Isolation Short Haul Modem

(M/N 57C382)

Industrial

CONTROLS

Instruction Manual J-3692

RELIANCE ELECTRIC

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DANGER

ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

CAUTION

THIS MODULE CONTAINS STATIC-SENSITIVE COMPONENTS. CARELESS HANDLING CAN CAUSE SEVERE DAMAGE. WHEN NOT IN USE, THE MODULE SHOULD BE STORED IN AN ANTI-STATIC BAG. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

Table of Contents

Appendices

List of Figures

1.0 INTRODUCTION

The equipment described in this instruction manual is manufactured and/or distributed by Reliance Electric Industrial Company.

The Isolation Short Haul Modem is intended for asynchronous transmission of data over distances up to 10 miles at a rate up to 19200 baud. It may be used in simplex, half duplex or full duplex systems, allowing local communication between computers, monitors, printers, or any device equipped with an RS-232/CCITT V.24 interface.

The Isolation Short Haul Modem also provides isolation for the communications ports on the DCS 5000 Processor Module (M/N 57C407), and the Communication Interface Modules (M/N 57C414, 57C417, 57C418, and 57C428). Isolation is required when the connected device is located at a cable length greater than 10 feet from the DCS module or the device communications ground is tied to earth ground. Two Isolation Short Haul Modems are required per application.

1.1 Additional Information

You should be familiar with the instruction manuals which describe your system configuration. This may include, but is not limited to, the following:

- J-3610 DCS 5000 USER MANUAL
- J-3016 AutoMate® 15 INSTRUCTION MANUAL
- J-3603 AutoMate 15F USER MANUAL
- J-3120 AutoMate 20 USER MANUAL
- J-3031 AutoMate 30 PROCESSOR HARDWARE MANUAL
- J-3141 AutoMate 40 CONTROL PROCESSOR INSTRUCTION MANUAL
- J-3644 TOLEDO SCALE INTERFACE MODULE INSTRUCTION MANUAL
- J-3036 INTELLIGENT SERIAL COMMUNICATION CARD INSTRUCTION MANUAL
- ICCC 518 GUIDE FOR THE INSTALLATION OF ELECTRICAL EQUIPMENT TO MINIMIZE ELECTRICAL NOISE INPUTS TO CONTROLLERS FROM EXTERNAL SOURCES

1.2 Related Hardware and Software

M/N 57C382 contains one Isolation Short Haul Modem and can be used with the hardware (purchased separately) listed below:

M/N 45C415 AutoMate 15 (120/240 VAC)
M/N 45C416 AutoMate 15 (24 VDC)
M/N 45C417 AutoMate 15 (120/240 VAC with R-Net)
M/N 45C418 AutoMate 15 (24 VDC with R-Net)
M/N 45C230 AutoMate 15E (120/240 VAC)
M/N 45C231 AutoMate 15E (120/240 VAC with R Net)
M/N 45C20 AutoMate 20 (120/240 VAC)
M/N 45C21 AutoMate 20 (24 VDC)
M/N 45C220 AutoMate 20 (120/240 VAC with R Net)
M/N 45C221 AutoMate 20 (24 VDC with R-Net)
M/N 45C224 AutoMate 20E (120/240 VAC)
M/N 45C225 AutoMate 20E (24 120/240 with R-Net)
M/N 45C301 AutoMate 30 Standard Processor
M/N 45C306 AutoMate 30 Enhanced Processor
M/N 45C307 Automate 30 Enhanced Processor
M/N 45C408 AutoMate 40X Control Processor
M/N 45C410 AutoMate 40 Contro Processor
M/N 45C411 AutoMate 40 Enhanced Control Processor
M/N 45C203 AutoMate Serial Communications Module
M/N 57C363 Modem Interface Cable
M/N 57C407 DCS 5000 Processor Module
M/N 57C414 Modbus Interface Module
M/N 57C417 AutoMate Interface Module
M/N 57C418 A/S Interface Module
M/N 57C428 Toledo Scale Interface Module

2.0 MECHANICAL/ELECTRICAL DESCRIPTION

The following sections describe the mechanical and electrical characteristics of the Isolation Short Haul Modem.

2.1 Mechanical Description

The Isolation Short Haul Modem contains one printed circuit board within a plastic enclosure. A choice of two connectors is provided on the circuit board: a five screw terminal block and a modular phone plug. A switch on the circuit board enables the modem to accommodate systems configured as Data Communications Equipment (DCE) or Data Terminal Equipment (DTE). See figures 2.0 and 2.1.

