INSTRUCTION MANUAL

MODEL CIP-2

COMMAND INTERFACE PANEL

MOSELEY ASSOCIATES, INC.
Santa Barbara Research Park
111 Castilian Drive
Goleta, California 93017

March 1980

(805) 968-9621

CIP-2 COMMAND INTERFACE PANEL

Schematic 91C7184
Assembly 21D2681
Component Layout 20D2756

I. PURPOSE

The CIP-2 Command Interface Panel is designed to provide a simple control interface for use with the Moseley MRC-1 Microprocessor-Based Remote Control System. When used in conjunction with an Open Collector or an Optically-Isolated Output Board, up to sixteen control relays may be operated in a single Command Interface Panel. Both normally-open and normally-closed relay contacts are available at each relay position. Unregulated DC power is also available at the spare power terminals for user convenience.

II. SPECIFICATIONS

The CIP-2 Command Interface Panel is designed to operate in conjunction with the MRC-1 Open Collector Output Board, 20C2755-1, or the Optically-Isolated Output Board, 20B2705.

WARNING: Improper operation will result if the CIP-2 is used in conjunction with the Modified Open Collector Output Board, 20C2755-2.

Outputs

Number of Contacts	Up to sixteen normally-open or normally-closed relay contacts

Termination	Wire-clamp barrier terminal blocks
Initial Contact Resistance	100 milliohm maximum
Contact Rating (Resistive Load)	5A @ 125 VAC, 250 VAC or 30 VDC
Contact Rating (Inductive Load)	1/10 hp @ 125 VAC or 250 VAC
Maximum Operating Speed	50 c/s
Operate Time	Approximately 10 ms
Release Time	Approximately 5 ms
Spare Power Output Voltage	+28V unregulated
Spare Power Output Current	25 mA to 281 mA depending on the number of relays installed in the CIP-2. CAUTION: See Section IV, INSTALLATION, in this manual for limitations on current demands above 25 mA.

Inputs

Number of Inputs	16 active lines and 16 ground returns
Termination	37-pin "D" connector
Drive Requirements	An NPN open collector (or switch to ground) able to withstand +35V open circuit voltage and 22 mA short circuit current for each relay. These drive requirements are met when the CIP-2 is driven by the Open Collector Output Board, 20C2755-1, or the Optically-Isolated Output Board, 20B2705.
Power Requirements	120 VAC or 240 VAC ±10%
Operational Temperature Range	0°C to +50°C

III. UNPACKING

The CIP-2 should be carefully unpacked and inspected for any shipping damage. Keep all packing material until performance is verified. Should inspection reveal shipping damage, or should hidden damage be revealed, immediately file a claim with the carrier. This inspection should include ascertaining that all the various components are mechanically secure.

IV. INSTALLATION

Prior to installation of the CIP-2, ensure that all relays are mechanically secure in their sockets.

The CIP-2 comes factory-wired for 120 VAC operation. If 240 VAC operation is desired, the primary lines of the power transformer can be reconnected, as shown in Schematic Diagram 91C7184. These lines are located on the power barrier strip next to the fuse holder. Extra space is provided for the 240 VAC connection.

The CIP-2 Command Interface Panel is designed to be rack-mounted within two feet of the MRC-1 Microprocessor. The unit comes supplied with extender brackets which are useful for rear rack mounting configurations. However, these extender brackets should be removed when the CIP-2 will be mounted on the front of a rack.

After the CIP-2 is secured to the rack, its input "D" connector should be connected to the output of the appropriate filtered I/O board. In turn, this I/O board should be connected to either an Open Collector Output Board, 20C2755-1, or an Optically-Isolated Output Board, 20B2705.

WARNING: Improper operation will result if the CIP-2 is used in conjunction with the Modified Open Collector Output Board, 20C2755-2.

AC power may now be connected to the CIP-2.

The CIP-2 relay outputs are located on the two large barrier terminal blocks which are situated along the top and bottom of the PC board. These terminal blocks are electrically connected to the relay contacts and are labeled K1 through K16. K1 is actuated by Command Channel 1 from the Command Output Board. K2 through K16 are controlled, respectivaly, by Command Channels 2 through 16. If more than one CIP-2 is used, then K1 through K16 on the second CIP-2 are controlled, respectively, by Command Channels 17 through 32 from the second Command Output Board. Relay control may be expanded in this manner up to 64 channels.

