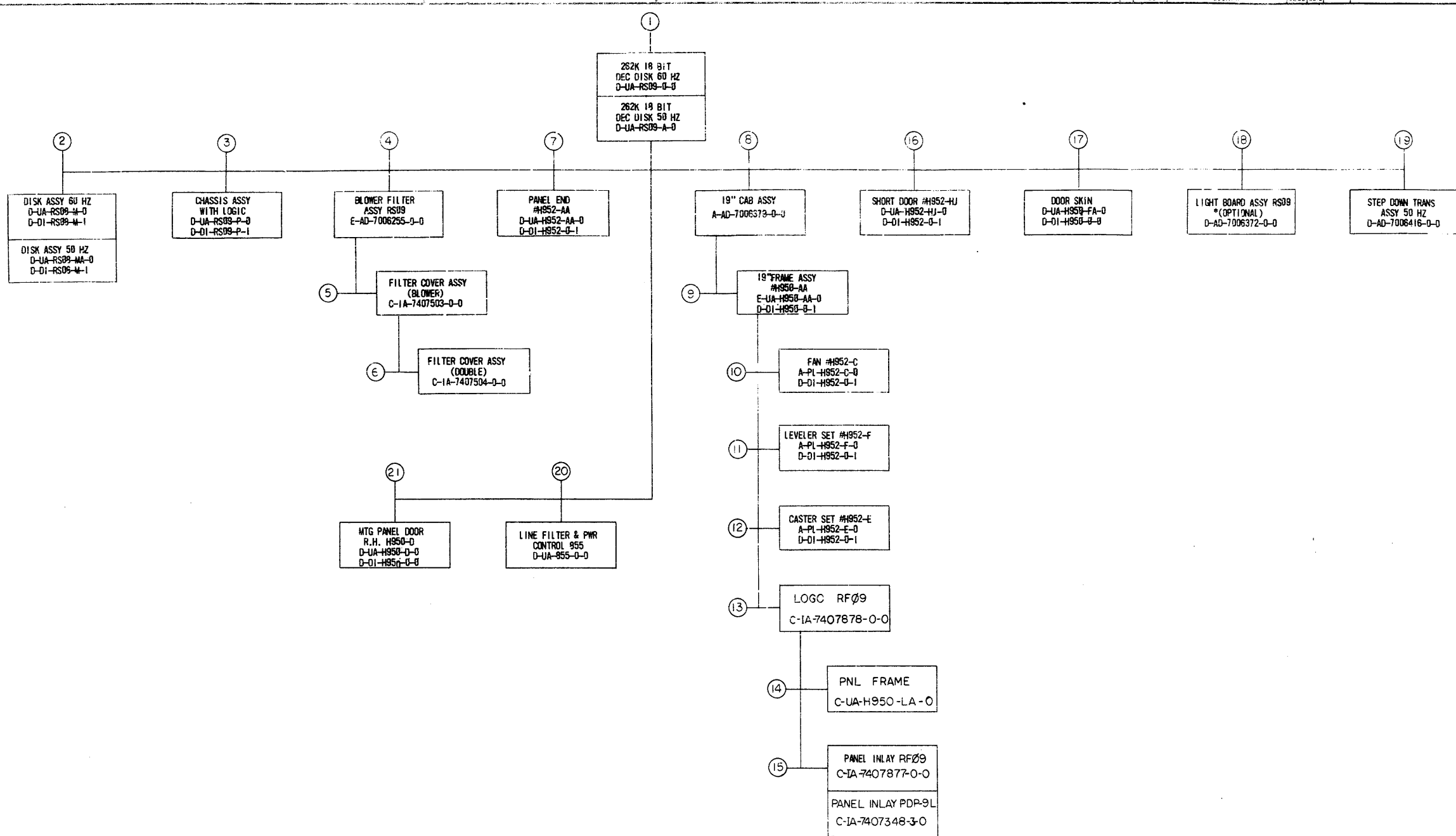
SEE NOTE #3
10

SEE NOTE #5
17

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C		3	11-1-68	D. VONADA	
D		4	11-1-68	D. VONADA	
E		5	11-1-68	D. VONADA	
F		6	11-1-68	D. VONADA	
G		7	11-1-68	D. VONADA	
H		8	11-1-68	D. VONADA	
I		9	11-1-68	D. VONADA	
J		10	11-1-68	D. VONADA	
K		11	11-1-68	D. VONADA	
L		12	11-1-68	D. VONADA	
M		13	11-1-68	D. VONADA	
N		14	11-1-68	D. VONADA	
O		15	11-1-68	D. VONADA	
P		16	11-1-68	D. VONADA	
Q		17	11-1-68	D. VONADA	
R		18	11-1-68	D. VONADA	
S		19	11-1-68	D. VONADA	
T		20	11-1-68	D. VONADA	
U		21	11-1-68	D. VONADA	
V		22	11-1-68	D. VONADA	
W		23	11-1-68	D. VONADA	
X		24	11-1-68	D. VONADA	
Y		25	11-1-68	D. VONADA	
Z		26	11-1-68	D. VONADA	

FIRST USED ON OPTION/ MODEL RS09-0		DO NOT SCALE DRAWING UNLESS OTHERWISE SPECIFIED DIMENSION IN INCHES TOLERANCES DECIMALS FRACTIONS ANGLES ± .005 ± .164 ± 0°30' FINAL SURFACE QUALITY REMOVE BURRS AND BREAK SHARP CORNERS		DRN. DATE CHKD. DATE ENG. DATE PROJ. ENG. DATE APP. DATE		EQUIPMENT CORPORATION TITLE 262 K 18 BIT DEC DISK (RS09)	
MATERIAL +-----+ FINISH +-----+		NEXT HIGHER ASSY A-ML-RS09-0		SCALE NONE		REV D	
SHEET OF		DIST. 18		NUMBER		REV	

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REV	CHANGE NO	REV
A	1	1
B	2	2
C	3	3
D	4	4
E	5	5
F	6	6
G	7	7
H	8	8
I	9	9
J	10	10
K	11	11
L	12	12
M	13	13
N	14	14
O	15	15
P	16	16
Q	17	17
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S	19	19
T	20	20
U	21	21

DEC FORM NO
DRC 100

FIRST USED ON OPTION/MODEL
RS09-0

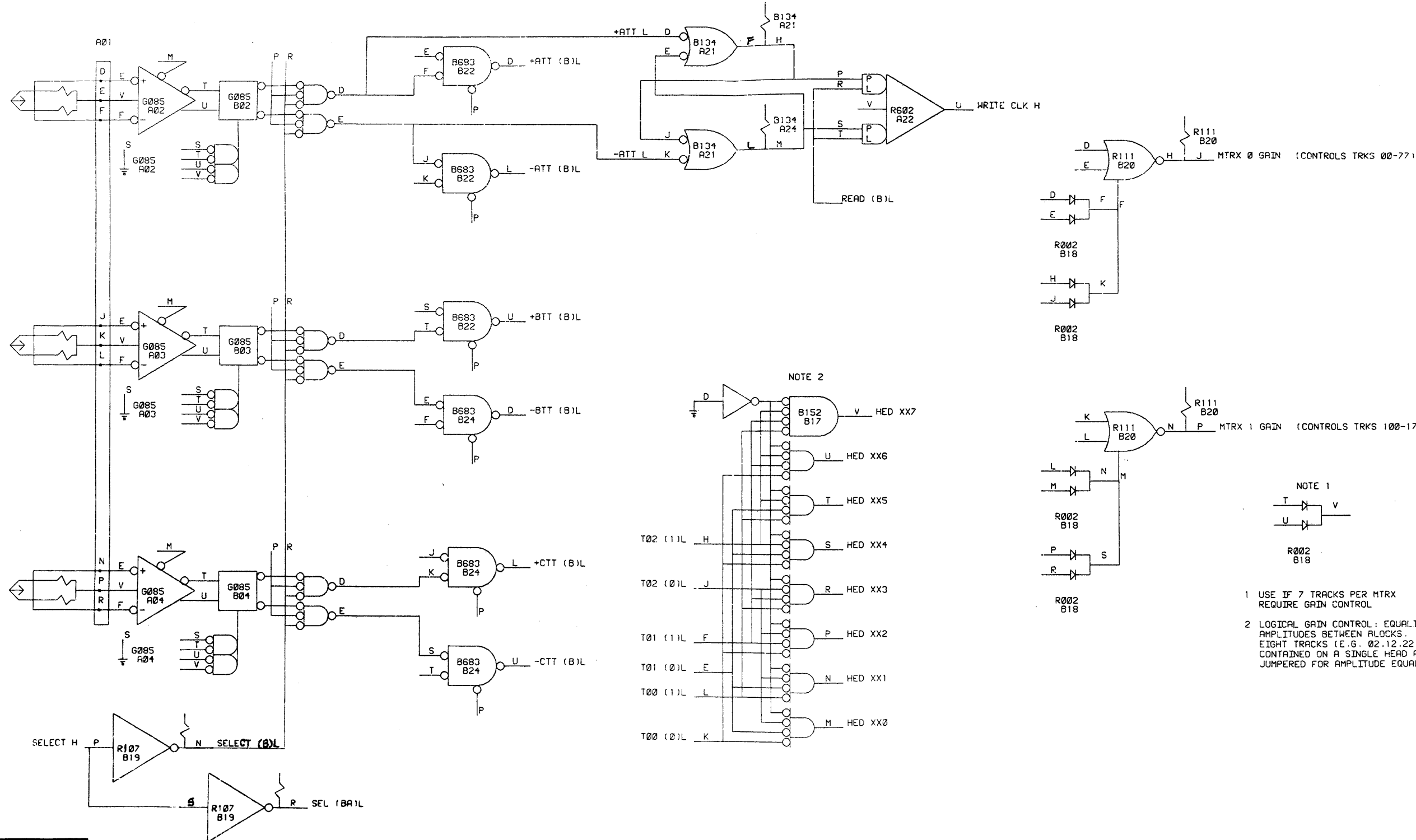
DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED
DIMENSION IN INCHES
TOLERANCES
DECIMALS FRACTIONS ANGLES
± .005 ± 1/64 ± 0°30'
FINAL SURFACE QUALITY
REMOVE BURRS AND BREAK SHARP CORNERS
MATERIAL
FINISH

