SIEMENS

Auxiliary Pilot Relay Cabinet Assembly Type L-841

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ETL Certified to FAA Specifications
AC 150/5345-13

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Siemens Airfield Solutions

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Record of Changes

Page	Rev	Description	EC No.	Checked	Approved	Date
6-1	A	Revised Table 6-1.		JY	WT	8/20/01
Title page	B	Created new title page.	00770	JY	WT	10/23/01

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SAFETY NOTICES

The operating and maintenance personnel should refer to FAA Advisory Circular AC 150/5340-26, "Maintenance of Airport Visual Aid Facilities" for instructions on safety precautions. Personnel must observe the safety regulations at all times. While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed.

KEEP AWAY FROM LIVE CIRCUITS

Operating and maintenance personnel must at all times observe all safety regulations. Do not change plug-in components or make adjustments inside equipment with high voltage supply on. Under certain conditions, dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualities, always remove power, then discharge and ground by use of a grounding rod, prior to touching any parts. See FAA Advisory Circular AC 150/5340-26 concerning safety.

RESUSCITATION

Operating and maintenance personnel should familiarize themselves with the technique for resuscitation found in the First Aid Instruction Manual.

OPTIONAL INTERLOCK

Do not depend on the interlock when working with the equipment. When it is absolutely mandatory that the interlock be bypassed in order to trace a fault or correct a malfunction, authorized maintenance personnel may perform the bypass for the specific test to be made. Immediately after completing the test, the interlock shall be restored to working condition.

GUARANTEE

ADB-Alnaco, Inc. guarantees that the Auxiliary Relay Cabinet Assembly described herein, when sold by ADB-Alnaco, Inc. or its approved representatives, has been manufactured and will perform in accordance with the FAA specification AC 150/5345-13, L-841, and that any defect in design, materials or workmanship which may occur during proper and normal use during a period of one (1) year from date of installation or a maximum of two (2) years from the date of shipment will be corrected by repair or replacement by ADB-Alnaco, Inc., f.o.b. factory. Such corrections shall constitute the limit of all ADB-Alnaco, Inc. liabilities for the L-841 Auxiliary Relay Cabinet Assembly.

SECTION 1. GENERAL INFORMATION AND REQUIREMENTS

1.1 INTRODUCTION.-

1.1.1 Purpose.- This instruction manual describes procedures for the installation, operation, maintenance and troubleshooting of the L-841 Auxiliary Relay Cabinet Assembly. See Figure 8-1.

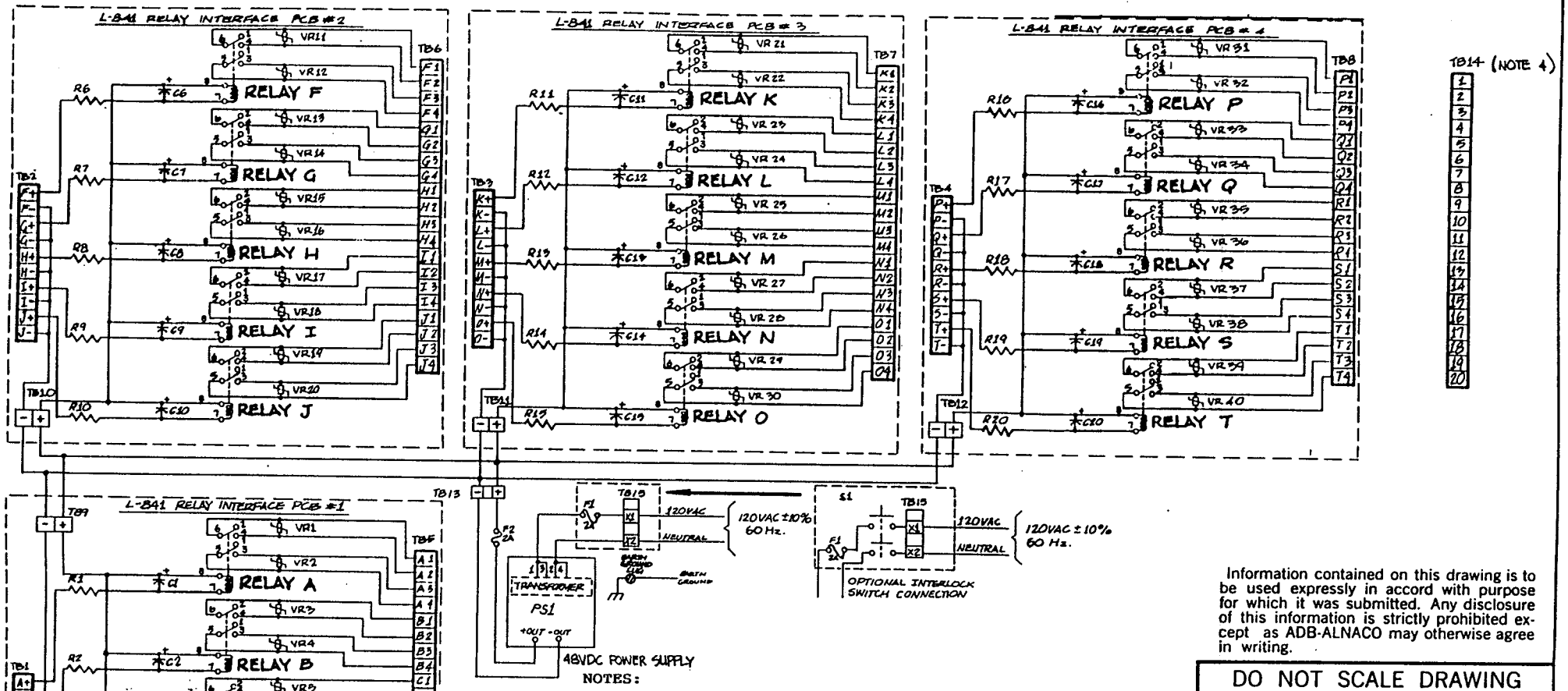
1.1.2 Scope.- This manual covers equipment manufactured to Specification AC 150/5345-13.

1.1.3 Use.- The L-841 Auxiliary Relay Cabinet is used to provide pilot control of runway and taxiway constant current regulators, rotating beacons, obstruction lights and other electrical circuits in an airport lighting vault.

1.2 EQUIPMENT SPECIFICATION DATA.- Table 1-1 gives the ADB-Alnaco, general assembly part numbers. Reference data pertinent to the equipment is provided in Table 1-2. Items not supplied which might be required for installation are given in Table 1-3. Table 1-4 lists equipment and accessories supplied.

1.2.1 The NEMA Type 1 enclosure (see Figure 8-2) is equipped with a handle that locks the door in the closed position. Two keys are furnished with the lock. See Figure 8-1.

1.2.2 An optional interlock switch is available. The switch disconnects the 120 V ac input power to the Auxiliary Relay Cabinet when the door is opened.



NOTES:

1. All RELAYS SHOWN DE-ENERGIZED.
2. CAPACITORS C1 TO C20, 0.47 µF, 600 V.
3. RESISTORS R1 TO R20, 10 Ω, 2 W.
4. TB14 IS A SPARE TERMINAL BLOCK TO BE USED AT THE DISCRETION OF THE INSTALLER. WIRE RANGE ALLOWED IS AWG 8 OR SMALLER.

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Figure 8-3.
Schematic Main Assembly

DRAWING NO. 43.B.0.6.2.8. REV.

Table 1-1. L-841 Part Numbers

Description	Part Number
L-841 with interlock switch	44D1047-1
L-841 without interlock switch	44D1047-2

Table 1-2. Equipment Data

Type: L-841

Input: 120 V ac, ±10%, 60 Hz.

Watts: 60 W maximum

Temperature Range of Installation: -43°C to +49°C (-45°F to +120°F)

Altitude: Sea level to 10,000 feet (3,000 m)

Relative Humidity: Up to 100%

Dimensions: 36" x 24" x 8-5/8" (H x W x D); See Figure 8-2

Weight: 97 lbs. (Approx.)