There are three LED status indicators on the face of the modem. The PWR LED, when lit, indicates the modem is receiving power. The TD and RD LEDs indicate the status of the transmitter and receiver, respectively, and will modulate as data is transmitted and received by the modem.

A pushbutton on the face of the modem is used to test the modem. The pushbutton should be fully extended for normal operation and depressed to perform a local loopback test.

An RS-232 connector is provided on the left side of the modem. An outlet for the terminal connections and a 6ft inch cable with a three-prong plug is provided on the back of the modem for 115 VAC.

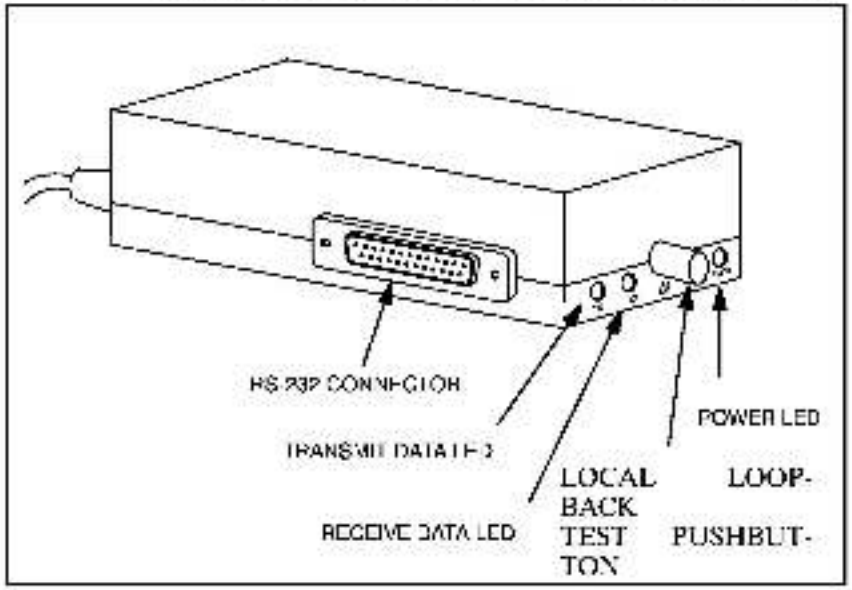

Figure 2.0- Isolation Short Haul Modem

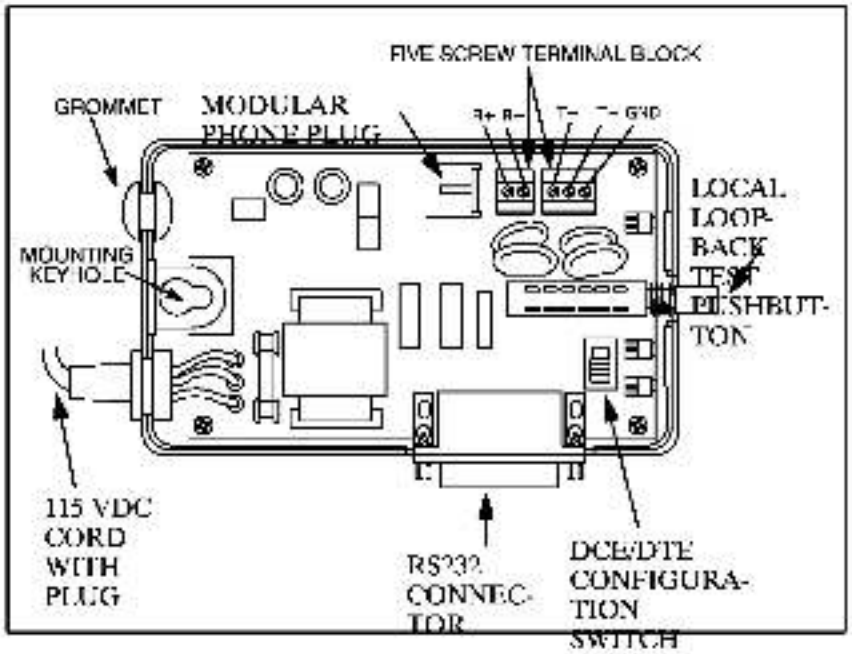

Figure 2.1- Isolation Short Haul Modem with Cover Removed

2.2 Electrical Description

The Isolation Short Haul Modem uses the RS-232 standard for the transmission of data. Only pins 2, 3, and 7 are required for operation. For DTE configurations, data is transmitted on pin 2 and received on pin 3. To facilitate flat cable connections to local terminals, many systems are now configured as DCE and have pins 2 and 3 reversed. The DCE/DTE configuration switch on the circuit board reverses pins 2 and 3. When the switch is in the DCE position, data that would normally be received on pin 2 is sent to pin 3.