QTY	DESCRIPTION	PART NO	ITEM NO
PARTS LIST			
DRN	DATE	TITLE	
CHG	DATE	DRAWING INDEX	
ENG	DATE	LIST RS09-C	
PROJ	DATE	NEXT HIGHER ASSY	
PROJ	DATE	A-ML-RS09-0-	
SCALE	+	+	+
SHEET	1	OF 2	DIST

FIRST USED ON OPTION/MODEL _____

QTY.	DESCRIPTION	PART NO.	ITEM NO.
PARTS LIST			
DRN.	DATE	TITLE	
CHK'D.	DATE	TITLE	
ENG.	DATE	TITLE	
PROD. ENG.	DATE	TITLE	
PROB.	DATE	TITLE	
NEXT HIGHER ASSY		TITLE	
SCALE		REV.	
SHEET		REV.	

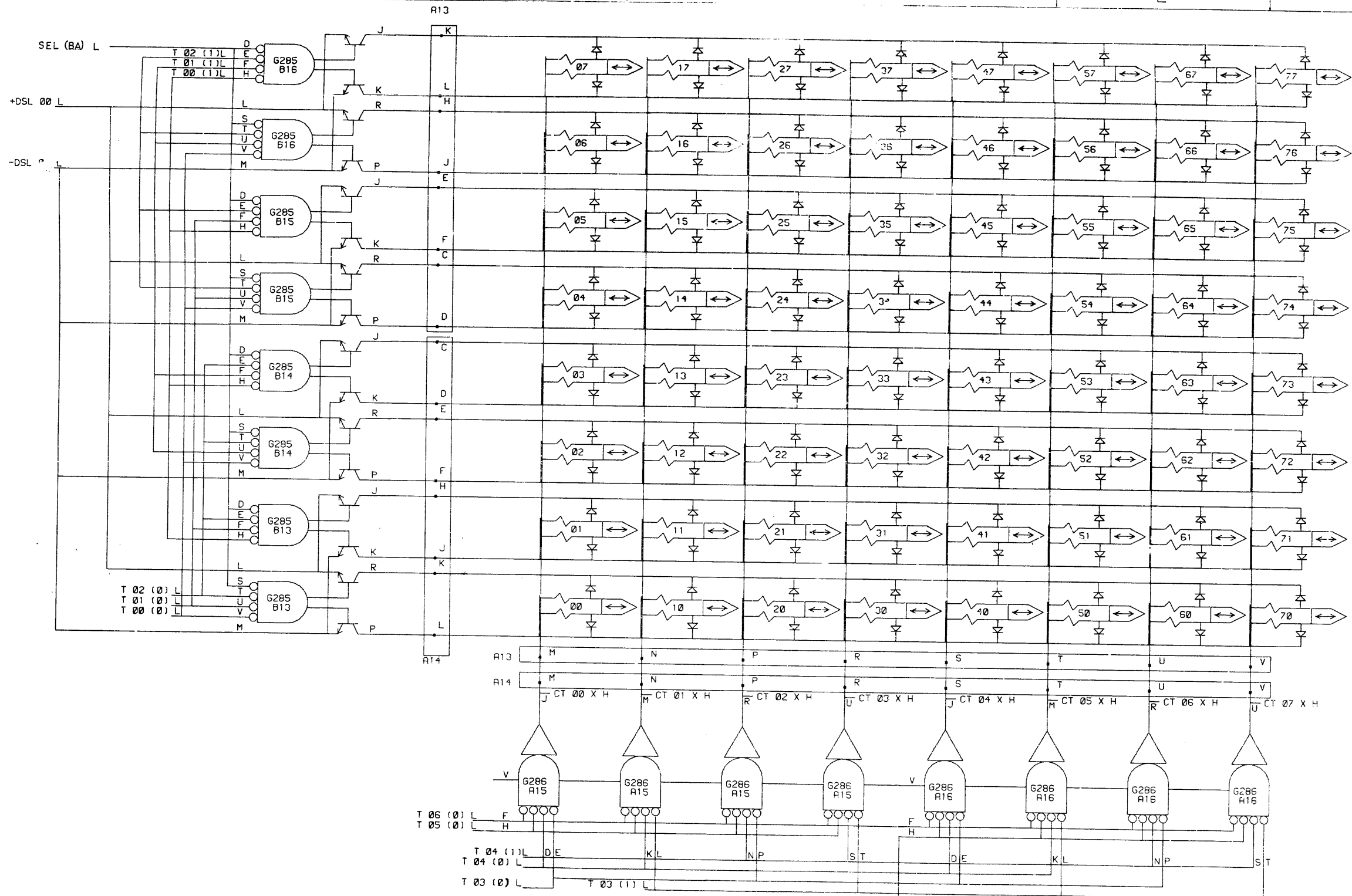
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REVISIONS		
CHK	CHANGE NO.	REV.
✓	RS09-00018	A

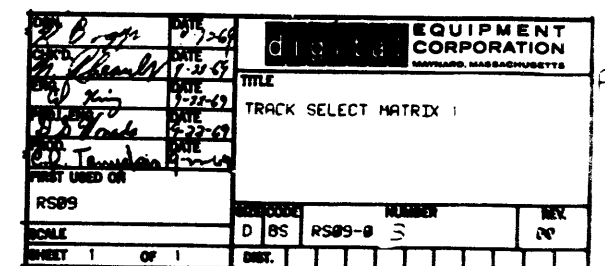
DRN. K B06GS	DATE 9/22/69	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
CHK'D N RHEULT	DATE 9/22/69		
ENG. E KING	DATE 9/22/69	TITLE CONTROL 1	
PROJ. ENG. D VONADA	DATE 9/22/69		
PROD. E TOMPKINS	DATE 9/22/69		
FIRST USED ON			
RS09		SIZE CODE D BS	NUMBER RS09-0-1
SCALE			REV. A
SHEET 1	OF 1	DIST.	

