HARRIS

WS2000 E-Telemetry with TABS SmartScanner

User Guide

994-T012 Rev. A

WS2000 E-Telemetry with TABS SmartScanner

User Guide

994-T012 Rev. A

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Table of Contents

About This Guide

This WS2000 E-Telemetry with TABS Remote Monitoring System user guide has been written as a companion reference for use with the WS2000 E-Telemetry with TABS SmartScanner. The documentation is comprised of four basic parts, as listed here:

- Section 1: Product Description
- Section 2: Installation
- Section 3: Configuration
- Section 4: WESMAINT Reference

Section 1 of the guide provides a description of the WS2000 product. It explains the application and describes features of the product. Also included are specifications and requirements which must be met in order for this product to be utilized.

Section 2 provides an in-depth explanation of how to install the product. It includes handling considerations and precautions, as well as points to consider when changing out any part of the product hardware. Instructions are provided on main assembly installation, module installation, and expansion shelf installation.

Section 3 provides information about how to configure a WS2000 remote monitoring system. Following a configuration overview, the first section describes points, process lists, interfaces, protocols, and display mapping. Configuration templates are included for use as a guide when configuring the system.

Section 4 of the guide contains the WESMAINT reference. It includes descriptions of all the WESMAINT functions, options and commands.

Appendix A provides information on the configuration defaults established in each WS2000 system. The Harris standard repair and warranty policies are included in Appendix B.

Harris Product Info & Support

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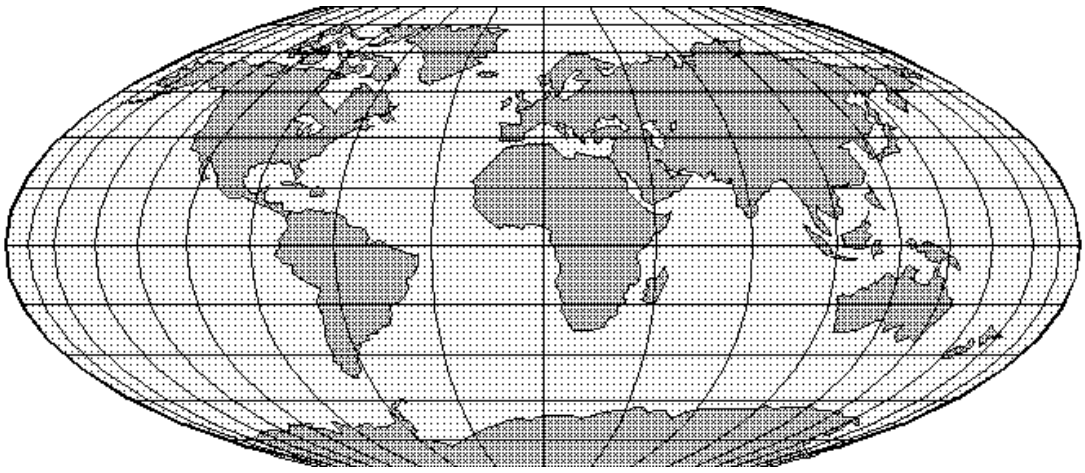

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Section 1: Product Description

1.1 Overview

The WS2000 E-Telemetry TABS Remote permits equipment with Telemetry Asynchronous Block Serial (TABS), Telemetry Byte Oriented Serial (TBOS) and discrete interfaces to be controlled and monitored, converting data to a single E-Telemetry serial channel interface. The E-Telemetry interface reports to the host network element via a direct or modem connection.

The WS2000 E-Telemetry TABS Remote is capable of picking up data and issuing controls allowing the host to view all the activity along the network. It ties multiple units together and needs only one serial interface with the host system, allowing for a more productive network and more data to be passed.

This version of the WS2000 E-Telemetry Remote monitoring system adds the capability to handle bit-oriented alarm, control, fault locate, and performance monitoring data on a TABS interface. It is now easy to pick up data from and issue controls to equipment which provides more information using a TABS interface.

The addressing and data handling capabilities of TABS have eliminated the need for many serial interfaces. This unit will handle eight TABS ports if desired via the eight TBOS/ TABS selectable input serial ports.

The E-Telemetry interfaces can be equipped with internal and external 202T modems. The modem allows for extended distances (greater than 4,000 feet) between remotes.

Concentration of data and low cost allows for the monitoring of sites which have not been monitored before due to limited serial port access, discrete input/output (I/O) access, or limited budget. Conversion of TBOS, TABS and discrete connections to E-Telemetry allows monitoring of a variety of equipment previously inaccessible to an E-Telemetry master station.