Table 1-3. Equipment Required But Not Supplied

Quantity	Description
A/R	Wire, Power
A/R	Wire, Remote Control
A/R	Wire, Input and Output
A/R	Ground Wire, No. 6 AWG
4	Mounting Bolts, ¼ inch
A/R	External Remote Control Devices
A/R	Ty-wraps (for holding down external wires inside L-841)

Table 1-4. Equipment Supplied

Quantity	Description
1	L-841 Relay Cabinet Assembly
2	Keys for Cabinet Lock
1	Instruction Manual

SECTION 2. THEORY OF OPERATION

2.1 GENERAL.- The L-841 Relay Cabinet Assembly is used to provide remote control of airport lighting constant current regulators, rotating beacons, obstruction lights and other electrical circuits in the airport lighting vault. The L-841 Relay Cabinet may be operated either by pilot-to-ground or ground-to-ground control.

2.2 THEORY OF OPERATION.- The L-841 Relay Cabinet consists of a low-voltage relay section that controls higher power circuits in the airport lighting vault. A regulated +48 V dc is supplied to the relay coils by the power supply.

2.2.1 DC Power Supply.- See Figure 8-3 . Power is input at terminal block TB15 terminals X1 (120 V ac) and X2 (neutral). The 120 V ac is then taken through fuse F1 and into power supply PS1. Regulated +48 V dc is output from power supply PS1 and taken through fuse F2 to terminal block TB13 terminals "+" (+48 V dc) and "-" (common). The regulated +48 V dc, with a ripple less than 10 millivolts, is then taken to printed circuit boards No. 1 through 4 at terminal blocks TB9 through TB12.

2.2.2 Pilot Relays.- There are 20 plug-in type pilot relays (five per PCB) housed in a transparent dustproof enclosure. Each relay has two sets of DPDT contacts rated 13 A at 120 V ac, 50/60 Hz breaking and rated to continuously carry a 4 A, 50/60 Hz inductive load.

2.2.2.1 A noncapacitive varistor is connected across each pair of relay contacts and provides protection from switching surges. A 0.47 microfarad, 600 V capacitor is connected across the coil of each relay to eliminate inductive spikes on the power supply lines when the coil is deenergized.

NOTE

Operation of Relay A will be explained. Relays B through T electrically operate in the same manner.

2.2.2.2 To energize Relay A, terminal block TB1 terminal A+ is shorted to terminal A- (see Figure 8-3). This connects the common of the +48 V dc power supply PS1 to one side of the coil of relay A through current limiting resistor R1. When Relay A is energized, terminal A1 is shorted to A2 and terminal A3 is shorted to A4 on terminal block TB5. This is then used to control external circuitry.

2.2.3 Optional Interlock Switch.- If the optional interlock switch S1 is used in the L-841 Auxiliary Relay Cabinet, power from terminal block TB15 is connected to one side of interlock switch S1. When the door is closed and the switch is depressed (normal operation) or the switch is manually placed in the service position with the door open (servicing operation) power is then taken to power supply PS1 through fuse F1.

2.2.4 Spare Terminal Block.- Terminal block TB14 is a spare terminal block to be used at the discretion of the installer.

SECTION 3. OPERATION

3.1 OPERATIONAL PROCEDURES.-

3.1.1 Without Interlock Switch.- If no interlock switch is used, turn an external circuit breaker ON. System is then operational.

3.1.2 With Interlock Switch.- If an interlock switch is used, turn external circuit breaker ON. Then either shut the door (for normal operation) or open the door and push in interlock switch while turning switch clockwise to place in service position (for servicing operation). System is then operational.

SECTION 4. MAINTENANCE

4.1 PREVENTIVE MAINTENANCE.- The preventive maintenance checks for the L-841 Relay Cabinet shall be performed as listed in Table 4-1.

Table 4-1. Preventive Maintenance Tasks

Interval	Maintenance Task	Action
Semi-Annually	Check DC power supply output voltage	Replace power supply if out of tolerance (48 VDC, ±0.5V)
	Loose terminal block wire connections	Tighten connections
	Evidence of arcing around relay contacts	Replace relay. Check value of current/ voltage being switched.
	Cracked or deteriorated wires	Replace wires
	Burnt or cracked varistors	Replace
Annually	Excessive dirt build-up	Clean
	Paint rusting or flaking off	Scrape and paint

SECTION 5. TROUBLESHOOTING

5.1 TROUBLESHOOTING TABLE.- The troubleshooting guide for the L-841 Relay Cabinet is given in Table 5-1.

Table 5-1. Troubleshooting Guide

Problem: All relays will not activate

Possible Cause	Solution
Fuse F1 or F2 blown	Replace fuse. If fuse blows again, determine location of short.
No input voltage	Check terminal block TB15 terminals X1 and X2 for proper 120 V ac voltage. If interlock switch is used, check for proper 120 V ac at input of power supply PS1.
+48 V dc power supply PS1 failed or out of tolerance	Check power supply output voltage. Replace if necessary.

Problem: One relay will not activate

Possible Cause	Solution
Bad relay	Swap relay with another and test. Replace if necessary.
Loose wire	Check to insure continuity occurs across + and - input of terminal block.
Resistor open	Replace.
Capacitor shorted	Replace.

Table 5-1. Troubleshooting Guide (continued)

Problem: One relay will not activate (continued)

Possible Cause	Solution
Bad PC board	Replace.

Problem: Relay activates, but device fails to turn on

Possible Cause	Solution
Varistor shorted	Replace.
Loose relay output wire connection	Tighten.
Bad PC board	Replace.
Bad relay	Replace.

SECTION 6. PARTS LIST

6.1 PARTS LIST.- Table 6-1 lists parts ordinarily required for repair or replacement.

Table 6-1. Parts List

Item No. Fig. 8-1	Description (Main Assembly)	ADB-ALNACO Part NO.
3	PCB Assembly	44B1035
4	PCB Assembly	44B1036
5	PCB Assembly	44B1037
6	PCB Assembly	44B1038
7,8	Terminal Block, Buchanan #625	72A0005-1
9	Terminal Block, Buchanan #621	72A0075
10	Terminal Block, Buchanan #630	72A0040
11	Fuse Block, Buss #S-8202-1	47A0061
12	Fuse, 2A, 250V (Buss AGC2 or LITTLEFUSE #312002)	47A0004
13	Power Supply, +48 VDC, CONDOR #C48-1	97A0001
30	Keylock Kit, (includes two keys)* HOFFMAN A36N24B (NEMA 1)	85A0051
44	Switch, Interlock, MICROSWITCH #13AC1	45A0264

Item No. Figs. 8-4 through 8-7	Description (Relay Interface PCB#1 through PCB#4)	ADB-ALNACO Part No.
2	Terminal Strip, 2 POS., Buchanan RSB-6VP-02-1201-NNN	72A0073
3	Terminal Strip, 10 POS., Buchanan RSB-6VP-10-1201-NNN	72A0076
4	Terminal Strip, 20 POS., Buchanan RSB-6VP-20-1202-NNN	72A0077
5	Resistor, 10 Ω, 2 W	2R00C10R0M25
6	Capacitor, 0.47 μF, 600 VDC	23A0008

*Note: For replacement keys contact ADB-ALNACO.

Table 6-1. Parts List (continued)

Item No. Figs. 8-4 through 8-7	Description (Relay Interface PCB#1 through PCB#4)	ADB-ALNACO Part No.
7	Socket, Relay, Guardian 1390-2PC	49A0066
8	Relay, Guardian #1395-2C-48D	53B0169
9	Varistor, GE-MOVII #V130LA2	32A0013

SECTION 7. INSTALLATION

7.1 INTRODUCTION.- This section provides instructions for the installation of the L-841 Auxiliary Relay Cabinet Assembly. Refer to the airport project plans and specifications for the specific installation instructions.

