

**TM 9-4931-381-14&P-3**

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**TECHNICAL MANUAL**

**OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT,  
AND GENERAL SUPPORT MAINTENANCE MANUAL  
INCLUDING REPAIR PARTS AND SPECIAL TOOLS  
LIST (INCLUDING DEPOT MAINTENANCE REPAIR  
PARTS AND SPECIAL TOOLS)**

**VOLUME. V  
SCHEMATICS**

**THERMAL SYSTEM TEST SET**

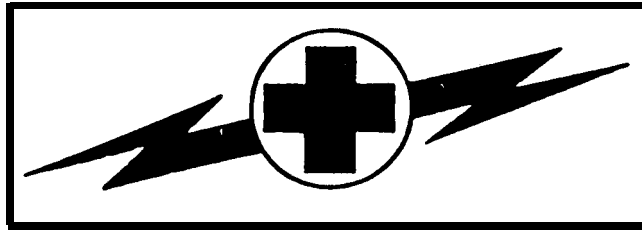
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**DECEMBER 1986**



**WARNING**

**HIGH VOLTAGE**

is used in the operation of this equipment.

**DEATH ON CONTACT**

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby. He should be familiar with the operation and hazards of the equipment. He should also be competent in giving first aid. When the technician is helped by operators, he must warn them about dangerous areas.

The power supply to the equipment must be shut off before beginning work on the equipment. Take special care to ground every capacitor likely to hold a dangerous potential.

Be careful not to contact high-voltage connections when installing or operating this equipment.

When possible, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

**WARNING**

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death.

For artificial respiration, refer to FM 21-II.



**WARNING**

**RADIATION HAZARD**

The anti-reflective coating on all infrared optics contains thorium fluoride which is slightly radioactive. The only potential hazard involves ingestion (swallowing or inhaling) of this coating material. Dispose of broken lens, etc., in accordance with AR 385-II.

**DON'T TAKE CHANCES!**

**HEADQUARTERS  
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WASHINGTON, D.C. 31 December 1986**

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INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST  
INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS  
THERMAL SYSTEM TEST SET  
(4931-01-119-7092)**

**RPSTL current as of technical manual date**

Software PN 12303273 Revision C, current as of technical manual date.

**Reporting Errors and Recommending Improvements**

You can help improve this manual. If you find any mistakes or if you know a way to improve the procedures, please let us know. Mail your letter DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

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**NOTE**

**This manual is divided into three bindings. The first binding consists of volumes I, II, and III and front matter for all three bindings. The second binding consists of volume IV and an index for volumes I through IV. Test set schematic and functional diagrams are contained in the third binding.**

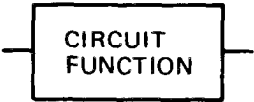




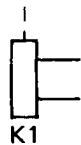
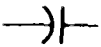


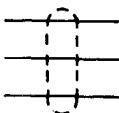

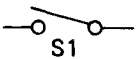

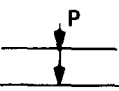

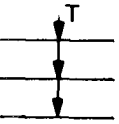

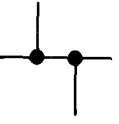
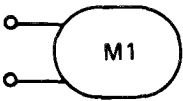

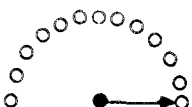
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# APPENDIX A

## SCHEMATIC DIAGRAM ELECTRICAL SYMBOLS

A-1. General. The following symbols are used in schematic diagrams throughout this manual. Use this appendix to determine what each symbol represents.

BLACK BOX		NO WIRE CONNECTION	
CALLOUT	 FIND NUMBER PAGE REFERENCE	POTENTIOMETER	
CALLOUT	 FIND NUMBER REFERENCED TO SAME PAGE	RELAY COIL	
CAPACITOR		RESISTOR	
CIRCUIT BREAKER		SHIELDED WIRE OR CABLE	
CHASSIS GROUND		TOGGLE SWITCH	
DIODE		TWISTED PAIR	
EARTH GROUND		TWISTED TRIPLET	
LAMP		WIRE CONNECTION	
MOTOR		ZENER DIODE	
MULTIPOSITION SWITCH			

ARR82-24517



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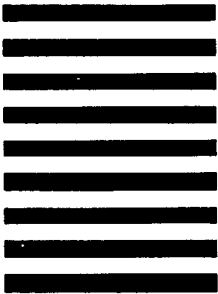
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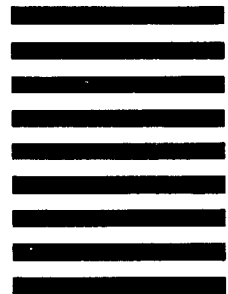
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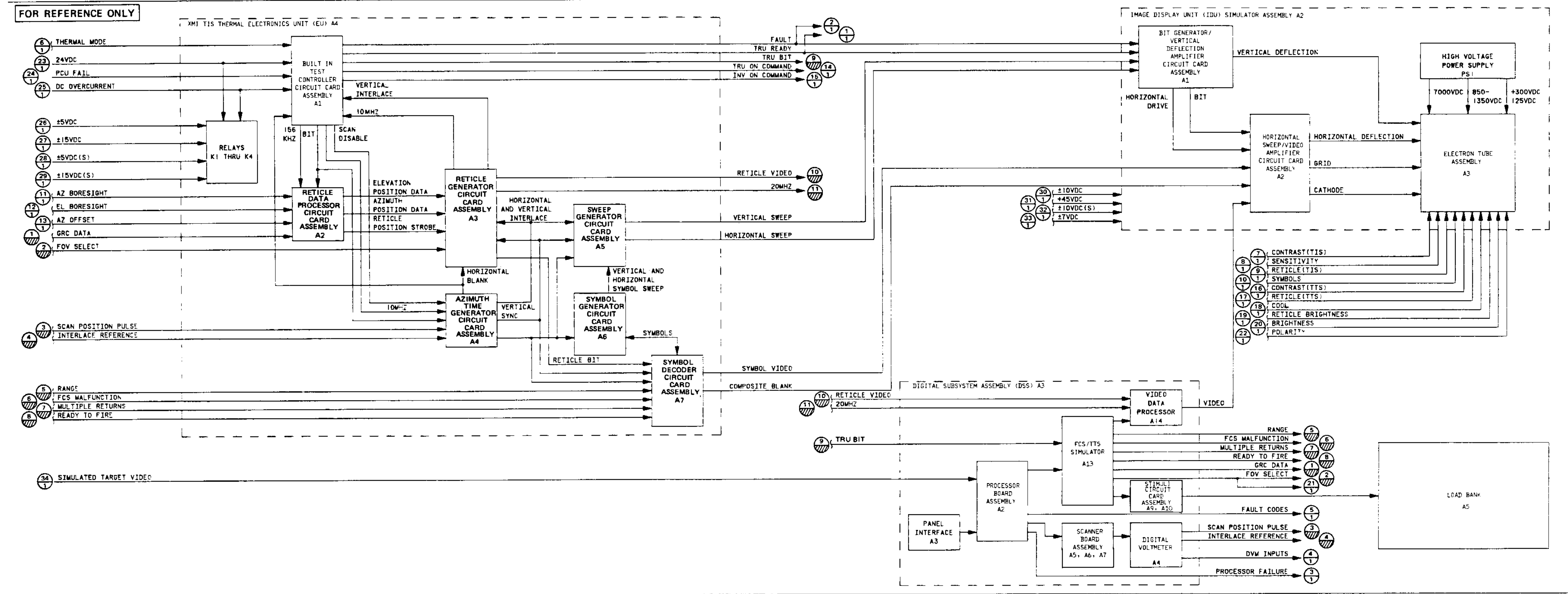


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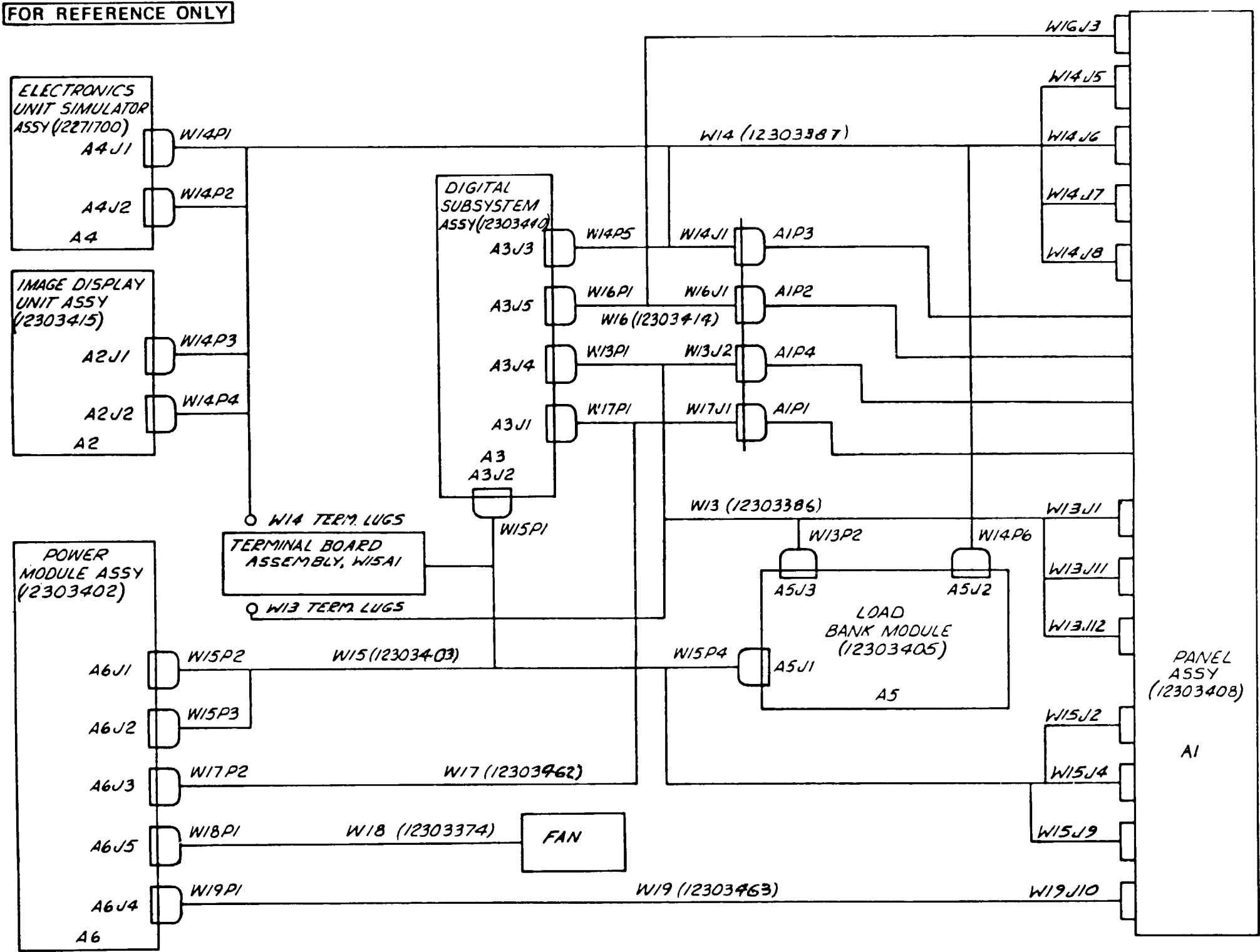




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FO-1. Thermal System Test Set (TSTS) Functional Block Diagram (Sheet 2 of 2)

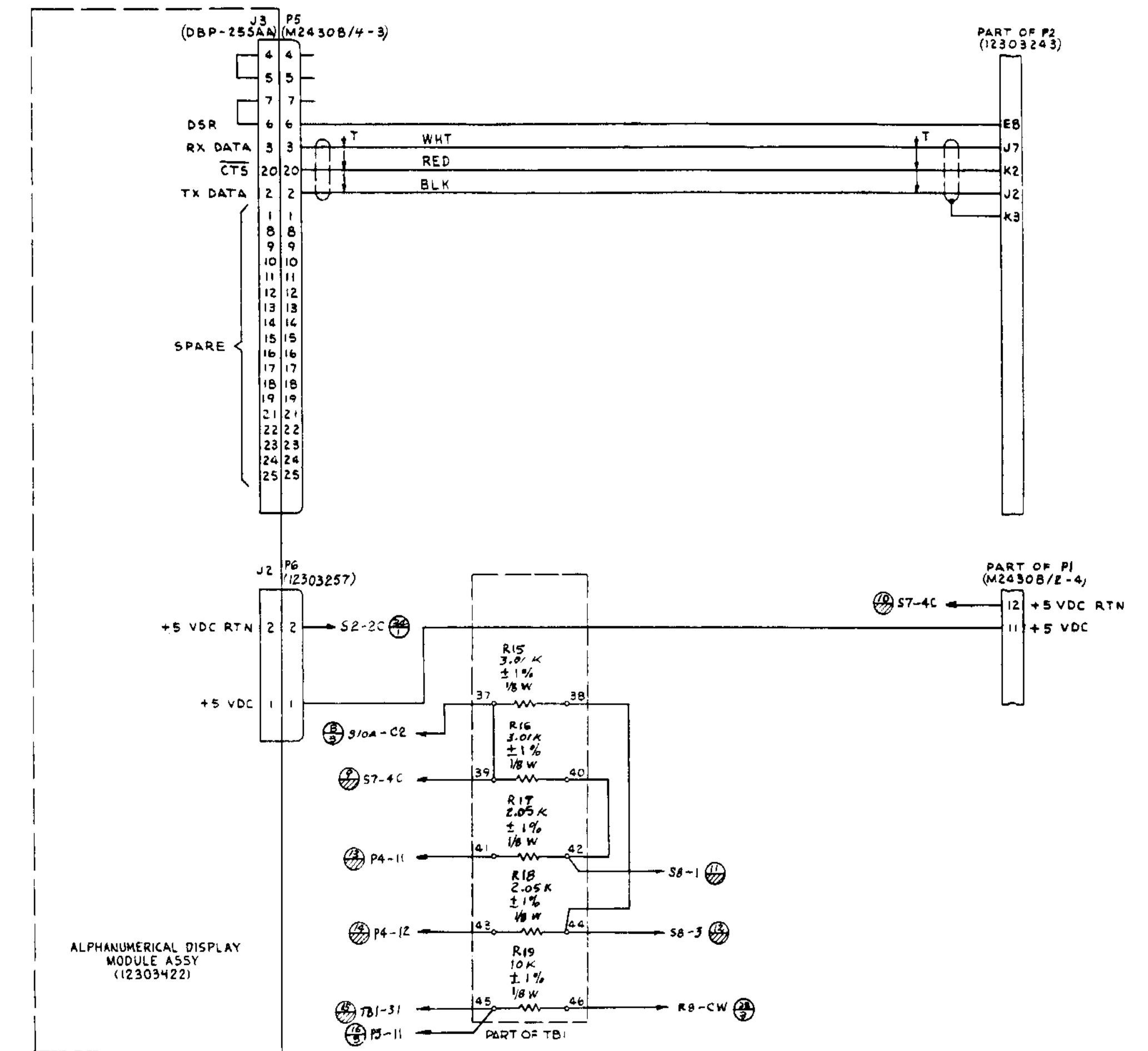
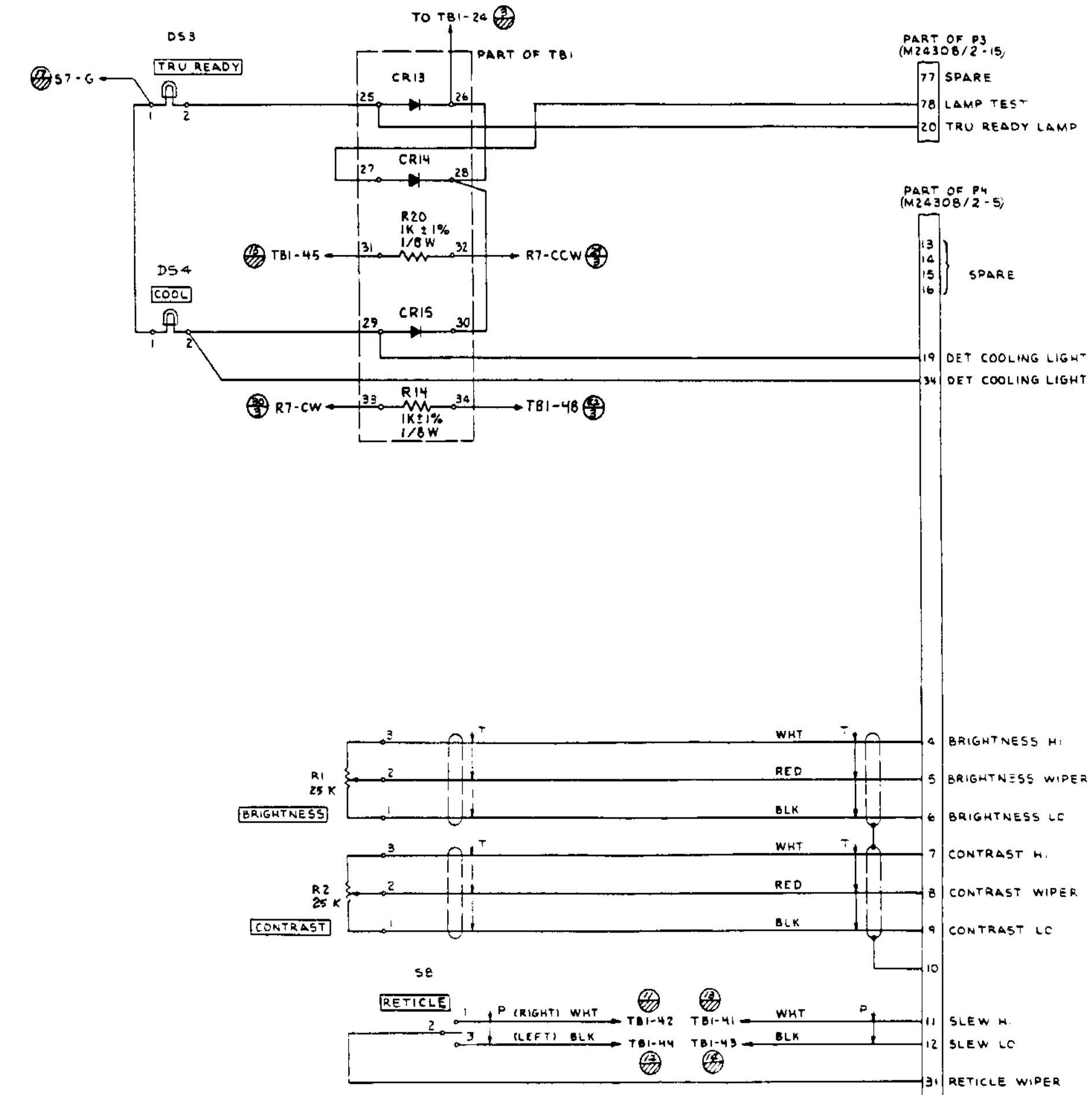
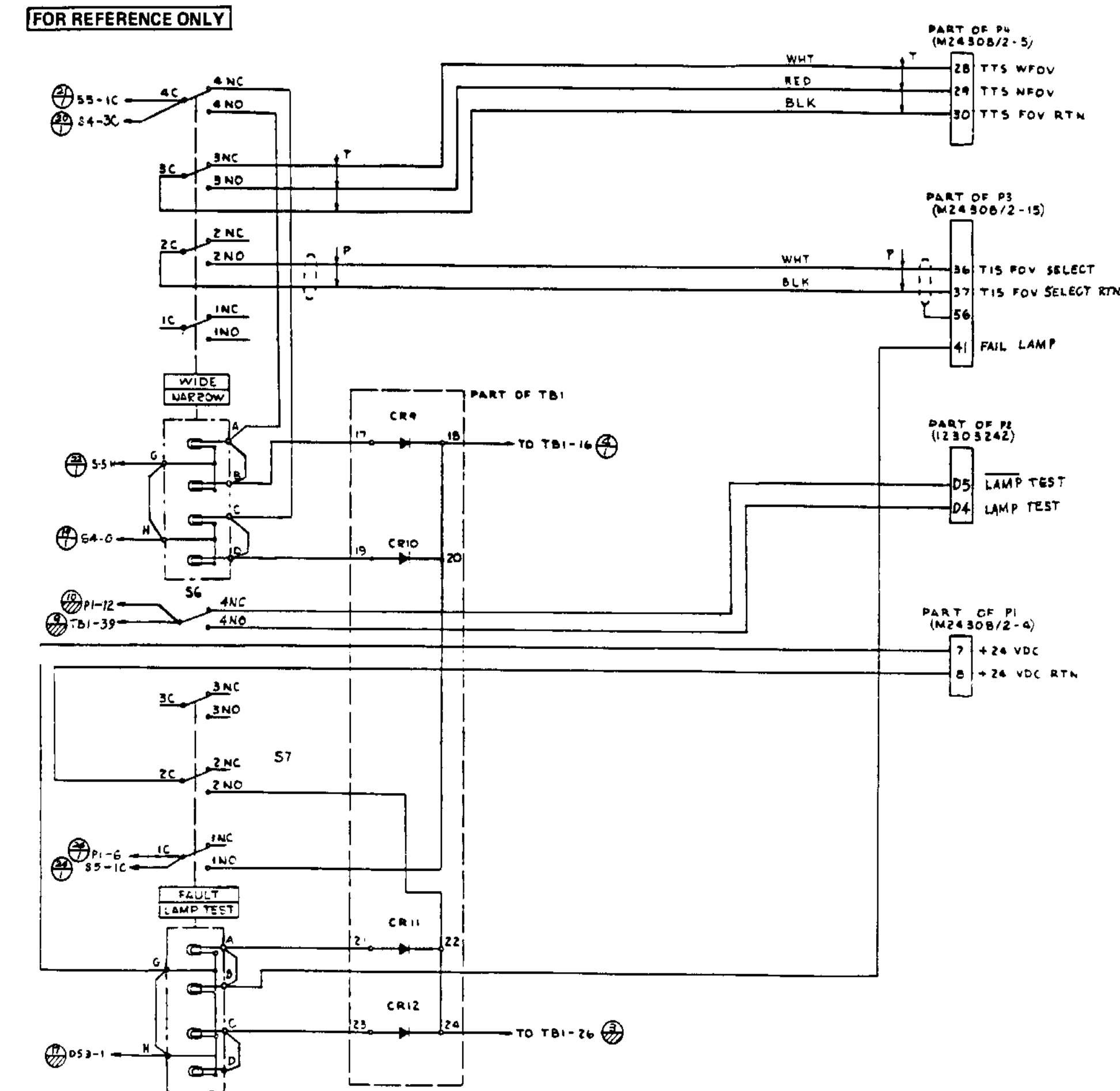
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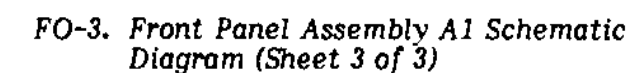
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FO-2. Internal Harness Interconnection Diagram



