

# *SMARTERM*®

## TECHNICAL MANUAL



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# 1.0

## OVERVIEW

SMARTERM® is an intelligent stand-alone Controller, containing all the hardware and software required to perform access control and related functions for up to four doors. Smarterm may operate as a fully self contained stand-alone access control system complete with full CRT and Printer capability. Smarterm may also operate as part of a networked system, where data is down-loaded by a host computer. In both cases, all programmed data is stored within Smarterm's own memory. The host computer can be an IBM compatible 286 PC running Smarterm Management Software or an IBM compatible 386 PC running CardAccess 450 software.

In the stand-alone mode, the operator programs Smarterm with a CRT which is connected directly to the Smarterm. All that is required to operate Smarterm is a "dumb" ASCII RS 232 terminal. The operator is prompted for input thru the extensive use of menus. All activity may be reported on the CRT and printer.

In the networked mode, one or more Smarters are connected to a host computer. In this configuration, there is two-way communication between the host and the Smarterm. The host computer may down-load programmed data to the Smarterm as well as up-load all transactions stored in Smarterm's memory. Smarterm may also request a down-load from the host. When Smarterm is hard wired to a host, this transfer takes place in real time. When Smarterm is in a dial-up mode with the host, all data is buffered and exchanged the next time communication is established.

## 2.0

# DESCRIPTION

### **2.1 READERS**

This manual describes the CardAccess SMARTERM. It is a guide to functional operation, installation, configuration, and troubleshooting.

Smarterm provides complete access control for four readers. The data base within Smarterm is large enough to fully control these four readers on an individual reader basis. Smarterm contains all the hardware and software required to perform all access control functions. Smarterm does not require communication with the host controller except when up-loading or down-loading the data base or transferring events to the host controller. Each reader may be configured to operate in four different modes, card only, card plus personal identification code, common four digit code only, or free access. These modes of operation are determined, and may switch automatically, based upon time zone assignments.

Each reader may be designated "Escort Required", mandating that supervisory personnel escort selected cardholders or visitors through critical areas. Each reader may also be configured for Anti-passback as either IN, OUT, NEUTRAL, or EXIT OVERRIDE. Anti-passback requires alternate IN and OUT transactions for each card in addition to the normal time zone and access level assignments. EXIT OVERRIDE is considered an OUT reader, as it will generate an alert if the cardholder's status is "OUT", but unlike an OUT reader, the door will be released.

### **READER TYPES**

Smarterm supports the following reader types:

Wiegand	(Swipe)
Wiegand	(Insertion)
Wiegand	(Key)
Mag Stripe	(CIC)
Mag Stripe	(ABA)
Proximity	

( See section 4.1 for Reader Connections )

**DESCRIPTION (CONT.)****2.2  
CARD HOLDERS**

Smarterm contains all the data necessary to control up to 4000 random card numbers, or in other words 4000 valid cards. The actual encoded number may range from one to 8,000,000. Each cardholder may be assigned to two independent combinations of access level and time zone.

**2.3  
TIME ZONES**

Smarterm allows for 128 time zones. All time zone data is stored in the Smarterm data base. Smarterm will automatically switch time zones based on its internal real time clock.

A time zone is an 8 day weekly schedule of start and stop times. The eighth day being "Holiday." Each time zone consists of up to 18 programmable intervals of time, each interval consisting of a range of days as well as a range of times.

**2.4  
HOLIDAYS**

Smarterm allows for 50 holidays. A Holiday is considered the eighth day of the week when programming time zones, generally used for exceptions to normal operation. The operator determines the start time for Holidays; Holidays terminate at midnite.

**2.5  
ACCESS LEVELS**

Each Smarterm allows for 256 Access Levels. An Access Level is a combination of cardreaders which a cardholder may have access to. All Access Level definitions are stored in the Smarterm data base.

**2.6  
TRANSACTION  
BUFFER**

Smarterm buffers 500 transactions, events, and in/out of service messages. These messages are stored by Smarterm until requested to be sent by the host controller. Those messages which have been sent to the host controller are deleted from memory, only after the host acknowledges correctly receiving them. In the event that the host controller does not request these messages and the buffer becomes full, the oldest messages are cleared and replaced on an as needed basis. If this overwrite should occur, Smarterm sends a message to the host controller to indicate to the host that this has happened. STORED MESSAGE LOST is sent. If a local printer is connected to the Smarterm at the time, then the stored lost messages are also sent to the local printer for a permanent record.

**2.7  
CLOCK**

Smarterm contains a real time clock to provide the time and date for all transactions.

## DESCRIPTION (CONT.)

### **2.8 ACCESS MODES**

Three modes of operation are provided. Each of these modes are established at the host controller. Free access doors may be assigned to a "card free access" time zone so that doors will automatically unlock and relock to a user-determined time schedule.

#### **2.8.1 CARD ONLY**

In this mode the Smarterm responds only to a valid card read. No additional input is required to grant access.

#### **2.8.2 KEY PAD ONLY**

In this mode the Smarterm responds only to the manual entry of a common keypad code into the keypad.

#### **2.8.3 CARD AND KEYPAD**

In this mode the Smarterm responds only after both a valid card has been read and removed, and the correct Cypher code has been entered.

### **2.9 KEY PADS**

3 X 4, (12 key) keypads are used to enter in the Cypher code.  
( See section 4.2 for keypad connections )

### **2.10 SERIAL PORTS**

Two RS232 ports are available for local reporting: COM1 and COM2. COM1 controls a CRT and COM2 controls a local serial printer.

### **2.11 BAUD RATES**

Baud rates for both the RS232 ports are set by jump jacks located on the Smarterm board. The following baud rates are individually available for all ports: 1200, 2400, 4800, 9600.

### **2.12 POLLING**

Polling refers to the communication between the Smarterm and the Host computer. Smarterm responds to any one of four polling modes. RS232, RS485, RS422 or under DIALUP.  
( See section 4.7 for polling line connections )

### **2.13 DIAL-UP**

Two way dialup is provided so that Smarterm can dial up the host when the transaction buffer is approx. 80 percent full. This dialup number can be down loaded from the host controller. Smarterm allows for the direct connection to a modem, without the need for external interface equipment.

### **2.14 FACILITY CODES**

Each Smarterm may recognize up to ten different Facility Codes. These Facility Codes are defined and then assigned on a per cardholder basis. This allows Smarterm to be retrofit into installations containing existing cards and card readers.

## DESCRIPTION (CONT.)

### **2.15 RELAYS**

Smarterm provides as standard, 8 relays to control the door strikes and the door alarm shunts. These are "Form C" relays with a contact rating of 3A at 24 VDC (3A at 120 vac, resistive). All 8 relays may be user configured. (See section 4.4 for Relay Connections).

### **2.16 CONSOLE RELAY**

One Console relay is provided that can be activated for various conditions. These conditions are: System Failure, Forced Door, Excess Door Open Time, Duress, Void Cards, Denied Cards, Alarm / Input, and Tamper Switch. This "CONSOLE RELAY" can be wired to an external alarm system.

( See section 4.41 for Console Relay Connections )

### **2.17 ALARM INPUTS**

Smarterm provides as standard 16 alarm inputs. Normally, two alarms are used per door. The first is used to monitor the door contacts and the second is used as a bypass input. The other eight alarms are uncommitted and are user assignable. Each alarm input is enabled by time zone with a user programmable time delay before generating an alert. Each alarm input is user defined as to its normal state (open or closed). If the two alarms that are normally used per door are not being used as defined above, they may be used as uncommitted alarm inputs.

( See section 4.3 for Alarm Connections )

### **2.18 TAMPER SWITCH**

A tamper switch is installed in the Smarterm control box to provide a means of activating an alarm whenever the enclosure is opened, either forcibly or with a key. This tamper alarm reports back to the host controller immediately if on line, or is stored in memory and sent to the host controller when communications are restored. In addition to this, it also can be sent to an external alarm system. Both tamper and return to normal are reported.

### **2.19 LINKING**

Smarterm allows for 64 link programs. A link program is the automatic triggering of a relay(s) output in response to an alarm input. The input may be a simple time zone definition or any 1 and/or combination of up to five alarm inputs. In response, up to 5 relays may be turned on, and/or up to five relays may be turned off, and/or up to five relays may track the alarm input.

### **2.20 PASSWORD PROTECTION**

Smarterm is password protected for local programming. Smarterm allows up to 6 six passwords, each password is assigned to 1 of 2 privilege levels (privilege levels define what tasks an operator may perform). Privilege level "0" allows operators to have full functionality. Privilege level "1" only allows operators to view data without being able to add, delete or change any information.

## DESCRIPTION (CONT.)

**2.21  
CRT**

Smarterm may accept a CRT to perform local programming functions as well as display events as they occur. All CardAccess transactions will display the Card number, Cardholder name (if programmed), Reader number, Date, Time, and whether access was granted or denied. All denials will be accompanied with the reason for denial (Access Level, Time Zone, etc.) All alarm events will display the Alarm Zone number, Date, Time, and if the alarm input has changed to NORMAL or ABNORMAL state.

( See section 4.5 for CRT Connections )

**2.22  
PRINTER**

Smarterm may accept a printer to print local events as they occur, as well as to produce summary reports of programmed data. Card and Alarm transactions will print out as above, mirroring the CRT. Printed summary reports include access level definitions, employees by name, employees assigned to access levels, employees assigned to time zones etc.

( See section 4.6 for Printer Connections )

## 3.0

# INSTALLATION WARNING

THE SMARTERM PRINTED CIRCUIT BOARD MAY BE ACCIDENTALLY DAMAGED BY AN ELECTROSTATIC DISCHARGE. ELECTROSTATIC CHARGES MAY DEVELOP ON YOUR BODY BY WALKING ACROSS A CARPETED FLOOR. BEFORE TOUCHING THE SMARTERM PRINTED CIRCUIT BOARD ALWAYS TOUCH AN EARTH GROUND FIRST.

### **3.1 SHIPPING CARTON CONTENTS**

#### **UNPACKING**

The shipping carton will contain a fully assembled Smarterm. This includes the Smarterm printed circuit board, the Smarterm power transformer and line cord, and the Smarterm backup batteries, all enclosed in the Smarterm enclosure.

Carefully open the carton containing the Smarterm and remove the protective packing material.

Keep the container and the protective material for use in transporting the Smarterm, or to return the Smarterm to the factory if required.

#### **INSPECTION**

Thoroughly examine the enclosure for signs of damage.

Open the enclosure and inspect the inside for any signs of damage.

Immediately report any damage to the carrier and to Continental Instruments. Use the Factory Repair Form included with this manual.

3.2  
**BENCH TESTS**

## INSTALLATION (CONT.)

### BENCH TESTS

**PRELIMINARY  
INSPECTION**

Visually inspect the Smarterm board and enclosure for obvious physical damage such as broken or missing components, damaged printed circuit board, etc..

As you go through this procedure, be sure to fill out a copy of the Troubleshooting Checklist found at the end of this section in the event that technical support becomes necessary.

Locate the dip switch assembly at S2 and close the switch at position 8 (depress the bottom rocker segment on the right side.) Various sections of the LED bar graph display should become illuminated. Proceed to the Secondary A.C. Present section if the right-most LED is lit. (This would indicate that both the primary and secondary voltages are present at the transformer.)

**PRIMARY A.C.  
CHECK**

If there are no segments lit, use an A.C. voltmeter to verify line voltage presence at the outlet or junction box supplying power to the Smarterm board.

If after correcting any faulty conditions, there are still no LED segments lit, check the voltages at J9. A secondary voltage of between 13.5 VAC and 16.5 VAC should be measured from T1 to T2 and from T2 to T3. If this is not the case, verify a good electrical connection from T1 through T3 and the transformer. If you still cannot obtain the correct readings, your transformer has failed and must be replaced. Contact technical support for further information.

**IF PRIMARY A.C.  
IS PRESENT**

The remaining measurements will be made using the negative (-) side of capacitor C2 as the common ground reference point. Clip the black lead of your voltmeter to this point now.

Now test the condition of the two main fuses (F1 and F2) with power applied. Measure the A.C. voltage at each side of F1 and F2. You should observe between 13.5 and 16.5 volts A.C. at each of the four points mentioned. If this voltage is found on only one side of a fuse, replace that fuse.

