Westronic

C1000

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Technical Manual

Technical Manual

Westronic Systems, Inc.
a Mediation Technology company

NOTICE

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REGULATORY INFORMATION

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

CAUTION: Changes or modifications not expressly approved by Westronic could void the user's authority to operate this equipment.

The FCC label can be found on the right side of the shelf assembly. The label includes the following information:

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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Revision History

Rev Level	Issue Date	Reason for Reissue
A	November, 1993	First Release
B	April, 1994	Strapping Information Added
C	June, 1995	New Part Numbers Added
D	March, 1997	External Annunciator Added
E	November, 1997	Clarifications
F	April, 1998	New 202T-Type Modem Added
G	March, 1999	New Configuration (RS-232 with TABS Protocol) Part Numbers (594-T100 through 594-T103) Added
H	April, 1999	Remove Configurations with 0 Control Outputs; Restore Rear-Panel Pinout Information for Power Connector J11
I	June, 1999	Format Changes (Word to FrameMaker), Logo Update
J	February, 2000	Restore Removed Switch Information, New C1000 Versions with 9,600-bps Data Rate for Host Port Equipped with RS-232 Interface. New Information Indicated by Change Bars
K	October, 2000	Change Company Branding From Harris to Westronic
L	February, 2001	Convert from FrameMaker to Word Format
M	June, 2005	Updated address and fax
N	September, 2007	Updated address

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1 Product Description

1.1 Overview

The C1000 provides an economical and flexible means of collecting small-to-large quantities of discrete alarm and status data, which it converts to a simple, easily handled Telemetry Asynchronous Block Serial (TABS) or Telemetry Byte-Oriented Serial (TBOS) interface to complement many operation support systems.

Based on the installed software, C1000 communicates with a TABS or TBOS host. C1000 can also pass through polls for other addresses, which allows C1000 units to be daisy-chained together to form larger configurations and combines telemetry data from the C1000 and local Network Elements (NEs) into a single channel. In some cases, data is combined through a single modem.

The C1000 mounts in an equipment rack, allowing location as close as possible to the source of discrete interfaces. This results in a large reduction in the wiring required to collect alarm and status data. A reduction in wiring eliminates the possibility of losing data through unknown, disconnected, moved, or cut wiring. Serial and discrete interfaces appear through standard DB9/DE9 and 50-pin connectors, making installation and replacement fast and simple.

C1000 comes equipped with two serial ports. The host port (J9) serves as the TABS or TBOS host communications interface. J9 can be equipped with an optional 1,200-bps Bell 202T-compatible internal modem or an internal RS-232 board, which allows locating C1000 beyond the range of standard RS-422/RS-485 interfaces. The expansion port (J10) serves as a TABS or TBOS data collection interface. The housing also accommodates a maximum of eight 50-pin discrete interface connectors that provide the capability to accept 256 discrete inputs and generate 32 discrete control outputs. All of the various configurations use the same housing.

Front-panel LEDs indicate when the unit has power, is functional, and is transmitting/receiving data on the serial ports. Figure 1-1 shows the front panel of a C1000 capable of accepting 256 discrete inputs. On units capable of fewer than 256 discrete inputs, the right side of the front panel is blank.

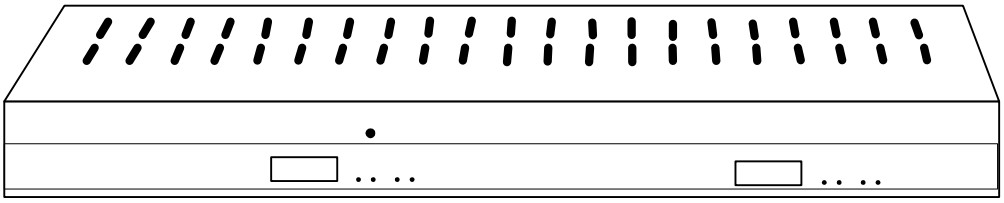


Figure 1-1 C1000 Front Panel

1.2 Applications

The C1000 collects discrete alarm/status inputs and routes control outputs. The C1000 expansion port interface (J10) can combine data reported by other TABS- or TBOS-based remote equipment into a single TABS or TBOS interface.

When C1000 receives a TABS or TBOS command from the host, it transmits the command to the NE over expansion port J10. When C1000 receives a response from the NE, it transmits the response to the host system over host port J9. Operating in this manner, C1000 functions as a repeater/concentrator for other TABS or TBOS remote equipment.

Figure 1-2 illustrates the basic configuration for a single C1000.

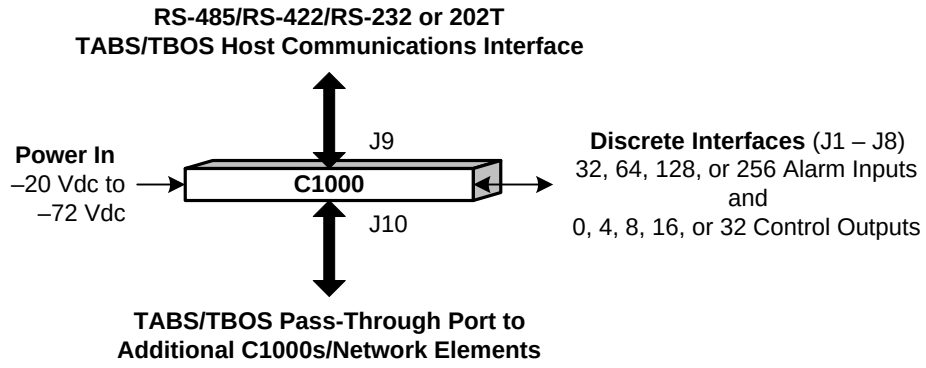
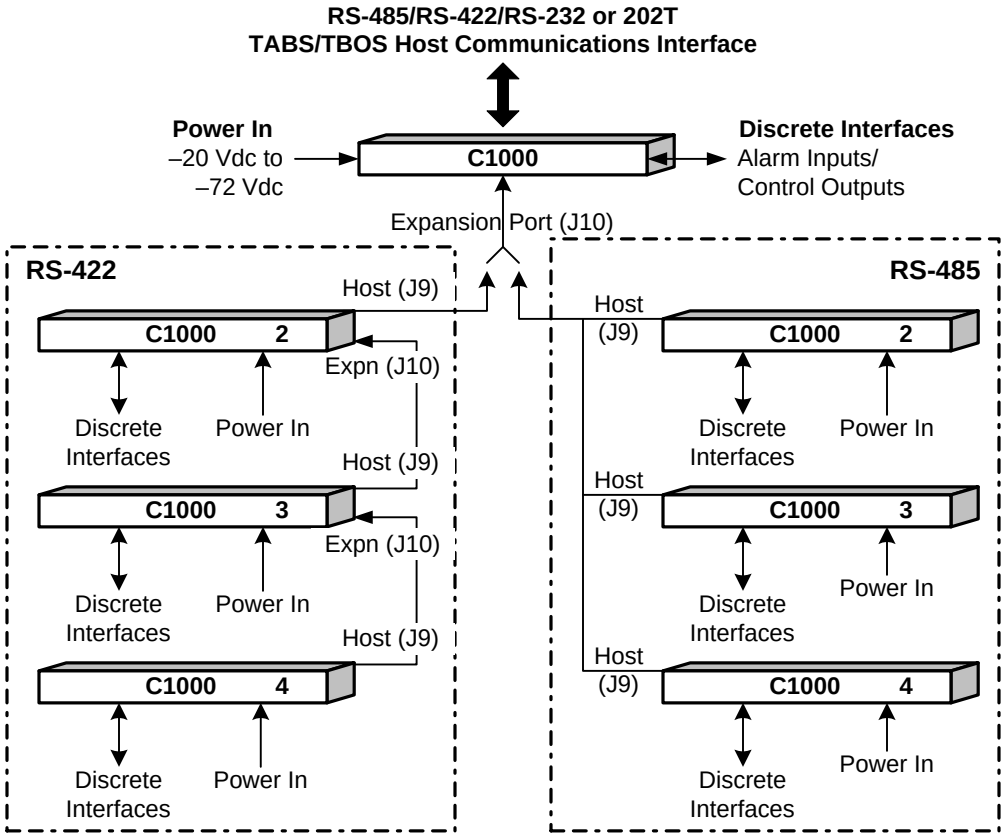


Figure 1-2 C1000 Basic Configuration

Figure 1-3 illustrates how multiple C1000 s interconnect to expand the number of discrete inputs/outputs accessible through a single TABS or TBOS connection to the host management system.



- TABS units with ≤ 128 discrete inputs require one TABS address.
- TABS units with 256 discrete inputs require two TABS addresses.
- Maximum of 30 additional TABS units if all are equipped with ≤ 128 discrete inputs.
- Maximum of 15 additional TABS units if all are equipped with 256 discrete inputs.
- Total number of TABS addresses cannot exceed 32.

- Maximum of three additional TBOS units if all are equipped with ≤ 128 discrete inputs.
- Maximum of one additional TBOS unit equipped with 256 discrete inputs.
- Total Number of TBOS displays cannot exceed eight.

Figure 1-3 C1000 Expansion

1.3 Configuration

DIP switches on the front panel enable C1000 configuration:

- TABS versions of C1000 are configured to respond to any of the 32 available TABS addresses whereas TBOS versions are configured to respond to any of the eight TBOS displays.
- Serial port communications use RS-422/485 or RS-232 at 1,200/ 2,400 bps for TABS and 2,400 bps for TBOS. When equipped with the optional internal RS-232 board, the TABS host port can also operate at 9,600 bps. See ***Segment 6 (RS Interface)*** on Page 20.

- The summary alarm option (see Table 1-3), if equipped in the unit, activates through the DIP switches. See ***Segment 6 (RS Interface)*** on Page 20 and ***Electrical Connections*** on Page 33.
- When the host port has a modem, switched (automatic) or constant carrier modem operation aids in adjusting transmit levels. See ***Segment 7*** on Page 21) or ***Segments 4 – 8 (TBOS*** Serial Port Interface) on Page 27.
- Two additional switches select line terminations for each serial port. See ***Segments 9 and 10 (Host/Expansion*** Port Termination) on Page 24 or ***Segments 9 and 10 (Serial*** Port Termination) on Page 28.

1.4 Specifications

The following provides detailed information on the C1000 electrical, environmental and mechanical specifications. Included are detailed data for serial (TABS and TBOS) and discrete interfaces.