7.2 UNPACKING.- The equipment must be handled very carefully to prevent component damage. Unpack carton upon receipt and check the contents and their condition. Note any exterior damage to the carton which might lead to detection of equipment damage.

7.2.1 Damage.- If damage to any equipment is noted, a claim form should be filed with the carrier immediately. Inspection of equipment by the carrier may be necessary.

7.3 MOUNTING.- The enclosure has four (4) holes, two (2) located at the top and two (2) at the bottom and is designed for indoor surface mounting using ¼ inch mounting bolts.

7.4 WIRING.- The L-841 Auxiliary Relay Cabinet Assembly contains 11 plugged holes for wire entry purposes. There are eight 1-inch holes (two on each of the four sides) and three 2-inch holes located at the bottom. A ground lug is provided inside the enclosure for a No. 6 AWG ground wire. See Figure 8-1.

a) Power and remote control wires shall be brought through the one-inch holes. This should be done in a fashion which will meet the National Electric Code and any state and/or local codes which may prevail.

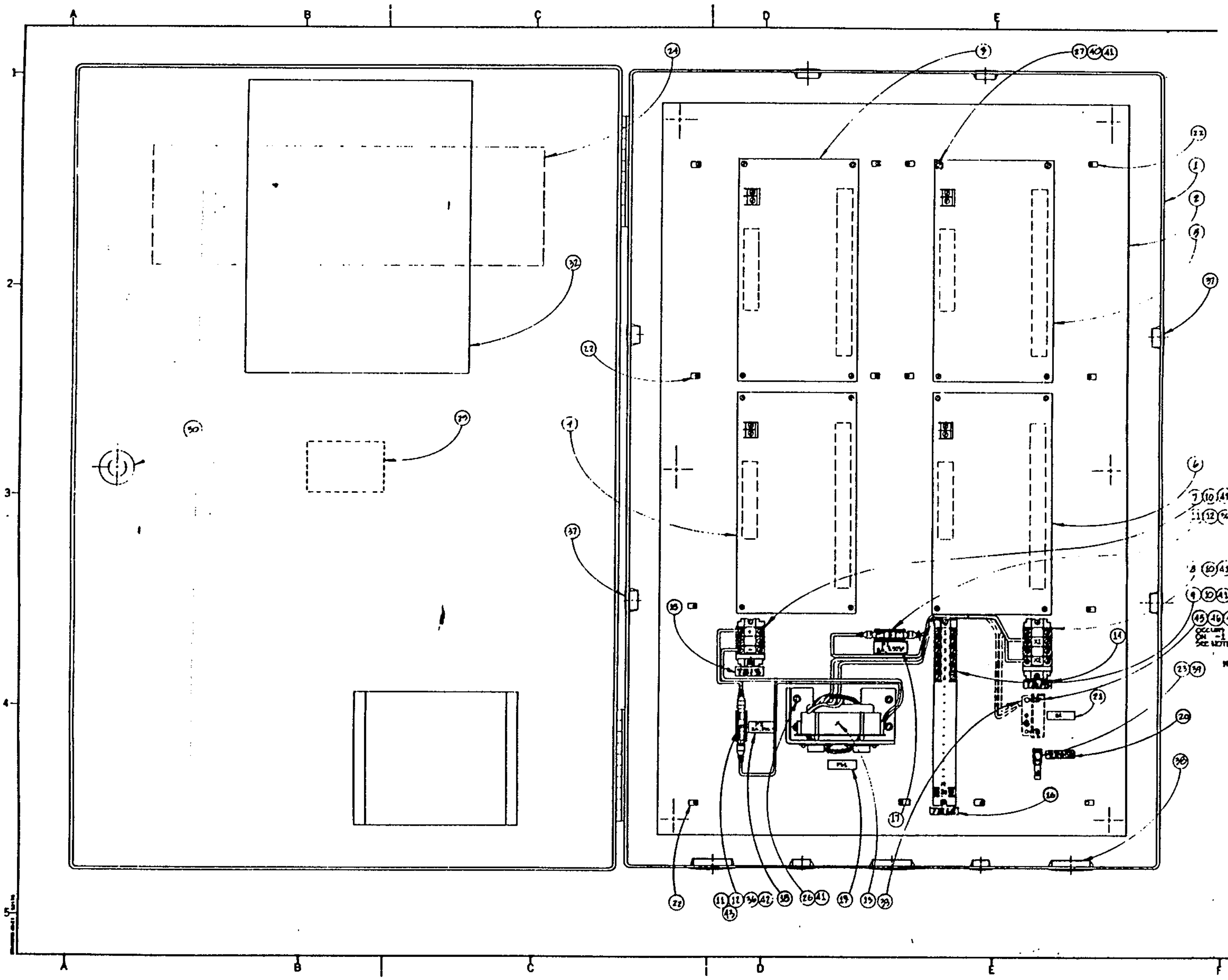
b) The AC input power wiring should be brought in from a one-inch hole (see Figure 8-1, Item 37) and routed to terminal block TB15 terminals X1 and X2.

c) Make sure a good earth ground (minimum AWG 6) is connected to the earth ground terminal (see Figure 8-1, Item 39) on the enclosure panel.

d) Input and output wires shall be brought in through the two-inch holes (see Figure 8-1, Item 38).

7.4.1 Wiring Diagrams.- The L-841 wiring diagram is given in Figure 8-8. Diagrams indicating the wire sizes to be used and wire routing are given in Figures 8-9 & 8-10, respectively. A typical wiring diagram for remote control of a 3-step constant current regulator using radio control is shown in Figure 8-11.

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	56B0077	ENCLOSURE	1
2	60D0155	PANEL, MOUNTING	1
3	44B1035	PCB ASSY.	1
4	44B1036	PCB ASSY.	1
5	44B1037	PCB ASSY.	1
6	44B1038	PCB ASSY.	1
7	72A0005-1	TERMINAL BLOCK	2
8	72A0005-1	TERMINAL BLOCK	4
9	72A0075	TERMINAL BLOCK	20
10	72A0040	TERMINAL BLOCK, END	2
11	47A0061	FUSE BLOCK	2
12	47A0004	FUSE, 2A, 250V	2
13	97A0001	POWER SUPPLY	1
14	91B0028-16	LABEL, TB-15	1
15	91B0028-17	LABEL, TB-13	1
16	91B0028-18	LABEL, TB-14	1
17	91B0028-19	LABEL, F1, 2A, 250V	1
18	91B0028-20	LABEL, F2, 2A, 250V	1
19	91B0028-21	LABEL, PS1	1
20	91B0028-22	LABEL, EARTH GROUND	1
21	91B0028-23	LABEL, S1	1
22	63A0126	MOUNT, CABLE TIE	12
23	64A0173-6	SCREW, HEX HEAD 1/4-20x3/8	1
24	42B0174-2	DECAL, ADB LOGO	1
25	42A0253	NAMEPLATE, L-841	1
26	66A0038-4	LOCKWASHER, INT. TH.	4
27	66A0039-5	LOCKWASHER, EXT. TH.	16
28	89A0070-01	WIRE, 12 AWG, 600V	A/R
29	89A0071-01	WIRE, 18 AWG, 600V	A/R
30	85A0051	KEYLOCK, KIT	1
31	43B0628	SCHEMATIC, MAIN ASSY.	1
32	43C0629	RELAY SCHEDULE/WIRING DIAGRAM	1
33	70A0066	TERMINAL, RING TONGUE	2
34	89A0070-02	WIRE, 12 AWG, 600V	A/R
35	89A0071-03	WIRE, 18 AWG, 600V	A/R
36	70A0264	TERMINAL, FEMALE 1/4" QUICK CONN.	4
37	63B0371-27	PLUG, HOLE	8
38	63B0371-43	PLUG, HOLE	1
39	72A0010	LUG, EARTH GROUND	1
40	66A0092	SPACER, MALE-FEMALE, HEX	16
41	64A0197-6	SCREW, 8-32x3/8 LG. ST. STL.	42
42	66A0026-15	LOCKWASHER, SPLIT	8
43	64A0194-6	SCREW, 6-32x3/8 LG. ST. STL.	2
44	70A0067	TERMINAL, FORK TONGUE, 1/4"	8
45	45A0264	SWITCH, INTERLOCK	1
46	60B0460	BRACKET, INTERLOCK	1
47	64A0197-6	SCREW, 8-32x3/8 LG. ST. STL.	4
48	66A0039-4	LOCKWASHER, EXT. TH.	2