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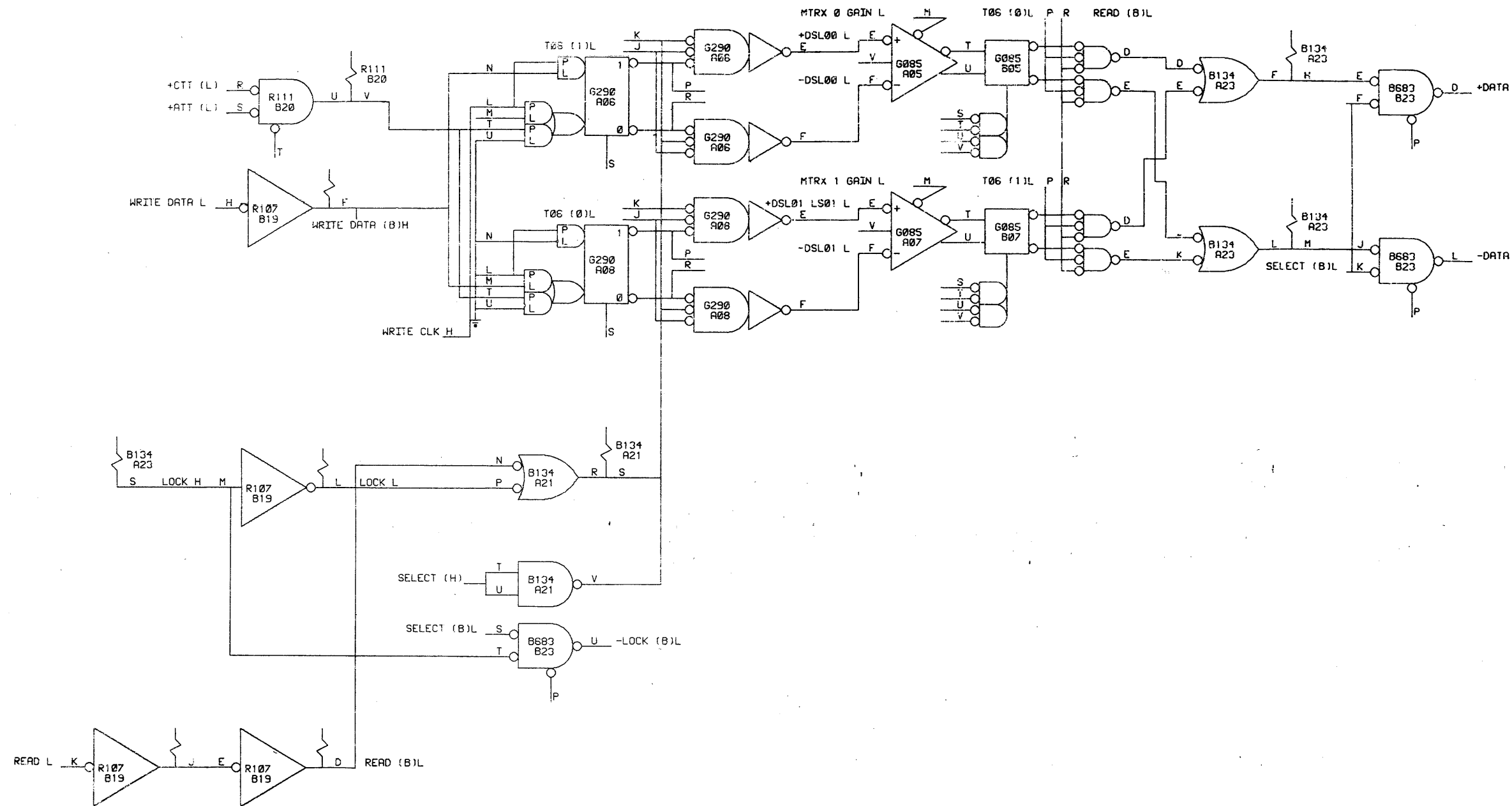


REVISIONS		
CHK	CHANGE NO.	REV.

DRN	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
CHK'D	DATE	
ENG	DATE	
PROJ/ENG	DATE	
PROD	DATE	
FIRST USED ON	DATE	TITLE
RSC9		TRACK SELECT MATRIX 0
SCALE	SIZE/CODE	NUMBER
SHEET 1 OF 1	D BS	RS09-0-2
DIST.		REV. 00



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CHK	CHANGE NO.	REV.
✓	RS09-00006	A
	12-15-69	

DRN K. BOGGS	DATE 9/22/69	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS
CHWD. M. BAULT	DATE 9/22/69	
ENG. D. KING	DATE 9/22/69	
PROJ. ENG. D. G. YONADA	DATE 9/22/69	
PROD. C. R. JIMPKINS	DATE 9/22/69	
FIRST USED ON		
RS09	SIZE CODE	NUMBER
SCALE	D BS	RS09-0-5
SHEET 1 OF 1	REV.	A

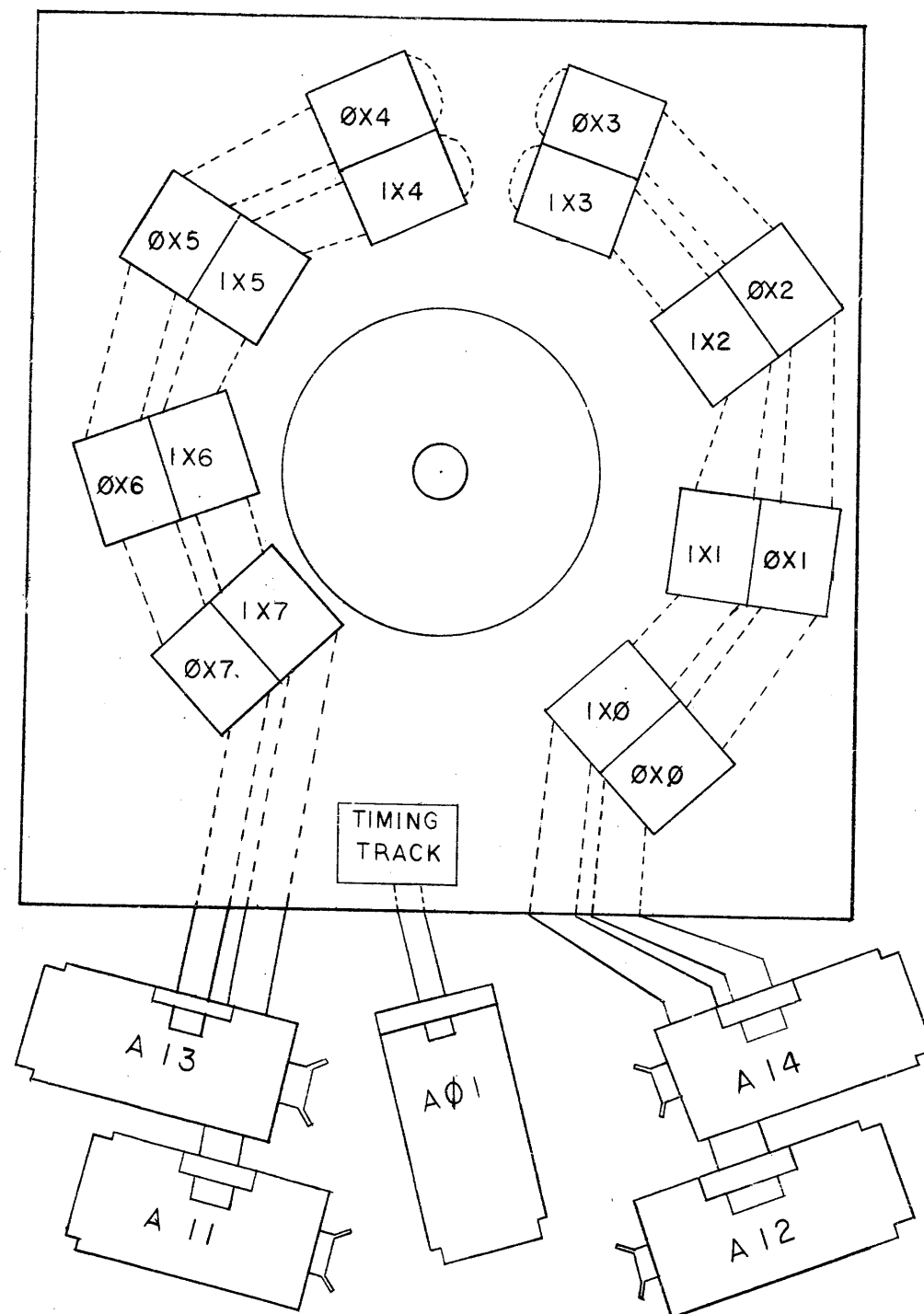
DRWG NO	REV LTR
K-WL-RS09-0-WL	C

REVISIONS			
REV LTR	ECO NO	DATE	ENG
A	RS09-00004	11-16-69	SDV
B	00009	1-16-70	SDV
C	RS09-00013	5-11-70	SDV

FIRST USED ON OPTION/MODEL RS09	DRAWN <i>CB Florida</i>	DATE 1/21/69	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	TITLE WIRE LIST			
	CHECKED <i>H. Wachman</i>	DATE 9/5/69		FOR TAPE # FILE *			
	ENG <i>E. King</i>	DATE 9-22-69		SIZE		CODE	DWG. NO.
	PROJ. ENG. <i>CB Florida</i>	DATE 9-22-69		K		WL	RS09-0-WL
	PROD <i>CB Tampa</i>	DATE 9-22-69		ASSY NO A-ML-RS09-0		REV LTR C	
SCALE			SHEET	OF	DIST.		