Pin 20 (Data Terminal Ready) and pin 4 (Request to Send) are used as an "and" circuit to provide a carrier control function. A low level on either pin will stop the transmission, and pin 8 (Data Carrier Detect) on the other modem will go false when data is no longer being transmitted by the local modem. An open is interpreted as a positive level. Pin 6 (Data Set Ready) is reserved as the "and" of these two signals.

Pin 1 (Request to Send) and pin 5 (Clear to Send) are internally connected for controlled carrier operation.

The Isolation Short Haul Modem operates on 115VAC input power. Line driving is performed by a two-way, balanced current loop. Refer to Appendix B.

3.0 INSTALLATION

This section describes how to install and replace the Isolation Short Haul Modem.

DANGER

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WARNING

INSERTING OR REMOVING A MODULE MAY RESULT IN UNEXPECTED MACHINE MOTION. TURN OFF POWER TO THE MACHINE BEFORE INSERTING OR REMOVING A MODULE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

CAUTION

THIS MODULE CONTAINS STATIC-SENSITIVE COMPONENTS. CARELESS HANDLING CAN CAUSE SEVERE DAMAGE. WHEN NOT IN USE, THE MODULE SHOULD BE STORED IN AN ANTI-STATIC BAG. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

3.1 Wiring

The installation of wiring must conform to the National Electrical Code and all applicable local codes. To reduce the possibility of electrical noise interfering with the control system, exercise care when installing wiring from the system to the external devices. For detailed recommendations, refer to IEEE 518 (Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources).

Modem to modem connections are made using two twisted pairs of solid or stranded conductors. If simplex (one way) operation is desired, only one pair is needed. For short distances within a building, regular telephone wire is sufficient. For maximum distances, 22 gauge wire is recommended.

The mechanical integrity of the cable should be considered in cases where the installations have outside wiring. The insulation needs to be chosen according to the environment, and stranded wire should be used if there is any possibility of movement.

Shielded cable is needed only if there is severe electrical noise. However, due to its capacitance, such cable reduces the maximum distances by one third. Ensure the shield is grounded at only one end.

3.2 Initial Installation

Use the following procedure to install the Gold on Short Haul Modem:

Step 1. Prepare the mounting surface using the drilling plan and mounting dimensions below for the correct placement of holes.

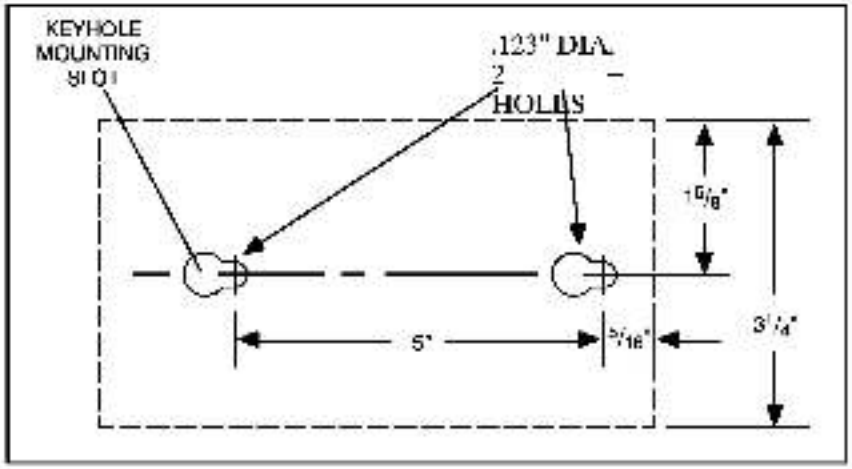


Figure 3.0- Drilling Plan and Mounting Dimensions

Step 2. Remove the modem cover by pressing a screwdriver into the slot on the back of the modem.