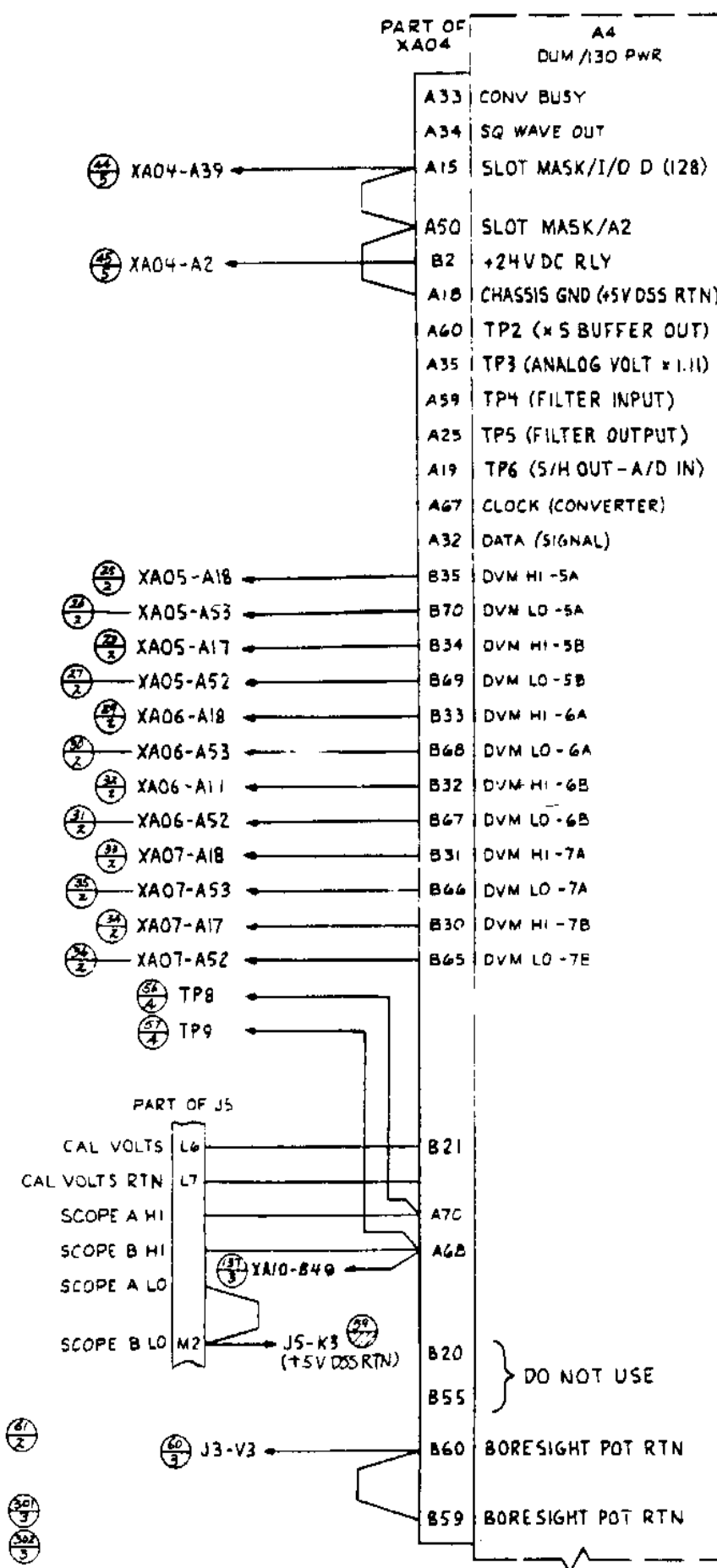
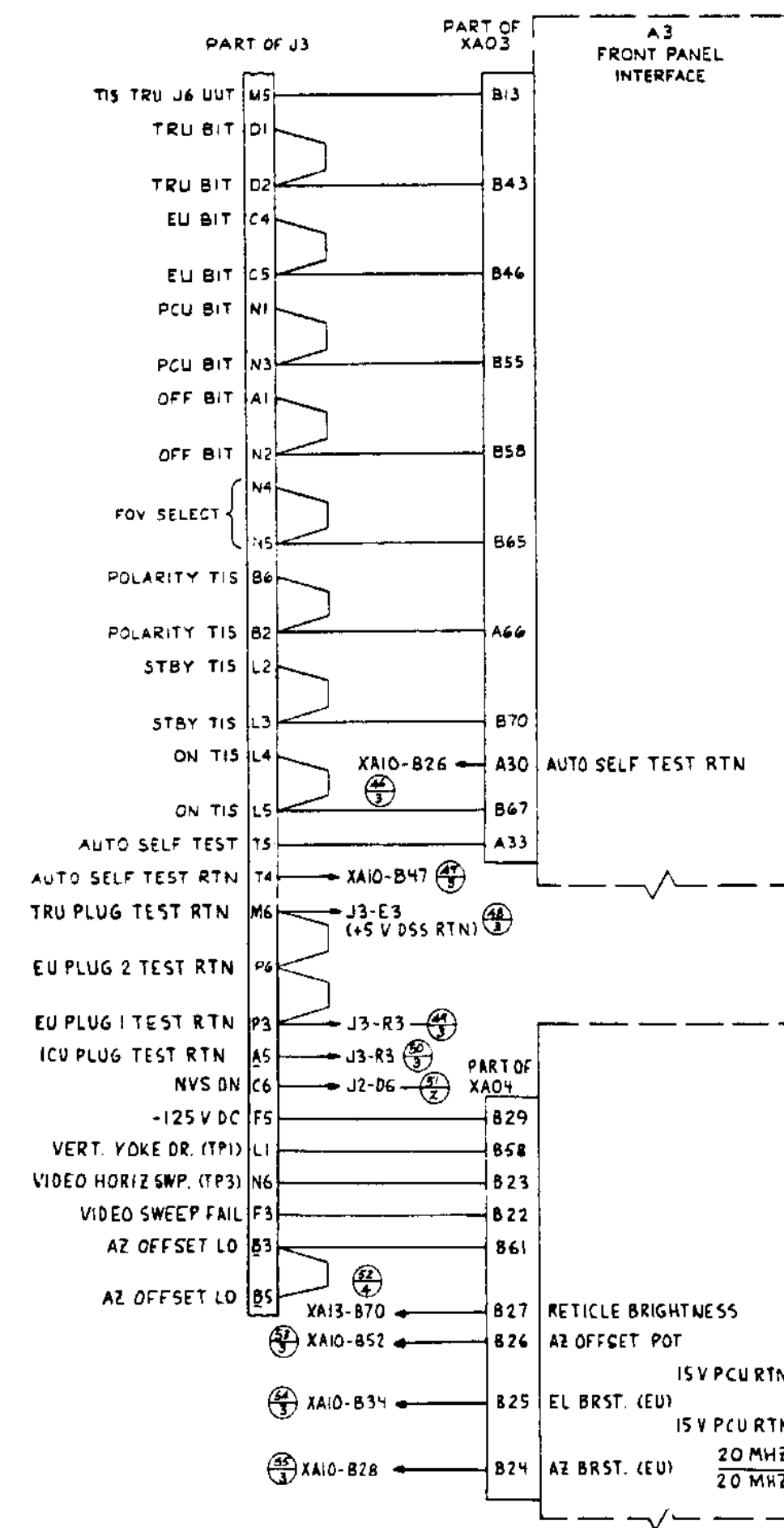
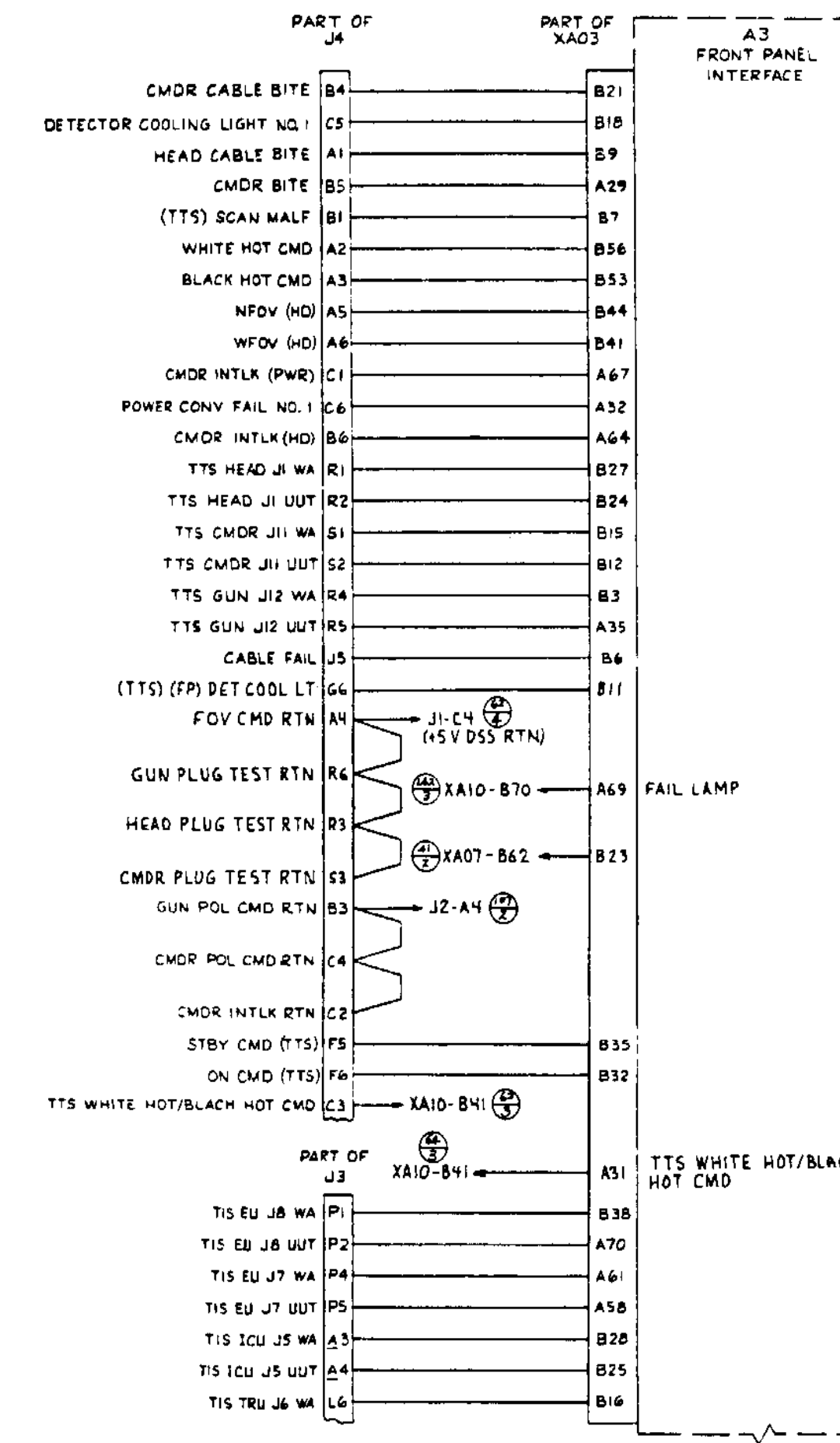
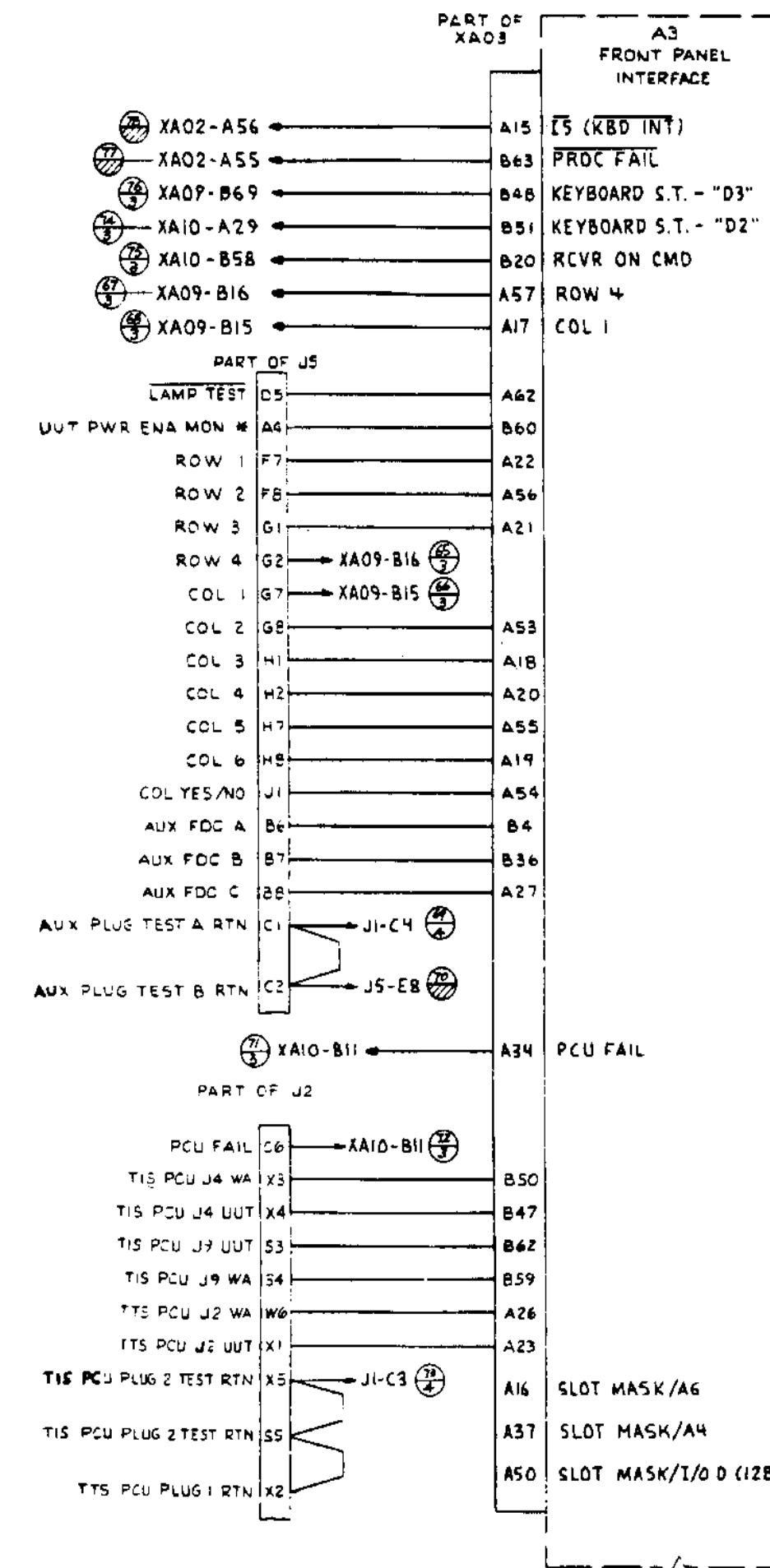
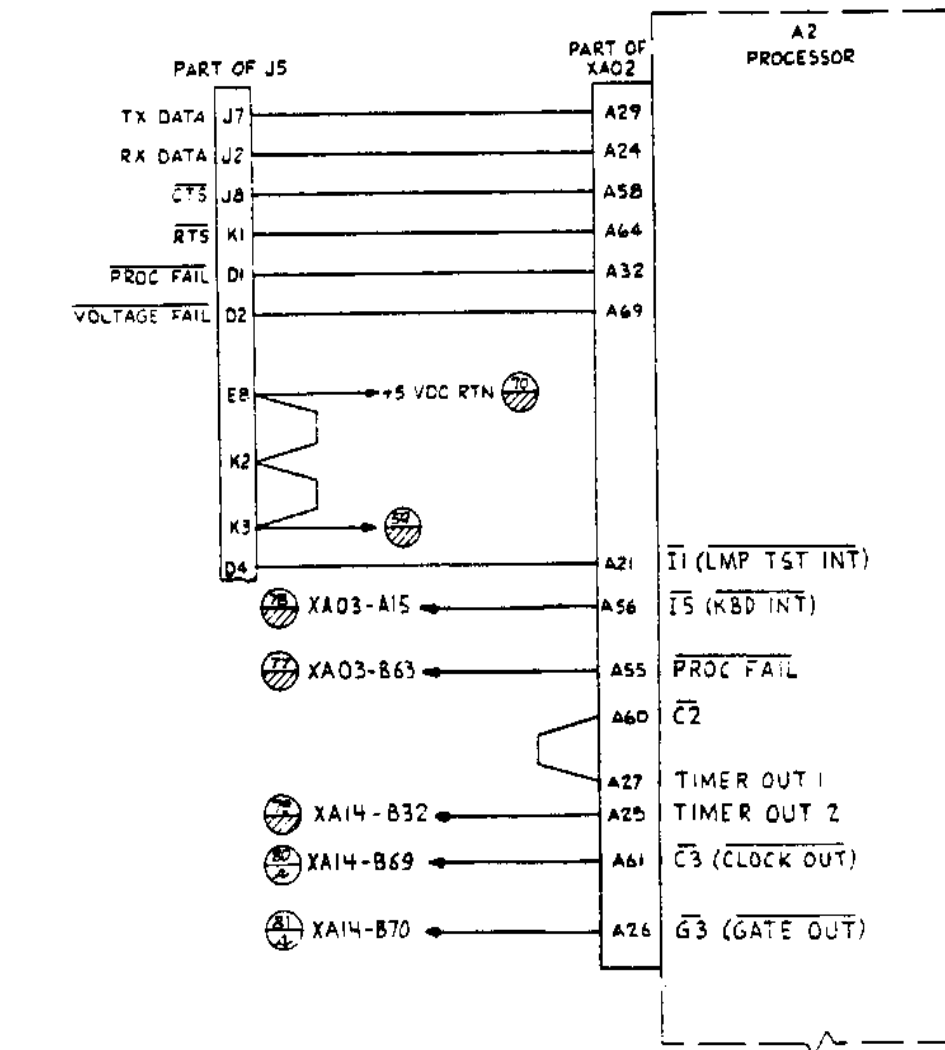


FO-3. Front Panel Assembly A1 Schematic  
Diagram (Sheet 2 of 3)