The next step will be to check the raw D.C. voltages. Verify that there is between +18 and +22 volts D.C. at the positive (righthand) side of C2. Then check for between -18 and -22 volts D.C. at the right side of R1 (just above the fuses.)

### 3.2

## BENCH TESTS (CONT.)

**IF SECONDARY  
A.C. IS PRESENT  
(LED LIT)**

**IF +12V DC IS  
PRESENT  
(LED LIT)**

**IF 5V DC IS  
PRESENT  
(LED LIT)**

**STAND-ALONE  
OPERATION**

## INSTALLATION (CONT.)

**DO NOT CONNECT A.C. POWER UNTIL  
SMARTERM IS MOUNTED AND FULLY WIRED  
AND CONFIGURED.**

Now the regulated voltages may be tested. Measure between +13.8 and +14.2 Volts D.C. on the left side of R27 (just above R1.) Measure between -11 and -13 volts D.C. at the anode (the side opposite the stripe) of diode D5.

The final supply voltage to be tested will be between 4.8 and 5.2 volts D.C. measured at pin 1 of any of the Buchanan strips for doors 1 through 4 (J10, J11, J17 or J18.) If the voltage reading is low, remove all of the Buchanan connectors at each of the doors. If the problem goes away, you must recheck all of your wiring at each of the doors before proceeding. Remember, **ALWAYS REMOVE THE POWER PLUG AT J9 BEFORE INSTALLING OR REMOVING A CARD READER OR PERMANENT DAMAGE MAY RESULT.**

At this point the Smarterm has been checked for the necessary voltages and should be operating. The next two sections describe suggested procedures for troubleshooting in stand-alone or networked modes of operation.

Verify that a terminal has been properly configured and connected to the COM1 (J14) connector on the Smarterm board.

Next, ensure that both the terminal and Smarterm have been set to operate at 9600 bps. Verify that the jumper for COM1 at the upper right hand corner of the board is set to the position labeled 9600.

Be sure the address switch is set as per section 4.1 of this manual. Momentarily depress the reset switch (S1). Upon release of S1, the attached terminal should display:

<<< Smarterm (V x.xx) >>>

Logon:

**3.2**  
**BENCH**  
**TESTS**  
**(CONT.)**

## INSTALLATION (CONT.)

***NETWORKED  
OPERATION***

If this is not the case, contact technical support for assistance. Be sure to have your completed Troubleshooting Checklist handy, and, if possible, have a telephone near the Smarterm in the event that technical support requires further information or wants you to run further tests.

Check that the RxD LED flashes occasionally. If this is not the case, recheck the wiring between the host computer and the malfunctioning Smarterm. If the wiring appears to be correct, refer to your operator's manual to verify proper host configuration for the Smarterm in question. If all is configured properly, contact technical support for further assistance.

If the RxD LED is flashing, but TxD remains off, check first to see that the Smarterm is addressed properly. Set S2 as per section 4.1 of this manual. Next check that the Smarterm in question has been configured properly in the host. If all seems correct, yet no flashing of the TxD LED occurs, contact technical support for assistance.

**3.2**  
**BENCH TESTS**  
**(CONT.)**

# INSTALLATION (CONT.)

## TROUBLESHOOTING CHECKLIST

<b>LED READINGS</b>	Visual Inspection	<input type="checkbox"/> OK	
	Set S2 - position 8 ON	<input type="checkbox"/> OK	
<b>VOLTAGE READINGS (AC)</b>	AC Secondary	<input type="checkbox"/> LIT	<input type="checkbox"/> UNLIT
	+12 VDC	<input type="checkbox"/> LIT	<input type="checkbox"/> UNLIT
	+ 5 VDC	<input type="checkbox"/> LIT	<input type="checkbox"/> UNLIT
<b>VOLTAGE READINGS (DC)</b>	Primary Voltage	Measured	VAC
	Secondary Voltage	T1 to T2	VAC
		T2 to T3	VAC
	Fuse Voltage (Referenced to (-) of C2)	F1 Left	VAC
		F1 Right	VAC
		F2 Left	VAC
		F2 Right	VAC
<b>POLLING INDICATORS</b>	+ side of C2		VDC
	Right side of R1		VDC
		+ 13 VDC	VDC
		- 12 VDC	VDC
		+ 5 VDC	VDC
	RxD	<input type="checkbox"/> Flashing	<input type="checkbox"/> Not Flashing
	TxD	<input type="checkbox"/> Flashing	<input type="checkbox"/> Not Flashing

### **3.3**

## **SELF TEST AND DIAGNOSTICS**

### ***INITIAL START UP***

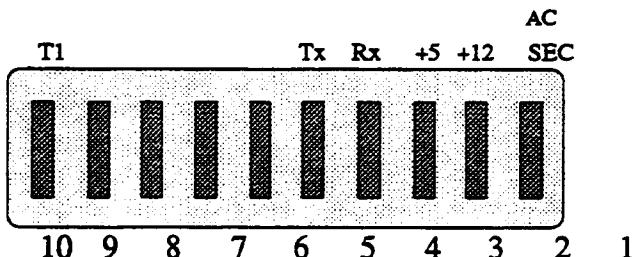
Upon initial start up from a power down situation, self test and diagnostics are run. The results are saved and transmitted to the host controller when requested.

### ***ON REQUEST***

The host controller is able to request that self test and diagnostics be run. A status message is sent back to the host controller indicating the results of the test.

### ***TEST LEDS***

#### **SELF TEST AND DIAGNOSTIC LED**



- 1 Indicates the presence of secondary AC voltage
- 2 Indicates the presence of regulated +12 VDC
- 3 Indicates the presence of regulated + 5 VDC
- 4 Indicates that the Smarterm is receiving data from a Host Controller.
- 5 Indicates that the Smarterm is sending data to a Host Controller.
- 6 Not used
- 7 Not used
- 8 Not used
- 9 Not used
- 10 Not currently used

## INSTALLATION (CONT.)

### 3.4

#### **LOCATION**

Smarterm should be located within the secured access controlled area. When locating Smarterm, remember to consider the maximum wiring distances to card readers, CRT, printer, host, etc. (see CABLE SPECIFICATIONS section 5.5). Mounting Smarterm at eye level will make wiring and maintenance easier.

#### **MOUNTING**

1. Drill four holes corresponding to the four mounting key holes as shown in figure 1.
2. Insert wall anchors into the mounting surface (if necessary).
3. Partially insert the screws (or bolts) into the holes.
4. Hang Smarterm on the four screws and then once positioned correctly, tighten the screws.

#### **3.4.1 CABLE ROUTING**

- 1.) Keypad wiring is normally run in the same cable as the reader wiring.
- 2.) Communication, Reader, keypad, and Alarm cables should be run in grounded conduit, and **MUST** be separated from Power and Door Strike cables.
- 3.) Power and Door Strike cables **MUST** also be run in grounded conduit separate from the Card Reader cable.
- 4.) All wiring must conform to the NEC (National Electric Code), NFPA 70, as well as any local electric codes.

# ADDRESS SETTING

## 3.5

Smarterm can be set to respond to 32 addresses. These addresses range from 1 to 32. Look up the SMARTERM ADDRESS in the chart below and set the dip switch (S2) as shown. The dip switch is located just to the right of the center of the Smarterm.

**DIP SWITCH  
SETTINGS  
(S2)**

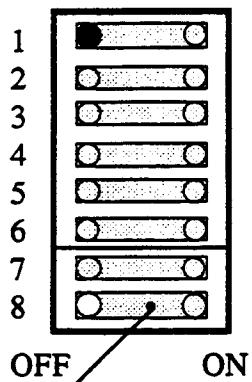
ADDRESS	SW1	SW2	SW3	SW4	SW5	SW6
1	OFF	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON
4	ON	ON	OFF	ON	ON	ON
5	OFF	ON	OFF	ON	ON	ON
6	ON	OFF	OFF	ON	ON	ON
7	OFF	OFF	OFF	ON	ON	ON
8	ON	ON	ON	OFF	ON	ON
9	OFF	ON	ON	OFF	ON	ON
10	ON	OFF	ON	OFF	ON	ON
11	OFF	OFF	ON	OFF	ON	ON
12	ON	ON	OFF	OFF	ON	ON
13	OFF	ON	OFF	OFF	ON	ON
14	ON	OFF	OFF	OFF	ON	ON
15	OFF	OFF	OFF	OFF	ON	ON
16	ON	ON	ON	ON	OFF	ON
17	OFF	ON	ON	ON	OFF	ON
18	ON	OFF	ON	ON	OFF	ON
19	OFF	OFF	ON	ON	OFF	ON
20	ON	ON	OFF	ON	OFF	ON
21	OFF	ON	OFF	ON	OFF	ON
22	ON	OFF	OFF	ON	OFF	ON
23	OFF	OFF	OFF	ON	OFF	ON
24	ON	ON	ON	OFF	OFF	ON
25	OFF	ON	ON	OFF	OFF	ON
26	ON	OFF	ON	OFF	OFF	ON
27	OFF	OFF	ON	OFF	OFF	ON
28	ON	ON	OFF	OFF	OFF	ON
29	OFF	ON	OFF	OFF	OFF	ON
30	ON	OFF	OFF	OFF	OFF	ON
31	OFF	OFF	OFF	OFF	OFF	ON
32	ON	ON	ON	ON	ON	OFF

**3.5****ADDRESS SETTING (CONT.)**

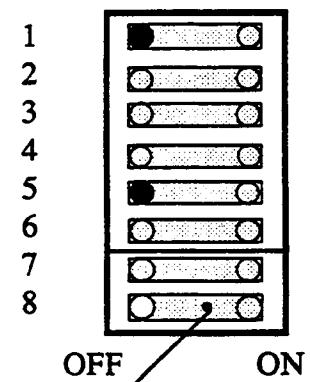
(Solid circles are used (below) to indicate which side of the switch is pressed down)

***EXAMPLE***

Address 1



Address 16



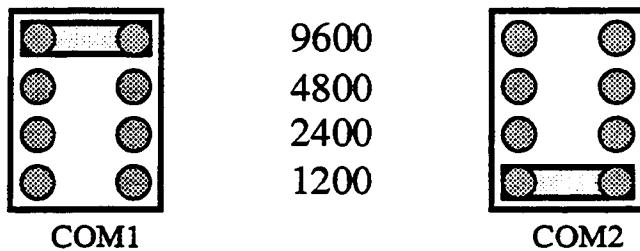
NOTE: Position 8 is used to enable and disable the LED array.  
Position 7 is not used.

### 3.6

## COMMUNICATIONS SETTING

The Baud Rates for COM1 and COM2 are set with Jump Jacks located on the center right hand side of the Smarterm board. Simply remove the Jump Jack and then replace it on the desired Baud Rate setting.

#### **EXAMPLE**



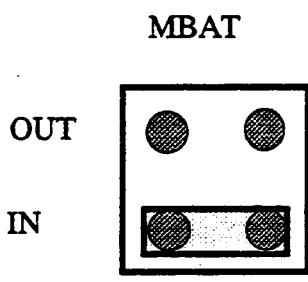
The above Jump Jack placement illustrates COM1 at 9600 Baud and COM2 at 1200 Baud.

## 3.7

### **MEMORY JUMPERS**

## **MEMORY**

Smarterm is equipped with a lithium battery to preserve memory for 10 months in the event of a power failure and system battery backup loss. In order that this battery not be unnecessarily drained when a Smarterm is in shipping, storage, or pre-installation, the MBAT jumper is used. The MBAT jumper is located on the lower left hand side of the SMARTERM board. In the "IN" position the Memory Backup Battery is connected. In the "OUT" position it is disconnected.



**IN      OUT**

**MBAT Jumper**  
(Shown in the "IN" Position)

#### **NOTE:**

The Lithium Battery, B1 is located on the lower left hand side of the Smarterm board. It should be checked periodically in your normal maintenance program.

$$V_{mbat} = 3.6V$$

## 3.8

## POWER REQUIREMENTS

## WARNING !

DO NOT CONNECT A.C. POWER UNTIL  
SMARTERM IS MOUNTED AND FULLY WIRED  
AND CONFIGURED.