NOTE: ASSEMBLY L-841 WITH INTERLOCK SWITCH, 44D1047-1, USES ITEMS #1 THRU #48

ASSEMBLY L-841 WITHOUT INTERLOCK SWITCH, 44D1047-2, USES ITEMS #1 THRU #44

Information contained on this drawing is to be used expressly in accord with purpose for which it was submitted. Any disclosure of this information is strictly prohibited except as ADB-ALNACO may otherwise agree in writing.

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Figure 8-1.
Main Assembly

44D1047:X

Document No. 96A0007

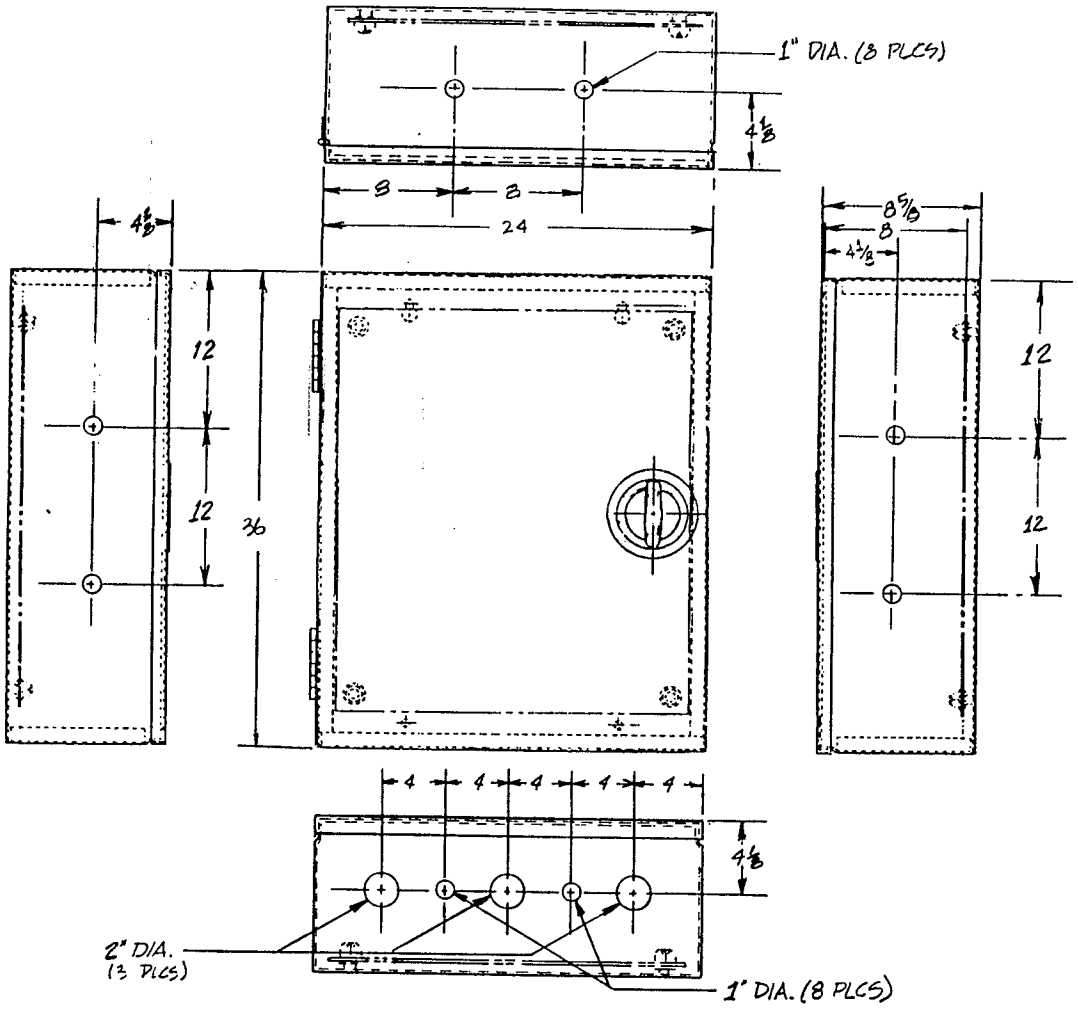

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Figure 8-2. Enclosure

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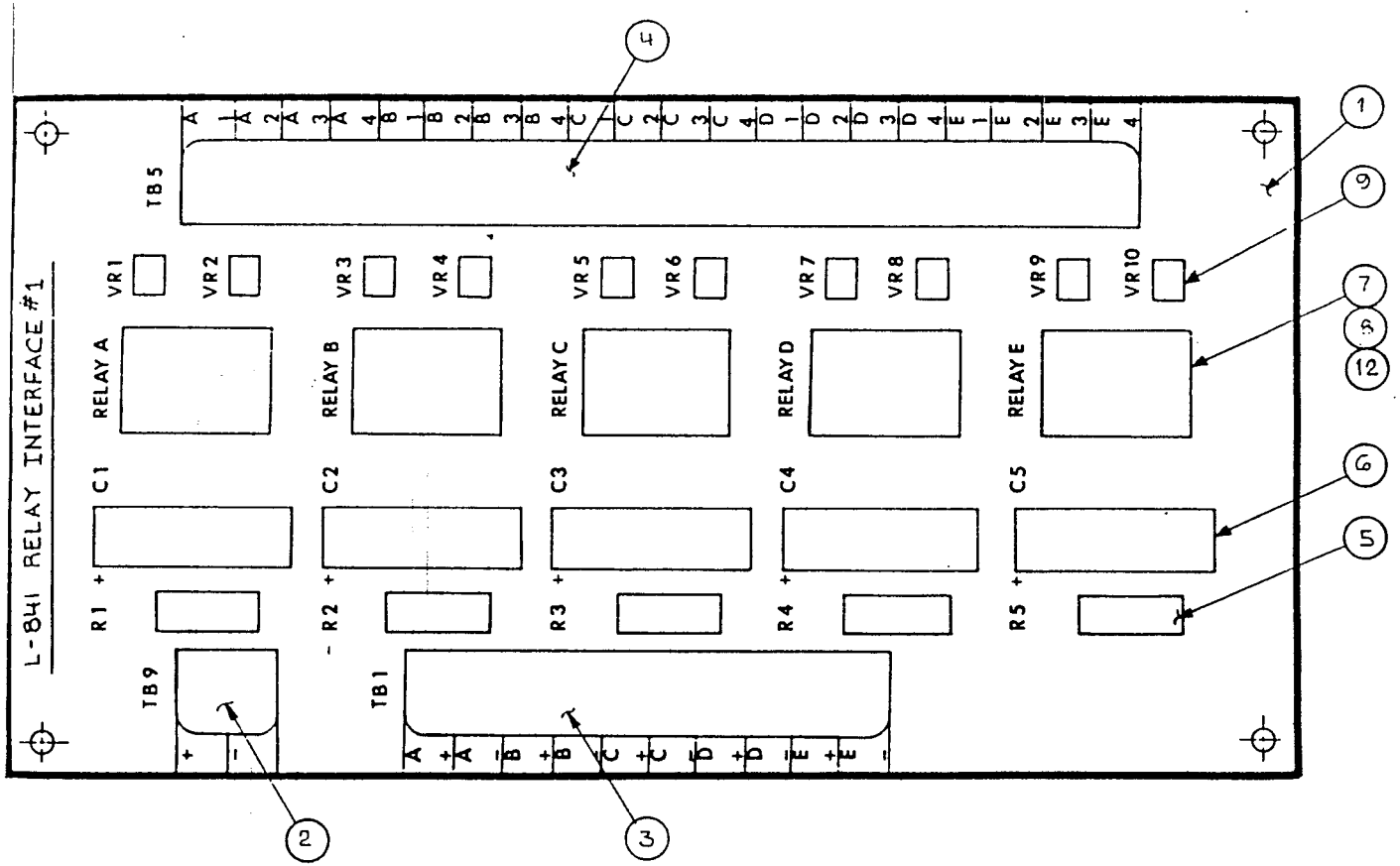