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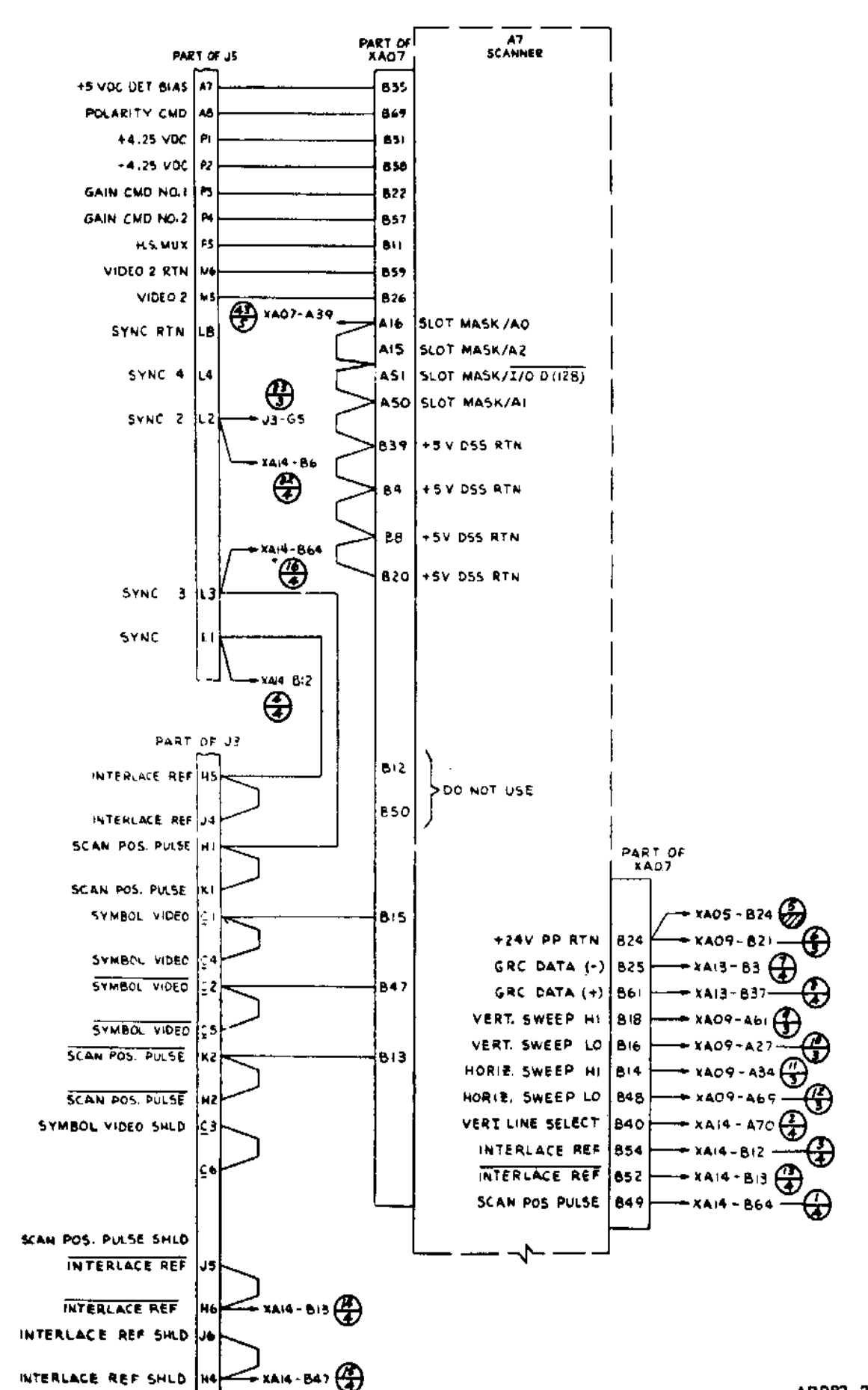
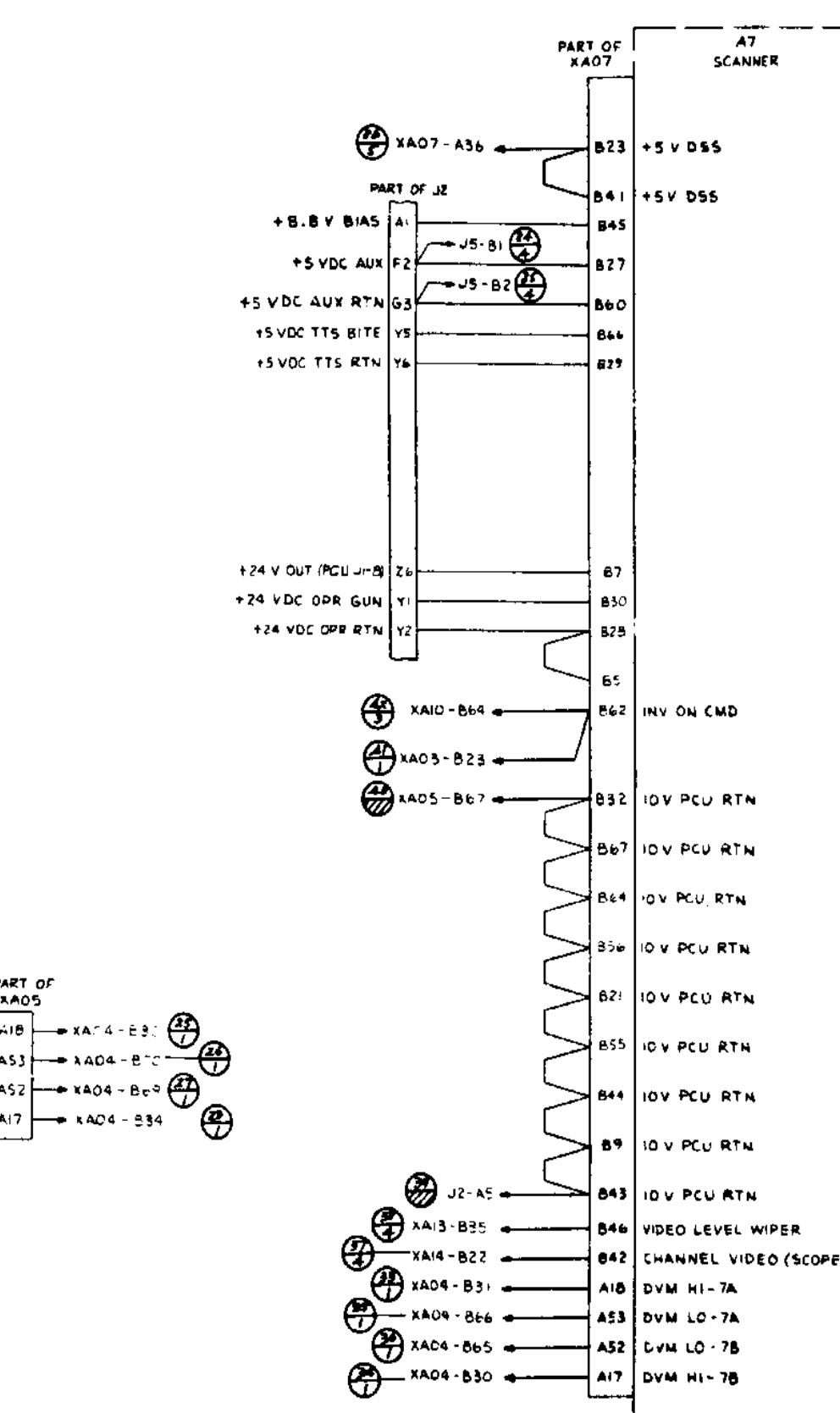
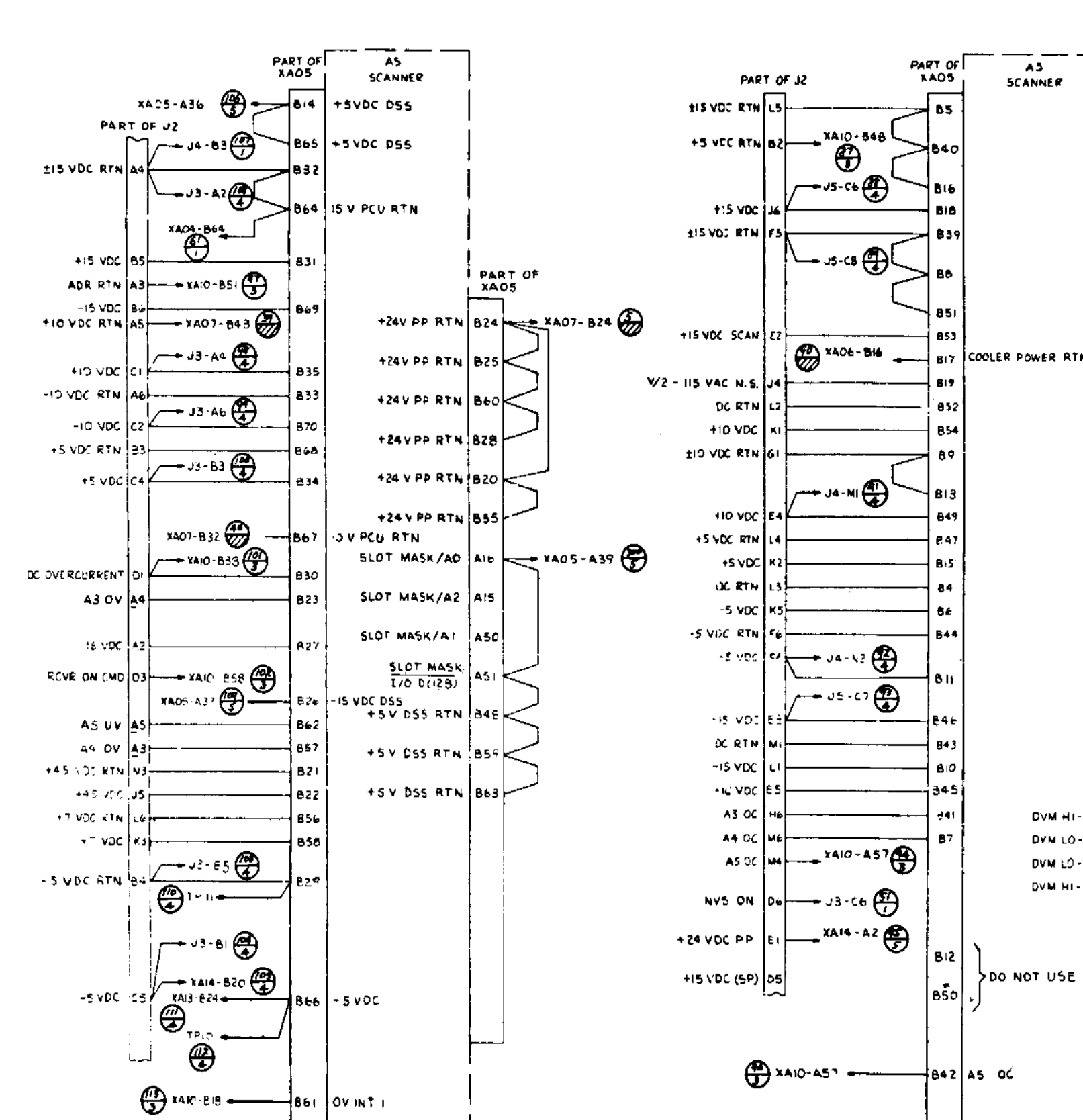
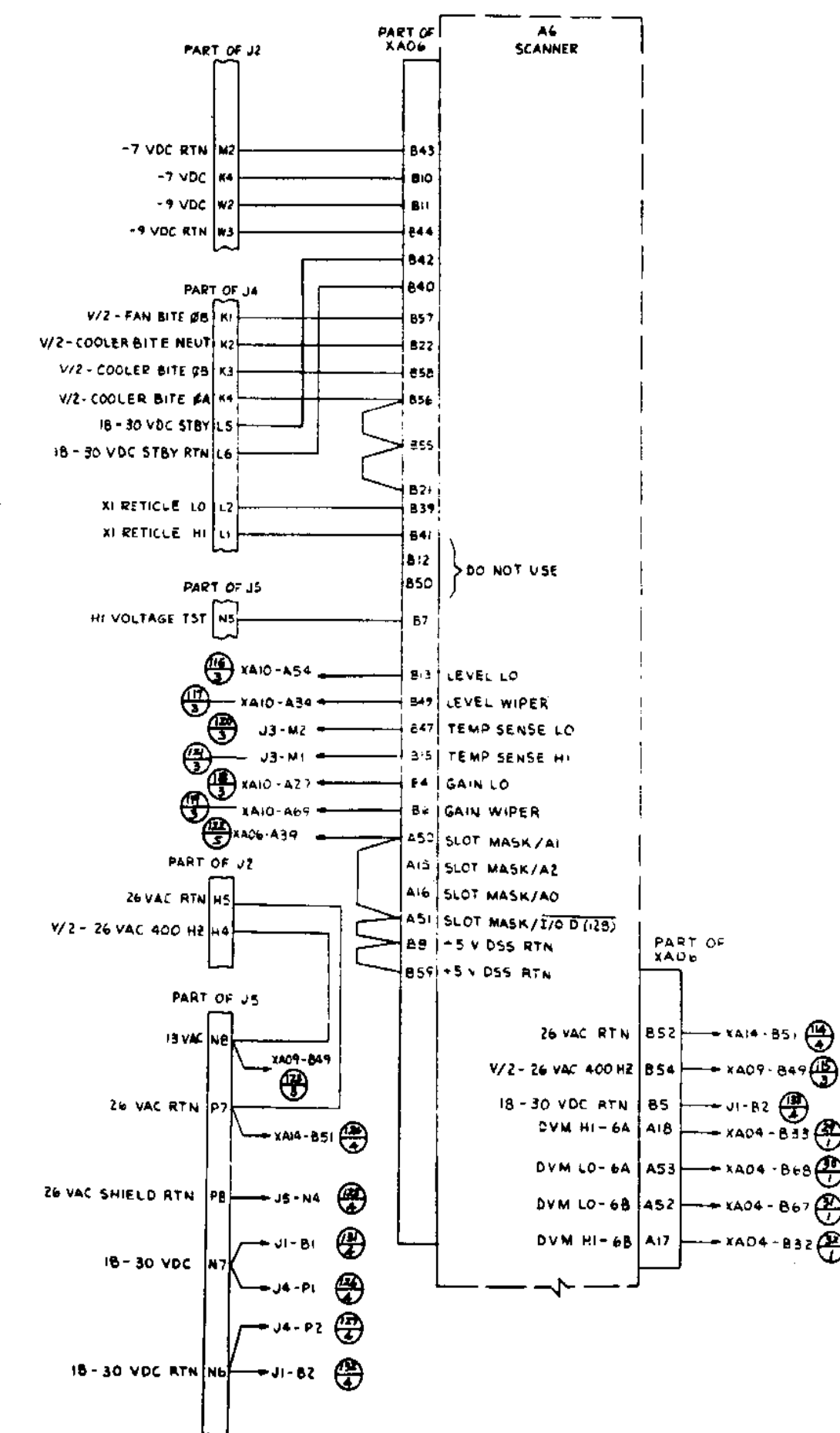
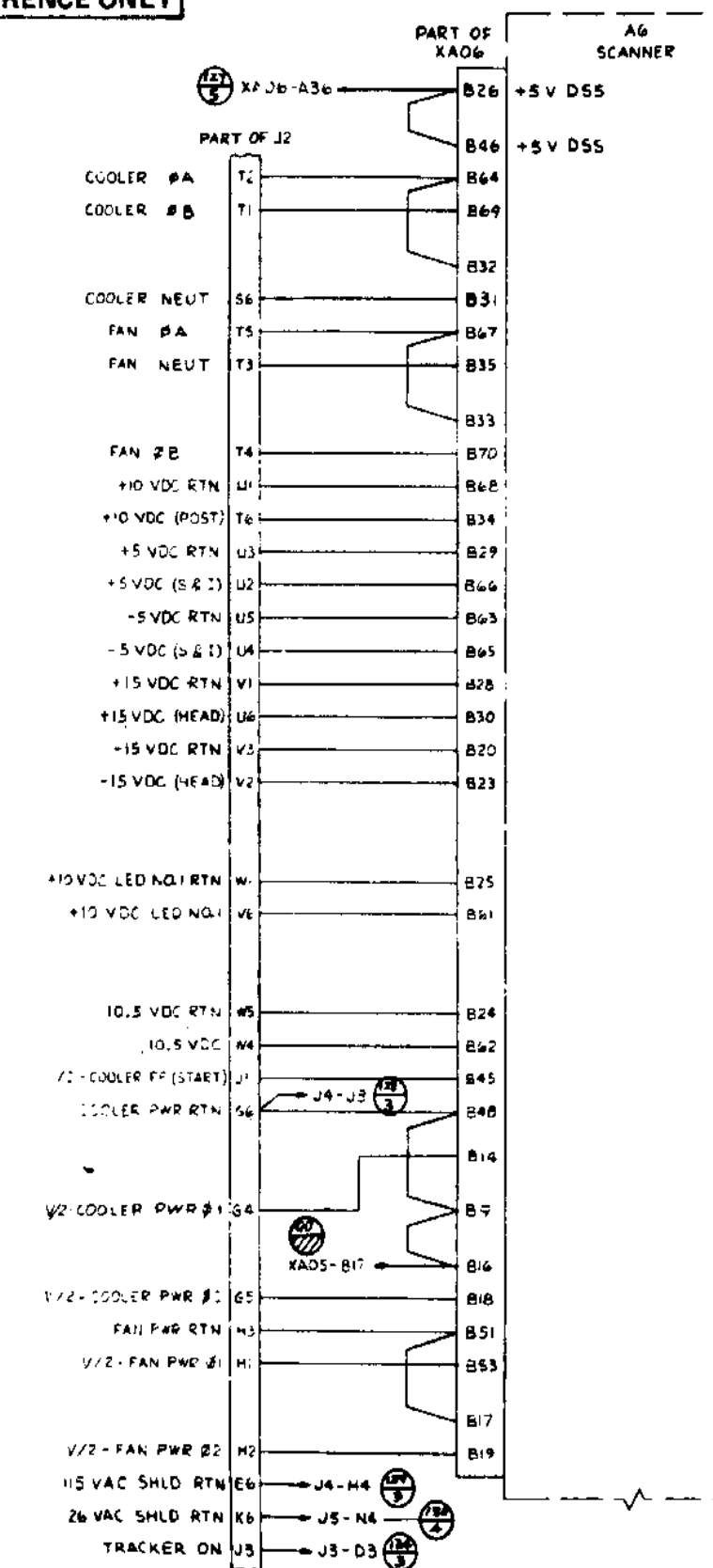


FO-5. DSS Motherboard Wiring Diagram (Sheet 1 of 5)

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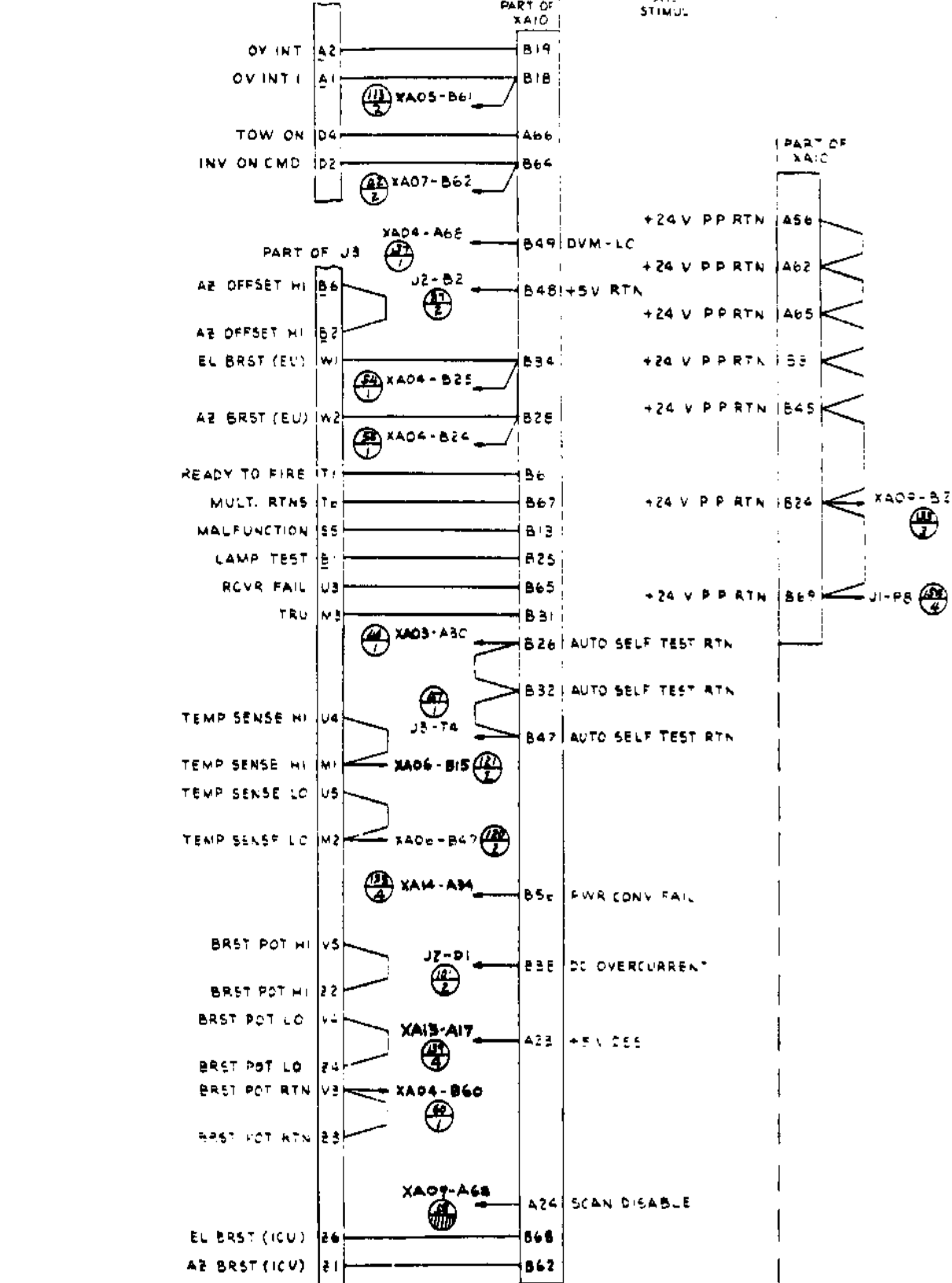
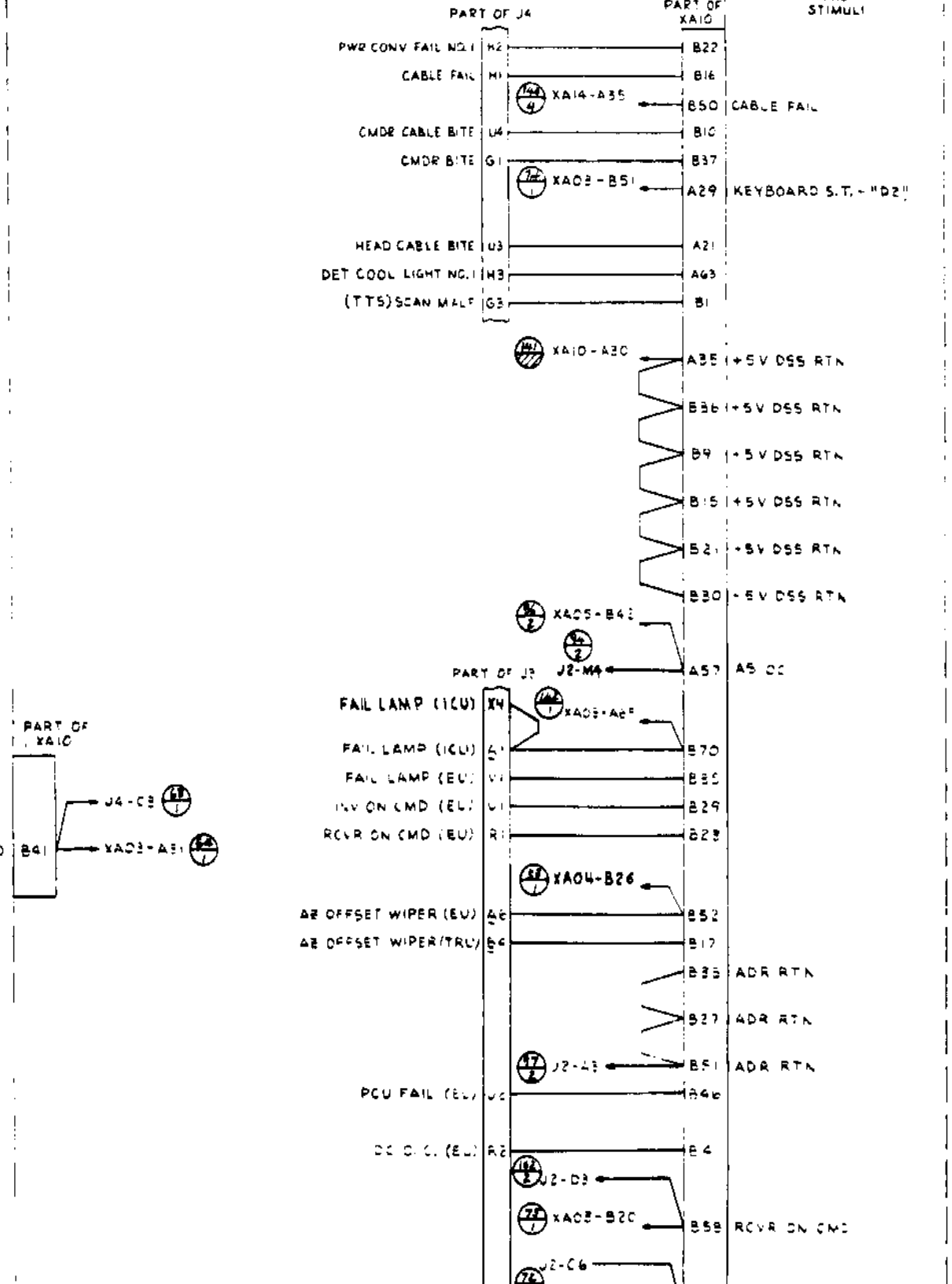
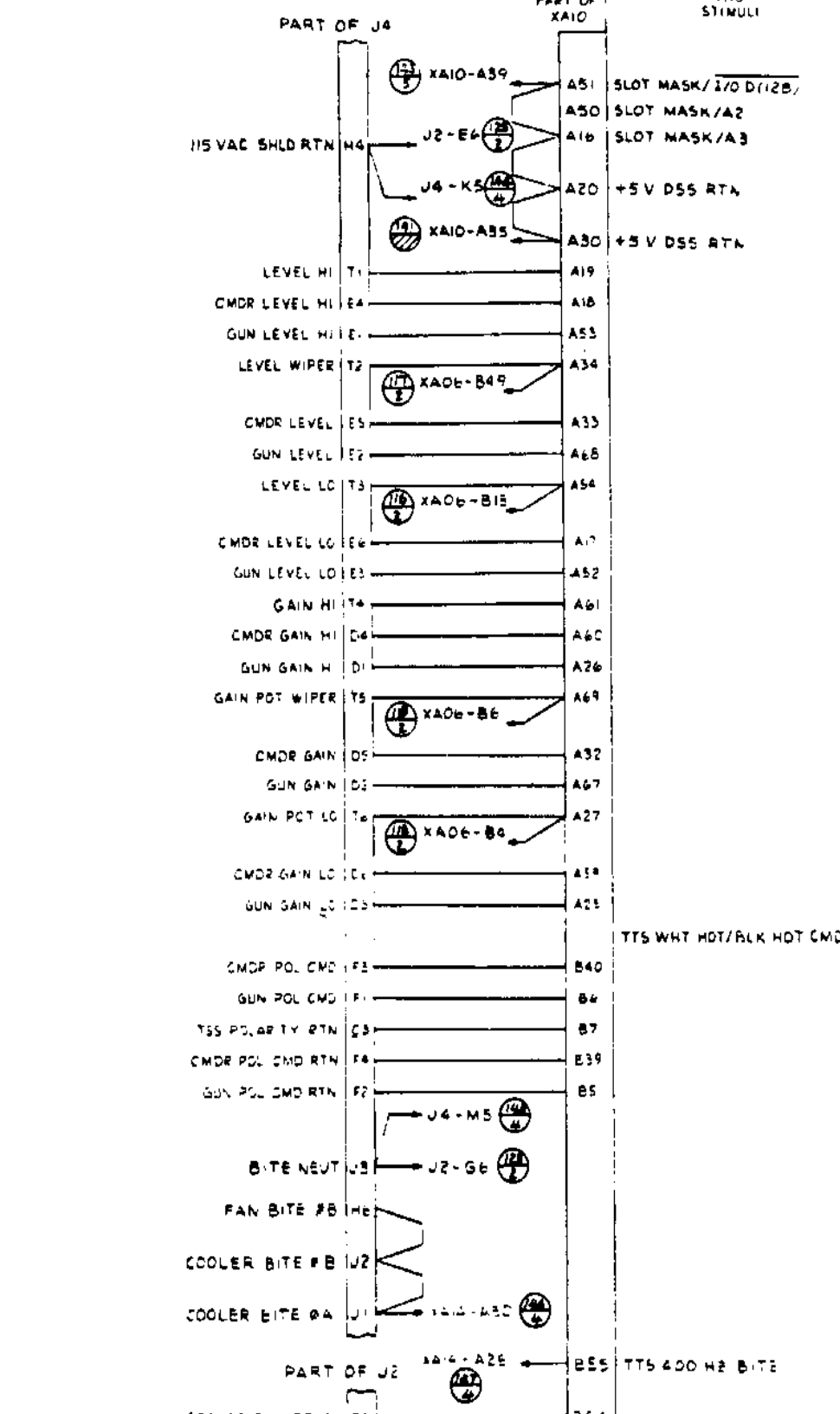
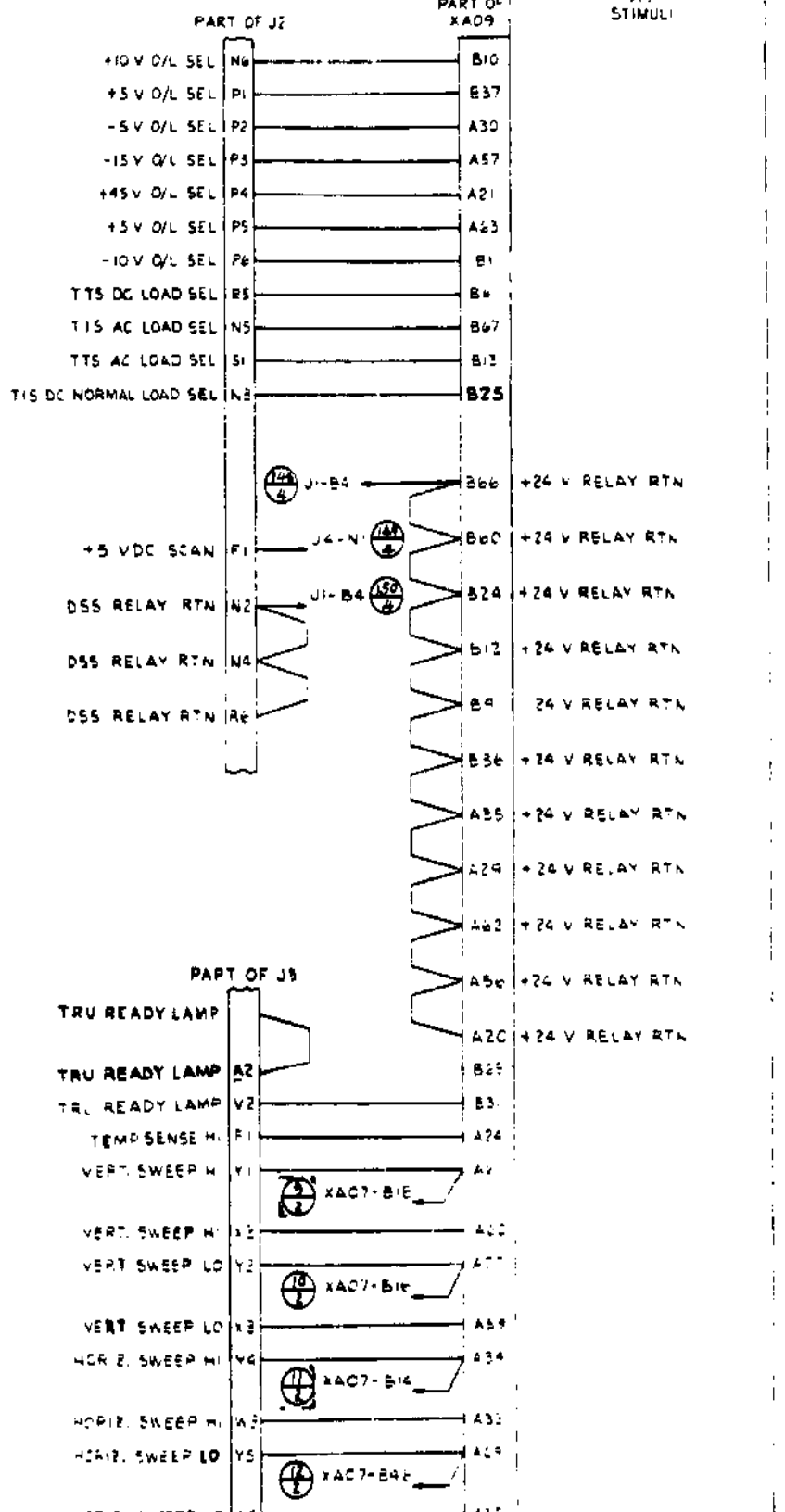
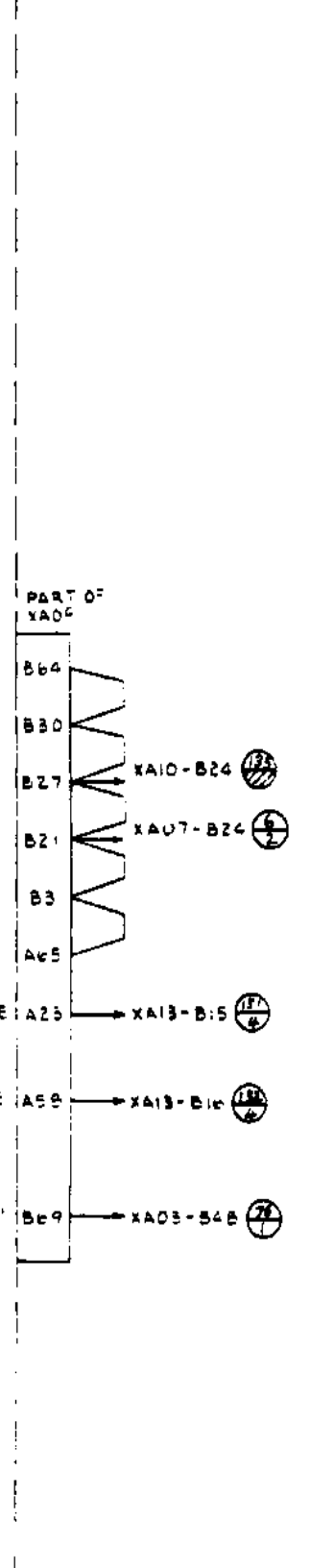
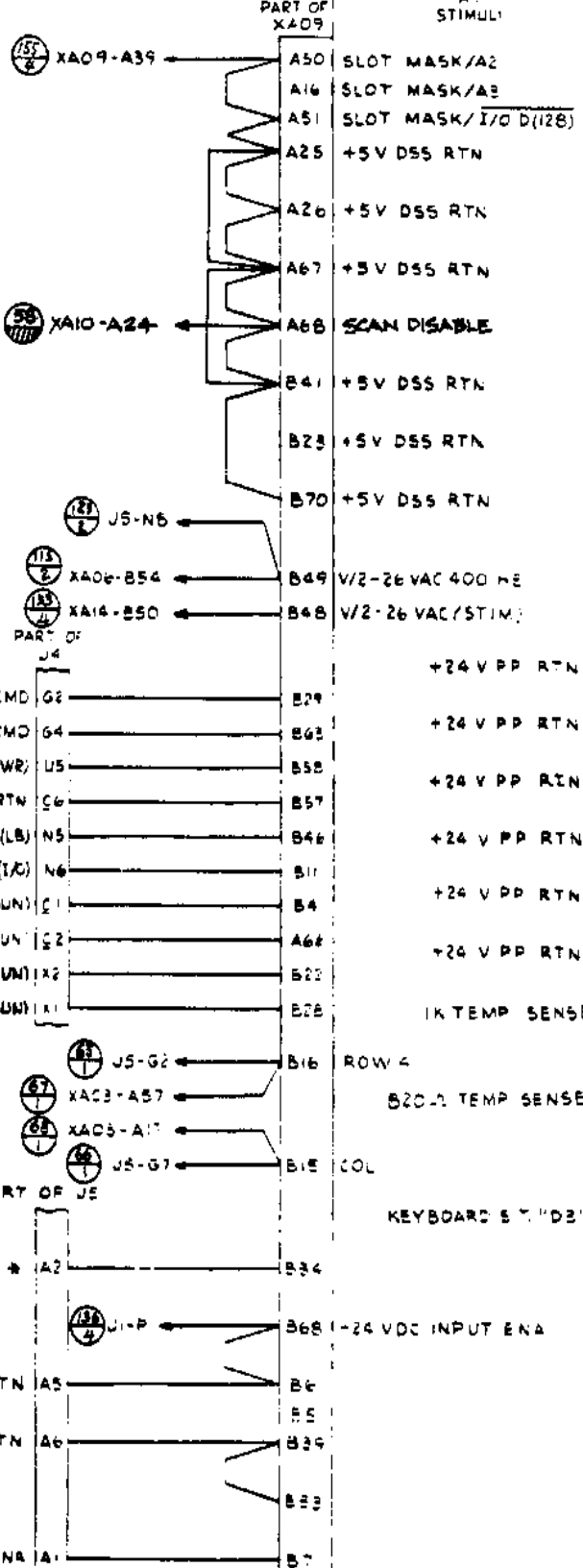
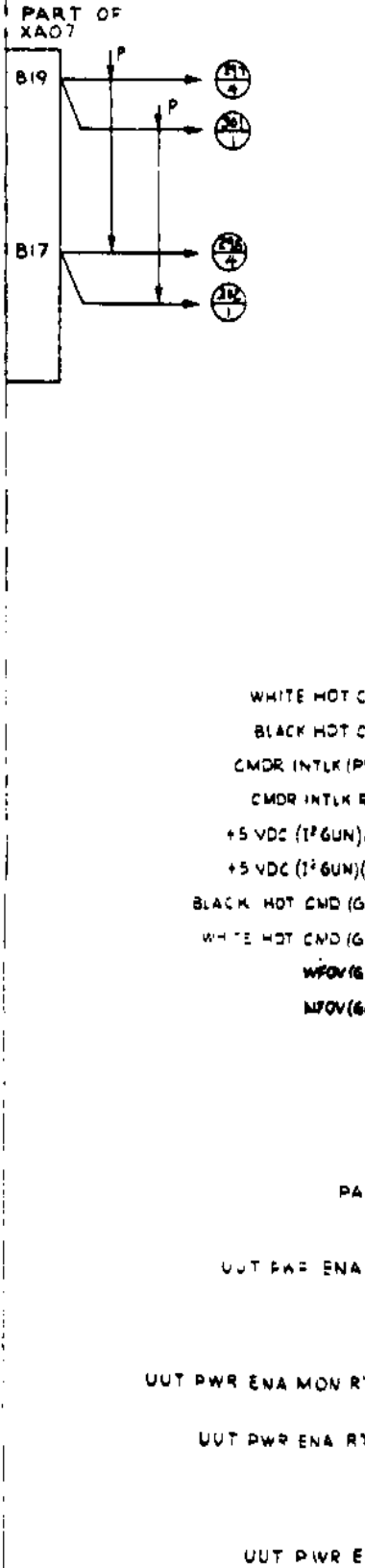
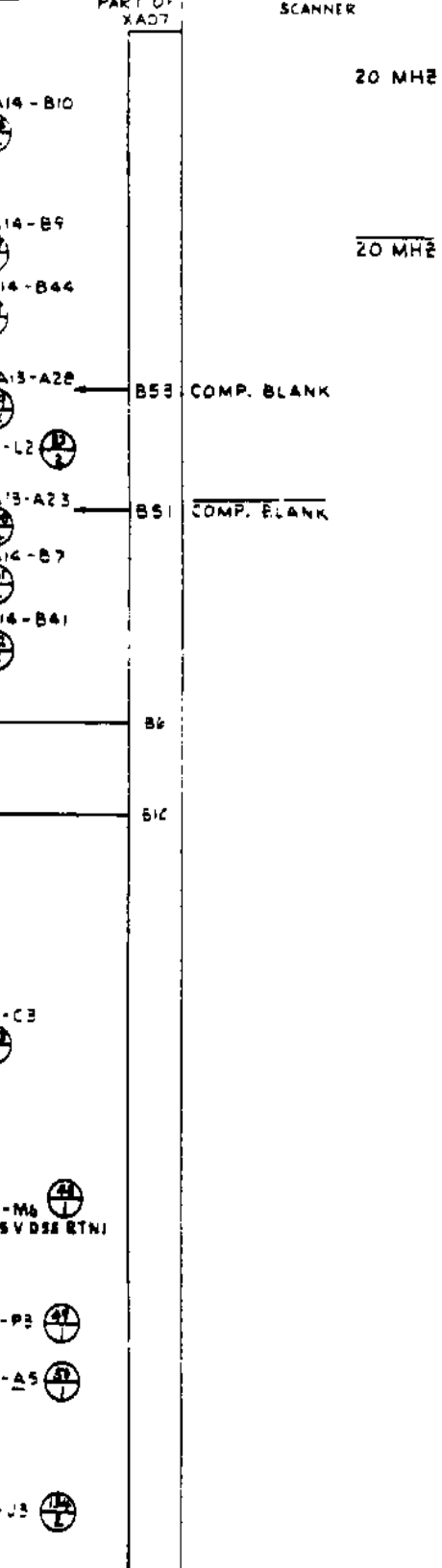
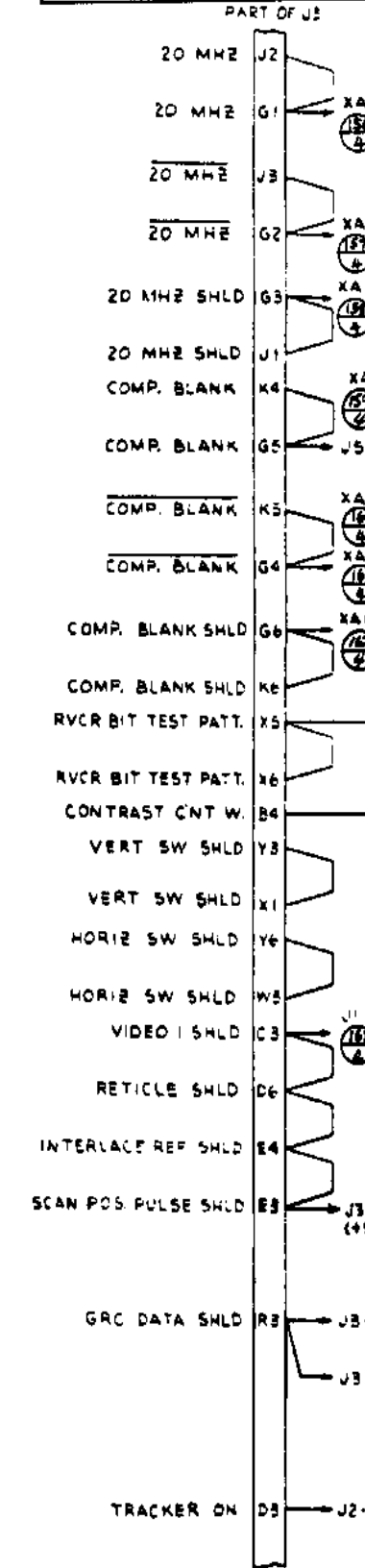