**POWER  
AND  
GROUNDING**

Smarterm as supplied by the factory contains a 115 VAC Power Supply, or optionally a 230 VAC Power Supply. It is recommended that a dedicated, UNSWITCHED power outlet be used to prevent any interference from other equipment which might be connected to that line.

VOLTAGE	CURRENT		POWER	
	NOM	MAX	NOM	MAX
A.C. 105-125 VAC 210-250 VAC	.15 A .075 A	.20 A .10 A	18.25VA	2.5VA
D.C. 12 VDC	.25 A	.60 A	3W	7.2W

**GROUNDING**

All grounding must conform to the National Electric Code and any local codes.

Cable shields or drain wires for all cables (except the polling cable) must be grounded at the Smarterm end to Chassis/Earth ground , NOT the signal ground point on the printed circuit board.

The polling cable must be grounded to Chassis/Earth ground at the Host end. In Multi-drop mode, the shields or drain wires for the incoming and outgoing polling cables must be tied together (isolated from everything else) inside the Smarterm enclosure. Refer to section 4.7.6 or 4.7.7. In Repeat mode, the shields or drain wires should be grounded to Chassis/ Earth ground, at the Smarterm closest to the Host only. Refer to section 4.7.4 or 4.7.5.

In order to avoid Electromagnetic Interference, a supplemental ground should be connected to the Smarterm enclosure. The ground should be a copper grounding rod driven 10 to 20 feet (3 to 4 meters) deep into the earth. A continuous, unspliced braid strap should be brazed to the grounding rod and connected to the Smarterm enclosure using one of the power transformer bolts. Many times a good source for such a ground is a cold water pipe.

**4.0****4.1  
READERS*****WIEGAND*****4.1**

	<u>SIGNAL</u>	<u>COLOR</u>	<u>CONN. #</u>	<u>DESCRIPTION</u>
	+5VDC	RED	JXX-1	+5VDC
	GROUND	BLACK	JXX-4	GND
	LED	BROWN	JXX-5	LED/TRE
	DATA 1	WHITE	JXX-6	D1
	DATA 0	GREEN	JXX-7	D0

***PROXIMITY*****4.2**

GROUND	BLACK	JXX-4	GND
DATA 1	WHITE	JXX-6	D1
DATA 0	GREEN	JXX-7	D0

***MAG-STRIPE***

+5VDC	RED	JXX-1	+5VDC
GROUND	BLACK	JXX-4	GND
RDP	BLUE	JXX-6	D1
RCP	GREEN	JXX-7	D0

FOR DOOR	XX =
1	17
2	18
3	11
4	10

**\*\* NOTE \*\***

Card Readers must **NEVER** be connected or disconnected with power applied. Damage may result if this is done.

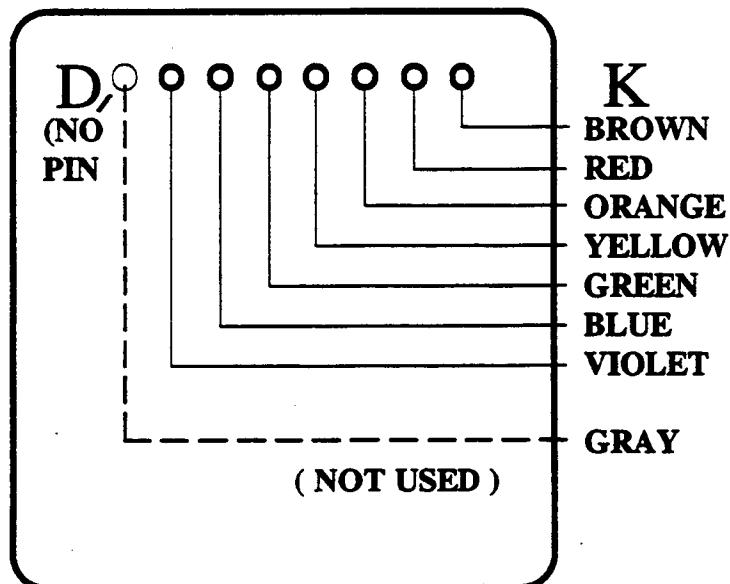
Maximum Card Reader current draw is 30 mA.

## CONNECTIONS (CONT.)

<b>4.2 KEY PAD</b>	<b>CARD READER</b>	<b>WIRE COLOR</b>	<b>SMARTERM SIGNAL</b>	<b>CONNECTION</b>
		BROWN	R1	JXX-8
		RED	R2	JXX-9
		ORANGE	R3	JXX-10
		YELLOW	R4	JXX-11
		GREEN	C1	JXX-12
		BLUE	C2	JXX-13
		VIOLET	C3	JXX-14

<u>FOR DOOR      XX =</u>	
1	17
2	18
3	11
4	10

## KEYPAD (REAR VIEW)



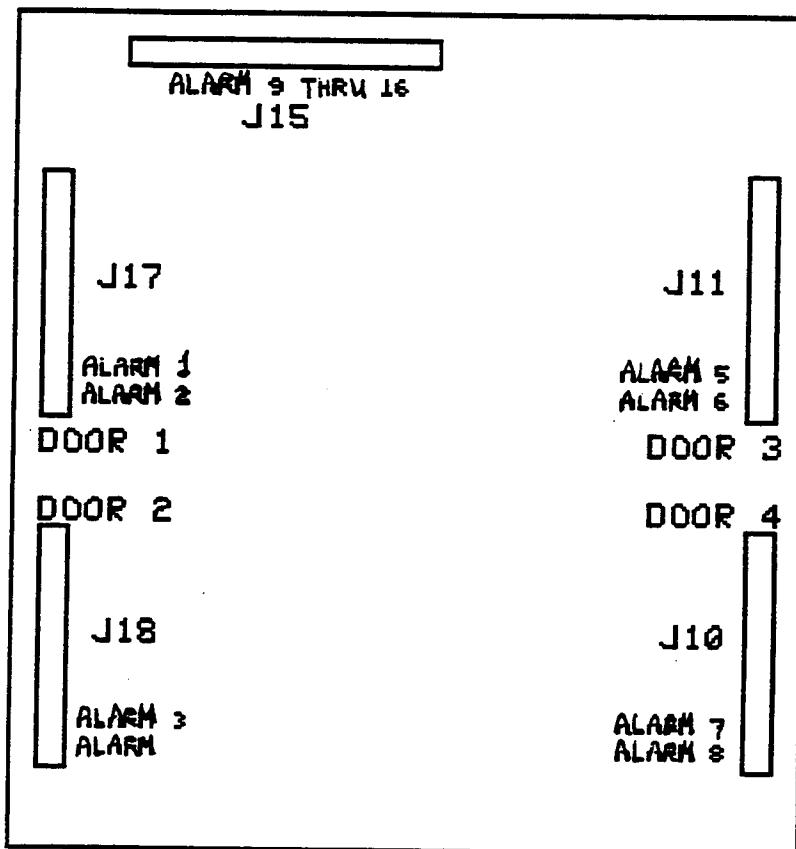
## CONNECTIONS (CONT.)

### 4.3 ALARM ZONE

Smarterm allows all alarms to be assigned by the user. In general, however, two alarms are usually used for "Door Alarm" and "Bypass". Two alarms have thus been placed on each door connector.

SMARTERM DESIGNATION	POSSIBLE USE	SMARTERM CONN. #
AL 1,3,5,7	"DOOR SENSOR"	JXX-15
RT 1,3,5,7	"DOOR SENSOR"	JXX-16
AL 2,4,6,8	"BYPASS"	JXX-17
RT 2,4,6,8	"BYPASS"	JXX-18

<u>FOR DOOR</u> XX=	
1	17
2	18
3	11
4	10



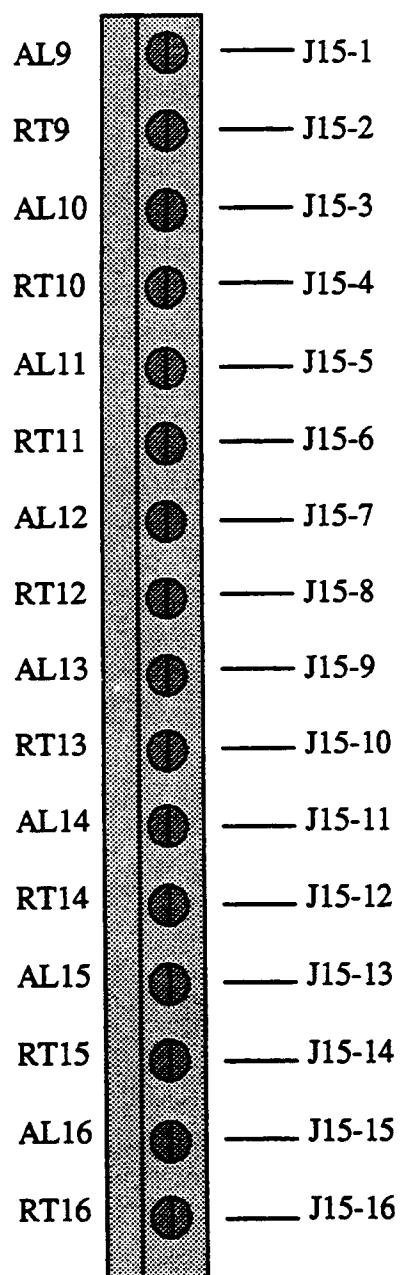
**FIGURE 2. SMARTERM CIRCUIT BOARD  
(ALARM CONNECTOR LOCATIONS)**

## CONNECTIONS (CONT.)

### 4.3 ALARM ZONE (CONT.)

### J15 CONNECTOR

All other Alarms (Alarms # 9-16) are available on J15 located on the top left of the Smarterm board.



**FIGURE 3. J15 CONNECTOR**

#### 4.4 RELAYS

##### **DOOR STRIKE**

	DOOR #1	DOOR #2	DOOR #3	DOOR #4
NO	J1-1	J3-1	J5-1	J7-1
COM	J1-2	J3-2	J5-2	J7-2
NC	J1-3	J3-3	J5-3	J7-3

NO, COM, NC are indicated with the relay de-energized.

There is a set of form "C" relay contacts for each of the four doors that Smarterm can control.

These contacts are rated at 3 amps (resistive).

To reduce electrical noise \* (caused by the door striker coil) from getting back into the system, metal oxide varistors (MOV'S) have been placed across all the relay contacts. These MOV'S will limit any noise caused by the strike to 56 volts.

To use door strikes with a coil voltage greater than 56 volts an external relay must be used, which can be driven by the Smarterm strike relay.

\*\* NOTE \*\*

\* BECAUSE OF THIS NOISE, DOOR STRIKE WIRING **MUST NOT** BE RUN IN THE SAME CABLE OR THE SAME CONDUIT WITH OTHER WIRING.