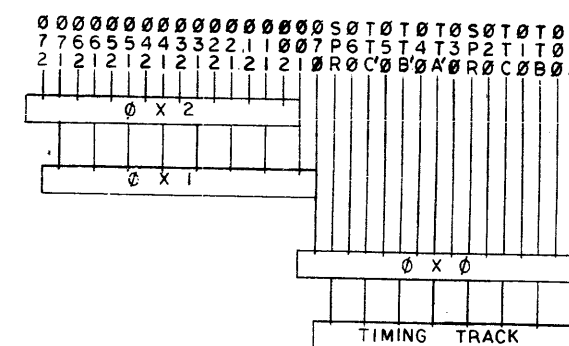
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TOP VIEW
DISK REMOVED



TRACK INTERLACE SCHEME

HEAD	INTERLACES	HEAD
T. TRACK		$\phi \times \phi$
$\phi \times 1$		$\phi \times 2$
$\phi \times 3$		$\phi \times 4$
$\phi \times 5$		$\phi \times 6$
$\phi \times 7$		$1 \times \phi$
1×1		1×2
1×3		1×4
1×5		1×6
1×7		



OUTER EDGE
ROTATION AS SHOWN

FIRST USED ON OPTION/MODEL		QTY.	DESCRIPTION	PART NO.	IT
RS09-0					
UNLESS OTHERWISE SPECIFIED		DRN	DATE	PARTS LIST	
UNLESS OTHERWISE SPECIFIED		CHRD	DATE	digital EQUIPMENT CORPORATION	
DIMENSION IN INCHES		END	DATE	MAYNARD MASSACHUSETTS	
TOLERANCES		PROBLEM	DATE	TITLE	
DECIMALS FRACTIONS ANGLES			DATE	(RS09)	
± .005 ± .125 ± .030			DATE	LOCATION CHART	
FINAL SURFACE QUALITY			DATE	TRACK, HEAD, CABLE	
REMOVE BURRS AND BREAK SHARP CORNERS			DATE		
MATERIAL		NEXT HIGHER ASSY			
		A-ML-RS09-0			
FINISH		SCALE	SIZE CODE	NUMBER	REV.
		SHEET	DIC	RS09-0-7	
		OF	DIST.		

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SIGNAL NAME	FROM PIN	TO PIN	COLOR	REMARKS
A01J	A01J	A03E	BLUE	
A01L	A01L	A03F	"	
A01N	A01N	A04E	"	
A01R	A01R	A04F	"	
A23D	A23D	B05D	"	
A23J	A23J	B05E	"	
B03D	B03D	B22T	"	
B03E	B03E	B24E	"	
B04E	B04E	B24S	"	
+CTT	B04D	B20R	"	
+CTT	B20R	B24K	"	
B07D	A23E	B07D	"	
B07E	A23K	B07E	"	
B09J	A12H	B09J	"	
B09K	A12J	B09K	"	
B09P	A12L	B09P	"	
B09R	A12K	B09R	"	

REVISIONS				DRN.	DATE	 EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS			
REV.	DATE	CHG. NO.	APP'D.	CHK'D.	DATE				
				W. Sutherland	11-4-69	TITLE GENERAL WIRING SHEET FOR SPECIAL HAND WRAP			
				ENG. Cal Kim	11-6-69				
				PROJ. ENG. J.B. Sutherland	11-5-69				
				PROD. C.P. Tamm	11-7-69				
				FIRST USED ON					
				SCALE		SIZE	CODE	NUMBER	REV.
						A	WL	RS09-0-10	
				SHEET 1	OF 4	DIST.			

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SIGNAL NAME	FROM PIN	TO PIN	COLOR	REMARKS
B10J	A12C	B10J	BLUE	
B10K	A12D	B10K	"	
B10P	A12F	B10P	"	
B10R	A12E	B10R	"	
B11J	A11E	B11J	"	
B11K	A11F	B11K	"	
B11P	A11D	B11P	"	
B11R	A11C	B11R	"	
B12J	A11K	B12J	"	
B12K	A11L	B12K	"	
B12P	A11J	B12P	"	
B12R	A11H	B12R	"	
B13J	A14H	B13J	"	
B13K	A14J	B13K	"	
B13P	B13P	A14L	"	
B13R	A14K	B13R	"	
B14J	A14C	B14J	"	
B14K	A14D	B14K	"	

REVISIONS				DRN.	DATE	 EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS			
REV.	DATE	CHG. NO.	APP'D.	CHK'D.	DATE				
				W. Sutherland	11-4-69	TITLE GENERAL WIRING SHEET FOR SPECIAL HAND WRAP			
				ENG. Cal Kim	11-6-69				
				PROJ. ENG. J.B. Sutherland	11-5-69				
				PROD. C.P. Tamm	11-7-69				
				FIRST USED ON					
				SCALE		SIZE	CODE	NUMBER	REV.
						A	WL	RS09-0-10	
				SHEET 2	OF 4	DIST.			

DEC FORM NO.
JAN 104

SIGNAL NAME		FROM PIN	TO PIN	COLOR	REMARKS
B14P	A14F	B14P	BLUE		
B14R	A14E	B14R	"		
B15J	A13E	B15J	"		
B15K	A13F	B15K	"		
B15P	A13D	B15P	"		
B15R	A13C	B15R	"		
B16J	A13K	B16J	"		
B16K	A13L	B16K	"		
B16P	A13J	B16P	"		
B16R	A13H	B16R	"		
+ATT	B02D	B20S	"		
+ATT	B20S	B22F	"		
+ATT	B22F	A21D	"		
-ATT	B02E	B22J	"		
-ATT	B22J	A21K	"		
+DSL00	A06E	B13L	"		
-DSL00	A06F	B13M	"		
+DSL01	A08E	B09L	"		
-DSL01	A08F	B09M	"		

REVISIONS			
REV.	DATE	CHG. NO.	APP'D.

DRN. E. STEVENSON	DATE 10-20-9
CHK'D. <i>W. L. L. L.</i>	DATE 11-4-69
ENG. <i>C. King</i>	DATE 11-6-69
PROJ. ENG. <i>E. S. L. L.</i>	DATE 11-5-69
PROD. <i>E. S. L. L.</i>	DATE 11-7-69
FIRST USED ON	
SCALE	
SHEET 3 OF 4	