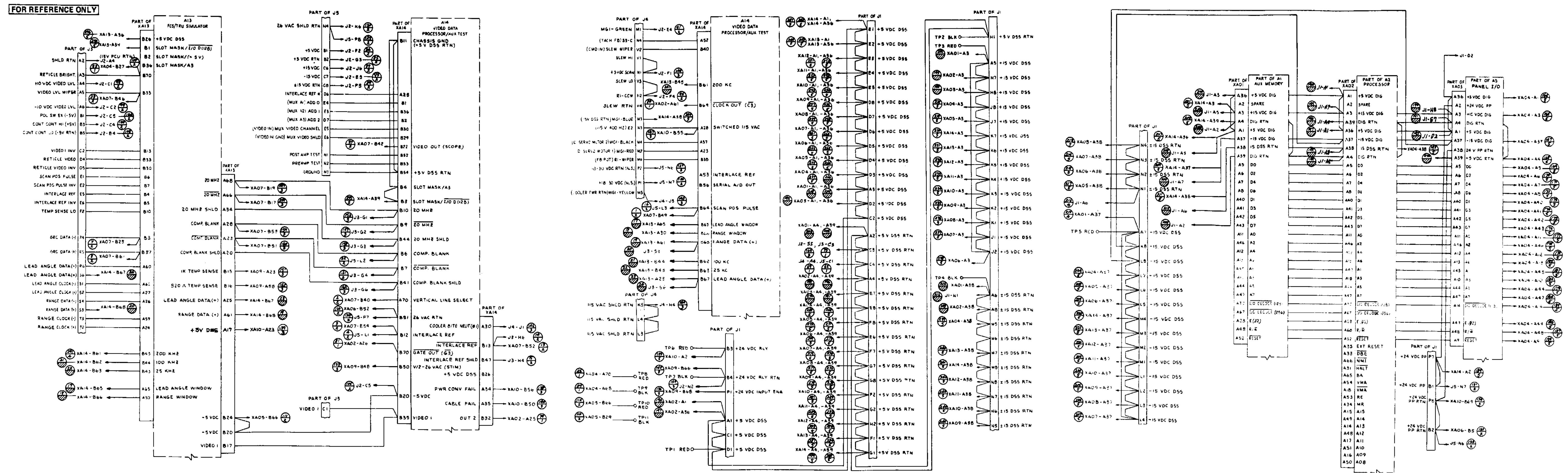
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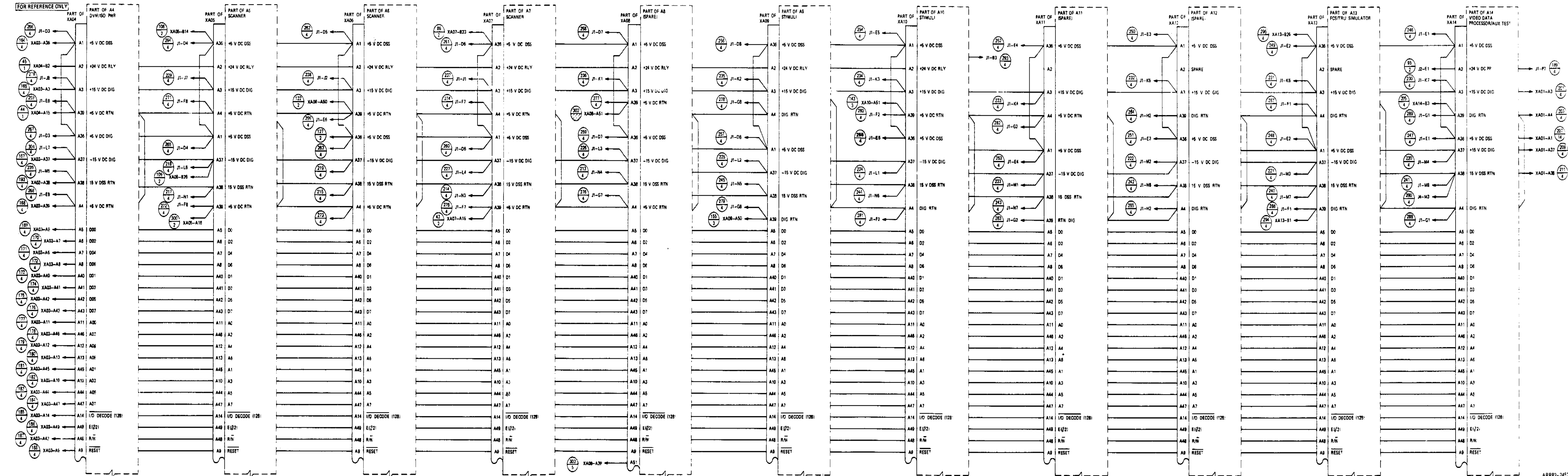


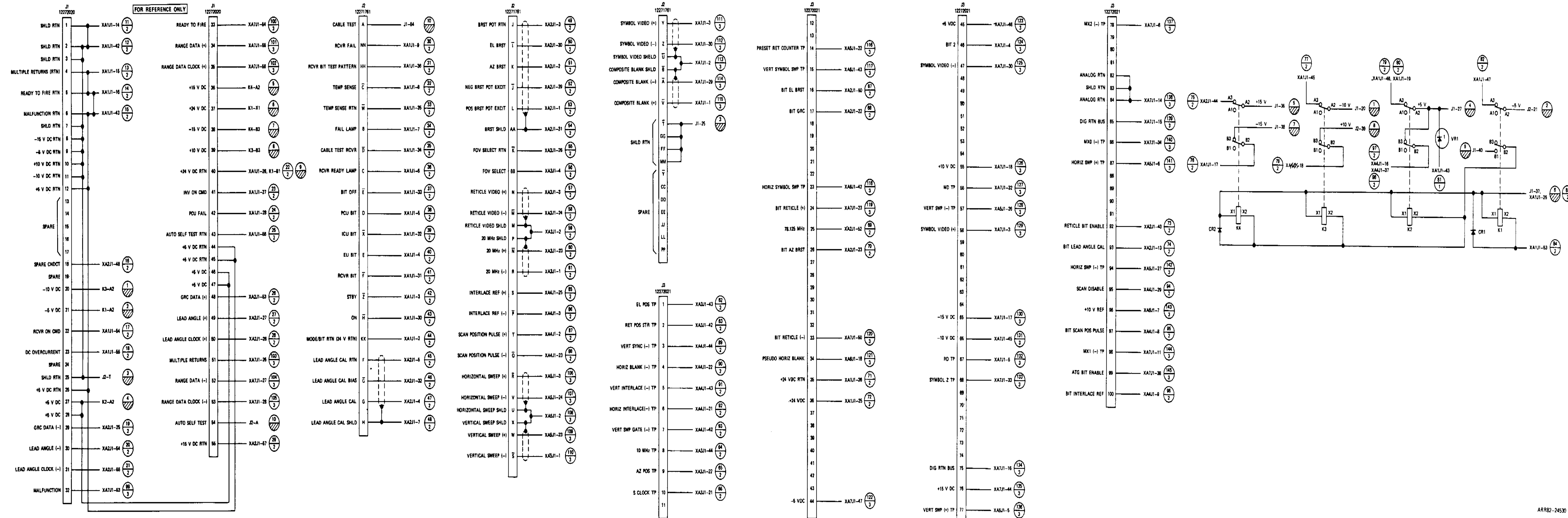
FO-5. DSS Motherboard Wiring Diagram  
(Sheet 2 of 5)

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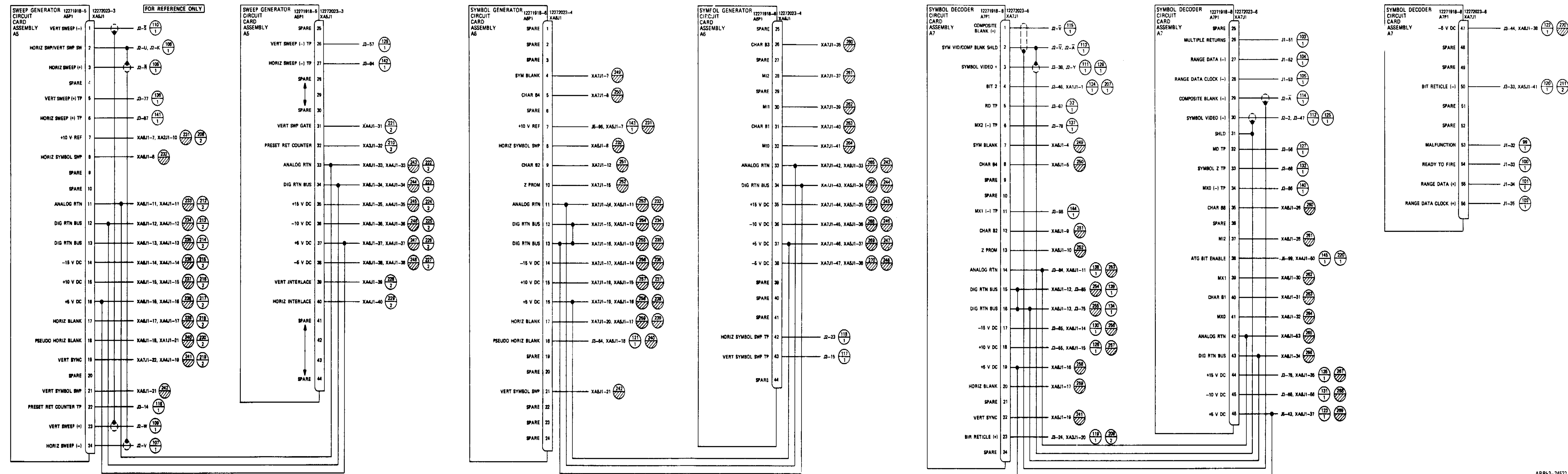


FO-5. DSS Motherboard Wiring Diagram  
(Sheet 3 of 5)