##### **DOOR SHUNTS**

	DOOR #1	DOOR #2	DOOR #3	DOOR #4
NO	J2-1	J4-1	J6-1	J8-1
COM	J2-2	J4-2	J6-2	J8-2
NC	J2-3	J4-3	J6-3	J8-3

#### 4.4.1 **CONSOLE RELAY**

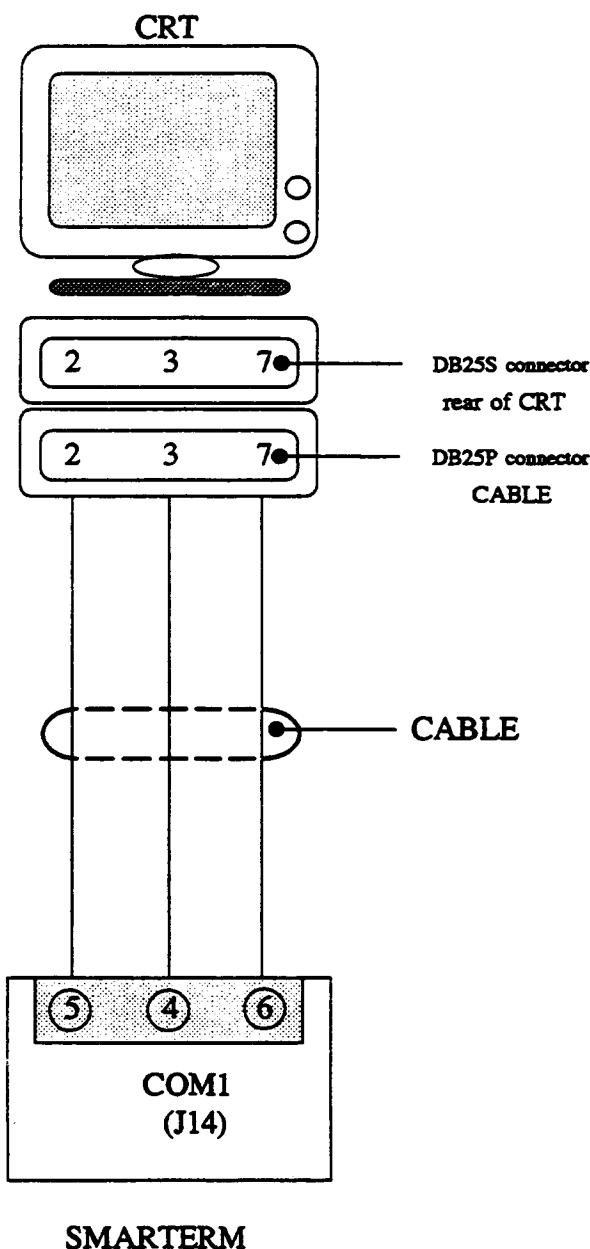
NO	J19-1
COM	J19-2
NO	J19-3

## 4.5

### COM1

## CONNECTIONS (CONT.)

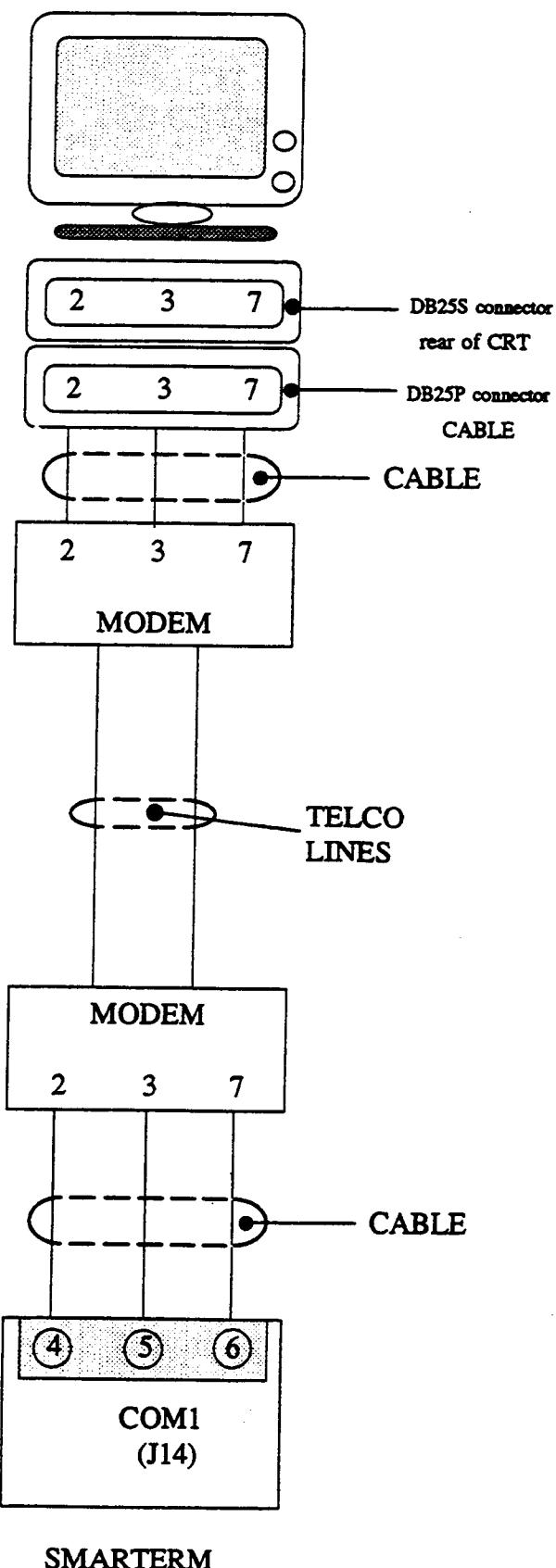
	<u>CRT</u>	<u>CONNECTION</u>	<u>COLOR</u>	<u>SIGNAL</u>	<u>SMARTTERM</u>
<i>CRT</i> <i>(COM1)</i>	DB 25	PIN 3	VIOLET	TXD1	J14-4
	DB 25	PIN 2	RED	RXD1	J14-5
	DB 25	PIN 7	BROWN	GND1	J14-6



#### 4.5.1

## CONNECTIONS (CONT.)

**CRT  
(COM1)  
MODEM**



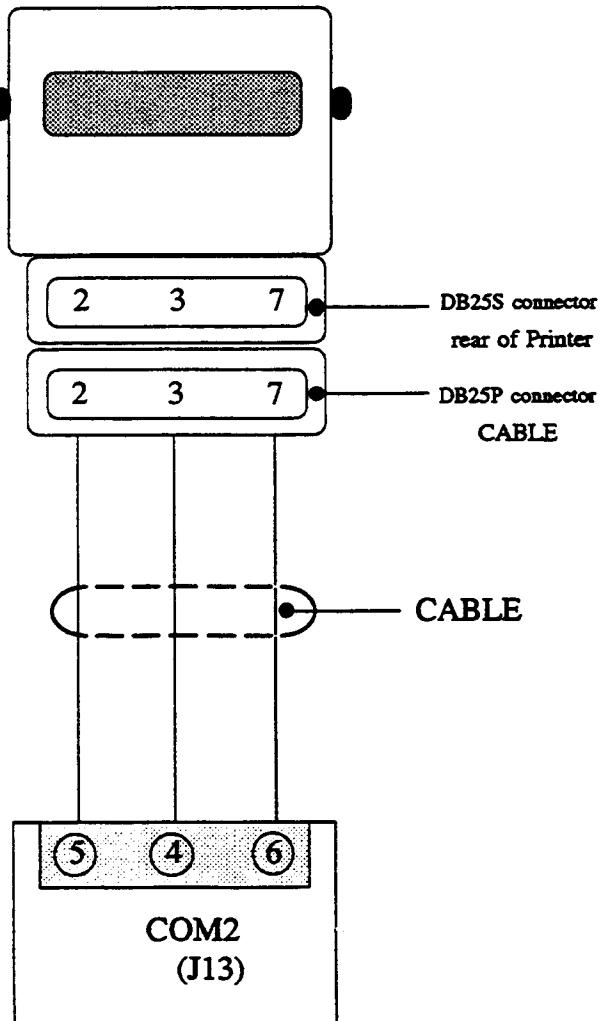
## 4.6

## CONNECTIONS (CONT.)

***PRINTER  
(COM2)***

<b>PRINTER CONNECTION</b>	<b>COLOR</b>	<b>SIGNAL</b>	<b>SMARTTERM</b>
DB 25P PIN 3	VIOLET	TXD2	J13-4
DB 25P PIN 2	RED	RXD2	J13-5
DB 25P PIN 7	BROWN	GND2	J13-6

PRINTER



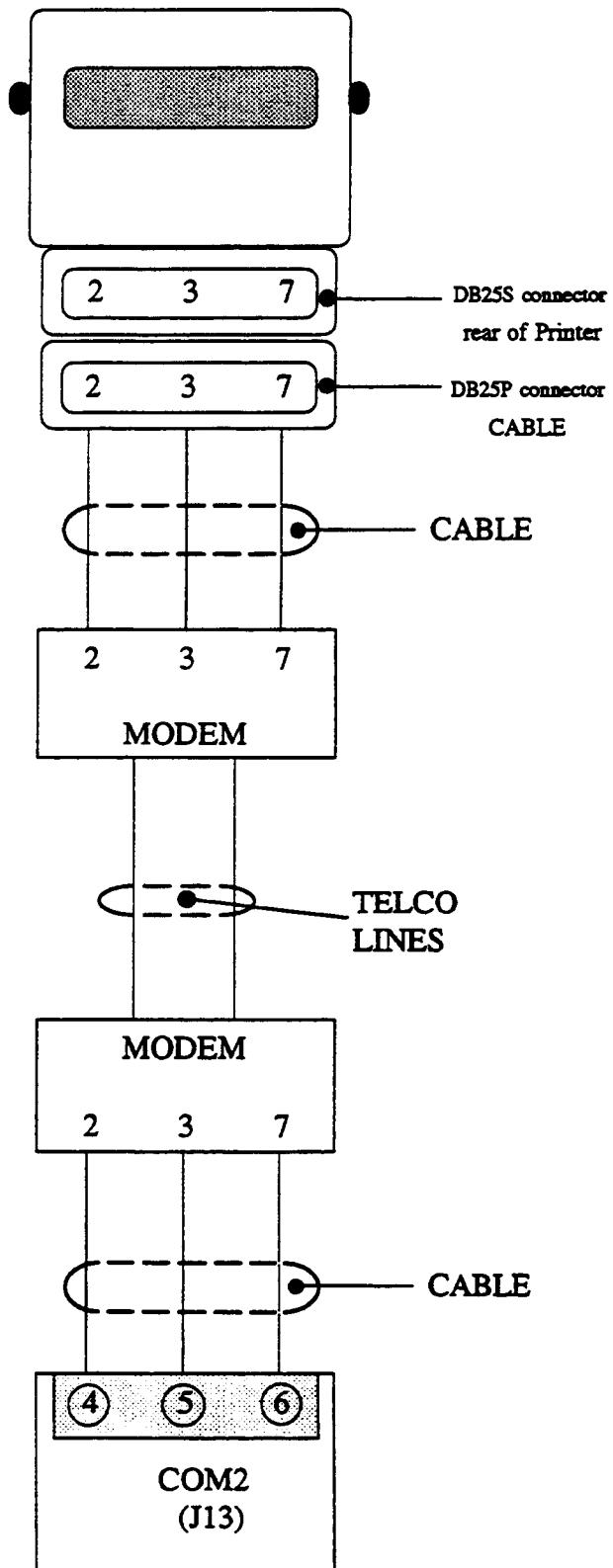
SMARTERM

## 4.6.1 COM2

**PRINTER  
(COM2)  
MODEM**

# CONNECTIONS (CONT.)

## PRINTER



## 4.7

# CONNECTIONS (CONT.)

### POLLING LINE

The Polling line operates in one of five modes:  
RS 485, RS 232, RS422 repeat, RS422 multi-drop or under DIALUP.

The connections for each mode are shown below.

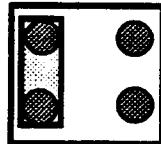
### RS 485

LINE	COLOR	SMARTERM
XCVA +		J12-15
XCVB -		J12-16

The RS 485 polling line is provided with a MOV to reduce the possibility of circuit damage or communication errors due to lightning or transients.

A terminating resistor is required at the end of the RS 485 polling line. In order to achieve this the EOL85 jumper on the LAST Smarterm on the RS 485 line must be inserted as shown below. The EOL85 jumper is located on the upper right hand side of the Smarterm board, to the right of U38.

EOL85



IN      OUT

(shown in the "IN" position)

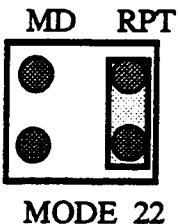
### RS 232 DIALUP

LINE	COLOR	SMARTERM
TXD		J12-4
RXD		J12-5
GND		J12-6

## CONNECTIONS (CONT.)

### 4.7 RS422

The RS422 Polling Port may be used in two (2) modes: Repeater and Multi-drop. The Mode 22 jumper is set to the desired mode.



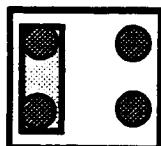
(Shown in the "REPEATER" position )

A terminating resistor is required at the end of the RS 422 Multi-drop polling line. In order to achieve this, the EOL22 jumper on the LAST Smarterm on the RS 422 Multi-drop line must be inserted as shown below. The EOL22 jumper is located on the upper right hand side of the Smarterm board, to the right of U38.

#### NOTE:

The EOL22 Jumper will always be in the "IN" position when the MODE 22 Jumper is in "REPEATER".

