

098-2648-01

REVISION 3
JULY 1986

Granger
Associates

INSTRUCTION MANUAL

MODEL 6710
POINT TO MULTIPOINT UHF RADIO

SCANCOM
1200M/9600M MASTER
AND
1200R/9600R REMOTE
SHELF MOUNTED

002-0246
INTERFACE

GRANGER ASSOCIATES

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TB6 RS232 SELECT
TB7 RPTR 5 SEC UNKEY DELAY
TB8 RPTR RX SQ KEY

SWITCHES/INDICATORS

DS1 ALARM
S1 SOFT CARRIER DELAY SELECT
S2 OW CALL AND TONE
K1 LOOPBACK RELAY
K2 SUMMARY ALM RLY

2. OPERATIONAL DESCRIPTION INTERFACE MODULE

GENERAL

2.01 The Interface Module is normally used to interface signals between the Radio System Transmit and Receive Modules and the Computer Remote Terminal Units (RTU's) at remote stations. This allows the monitor and control systems of the RTU's to transfer data over the Scancom radio system to and from the Host Computer at the Master Station.

2.02 There are eight Options available for the Interface Module. The Standard (-01) option is the basic configuration used in all eight Interface Module Options, and provides normal system interface functions. Option -02 adds the Loopback function to the basic (-01) Interface. Option -03 adds an Orderwire capability to the basic configuration, and Option -04 combines both Loopback and Orderwire with the basic Interface. Option -05 adds a selectable TX keying capability to the basic (-01) Interface. Option -06 combines the Loopback and TX Keying functions with the basic option. The -07 Option contains the Orderwire and TX Keying functions, and Option -08 is a combination of all (basic, Loopback, Orderwire, and TX Keying) optional functions in a single Interface Module.

2.03 The following Functional and Circuit descriptions of the Model 6710 Remote Interface will cover an Option -08 Interface Module containing all functions of basic Interface

and Loopback, Orderwire, and TX Keying options.

3. FUNCTIONAL DESCRIPTION

3.01 In its normal operating mode, the Computer at the Master station sends data to each of its individual Remote Terminal Units (RTU's). The data is transmitted through the Scancom Radio System. The Computer signal received at the remote station by the Model 6710 Receiver Module comes into the Interface Module at J1-6, and after amplification goes to the J2-8,9 output connection to the Computer (RTU) as a -25 dBm to +7 dBm 600 ohm Balanced signal.

3.02 If the J1-6 input is a 3 kHz Loopback signal from the Controller, it is detected and if the address decoded is the address for this Remote, the Decoder will set the Loopback Relay, K1. If the Interface is part of a Repeater, the 12 sec. LB Latch U19 is set, and will turn OFF the Loopback after the Latch times out. The Interface also provides a Loopback switched output to J2-6.

3.03 Besides providing Loopback Detection, the Loopback Detector provides the 3 kHz signal from which the 1,500 Hz signal is derived. If the Interface Loopback Relay is set, the U10 Switch is closed and the 1,500 Hz signal is input to the U8 VF Amplifier. If the PWR Supply Alarm input at J1-3 (from the Scancom Radio System Power Supply) is High, indicating the system Power Supply is now on battery power, a Free-running Oscillator will cause the gate of U10-5 to interrupt the 1,500 Hz output to the VF Amplifier with at least 10 pulses. If these pulses are detected at the Controller, they are used to light its AC ALM LED, and indicate a failure of the Remote Station Power Supply.

3.04 When the RTU has acted on the Computer signal input, it will send its own signal back to the Computer at the Master station through the

Scancom Radio System and the Interface Module. The RTU response comes into the Interface TX VF input at J2-1,7 and is a 600 ohm Balanced signal at -25 dBm to +10 dBm. The signal is amplified and output at J2-1 to the Model 6710 Radio Transmitter Module.

3.05 If the operator is using the optional Orderwire function to call the Controller Master Station, he must connect the Handset to J3, and press the ORDER WIRE CALL button, S2. This transmits 1,500 Hz to the Controller operator to alert him to an incoming Orderwire call. When the Controller operator responds, the operator at the Remote Station can talk with him by pressing the Handset Press-To-Talk (PTT) button and speaking into its mouthpiece.