1.4.1 Power Requirements

A watchdog/power supply monitor circuit expedites powerup/power-down situations and provides automatic initialize reset/restart capability. An external nominal –24/–48 Vdc connection supplies power for the C1000, which has its own integral switching power supply for onboard power requirements. The following are C1000 system electrical specifications:

- Input voltage:–24 Vdc or –48 Vdc (–20 Vdc to –72 Vdc)
- Maximum external fusing:1.3 Amps (–24 Vdc in) or .75 Amps (–48 Vdc in) Type 70 or GMT

Table 1-1 lists the maximum power consumption for the available configurations with all inputs assumed open. Add an additional 1.0 Watt for units with modems installed.

Table 1-1 Maximum Power Consumption of C1000 Configurations

Equipment Configuration (Max)	Power (Watts)
64 Inputs/8 Outputs	1.7
128 Inputs/16 Outputs	2.7
256 Inputs/32 Outputs	5.3

1.4.2 Environmental

- Ambient operating temperature range: 0°C to +60°C
- Humidity: < 95% noncondensing

1.4.3 Mechanical

- Dimensions: 17.2” (43.7 cm) wide x 1.7” (4.3 cm) high x 6.7” (17.0 cm) deep
- Mounting: 19.0” (48.3 cm) or 23.0” (58.4 cm) communications rack
- Weight: 6.5 lbs (2.95 kg) maximum
- Connectors:
  - Power: two-position, compression mating plug that accepts #14-AWG through #24-AWG wire (plug included with unit – PN 640-T005)
  - Serial: standard female DB9/DE9 that accepts #22-AWG through #26-AWG wire (included with the unit are two male DB9/DE9 connectors – PN 620-T045 – and an insertion tool – PN 990-0150)
  - Discrete: standard female 50-pin D connector that accepts #22-AWG through #26-AWG wire (connections made using 50-pin connector assembly – PN 620-0078)

1.4.4 Interfaces

All C1000 versions contain discrete input and control output capabilities. The host and expansion ports communicate using TABS or TBOS protocol. The following describes the discrete and the TABS/TBOS serial interfaces used in C1000.

1.4.4.1 Discrete Interface

Internally, the C1000 discrete alarm/status inputs reference the negative battery input (–24/–48 Vdc). Essentially, the inputs are single lines whereby an Off condition exists when the input is open or tied to negative battery. An On condition exists when the input is tied to positive battery (return). If the source is a set of isolated contacts, positive battery (return) connections are available on the rear discrete connectors for application to one side of the contacts. Table 1-2 lists the discrete input logic levels.

Table 1-2 Discrete Input Logic Levels

Input Power	Logic Level	Voltage
–24 Vdc	0 (Off)	–15 Vdc through –30 Vdc
	1 (On)	–8 Vdc through +5 Vdc
–48 Vdc	0 (Off)	–15 Vdc through –60 Vdc
	1 (On)	–8 Vdc through +5 Vdc

Discrete logic control outputs use Form A contacts and operate in momentary or latching mode. The TABS or TBOS control command defines the mode. Each discrete output is a normally open Single-Pole, Single-Throw (SPST) isolated contact with both sides of the connection individually available to the user. Ground connections are available on the rear-panel connectors as a convenience for applications where one contact side needs ground.

The following describes the discrete status/alarm inputs and control outputs:

Discrete Status/Alarm Inputs

- Number of inputs: 64, 128 or 256 (dependent on version)
- Protection: sustain transient voltages up to 15 kV
- Ground: common ground for all inputs
- Current:
  - 1.0 mA for each input at +Batt (–48 Vdc operation)
  - 0.5 mA for each input at +Batt (–24 Vdc operation)

Discrete Control Outputs

- Number of outputs: 8, 16, or 32 relay control outputs (dependent on version). In TABS units with the summary alarm option (see), the last control output can be configured as a summary alarm. On units with 32 outputs, Control Outputs 16 and 32 can be configured as summary alarms.
- Contact type: SPST normally open (Form A)
- Operation: momentary (300 ms) or latched (based on TABS or TBOS command)
- Contact Ratings:
  - 0.5 Amps at 60 Vdc or 0.3 Amps at 110 Vdc
  - 30 Watts (maximum) switching power

1.4.4.2 TABS Serial Ports

The TABS serial ports consist of the host (J9) and the expansion (J10) ports:

Host Port (J9)

- Protocol: TABS (one start bit, eight data bits, odd/no parity, one stop bit), 1,200/2,400/9,600 bps
- Physical interface: RS-422, RS-485, RS-232, or 202T modem
- Protection: sustain transient voltages (15 kV maximum)
- Connection: rear-panel DB9/DE9 connector
- Optional internal modem (PN 535-T005): 202T/CCITT V.23-compliant, 2-wire or 4-wire at 1,200 bps
  - Output amplification: –10 dBm default (+2.0 dBm maximum)
  - Receive sensitivity: –36 dBm default (–6 dBm to –48 dBm in 6-dBm steps)
- Optional internal modem (PN 535-T016): 202T/CCITT V.23-compliant, 2-wire or 4-wire at 1,200 bps
  - Output amplification: –10 dBm default (+2.0 dBm maximum)
  - Receive sensitivity: automatic set (–6 dBm to –48 dBm)

Expansion Port (J10)

- Protocol: TABS (one start bit, eight data bits, odd parity, one stop bit), 1,200/2,400 bps
- Physical interface: RS-422 or RS-485
- Protection: sustain transient voltages (15 kV maximum)
- Connection: rear-panel DB9/DE9 connector

1.4.4.3 TBOS Serial Ports

The TBOS serial ports consist of the host (J9) and the expansion (J10) ports:

Host Port (J9)

- Protocol: TBOS (eight data bits, odd parity, two stop bits), 2,400 bps
- Physical interface: RS-422, RS-485, RS-232, or 202T modem
- Protection: sustain transient voltages (15 kV maximum)
- Connection: rear-panel DB9/DE9 connector

- Optional internal modem (PN 535-T005): 202T/CCITT V.23-compliant, 2-wire or 4-wire at 1,200 bps
  - Output amplification: –10 dBm default (+2.0 dBm maximum)
  - Receive sensitivity: –36 dBm default (–6 dBm to –48 dBm in 6-dBm steps)
- Optional internal modem (PN 535-T016): 202T/CCITT V.23-compliant, 2-wire or 4-wire at 1,200 bps
  - Output amplification: –10 dBm default (+2.0 dBm maximum)
  - Receive sensitivity: automatic set (–6 dBm to –48 dBm)

Expansion Port (J10)

- Protocol: TBOS (eight data bits, odd parity, two stop bits), 2,400 bps
- Physical interface: RS-422 or RS-485
- Protection: sustain transient voltages (15 kV maximum)
- Connection: rear-panel DB9/DE9 connector

1.5 C1000 Configurations

The C1000, available in many TABS and TBOS versions, supports various numbers of discrete inputs/control outputs and different serial interfaces. Table 1-3 lists all available configurations.

Table 1-3 C1000 Configurations

Part Number	Discrete		Host Interface	Serial Protocol
	Inputs	Outputs		
594-T039	64	8	RS-422/485	TBOS
594-T040	64	8	202T Modem	
594-T065	64	8	RS-232	
594-T041	128	16	RS-422/485	
594-T042	128	16	202T Modem	
594-T059	128	16	RS-232	
594-T043	256	32	RS-422/485	
594-T044	256	32	202T Modem	
594-T063	256	32	RS-232	
594-T047	64	8	RS-422/485	TABS
594-T089	64	8 (*)	RS-422/485	
594-T048	64	8	202T Modem	
594-T090	64	8 (*)	202T Modem	
594-T067	64	8	RS-232	
594-T101	64	8 (*)	RS-232	
594-T105	64	8 (†)	RS-232	
594-T049	128	16	RS-422/485	
594-T091	128	16 (*)	RS-422/485	
594-T050	128	16	202T Modem	
594-T092	128	16 (*)	202T Modem	
594-T068	128	16	RS-232	
594-T102	128	16 (*)	RS-232	
594-T106	128	16 (†)	RS-232	
594-T051	256	32	RS-422/485	
594-T093	256	32 (*)	RS-422/485	
594-T052	256	32	202T Modem	
594-T094	256	32 (*)	202T Modem	
594-T069	256	32	RS-232	
594-T103	256	32 (*)	RS-232	
594-T107	256	32 (†)	RS-232	

* These part numbers have the summary alarm option, which, when active, makes the last control output an alarm indicator. When the summary alarm option is active on units with more than 128 inputs, it replaces the last control output from each half (that is, Controls 16 and 32).

† The RS-232 card available with these part numbers is capable of 9,600-bps operation on the host port.

Table 1-4 lists cables and connectors that are available for use with the C1000.

Table 1-4 Compatible Cables and Connectors

Part Number	Description
620-T030	Rear-Access Wire-Wrap Connector
620-T045	Male DB9/DE9 Connector with Shell (Two Included With Unit)
533-T038	Front Access Wire-Wrap Block, C1000, 256D/32C, 19” Rack Mount. Use 977-T003-XXX cables
533-T037	Front Access Wire-Wrap Block, C1000, 256D/32C, 23” Rack Mount. Use 977-T003-XXX cables
977-T003-003	Cable, 25Pr, Male to Female, 3FT
977-T003-005	Cable, 25Pr, Male to Female, 5FT
977-T003-007	Cable, 25Pr, Male to Female, 7FT
977-T003-050	Cable, 25Pr, Male to Female, 50FT
977-T003-100	Cable, 25Pr, Male to Female, 100T
977-T003-150	Cable, 25Pr, Male to Female, 150FT
977-T003-250	Cable, 25Pr, Male to Female, 250FT
977-T004	100-foot, Single-Ended Cable with 50-Pin Connector
977-T005	200-foot, Single-Ended Cable with 50-Pin Connector
585-T073	Kit, C1000, 2 9-pin subminature IDC connectors with Insertion Tool.

1.6 Other Westronic Products

The following information briefly describes other Westronic products that are available to meet alarm system needs. Call 972-235-5292 to talk with a Westronic representative to learn more about these and other Westronic products.

1.6.1 WS1000

The WS1000 product line provides an economical, flexible means of converting varying quantities of discrete (dry-contact) alarm, status, and control data into a simple, easily handled TABS or TBOS interface.

Available configurations provide the flexibility to select the unit best suited for various applications. Choose from 64 – 128 discrete inputs and from 8 – 40 discrete outputs.