Each relay output has three connections associated with it: "C", or common line; "NO", or normally-open contact; and "NC", or normally-closed contact. "Normally", in this case, indicates the relationship between the relay contacts and the common line when the relay coil is not energized. Lines to the externally-controlled equipment should be connected to the appropriate relay terminal blocks. These terminal blocks feature wire-clamping screws which eliminate the need to lug wires. For 5-ampere service, use 16-gauge wire.

Spare DC power is available at the spare power terminal block located on the CIP-2 PC board. The voltage at these terminals is 28 VDC unregulated with an output current capability between 25 mA and 281 mA, depending on the number of relays installed in the CIP-2. A formula for deter-

mining the allowable spare power current capability for a given number of relays is:

$$I\ mA = 281-N \quad (16)$$

where N is the number of relays installed. For example, if the CIP-2 contains eight relays, a maximum of 153 mA can be drawn from the spare power terminals.

V. THEORY OF OPERATION

The following description is with reference to Schematic Drawing 91C7184.

Transformer T1, in conjunction with diodes CR17, CR18 and filter capacitor, C3, form a full-wave 28 VDC unregulated power supply with sufficient capacity for powering sixteen 16 mA relays. Capacitors C1, C2 and C4 perform the function of RF filtering, while resistor R1 improves the load regulation of the power supply. Since the full current capability of the supply is not needed for driving relays, external access to the supply is provided through the spare power terminals and fuse F1. The amount of current that can be drawn from this source (which depends on the number of relays installed in the CIP-2) is defined in Section IV, INSTALLATION.

To conserve space, the relays used in the CIP-2 are magnetically (as opposed to mechanically) biased. This requires that coil power be of proper polarity. Therefore, the positive line of the power supply connects to the positive coil inputs on relays K1 through K16. Diodes CR1 through CR16 serve as transient snubbers to suppress turnoff transients which might otherwise damage the relay drivers.

The negative coil lead of each relay is brought out to a 37-pin "D" connector. Pins 1 through 16 of this connector are connected respectively to relays K1 through K16, and pins 20 through 35 function as ground returns. Relay K1 will be activated by a low impedance connection between pins 1 and 20. This connection may be affected by an open collector gate or a switch. The worst case open circuit voltage across these pins is 35 VDC. The worst case short circuit current through these pins is 22 mA. The other relay control pins function similarly.

Each relay has a common lead, a normally-open contact and a normally-closed contact, all of which are connected to wire-clamping terminal blocks, where connections to externally-controlled equipment are to be made. The non-inductive current-carrying capacity of these contacts is 5A maximum.

VI. TROUBLESHOOTING

A. Partial Failure (Some Relays Work)

This indicates that the CIP-2 power supply is operating correctly. One possible problem could be a faulty relay. Try exchanging this relay with one from a functioning channel. If the bad channel still does not work, determine if the relay is pulling in (there should be an audible click upon activation). If the relay is pulling in but there is no change in the output, then the problem is a break between the relay contacts and the output barrier strip. However, if the relay is not changing state on command, there is either a fault in the CIP-2 or the MRC-1 Command Output Board. A test to isolate the unit at fault is as follows:

Disconnect the CIP-2 "D" connector from its mating "D" plug on the filtered I/O board and carefully inspect the pins on both connectors. If, for example, relay K4 were inoperative, use a small screwdriver and short pins 4 and 23 in the CIP-2 "D" connector together. If the relay operates properly under this condition, the problem lies either in the MRC-1 Command Output or filtered I/O board, and their respective manuals should be consulted. However, if the relay still does not operate, then there is likely an open or short in the PC board trace or the connector cable of the CIP-2 that corresponds to this relay.

B. Complete Failure (No Relays Work)

The most probable cause of this condition is the power supply. Check the connection to AC mains and fuses F1 and F2. The voltage at the spare power terminals should be 28V ±20%.

If the power supply is functioning properly, then the fault is either a faulty Command Output Board or an improperly connected system. Check the CIP-2 connections to the MRC-1 with reference to Section IV, INSTALLATION. If this seems normal, then troubleshoot the appropriate Command Output Board with reference to its manual.

WARNING: Improper operation will result if the CIP-2 is used in conjunction with the MRC-1 Modified Open Collector Output Board, 20C2755-2. Refer to Section II, SPECIFICATIONS, for proper Command Output Board selection.