3.06 Comparator U6 looks at the combined alarm inputs from the Pwr Supply Alarm, TX Alarm (for a failed Transmitter module), and LO Alarm (for a failed Receiver module). One part of U6 compares the input +13 V to a +5 V reference from Regulator U7, also. If any alarm is detected by this Comparator, the U6-2 or U6-13 output will go Low, and de-energize Alarm Relay K2. The Low will also light the red ALARM LED.

3.07 If the RS232C Transmitter Keying Option is not installed (Interface Module Options -01 through -04), the keying is provided by placing either positive Vdc at J2-13 and GND at J2-12, or GND at J2-13 and negative Vdc at J2-12. A 1k ohm 1/4 W resistor may be added between E3 and E4 on the Interface Module to provide keying through a switched ground at J2-12

CAUTION

ADDING THE 1K OHM RESISTOR AT E3 AND E4 WILL DEFEAT THE 2.5 KV ISOLATION OF J2.

3.08 If the RS232C Transmitter Keying Option is installed (Interface Module Options -05 through -08),

the keying options are set by the strapping of TB6. The Keying input operates through an Opto-isolator U2 and puts a GND at the U6-9 TX KEY Driver input. The setting of Soft Carrier Delay switch S1 is between 4 and 64 milliseconds (ms). The TX Key GND output goes to J1-4. A second GND input which will send a TX KEY to J1-4 is from the ORDER WIRE CALL switch, S2. (-B)

3.09 A modification kit (091-8005), to be used only with the TX KEY Option, is available to provide a switch output indication of Receiver Squelching, and will give a GND output at J2-14 for a Squelch Input at J1-9.

3.10 The Time Out Override signal at J1-7 is driven from Time Out Override Buffer Amp by the strapping of TB8.

4. CIRCUIT DESCRIPTION

VF RECEIVE

4.01 The input signal from the Model 6710 Receiver Module comes into the Interface Module at J1-6. The normal path for the VF input signal is through switch U10-8,9 to VF Amplifier U8-13. The U8-14 VF Amplifier output level is adjusted by the R46 RX LEVEL adjust, and input to Balanced Amplifier U8-10. The U8-7,8 Balanced Amplifier output goes to the J2-8,9 output connection to the Computer Remote Terminal Unit (RTU) as a -25 dBm to +7 dBm, 600 ohm Balanced signal. The U8-7 Balanced Amplifier output goes through normally closed (N.C.) relay contacts 13 and 11 of Loopback Relay K1-A.

5. LOOPBACK

5.01 When the Controller (at the Combiner input to the 6710 Radio Master) is turned on, it generates a continuous 3 kHz output signal indicating the system is being placed in the Loopback mode. If the J1-6 input is a 3 kHz Loopback signal from the Controller, it is detected at the U11-3 input

to the 3 kHz Loopback Detector and Oscillator circuit.

5.02 When the operator enters a two digit station address into the Controller, the digits interrupt the 3 kHz with pulses corresponding to the address entered. When the 3 kHz Tone is detected, the U11-8 output will go Low and remove the Resets at U14-15, U15-15, and U20-15. Hold circuit R68/C48 will hold the Reset off for about 1 second to ensure the address pulses can be passed. The Pulse Director U20 is first set when the Reset is removed, when the U11-8 Low output is inverted through U18-11 and places a High at U20-14 Clock input. This enables the U20-2 "1" output and (when inverted at U18-4) enables the input to the decade (TENS) Pulse Decoder U14-14 by removing the INHIBIT at U14-13.

5.03 The 800 ms delay between the first Decade number and the next (Units) number causes the 100 ms Hold circuit R69/C49 to lose its charge, setting U20-4 "2" output High and U20-2 "1" Low. This Inhibits the TENS Pulse Decoder (U18-4 goes High), and allows the second pulse string to enter the Units Pulse Decoder U15-14 by causing U18-10 to go Low, removing the Inhibit at U15-13.

5.04 The strapping on U14 and U15 corresponds to the station address. If the decoded input pulses received at this station are for its address, the straps will conduct the 0-9 digit counter output Highs to U17-11 and 12. If the output of U20-7,13 is also High (indicating that both address digits have been entered), NAND gate U17-10 will go Low, and (with TB2 strapped from B-C for a standard Master with multiple Remotes system) energize Loopback Relay K1 through Driver U21.