Small size and flexible mounting requirements allow placing the unit close to the source of discrete interfaces. WS1000 can mount in an equipment bay or on a distribution frame, as the application demands. This flexibility results in reduction in the amount of required wiring. The basic structure of a front-facing wire-wrap block, commonly found on distribution frames, provides a sturdy housing for the WS1000 electronics. All active components are located on a removable module contained within the housing. The WS1000 is the ideal way to collect discrete alarms throughout a site or service area with feedback to a WS2000 or WS3000 hub.

1.6.2 WS2000

The WS2000 product line offers data collection and reporting capabilities necessary to make small remote telemetry units more flexible and efficient. WS2000s combine compact design with power to configure multiple serial and discrete interfaces in virtually any arrangement to best serve the needs of the network. A single-rack-increment high unit fits within 19-inch or 23-inch racks. Other mountings are available.

A WS2000 can have the following equipment combinations:

- 4 or 8 serial ports with user-selectable RS-232, RS-422, or RS-485 interfaces at 1,200; 2,400; or 9,600 bps
- 32 – 512 discrete alarm/status inputs and 8 – 128 discrete control outputs, expandable to 2,048 inputs and 512 outputs in some configurations
- 8 pulse accumulator inputs (optional)
- 8 analog inputs (optional), expandable to 24 analog inputs
- Host port interface at RS-232, RS-422, or RS-485 at 1,200; 2,400; or 9,600 bps (an optional internal modem is available)

To support a broad range of equipment, the WS2000 can incorporate many interface types:

- Asynchronous and synchronous serial
- Discrete inputs and outputs
- Analog and pulse inputs

Some of the many available serial protocol types include:

- E-Telemetry (E2A format)
- TABS
- TBOS
- MCS-11
- HASP (ASCII)

1.6.3 WS3000

The WS3000 is a powerful telemetry unit that combines a high-speed processor and large database capacity with the most useful functions of discrete and serial alarm collection, mediation, and access. The WS3000 is the ideal bridge between today's telemetry networks and the advanced protocols now appearing. WS3000 features include the following:

- Optional ethernet interface
- Available solutions for remote alarm monitoring over TL1 (ASCII) TCP/IP ethernet, OSI ethernet, and asynchronous communications
- Data collection using TBOS, TABS, and Teltrac protocols and discrete dry contacts
- 5 serial ports supporting user-selectable RS-232/RS-422/RS-485 interfaces from 1,200 – 9,600 bps
- 4 serial ports supporting RS-422 interfaces from 1,200 – 9,600 bps
- 32 – 512 discrete alarm/status inputs and 8 – 128 discrete control outputs with capability to support a maximum of 30,000 alarm points (about 2,000 SIDs)
- Remote database configuration and software upgrade through exchanging PCMCIA cards or downloading through a Trivial File Transfer Protocol (TFTP) server or X-modem
- Switched Network Software (SNS, also referred to as String TABS) to control network access devices, such as PADs, terminal servers, and modems, for monitoring network elements and remotes
- Fault-Tolerant Monitor (FTM, also referred to as TABS2) software to provide redundant 2-way monitoring of long-distance network elements
- Custom protocols are available on a special assembly basis

2 Installation

2.1 Overview

This section presents information on how to install, configure, and wire the C1000.

2.2 Installation Procedures

The following describes how to install C1000 units into a permanent location. C1000 can mount into a 19-inch (48.3-cm) equipment rack. Each unit comes with mounting brackets to allow mounting in a 23-inch (58.4-cm) equipment rack.

2.2.1 Wiring the Unit

All connections are made on the rear panel (Figure 2-1). Located on top of the C1000 is a decal that provides wiring information and switch settings for each configuration. Figure 2-2 breaks out details of the various labels for the differing C1000s available.

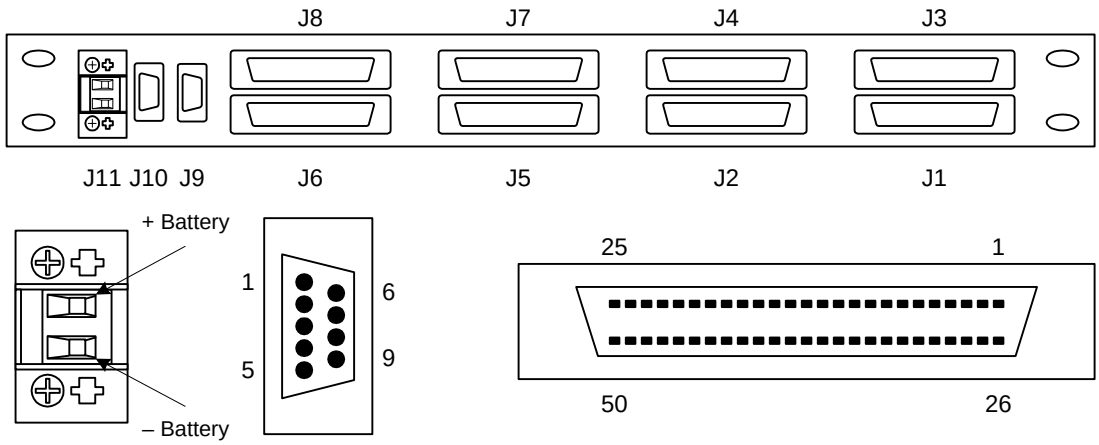


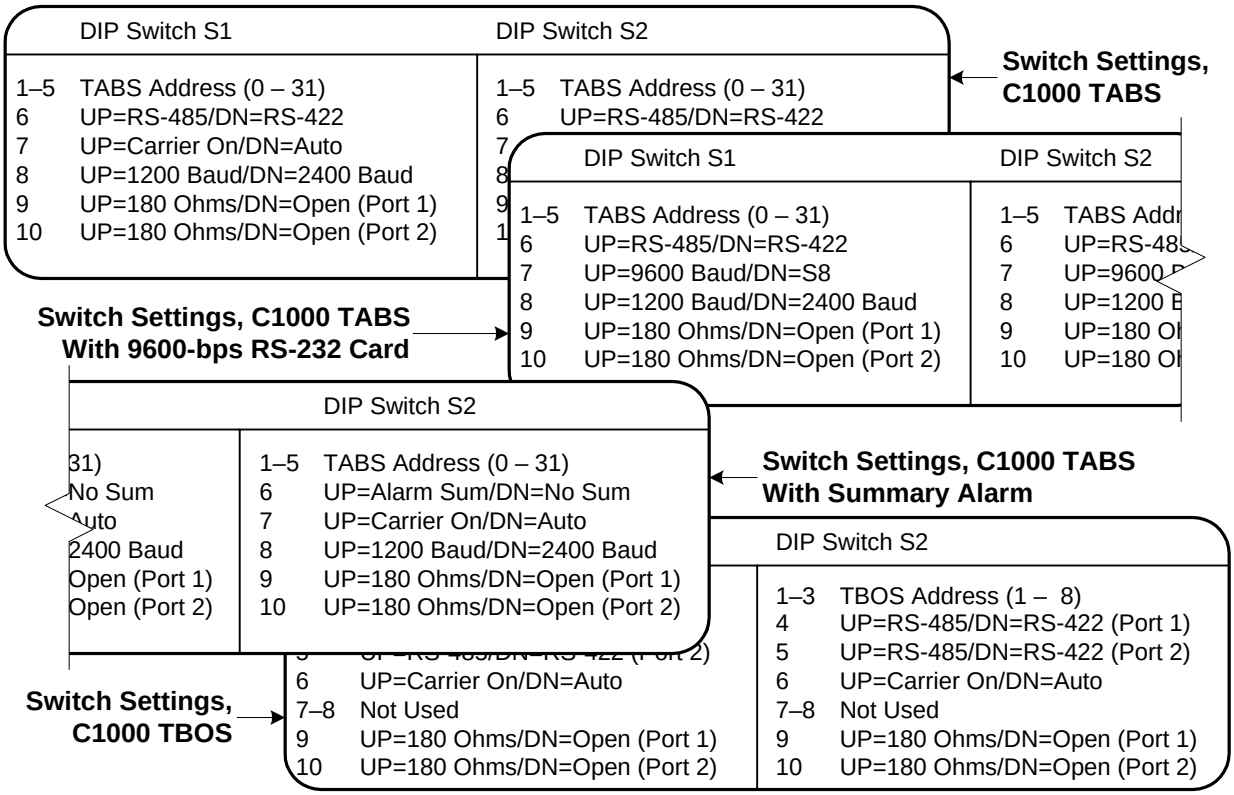
Figure 2-1 C1000, Rear Panel With Pinouts

Table 2-1 relates the discrete status/alarm inputs and control outputs to connectors and pinouts on the rear panel. Compare the information in Table 2-1 with Figure 2-2.

Table 2-1 Connectors J1 – J8 (Discrete I/O) Pinouts

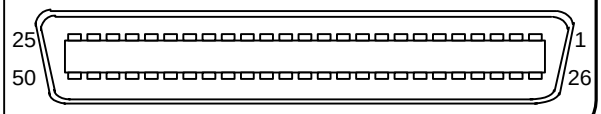
Discrete Type	Pin No		Control or Status/Alarm Number (Note)							
			Display 1		Display 2		Display 3		Display 4	
			J1	J2	J3	J4	J5	J6	J7	J8
Control Out/Rtn	1	26	1	5	9	13	17	21	25	29
Control Out/Rtn	2	27	2	6	10	14	18	22	26	30
Control Out/Rtn	3	28	3	7	11	15	19	23	27	31
Control Out/Rtn	4	29	4	8	12	16	20	24	28	32
Common	5-9	30–34								
Status, Alarm In	10	35	1/2	33/34	65/66	97/98	129/130	161/162	193/194	225/226
Status, Alarm In	11	36	3/4	35/36	67/68	99/100	131/132	163/164	195/196	227/228
Status, Alarm In	12	37	5/6	37/38	69/70	101/102	133/134	165/166	197/198	229/230
Status, Alarm In	13	38	7/8	39/40	71/72	103/104	135/136	167/168	199/200	231/232
Status, Alarm In	14	39	9/10	41/42	73/74	105/106	137/138	169/170	201/202	233/234
Status, Alarm In	15	40	11/12	43/44	75/76	107/108	139/140	171/172	203/204	235/236
Status, Alarm In	16	41	13/14	45/46	77/78	109/110	141/142	173/174	205/206	237/238
Status, Alarm In	17	42	15/16	47/48	79/80	111/112	143/144	175/176	207/208	239/240
Status, Alarm In	18	43	17/18	49/50	81/82	113/114	145/146	177/178	209/210	241/242
Status, Alarm In	19	44	19/20	51/52	83/84	115/116	147/148	179/180	211/212	243/244
Status, Alarm In	20	45	21/22	53/54	85/86	117/118	149/150	181/182	213/214	245/246
Status, Alarm In	21	46	23/24	55/56	87/88	119/120	151/152	183/184	215/216	247/248
Status, Alarm In	22	47	25/26	57/58	89/90	121/122	153/154	185/186	217/218	249/250
Status, Alarm In	23	48	27/28	59/60	91/92	123/124	155/156	187/188	219/220	251/252
Status, Alarm In	24	49	29/30	61/62	93/94	125/126	157/158	189/190	221/222	253/254
Status, Alarm In	25	50	31/32	63/64	95/96	127/128	159/160	191/192	223/224	255/256