Step 3. There are two mounting keyhole slots on the bottom of the modem. Only one, however, is accessible from inside the modem. The modem will be mounted using the slot that is not accessible from the inside first.

Step 4. Insert one #6-32 mounting screw into the mounting surface so that 3/16" remains between the bottom of the screw head and the mounting surface.

Step 5. Mount the modem on the screw and secure it to the mounting surface with another #6-32 mounting screw through the second keyhole slot.

Step 6. To connect modem to modem for half or full duplex operation, refer to step A. For simplex operation, refer to step B.

A. For half or full duplex operation, feed two twisted pairs or four conductor cables through the grommet provided in the back of the modem and connect to the modem's terminal blocks as shown in figure 3.1.

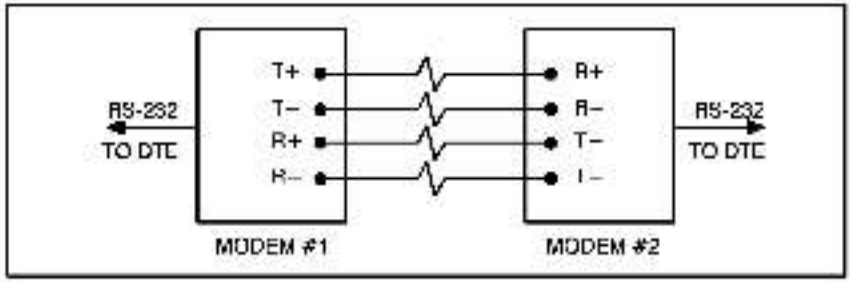


Figure 3.1 - Connections for Half or Full Duplex Operation

3. For simplex operation, feed one twisted pair through the grommet provided on the back of the modem and connect to the modem's terminal blocks inside the unit as shown in figure 3.2.

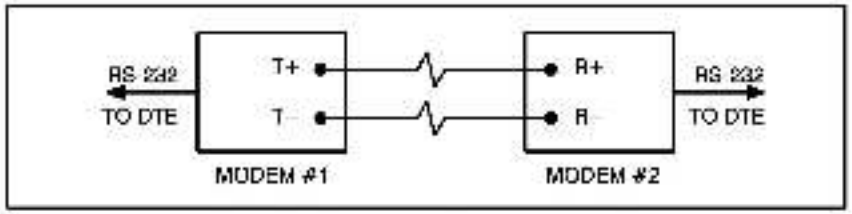


Figure 3.2 - Connections for Simplex Operation

Step 7. Set the DTE/DCE switch according to the equipment and cable being used.

Step 8. Replace the cover.

Step 9. Connect the modem to the CRT or printer using an RS-232 interface cable, ensuring pins 2, 3, and 7 are connected straight through.

If the modem is connected to a printer and the printer uses hardware handshaking protocol, consult the printer manual to determine which signal is dropped to indicate "buffer full" (typically Data Terminal Ready, Request to Send or Supervisory Send Data). This signal should be connected to either pin 20 (Data Terminal Ready) or pin 4 (Request To Send) on the modem. If the unit is receive only, pin 2 (Transmit Data) must be connected to a valid RS-232 signal, such as pin 3 (Receive Data).

Step 10. Plug the cable into the grounded 115 VAC power source.

Step 11. Refer to section 4.2 to test the modem.

3.3 Modem Replacement

Use the following procedure to replace the Isolation Short Haul Modem.

1. Unplug the modem.
2. Disconnect the RS-232 interface cable from the modem.
3. Use a screwdriver to remove the cover of the modem.
4. Disconnect the wires from the terminal block or modular phone plug.
5. Using a screwdriver, remove the mounting screw visible from the inside of the unit.
6. Guide the unit off of the remaining mounting screw.
7. Use a screwdriver to remove the cover of the replacement modem.
8. Guide the replacement modem onto the mounting screw and secure it to the mounting surface with a #8-32 mounting screw.
9. Re-connect wires to the terminal block. Refer to section 3.2 for the correct connections for simplex, half duplex, or full duplex operation.
10. Re-connect the modem to the CRT or printer using an RS-232 interface cable.
11. Set the DCE/DTE switch according to the equipment configuration.
12. Replace the cover.
13. Connect the RS-232 interface cable to the modem.
14. Plug the cable into the grounded 115 VAC power source.
15. Refer to section 4.2 to test the modem.