5.05 The Loopback Relay can be energized all the time by strapping TB2 A-B (regardless of U17-10 status). If the Interface being addressed is at

a Repeater site, TB2 will be strapped C-D. Now the U17-10 output will set Latch U19, and start the Loopback Reset Timer whose 12 second time is set by R117/C45. The normally High Timer output at U19-11 goes through U16-4, U16-11, and U17-6 to turn OFF switch U10-5.

5.06 When U19-11 goes Low (during Loopback), the switch U10 closes 3 to 4. The U10-3 input to the switch is 1,500 Hz, and is derived by dividing by 2 (in U12) the 3 kHz output of U11-5. This 1,500 Hz signal is input to Band Pass Filter U13-13, and its pin 14 output sent to Buffer Amp input U13-2. The U13-1 output goes to U10-3, through U10-4, and into VF Buffer Amp U8-13.

5.07 If the Pwr Supply Alarm signal at J1-3 goes High, indicating that there is a problem with the primary power source, the output of Free-running Multivibrator U16-10 is enabled and inputs a 5 Hz (approximately) signal to U17-5. If the Repeater Interface is in the Loopback mode (U19-11 Low), the output of U17-6 will be a 5 Hz signal to U10-5 switch control. This signal will interrupt the 1,500 Hz output to U8-13 going to the Controller, and cause the Controller AC ALM LED to light.

5.08 With Loopback Relay K1 in the Loopback position, contacts 9 and 13 (at the output of U8-7) will be closed, and the VF Receive Signal (either the signal received from the Master Radio, or from the 1,500 Hz Oscillator Buffer Amp U13-1 output) will be input to Loopback Amplifier U13-5. Loopback level is adjusted through R94, (and 20 dB ATT TB1) and the signal sent through U13-8 to Loopback Relay K1 contact 8 at the TX VF circuits.

5.09 Opto-isolator U1, with R123 and diode C11, are an available modification to the Interface Module (Modification Kit 091-7994) which will provide an isolated switched output (to

the Computer remote RTU) at J2-6. The output will go Low during Loopback.

6. TX VF CIRCUITS

6.01 The 600 ohm Balanced, -25 dBm to +10 dBm TX VF Input from the Computer RTU is at J2-1,7. It is the normal input signal for the TX VF signal, and goes through Loopback Relay contacts 6,4 to U9 TX VF Amplifier. In the Loopback mode of operation, the Loopback Relay contacts will be switched to 8,4 and the VF RX Input signal looped back to the TX VF Amplifier input. The output of the U9 Amplifier goes to J1-2, TX VF OUT to the Model 6710 Scancom Transmitter Module at the remote station.

7. ORDERWIRE

7.01 If the operator is using the optional Orderwire function to call the Controller Master Station, he must connect the Handset to J3, and press the ORDER WIRE CALL button, S2. This inputs 1,500 Hz to TX VF Amp U9, and it is transmitted to the Controller operator to alert him to an incoming Orderwire call. Orderwire call button S2 also keys TX. When the Controller operator responds, the operator at the Remote Station will press the Handset Press-To-Talk (PTT) button and speak into its mouthpiece. This VF signal is input to the TX VF Amplifier through the "T" (Tip) Handset connection. At the same time, the Common mode voltage of the PTT switch on the "T" connection turns on Q5 and activates Switch U10-1,2. This shunts all other input to the circuit and allows only the Orderwire input to be transmitted.

8. ALARM CIRCUITS

8.01 Comparator U6 looks at the combined alarm inputs from the Pwr Supply Alarm, Tx Alarm (for a failed Transmitter module), and LO Alarm (for a failed Receiver module). One part of U6 compares the input +13 V to a +5 V reference from Regulator U7, also. If any alarm is detected by this

Comparator, the U6-2 or U6-13 output will go Low, and de-energize Alarm Relay K2. The Low will also turn ON Alarm Switch Q3 and light the red ALARM LED.

