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.

<u>WARNING</u>: 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

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Termination Wire-clamp barrier terminal blocks Initial Contact 100 milliohm maximum Resistance Contact Rating 5A @ 125 VAC, 250 VAC or 30 VDC (Resistive Load) Contact Rating 1/10 hp @ 125 VAC or 250 VAC (Inductive Load) Maximum Operating Speed 50 c/s Operate Time Approximately 10 ms Release Time Approximately 5 ms +28V unregulated Spare Power Output Voltage Spare Power Output 25 mA to 281 mA depending on the number of relays installed in Current the CIP-2. CAUTION: See Section IV, INSTAL-LATION, in this manual for limitations on current demands above 25 mA. Inputs 16 active lines and 16 ground Number of Inputs 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. 120 VAC or 240 VAC ±10% Power Requirements Operational Temperature 0°C to +50°C Range CIP-2 Command Interface Panel (91C7184)

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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 rackmounted 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.

CIP-2 Command Interface Panel (91C7184) 7 March 1980 -3WARNING: 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-

CIP-2 Command Interface Panel (91C7184) 7 March 1980 -4mining the allowable spare power current capability for a given number of relays is:

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

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 Kl through Kl6. Diodes CRl through CRl6 serve as transient snubbers to suppress turnoff transients which might otherwise damage the relay drivers.

CIP-2 Command Interface Panel (91C7184) 7 March 1980 -5The 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:

CIP-2 Command Interface Panel (91C7184) 7 March 1980 -6Disconnect 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 Fl 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.

<u>WARNING</u>: 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.

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| 11 GROUNDING_LUG 10 10 INSULATING COVER App 2060317 9 BARRIER STRIP 3290418 1 9 BARRIER STRIP 3290418 1 8 POWER XEMR 3-76 T/ 4090312 1 7 STRAIN RELIEF BUSHING 1270180 1 6 EUSSMAN HKP 3370315 1 5 FUSE MAN HKP 3370228 1 4 FXTENDER BRACKET App 2060325 2 3 U - BRACKET P 2060325 1 2 RELAY PANEL BOARD REV 2010163 1 1 PANEL DETAIL Dp 2010163 1 | | | | | | 12 | PC | OWE | R | 0 | :0 | RD | 50 | ELA | EN | | 3 | 3700 | 020 | 1 |
| 10 INSULATING COVER REV. 2060317 / 9 BARRIER STRIFO-4 3290418 / 8 POWER XEMR 3-1086 T/ 4090312 / 7 STRAIN RELEF BUSHING 1270180 / 6 EUSE HOLDER KR 3370335 / 5 FUSE SLO-BLO-25A250V F/ 3370228 / 4 EXTENDER BRACKET REV. 2060307 2 3 U - BRACKET REV. 2060325 / 2 RELAY PANEL BOARD REV. 2010163 / | | | | | | 11 | GR | AL | 28 | 12 | G | 44 | IG. | | | | | | | 1 |
| 9 BARRIES STRIP 3290418 1 8 POWER XFMR 3-1086 T/ 4090312 1 7 STRAIN RELIEF BUSHING 1270180 1 6 EUSSMAN FLKP 3370315 1 5 EUSSMAN FLKP 3370228 1 4 FXTENDER BRACKET AQ 2060507 2 3 U - BRACKET REV 2060325 1 2 RELAY PANEL BOARD REV 9201781 1 1 PANEL DETAIL D\$ 2010163 1 | | | | | | 10 | INS | SUL. | ATI | N | G | CO | VER | R | | AØ | 2 | 060 | 317 | 1 |
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| 6EUSE MAN ELKP3370335 /5FUSE FALLO BLO 25A250VF/3370228 /4EXTENDER BRACKETAd2060507 23U - BRACKETEX2060325 /2RELAY PANEL BOARDEX9201781 /1PANEL DETAILDd2000632 / | | | | | | 7 | STA | AIN | R | EL | IEF | - B | USI | HIN | G | | 12 | 270 | 180 | 1 |
| 5 EUSENALD BLO25A250V F/ 3370228 / 4 EXTENDER BRACKET AG 2060507 2 3 U-BRACKET EC 2060325 / 2 RELAY PANEL BOARD EC 9201781 / 1 PANEL DETAIL DO 2010163 / | | | | | | 6 | | | | | | | | | | | 3 | 370 | 335 | 11 |
| 4EXTENDER BRACKETRev. 2060507206050723U-BRACKETRev. 206032512RELAY PANEL BOARDRev. 20078192017811PANEL DETAILDop 20101631 | | | | | | 5 | | | | | | | | 125 | SOV | FI | 13 | 370 | 228 | 1 |
| 3 U-BRACKET CC 2060325 / 2 RELAY PANEL BOARD CC 92010163 / 1 PANEL DETAIL DO 2010163 / | | | | | | 4 | | | | - | | - | | | | | 2 | 060 | 2507 | 12 |
| / PANEL DETAIL Do 2010163 1 | | | | | 9 | 3 | | | _ | | | _ | | | - | TREY. | + | - | | |
| / PANEL DETAIL Do 2010163 / | | | | | | 2 | RE | ELA | YP | P/ | N | ĒL | . 8 | 304 | AD | REV. | 9 | 201 | 781 | 1 |
| | | | | | | 1 | PA | NE | 4 | D | 57 | AI. | <u> </u> | | | REV. | 2 | 010 | 163 | 1 |
| | | | | | | ITEM | 12 | ES | CA | 21 | P | -10 | DN | - | | REF | - | 570 | CK | QTY |
| | 1 PC02041 MARIZ B. CH | 7-0011713 WED 2395 40 ADDBD REV. D6516. Z TEVA IT WAS 2 200 - 13 2 2 4 10 - 12 | N | D2/ D2/ | 672.400 670.820 24 510.64 | ITEN O. | 500 N | E nox | CA | | - | -10 | N | 81 | | D¢ REF DES | | | ICK D. | R |
| | QOV | APD APD | ADDED T | NO.WA | TEL' | KELDCATE TI U-BRACKE REVISE ITENS | 201 | RELEASED | 1813 | | WN | | 9 | 1000 | 779 | | | | . 2 | = 1/1* |
| ASSEMBLY & WIRING GUIDE ECOLONY OF AND ASSEMBLY & WIRING GUIDE CIP - 2 CIP - 2 C | 10 | 20 | õ | 12 | 2 | 3 | | X | NEV. | | NK | A.H | | | 2-79 | 211 | 20 | 68 | 3/ | DA |