Note: J1-1 = Control Out 1, J1-26 = Control Return 1
J8-1 = Control Out 29, J8-26 = Control Return 29
J4-10 = Status/Alarm 97, J4-35 = Status/Alarm 98
J5-25 = Status/Alarm 159, J5-50 = Status/Alarm 160



J1 – J2 – J3 – J4 – J5 – J6 – J7 – J8

Pin 1–C1	Pin 26–C1	Pin 11–S3	Pin 36–S4	Pin 21–S23	Pin 46–S24	J1/J2 – First Display	
Pin 2–C2	Pin 27–C2	Pin 12–S5	Pin 37–S6	Pin 22–S25	Pin 47–S26	J3/J4 – Second Display	
Pin 3–C3	Pin 28–C3	Pin 13–S7	Pin 38–S8	Pin 23–S27	Pin 48–S28	J5/J6 – Third Display	
Pin 4–C4	Pin 29–C4	Pin 14–S9	Pin 39–S10	Pin 24–S29	Pin 49–S30	J7/J8 – Fourth Display	
Pin 5–Rtn	Pin 30–Rtn	Pin 15–S11	Pin 40–S12	Pin 25–S31	Pin 50–S32		
Pin 6–Rtn	Pin 31–Rtn	Pin 16–S13	Pin 41–S14				
Pin 7–Rtn	Pin 32–Rtn	Pin 17–S15	Pin 42–S16				
Pin 8–Rtn	Pin 33–Rtn	Pin 18–S17	Pin 43–S18				
Pin 9–Rtn	Pin 34–Rtn	Pin 19–S19	Pin 44–S20				
Pin 10–S1	Pin 35–S2	Pin 20–S21	Pin 45–S22				



Connection Information, All C1000s

J9					J10	
Pin	RS-422/485	RS-232	202T Modem		Pin	RS-422/485
1	Rx–	DCD	RxR	1 6	1	Rx–
2	Rx+	Rx	RxT		2	Rx+
3	Tx+	Tx	TxT		3	Tx+
4	N/A	N/A	N/A		4	N/A
5	GND	GND	GND		5	GND
6	N/A	N/A	N/A		6	N/A
7	Tx–	RTS	TxR		7	Tx–
8	N/A	N/A	N/A	5 9	8	N/A
9	N/A	N/A	N/A		9	N/A

Figure 2-2 Labels for TABS and TBOS C1000s

Table 2-2 shows the pinouts for the host port (J9), whereas Table 2-3 shows the pinouts for the expansion port (J10).

Table 2-2 Connector J9 (Host Port) Pinouts

Pin No	RS-422/485	RS-232	202T Modem
1	RX–	DCD	RxR
2	RX+	RX	RxT
3	TX+	TX	TxT
4	–	–	–
5	GND	GND	GND
6	–	–	–
7	TX–	RTS	TxR
8	–	–	–
9	–	–	–

Table 2-3 Connector J10 (Expansion Port) Pinouts

Pin No	RS-422/485
1	RX–
2	RX+
3	TX+
4	–
5	GND
6	–
7	TX–
8	–
9	–

2.2.2 Powering the Unit

Use #14 AWG through #24 AWG (#20 AWG is optimum) for the power feed and return wires from a fuse panel or Power Distribution Panel (PDP). Connect the power leads as shown in Figure 2-1. The input voltage ranges from –20 Vdc to –72 Vdc. Remove the fuse protection before inserting or removing power wires.

Install the appropriate size fuse at the fuse panel or PDP to power the C1000 up. *Power Requirements* on Page 4 lists the fuse requirements for the unit. After you apply power to the unit, the **MPU RUN LED** on the front panel should light and remain lit.

2.3 C1000 Unit Configuration

Use the DIP switches on the front of the unit to configure each C1000 unit. Units handling fewer than 128 discrete inputs have one 10-segment switch block whereas units handling more than 128 discrete inputs have two 10-segment switch blocks. The factory default switch setting for all switches is in the Down (Off) position.

Consider C1000 units with two DIP switch blocks as two separate units. Switch block S1, the left-most block, controls the first 128 discrete inputs and 16 control outputs. The right-most switch block, S2, controls the second 128 discrete inputs and 16 control outputs. Figure 2-3 shows a typical DIP switch block with Segments 3, 5, and 6 On and the remaining segments Off.

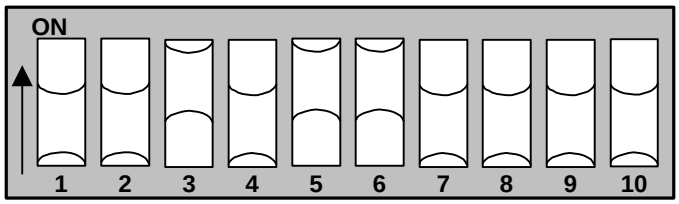


Figure 2-3 Typical S1 and S2 DIP Switch Blocks

All internal strapping is preset at the factory. *Internal Strapping* on Page 29 describes how to change modem sensitivity on units equipped with internal 202T modems.

Recommendation: Leave all other straps in the factory preset positions.

Reference Figure 2-4 when establishing TABS or TBOS serial port interface switch settings on S1/S2. As shown, the meaning of host and expansion applies to more than just J9 and J10. Except for TABS address or TBOS display settings, S2 settings generally reflect S1 settings unless indicated otherwise.

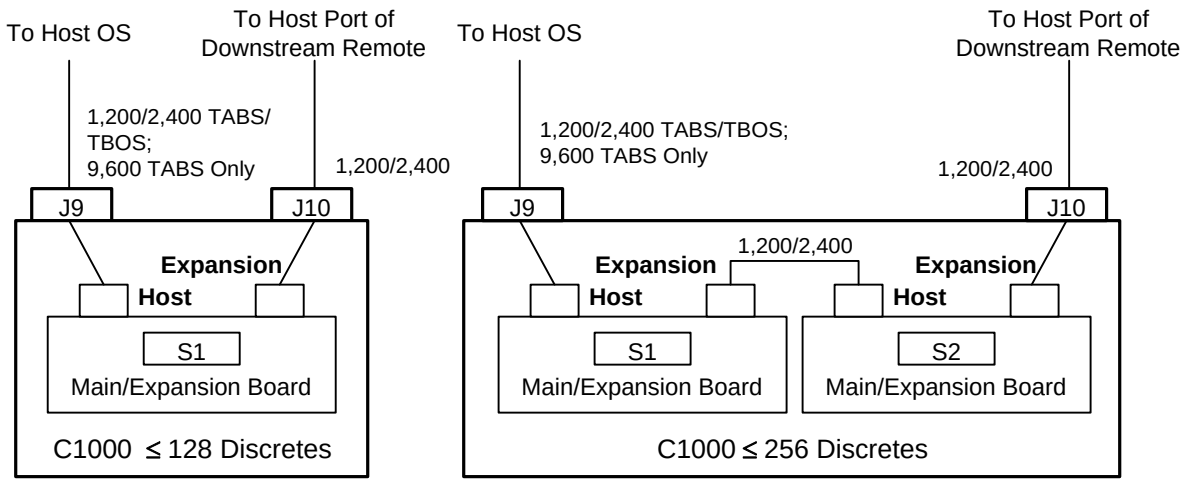


Figure 2-4 Simplified Block Diagram of Host and Expansion Ports

2.3.1 TABS Unit DIP Switch Settings

TABS, when used between a host and the C1000, normally uses the RS-422 physical layer interface with a channel speed of 2,400 bps. Some C1000 TABS versions have an RS-232 interface operating at 9,600 bps on the TABS host port.

Under TABS rules, the host issues a poll or command message to C1000 and waits a maximum of 500 milliseconds for C1000 to begin a response message. TABS messages can be a maximum of 261 bytes in length.

TABS protocol provides a number of message sets for monitoring/controlling various forms of data. The alarm surveillance and control message set is similar to TBOS protocol in that it transports scan and control point information to monitor TABS equipment. The fundamental information unit in TABS protocol is the display, which is a set of 64 scan points and 64 control points (1 – 64). Monitored equipment contain one or more displays, depending on the number of defined scan and control points. TABS supports a maximum of 65,536 displays (0 – 65,535) for each TABS address.

TABS has the ability to address a particular Network Element (NE) in the address range 0 through 31. The TABS address scheme, known as the Monitored Equipment Frame Address (MEFA), allows a maximum of 32 TABS NEs to connect to a single serial channel and to further connect to a single host. The host uses the TABS message address field to identify the NE that is to accept and respond to each TABS command. Only the NE addressed in the command transmits a

corresponding response message. The TABS input display is known as the Monitored Equipment Display Number (MEDN).

C1000s capable of a maximum 128 points have a single TABS address. Units capable of a maximum 256 points require two TABS addresses, as follows:

- Display 0 of the first TABS address contains the first set of 64 discrete inputs (1 – 64).
- Display 1 of the first TABS address contains the second set of 64 discrete inputs (65 – 128).
- Display 0 of the second TABS address contains the third set of 64 discrete inputs (129 – 192).
- Display 1 of the second TABS address contains the fourth set of 64 discrete inputs (193 – 256).

Control Outputs 1 – 16 are always in the first TABS address while Control Outputs 17 – 32 are always in the second TABS address.

The following are configurable items for C1000 TABS:

- TABS Address (Segments 1 – 5)
- Host/expansion port RS interface, modem carrier, or summary alarm feature (Segments 6, 7)
- Host/expansion port data rates (Segments 7, 8)
- Host/expansion port terminations (Segments 9, 10)

2.3.1.1 Segments 1 – 5 (TABS Address Number)

You must configure a particular address for each C1000 unit. Segments 1 through 5 of S1/S2 determine the TABS address number to which the unit responds on the TABS host port. Table 2-4 shows the switch segment settings for each TABS address.