REVISIONS		DATE
A	RELEASED FOR PRODUCTION.	18 SEPT 79 DT.W.
B/Ø	RELEASED FOR PROD. ECO #1450	3-11
B/1	11,F2 WERE F2,F1	ECO 1592
CØ	THE C1,F2 F4,1/2A WAS SCV, 14 MARKED	ECO 1648

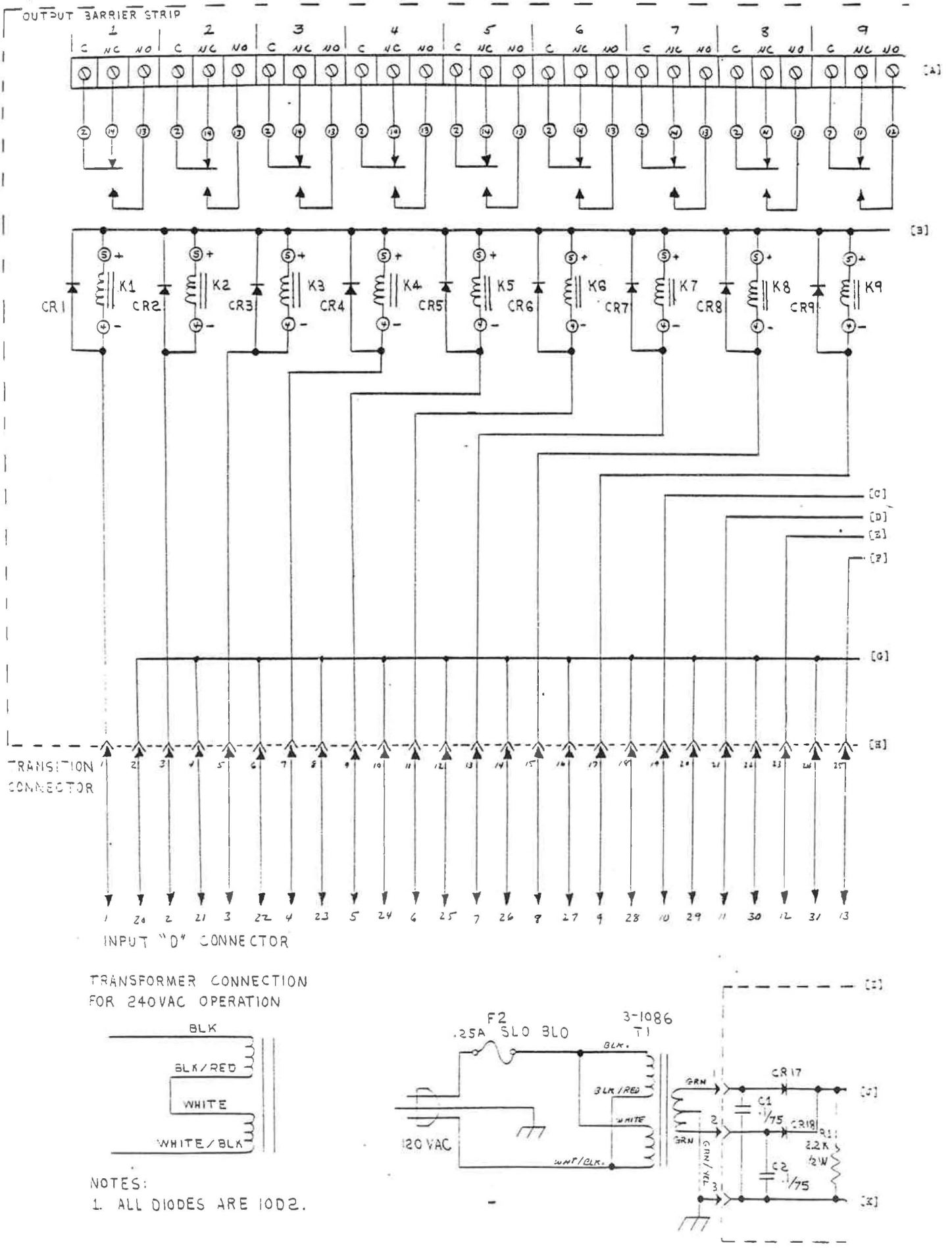
MGMT. APPR.

MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK
GOLETA, CALIFORNIA 93017

SCHEMATIC CIP-2
RELAY PANEL

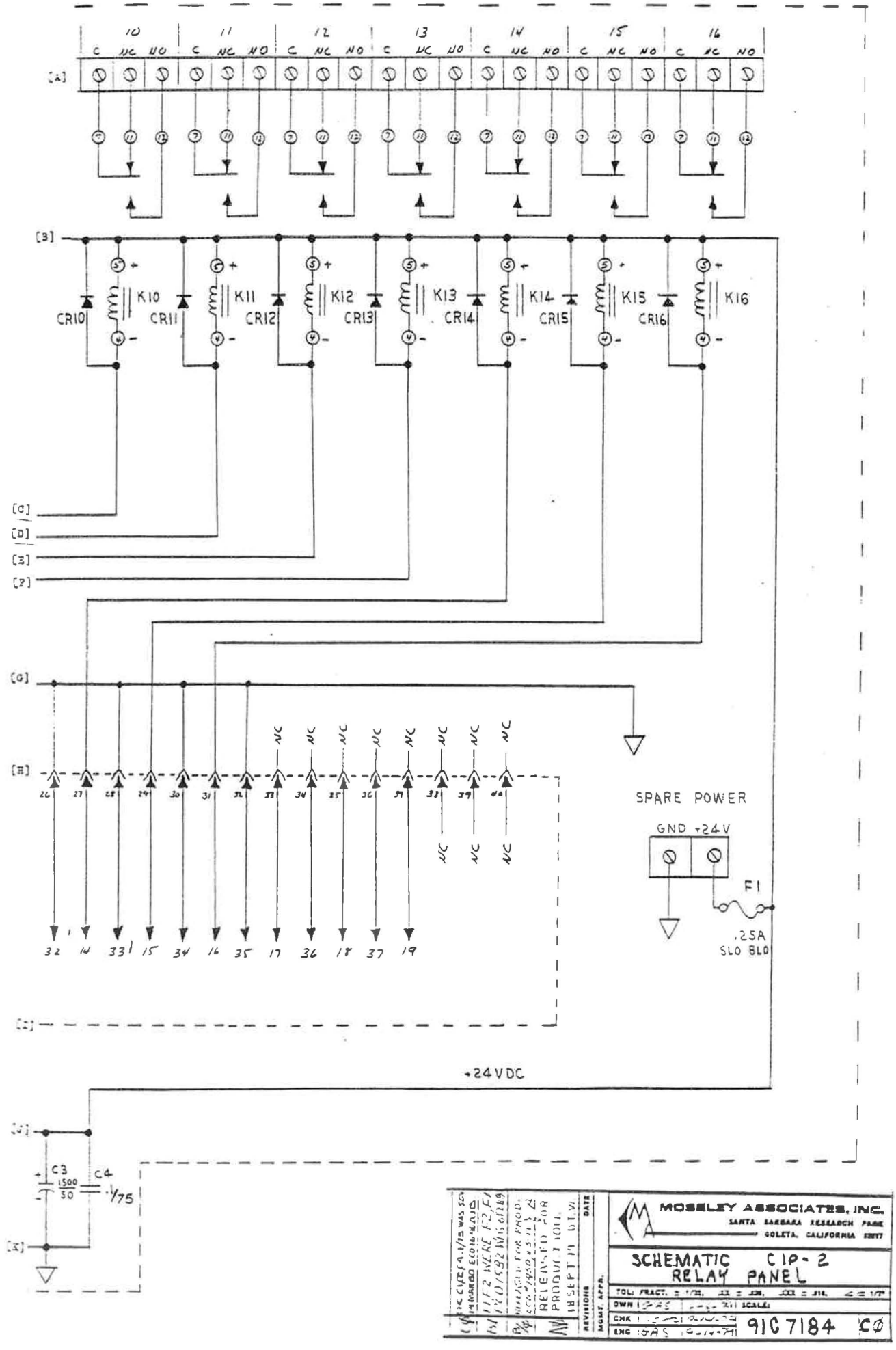
TOL: FRACT. ± 1/32, .XX ± .030, .XXX ± .010, ∠ ± 1/2°