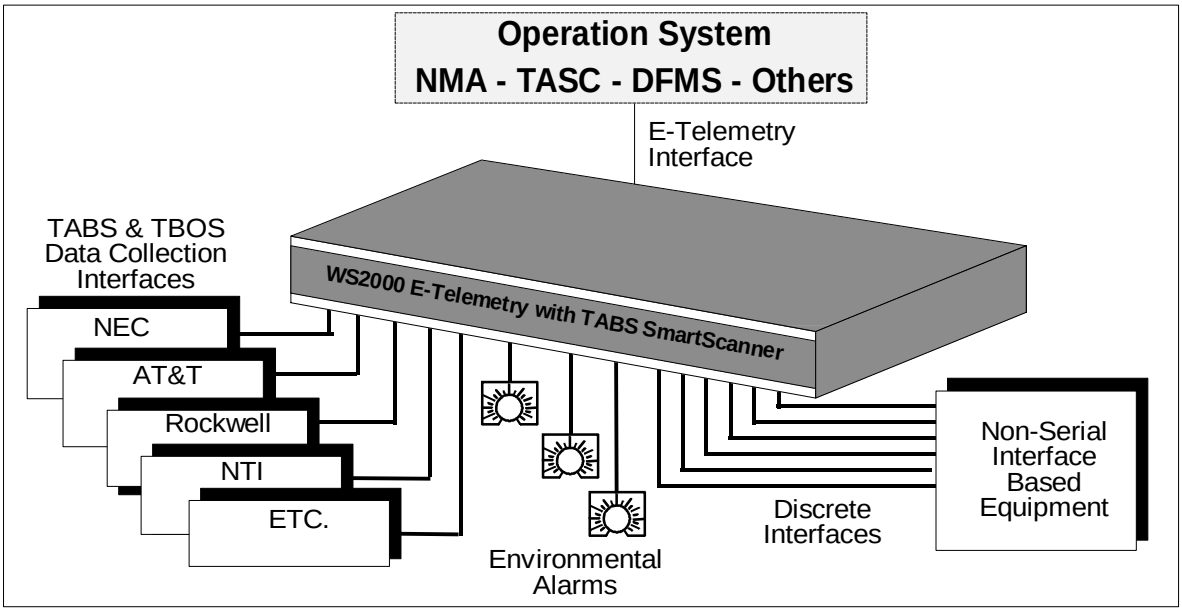
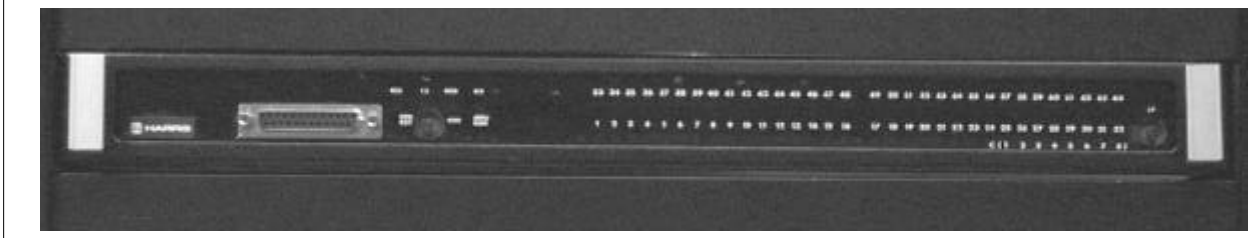