#### EOL 22

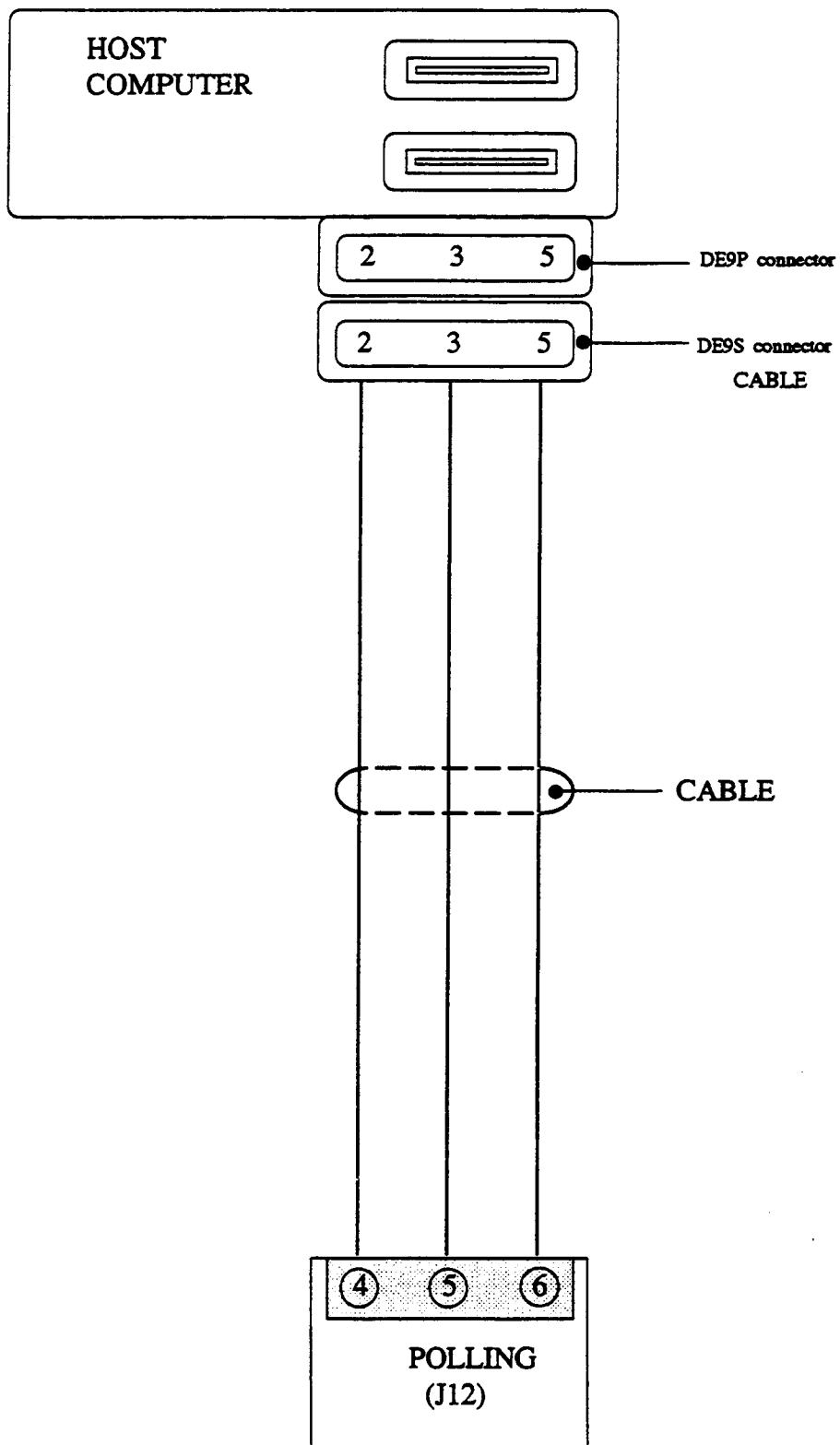


after page 32

**4.7**  
**COMMUNICATIONS**  
**CONNECTORS**

<b>RS232</b>	CTS2	1	<b>COM2</b> J13
	RTS2	2	
	DCD2	3	
	TXD2	4	
	RXD2	5	
	GND2	6	
	CHS2	7	
<b>RS232</b>	CTS1	1	<b>COM1</b> J14
	RTS1	2	
	DCD1	3	
	TXD1	4	
	RXD1	5	
	GND1	6	
<b>RS232</b>	CHS	1	<b>POLLING</b> J12
	RTS	2	
	DCD	3	
	TXD	4	
	RXD	5	
	GND	6	
	RPT/T+	7	
<b>RS422</b>	RPT/T-	8	<b>J12</b>
	RPT/R+	9	
	RPT/R-	10	
	MD/T+	11	
	MD/T-	12	
	MD/R+	13	
	MD/R-	14	
<b>RS485</b>	XCV+	15	
	XCV-	16	

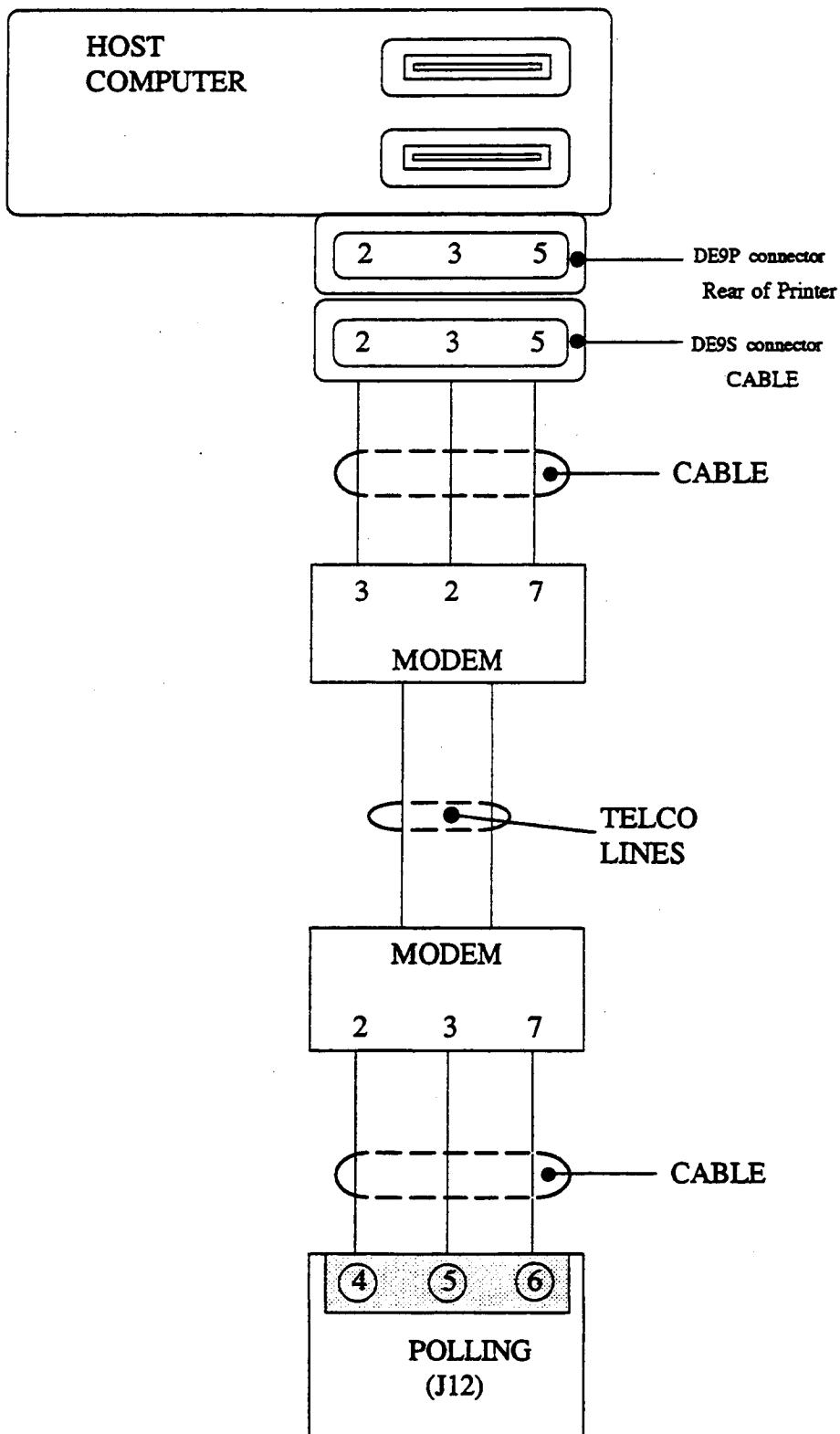
**4.7.2  
POLLING LINE  
DIAGRAM  
RS 232**



**SMARTERM**

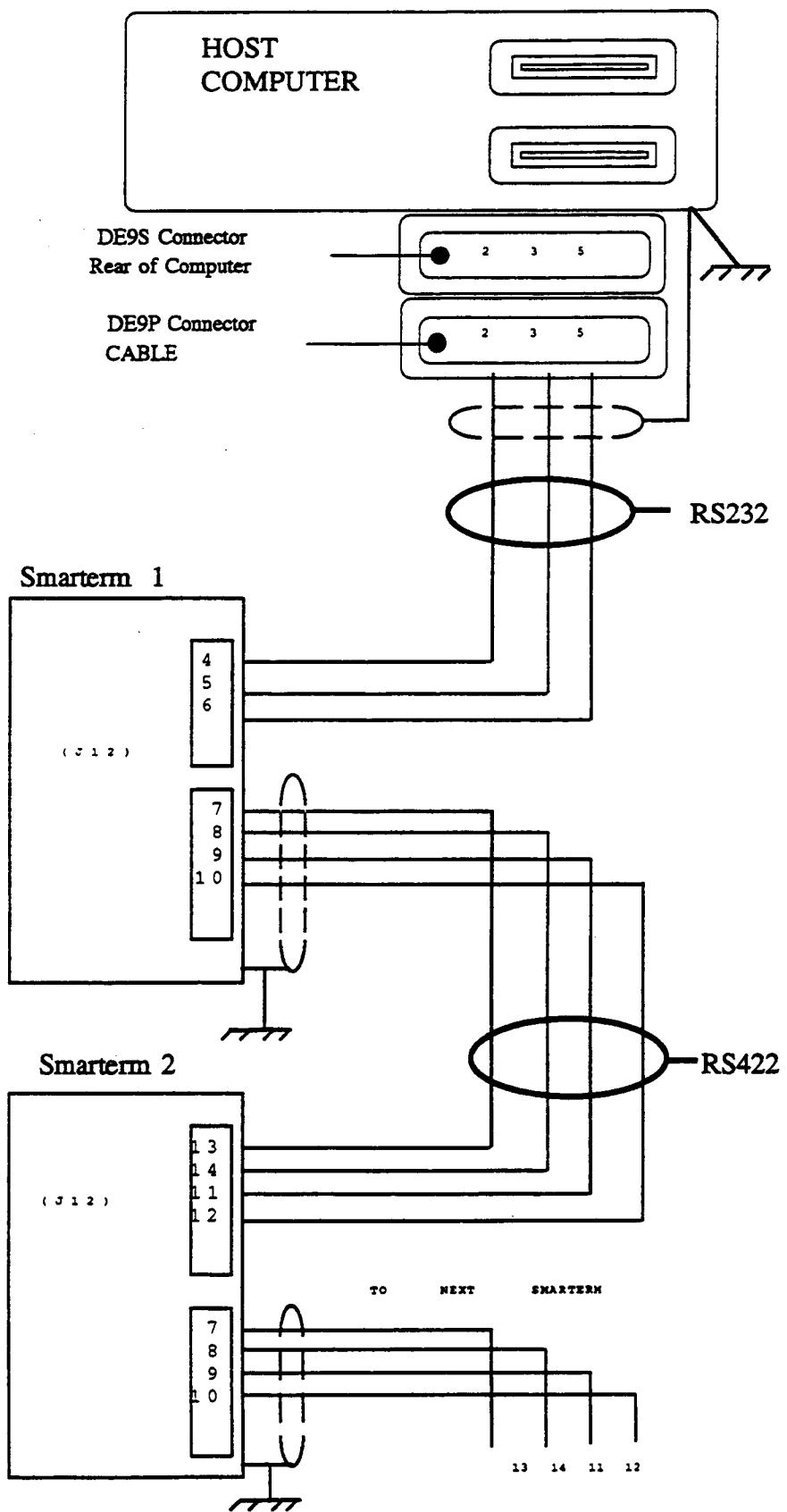
**4.7.3**  
**POLLING LINE**  
**DIAGRAM**  
**RS232**  
**MODEM**