Important: Set Segments 1 – 5 of S1/S2 to different addresses on units capable of processing 256 discrete inputs.

Table 2-4 Segments 1 – 5 of S1/S2 TABS Units (TABS Address Number)

Add	1	2	3	4	5	Add	1	2	3	4	5
0	↓	↓	↓	↓	↓	16	↑	↓	↓	↓	↓
1	↓	↓	↓	↓	↑	17	↑	↓	↓	↓	↑
2	↓	↓	↓	↑	↓	18	↑	↓	↓	↑	↓

Table 2-4 Segments 1 – 5 of S1/S2 TABS Units (TABS Address Number)

Add	1	2	3	4	5	Add	1	2	3	4	5
3	↓	↓	↓	↑	↑	19	↑	↓	↓	↑	↑
4	↓	↓	↑	↓	↓	20	↑	↓	↑	↓	↓
5	↓	↓	↑	↓	↑	21	↑	↓	↑	↓	↑
6	↓	↓	↑	↑	↓	22	↑	↓	↑	↑	↓
7	↓	↓	↑	↑	↑	23	↑	↓	↑	↑	↑
8	↓	↑	↓	↓	↓	24	↑	↑	↓	↓	↓
9	↓	↑	↓	↓	↑	25	↑	↑	↓	↓	↑
10	↓	↑	↓	↑	↓	26	↑	↑	↓	↑	↓
11	↓	↑	↓	↑	↑	27	↑	↑	↓	↑	↑
12	↓	↑	↑	↓	↓	28	↑	↑	↑	↓	↓
13	↓	↑	↑	↓	↑	29	↑	↑	↑	↓	↑
14	↓	↑	↑	↑	↓	30	↑	↑	↑	↑	↓
15	↓	↑	↑	↑	↑	31	↑	↑	↑	↑	↑

2.3.1.2 Segments 6 – 8 (TABS Serial Port Interface)

Segment 6 (RS Interface)

Depending on whether the C1000 unit has the summary alarm feature, Segment 6 of S1/S2 selects one of the following:

- RS-422 or RS-485 electrical interface on the host port
- Summary alarm feature (see Table 1-3) enabled or disabled

Use the summary alarm feature with the Universal Annunciator Panel (see *Electrical Connections* on Page 33). The summary alarm feature, when enabled, makes the last installed control output (4, 8, or 16/32) a summary alarm indication rather than a standard control output. When the summary alarm feature is disabled, the last control output remains a control output.

Table 2-5 summarizes Segment 6 of S1/S2.

Table 2-5 Segment 6 of S1/S2 TABS Units

6	Unit Condition	Function
↑	**A.** No alarm summary feature	RS-485 interface on host/expansion ports
	B. Alarm summary feature	Alarm summary enabled (Note)
↓	**A.** No alarm summary feature	RS-422 interface on host/expansion ports
	B. Alarm summary feature	Alarm summary disabled

Note: S1-6 makes Control Output 4, 8, or 16 a summary alarm. S2-6 makes Control Output 32 a summary alarm. S2-6 is not equipped on units with fewer than 32 control outputs. On units having 32 control outputs, Controls 16 and 32 become alarm summary indicators.

Segment 7

The function of Segment 7 of S1/S2 depends greatly on the C1000 unit, as follows:

- Whether the unit is equipped with the summary alarm feature
- Whether the unit host port has an internal modem or an RS-232 card, which can have 1,200-/2,400-bps or 9,600-bps software
- Whether the RS-232 card is set for constant or switched carrier

Table 2-6 summarizes Segment 7 of S1/S2.

Table 2-6 Segment 7 of S1/S2 TABS Units

7	Unit Condition	Function
↑	**A.** No alarm summary feature, internal modem, or RS-232 card	RS-485 interface on host/expansion ports
	B. No alarm summary feature, but has internal modem or RS-232 card with standard software on the host port	Constant carrier or RTS On (Note 1) on host port; (RS-422 interface automatically set on expansion port)
	C. No alarm summary feature, but has RS-232 card with 9,600-bps software on the host port	9,600-bps data rate, 8 data bits, no parity, switched (automatic) carrier (Note 2) on host port. This position overrides Segment 8 settings for host (J9). See Figure 2-4.
	D. Alarm summary feature, but no internal modem	RS-485 interface on host port
	E. Alarm summary feature with internal modem	Constant carrier on host port
↓	**A.** No alarm summary feature, internal modem, or RS-232 card (Note 3)	RS-422 interface on host/expansion ports,switched (automatic) carrier
	B. No alarm summary feature, but has internal modem or RS-232 card with standard software (Notes 3, 4) on the host port	Switched (automatic) carrier or normal RTS (Note 1) on host port; (RS-422 interface automatically set on expansion port)
	C. No alarm summary feature, but has RS-232 card with 9,600-bps software on the host port	Segment 8 controls data rate, odd parity on host/expansion port
	D. Alarm summary feature, but no internal modem	RS-422 interface on host/expansion ports
	E. Alarm summary feature with internal modem	Switched (automatic) carrier on host/ expansion ports

Table 2-6 Segment 7 of S1/S2 TABS Units

7	Unit Condition	Function

Notes:

1. If jumper Z1 on RS-232 card is set to constant carrier, Segment 7 has no effect; however, if Z1 is set to switched carrier, Segment 7 controls RTS On or normal RTS function.
2. Jumper Z1 on RS-232 card, if set to constant carrier, overrides Segment 7 switched carrier.
3. S2-7 must be down in C1000 units with 32 discrete outputs.
4. S1-7 must be down if the modem is set to 2-wire mode or if an RS-232 card is installed with jumper Z1 set to constant carrier.

Segment 8 (Data Parameters)

Segment 8 of S1/S2 selects the data rate and other parameters for the host and expansion ports. Table 2-7 summarizes Segment 8 of S1/S2:

Table 2-7 Segment 8 of S1/S2 TABS Units

8	Unit Condition (Note)	Function
	A. No internal modem or RS-232 card	1,200 bps; 8 data bits; odd parity on host/ expansion ports
	B. No internal modem, but has RS-232 card with standard software on host port	
↑	**C.** No internal modem, but has RS-232 card with 9,600-bps software on host port	See Figure 2-4. If S1-7 ↑, S1-8 sets 1,200 bps; 8 data bits; odd parity on expansion port only, but S2-8 sets for host/expansion ports. If S1-7 ↓, Segment 8 sets 1,200 bps; 8 data bits; odd parity on host/expansion ports.
	D. Internal modem	Must be Up
↓	**A.** No internal modem or RS-232 card	2,400 bps; 8 data bits; odd parity on host/ expansion ports
	B. No internal modem, but has RS-232 card with standard software on host port	

Table 2-7 Segment 8 of S1/S2 TABS Units

8	Unit Condition (Note)	Function
	C. No internal modem, but has RS-232 card with 9,600-bps software on host port	See Figure 2-4. If S1-7 ↑, S1-8 sets 2,400 bps; 8 data bits; odd parity on expansion port only, but S2-8 sets for host/expansion ports. If Segment 7 ↓, sets 2,400 bps; 8 data bits; odd parity on host/expansion ports.
	D. Internal modem	Must be Up

Note: The setting for S2-8 must reflect the setting of S1-8.

2.3.1.3 Segments 9 and 10 (Host/Expansion Port Termination)

Segment 9 (Host Port Termination)

Segment 9 sets the balanced line termination for the TABS host port when C1000 is not equipped with an internal modem. Table 2-8 summarizes Segment 9 of S1/S2.

Table 2-8 Segment 9 of S1/S2 TABS Units

9	Unit Condition	Function
↑	Host port in a point-to-point link (RS-422) or at end of a multipoint link (RS-485)	180-Ohm termination applied to port (Note)
↓	Host port in the middle of a multipoint link (RS-485) or C1000 has an RS-232 card	Open termination applied to port

Note: C1000 units capable of handling 256 discrete inputs require S2-9 to be ↑, regardless of whether the C1000 has an internal modem.

Segment 10 (Expansion Port Termination)

Segment 10 sets the balanced line termination for the TABS expansion port. S1 handles expansion ports for C1000 units having a maximum 128 discrete inputs. S2 handles the expansion port for C1000 units with 256 discrete inputs. Table 2-9 summarizes Segment 10 of S1/S2.

Table 2-9 Segment 10 of S1/S2 TABS Units

10	Unit Condition	Function

Table 2-9 Segment 10 of S1/S2 TABS Units

10	Unit Condition	Function
↑	Expansion port in a point-to-point link (RS-422) or at end of a multipoint link (RS-485)	180-Ohm termination applied to port (Note)
↓	Expansion port in the middle of a multipoint link (RS-485) or C1000 has an RS-232 card	Open termination applied to port

Note: C1000 units capable of handling 256 discrete inputs require S2-10 to be ↑.

2.3.2 TBOS Unit DIP Switch Settings

TBOS, used between a host and the C1000, normally uses the RS-422 physical layer interface with a channel speed of 2,400 bps. The C1000 can act as a pass-through unit for reporting other TBOS devices to the host system.

The fundamental information unit in TBOS protocol is the display, which is a set of 64 scan points and 64 control points (1 – 64). Monitored equipment contain one or more displays, depending on the number of defined scan and control points. TBOS supports a maximum of eight displays (8 x 64 = 512 points) for each serial port.

Displays are also organized into characters, the smallest information unit transferred by TBOS protocol. Because a character consists of eight scan points and a display has 64 scan points, each display contains eight characters or eight sets of eight scan points each.

The host sends two types of TBOS messages: scan requests and command requests. A TBOS scan request identifies which display and character the TBOS host is polling for. The TBOS NE returns the requested character. A TBOS command request not only identifies which display and control point the host wants to control, but also identifies the type of control (latch, unlatch, or momentary).

2.3.2.1 Segments 1 – 3 (TBOS Unit Display Number)

You can configure each C1000 unit for a particular display or displays. Segments 1 through of S1/S2 set the display number or numbers to which the unit responds on the host port. For units capable of handling 256 discrete inputs, S1 handles the display number for the first 128 discrete inputs (1 – 128); S2 handles the display number for the second

128 discrete inputs (129 – 256). Table 2-10 shows the switch settings for each of the eight possible display numbers.