Figure 1-1. Multiple Application Monitoring Capabilities

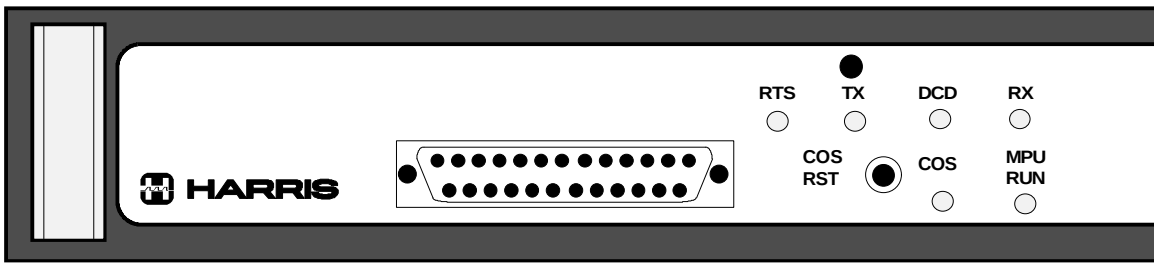
1.2 Capabilities

1.2.1 Front Panel Controls and Indicators

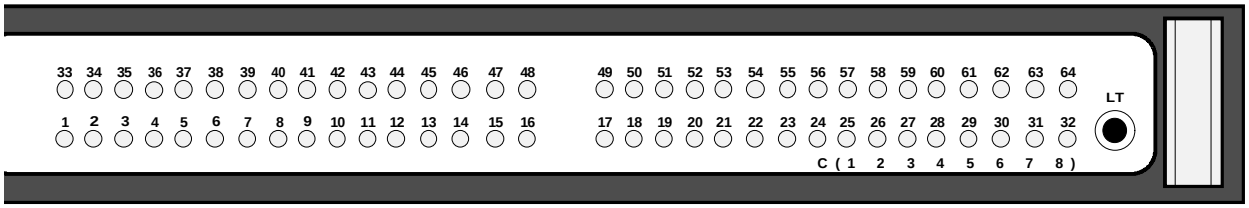
Figure 1-2 is an illustration of the WS2000 front panel.



FULL FRONT PANEL



LEFT FRONT DETAIL



RIGHT FRONT DETAIL

Figure 1-2. WS2000 Front Panel

1.2.1.1 Indicators

Table 1-1 defines the purpose and functions of all front panel indicators

INDICATOR	TITLE	FUNCTION
MPU RUN	Microprocessor Run LED	Indicates proper initialization and operation of microcomputer and real-time operating system software. Failure indicated if "Off"
COS	Change-of-State LED	Indicates input (serial/discrete) change-of-state (alarm)
STATUS/ALARM LED (1-32)	Input Indications	Alarm present on point (1-32). LED's 25-32 are indications for control outputs 1-8 if backplane jumper Z7 is installed
STATUS/ALARM LED (33-64)	Input Indications	Alarm present on point (33-64). LED's 57-64 are indications for control outputs 9-16 if backplane jumper Z9 is installed
* RTS	Request-To-Send	Carrier Output
* TX	Transmit	Transmit data indication
* DCD	Data Carrier Detect	Carrier Frequency Received
* RX	Receive	Receive data indication
* If the WS2000 unit is equipped with an optional 202T Modem or Annunciator.		

Table 1-1. Front Panel Indicators

1.2.1.2 Pushbuttons

Table 1-2 defines the purpose and functions of the front panel pushbuttons.

BUTTON	TITLE	FUNCTION
COS RST	Change-of-State Reset	Resets COS LED and central office alarm annunciator (ACO)
LT	Lamp Test	Lights all Status/Alarm LEDs

Table 1-2. Front Panel Pushbuttons

1.2.1.3 Modem Output Level Adjustment

If the optional 202T/V.23 modem is installed, its transmit output level can be adjusted with a front panel adjustment. The adjusting screw is located at the top of the front panel, above the TX LED. Turn the adjusting screw clockwise to increase the output level, and counter-clockwise to decrease it.

1.2.2 Internal

The WS2000 E-Telemetry with TABS SmartScanner is equipped with 10 serial ports, 32 discrete alarm/status inputs, and 8 discrete control outputs. The serial ports include one for E-Telemetry data reporting and one for maintenance and configuration. The additional 8 serial ports are for data collection and controls with either TABS or TBOS format.

The serial ports include P6 or P12 (Channel 1) for E-Telemetry data reporting and P5 for CRAFT maintenance and configuration. Channels 2-9 (P4, P11, P3, P10, P8, P1, P9 and P2 respectively) are serial ports that are configured for either TABS or TBOS data collection.

This capability may be expanded with plug-on expansion boards. One location on the WS2000 accepts a board that adds 32 discrete alarm/status inputs and 8 discrete control outputs. A second location is used for an optional 202T modem, providing a 4-wire VF circuit interface for the Host E-Telemetry port.

1.2.3 External Discrete Expanders

Each WS2000 SmartScanner can control up to 7 WS2000 Discrete Expanders over a parallel Peripheral Interface Bus (WPIB). Each WS2000 Discrete Expander has a minimum of 32 discrete alarm status inputs and 8 discrete control outputs. They can each be further expanded with a 32 input/8 output expansion board, providing a maximum of 64 discrete inputs and 16 discrete control outputs per Expander.