rear of Computer

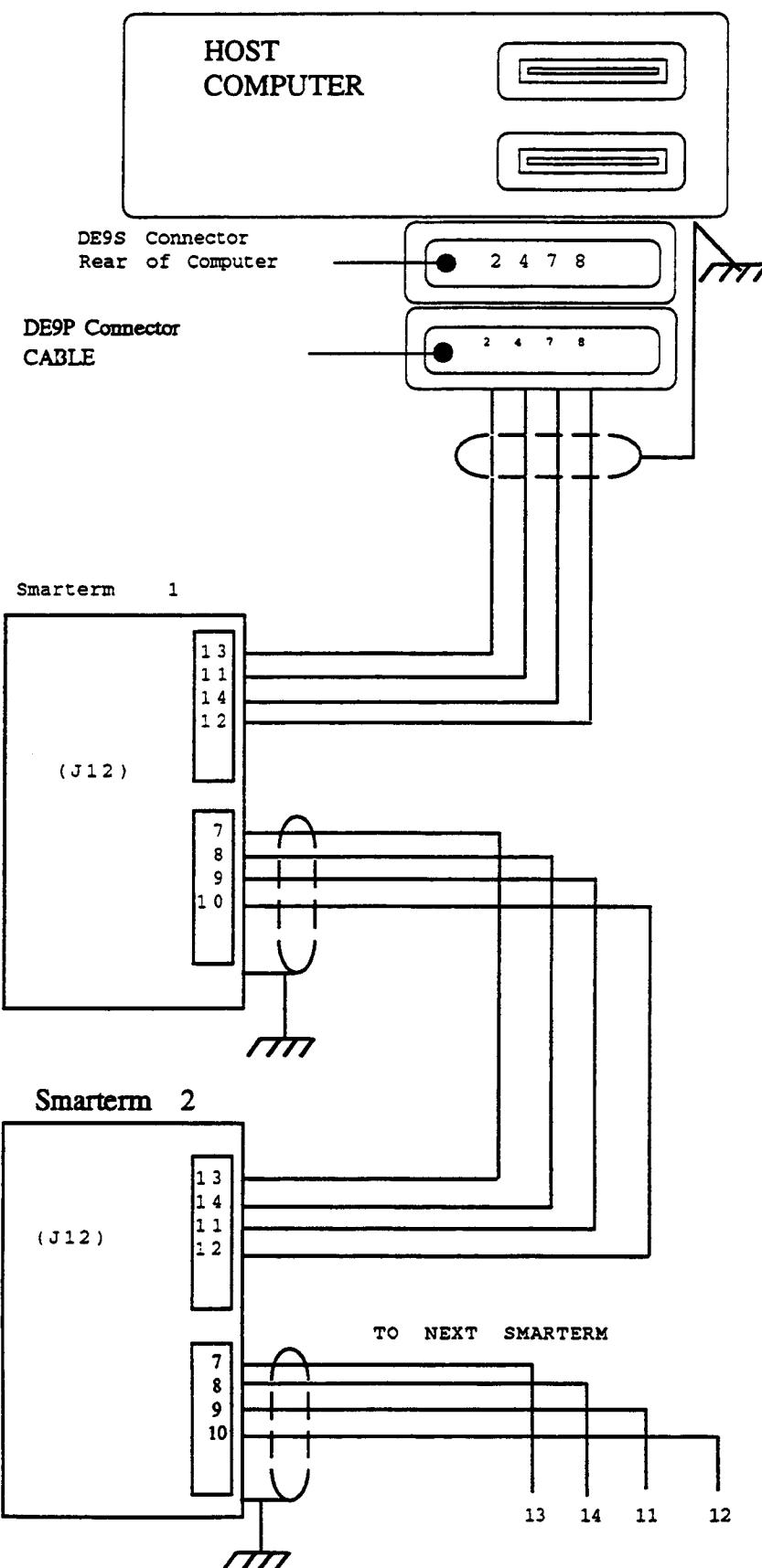


**SMARTERM**

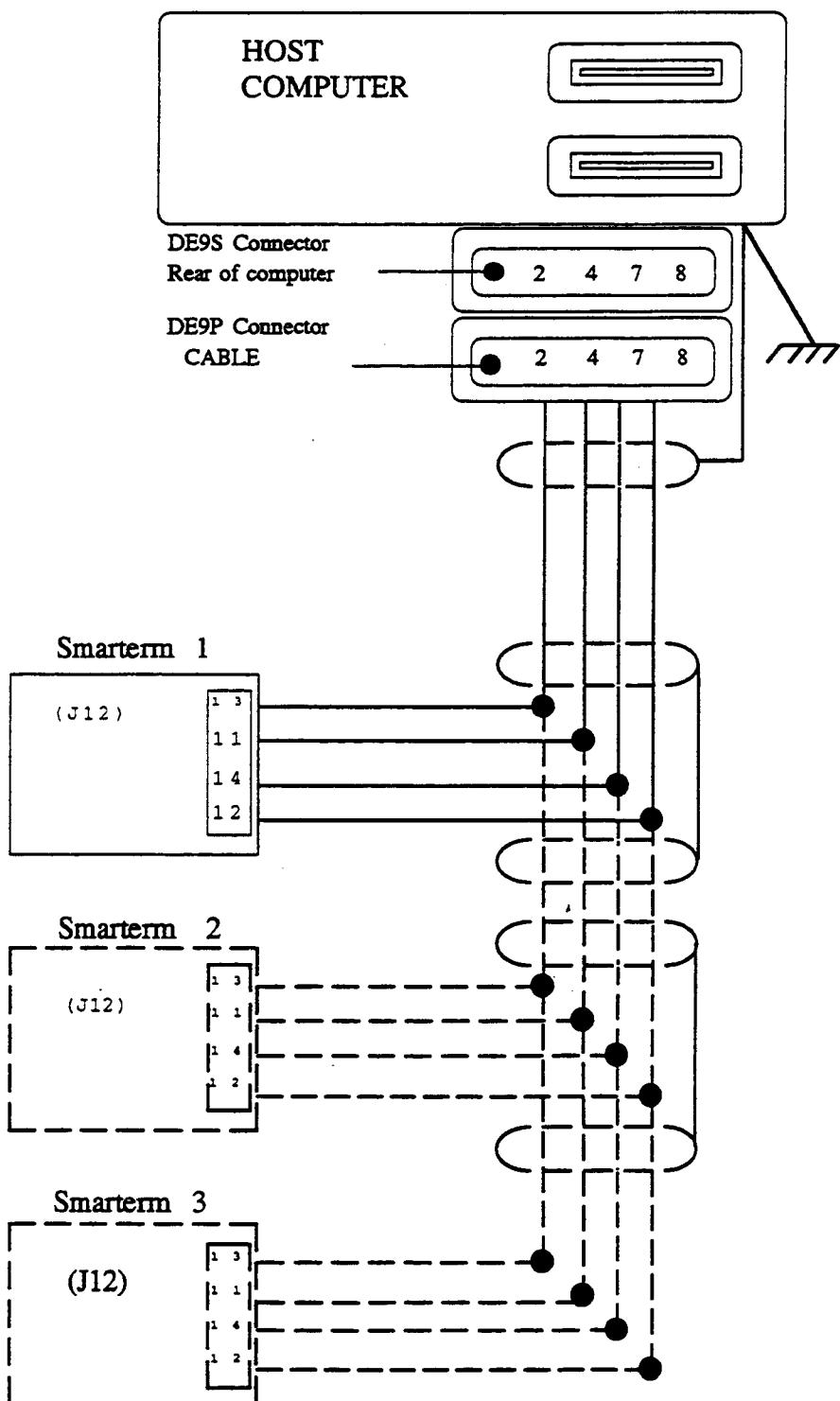
**4.7.4  
POLLING LINE  
DIAGRAM  
RS 232 TO RS422  
REPEAT**



**4.7.5  
POLLING LINE  
DIAGRAM  
RS422 TO RS422  
REPEAT**

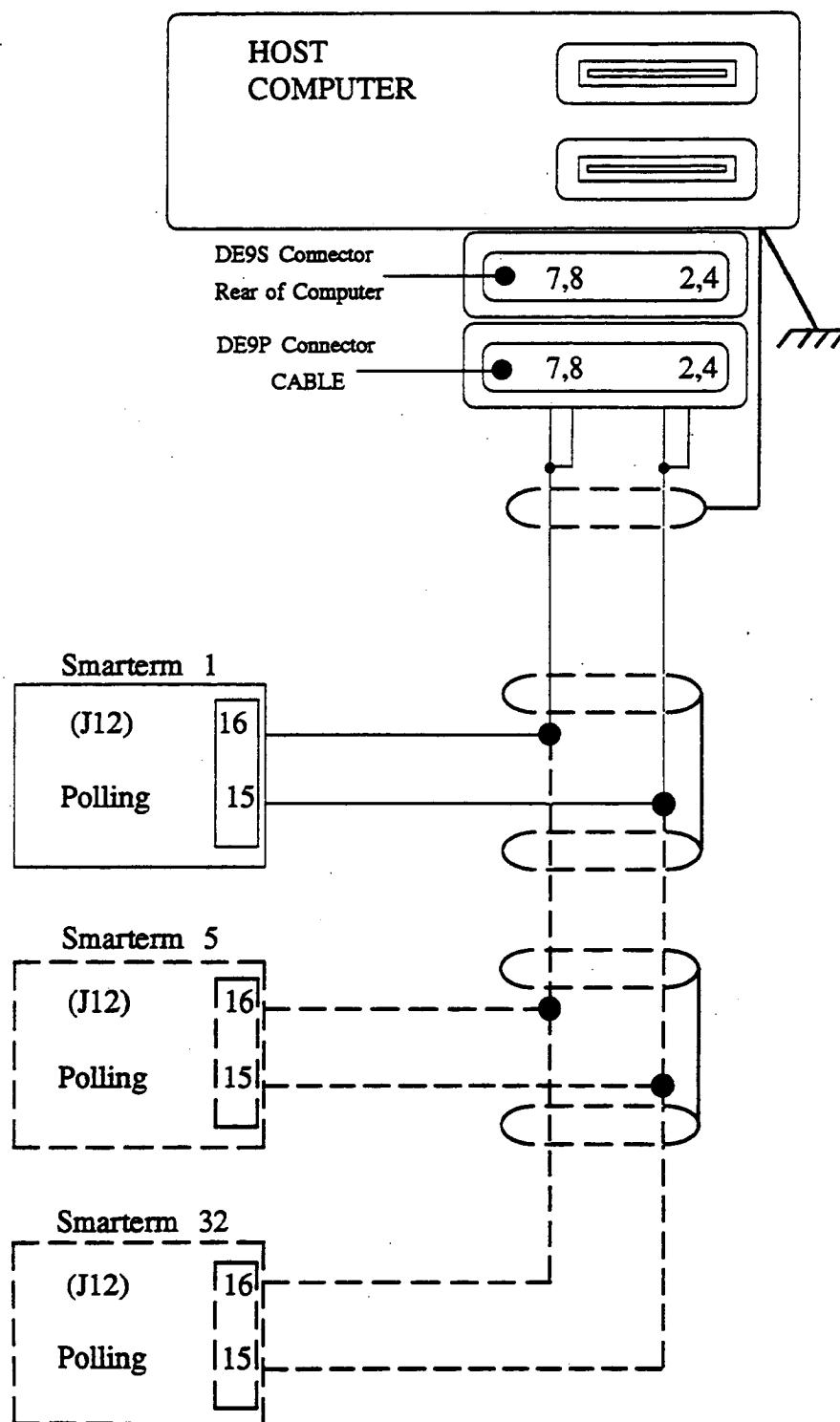


**4.7.6**  
**POLLING LINE**  
**DIAGRAM**  
**RS422**  
**MULTIDROP**



**NOTE:** Up to 10 Smarterms may be connected to one RS422 Multidrop Polling Line.

**4.7.7  
POLLING LINE  
DIAGRAM  
RS 485**



NOTE: Up to 32 Smarterm units may be connected to one polling line

## 5.1

# MEMORY EXPANSION BOARD

The Memory Expansion Board is added to SMARTERM in order to increase the size of its Databases including: Employee data, Transactions, Time Zones, etc.