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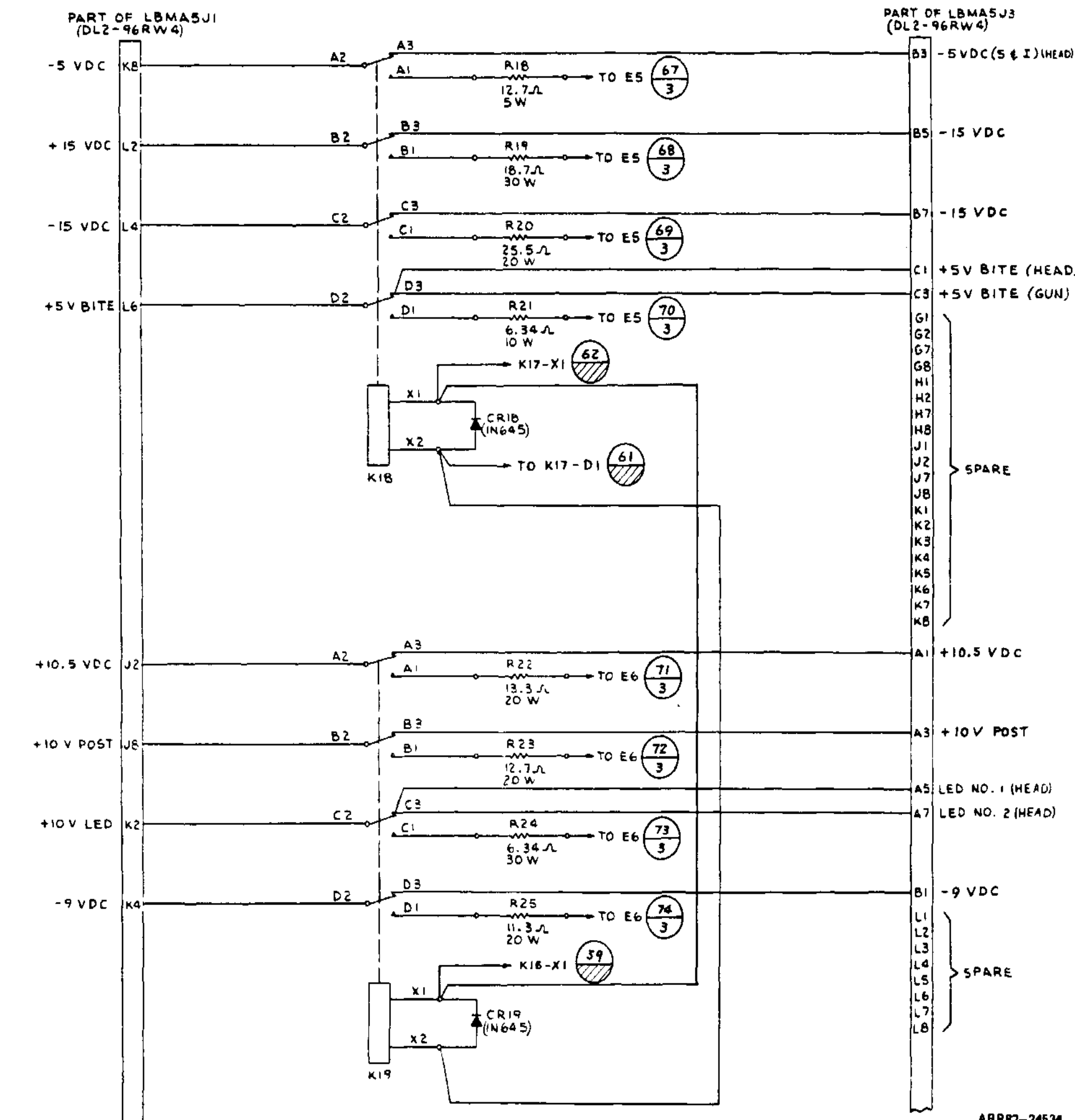
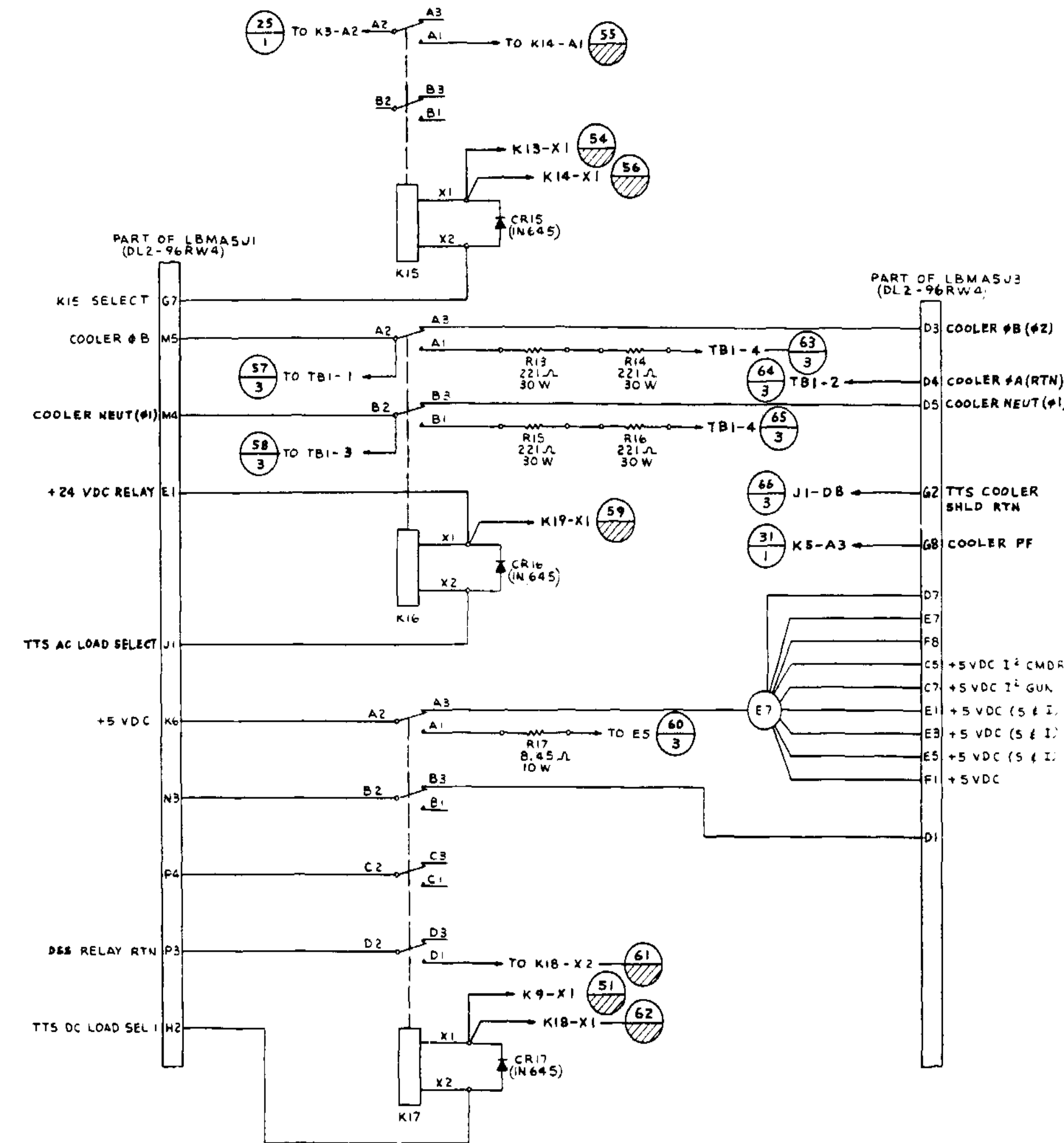
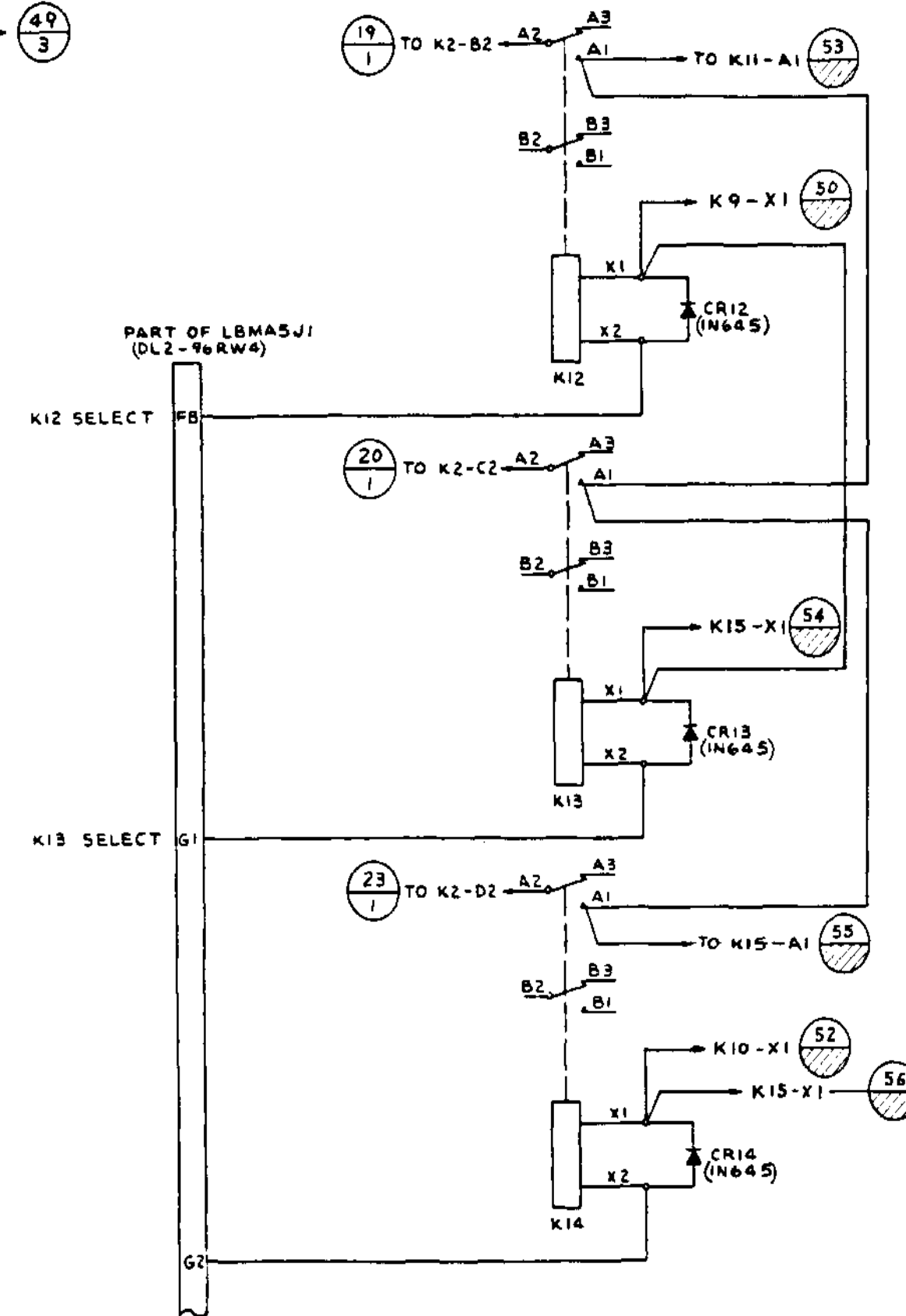
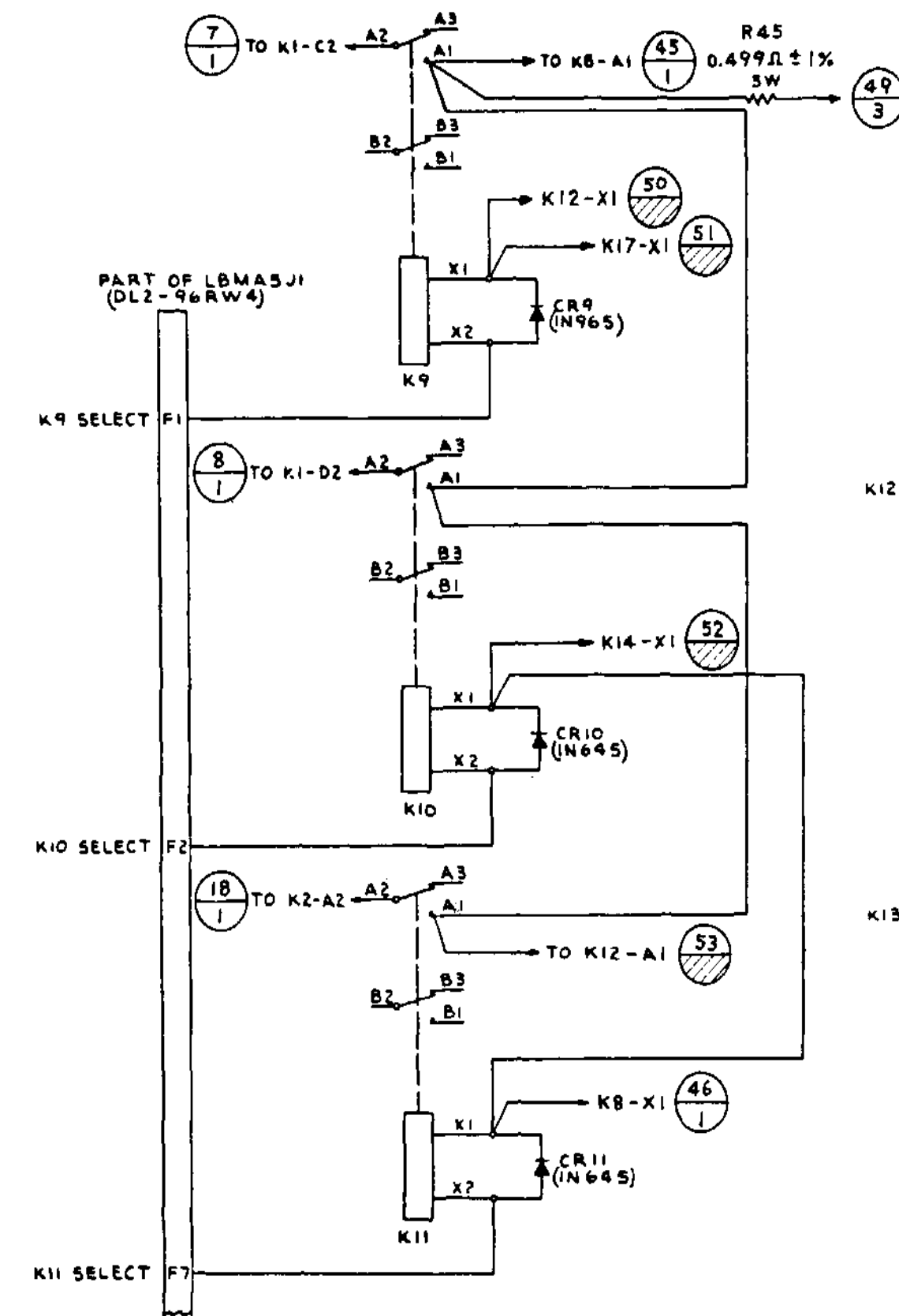
FO-6, Electronic Unit (EU) A4 Schematic  
Diagram (Sheet 3 of 3)

FP-29/(FP-30 blank)



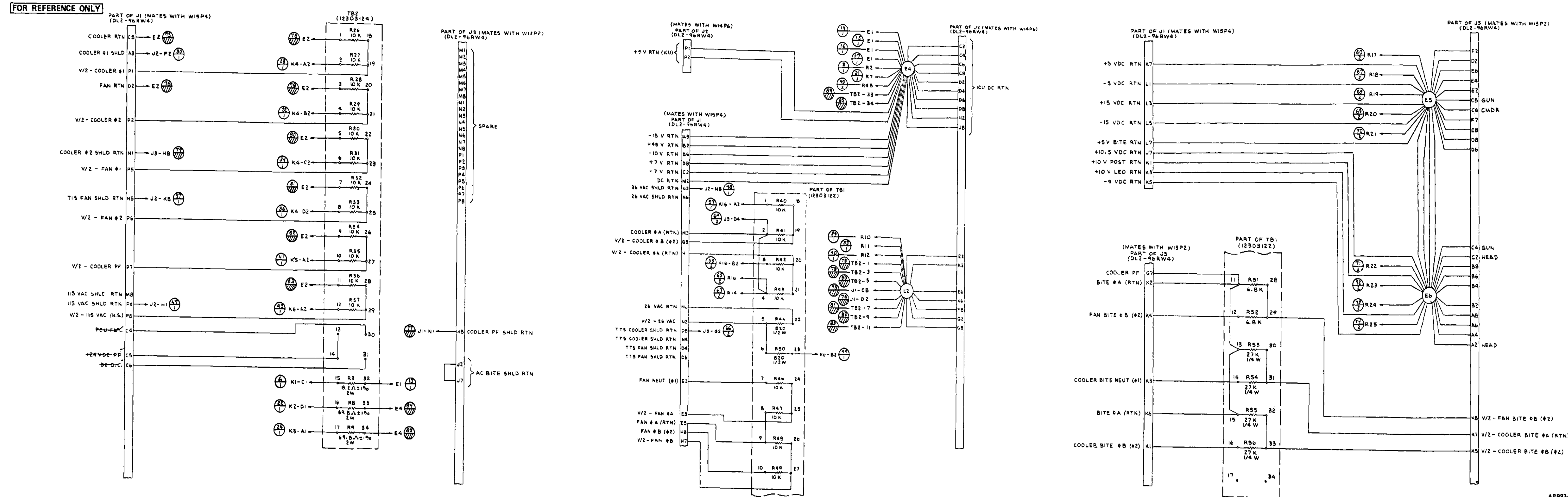


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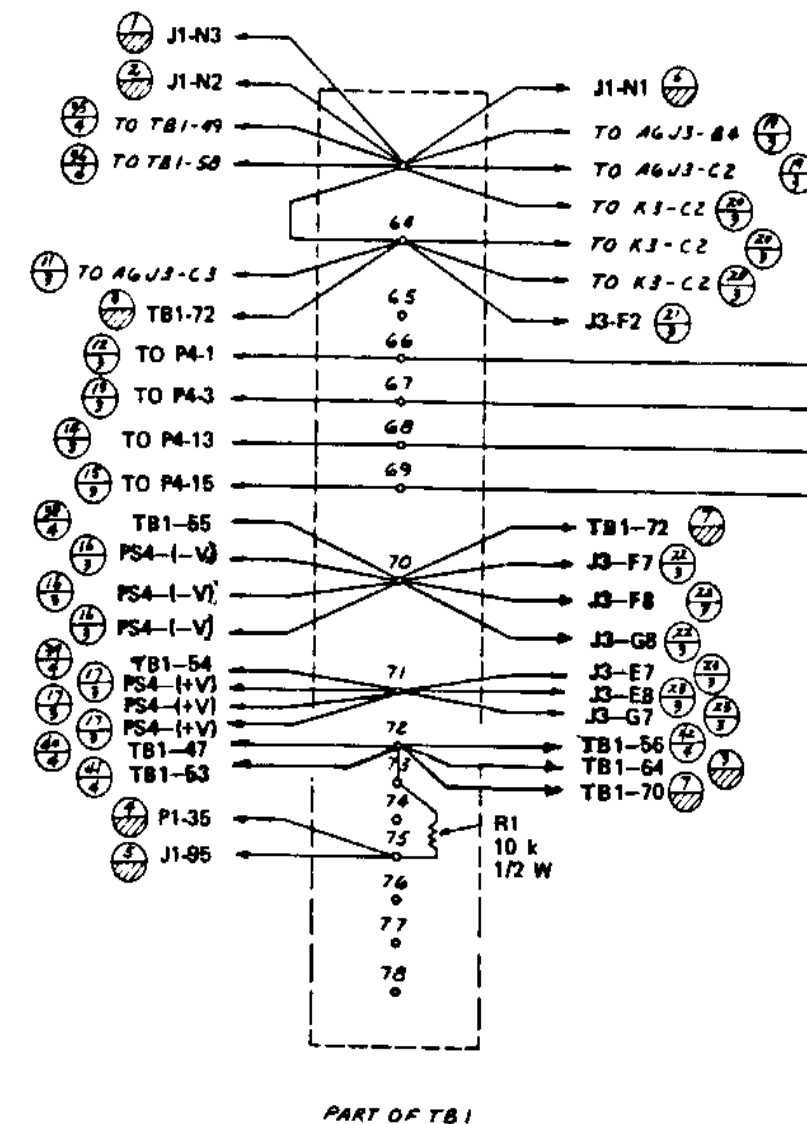
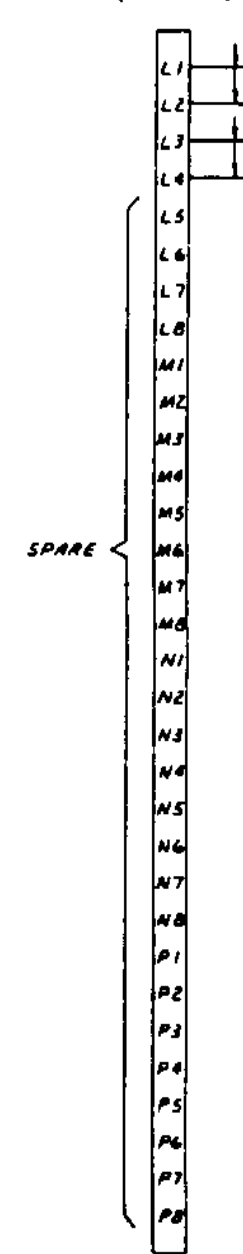
FO-7. Load Bank A5 Schematic Diagram  
(Sheet 2 of 3)

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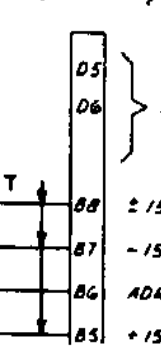


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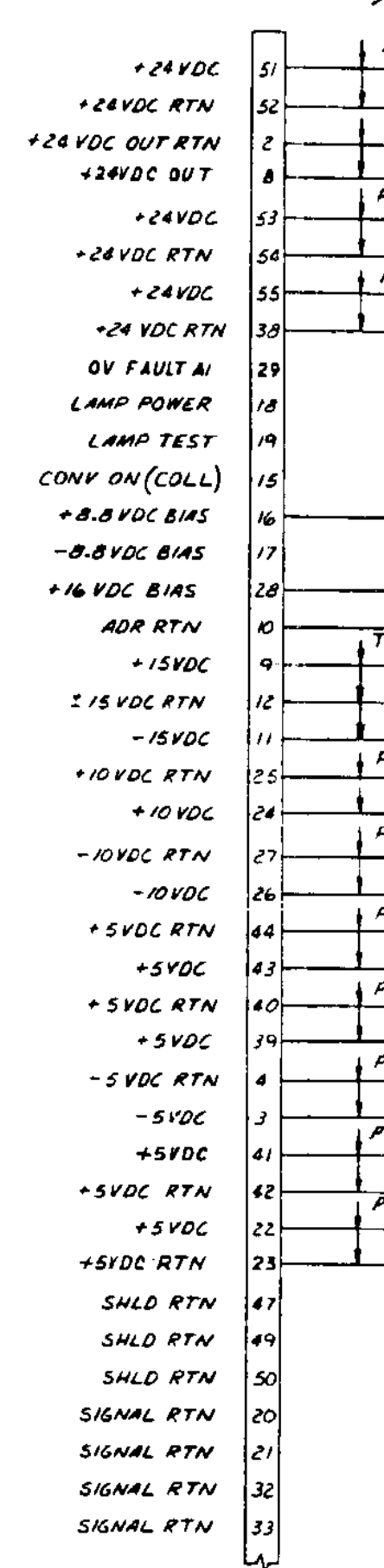
PART OF P1  
(MATES WITH AG4J1)  
(12303243)



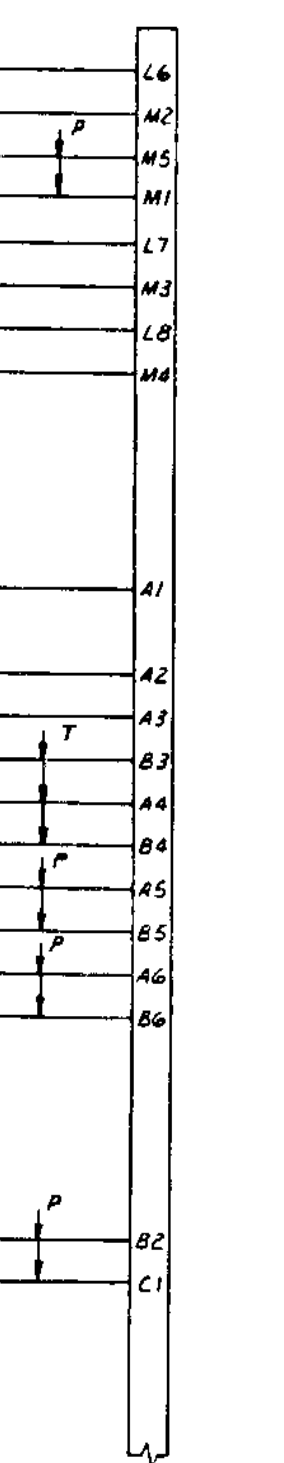
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(12303243)