dogmoran EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE

GENERAL WIRING SHEET

FOR

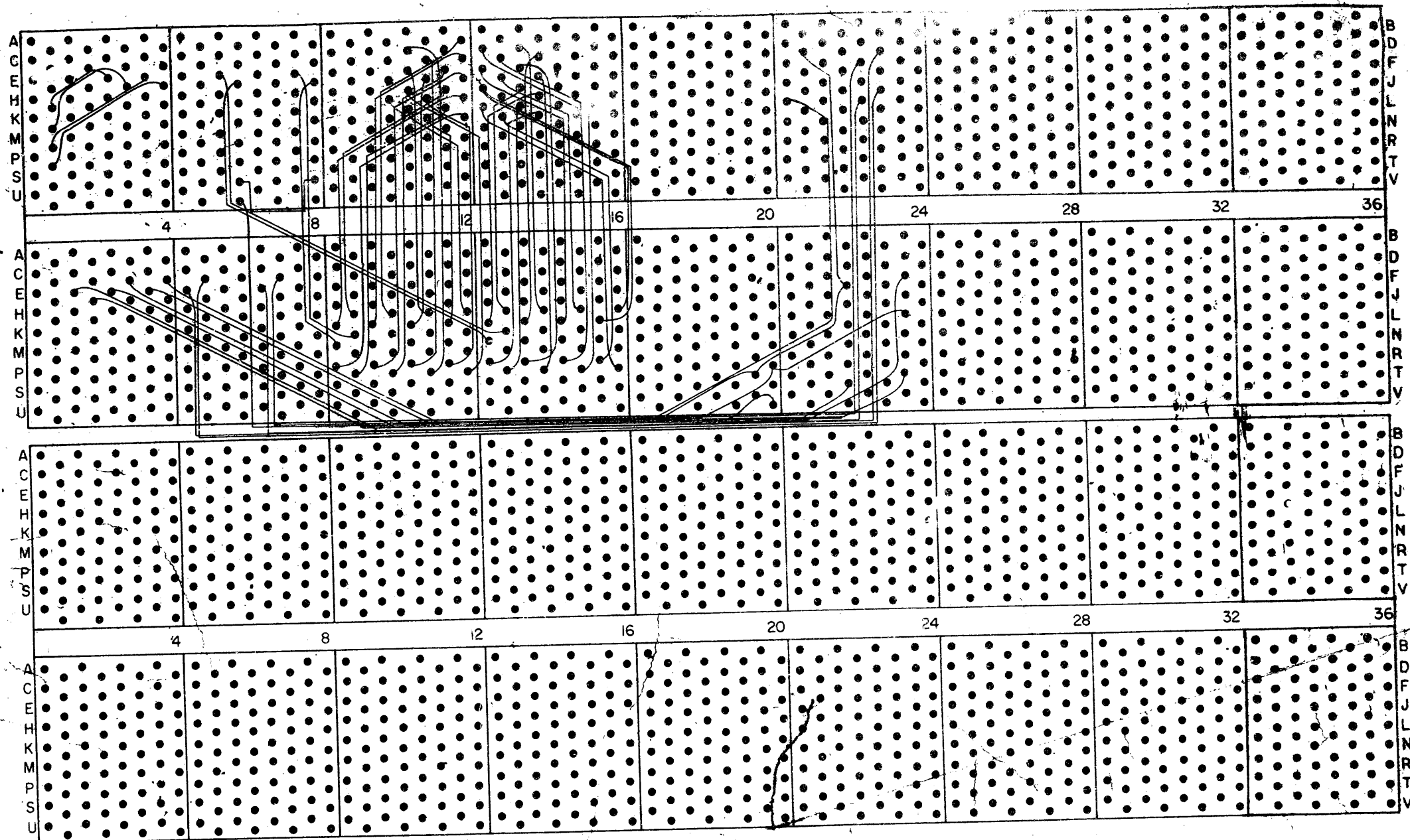
SPECIAL HAND WRAP

SIZE	CODE	NUMBER	REV.
A	WL	RS09-0-10	

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DEC FORM NO.

[illegible]



DRAWN <i>John Monaco</i>		DATE 11-4-69	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	TITLE HAND WRAP ROUTING
CHECKED <i>[Signature]</i>		DATE 11-4-69		FOR RS09
DATE 11-6-69		DATE 11-5-69		DRW. NUM. C-RS09-0-11
DATE 11-7-69		DATE 11-7-69		REV. LTR. A
REV. LTR.	ECO NO.	DATE	ASSY NO. A-ML-RS09-0	CODE WD
ORIG RS09-00004	5-1-70	2811	SCALE	SHEET 1 OF 1
A	00013			

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DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 6/8/71

TITLE RS09 CALIBRATION PROCEDURE

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE

1. Limit release until final version of RS09 Preliminary Calibration Program is completed.

ENG	APPD <i>Donald G. Torada</i>	SIZE A	CODE SP	NUMBER RS09-0-12	REV
-----	---------------------------------	-----------	------------	---------------------	-----

DEC FORM NO.
DRA 107A

SHEET 1 OF 11

CONTINUATION SHEET

TITLE RS09 CALIBRATION PROCEDURE

TABLE OF CONTENTS

	Page
1.0 General Information	3-11
1.1 Introduction	3-11
1.2 General Description of Calibration Procedure	3-11
1.3 Preliminary Preparations	5-11
1.4 Troubleshooting Tips	5-11
2.0 RS09 Calibration Procedure	6-11
2.1 Gain and Slice Measurements Techniques	6-11
2.2 Timing Track Calibration	6-11
2.3 Data Track Gain Calibration	6-11
2.4 Data Track Slice Calibration	7-11
2.5 Multi-Disk Program Operating Instructions	9-11

SIZE A	CODE SP	NUMBER RS09-0-12	REV
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DEC FORM NO.
DRA 108A

SHEET 2 OF 11

TITLE RS09 CALIBRATION PROCEDURE

1.0 GENERAL INFORMATION

1.1 INTRODUCTION

This procedure is intended to supplement the information given in the RF15/RS09 DECdisk System Maintenance Manual. It is assumed that the reader is familiar with the general theory of operation and maintenance procedures for the RS09.

The primary purpose of this procedure is to specify the techniques to be used in calibrating the G085 Disk Read Amplifier and Slice Modules in the RS09. A further goal is to give the user an understanding of the reasons behind the procedures so that he can use them with confidence.

1.2 GENERAL DESCRIPTION OF CALIBRATION PROCEDURE

The RS09 Fixed Head Disk uses the Non-Return-to-Zero (NRZ) recording technique which means that the track magnetization is reversed everytime a binary one is recorded. No reversal occurs when recording a binary zero, i.e., nothing at all is done to the track. When reading a track, the flux reversals (binary ones) are detected by the head and appear as positive or negative pulses at the output of the sense amplifier. Binary zeros, of course, do not develop any signals. In the ideal case, data read from the disk would produce a clean signal as shown in Figure 1A. A regular data pattern such as alternating ones and zeros does, in fact, produce a signal very close to the ideal. However, experience has shown that a complex data pattern produces an extremely noisy signal as shown in Figure 1B. Since the noise depends on the data, the only reliable method of calibrating a disk is with a diagnostic that simulates a realistic data pattern.

The calibration procedure has two objectives: to maximize the good signal region and to achieve the widest possible margins against noise. The best method of reaching these goals is to use a procedure as follows (see Figure 2):

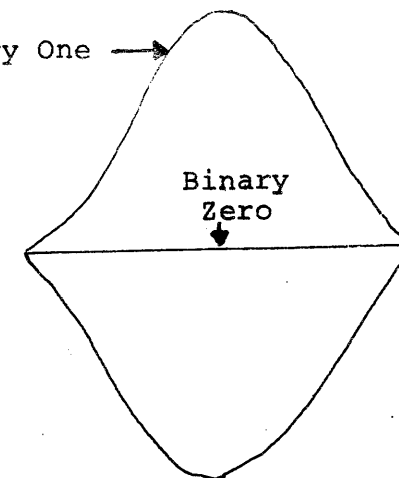
1. Check the "zero" noise level.
2. Check the "one" noise level.
3. Calculate the Figure of Merit (FM) and the signal region (Δ).
4. Put an AGC jumper on the shoe containing the track that caused the first error in Step 2.