The Memory Expansion Board is installed on the underside of the SMARTERM board so the SMARTERM board must be removed from the enclosure.

Once the SMARTERM board is removed, the Memory Expansion Board's 36 pin male connector may be mated with the 36 pin female connector on the underside of the SMARTERM board.

Make sure the five mounting stand-offs insert into the holes on the SMARTERM board. Fasten the stand-offs to the SMARTERM board with the supplied nylon nuts.

Smarterm will automatically identify the Memory Expansion Board as being present and will thus immediately utilize the Expanded Memory Space.

## 5.2

# EXPANSION BOARD INSTALLATION INSTRUCTIONS

1. Align the Expansion Board over the six plastic stand-offs and snap it into place.
2. Connect one end of the supplied ribbon cable to the SMARTERM with the "ARROW" on the ribbon cable connector pointing to "PIN1" on the SMARTERM I/O Expansion Connector (J20).
3. Connect the other end of the ribbon cable to the Expansion Board again with the "ARROW" on the ribbon cable connector pointing to "PIN 1" on the Expansion Board I/O Connector (J19).
4. Connect the power connector to the Expansion Board (J17).

## 5.3

## I/O EXPANSION BOARD

## RELAY WIRING

CONN#	DESCRIPTION
JX-1	NO - NORMALLY OPEN
JX-2	C - COMMON
JX-3	NC - NORMALLY CLOSED

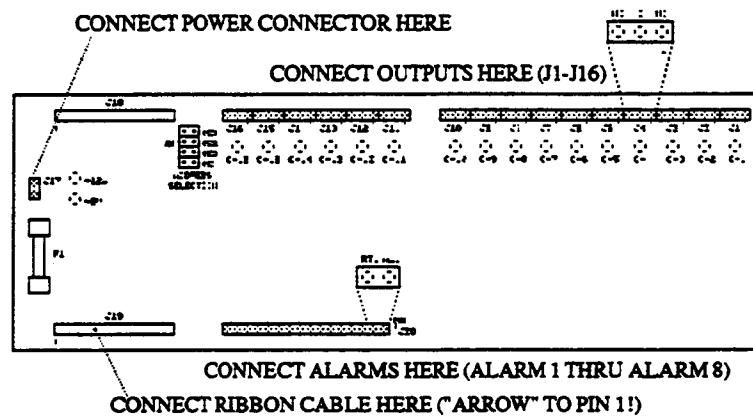
NOTE: X = RELAY NUMBER = 1 THRU 16

## ALARM WIRING

CONN#	DESCRIPTION
J20-1,2	AL1/RT1
J20-3,4	AL2/RT2
J20-5,6	AL3/RT3
J20-7,8	AL4/RT4
J20-9,10	AL5/RT5
J20-11,12	AL6/RT6
J20-13,14	AL7/RT7
J20-15,16	AL8/RT8

## 5.4

# I/O EXPANSION BOARD CONNECTIONS



SMARTTERM I/O EXPANSION BOARD CONNECTIONS

5.5

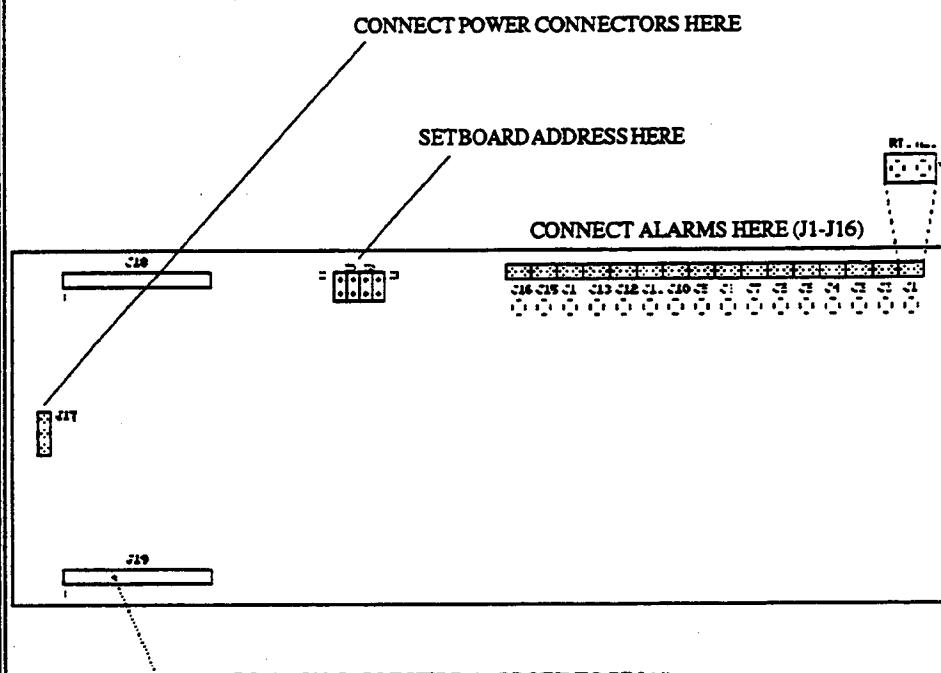
## SUPERVISED ALARM EXPANSION BOARD

ALARM WIRING	
CONN#	DESCRIPTION
JX-1	ALX
JX-2	RTX

NOTE: X = ALARM NUMBER = 1 THRU 16

## 5.6

# SUPERVISED ALARM EXPANSION BOARD CONNECTIONS



**SMARTTERM SUPERVISED ALARM EXPANSION BOARD CONNECTIONS**

## 5.7

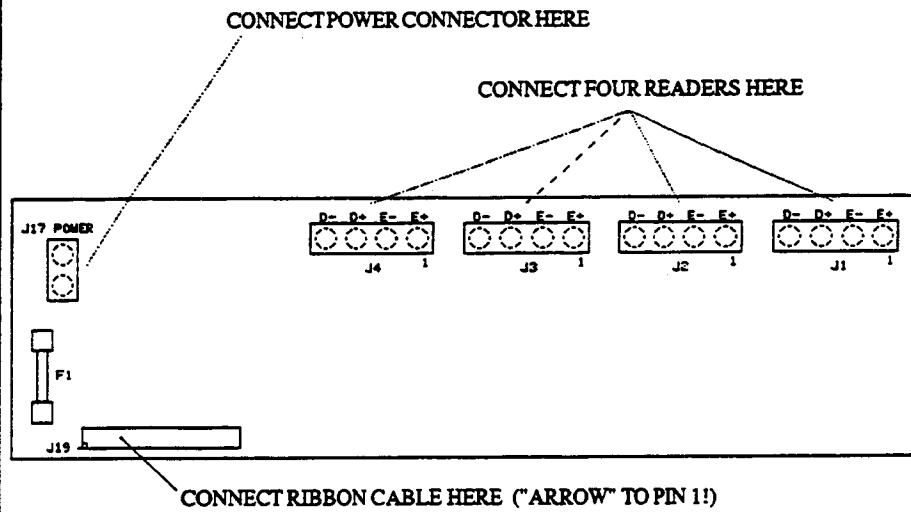
## BARIUM FERRITE EXPANSION BOARD

READER WIRING			
SIGNAL	COLOR	CONN#	DESCRIPTION
+ENABLE	RED	JX-1	E +
-ENABLE	BROWN	JX-2	E -
+DATA	YELLOW	JX-3	D +
-DATA	ORANGE	JX-4	D -

NOTE: If the Barium Ferrite Expansion Board is to be wired to a Battery-Backed D.C. Power Supply, the Factory installed A.C. wiring must be removed (from the power connector, J17, to the A.C. terminal block).

## 5.8

# BARIUM FERRITE EXPANSION BOARD CONNECTIONS



SMARTERM SUPERVISED ALARM EXPANSION BOARD CONNECTIONS

**5.1**  
**FUNCTIONAL**

# SPECIFICATIONS

	QUANTITY	COMMENTS
<i>READERS</i>	4 (max.)	Full function on or off line
<i>CARD HOLDERS</i>	4000	Standard
<i>RANDOM CARDS</i>		Standard
<i>TIME ZONES</i>	128	Standard
<i>ACCESS LEVELS</i>	255	Standard
<i>ANTI-PASSBACK</i>		Standard (Within the 4 doors)
<i>TRANSACTION BUFFER</i>	500	Standard
<i>ACCESS MODES</i>	4	Card Only Unique Code Only Card and Code Free Access
<i>SERIAL PORTS</i>	2	Printer, CRT (RS 232)
<i>POLLING MODES</i>	4	RS485, Dial Up (RS 232), RS422, RS422 Report
<i>BAUD RATES</i>	4	9600, 4800, 2400, 1200
<i>KEYPADS</i>	4	Smarterm allows four keypad entries to be used in conjunction with Card Readers
<i>RELAYS</i>	9	Eight relays may be assigned by the operator under program control. One relay may be assigned for console alert functions.

**5.1**  
**FUNCTIONAL**

## SPECIFICATIONS (CONT.)

	QUANTITY	COMMENTS
<i>ALARMS</i>	16	Sixteen alarm inputs may be assigned by the operator under program control. They may be used as general alerts or for door strike and shunt control. The operator may select the active state of each alert.
<i>LEDS</i>	4	One led for each door (Wiegand only)
<i>TAMPER SWITCH</i>	1	Pre-Assigned
<i>READER TYPES</i>		Wiegand (Swipe) Wiegand (Insertion) Wiegand (Key) Mag-Stripe (CIC) Mag-stripe (ABA) Proximity
<i>LINK PROGRAMS</i>	64	Standard
<i>PASSWORDS</i>	6	Standard
<i>PRIV LEVELS</i>	2	Standard
<i>HOLIDAYS</i>	50	Standard
<i>FACILITY CODES</i>	10	Standard
<i>BATTERY BACKUP OPERATING</i>		Four to Six Hours
<i>BATTERY BACKUP MEMORY</i>		10 Months
<i>ENCLOSURE DIMENSIONS</i>		20 3/4" H X 16" W X 4.5" D
<i>WEIGHT</i>		24 lbs.

## 5.2 POWER

# SPECIFICATIONS (CONT.)

Smarterm as supplied by the factory contains a 115 VAC Power Supply, or optionally a 230 VAC Power Supply. It is recommended that a dedicated, UNSWITCHED power outlet be used to prevent any interference from other equipment which might be connected to that line.