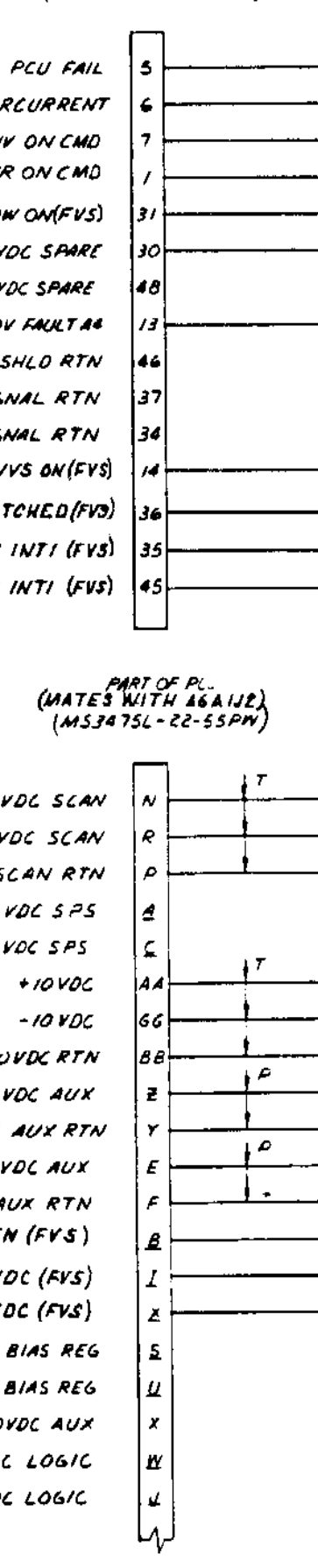
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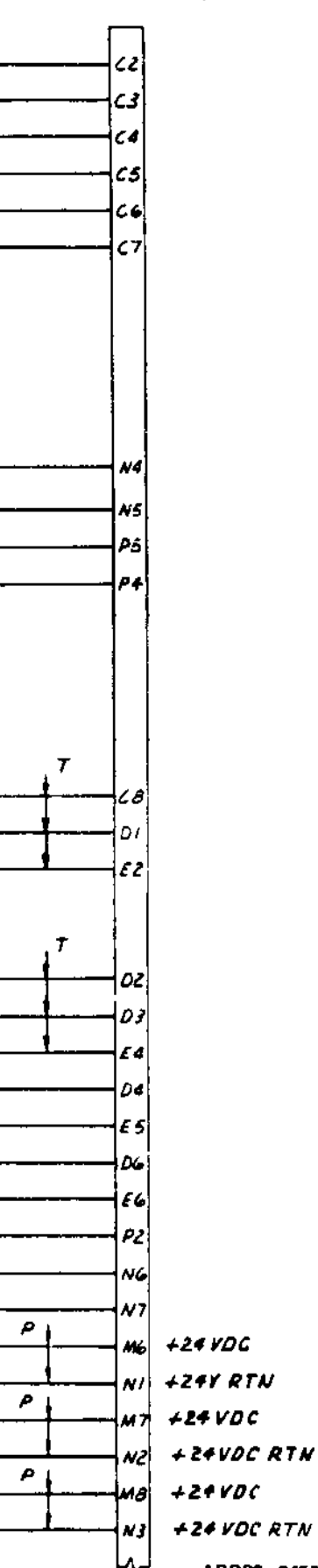
PART OF P1  
(MATES WITH AG4J1)  
(12303243)



PART OF P1  
(MATES WITH AG4J1)  
(12303243)



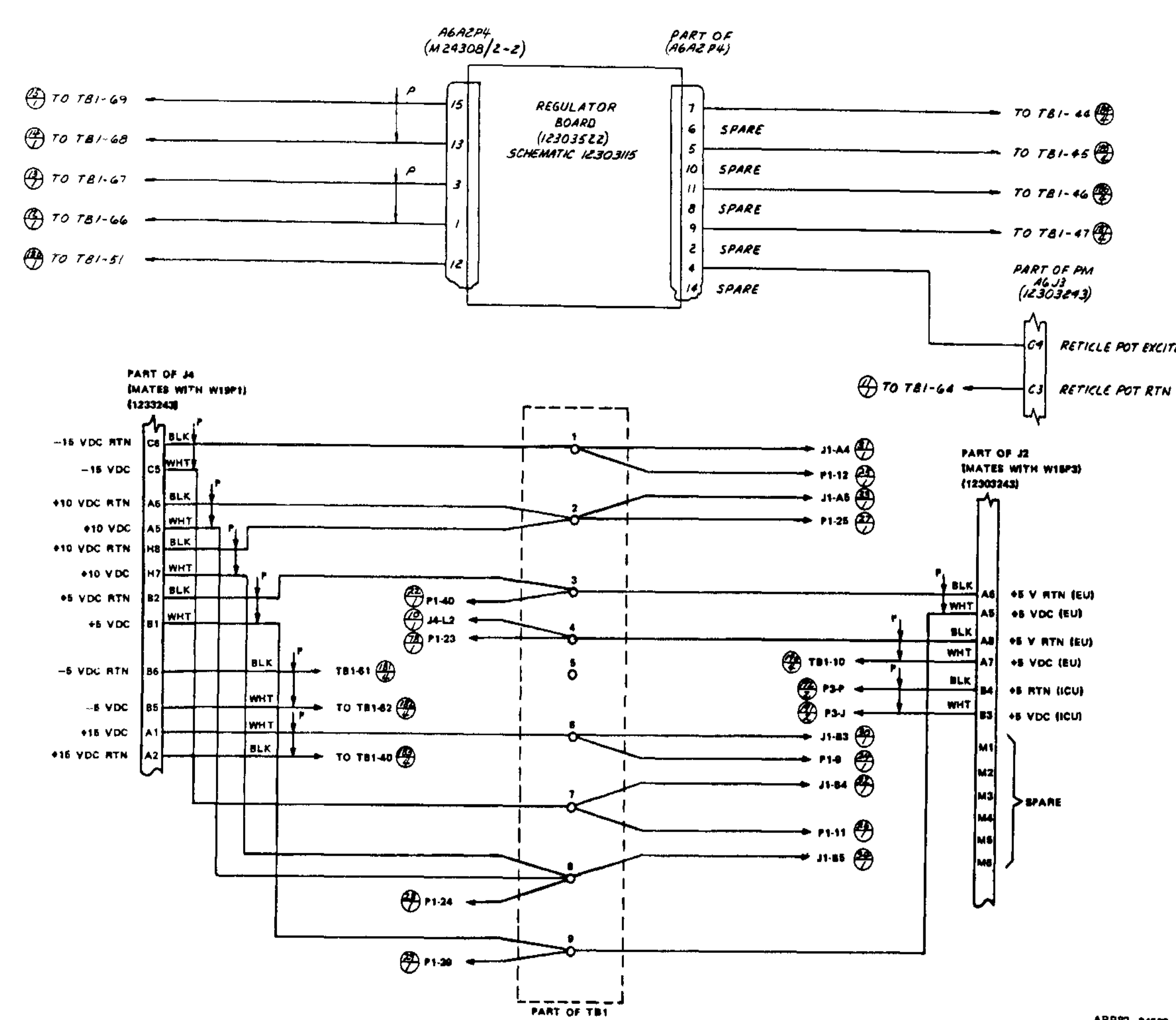
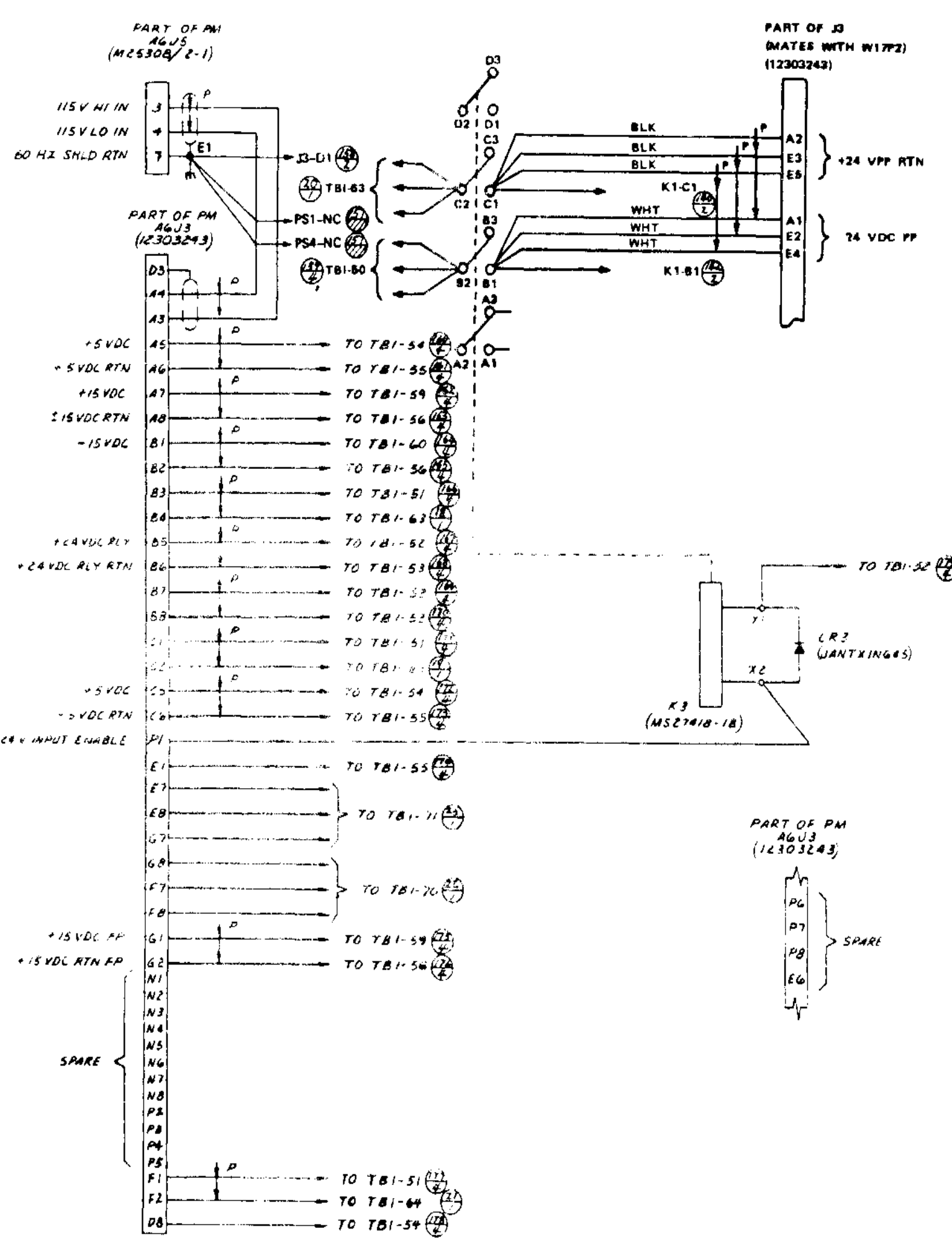
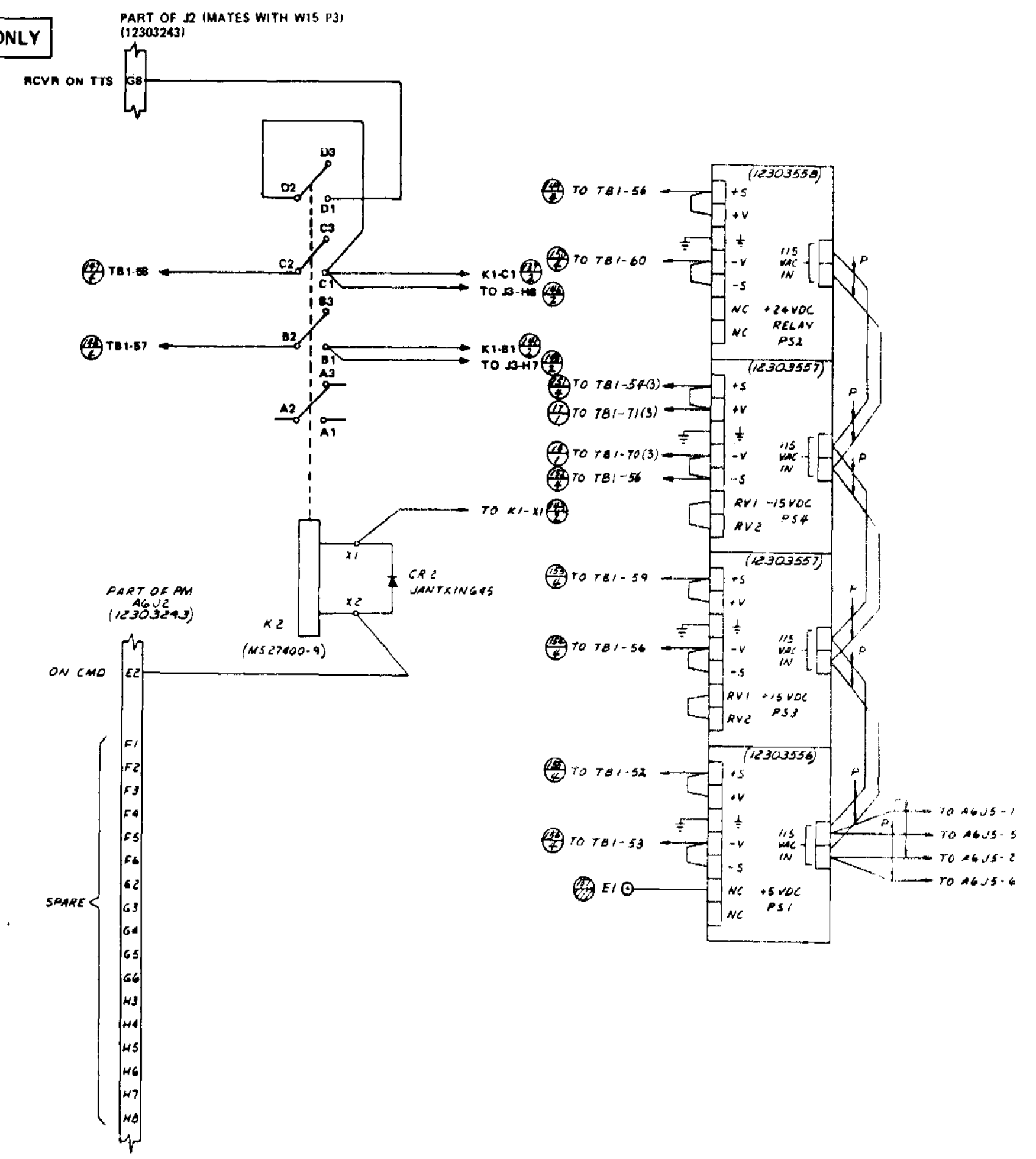
PART OF P1  
(MATES WITH AG4J1)  
(12303243)



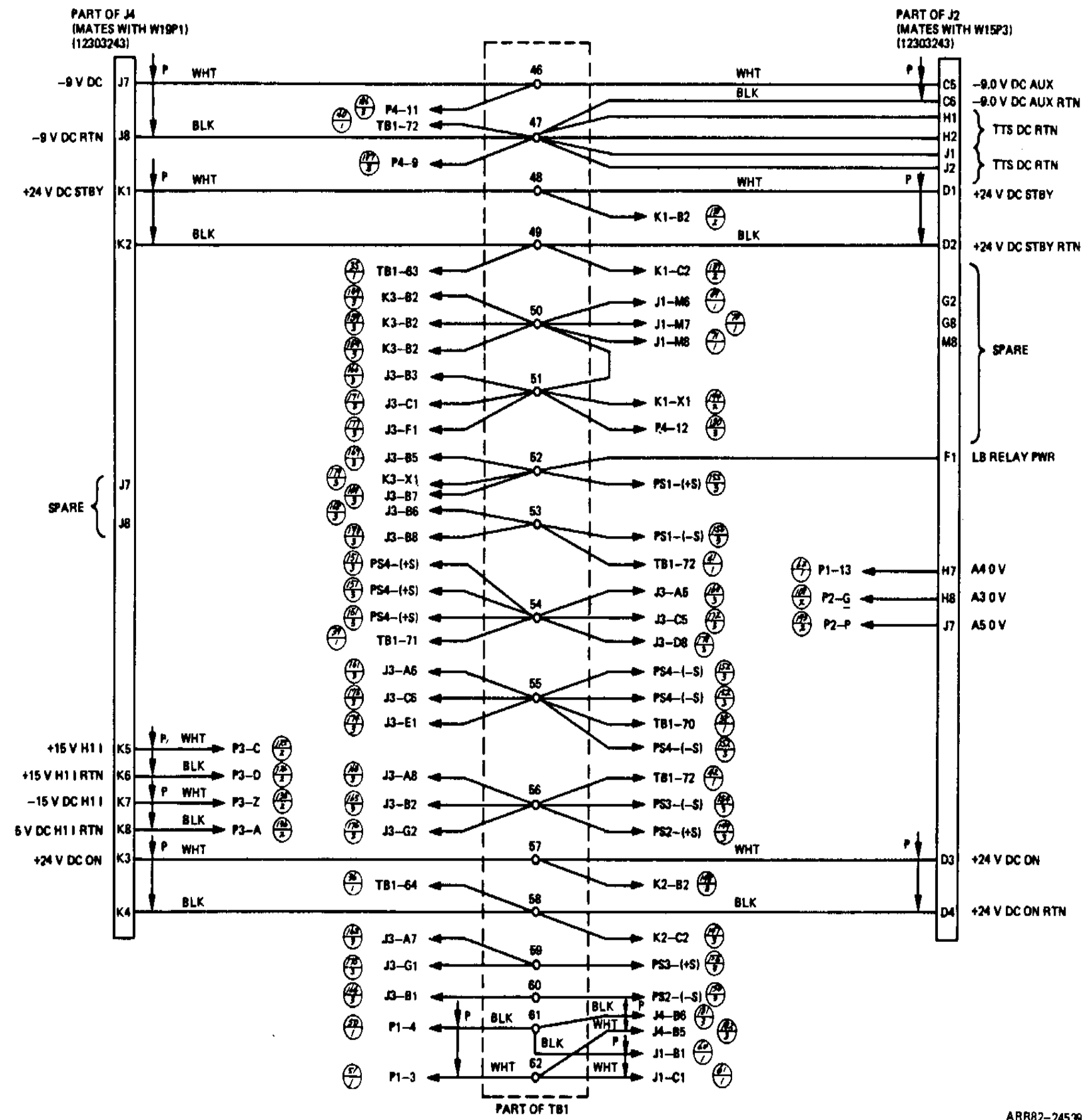
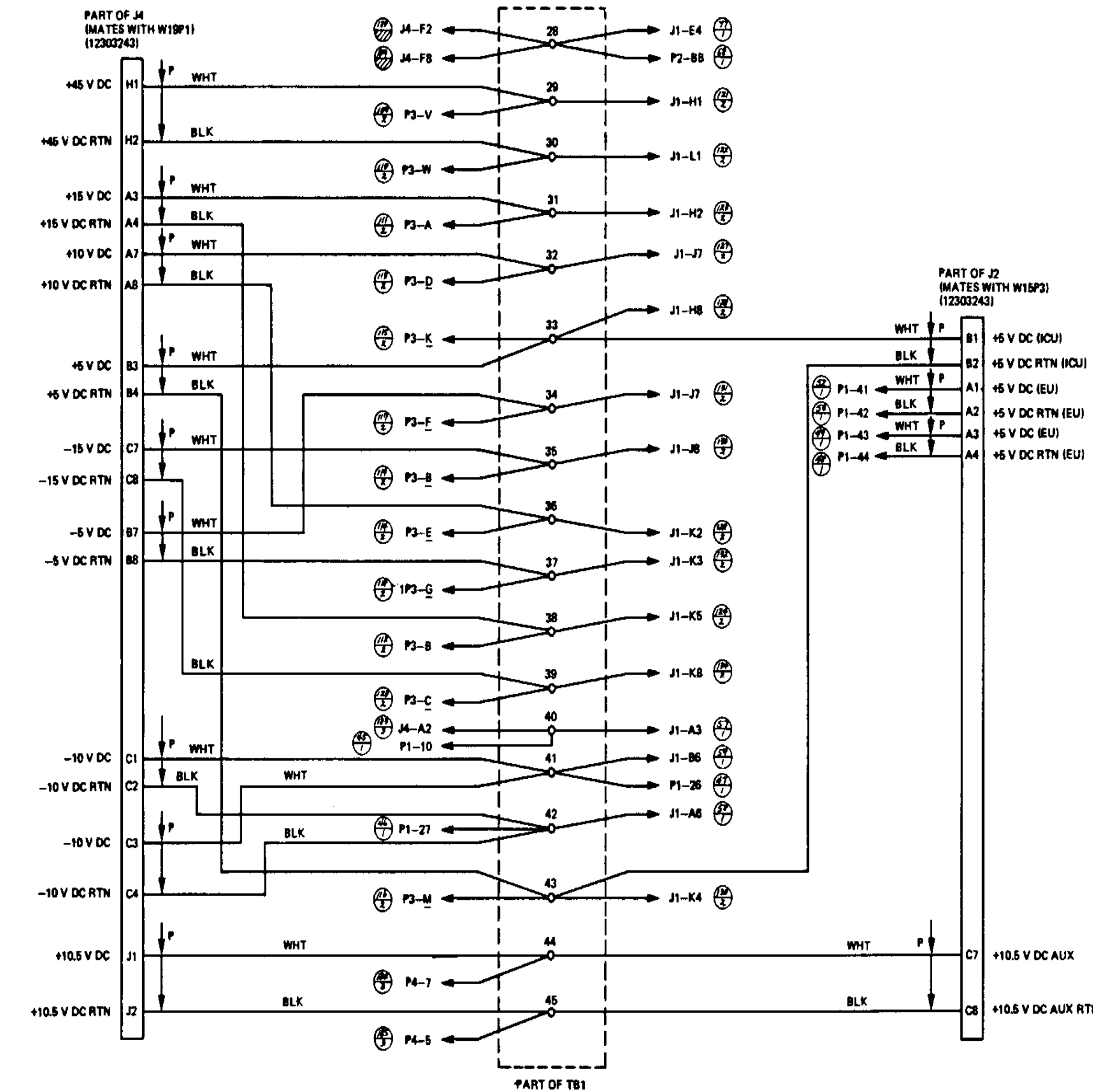
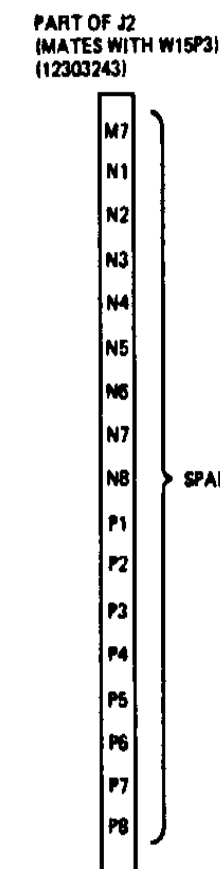
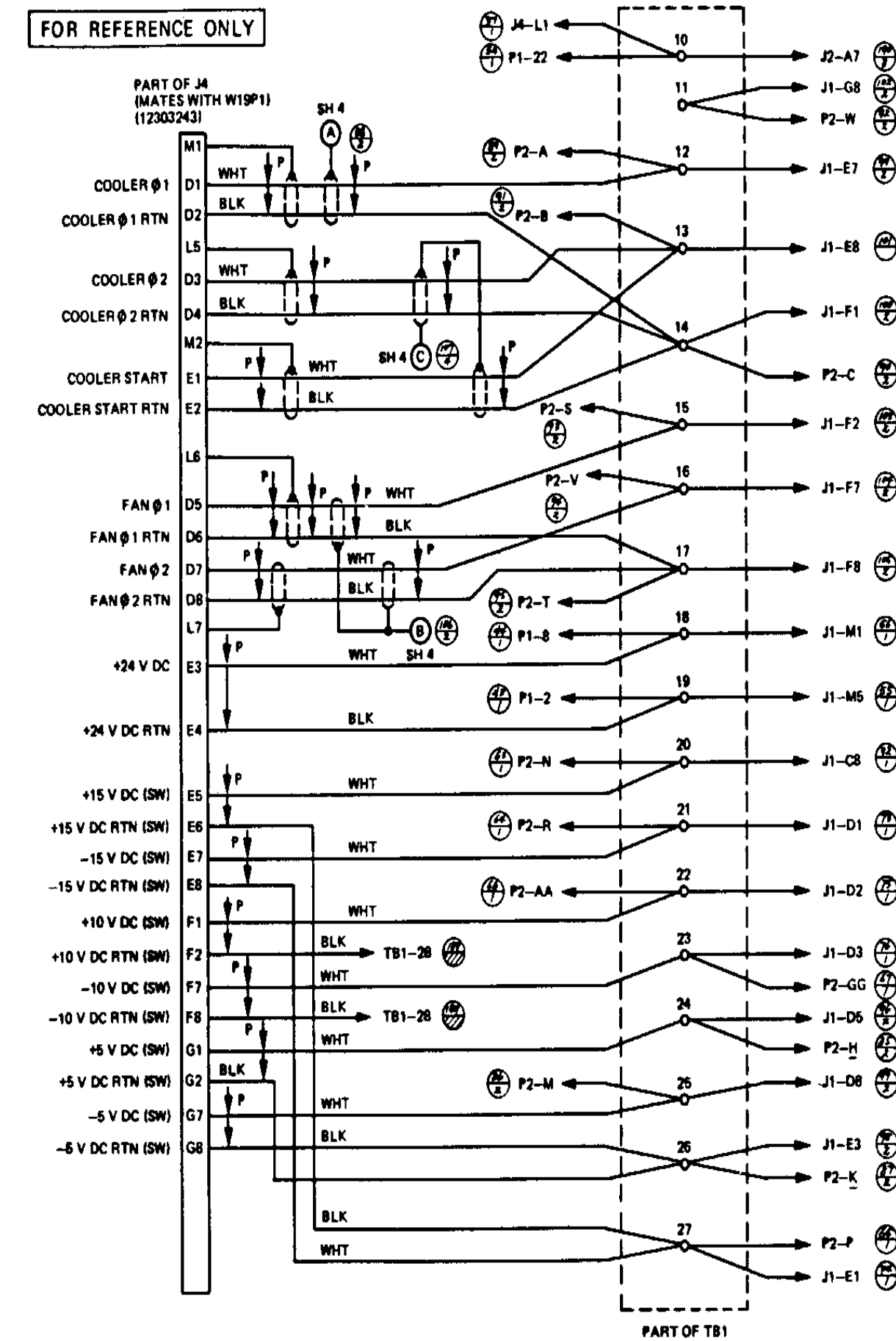
FO-8. Power Module A6 Schematic Diagram  
(Sheet 1 of 4)