ITEM NO.	PART NO.	PART NAME / DESCRIPTION	QTY
1	41B0144	RELAY INTERFACE PCB, BARE	1
2	72A0073	TERMINAL STRIP, 2POS.	1
3	72A0076	TERMINAL STRIP, 10 POS.	1
4	72A0077	TERMINAL STRIP, 20POS.	1
5	2R00C10R0M25	RESISTOR	5
6	23A0008	CAPACITOR	5
7	49A0066	SOCKET RELAY	5
8	53B0169	RELAY	5
9	32A0013	VARISTOR	10
12	61A0131	SPRING, RELAY	5

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Figure 8-4. Relay Interface PCB#1 Assembly

RAW STOCK NO: —	MAT'L: —		
NEXT ASSEM: 44D1047-X	CHKD BY:	DATE:	
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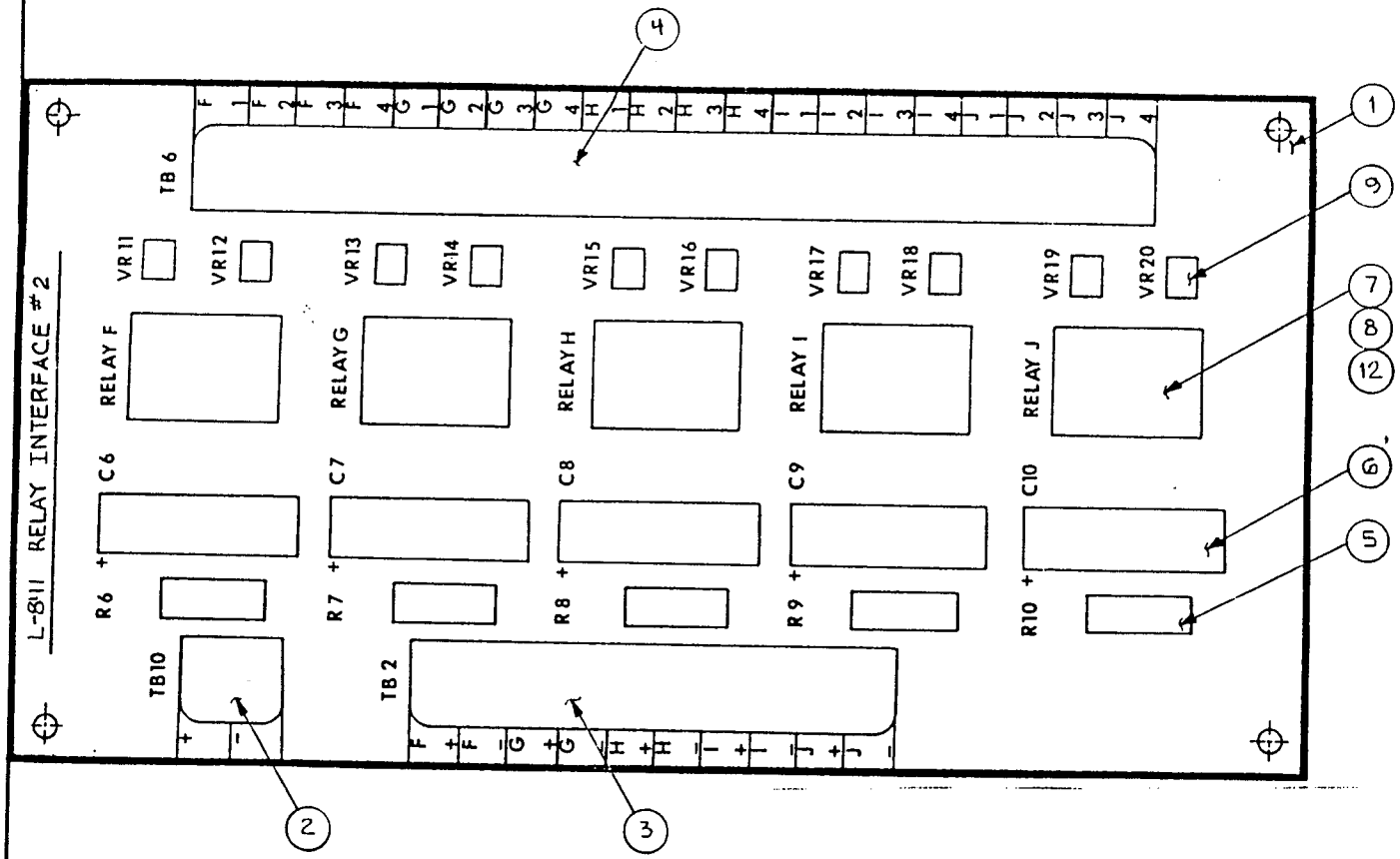

ITEM NO.	PART NO.	PART NAME / DESCRIPTION	QTY
1	41B0144	RELAY INTERFACE PCB, DARE	1
2	72A0073	TERMINAL STRIP, 2POS.	1
3	72A0076	TERMINAL STRIP, 10POS	1
4	72A0077	TERMINAL STRIP, 20POS	1
5	2R00C10R0M25	RESISTOR	5
6	23A0008	CAPACITOR	5
7	49A0066	SOCKET, RELAY	5
8	53B0169	RELAY	5
9	32A0013	VARISTOR	10
12	61A0131	SPRING, RELAY	5

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Figure 8-5. Relay Interface PCB#2 Assembly