4.0 DIAGNOSTICS AND TROUBLESHOOTING

This section describes how to troubleshoot the Isolation Short Haul Modem. If the problem cannot be corrected using the instructions below, the unit is not user-serviceable.

4.1 Problem: System Won't Communicate

If the system won't communicate or is receiving partial information or an inconsistent response, use the following procedure to isolate the problem.

Step 1. Verify the modem is receiving the correct input power.

Step 2. Verify the internal wire connections are correct and secure.

Step 3. Verify the RS-232 interface cable is secure to both the modem and the CRT or printer, and that pins 2, 3, and 7 are connected straight through.

Step 4. Verify the DCE/DTE switch on the circuit board is in the correct position.

Step 5. Verify the self-test button on the front of the modem is fully extended.

Step 6. Verify that the communication cables are not picking up noise and that the wiring is consistent with IEEE 518 (Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources).

Step 7. If the above procedures do not correct the problem, replace the modem.

4.2 Modem Self-Test

The Isolation Short Haul Modem can be tested using either of the following methods:

Method I

Step 1. Depress the pushbutton on the front of the modem.

Step 2. Connect the RS-232 interface cable between the modem and an asynchronous CRT.

Step 3. Any data typed on the keyboard should now be looped back and displayed on the CRT. If data does not display, replace the modem.

Step 4. Press the pushbutton again to return the modem to operating mode.

Method II

Step 1. Install a loopback jumper wire four to six inches in length between T+ and R− and a second jumper wire between T- and R- on the terminal block inside the modem.

Step 2. Connect the RS-232 interface cable between the Isolation Short Haul Modem and an asynchronous CRT.

Step 3. Any data typed on the keyboard should now be looped back and displayed on the CRT. If data does not display, replace the modem.

Step 4. Remove jumper wires to return the modem to operating mode.

Appendix A

Technical Specifications

Ambient Conditions

- Temperature 5° to 50°C (40° to 120°F)
- Humidity 5 to 95% (Non-condensing)

Dimensions

- Height 2 inches (50.8mm)
- Width 3.25 inches (86.9mm)
- Depth 6.25 inches (158.75mm)
- Weight 1 lb. (0.5kg)

Input Power

- 115VAC, 50/60Hz, 0.1A

Line

- One twisted pair for simplex, two twisted pairs for full duplex (18-24 AWG) D-C continuity required

Connectors

- Five screw terminals or modular phone plug

Current Loop

- 10mA

Isolation

- Optical couplers (1.5KV isolation)

Data Communications

- Interface EIA RS-232 and CCITT/V.24
- Transmission Asynchronous
- Mode Full duplex, half duplex, or simplex
- Speed 600 to 19200 baud in increments shown below:

Baud Rate	19200	9600	4800	2400	1200	600
Distance in Miles*	1	2	3	5	10	10

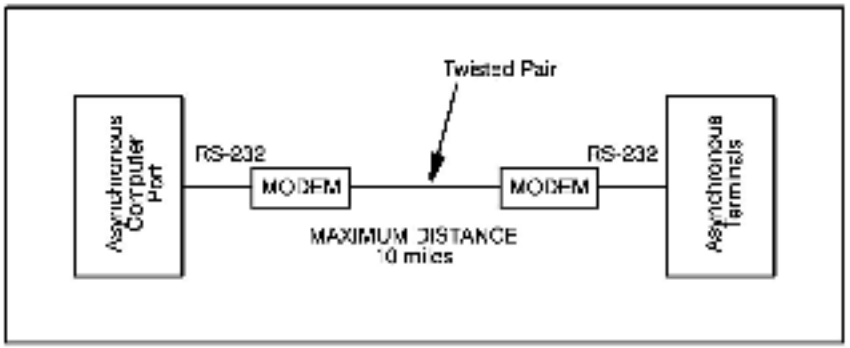
*Using 22 gauge wire. For 24 gauge wire, decrease distance 10%.