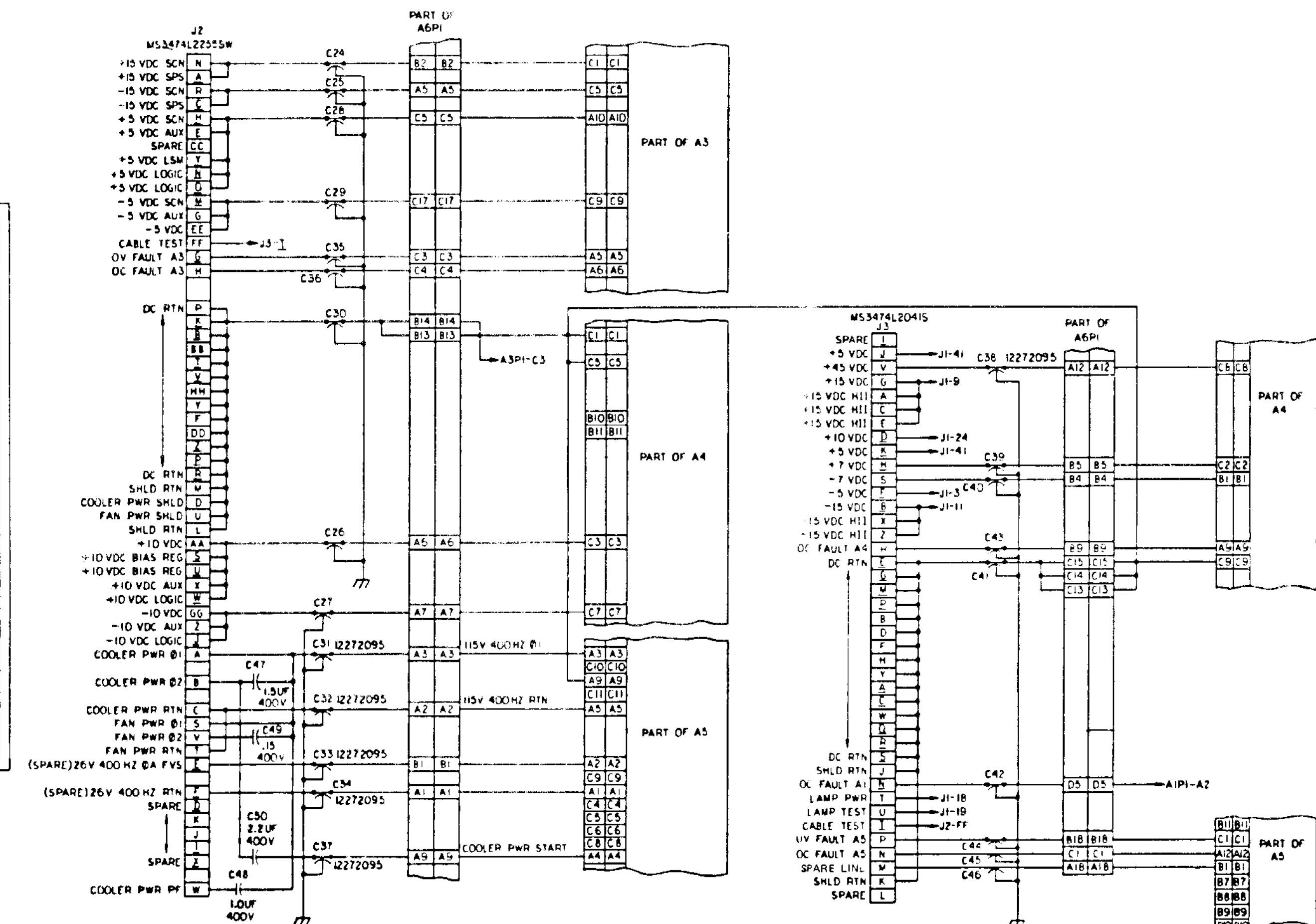
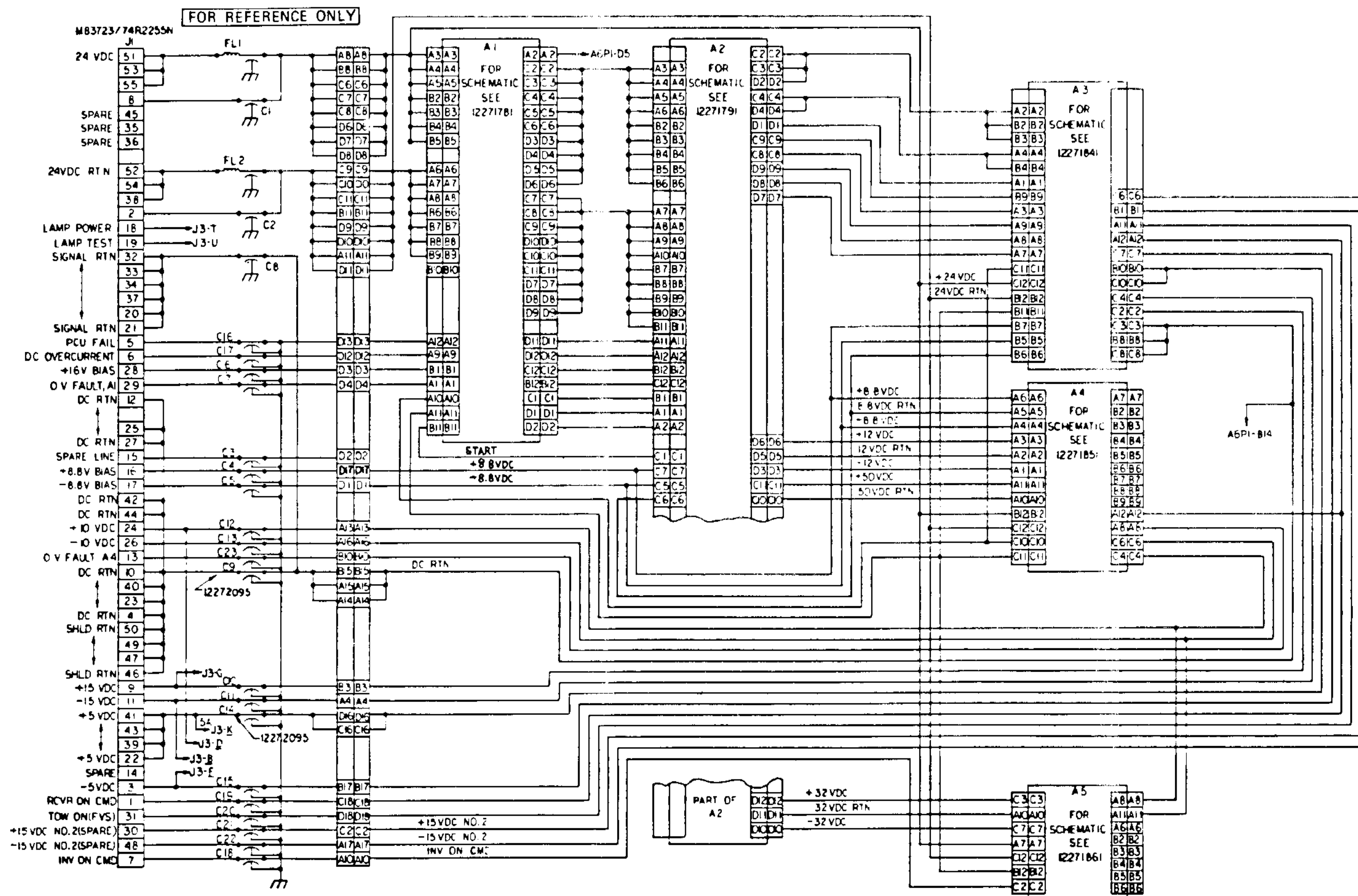


FOR REFERENCE ONLY



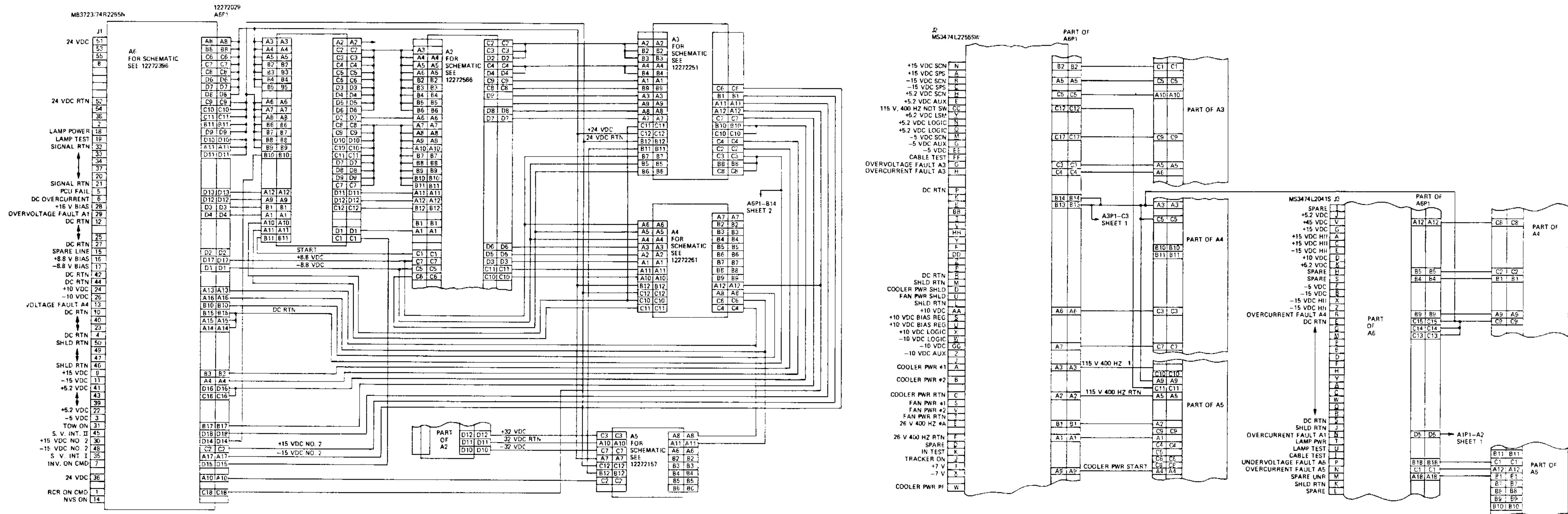
FO-8. Power Module A6 Schematic Diagram  
(Sheet 3 of 4)

FO-8. Power Module A6 Schematic Diagram.  
(Sheet 4 of 4)

FO-9. Power Control Unit (PCU) A6A1  
Schematic Diagram



FOR REFERENCE ONLY

FO-10. Common Power Control Unit (PCU) A6A1  
Schematic Diagram



CS 2334

FOR REFERENCE ONLY

(12303344)

W13 P1

HEAD CABLE BITE

WHITE HOT CMD

BLACK HOT CMD

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W13 P2

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W13 P3

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HEAD CABLE BITE

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W13 P5

HEAD CABLE BITE

WHITE HOT CMD

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FP CMD RTN

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W13 P6

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BLACK HOT CMD

FP CMD RTN

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W13 P7

HEAD CABLE BITE

WHITE HOT CMD

BLACK HOT CMD

FP CMD RTN

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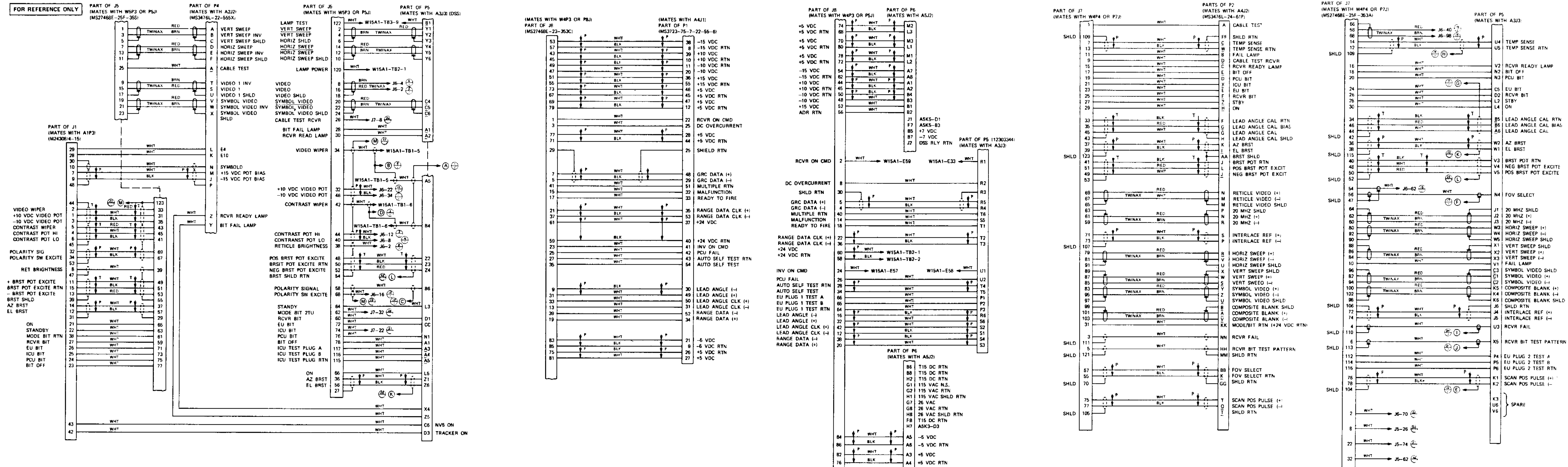
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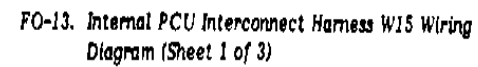
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WFOV

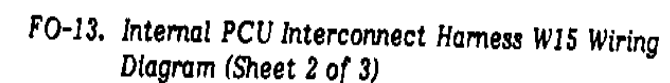
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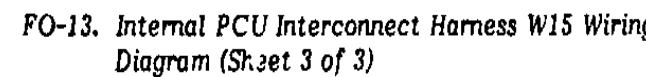


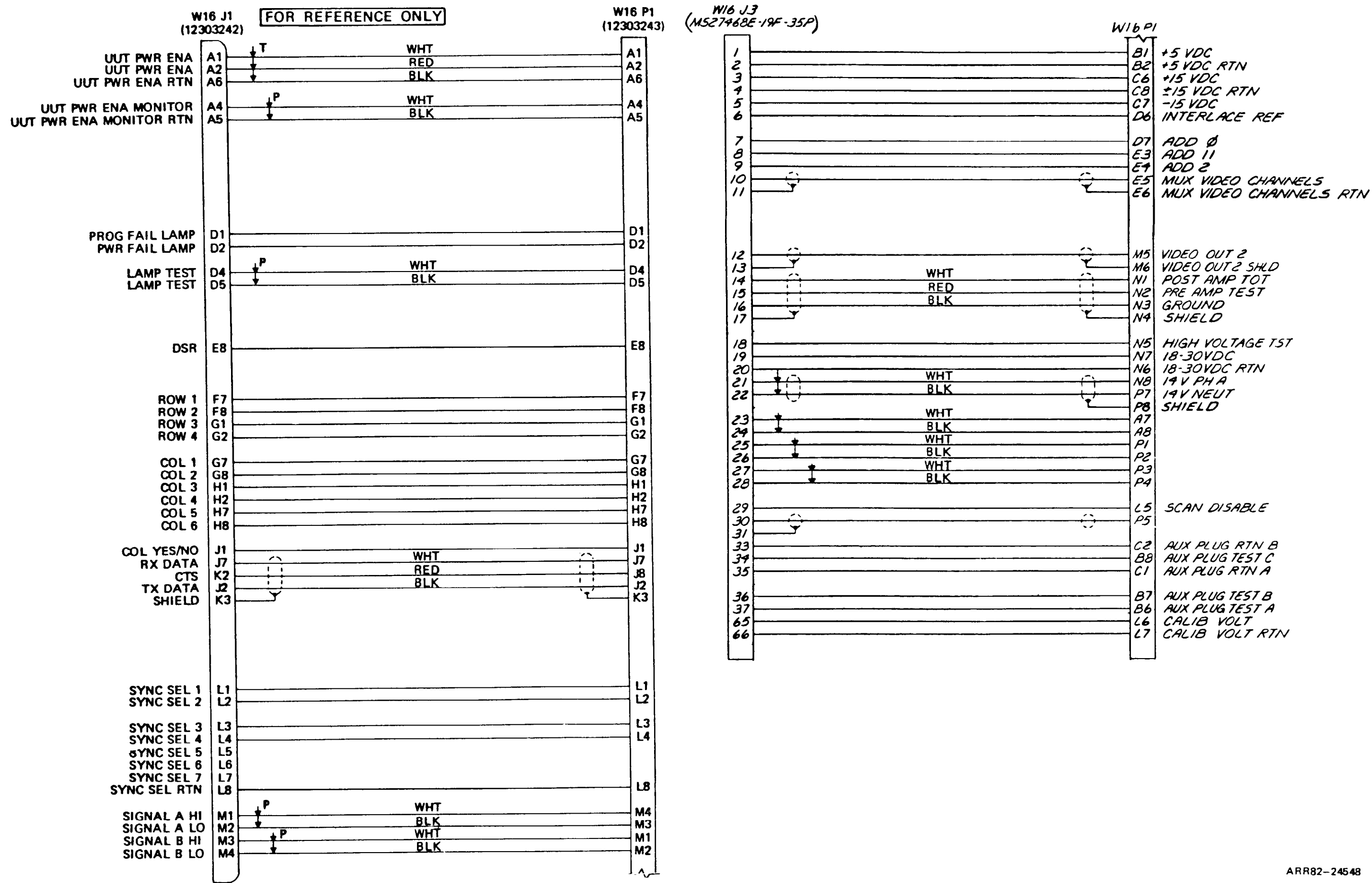










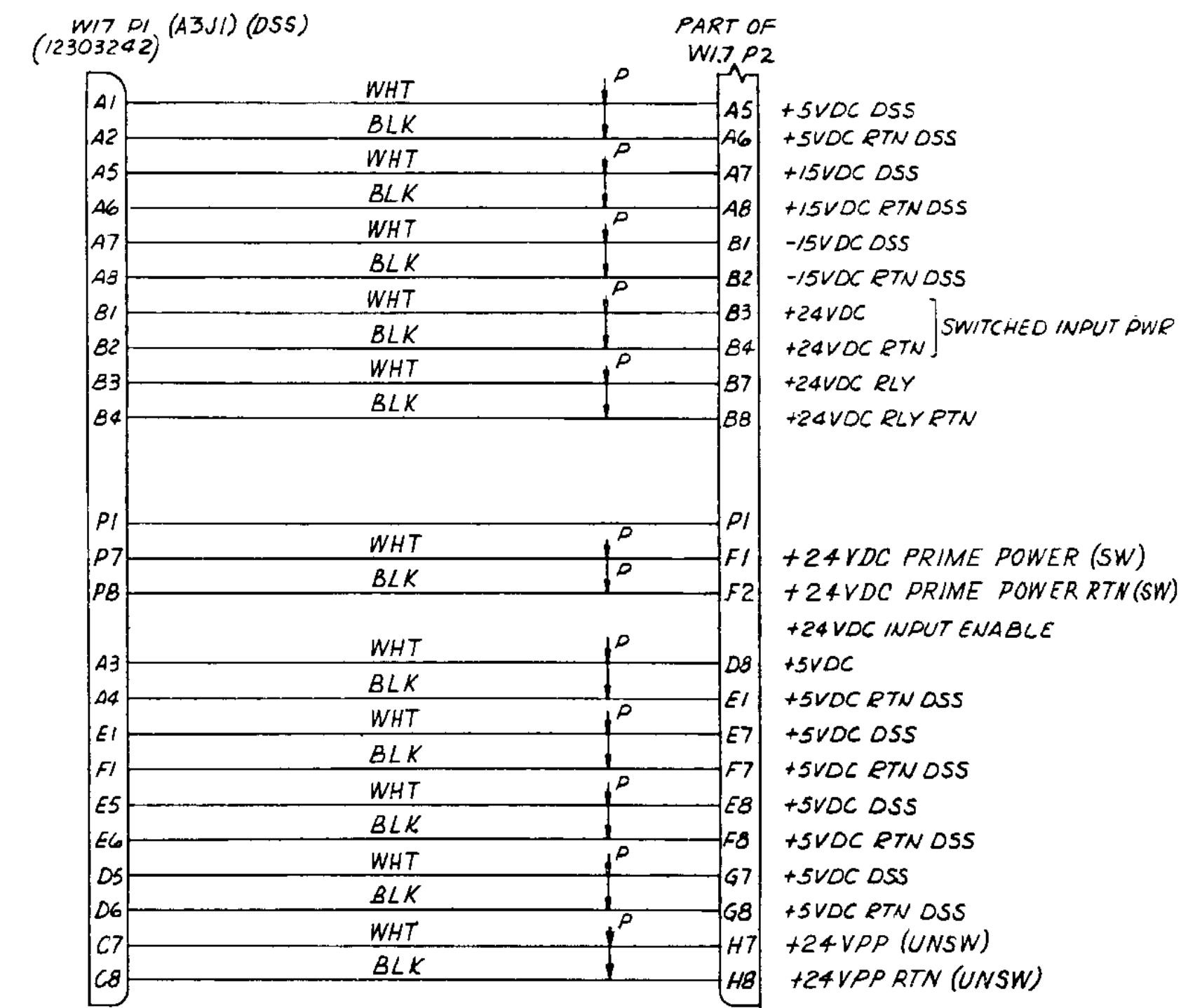
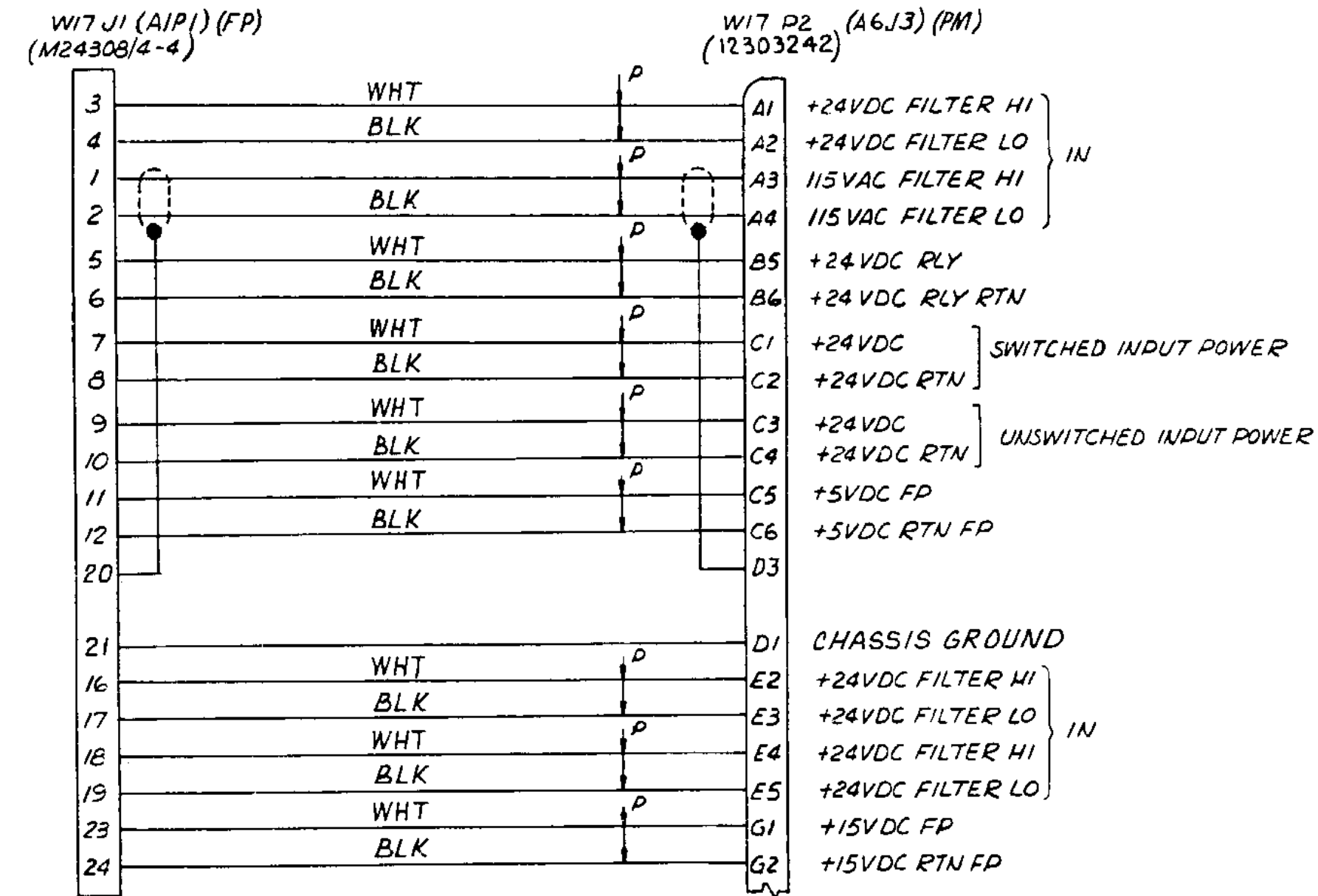