SIZE	CODE	NUMBER	REV
A	SP	RS09-0-12	

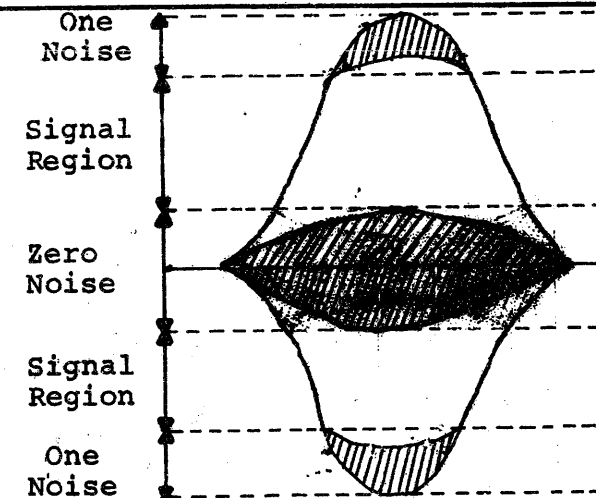
TITLE RS09 CALIBRATION PROCEDURE

Binary One

Binary Zero



A. Ideal Signal



B. Actual Signal

Figure 1. Sense Amplifier Output Signal - Ones & Zeros Superimposed

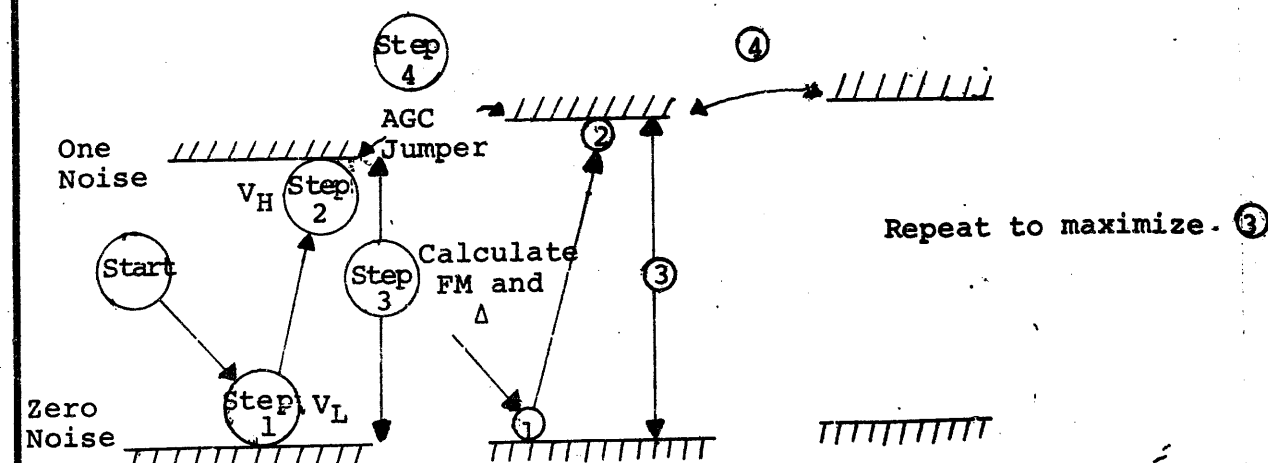


Figure 2. RS09 Setup Procedure

SIZE	CODE	NUMBER	REV
A	SP	RS09-0-12	

CONTINUATION SHEET

TITLE RS09 CALIBRATION PROCEDURE

5. Repeat steps 1 to 4 until the FM and signal region are maximized.
6. Set the slice at the midpoint of the signal region.

The adjustment potentiometers on the G085 module have been modified to simplify the procedure. The gain adjustment pot has been changed so that all disk surfaces, whether high or low output, can be set to produce the same size signal out of the sense amplifier. The range of the slice adjustment pot has been increased so that it is possible to measure both the "zero" noise level and the "one" noise level without adjusting the gain pot. As a result, the gain need be set only once at the beginning of the procedure.

1.3 PRELIMINARY PREPARATIONS

Before using this calibration procedure, insure that the following steps have been taken:

1. All G085 modules have been retrofitted to Revision (f).
2. Spot check the head output signals to see if they agree with the readings on the original Head Data Sheet.
3. If the surface or any shoes have been replaced, fill out a new Head Data Sheet according to the procedures in the Maintenance Manual.
4. Have on hand a copy of the RF15 Preliminary Calibration Program (Pre CAC al Prog.) AUTOCAD-15-05AA. This program contains a switch-selectable subroutine similar to the Stamp Test in the Disk Data Diagnostic. If this program is not available, MULT-DISK and DISK DATA (STAMP TEST) can be used instead.

1.4 TROUBLESHOOTING TIPS

In order to calibrate an RS09 successfully, it is necessary to have a uniform disk surface and a set of shoes that are well matched and adjusted. In many cases, an excessive error rate may be due to a bad spot on the surface or a degraded or mis-adjusted shoe. If the disk has a high error rate that cannot be corrected by recalibrating the gain and slice adjustment, then it may be necessary to replace the surface or a shoe. To localize the problem area, take the following steps:

SIZE	CODE	NUMBER	REV
A	SP	RS09-0-12	

CONTINUATION SHEET

TITLE RS09 CALIBRATION PROCEDURE

1. Determine the troublesome tracks from the error printouts on the teletype.
2. Inspect the individual tracks using the Stamp Test.
3. If the surface modulation is too great for any track (more than 20%) or if there is a spot on the track with a low output signal, replace the surface.
4. If the surface appears to be within specification, compare the tracks within a particular shoe. If the range of head outputs within the same shoe differs by more than 25%, replace the entire shoe.

2.0 RS09 CALIBRATION PROCEDURE

2.1 GAIN AND SLICE MEASUREMENTS TECHNIQUES

To measure Gain and Slice, use the procedures outlined in Section 6.2 of the Maintenance Manual with the following exception:

Measure Slice by reading the leading edge of the composite Gain-Slice waveform.

2.2 TIMING TRACK CALIBRATION

Calibrate the A, B, and C timing tracks using the procedures in Section 6.2.3 of the Maintenance Manual with the following exceptions:

Set the average voltage (gain) to 6 volts peak-to-peak.

Set the slice to 1.4 volts (reading the leading edge).

2.3 DATA TRACK GAIN CALIBRATION

1. Find the average track in Matrix 0 from the head data sheet and record its number on the Calibration Record Sheet (Figure 3).
2. Load and run the Pre Cal ProgStamp Test Program (see paragraph 2.5.4) selecting the average track noted in Step 1.

SIZE	CODE	NUMBER	REV
A	SP	RS09-012	

ENGINEERING SPECIFICATION

CONTINUATION SHEET

TITLE RS09 CALIBRATION PROCEDURE

3. Adjust the gain of the average track to 6 volts peak-to-peak and the slice to 1.4 volts.
4. Repeat Steps 1 to 3 for Matrix 1.

NOTE:

Do not readjust gain during the rest of the calibration procedure.

2.4 DATA TRACK SLICE CALIBRATION

- 2.4.1 The Data Track Slice Calibration procedure is repetitive and has the overall objective of maximizing the signal region and the Figure of Merit for the disk. The procedure will be described for Matrix 0 through it can be performed on both matrices simultaneously to save time. Note that the low failing track found on the first pass will be considered the reference track. All subsequent slice voltage readings will be taken from this track. Since the reference track exhibits the highest "zero" noise level, do not put on AGC jumper on its shoe; to do so would increase the "zero" noise level.
- 2.4.2 To calibrate the Data Track Slice Adjustment, perform the following steps:
 1. Run the Pre. Cal. Program in the Random Pattern, Non-Save Mode.
 2. Carefully reduce the Slice voltage on Matrix 0 and find the low failing point, Increase Slice slightly until the program just runs error free. This test find the "zero" noise level illustrated above. Record the number of the first track that caused an error on the Calibration Record Sheet.
 3. Stop the Random Mode program and run one pass of the Prel. Cal. Prog. to write the pattern 252525 and restart the Stamp Test, selecting the reference track (i.e., the track found in Step 2 on the first pass.) Record the low slice voltage level (V_L). (On the first pass, also measure and record the Gain of the reference track.)

SIZE A	CODE SP	NUMBER RS09-0-12	REV
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ENGINEERING SPECIFICATION

CONTINUATION SHEET

TITLE RS09 CALIBRATION PROCEDURE

4. Restart Prel. Cal. Prog. Random Non-Save Mode. Carefully increase the slice voltage and find the high failing point. Reduce slice slightly until the program just runs error free. This test finds the "one" noise level illustrated above.
5. Write 252525 PATTERN by running one pass of Prel. Cal. Prog. Go back to the Stamp Test, selecting the reference track. Record the high failing track number and the high slice voltage (V_H).
6. Install an AGC jumper on the shoe containing the high failing track found in Step 4 and record the jumper location.
7. Calculate and record the Figure of Merit (FM) and the Signal REgion (Δ), where:

$$FM = \frac{V_H - V_L}{V_H + V_L}$$

$$\text{and } \Delta = V_H - V_L$$

8. Repeat steps 1 through 7 until Δ is maximized. If Δ decreases significantly on a subsequent pass, remove the previous AGC jumper.
9. The following figures are the minimum acceptable results in calibrating the RS09. In actual practice, a disk with a good surface and well matched shoes will surpass these figures by a wide margin. Since the goal of the calibration procedure is to maximize disk performance, every effort should be made to exceed these figures.

$$\text{Minimum FM} = 0.4$$

$$\text{Minimum } \Delta = 1.3 \text{ Volts}$$

$$\text{Maximum } V_L = 1.0 \text{ Volts}$$

10. When Δ has been maximized, calculate and record the final slice voltage setting (V_F) using the data from the last pass, where:

$$V_F = \frac{V_H + V_L}{2}$$

Set the slice voltage to V_F on the reference track.

SIZE A	CODE SP	NUMBER RS09-0-12	REV
-----------	------------	---------------------	-----

TITLE RS09 CALIBRATION PROCEDURE

11. Repeat the procedure for Matrix 1.

2.5 MULTI-DISK PROGRAM OPERATING INSTRUCTIONS

2.5.1 The program used in this calibration procedure is:

AUTOCAD-15-D5AA
RF15 Calibration Program
Date:

2.5.2 Multi-Disk operates in four modes as selected by the console data switches:

Data Switch	Setting	Mode
1	0	Save Mode
	1	Non-Save Mode
3	0	Random Pattern
	1	252525 Pattern

2.5.3 To run the Random Pattern, perform the following steps:

1. Start Multi-Disk at location 200 with:

Data Switch 1 = 1
Data Switch 3 = 0

2. The operator will then be asked (via the teletype) what the last available location of memory is for the system.

Reply (in octal notation); 007777 for a 4K System
to
377777 for a 131K System

The program will then printout the number of disks on-line and start running the program.