9. KEYING CIRCUITS

9.01 If the RS232C Transmitter Keying Option is not installed (Interface Module Options -01 through -04), the keying is provided by placing either +3 to +25 Vdc at J2-13 and GND at J2-12, or GND at J2-13 and -3 to -25 Vdc at J2-12. A 1k ohm 1/4 W resistor may be added between E3 and E4 on the Interface Module to provide keying through a switched ground at J2-12.

CAUTION

ADDING THE 1K OHM RESISTOR AT E3 AND E4 WILL DEFEAT THE 2.5 KV ISOLATION OF J2.

9.02 If the RS232C Transmitter Keying Option is installed, (Interface Module Options -05 through -08) Isolated Power Supply U5 will provide a 50 kHz output to Isolation Transformer T3. The T3 output goes to Bridging Rectifier U4, which passes through positive signal excursions only. Zener diode CR27 regulates the output level for +5 V at J2-13 (KEY +5V).

9.03 The keying options are set by the strapping of TB6. If TB6 is strapped A to B, the J2-15 input is used at RS232 levels. When TB6 is strapped B to C, the input is at RS232 levels input to J2-5 KEY. Strapping at TB6, C to D provides for a +5 V TTL level input at J2-15. Inverting current drivers Q1 and Q2 provide the keying input to Opto-isolator U2.

9.04 The Keying input will turn Opto-isolator U2 ON, and put a GND at the U6-9 TX KEY Driver input. The U6-9 input is a fast attack, slow release circuit which will go to GND immediately, but the time it takes to return to a High depends on the setting of Soft Carrier Delay switch S1. With all switch positions open, the delay