ARR82-24548

FO-14. Internal Panel Interconnect Harness W16  
Wiring Diagram

FP-61/(FP-62 blank)

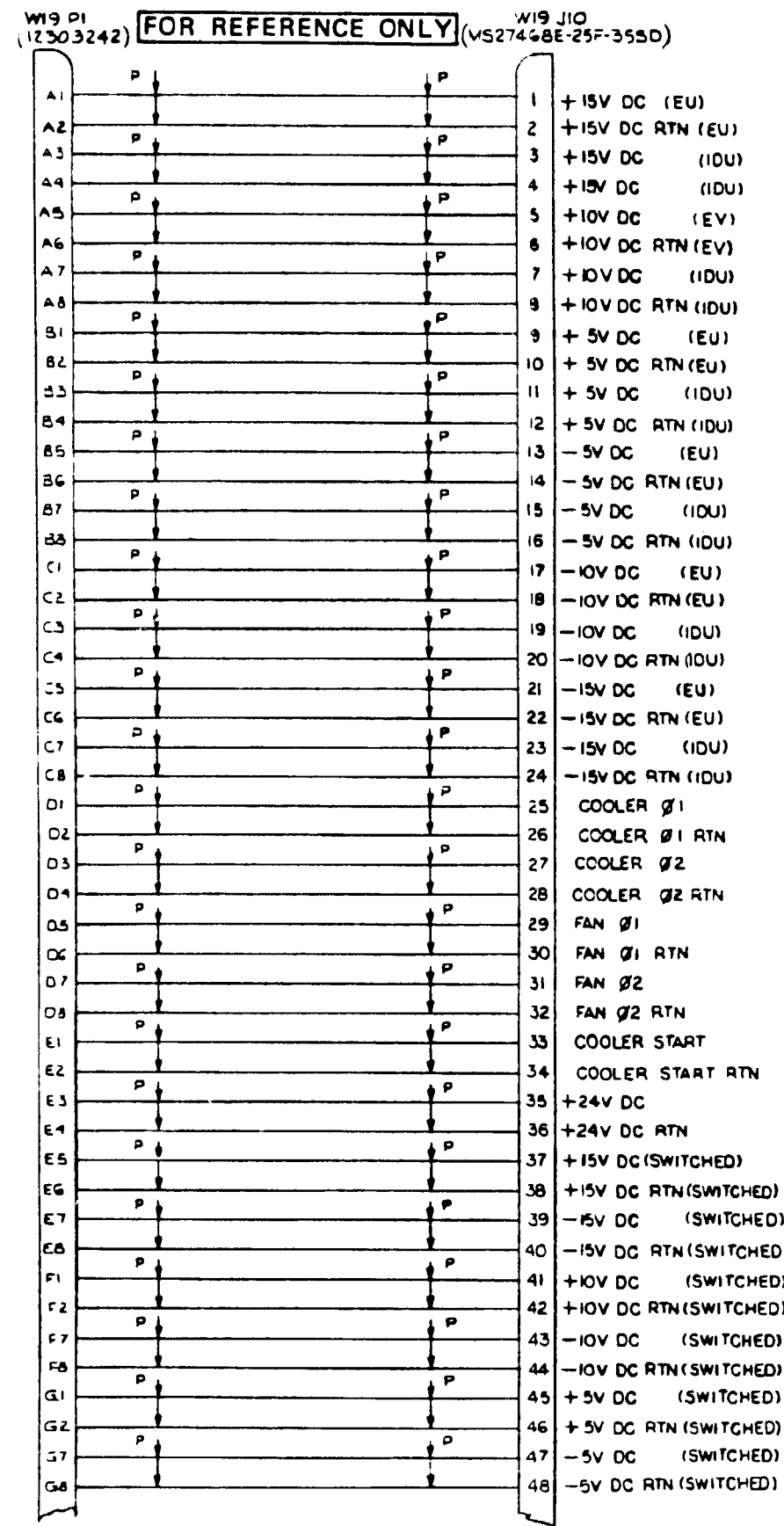
FOR REFERENCE ONLY



ARR82-24545

FO-15. Internal Power Distribution Harness W17  
Wiring Diagram





W19 P1  
(MATES WITH A6JW)  
(1230242)

W19 10  
(MS27468E-25F-355)

TABLE	
REF DES	PINS NOT USED
P1	M3 THRU M8 N1 THRU N8 P1 THRU P8
J10	74 THRU 128

ARR82-24550

FO-16. Internal TIS Interconnect Harness W19 Wiring Diagram

## FOR REFERENCE ONLY

FROM CONTACT	TO CONTACT
P1A -1	P1A -2
↑ -3	↑ -4
↑ -97	↑ -96
↑ -99	↑ -98
↑ -11	↑ -10
↑ -5	↑ -12
↑ -17	↑ -19
↑ -29	↑ -20
↑ -23	↑ -22
↑ -15	↑ -24
↑ -27	↑ -26
↑ -39	↑ -28
↑ -21	↑ -30
↑ -33	↑ -32
↑ -45	↑ -34
↑ -35	↑ -36
↑ -37	↑ -38
↑ -31	↑ -40
↑ -43	↑ -42
↑ -53	↑ -44
↑ -57	↑ -46
↑ -49	↑ -48
↑ -41	↑ -50
↑ -51	↑ -52
↑ -55	↑ -54
↑ -65	↑ -56
↑ -47	↑ -58
↑ -69	↑ -60
↑ -91	↑ -92
P1A -93	P1A -100
CONTACTS 16, 18, 25, 59, THRU 84, 87 THRU 88, 94, 95, NOT USED	

P1A

FROM CONTACT	TO CONTACT
P2A -1	P2A -2
↑ -3	↑ -4
↑ -5	↑ -6
↑ -9	↑ -8
↑ -11	↑ -10
↑ -13	↑ -12
↑ -7	↑ -14
↑ -15	↑ -16
↑ -17	↑ -18
↑ -19	↑ -20
↑ -21	↑ -22
↑ -23	↑ -24
↑ -25	↑ -26
↑ -27	↑ -28
↑ -29	↑ -30
↑ -31	↑ -32
↑ -33	↑ -34
↑ -37	↑ -36
↑ -39	↑ -38
↑ -41	↑ -40
↑ -43	↑ -42
↑ -45	↑ -44
↑ -35	↑ -46
↑ -49	↑ -48
↑ -65	↑ -66
P2A -67	P2A -68

P2A

FROM CONTACT	TO CONTACT
P2A -83	P2A -82
↑ -85	↑ -84
↑ -87	↑ -86
↑ -89	↑ -88
↑ -91	↑ -90
↑ -81	↑ -92
↑ -95	↑ -94
↑ -97	↑ -96
↑ -99	↑ -98
↑ -71	↑ -72
↑ -73	↑ -74
↑ -79	↑ -80
↑ -113	↑ -114
↑ -75	↑ -76
↑ -77	↑ -78
↑ -111	↑ -112
↑ -67	↑ -66
↑ -69	↑ -68
↑ -63	↑ -64
↑ -61	↑ -62
P2A -59	P2A -60
CONTACTS 47, 50 THRU 55, 70, 83, 100 THRU 110, 115 THRU 128 NOT USED	

FROM CONTACT	TO CONTACT
P4A -1	P4A -2
↑ -3	↑ -4
↑ -5	↑ -6
↑ -9	↑ -8
↑ -11	↑ -10
↑ -13	↑ -12
↑ -7	↑ -14
↑ -15	↑ -16
↑ -17	↑ -18
↑ -19	↑ -20
↑ -21	↑ -22
↑ -23	↑ -24
↑ -25	↑ -26
↑ -27	↑ -28
↑ -29	↑ -30
↑ -31	↑ -32
↑ -33	↑ -34
↑ -37	↑ -36
↑ -39	↑ -38
↑ -41	↑ -40
↑ -43	↑ -42
↑ -45	↑ -44
↑ -35	↑ -46
↑ -49	↑ -48
↑ -51	↑ -50
↑ -53	↑ -52
↑ -55	↑ -54
↑ -57	↑ -56
↑ -59	↑ -58
↑ -59	↑ -60
P4A -61	P4A -62

P4A

FROM CONTACT	TO CONTACT
P4A -63	P4A -64
↑ -65	↑ -66
↑ -67	↑ -68
↑ -71	↑ -72
↑ -73	↑ -74
↑ -75	↑ -76
↑ -77	↑ -78
↑ -79	↑ -80
↑ -83	↑ -82
↑ -85	↑ -84
↑ -87	↑ -86
↑ -89	↑ -88
↑ -91	↑ -90
↑ -95	↑ -94
↑ -97	↑ -96
↑ -99	↑ -98
↑ -101	↑ -100
↑ -103	↑ -102
↑ -105	↑ -104
↑ -107	↑ -106
↑ -109	↑ -108
↑ -111	↑ -110
↑ -113	↑ -112
↑ -121	↑ -114
↑ -115	↑ -116
↑ -117	↑ -118
↑ -119	↑ -120
↑ -125	↑ -124
↑ -123	↑ -122
P4A -127	P4A -128
P4A -70	P4A -128
CONTACTS 47, 93 NOT USED	

FROM CONTACT	TO CONTACT
P5A -1	P5A -2
↑ -3	↑ -4
↑ -5	↑ -6
↑ -9	↑ -8
↑ -11	↑ -10
↑ -13	↑ -12
↑ -7	↑ -14
↑ -15	↑ -16
↑ -17	↑ -18
↑ -19	↑ -20
↑ -21	↑ -22
↑ -23	↑ -24
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↑ -31	↑ -32
↑ -33	↑ -34
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↑ -55	↑ -54
↑ -57	↑ -56
↑ -59	↑ -58
↑ -59	↑ -60
↑ -61	↑ -62
↑ -63	↑ -64
↑ -65	↑ -66
↑ -67	↑ -68
↑ -71	↑ -72
↑ -73	↑ -74
↑ -75	↑ -76
P5A -77	P5A -78

P5A

FROM CONTACT	TO CONTACT
P5A -79	P5A -80
↑ -82	↑ -83
↑ -85	↑ -84
↑ -101	↑ -100
↑ -91	↑ -90
↑ -89	↑ -88
↑ -87	↑ -86
↑ -95	↑ -94
↑ -99	↑ -98
↑ -103	↑ -102
↑ -105	↑ -104
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↑ -109	↑ -108
↑ -111	↑ -110
↑ -113	↑ -112
↑ -81	↑ -82
↑ -70	↑ -83
↑ -115	↑ -117
P5A -47	P5A -114
CONTACTS 116, 118, THRU 128 NOT USED	

FROM CONTACT	TO CONTACT
P6A -1	P6A -2
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↑ -5	↑ -6
↑ -9	↑ -8
↑ -41	↑ -98
↑ -13	↑ -12
↑ -7	↑ -14
↑ -15	↑ -16
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↑ -19	↑ -20
↑ -21	↑ -22
↑ -79	↑ -78
↑ -75	↑ -76
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↑ -43	↑ -42
↑ -45	↑ -44
↑ -47	↑ -46
↑ -67	↑ -68
↑ -65	↑ -66
↑ -63	↑ -64
↑ -55	↑ -54
↑ -57	↑ -56
↑ -81	↑ -80
↑ -59	↑ -58
↑ -50	↑ -60
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↑ -65	↑ -66
↑ -67	↑ -68
↑ -71	↑ -72
↑ -73	↑ -74
↑ -75	↑ -76
↑ -79	↑ -80
P7A -83	P7A -82
CONTACTS 10, 11, 23 THRU 29, 36, 48 THRU 53, 69, 70, 71, 80, 82 THRU 97, 99 THRU 128 NOT USED	

P6A

FROM CONTACT	TO CONTACT
P7A -1	P7A -2
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↑ -9	↑ -8
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↑ -7	↑ -14
↑ -15	↑ -16
↑ -17	↑ -18
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↑ -61	↑ -62
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↑ -65	↑ -66
↑ -67	↑ -68
↑ -71	↑ -72
↑ -73	↑ -74
↑ -75	↑ -76
↑ -79	↑ -80
P7A -83	P7A -82

P7A

FROM CONTACT	TO CONTACT
P7A -85	P7A -84
↑ -87	↑ -86
↑ -89	↑ -88
↑ -91	↑ -90
↑ -81	↑ -92
↑ -103	↑ -102
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↑ -77	↑ -78
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↑ -99	↑ -98
↑ -101	↑ -100
↑ -107	↑ -106
↑ -109	↑ -108
↑ -112	↑ -116
↑ -119	↑ -118
↑ -121	↑ -120
↑ -123	↑ -122
P7A -125	P7A -124
CONTACTS 47, 70, 93, 111, 113, 114, 115, 117, 126, 127, 128 NOT USED	

FROM CONTACT	TO CONTACT
P8A -1	P8A -2
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↑ -7	↑ -6
↑ -3	↑ -8
↑ -9	↑ -16
↑ -13	↑ -12
↑ -15	↑ -14
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↑ -43	↑ -44
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↑ -53	↑ -54
↑ -55	↑ -56
↑ -57	↑ -62
↑ -61	↑ -60
↑ -59	↑ -58
P8A -64	P8A -65
CONTACTS 10, 11, 63, 65, 67 THRU 100 NOT USED	

P8A

FROM CONTACT	TO CONTACT
P8A -1	P8A -2
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↑ -5	↑ -6
↑ -7	↑ -14
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↑ -15	↑ -16
↑ -17	↑ -18
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P8A -50	P8A -54
CONTACTS 45, 51, 52, 53, 55 THRU 58 NOT USED	

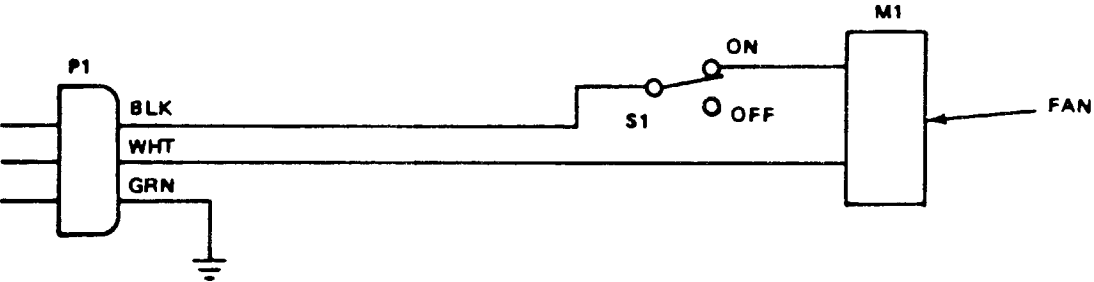
P8A

FROM CONTACT	TO CONTACT
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↑ -9	↑ -8
↑ -11	↑ -10
↑ -13	↑ -12
↑ -15	↑ -14
↑ -23	↑ -16
↑ -17	↑ -18
↑ -19	↑ -20
↑ -21	↑ -22
↑ -27	↑ -32
↑ -25	↑ -28
P11A -64	P11A -68
CONTACTS 1, 24, 28 THRU 31, 33 THRU 63, 65 NOT USED	

P11A

FROM CONTACT	TO CONTACT
P12A -1	P12A -2
↑ -3	↑ -4
↑ -5	↑ -6
↑ -17	↑ -8
↑ -9	↑ -10
↑ -11	↑ -12
↑ -13	↑ -14
↑ -25	↑ -16
↑ -19	↑ -18
↑ -21	↑ -20
↑ -23	↑ -22
↑ -15	↑ -24
↑ -27	↑ -26
↑ -29	↑ -28
↑ -63	↑ -64
↑ -65	↑ -66
↑ -67	↑ -68
↑ -69	↑ -70
↑ -45	↑ -44
↑ -47	↑ -46
↑ -49	↑ -48
↑ -51	↑ -50
↑ -53	↑ -52
↑ -55	↑ -54
↑ -57	↑ -56
↑ -59	↑ -58
↑ -61	↑ -60
↑ -71	↑ -72
↑ -73	↑ -74
↑ -86	↑ -87
↑ -89	↑ -90
P12A -98	P12A -100
CONTACTS 7, 30 THRU 43, 82, 75, 86, 88, 91 THRU 100 NOT USED	

P12A



FO-18. PCU Heatsink Holding Fixture Schematic Diagram

FOR REFERENCE ONLY

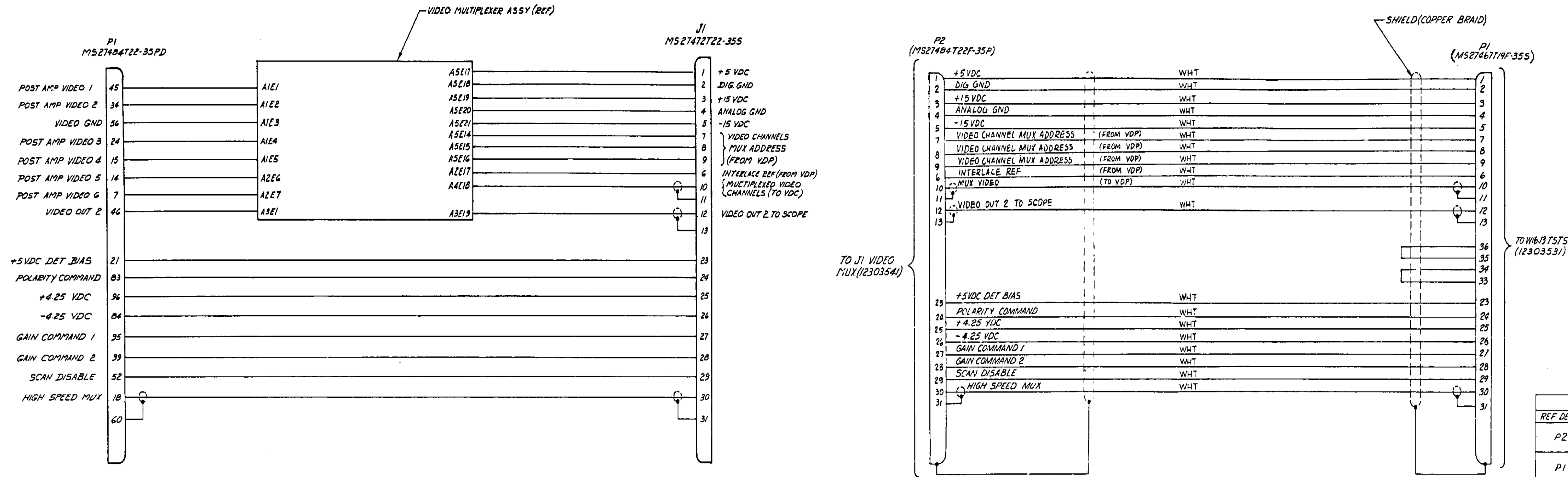


TABLE	
REF DESIG	PINS NOT USED
P2	14 THRU 22, 32 THRU 100
P1	14 THRU 22, 32, 37 THRU 66





## THE METRIC SYSTEM AND EQUIVALENTS

### LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

### WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 Lb  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

### SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches  
 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet  
 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

### CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches  
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

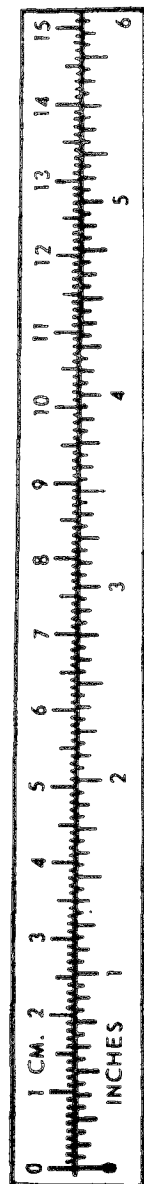
### TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212<sup>o</sup> Fahrenheit is equivalent to 100<sup>o</sup> Celsius  
 90<sup>o</sup> Fahrenheit is equivalent to 32.2<sup>o</sup> Celsius  
 32<sup>o</sup> Fahrenheit is equivalent to 0<sup>o</sup> Celsius  
 $9/5 ^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

### APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches . . . . .	Centimeters . . . . .	2.540
Feet . . . . .	Meters . . . . .	0.305
Yards . . . . .	Meters . . . . .	0.914
Miles . . . . .	Kilometers . . . . .	1.609
Square Inches . . . . .	Square Centimeters . . . . .	6.451
Square Feet . . . . .	Square Meters . . . . .	0.093
Square Yards . . . . .	Square Meters . . . . .	0.836
Square Miles . . . . .	Square Kilometers . . . . .	2.590
Acres . . . . .	Square Hectometers . . . . .	0.405
Cubic Feet . . . . .	Cubic Meters . . . . .	0.028
Cubic Yards . . . . .	Cubic Meters . . . . .	0.765
Fluid Ounces . . . . .	Milliliters . . . . .	29.573
Pints . . . . .	Liters . . . . .	0.473
Quarts . . . . .	Liters . . . . .	0.946
Gallons . . . . .	Liters . . . . .	3.785
Ounces . . . . .	Grams . . . . .	28.349
Pounds . . . . .	Kilograms . . . . .	0.454
Short Tons . . . . .	Metric Tons . . . . .	0.907
Pound-Feet . . . . .	Newton-Meters . . . . .	1.356
Pounds per Square Inch . . . . .	Kilopascals . . . . .	6.895
Miles per Gallon . . . . .	Kilometers per Liter . . . . .	0.425
Miles per Hour . . . . .	Kilometers per Hour . . . . .	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters . . . . .	Inches . . . . .	0.394
Meters . . . . .	Feet . . . . .	3.280
Meters . . . . .	Yards . . . . .	1.094
Kilometers . . . . .	Miles . . . . .	0.621
Square Centimeters . . . . .	Square Inches . . . . .	0.155
Square Meters . . . . .	Square Feet . . . . .	10.764
Square Meters . . . . .	Square Yards . . . . .	1.196
Square Kilometers . . . . .	Square Miles . . . . .	0.386
Square Hectometers . . . . .	Acres . . . . .	2.471
Cubic Meters . . . . .	Cubic Feet . . . . .	35.315
Cubic Meters . . . . .	Cubic Yards . . . . .	1.308
Milliliters . . . . .	Fluid Ounces . . . . .	0.034
Liters . . . . .	Pints . . . . .	2.113
Liters . . . . .	Quarts . . . . .	1.057
Liters . . . . .	Gallons . . . . .	0.264
Grams . . . . .	Ounces . . . . .	0.035
Kilograms . . . . .	Pounds . . . . .	2.205
Metric Tons . . . . .	Short Tons . . . . .	1.102
Newton-Meters . . . . .	Pound-Feet . . . . .	0.738
Kilopascals . . . . .	Pounds per Square Inch . . . . .	0.145
Kilometers per Liter . . . . .	Miles per Gallon . . . . .	2.354
Kilometers per Hour . . . . .	Miles per Hour . . . . .	0.621



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