TITLE RS09 CALIBRATION PROCEDURE

Example:

LAST AVAILABLE MEMORY LOCATION OCTAL?17777

1 EXISTENT DISK(S)

2.5.4 To run the Stamp Test, perform the following steps:

1. Start Cal. Prog. at location 200 with:

Data Switch 1 = 1
Data Switch 3 = 1

2. Stop the computer after one pass .

3. Load the number of the desired disk in Data Switches 15 - 17. This writes a 25 pattern on the disk in non-save mode.

4. Start the Stamp Test at location 201.

5. The program will HALT at location 1235. Set the Data Switches to the 18-bit address of the desired track and press CONTINUE.

TITLE RS09 CALIBRATION PROCEDURE

Figure 3. RS09 CALIBRATION SHEET

RS09 SN _____ Disk Type _____ SN _____ Date _____

Use Random Pattern (Non-Save Mode) while making adjustments. Use Stamp Test (25 pattern) while taking Slice Voltage Readings.

Average Track # _____ Matrix 0
Reference Track # _____ Reference Track Gain _____ volts

Pass	Low Track #	Low Slice Voltage V_L	High Track #	High Slice Voltage V_H	FM	Δ	AGC Jumper
Final Slice Setting $V_F = \frac{V_H + V_L}{2}$							

Average Track # _____ Matrix 1
Reference Track # _____ Reference Track Gain _____ volts

Pass	Low Track #	Low Slice Voltage V_L	High Track #	High Slice Voltage V_H	FM	Δ	AGC Jumper
Final Slice Setting $V_F = \frac{V_H + V_L}{2} =$							

$$FM = \frac{V_H - V_L}{V_H + V_L} ; \text{ Minimum FM} = 0.4.$$

$$\Delta = V_H - V_L ; \text{ Minimum } \Delta = 1.3 \text{ volts}$$

Maximum $V_L = 1.0 \text{ volts}$

MASTER DRAWING LIST

[illegible]

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REV. A
NUMBER 3000 3215
D-UA-RS09-P-0

NOTES:

- 1 FOR DWG INDEX LIST REFER TO D-DI-RS09-P-
- 2 WIRES TO BE SOLDERED TO LOCATIONS SHOWN PER DETAIL B
- 3 LABEL (PURCHASE SPEC #1809816) TO BE APPLIED AS REQUIRED AT FINAL ASSEMBLY

(YEL) TO PIN A10A
(BLK) TO GND 8 (LOCATED ON #29 OF 144 PIN BLOCK)
(BLU) TO PIN B24B
(RED) TO PIN B24A
SEE NOTE 2

DETAIL B

SEE DETAIL B

9 - FAR SIDE

PLUGS INTO SLOT A1F

SEE NOTE 3

VIEW A-A

PICTURE INCORRECT
REFER TO DWG D-40-7006156-0-0
FOR CORRECT PICTURE

REV.	CHANGE NO.	DATE
A	RS09P-CC-01	1-27-70
B	JORDAN	2-2-70

FIRST USED ON OPTION/MODEL RS09-0		QTY.	DESCRIPTION	PART NO.	ITEM NO.
UNLESS OTHERWISE SPECIFIED		PARTS LIST			
UNLESS OTHERWISE SPECIFIED		DRN.	DATE	digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	
DIMENSION IN INCHES		CHK'D.	DATE	TITLE	
TOLERANCES		DATE	DATE	CHASSIS ASS'Y WITH LOGIC (RS09-P)	
DECIMALS FRACTIONS ANGLES		DATE	DATE	SIZE CODE NUMBER REV.	
± .005 ± 1/64 ± 0°30'		DATE	DATE	D-UA-RS09-P-0 A	
FINAL SURFACE QUALITY		DATE	DATE	SCALE NONE	
REMOVE BURRS AND BREAK SHARP CORNERS		DATE	DATE	SHEET 1 OF 1	
MATERIAL		NEXT HIGHER ASSY		DIST. G	
FINISH		D-UA-RS09-0-0			

DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS		
PARTS LIST		
MADE BY G. FLANDERS	CHECKED D. HEALY	SECTION
DATE 5/22/69	DATE 5/23/69	1
ENG <i>[Signature]</i>	PROD <i>[Signature]</i>	ISSUED SECT.
DATE 6/10/69	DATE 7-1-69	1

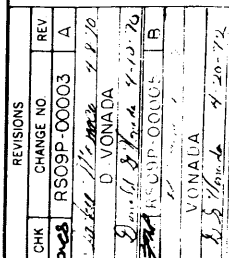
DATE 6/10/89

DATE 7-2-61

1

[illegible][illegible]

FILE	
DIST.	G



4			3			B REV			DIRS09-P-1 NUMBER			2			1								
MECHANICAL						DEPT USAGE						ELECTRICAL						DEPT USAGE					
FIND NO	DESCRIPTION					PART NO	PROD	CUST	F/C	FIND NO	DESCRIPTION					PART NO	PROD	CUST	F/C				
1	CHASSIS ASSY WITH LOGIC CHASSIS ASSY WITH LOGIC (P.L.) BAR, HOLD DOWN MODULES RS09 STANDOFF, LOGIC COVER, LOGIC					D-UA-RS09-P-B A-PL-RS09-P-B D-IA-7407045-0-0 C-IA-7407010-0-0 B-MD-7407011-0-0				1	CHASSIS ASSY WITH LOGIC 282K 18 BIT DEC DISK WIRE LIST MODULE UTILIZATION MODULE UTILIZATION LIST WIRED ASSY WIRED ASSY (P.L.)					A-WL-RS09-P B-WL-RS09-B K-WL-RS09-B-WL D-MU-RS09-B-9 A-PL-RS09-B-9 D-AD-7006357-0-0 A-PL-7006357-0-0							
2	CHASSIS ASSY W/O LOGIC CHASSIS ASSY (P.L.) FAN, SCREEN STOP, CHASSIS BRACKET, RELAY					D-AD-7006156-0-0 A-PL-7006156-0-0 C-MD-7404881-0-0 B-MD-7407336-0-0 C-MD-7407255-0-0				2	CHASSIS ASSY W/O LOGIC					D-AD-7006156-0-0							
3	CHASSIS SILK SCREEN					E-IA-7407009-0-0 C-SS-7407009-0-1				6	CIRCUIT SCHEMATIC					B-CS-5409339-0-1							
4	WIRED ASSY (RS09) (P.L.) WIRED ASSY (RS09) (PL) MTG BAR RS09 NOISE SUPPRESSOR					D-AG-7006357-0-0 A-PL-7006357-0-0 D-IA-7404012-0-0 C-IA-7406090-0-0				9	RELAY BOARD CIRCUIT SCHEMATIC					B-AD-5409172-0-0 B-CS-5409172-0-1							
5	SWITCH PLATE ASSY SWITCH PLATE					C-IA-7006434-0-0 C-IA-7407232-0-0				10	RS09 LOW AC DET. CIRCUIT SCHEMATIC					B-AD-5409920-0-0 B-CS-5409920-0-1							
6	WRITE LOCKOUT SW ASSY					B-IA-5409339-0-0																	
7	WRITE LOCKOUT SW (ETCH BOARD) PRINTED CIRCUIT					C-IA-5008339-0-0 PC-5008338																	
9	RELAY BOARD RELAY BOARD (PL)					B-AD-5409172-0-0 A-PL-5409172-0-0																	
9	ETCH BOARD PRINTED CIRCUIT					D-IA-5008173-0-0 PC-5008173																	
10	RS09 LOW AC DET RS09 LOW AC DET (PL)					B-AD-5409920-0-0 A-PL-5409920-0-0																	
11	ETCH BOARD PRINTED CIRCUIT					D-IA-5009919-0-0 PC-5009919																	

FIRST USED ON OPTION/MODEL RS09-P		DO NOT SCALE DRAWING		DRN <i>J. Henders</i> DATE 6/24/69		PARTS LIST		digital EQUIPMENT CORPORATION M. YARD MASSACHUSETTS	
UNLESS OTHERWISE SPECIFIED		DIMENSION IN INCHES		CHK'D <i>B. Neely</i> DATE 7-28-69		TITLE		DRAWING INDEX	
TOLERANCES		DECIMALS FRACTIONS ANGLES		ENG <i>R. Bannister</i> DATE 7/28/69				LIST RS09-P	
± .005 ± 1/64 ± 0°30'		FINAL SURFACE QUALITY		PROJ ENG <i>S. D. Lynch</i> DATE 7-28-69					
REMOVE BURRS AND BREAK SHARP CORNERS				PROD <i>M. L. Lawrence</i> DATE					
MATERIAL				NEXT HIGHER ASSY					
+-----+				A-ML-RS09-P					
FINISH				SCALE +-----+		SIZE CODE NUMBER REV.		D DIRS09-P-1 B	
+-----+				SHEET OF		DIST.			