VOLTAGE	CURRENT		POWER	
	NOM	MAX	NOM	MAX
A.C. 105-125 VAC 210-250 VAC	.15 A .075 A	.20 A .10 A	18.25VA	2.5VA
D.C. 12 VDC	.25 A	.60 A	3W	7.2W

**5.3**  
**ENVIRONMENTAL**

**SPECIFICATIONS (CONT.)**

<b>TEMPERATURE RANGE</b>	Operating:      32 to 115 degrees Fahrenheit 0 to 46 degrees Celsius
	Storage:        32 to 149 degrees Fahrenheit 0 to 65 degrees Celsius
<b>HUMIDITY</b>	Relative Humidity    20% to 80% (non-condensing)

## 5.4

### DIMENSIONAL

## SPECIFICATIONS (CONT.)

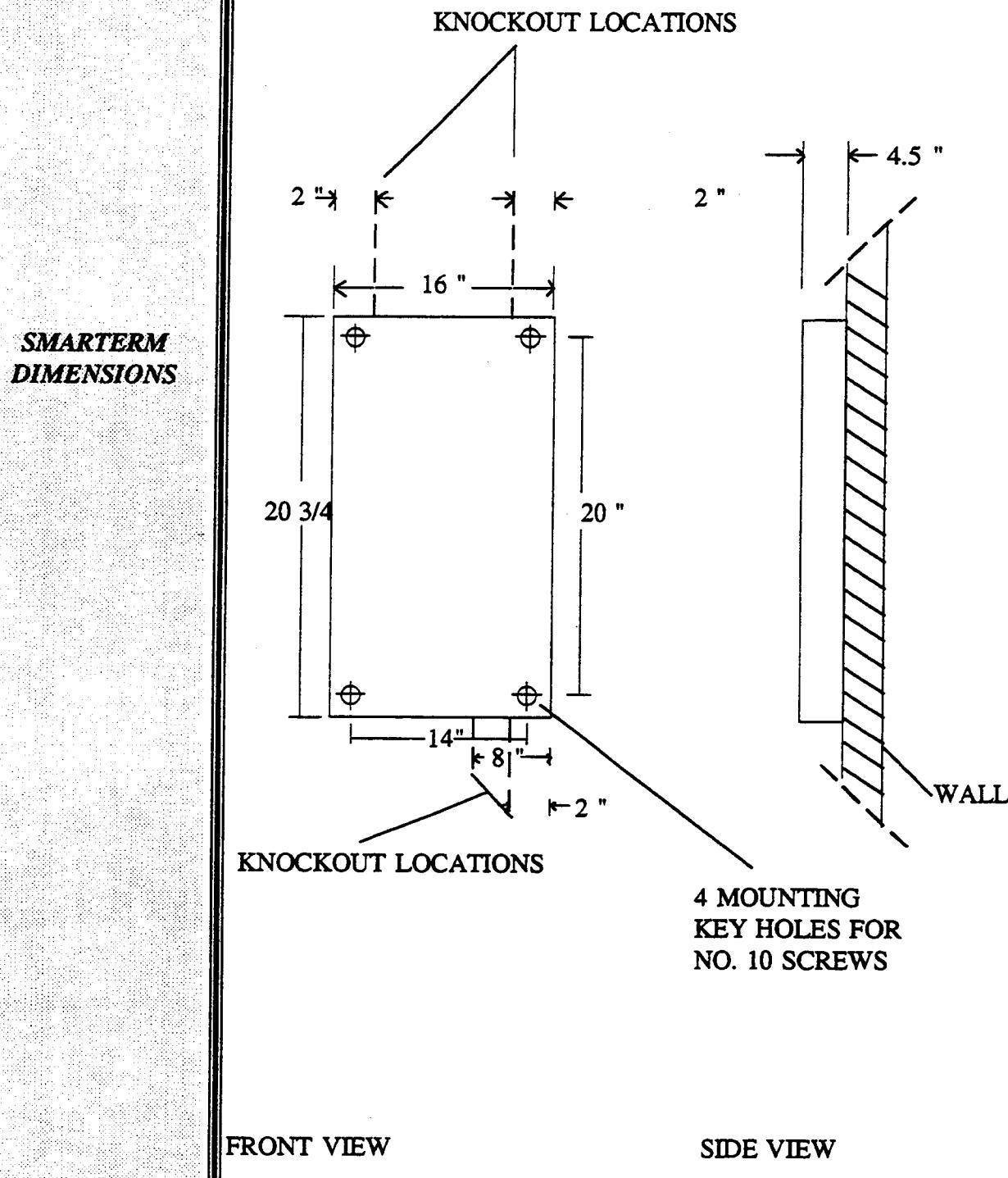


FIGURE 1. SMARTERM DIMENSIONS

## 5.5 CABLE

## SPECIFICATIONS (CONT.)

<b>MAG-STRIPE AND WIEGAND</b>	22 ga. stranded, shielded with drain C I C 600-1059 5 conductor <b><u>MAXIMUM DISTANCE</u></b> = 500 ft.
<b>PROXIMITY</b>	22 ga. stranded, shielded with drain C I C 600-1050 3 conductor <b><u>MAXIMUM DISTANCE</u></b> = 500 ft.
<b>KEYPAD</b>	22 ga. stranded, shielded with drain 7 conductor <b><u>MAXIMUM DISTANCE</u></b> = 500 ft.
<b>POLLING LINE</b>	<b>RS 485</b> 22 ga. stranded, shielded with drain 1 twisted pair <b><u>MAXIMUM DISTANCE</u></b> = 4000 ft.
	<b>RS422</b> 22 ga. stranded, shielded with drain 2 twisted pair <b><u>MAXIMUM DISTANCE</u></b> = 4000 ft.
	<b>RS 232, DIAL-UP</b> 22 ga. stranded, shielded with drain 3 conductor <b><u>MAXIMUM DISTANCE</u></b> = 50 ft.
<b>CRT</b>	22 ga. stranded, shielded with drain 3 conductor <b><u>MAXIMUM DISTANCE</u></b> = 50 ft.
<b>PRINTER</b>	22 ga. stranded, shielded with drain 3 conductor <b><u>MAXIMUM DISTANCE</u></b> = 50 ft.

**6.1**

**FIELD**  
**REPLACEABLE**  
**PARTS**

**SERVICE**

The following table describes all Smarterm field replaceable parts:

No.	Item	CIC Part #
1.	Fuses: F1,F2 and F3 2A,3AG, Slo-Blo 250V Little Fuse # 313.002	510-1112 (Each)
2.	Smarterm Circuit Board	170--1085
3.	System Back-up Batteries	400-1012 (2 required)

**WARNING:**

FUSES ARE PROVIDED TO REDUCE THE RISK OF FIRE AND ELECTRIC SHOCK. NEVER BYPASS THE FUSES, AND ALWAYS REPLACE THEM WITH FUSES OF THE SAME TYPE AND RATING.

**6.1.1  
FACTORY REPAIR  
PROCEDURE**

## **SERVICE**

### **SMARTTERM FACTORY REPAIR PROCEDURE**

If Smarterm should require factory repair, the following procedure must be followed:

1. Provide us with a purchase order number. **THIS IS REQUIRED BEFORE ANY REPAIRS CAN BEGIN.**

1. Along with your carefully packed Smarterm, include a note with the word "Smarterm" and the Serial Number on it, a detailed description of the problem(s) with the unit, and state the method of return shipment (UPS, Federal Express, etc.).

**THIS INFORMATION SHOULD BE FILLED OUT IN THE FORM ON THE FOLLOWING PAGE. DO NOT OMIT ANY INFORMATION.**

3. Send to:

Continental Instruments LLC  
Attn: Repair Dept.  
355 Bayview Avenue  
Amityville, NY 11701  
631-842-9400

6.2

**FACTORY**  
**REPAIR FORM**

**SERVICE**

Purchase order #: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Your Name: \_\_\_\_\_

Telephone # :\_(\_\_\_\_\_)\_\_\_\_\_

SMARTERM Serial # \_\_\_\_\_

Method of Return Shipment: \_\_\_\_\_

(UPS, Federal Express, Acct #) \_\_\_\_\_

**DETAILED DESCRIPTION OF THE PROBLEM**

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## 7.0

# INDEX

Access Levels, Description  
Access Modes, Description  
Address, Dip Switch Setting  
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Alarm Zone, Connections

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Baud Rates, Description

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Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with the Class A FCC limits.

"This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications."

"Le present appareil numerique n' emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada."

# SPECIAL INSTRUCTIONS

for connecting the RF bypass network on a SMARTERM® unit

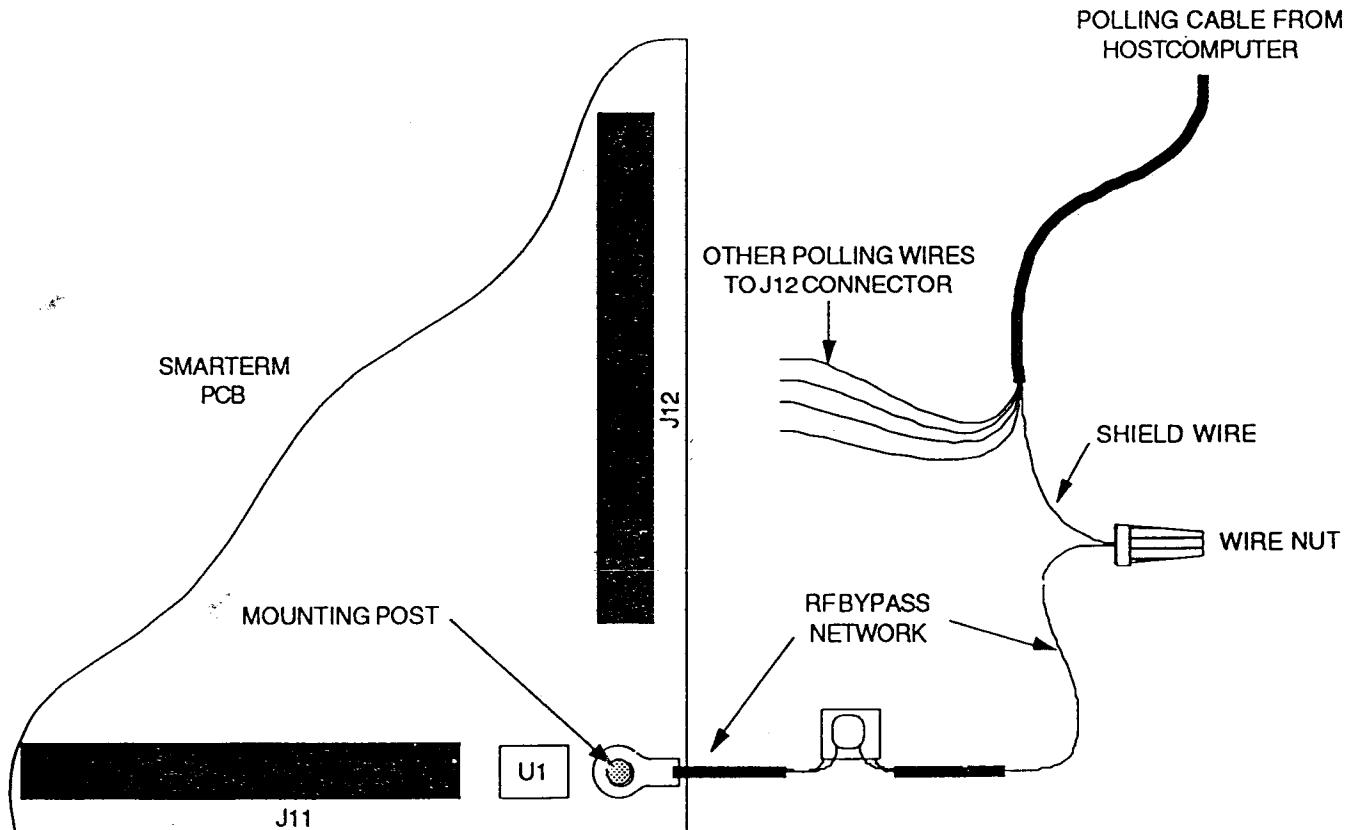
**THIS INSTALLATION IS INTENDED FOR QUALIFIED SERVICE PERSONNEL ONLY.**

To reduce radio-frequency noise emission and assure compliance with FCC part 15 regulations, the shield of the Smarterm polling cable must be connected to the RF bypass network which is attached to the Smarterm chassis.

**Installation Instructions:**

**DO NOT CONNECT POWER TO THE J9 POWER TERMINAL UNTIL THE SMARTERM IS MOUNTED AND FULLY CONNECTED AS DESCRIBED IN THE SMARTERM TECHNICAL MANUAL AND THIS INSTRUCTION SHEET.**

1. Open the cover on the Smarterm unit. Ensure that the RF bypass network, illustrated below, is attached to the proper terminal (PCB mounting post) on the Smarterm PCB.
2. Attach the SHIELD wire from the host computer polling cable to the stripped end of the RF bypass network using a wire nut, as illustrated below.
3. Connect the remaining polling wires from the host computer to the Smarterm J12 connector, in accordance with the instructions in the SMARTERM Technical Manual, section 4.7.



**NOTE:** Information furnished by Continental Instruments Corporation is believed to be accurate and reliable. However, no responsibility is assumed by Continental Instruments Corporation for its use; nor for any infringements of other rights of third parties which may result from its use. No license is granted by implications or otherwise under any patent or patent rights of Continental Instruments Corporation.

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