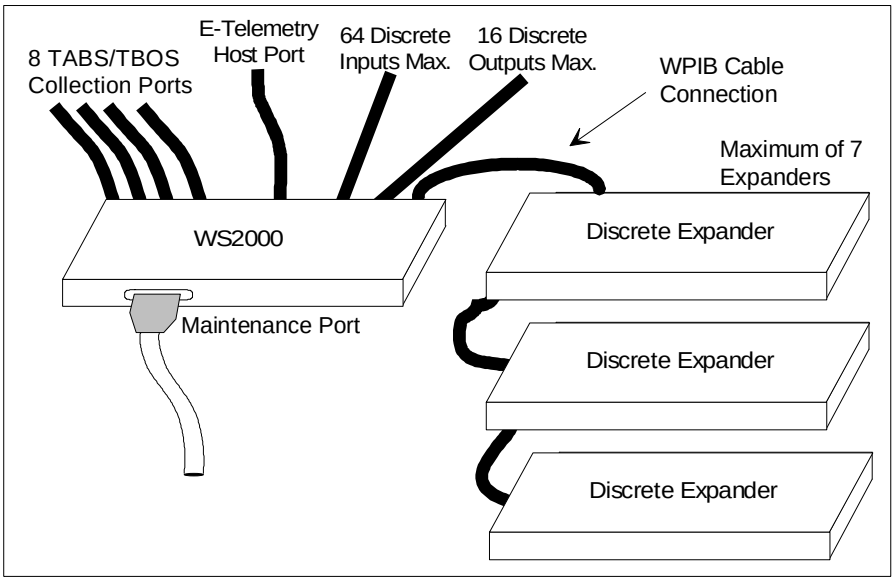


Figure 1-4. Configuration Example Using Discrete Expanders

1.2.4 Rack Mount Modem

Rack mount modem panels allow a WS2000 data collection serial port to operate on a 2 or 4 wire FSK circuit. Two types of modem are available; 1) 202T/CCITT V.23 modem (P/N 520-T001) and 2) VFCT modem (P/N 540-T001). They each require only 1 vertical space (1**x**") in a standard 19" equipment rack. Rack mount adapters are included for mounting in a 23" rack.

The front of the panels have four LED indicators to annunciate RTS, TX, DCD, and RXD. Strap Z1 on the circuit board assemblies select normal RTS or continuous carrier operation. Continuous carrier operation allows the Craft technician to align the transmit output of the modem module (refer to paragraph 2.5.4).

1.2.5 External Alarm Panel

The HARRIS External Alarm Panel can be connected to the COS relay outputs (located on TB1) to provide both audible and visual standing alarm summary indications. The external alarm panel is equipped with an audible annunciator, audible alarm disable toggle switch, ACO button and alarm summary LED. Whenever the WS2000 detects a new alarm, the audible annunciator is activated. It remains active until the ACO button is pressed, or all active alarms have cleared. The alarm summary LED remains lit as long as the WS2000 detects one or more active alarms.

The external audible indication can be silenced by depressing the COS button located on the front panel of the WS2000 or by using an external button or other device to temporarily ground the external COS reset terminal located on TB1. The COS LED on the WS2000 front panel mirrors the operation of the COS relay, providing a visual indication of the state of the relay.

When a new alarm is detected by the WS2000, the COS relay and LED are activated. Pressing the COS button acknowledges all alarms that are currently active in the WS2000. It also causes the COS relay to be released and the COS LED to be extinguished. Any new alarm that is detected after the COS button has been released, will reactivate the COS relay and LED. When all unacknowledged alarms have cleared, the COS relay and LED will be deactivated. If an acknowledged alarm clears, then re-occurs, the alarm is considered to be unacknowledged and the COS relay and LED will be reactivated. The part number for the External Alarm Panel is 520-T007

1.3 Features

This section describes unique features of the WS2000 E2A with TABS SmartScanner monitoring system. It includes information about discrete and serial interfaces, configuration and diagnostics, ancillary features, and wire-wrap interface options.

1.3.1 Discrete Interfaces

The WS2000 E-Telemetry with TABS SmartScanners and Discrete Expander units each handle 32 status/alarm inputs with on-board expansion capabilities of up to 64 inputs each. They provide 8 relay control outputs with an expansion capability of up to 16 outputs each. LED indications are provided for status/alarm inputs and control outputs.

Discrete logic inputs must be referenced to either + or - battery as desired. These inputs require "wetting" current to operate. WS2000 Remotes and Discrete Expanders derive their wetting current from the power input.

The discrete logic outputs (control points) utilize either magnetically latched Form C (SPDT) or Form A (SPST) relay contacts. They may be individually operated in either momentary or latched modes. In latched mode, the last output is magnetically held, to ensure that the output will remain during power outages. Control output type (Form A or C) is determined by backplane jumper connections (Refer to Figure 2-12). Form A outputs are normally open contacts. Form C outputs are provided as both normally open and normally closed. The wiper of each Form C relay is connected to a common control voltage. Figure 1-5 shows Form A and Form C configuration.