DWN	GAS	6-6-79	SCALE:
CHK		9-14-79	91C7184 CØ
ENG	GAS	9-14-79	

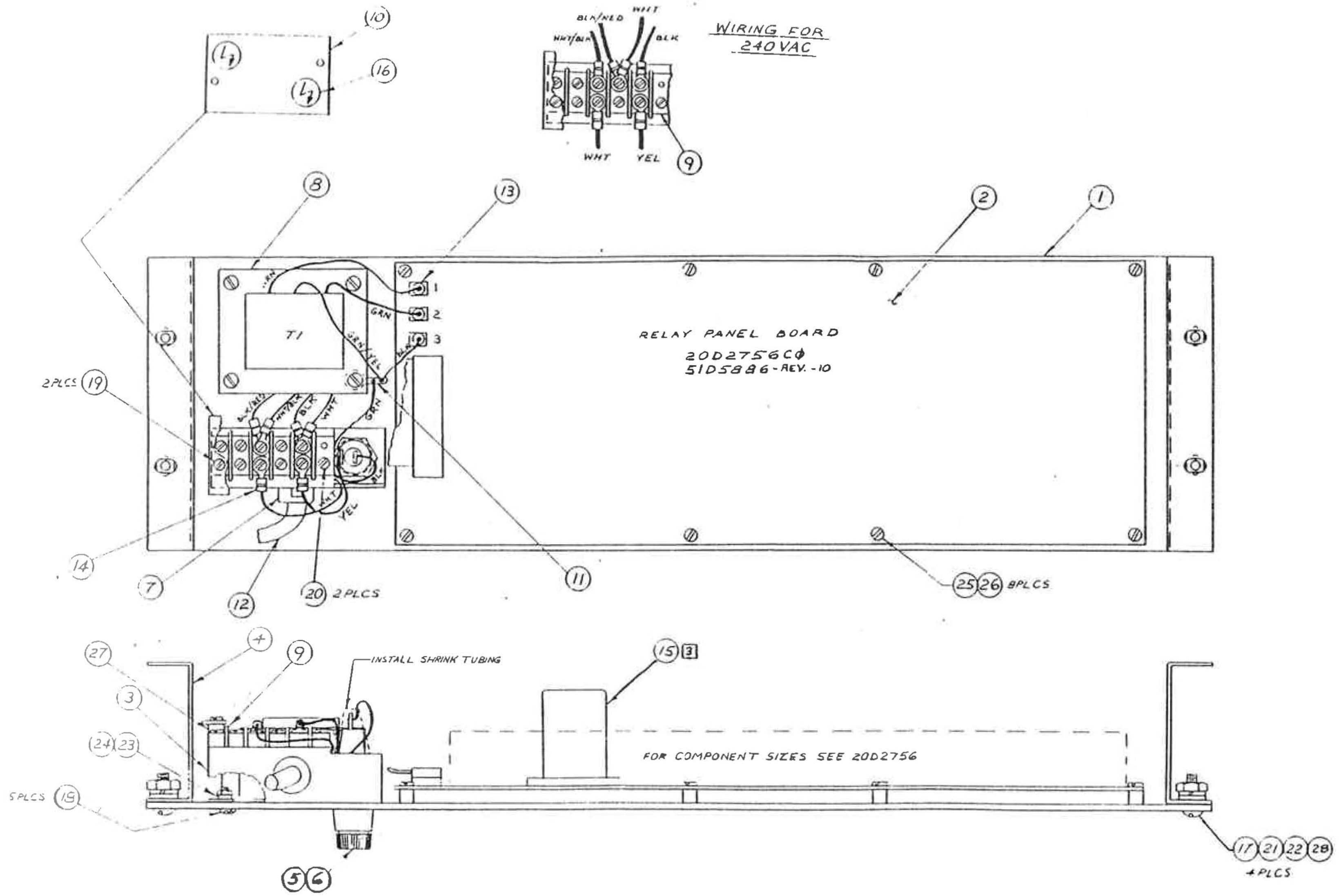


NOTES:

1. ALL DIODES ARE 1OD2.



REVISIONS	DATE	MOSELEY ASSOCIATES, INC.	
		SANTA BARBARA RESEARCH PARK	
		GOLETA, CALIFORNIA 93117	
		SCHEMATIC C1P-2 RELAY PANEL	
		91C7184	C0



NOTES:
1. ALL WIRES ARE #18 GAUGE UNLESS NOTED.
2. SCHEMATIC IS 91C7184 C∅
[3] THE DASH NO. FOLLOWING 21D2681 INDICATES THE QUANTITY OF ITEM 15 NEEDED. INSTALL QUANTITY OF ITEM IS CHRONOLOGICALLY STARTING WITH SOCKET K1

Rev.	Revisions
D4	ITEM 24 WAS QTY 4 ECO2041 MAR 81
D3	ADD 240VAC WIRING ECO1913
D2	ADDED REV. DES. IG ITEM 17 WAS SCREW ECO
D1	ADDED ITEM 28 ECO1797
C1	ITEM 9 STOCK NO. WAS 01-021 PCO1684
C	ITEM 15 WAS NC2; ADD SHRINK TUBING TO K1 PCO1634
B	RELOCATE T1 & U-BRACKET; REVISE ITEMS; ADD 27 ECO1581-1590
A	RELEASED FOR PROD. ECO1450 11-5-79

MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK
GOLETA, CALIFORNIA

ASSEMBLY & WIRING GUIDE
CIP-2

TOL: FRACT. ± 1/32 XX ± .XX XXX ± .XXX ∠ ± 1/2°

DWN	WHG	5 OCT 79	SCALE: FULL
CHK		12-17-79	21D2681
ENG	GNS	11-5-79	D4

ITEM NO.	DESCRIPTION	REF DES.	STOCK NO.	QTY
28	WASHER, FLAT #10		1150143	4
27	NYLON SPACER, #6X3/8		13-007.35	2
26	LOCKWASHER #4 I.T.		1050624	8
25	SCREW #4-40X1/4LG		1050129	8
24	LOCKWASHER, #6 I.T.		1090562	1
23	NUT #6-32		1090554	1
22	SPLIT LOCKWASHER #10		1150135	4
21	NUT #10-32		1150093	4
20	SCREW #6-32X3/8LG		1090208	2
19	SCREW #6-32X 1.00 LG		1090281	2
18	SCREW #6 BUTTON HD, 3/8LG		1090315	5
17	SCREW #10-32 x 1/2 LG. BUTTON HD.		1150077	4
16	LABEL H.V. SYMBOL		3430071	2
15 [3]	RELAY ARROW-M, NC2D-DC24V		3270238	AR
14	LUG, ROUND #18 WIRE, #4 SCREW		3110061	6
13	LUG, INSULATED, FASTON AMP 2-350804-2		3110004	3
12	POWER CORD BELDEN 3-WIRE		3370020	1
11	GROUNDING LUG WALDOM T-234			1
10	INSULATING COVER	REV. AΦ	2060317	1
9	BARRIER STRIP CINCH-JONES TRW 140-4		3290418	1
8	POWER XFMR 3-1086 INELCO 8-P-76	T1	4090312	1
7	STRAIN RELIEF BUSHING SMITH 939		1270180	1
6	FUSE HOLDER BUSSMAN HKP		3370335	1
5	FUSE, SLO-BLO .25A250V BUSSMAN MDL	F1	3370228	1
4	EXTENDER BRACKET	REV. AΦ	2060507	2
3	U-BRACKET	REV. CΦ	2060325	1
2	RELAY PANEL BOARD	REV. CΦ	9201781	1
1	PANEL DETAIL	REV. DΦ	2010163	1

REV.	REVISIONS
D4	ITEM 24 WAS QTY 4 PCO2091 MAR12 80 CH
D3	ADD 240VAC WIRING PCO1913 WPG 23SEP80
D2	ADDED REV. DGSIG. ITEM 17 WAS #10-32 SCREW PCO 1874 AJB 3-12-80
D1	ADDED ITEM 28 ECO1797; 7-3-80
C1	ITEM 9 STOCK NO. WAS 01-021 PCO1688 WPG 14APR80
C	ITEM 15 WAS NC2; ADD SHRINK TUBING TO ITEM ECO1639 PCO1631
B	RELOCATE T1 & U-BRACKET REVISE ITEMS 9, 12, 18, 19, ADD ITEM 27 ECO1587-1590 WPG 12FEB80
A	RELEASED FOR PROD. ECO 1050, 11-5-79

MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK
GOLETA, CALIFORNIA 93017

ASSEMBLY & WIRING GUIDE CIP-2

TOL: FRACT. = 1/32, .XX = .030, .XXX = .010, ∠ = 1/2°

DWN WPG 10 OCT 79 SCALE: FULL
CHK 10-17-79
ENG GHS 11-5-79

2lD2681 D4

C/R	C1, C2, C4 WAS ... ECO 1646 ...
B/...	RELEASED FOR PROD ECO 1490 ...
A	RELEASED FOR PRODUCTION 18 SEPT 79 D.T.W.
REVISIONS	DATE

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COMPONENT LAYOUT
CIP-2 RELAY PANEL BOARD