Terminal Interface

- Voltage Levels According to EIA RS-232C

Appendix B

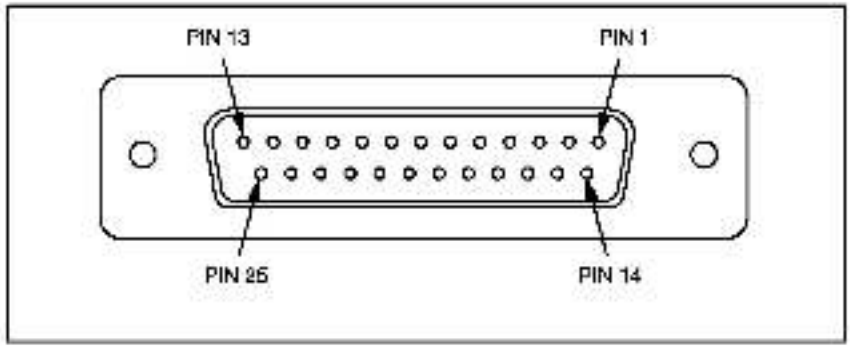
Block Diagram



Appendix C

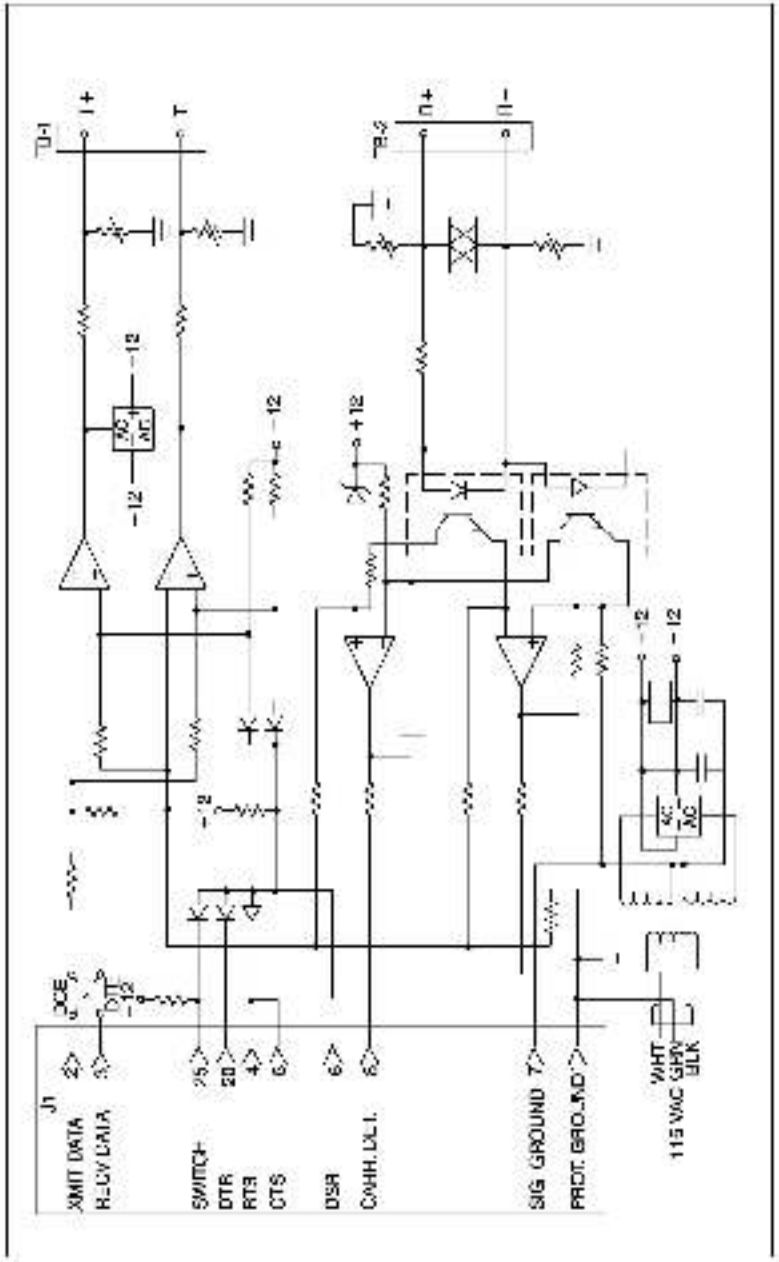
25-Pin Connector Wiring

PIN	EIA RS-232C	CCITT V.24	NAME	
1	AA	101	Protective Ground	
7	AB	102	Signal Ground	
2	BA	103	Transmitted Data	
3	BB	104	Received Data	
4	CA	105	Request to Send	Jumpered together
5	CB	106	Clear to Send	
6	CC	107	Data Set Ready	
20	CD	108.2	Data Terminal Ready	
8	DF	109	Carrier Detect	



Appendix D

Schematic



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