Table 2-10 Segments 1 – 3 of S1/S2 TBOS Units (TBOS Display Number)

Display	1	2	3
1	↓	↓	↓
2	↓	↓	↑
3	↓	↑	↓
4	↓	↑	↑
5	↑	↓	↓
6	↑	↓	↑
7	↑	↑	↓
8	↑	↑	↑

Operation Systems (OSs) designed prior to EIA RS-485, such as AT&T DAS, handled TBOS ports as single NEs. These OSs require that the lowest display number be assigned to the C1000 unit furthest from the host port. If your installation uses a single C1000, configure Switch S1 to a display number higher than S2. If your installation uses two or more cascaded C1000 units, assign the lowest number or numbers to the C1000 furthest from the host and assign progressively higher display numbers toward the host (see Figure 2-5). A 128-point C1000 responds to two contiguous displays (that is, if the unit is assigned Display 3, it responds to Displays 3 and 4). A 256-point C1000 has four displays, which can have the following assignment: Displays 2 and 3 on Switch S1 and Displays 7 and 8 on Switch S2. Figure 2-5 shows display numbers for a maximum configuration.

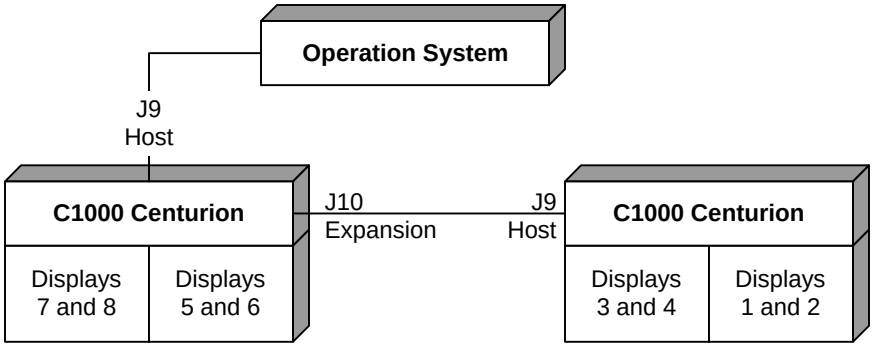


Figure 2-5 TBOS Display Number Assignments

2.3.2.2 Segments 4 – 8 (TBOS Serial Port Interface)

Segment 4 (Host) and Segment 5 (Expansion)

Segment 4 sets the host port electrical interface on C1000 TBOS units without internal modems or RS-232 boards. Segment 5 does the same for the expansion port, as shown in Table 2-11.

Table 2-11 Segments 4 and 5 of S1/S2 TBOS Units

Segment		Function
4	↑	RS-485 interface on host port (Note 1)
	↓	RS-422 interface on host port (Notes 1, 2)
5	↑	RS-485 interface or RTS On on expansion port (Note 3)
	↓	RS-422 interface port or normal RTS on expansion port (Notes 3, 4)

Notes:

1. S1-4 has no effect if the C1000 has an internal modem or an RS-232 card.
2. S2-4 must be ↓ in units handling 256 discrete inputs.
3. S1-5 has no effect if the C1000 has an RS-232 card and Z1 is set to Constant. However, if Z1 is set to Switched, Segment 5 controls RTS On or normal RTS function.
4. S1-5 must be ↓ in units handling 256 discrete inputs.

Carrier On/Auto Selection (Segment 6)

Table 2-12 shows the functions for Segment 6 of S1/S2.

Table 2-12 Segment 6 of S1/S2 TBOS Units

Segment		Function
6	↑	Carrier On
	↓	Automatic mode (Note)

Note: Verify that S1-6 is ↓ when using 2-wire mode. Verify that S2-6 is ↓ in units handling 256 discrete inputs.

Segments 7 and 8

Segments 7 and 8 of S1/S2 are not used.

2.3.2.3 Segments 9 and 10 (Serial Port Termination)

Segment 9 (Host Port Termination)

Segment 9 sets the balanced line termination for the TBOS host port when C1000 is not equipped with an internal modem. Table 2-13 summarizes Segment 9 of S1/S2.

Table 2-13 Segment 9 of S1/S2 TBOS Units

9	Unit Condition	Function
↑	Host port in a point-to-point link (RS-422) or at end of a multipoint link (RS-485)	180-Ohm termination applied to port (Note)
↓	Host port in the middle of a multipoint link (RS-485) or C1000 has an RS-232 card	Open termination applied to port

Note: C1000 units capable of handling 256 discrete inputs require S2-9 to be ↑, regardless of whether the C1000 has an internal modem.

Segment 10 (Expansion Port Termination)

Segment 10 sets the balanced line termination for the TBOS expansion port. S1 handles expansion ports for C1000 units having a maximum 128 discrete inputs. S2 handles the expansion port for C1000 units with 256 discrete inputs. Table 2-14 summarizes Segment 10 of S1/S2.

Table 2-14 Segment 10 of S1/S2 TBOS Units

10	Unit Condition	Function
↑	Expansion port in a point-to-point link (RS-422) or at end of a multipoint link (RS-485)	180-Ohm termination applied to port (Note)
↓	Expansion port in the middle of a multipoint link (RS-485) or C1000 has an RS-232 card	Open termination applied to port

Note: C1000 units capable of handling 256 discrete inputs require S2-10 to be ↑.

2.3.3 Internal Strapping

C1000 exists in many versions and, therefore, many different circuit board configurations are available. A C1000 with fewer than 256 discretes has a single main board located in the left side of the chassis. A C1000 with 256 discretes also has an identical board mounted in the right side of the chassis. Both boards can have a discrete expansion board mounted on them. The board on the left side contains the circuitry for RS-422/RS-485 host and expansion port communications. The host port can also be equipped with an optional RS-232 or 202T modem plug-in daughter board. The factory presets all strapping on the main and daughter boards.

Recommendation: Change only the modem sensitivity while in the field. Contact your Westronic customer service representative before making changes to any other strapping.

The following describes strapping options on all boards.

2.3.3.1 Main Board

Place a jumper to connect J3, Pins 1 and 2, if the main board is not equipped with a discrete expansion daughter board. Pin 1 is closest to the board edge.

Place a jumper to connect J9, Pins 1 and 2, if C1000 is not equipped with an internal modem or an RS-232 board. Pin 1 is closest to the board front.

Place a jumper to connect all Pins Z1A to Z1B for RS-232 or 202T modem operation (C1000 equipped with a modem or an RS-232 board).

Place a jumper to connect all Pins Z1C to Z1B for RS-422 or RS-485 operation.

2.3.3.2 202T Internal Modem PN 535-T005

The 202T internal modem comes in two varieties. Figure 2-6 shows the modem board physical layout for Part Number 535-T005. Jumper blocks Z1, Z2, and Z3 determine the communication type and sensitivity settings for the 202T internal modem. Modem sensitivity is set to -36 dBm at the factory. If your application requires a different sensitivity, set it 5 – 10 dBm below the input power level. For example, if the input power is –17 dBm, set the sensitivity to –24 dBm. Table 2-15 shows all the jumper settings.

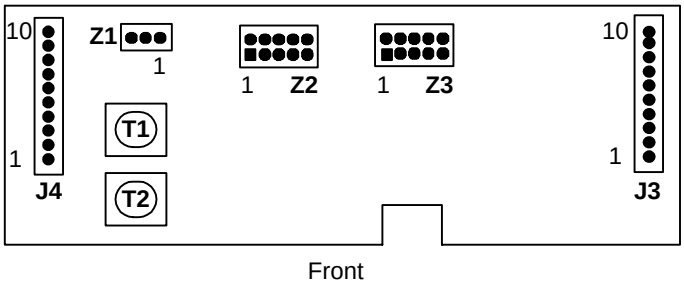


Figure 2-6 202T Internal Modem Board PN 535-T005 Layout

Table 2-15 202T Internal Modem PN 535-T005 Strap Settings

Jumper	Pins	Function
Z1	1-2	2-Wire, Half Duplex
	2-3	4-Wire, Full Duplex (Default)
Z2	1-10, 2-9, 3-8, 4-7, 5-6	–6 dBm Sensitivity
	5-6	–12 dBm Sensitivity
	4-7	–18 dBm Sensitivity
	3-8	–24 dBm Sensitivity
	2-9	–30 dBm Sensitivity
	1-10	–36 dBm Sensitivity (Default)
	None	–42 dBm Sensitivity
Z3	1-10, 2-9, 3-8, 5-6	2-Wire, 202T
	1-10, 2-9, 3-8	2-Wire, 202T, Equalized
	1-10, 2-9, 5-6	2-Wire, V.23
	1-10, 2-9	2-Wire, V.23, Equalized
	2-9, 3-8, 5-6	4-Wire, 202T (Default)
	2-9, 3-8	4-Wire, 202T, Equalized

Table 2-15 202T Internal Modem PN 535-T005 Strap Settings

Jumper	Pins	Function
Z3	2-9, 5-6	4-Wire, V.23
	2-9	4-Wire, V.23, Equalized
	1-10, 2-9, 3-8, 4-7, 5-6	103 Orig

2.3.3.3 202T Internal Modem PN 535-T016

Internal modem PN 535-T016 (Figure 2-7) has only two strapping options: selecting 2-wire or 4-wire operating mode (jumper block Z1) and whether to enable squelch (jumper block Z2). This model automatically sets receiver sensitivity. Use Table 2-16 to configure the modem according to your local engineering requirements. Table 2-16 indicates the factory default settings.

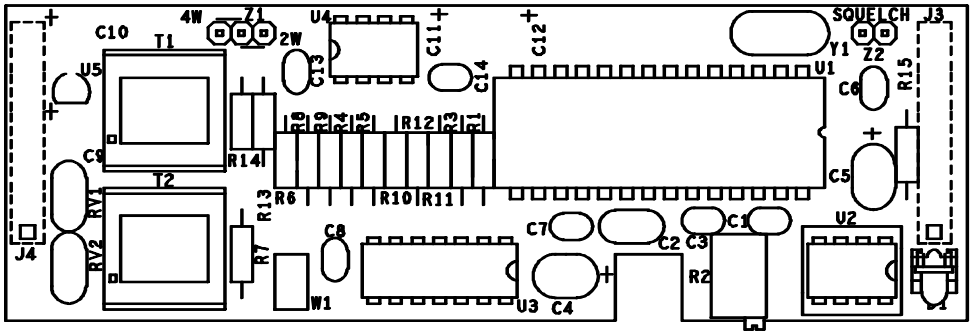


Figure 2-7 202T Internal modem Board PN 535-T016 Layout

Table 2-16 202T Internal Modem PN 535-T016 Jumper Settings

Jumper	Strap Pins	Function
Z1	1-2 (Default)	4-Wire, Full Duplex
	2-3	2-Wire, Half Duplex
Z2	Installed	Squelch Enabled
	Not Installed (Default)	Squelch Disabled

The squelch jumper, when inserted, disables the receive line while the modem transmits. Install the jumper to enable squelch when operating in 2-wire mode.