RAW STOCK NO —	MAT'L: —		
NEXT ASSEM: 44D1047-X	CHKD BY:	DATE:	
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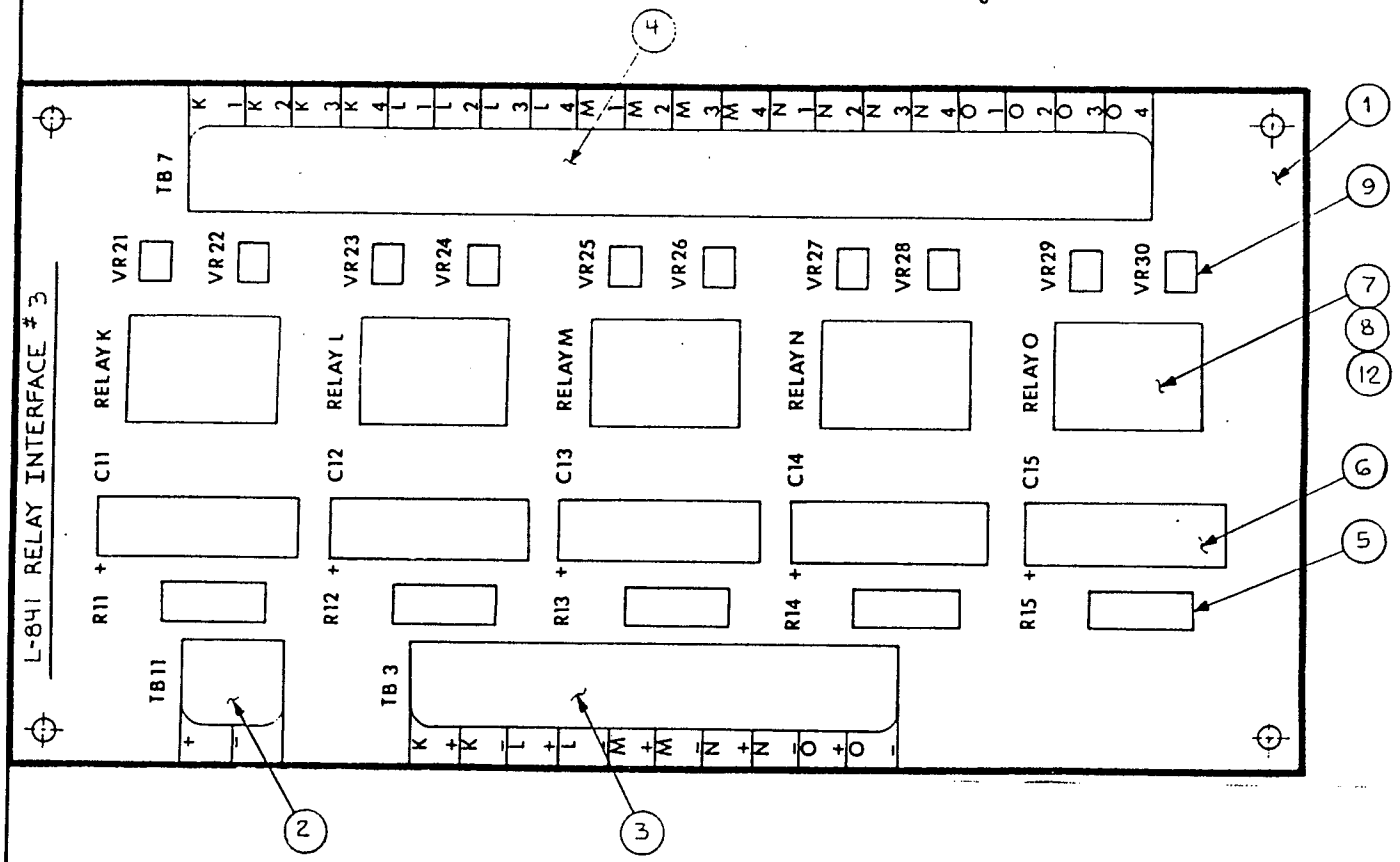

ITEM NO.	PART NO.	PART NAME / DESCRIPTION	QTY
1	41B0144	RELAY INTERFACE PCB, BARE	1
2	72A0073	TERMINAL STRIP, 2POS.	1
3	72A0076	TERMINAL STRIP, 10POS.	1
4	72A0077	TERMINAL STRIP, 20POS.	1
5	2R00C10R0M25	RESISTOR	5
6	23A0008	CAPACITOR	5
7	49A0066	SOCKET RELAY	5
8	53B0169	RELAY	5
9	32A0013	VARISTOR	10
12	61A0131	SPRING, RELAY	5

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Figure 8-6. Relay Interface PCB#3 Assembly

RAW STOCK NO: —	MAT'L —		
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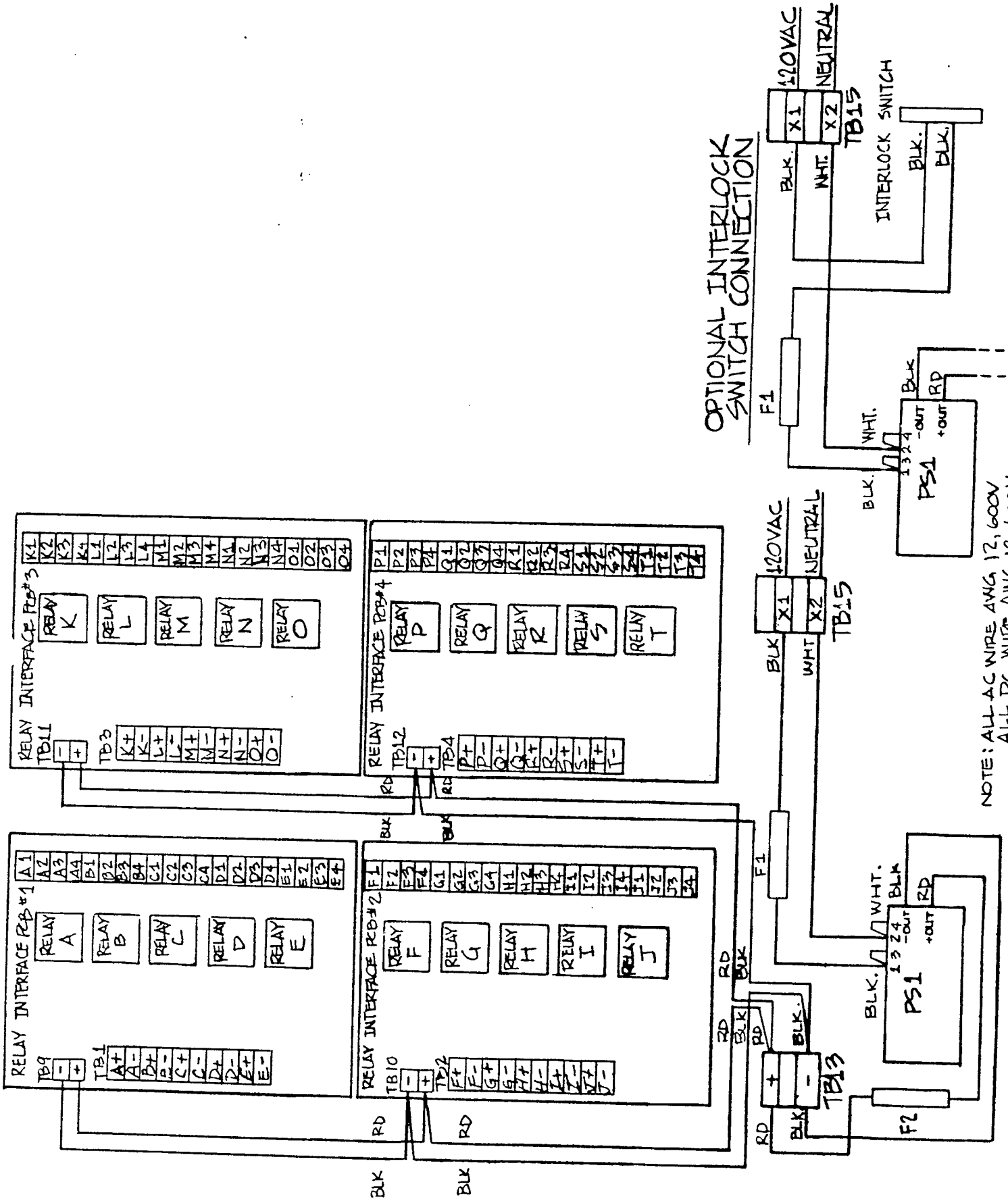
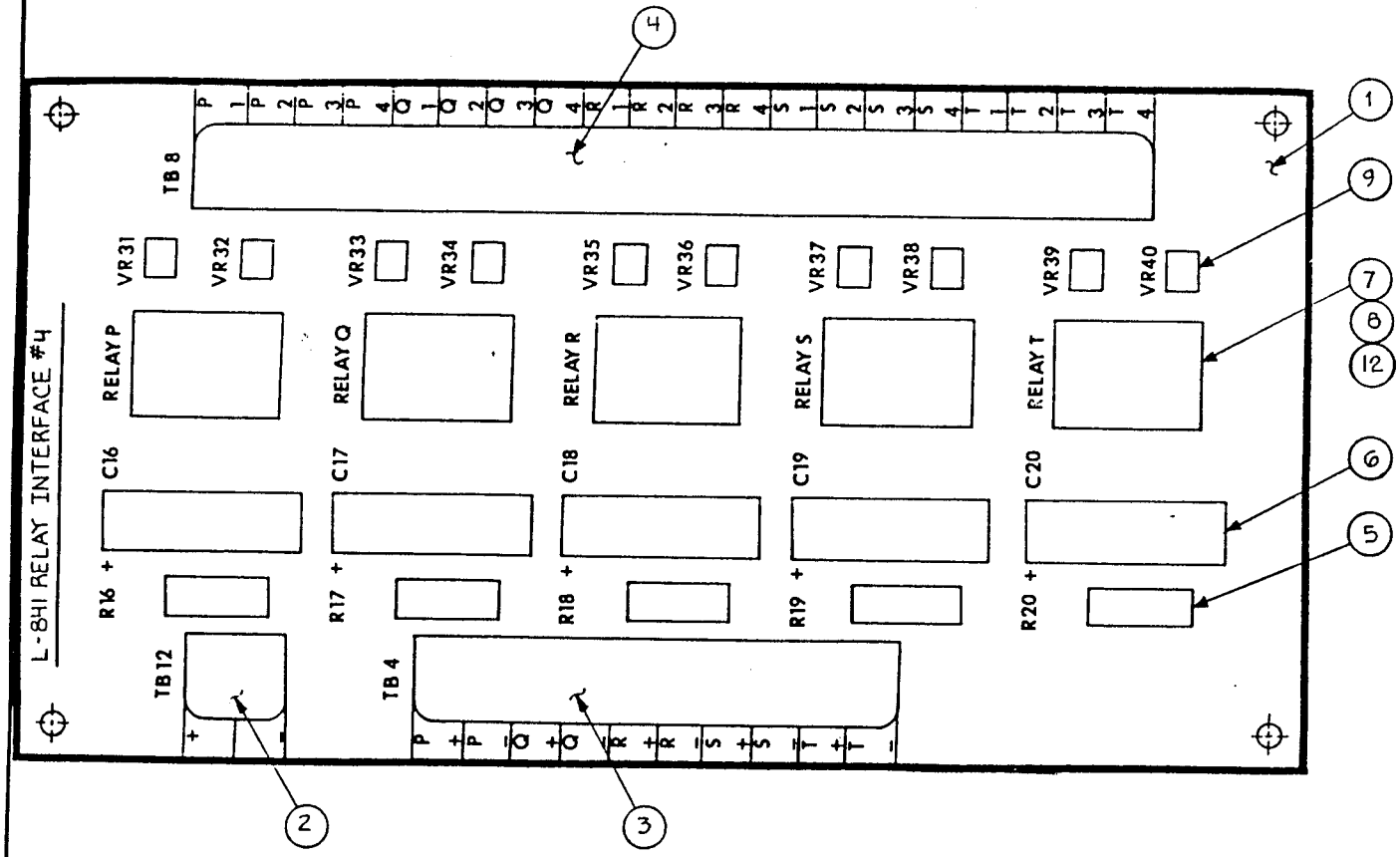