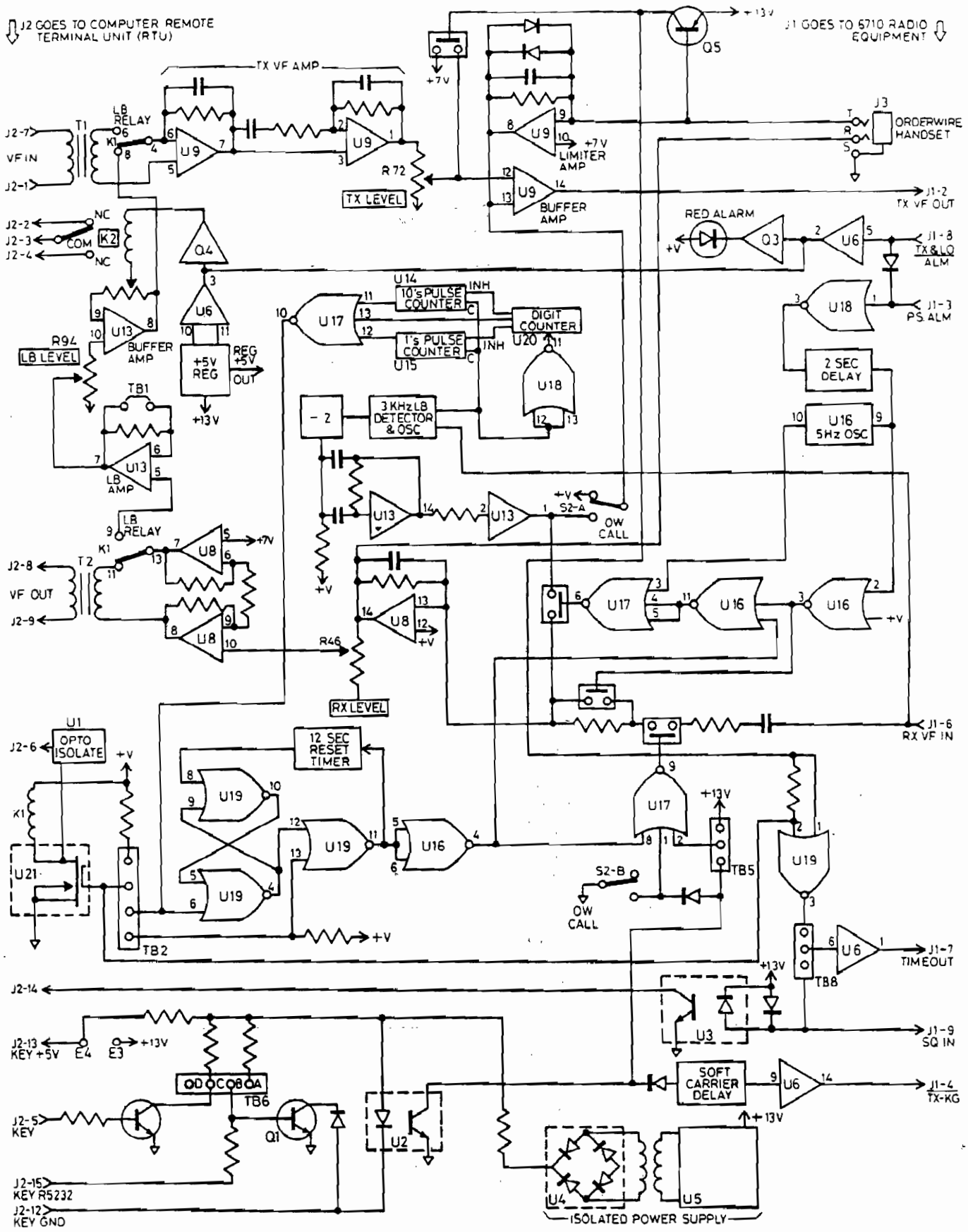


Figure 1 Interface 002-0246-XX Module Block Diagram

AC/DC POWER SUPPLY MODULE

PART NUMBER 001-9823-XX*

(* where XX = the Option Suffix number)

REFERENCE

Schematic Diagram 071-8151

Module Assembly/
PCB Assembly/Parts List 001-9823

Schematic Diagram
Intronics DCS-30-3/2 Figure 1

1. FUNCTION

1.01 The Power Supply Module is a switching regulator type supply with a +13.6 Vdc output. Supplies which operate from +13.6 Vdc, +24 Vdc, +48 Vdc, +130 Vdc, and 115 Vac sources are available.

INPUTS

- 001-9823-01 +48 Vdc LP*
- 001-9823-02 +24 Vdc LP*
- 001-9823-03 +130 Vdc LP**
- 001-9823-04 115 Vac LP**
- 001-9823-05 +48 Vdc HP*
- 001-9823-06 +24 Vdc HP*
- 001-9823-07 +130 Vdc HP**
- 001-9823-08 115 Vac HP**
- 001-9823-09 +13.6 Vdc with Line Filter
- 001-9823-10 21-56 V LP (or HP)***
- 001-9823-11 +13.6 Vdc no Line Filter

- * Intronics Module
- ** Lambda Module
- *** Vicor Module

OUTPUTS

- J1-4, 5 and 9 +13.6 Vdc
- J1-1, 2, and 6 GND
- J1-3 AC SOURCE ALARM

TEST POINTS

- White Test Point +13.6 Vdc - output

ADJUSTMENTS

NONE

STRAPS

NONE

SWITCHES/INDICATORS

INPUT LINE FUSES

2. CIRCUIT DESCRIPTION
AC/DC POWER SUPPLY MODULE

2.01 The Power Supply Module is a sealed, switching type (except option -09 which is an LC filter and Option 11 which is a standard supply) power supply with a +13.6 Vdc output. Supplies with source voltages of 13.6 Vdc (+12 Vdc, nominal), 24 Vdc, 48 Vdc, +130 Vdc, and 115 Vac are available as required by the customer. There are no adjustments. The white test point on the front panel monitors the +13.6 Vdc output of the module.

| REV | ZONE | DESCRIPTION | DATE | APPROV |
|-----|------|-----------------------------|----------|-------------------|
| A | | PRODUCTION RELEASE | 4-30-84 | J. J. [Signature] |
| B | | REDREW SCHEMATIC ECO*14194 | 9-22-84 | J. J. [Signature] |
| C | | ADDED PIN 3 TO J1 ECO*14302 | 12-14-84 | J. J. [Signature] |
| D | | REDREW SCHEMATIC ECO*15190 | 11-1-85 | J. J. [Signature] |