In a TABS application, set DIP switch segment S1-7 in the Down (Auto) position when operating in 2-wire mode or when operating in 4-wire mode with squelch enabled.

The **Carrier Detect** LED illuminates whenever the modem detects a carrier. When operating in 2-wire mode, the LED blinks while the modem transmits because the modem detects its own carrier regardless of the squelch jumper (Z2) setting.

2.3.3.4 Internal RS-232 Board Straps

Connect Z1 Pins 1 and 2 together for constant carrier or Pins 2 and 3 together for automatic (switched) carrier.

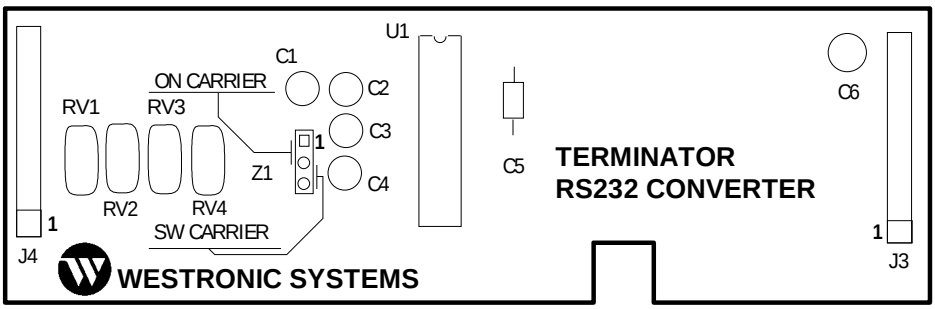


Figure 2-8 RS-232 Host Interface Board PN 535-T007 Layout

2.4 Front-Panel Control and Indicators

Table 2-17 lists the front-panel indicators along with their function and description. See Section C1000 Unit Configuration for discussions on the front-panel DIP switch settings. Figure 1-1 shows the location of all controls and indicators.

Table 2-17 Front Panel Indicators

Indicator	Function	Description
MPU RUN	Microprocessor Run	Indicates proper microprocessor initialization and operation. A hardware or software failure has occurred if LED **MPU RUN** is Off after powering the unit. LED **MPU RUN** is Off if the input power wire polarities are reversed.
HOST RX	J9 Receive	LED blinks On for each poll received from the host.
HOST TX	J9 Transmit	LED blinks On for each response transmitted to the host.
EXPN RX	J10 Receive	LED blinks On for each response received from subtending units.
EXPN TX	J10 Transmit	LED blinks On for each poll relayed to subtending units.

When C1000 is equipped with a modem, you can adjust the transmit carrier level through the tuning access located near the top center of the

front panel. Turn the adjusting screw clockwise to increase or counter-clockwise to decrease the transmit carrier level.

2.5 Universal Annunciator Panel Option

The Universal Annunciator Panel provides simultaneous audible and visual notification of alarms reported by a combination of a maximum eight Westronic Remote Telemetry Units (RTUs), such as C1000, WS1000, WS2000, and WS3000. The panel is equipped with an audible annunciator, power LED, audible alarm disable switch, lamp test button, alarm cutoff button, and eight individual alarm LEDs. You can use the panel with the following C1000 Part Numbers:

- 594-T087
- 594-T088
- 594-T089
- 594-T090
- 594-T091
- 594-T092
- 594-T093
- 594-T094
- 594-T100
- 594-T101
- 594-T102
- 594-T103

2.5.1 Mounting

The Universal Annunciator Panel is one Vertical Unit (VU) or 1.75 inches in height and mounts in a standard 19- or 23-inch (using included adapters) communications rack. The panel mounts flush with the rack or has a front extension by positioning the mounting ears toward the front or rear.

2.5.2 Electrical Connections

The panel connects to the last control relay output of each TABS address to provide both audible and visual standing alarm summary indications. Set the appropriate C1000 front-panel DIP switch segment (S1-6 or S2-6) to the Up position to disable the last control output and enable the summary alarm output (see Table 1-3). See *TABS Unit DIP Switch Settings* on Page 18 for more details on all the DIP switch settings. Figure 2-9 shows the locations of all front-panel controls and indicators and rear-panel connectors.

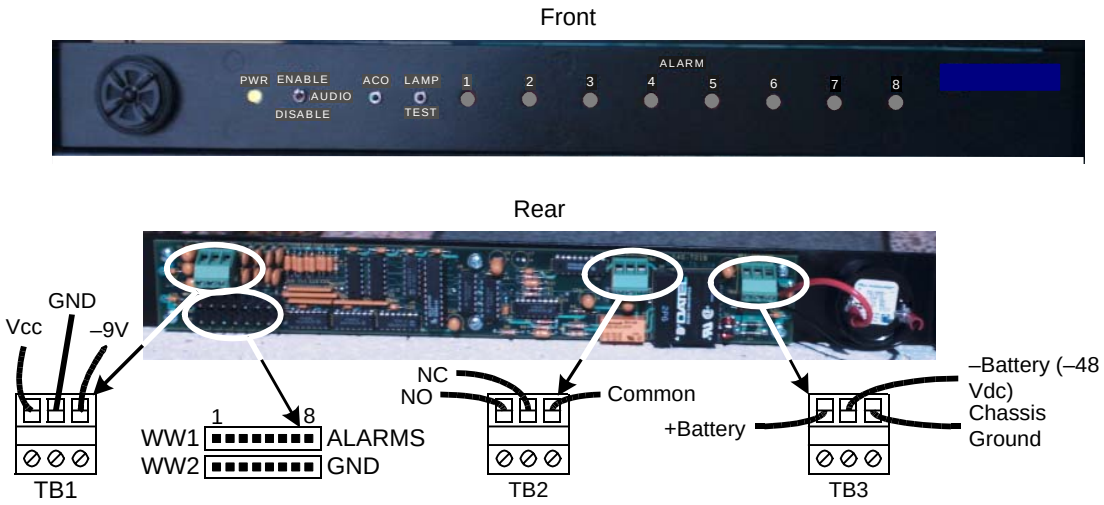


Figure 2-9 Universal Annunciator Panel, Front and Rear Panels

Caution: Exercise caution when making wiring connections to the rear of the annunciator panel. Small bits of wire or other debris can fall into units mounted lower in the equipment rack. Westronic Systems is not responsible for damage caused by debris falling into this or other equipment.

TB1 is reserved for future expansion.

TB2 is a summary alarm output (normally open/normally closed contacts and common) for use with an external unit. **TB2** output, rated at 2 Amps (24 Watts maximum) switching, provides an alarm output any time the audible alarm activates.

Input power (–20 Vdc to –72 Vdc) connects to TB3. Pin 1 is +Batt, Pin 2 is –Batt, and Pin 3 is chassis ground.

Make alarm input connections at connectors **WW1** (**ALARMS**) and **WW2** (**GND**). Table 2-18 shows the input connections. For example, possible connection for a C1000 with 16 control outputs is as follows:

From C1000	To UAP Alarm 2 LED
J4-4 (C16)	WW1-2 (ALARMS)
J4-29 (C16R)	WW2-2 (GND)

A C1000 with 32 control outputs possibly connects as follows:

From C1000	To UAP Alarm 5 LED
J8-4 (C32)	WW1-5 (ALARMS)

J8-29 (C32R) WW2-5 (GND)

Table 2-18 Summary Alarm Input Connections

Connector	Front Panel ALARM LED							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
WW1 (ALARMS) Pin	1	2	3	4	5	6	7	8
WW2 (GND) Pin	1	2	3	4	5	6	7	8

2.5.3 Operation

The **PWR** LED lights green when power is properly applied and lights red when the power leads are reversed. Verify that **PWR** is green when applying power. Press the **LAMP** TEST pushbutton to test all LEDs.

When the annunciator panel receives a relay closure (alarm) from the C1000, the appropriate front panel **ALARM** LED lights red and the audible alarm sounds. The alarm output is available at TB2 as normally open, normally closed, and common points. You can use the alarm output to indicate an alarm to another unit, such as an end-of-rack indicator. The audible alarm sounds until disabled by the audible alarm timer (available on units delivered after August, 1998), the alarm cutoff (**ACO**) button is pressed, or the alarm input clears. The alarm does not sound again until receipt of another alarm input. The **ALARM** LED remains lit until the alarm input is removed.

Moving the **AUDIO** switch to the down position (**DISABLE**) disables the audible alarm until returned to the up position (**ENABLE**) and has no other effect on panel operation, including the alarm output at **TB2**.

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3 Maintenance

3.1 C1000 Startup Tests

During C1000 powerup, C1000 runs a series of diagnostic tests, such as a Random Access Memory (RAM) test and a Programmable Read Only Memory (PROM) checksum test, to verify microprocessor integrity. While the **MPU RUN** LED is off during startup, the front-panel receive and transmit LEDs for both serial ports help determine failed startup tests. The **RX** LED indicates testing in progress for the PROM checksum and the **TX** LED indicates testing in progress for RAM integrity. Initially, the appropriate LED illuminates on each test. If all tests pass, the **RX** or **TX** LEDs turn off (if the serial ports are not terminated) and the **MPU RUN** LED on the unit front lights and remains lit as long as the C1000 has power.

PROM Checksum and RAM Failure

The **Host RX** LED remaining lit after the **MPU RUN** LED lights indicates that the actual calculated checksum does not agree with the embedded firmware checksum.

The **Host TX** LED remaining lit after the **MPU RUN** LED lights indicates a fatal RAM failure, which in turn causes the MPU to disable unit operation.

The RAM and PROM reside within the microprocessor chip and are not repairable in the field. If the chip appears to have failed, contact the factory for a Return Material Authorization (RMA) number to begin the repair process.

3.2 C1000 TABS Failure Indications

Table 3-1 through Table 3-5 refer to possible failure indications on various configurations of C1000 TABS units. Table 3-6 describes the notes listed in the **Trouble Notes** columns.