[illegible]

[illegible]

DIGITAL EQUIPMENT CORPORATION

MAYNARD, MASSACHUSETTS

PARTS LIST

MADE BY ROBICHARD	CHECKED D. HEALY	SECTION
DATE 6/25/69	DATE 6/26/69	1
ENG <i>DD Nevada</i>	PROD <i>Ch. 10/10/69</i>	ISSUED SECT.
DATE 7-28-69	DATE <i>7-21-69</i>	1

[illegible]

QUANTITY / VARIATION

TITLE MODULE UTILIZATION LIST (RS09)	ASSY NO. D-MU-RS09-0-9	SIZE A	CODE PL	NUMBER RS09-0-9				REV. A	ECO NO. RS09-00009
	SHEET 1 OF 1	DIST.							

DEC FORM NO.
DRA 110

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EXTERNAL COMPONENT TABLE

ITEM	COMP	POL	FROM	TO	POL	REMARKS
11, 12	CAP	-	B23B	B26C	+	SEE NOTE # 4
11, 12	CAP	-	B24A	B27C	+	

WIRE TABLE

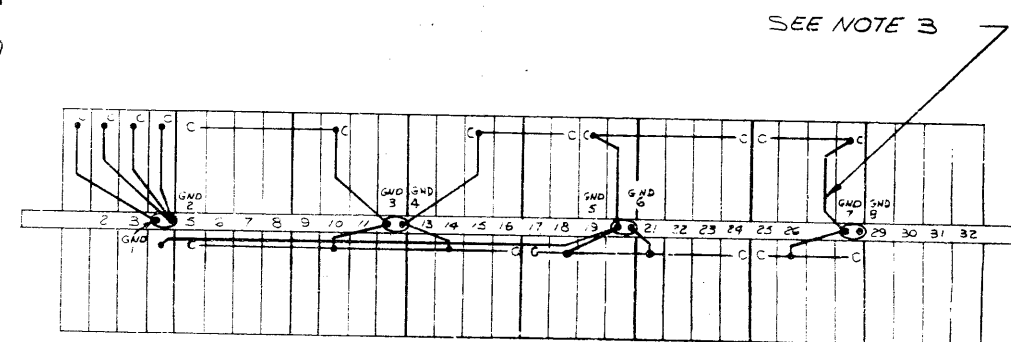
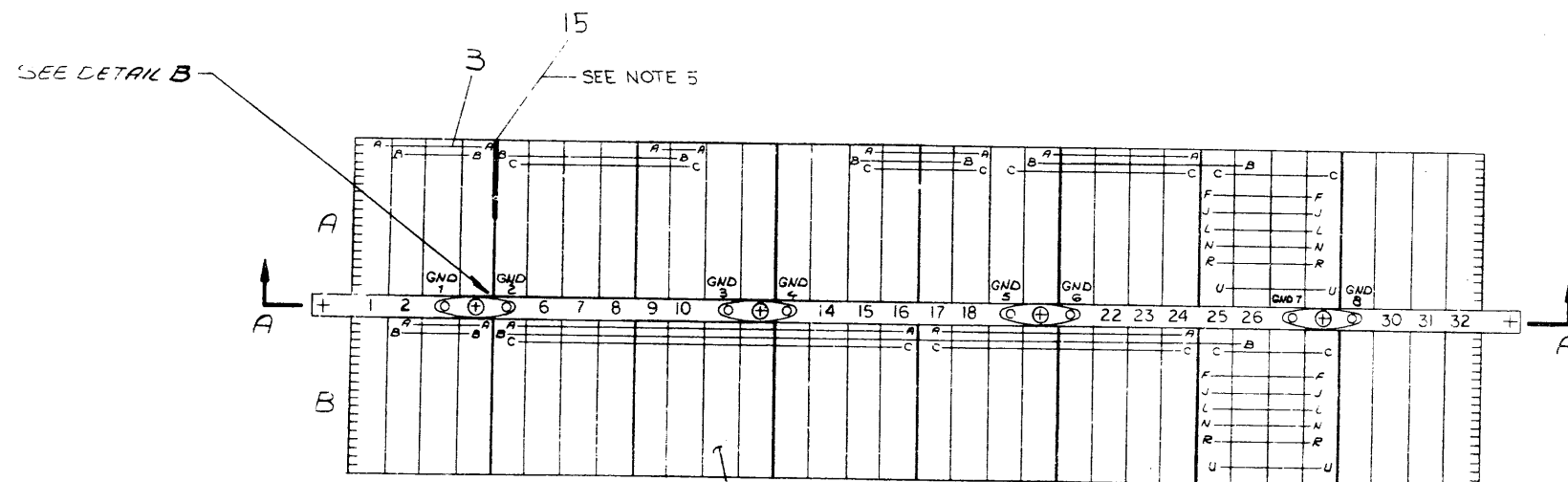
SIGNAL NAME	ITEM NO	DESCRIPTION	CONNECTIONS	REMARKS
+10	7	*18 RED	A24A B24A	
+10	7	RED	A24A A08A	
+10	7	RED	A08A A06A	
+20	8	ORN	B04A A04A	
	8	ORN	A04A A10A	
	8	ORN	A10A A15A	
+20	8	ORN	A10A B09A	
-15	9	BLU	A24B B24B	
		BLU	B24B B04B	
		BLU	B04B A04B	
		BLU	A04B A10B	
-15	9	BLU	A10B A20B	
GND	10	BLK	GND 7 A28C	
GND	10	BLK	GND 7 B26C	
GND	10	*18 BLK	GND 6 B21C	

WIRE TABLE

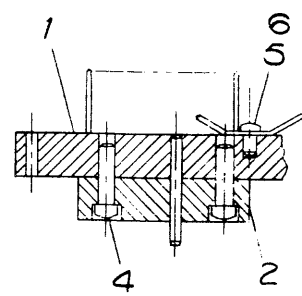
SIGNAL NAME	ITEM NO	DESCRIPTION	CONNECTIONS	REMARKS
GND	10	*18 BLK	GND 5 A19C	
			GND 5 B18C	
			GND 5 B04C	
			GND 4 B14C	
			GND 4 A15C	
			GND 3 B10C	
			GND 3 A10C	
			GND 2 A04C	
			GND 2 A03C	
			GND 2 A02C	
GND	10	*18 BLK	GND 1 A01C	

NOTES:

1. ALL CONN. BLOCKS TO BE GROUNDED TO GND LUGS AS PER CHART & DET. B
2. USE YEL WIRE (ITEM #13) FOR MACHINE WRAPPED, BLU WIRE (ITEM #14) FOR HAND WRAPPED WIRING.
3. GND WIRES TO BE #18 AWG STRANDED BLK INS.
4. DRESS CAPS IN MTG BAR CHANNEL.
5. ADD NOISE SUPPRESSOR BETWEEN A04 & A05 MODULE BLOCKS. TIE GND WIRE TO A05C.



DETAIL B
GROUND CONNECTIONS



SECTION A-A
SCALE 1-1

FIRST USED ON OPTION/MODEL RS09-0	QTY	DESCRIPTION	PART NO.	ITEM NO
UNLESS OTHERWISE SPECIFIED				
DRN	DATE	PARTS LIST		
UNLESS OTHERWISE SPECIFIED	DATE	digital EQUIPMENT CORPORATION		
UNLESS OTHERWISE SPECIFIED	DATE	TITLE		
UNLESS OTHERWISE SPECIFIED	DATE	WIRED ASSY		
UNLESS OTHERWISE SPECIFIED	DATE	RS09		
UNLESS OTHERWISE SPECIFIED	DATE	SIZE CODE		
UNLESS OTHERWISE SPECIFIED	DATE	NUMBER		
UNLESS OTHERWISE SPECIFIED	DATE	REV.		
UNLESS OTHERWISE SPECIFIED	DATE	D-UP-RS09-P-0		
UNLESS OTHERWISE SPECIFIED	DATE	SCALE		
UNLESS OTHERWISE SPECIFIED	DATE	SHEET		