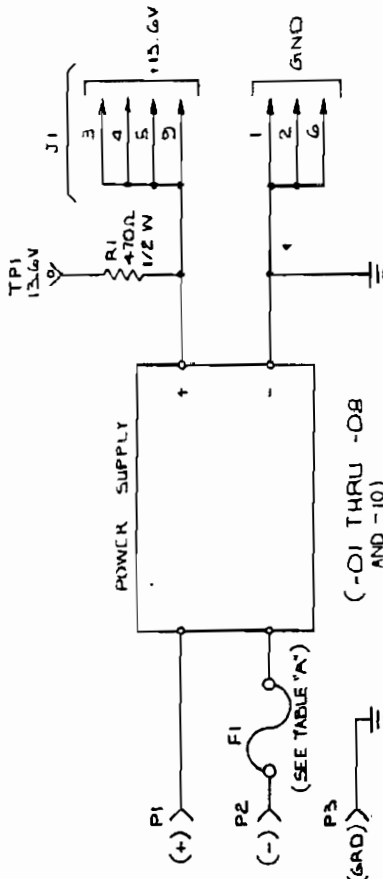
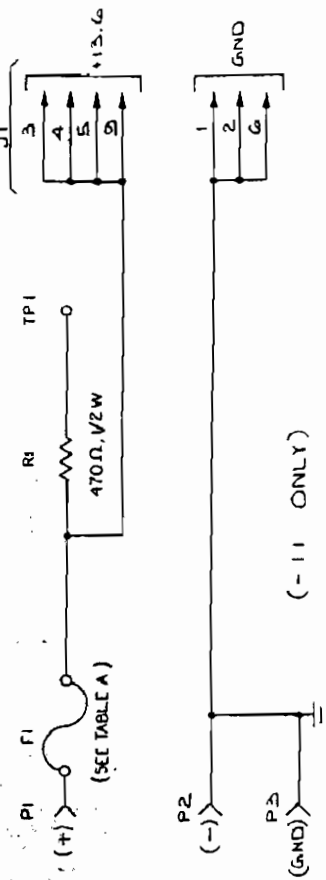


TABLE - A

| OPTIONS | F1 (VALUE) |
|--------------------|------------|
| 18VDC-LOW PWR | 1 A |
| 24VDC-LOW PWR | 2 A |
| 120VDC-LOW PWR | 1 A |
| 115VAC-LOW PWR | 1 A |
| 18VDC-HIGH PWR | 3 A |
| 24VDC-HIGH PWR | 5 A |
| 120VDC-HIGH PWR | 2 A |
| 115VAC-HIGH PWR | 2 A |
| 12VDC LINE FLTR | 3 A |
| 24-48VDC LO/HI | 3 A |
| 12VDC NO LINE FLTR | 3 A |



| DATE | TIME | QUANTITY | PART NO. | DESCRIPTION |
|------|------|----------|----------|------------------|
| | | | | LIST OF MATERIAL |

| | | |
|-----------|------|----------|
| APPROVALS | | DATE |
| DRAWN | DATE | 7-30-84 |
| CHECKED | DATE | 11-30-84 |
| COB | DATE | 5-30-84 |
| TRF | DATE | 10-84 |
| APD | DATE | 10-84 |
| QA | DATE | 10-84 |

| | |
|----------------------------|----------|
| TOLERANCES | AS SHOWN |
| ANGLES | AS SHOWN |
| UNLESS OTHERWISE SPECIFIED | |

| | | | | | | |
|-----|-------|---------|----------|-----|-----|-------------------------------|
| REV | ECO | STATUS | DATE | BY | CDR | FOR DOCUMENT CONTROL USE ONLY |
| D | 15190 | RCD | 11-5-85 | JJA | | |
| C | 14302 | RCD | 12-28-84 | JJ | | |
| B | 14194 | RCD | 9-22-84 | JJ | | |
| A | | RELEASE | 7-22-84 | JJ | | |

| | | |
|----------|------------|---------|
| OPTION | MEET ASSY | USED ON |
| 001-9823 | PWR SUPPLY | |

| | | | | |
|------|------|----------|----------|------------------|
| DATE | TIME | QUANTITY | PART NO. | DESCRIPTION |
| | | | | LIST OF MATERIAL |

Granger Associates

SCHEMATIC, POWER SUPPLY

| | | | | | | |
|-----|-------|--------|---------|-----|-----|-------------------------------|
| REV | ECO | STATUS | DATE | BY | CDR | FOR DOCUMENT CONTROL USE ONLY |
| D | 08935 | RCD | 11-1-85 | JJA | | |