Figure 8-8. L-841 Wiring Diagram



ITEM NO.	PART NO.	PART NAME / DESCRIPTION	QTY
1	41B0144	RELAY INTERFACE PCB, BARE	1
2	72A0073	TERMINAL STRIP, 2 POS.	1
3	72A0076	TERMINAL STRIP, 10 POS.	1
4	72A0077	TERMINAL STRIP, 20 POS.	1
5	2R00C10R0M25	RESISTOR	5
6	23A0008	CAPACITOR	5
7	49A0066	SOCKET, RELAY	5
8	53B0169	RELAY	5
9	32A0013	VARISTOR	10
12	61A0131	SPRING, RELAY	5

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Figure 8-7. Relay Interface PCB#4 Assembly

RAW STOCK NO: —	MAT'L: —		
NEXT ASSEM: 44D1047-X	CHKD BY:	DATE:	
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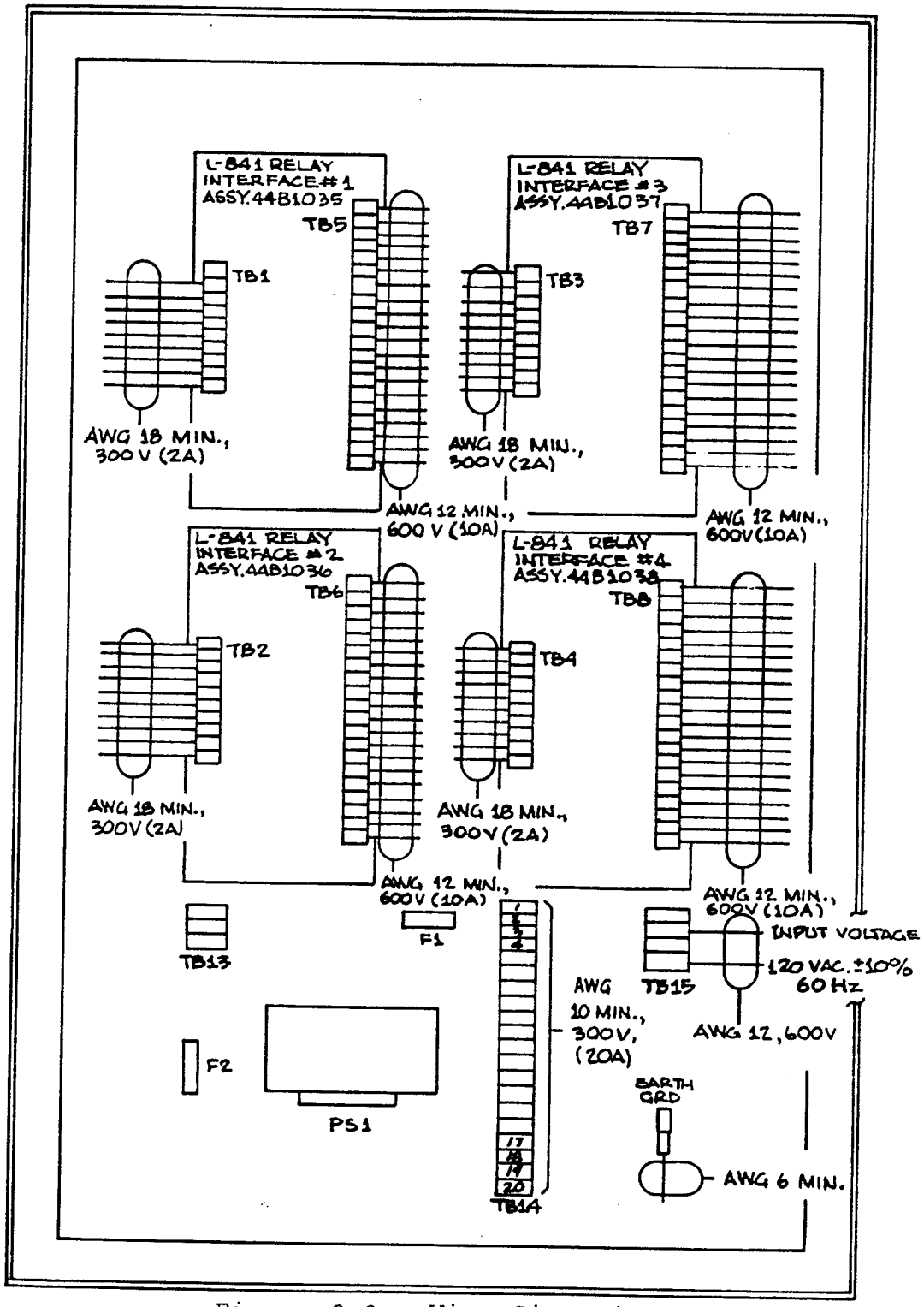