NOTES:

1. SCHEMATIC 9107194.CØ 2. P.C. BOARD 5195686-REV.-10



| 11 | JUN | PER 2 | 6GA. | RED | | | 1 | | |
|-------------|-----------|---|--|--|--|---|--|--|--|
| 10 | | | | | 1 | 36-222 | 1 | | |
| q | | | | | | 12-006 | 1 | | |
| 3 | DI | 300 | 500 | | CR1-18 | 19-202 | 18 | | |
| 7 | CAP | ACITOR | .1/7 | 5 | 61.2.4 L | 105-3981 | 3 | | |
| 6 | | u. | 1500. | FISOV | C3 | 05-5641 | 1 | | |
| 5 | RELA | Y SOCKE | SON T | - PS | K1-16 | 1 | 16 | | |
| 4 | CABL | E ASSY | . 348 | 1036 | | 24810361 | 1 | | |
| 3 | BARR | ER STRIF | P SPCY- | 000-50 | | 1 | 1 | | |
| 5 |).8 | 11 | | | | | 2 | | |
| 1 1 | c | C. 30A | RO REN | 1-10 | SIDSE | 286 | 1 | | |
| MEN | | | | | | | 171 | | |
| 1 79 | BATE | | MPC | VEN | COLETA, | | 4C. | | |
| PDDU SEP | 1 . | CIP-2 RELAY PANEL BOARD TOU FAAT 198, 13 - 48, 128 - 48, 2 - 178 DWN D.T.W. 17 AUG 191 SCALE: CNR - 25 - 25 - 25 - 25 - 25 - 25 - 25 - 2 | | | | | | | |
| | 119 D.T.W | 10 RES 9 FU 3 DIG 7 CAP 6 S 4 CABL 3 JARR 4 CABL 3 JARR 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 | ID RESISTOR 9 FUSE 3 DIODE 7 CAPACITOR 5 II 5 RELAY SOCKE 4 CABLE ASSY 3 BARRIER STRII 2 II 1 P.C. BOAN 1 P.C. B | 10 RESISTOR 22KD 9 FUSE 1/4A 51 3 DIODE 1002 7 CAPACITOR 1/7 5 11 15004 7 CAPACITOR 1/7 5 11 15004 5 12 15004 4 CABLE ASSY, 242 3 3 BARRIER STRIP 6PCV-0 2 1 2 C. 30A RD RED 1 1 2 C. 30A RD RED 1 | IO RESISTOR 2.2KD.V2WIOZ 9 FUSE 1/4 A SLO-BLO 3 DIODE IOD2 7 CAPACITOR 1/75 5 II ISOO_F/SOV 5 III ISOO_F/SOV 5 III ISOO_F/SOV 6 III ISOO_F/SOV 7 CABLE ASSY, 3431035 3ARRIER STRIP 6PCY-02-000 2 III GPCV-24-000 1 PC, 30A RD REY -/O DESCRIPTION 8 III DESCRIPTION 8 IIII CCMPONEN 9 IIII CCMPONEN 9 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | 10 RESISTOR 2.2KΩ.V2W101 9 FUSE 1/4A SLO-BLO FI 3 DIODE 1002 CRI-18 7 CAPACITOR 1/75 CI.2.44 5 II ISO0_F/SOV C3 5 RELAY SOCKET VC2 - PS KI-16 4 CABLE ASSY. 242(035) 3 BARRIER STRIP 6PCY-02-000 2 II GPCY-24-000 1 PC. 30A RD REY - IO SIDSE 1 PESCRIPTION REF. D. 0 II CCMPONENT 0 II CCMPONENT 0 II CCMPONENT 0 II CIP-2 | 10 RESISTOR 2.2K0.V2W101 36-222 9 FUSE '/4A SLO-BLO FI 12-006 3 DIODE 1002 CRI-18 19-202 7 CAPACITOR 1/75 CL244 05-398 5 11 1500mF/50V C3 05-564 5 RELAY SOCKET NC2 - PS KI-16 14 4 CABLE ASSY. 3481036 2481036 3 BARRIER STRIP 6PCY-02-000 1 2 2 11 GPCV-24-000 1 1 PC. 30ARD REY -10 SIDSEE6 TEM DESCRIPTION REF. D. 370CX 6 TEM CCMPONENT AT00T 7 CCMPONENT AYOUT 8 CCMPONENT AYOUT 9 CLIP-2 RELAY PANET 30 | | |