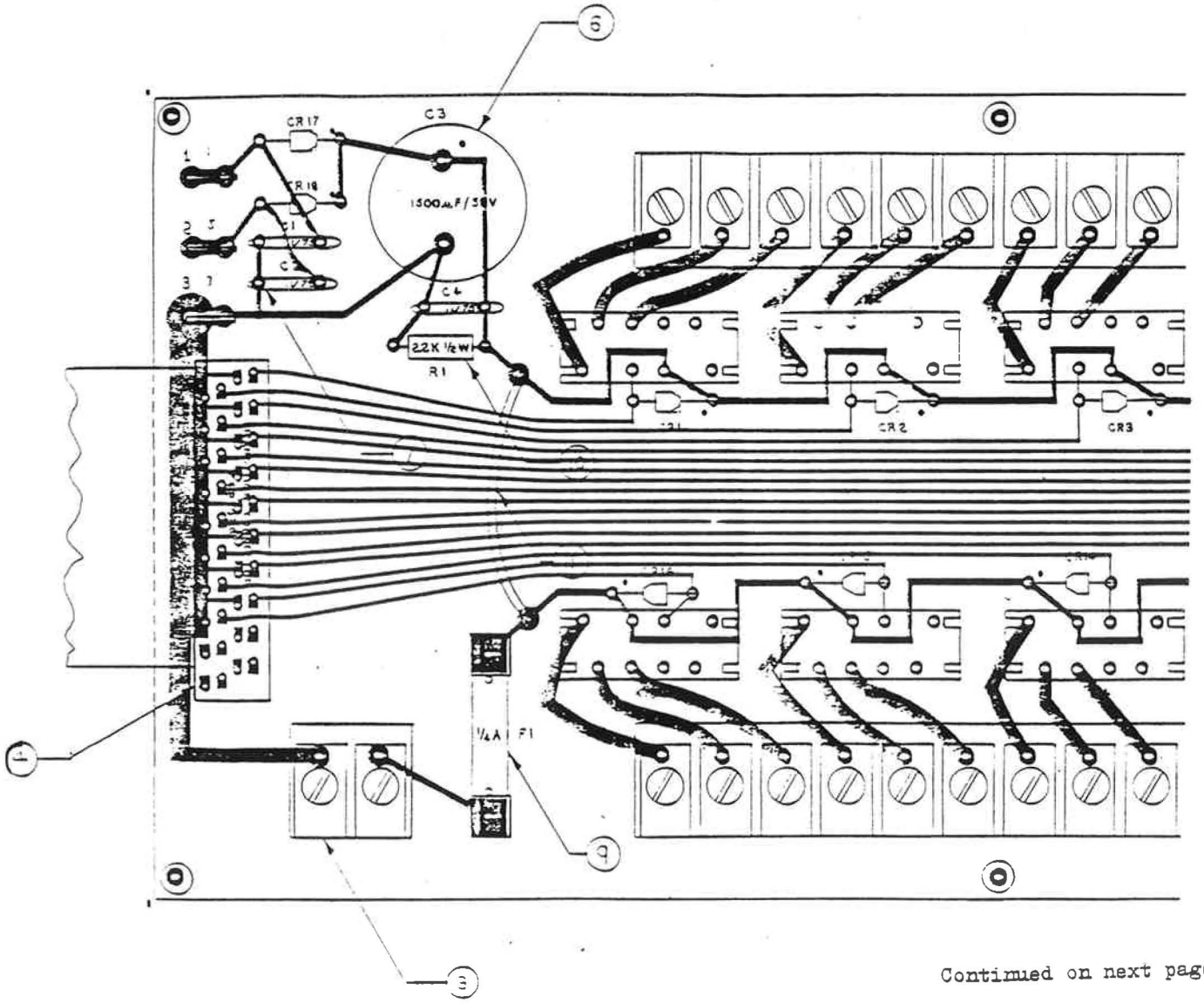
TOL. FRACT. ± 1/32, .XX ± .030, .XXX ± .010, ∠ ± 1/2°

DWN D.T.W. 17 AUG 79 SCALE:

CHK 79

ENG GAS ...-79

20D2756 C0



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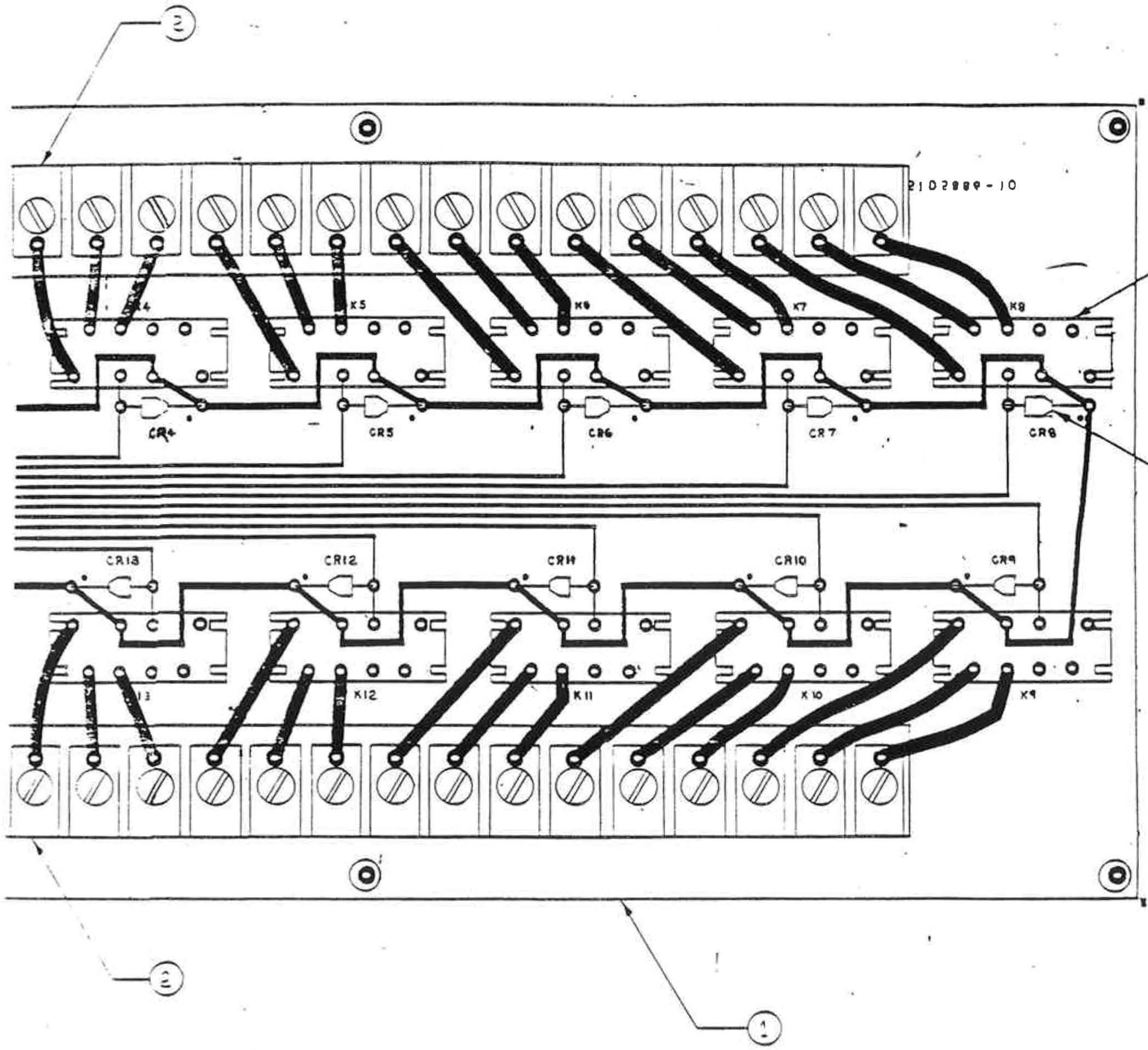
NOTES:

1. SCHEMATIC 91C7184.CØ
2. P.C. BOARD 51D5686-REV.-10



11	JUMPER 26GA. RED			1
10	RESISTOR 2.2KΩ ½W 10%		36-222	1
9	FUSE 1/4A SLO-BLO	F1	12-006	1
8	DIODE 1002	CR1-18	19-202	18
7	CAPACITOR .1/75	C1,2,&4	05-398	3
6	" 1500 µF/50V	C3	05-564	1
5	RELAY SOCKET NC2-PS	K1-16		16
4	CABLE ASSY. 2481036		2481036	1
3	BARRIER STRIP 6PCV-02-000			1
2	" " 6PCV-24-000			2
1	P.C. BOARD REV-10	51D5886		1
ITEM	DESCRIPTION	REF. D.	STOCK	QTY

REVISIONS		DATE
C/	C1,C2,C4 WAS .1/20V ECO 1646	
B/	RELEASED FOR PROD. ECO 1430	
A	RELEASED FOR PRODUCTION	18 SEPT 79 D.T.W.

MOSELEY ASSOCIATES, INC.
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GOLETA, CALIFORNIA

COMPONENT LAYOUT
CIP-2 RELAY PANEL BOARD

TOL: FRACT. ± 1/32, .XX ± .030, .XXX ± .010, ∠ ± 1/2°

DWN	D.T.W.	17 AUG 79	SCALE:
CHK			20D2756 C
ENG	GAS	9-14-79	