Table 3-1 Single C1000 Connection to a TABS Host System (RS-422 or 202T)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-6)
0	On	Flash	Flash	–	–	1
1	Off	No Flash	No Flash	–	–	2
1	On	No Flash	No Flash	–	–	3, 6, 10, 13, 20
1	On	Flash	No Flash	–	–	3, 6, 10, 13, 20, 21
1	On	Flash	No Flash	–	–	5, 9, 15, 18, 19

Table 3-2 Multiple C1000 Connections to a TABS Host System (RS-485)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-6)
0	On	Flash	Flash	–	Flash	1
1	Off	No Flash	No Flash	–	–	2
1	On	No Flash	No Flash	–	No Flash	3, 6, 10, 13, 20
1	On	Flash	No Flash	–	Flash	3, 6, 10, 13, 21
1	On	Flash	Flash	–	Flash	5, 9, 15, 16, 18, 19, 21

Table 3-3 Multiple C1000 Units/Network Element Connections to a Single C1000 (RS-485) and to a TABS Host System (202T Modem)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-6)
0	On	Flash	Flash	Flash	Flash	1
1	Off	No Flash	No Flash	No Flash	No Flash	2
1	On	No Flash	No Flash	No Flash	No Flash	3, 6, 10, 13, 20
1	On	Flash	Flash	No Flash	Flash	4, 5, 9, 15, 18, 19
1	On	Flash	No Flash	Flash	Flash	8, 9, 12, 14, 17
1	On	Flash	No Flash	No Flash	Flash	3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 16, 17, 20, 21
1	On	Flash	Flash	Flash	Flash	5, 8, 9, 12, 14, 16, 17, 18, 19, 21

Table 3-4 Multiple C1000 Connections to a TABS Host System (RS-232)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-6)
0	On	Flash	Flash	–	Flash	1
1	Off	No Flash	No Flash	–	–	2
1	On	No Flash	No Flash	–	No Flash	3, 10, 13
1	On	Flash	No Flash	–	Flash	3, 10, 13, 21
1	On	Flash	Flash	–	Flash	9, 18, 19, 21

Table 3-5 Multiple C1000 Units/Network Element Connections to a Single C1000 (RS-485) and to a TABS Host System (RS-232)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-6)
0	On	Flash	Flash	Flash	Flash	1
1	Off	No Flash	No Flash	No Flash	No Flash	2
1	On	No Flash	No Flash	No Flash	No Flash	3, 10, 13
1	On	Flash	Flash	No Flash	Flash	4, 9, 15, 18, 19
1	On	Flash	No Flash	Flash	Flash	9, 12, 14, 17
1	On	Flash	No Flash	No Flash	Flash	3, 4, 10, 11, 12, 13, 14, 17
1	On	Flash	Flash	Flash	Flash	5, 8, 9, 12, 14, 17, 18, 19

Table 3-6 provides descriptions and possible causes for failures indicated in the Trouble Notes columns of Table 3-1 through Table 3-5.

Table 3-6 C1000 TABS Probable Trouble Conditions

Note	Description	Check/Fix
1	Normal	N/A
2	MPU RUN LED off, no power	Check for blown or missing fuse, open power wire, or reversed ± conditions
3	Reversed host port Tx and Rx data lines	Check for crossed connections; swap data lines on host port if necessary
4	Reversed expansion port Tx and Rx data lines	Check for crossed connections; swap data lines on expansion port if necessary
5	Reversed host port Tx+ and Tx– data lines	Check for crossed connections; swap data lines on host port Tx pins if necessary

Table 3-6 C1000 TABS Probable Trouble Conditions

Note	Description	Check/Fix
6	Reversed host port Rx+ and Rx– data lines	Check for crossed connections; swap data lines on host port Rx pins if necessary
7	Reversed expansion port Tx+ and Tx– data lines	Check for crossed connections; swap data lines on expansion port Tx pins if necessary
8	Reversed expansion port Rx+ and Rx– data lines	Check for crossed connections; swap data lines on expansion port Rx pins if necessary
9	Inoperative host port transmit driver	Replace C1000
10	Inoperative host port receive circuitry	Replace C1000
11	Inoperative expansion port transmit driver	Replace C1000
12	Inoperative expansion port receive circuitry	Replace C1000
13	Host port receive termination DIP switch segment 9 in wrong position	Set DIP switch segment 9 to opposite setting
14	Expansion port receive termination DIP switch segment 10 in wrong position	Set DIP switch segment 10 to opposite setting
15	Host port RS-422/RS-485 DIP switch segment 6 in wrong position	Set DIP switch segment 6 to opposite setting
16	Inoperative receive circuitry on downstream C1000 or network element	Check downstream C1000 or network element
17	Inoperative transmit driver on downstream C1000 or network element	Check downstream C1000 or network element
18	Inoperative receive circuitry on TABS host system	Check TABS host system for proper operation
19	202T modem transmit level is out of adjustment	Set transmit output of 202T modem to proper level
20	202T modem receive sensitivity is out of adjustment	Set receive input sensitivity to proper level
21	TABS address DIP switches set to wrong address number	Set address DIP switches to correct address number

C1000 TBOS Failure Indications

Table 3-7 through Table 3-11 refer to possible failure indications on various configurations of C1000 TBOS units. Table 3-12 describes the notes in the **Trouble Notes** columns.

Table 3-7 Single C1000 Connection to a TBOS Host System (RS-422 or 202T)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-12)
0	On	Flash	Flash	–	–	1
1	Off	No Flash	No Flash	–	–	2
1	On	No Flash	No Flash	–	–	3, 6, 10, 13, 21
1	On	Flash	No Flash	–	–	3, 6, 9, 10, 13, 21, 22
1	On	Flash	Flash	–	–	5, 9, 15, 19, 20

Table 3-8 Multiple C1000 Connections to a TBOS Host System (RS-485)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-12)
0	On	Flash	Flash	–	Flash	1
1	Off	No Flash	No Flash	–	–	2
1	On	No Flash	No Flash	–	No Flash	3, 6, 10, 13
1	On	Flash	No Flash	–	Flash	3, 6, 9, 10, 13, 22
1	On	Flash	Flash	–	Flash	5, 9, 15, 19

Table 3-9 Multiple C1000 Units/Network Element Connections to a Single C1000 (RS-485) and to a TBOS Host System (202T Modem)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-12)
0	On	Flash	Flash	Flash	Flash	1
1	Off	No Flash	No Flash	No Flash	No Flash	2
1	On	No Flash	No Flash	No Flash	No Flash	3, 6, 10, 13, 21
1	On	Flash	Flash	No Flash	No Flash	4, 5, 9, 11, 15, 19, 20
1	On	Flash	No Flash	Flash	Flash	8, 9, 12, 14, 18
1	On	Flash	No Flash	No Flash	Flash	3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 17, 18, 21, 22
1	On	Flash	Flash	Flash	Flash	5, 8, 9, 12, 14, 17, 18, 19, 20, 22

Table 3-10 Multiple C1000 Connections to a TBOS Host System (RS-232)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-12)
0	On	Flash	Flash	–	Flash	1
1	Off	No Flash	No Flash	–	–	2
1	On	No Flash	No Flash	–	No Flash	3, 10, 13
1	On	Flash	No Flash	–	Flash	3, 9, 10, 13, 22
1	On	Flash	Flash	–	Flash	9, 19

Table 3-11 Multiple C1000 Units/Network Element Connections to a Single C1000 (RS-485) and to a TBOS Host System (RS-232)

Host Bit 64	MPU Run LED	Host Port RX LED	Host Port TX LED	Expn Port RX LED	Expn Port TX LED	Trouble Notes (See Table 3-12)
0	On	Flash	Flash	Flash	Flash	1
1	Off	No Flash	No Flash	No Flash	No Flash	2
1	On	No Flash	No Flash	No Flash	No Flash	3, 10, 13
1	On	Flash	Flash	No Flash	No Flash	4, 9, 11, 19
1	On	Flash	No Flash	Flash	Flash	9, 12, 14, 18
1	On	Flash	No Flash	No Flash	Flash	3, 4, 10, 11, 12, 13, 14, 17, 18, 22
1	On	Flash	Flash	Flash	Flash	9, 12, 14, 17, 18, 19, 22

Table 3-12 provides descriptions and possible causes for failures indicated in the Trouble Notes columns in Table 3-7 through Table 3-11.

Table 3-12 C1000 TBOS Probable Trouble Conditions

Note	Description	Check/Fix
1	Normal	N/A
2	MPU RUN LED off, no power	Check for blown or missing fuse, open power wire, or reversed ± conditions
3	Reversed host port Tx and Rx data lines	Check for crossed connections; swap data lines on host port if necessary
4	Reversed expansion port Tx and Rx data lines	Check for crossed connections; swap data lines on expansion port if necessary
5	Reversed host port Tx+ and Tx– data lines	Check for crossed connections; swap data lines on host port Tx pins if necessary
6	Reversed host port Rx+ and Rx– data lines	Check for crossed connections; swap data lines on host port Rx pins if necessary
7	Reversed expansion port Tx+ and Tx– data lines	Check for crossed connections; swap data lines on expansion port Tx pins if necessary
8	Reversed expansion port Rx+ and Rx– data lines	Check for crossed connections; swap data lines on expansion port Rx pins if necessary
9	Inoperative host port transmit driver	Replace C1000
10	Inoperative host port receive circuitry	Replace C1000
11	Inoperative expansion port transmit driver	Replace C1000
12	Inoperative expansion port receive circuitry	Replace C1000
13	Host port receive termination DIP switch segment 9 in wrong position	Set DIP switch segment 9 to opposite setting
14	Expansion port receive termination DIP switch segment 10 in wrong position	Set DIP switch segment 10 to opposite setting
15	Host port RS-422/RS-485 DIP switch segment 4 in wrong position	Set DIP switch segment 4 to opposite setting
16	Expansion port RS-422/RS-485 DIP switch segment 5 in wrong position	Set DIP switch segment 5 to opposite setting
17	Inoperative receive circuitry on downstream C1000 or network element	Check downstream C1000 or network element
18	Inoperative transmit driver on downstream C1000 or network element	Check downstream C1000 or network element

Table 3-12 C1000 TBOS Probable Trouble Conditions

Note	Description	Check/Fix
19	Inoperative receive circuitry on TBOS host system	Check TBOS host system for proper operation
20	202T modem transmit level is out of adjustment	Set transmit output of 202T modem to proper level
21	202T modem receive sensitivity is out of adjustment	Set receive input sensitivity to proper level
22	TBOS display DIP switches set to wrong display number	Set display DIP switches to correct display number

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