Figure 8-9. Wire Size Diagram

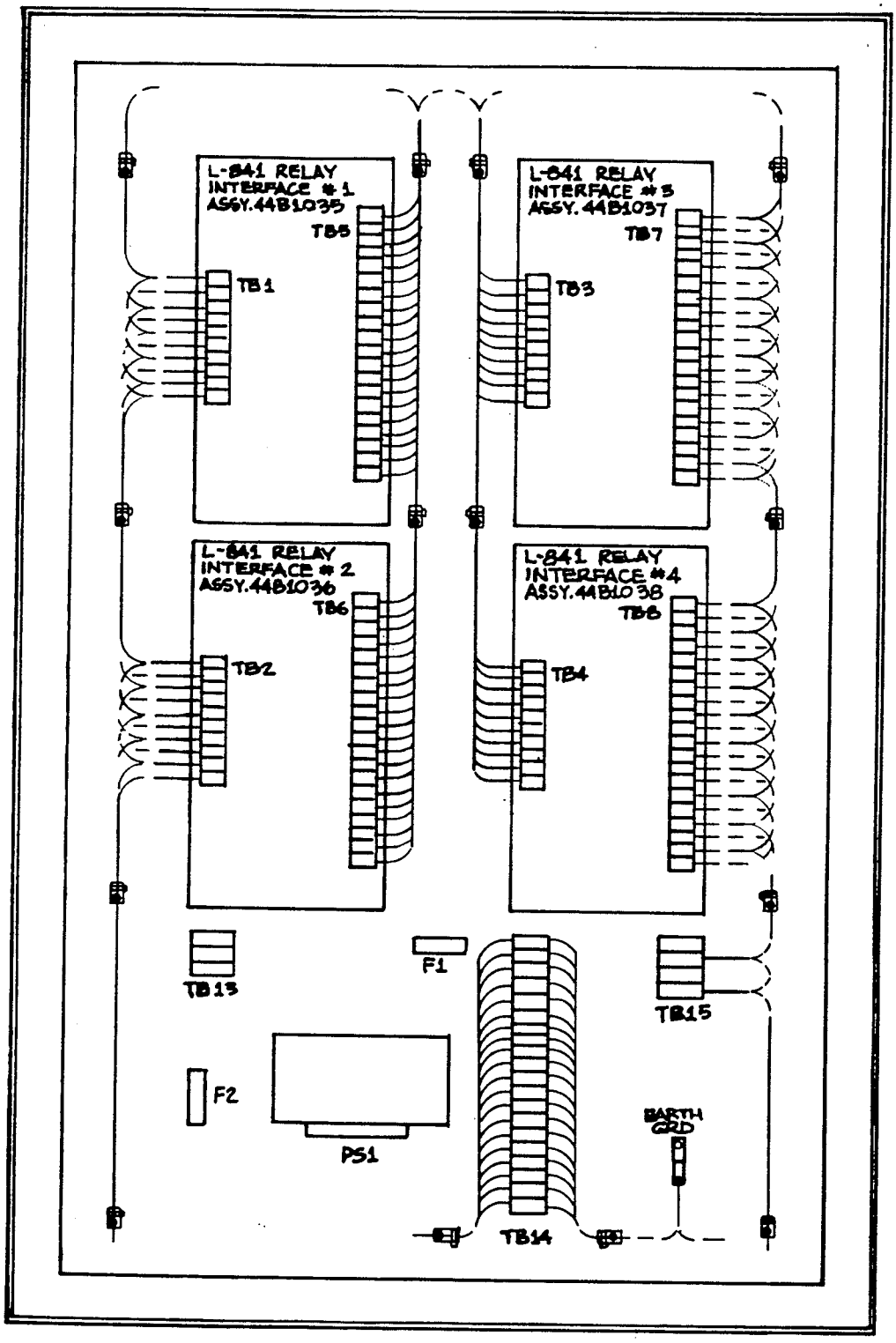

Figure 8-10. Wire Routing Diagram

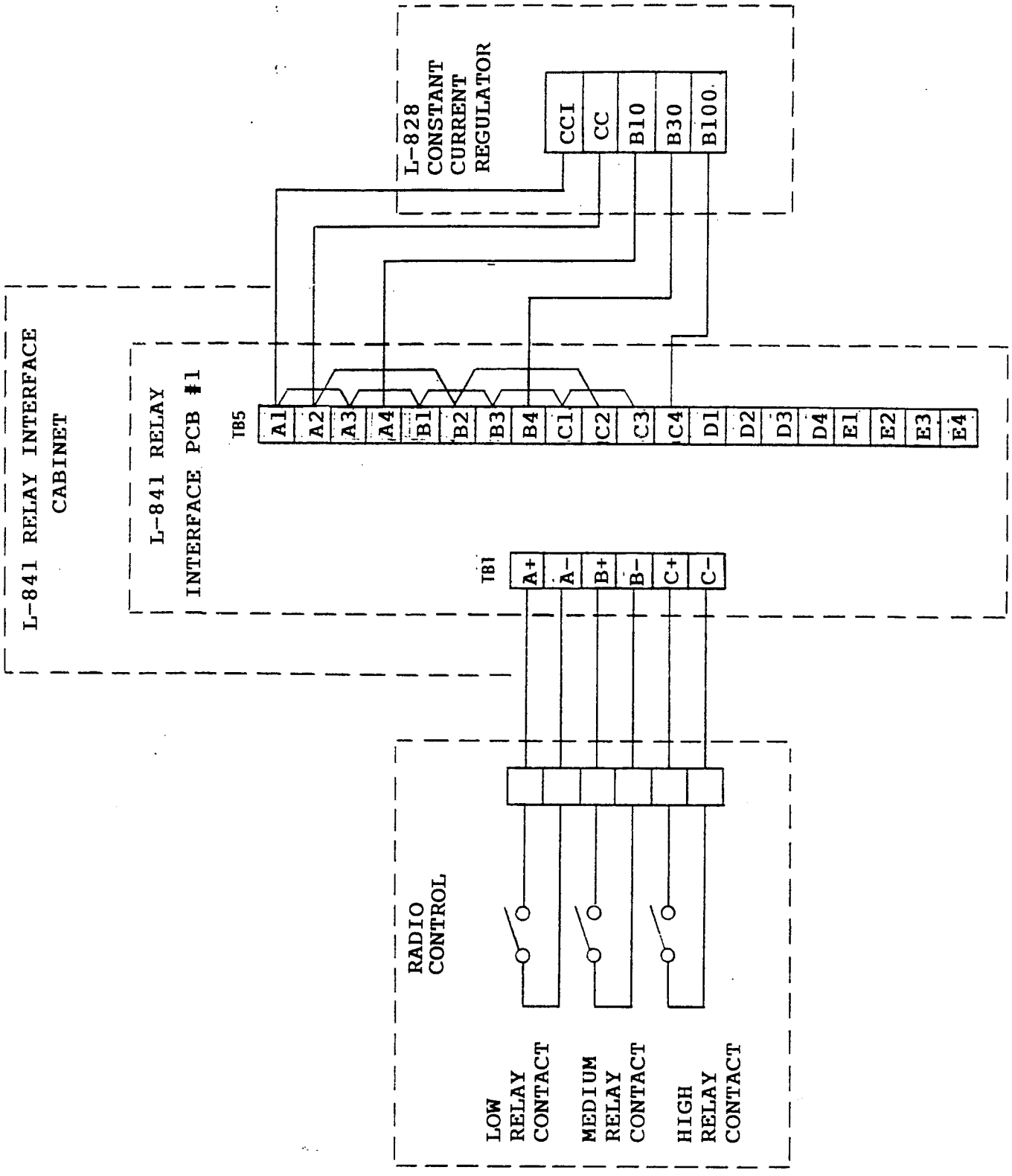

Figure 8-11. Typical Wiring Diagram for Remote Control of 3-Step Constant Current Regulator using Radio Control