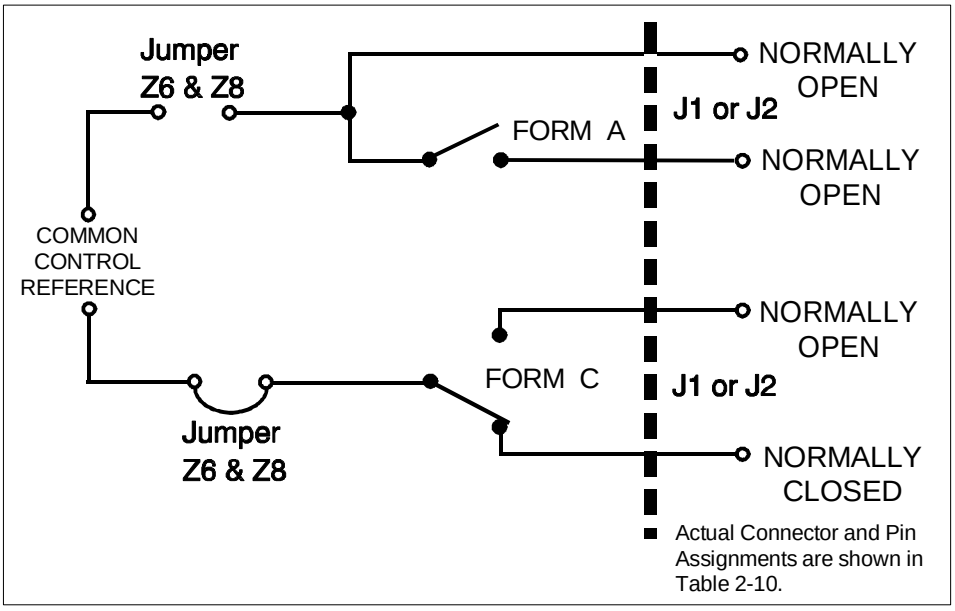


Figure 1-5. Form A and Form C Control Output Configuration

Groups of 8 relay outputs may be strapped directly as status inputs, through jumper strap selections (backplane jumper Z7 for outputs 1-8 and jumper Z9 for outputs 9-16). This allows status monitoring of control outputs. Outputs 1 - 8 are routed to status input points 25 - 32, and outputs 9 - 16 are routed to inputs 57 - 64. Note that routing these outputs reduce the discrete point input capability from 32 to 24 inputs or 64 to 56 or 48 inputs.

1.3.2 Serial Interfaces

A WS2000 E-Telemetry with TABS SmartScanners comes equipped with 10 serial ports. Channel 1 supports E-Telemetry host communications, and can use either RS-232, RS-422 or RS-485 interface. Channels 2-5 are for TBOS or TABS data collection and can also use either RS-232, RS-422 or RS-485 interface. Channels 6 - 9 are for also for TABS or TBOS data collection, but can only use RS-422 interface. Channel 10 is an RS-232, 9600 bps port used for CRAFT interface. The host communications interface (Channel 1) can also have an optional internally mounted BELL 202T/CCITT V.23 or VFCT modem that provides two or four wire (jumper strap selectable) voice frequency interface. When an internal modem is installed, front panel LEDs indicate transmit data, receive data, request-to-send and carrier detection activity. Transmit output level adjustments can be made via an access hole in the front panel.

1.3.3 Configuration and Diagnostics

A maintenance (CRAFT) port is accessible via connectors on both the front and rear of the unit. They are used to perform configuration and diagnostics. The input data to the unit and the data as it is to be reported to the host, can be viewed from either of these ports. Major functions accessible at these ports are:

- configure custom or standard data point process lists.
- assign process lists to the available data collection inputs (discrete or serial ports).
- configure and map the data collection displays into the displays available on the E2A host communications port.

Optional four digit hexadecimal password control can be set into the unit. The password resides on the 1k EPROM located on the WS2000 shelf, thus the password is retained, even if the plug-in is removed or replaced.

1.4 Ancillary Features

The WS2000 SmartScanner provides compact mechanical packaging for rack mounting utilizing a metal enclosure for shielding and support.

A watchdog/power supply monitor circuit is used to facilitate power up and power down situations as well as provide automatic initialize reset/restart capability. A microprocessor unit (MPU) RUN LED indication is provided together with a relay output contact. Event change-of-state (COS) conditions are presented by a COS LED and a relay output. A COS RESET front panel push button is provided for local reset of COS. COS can also be reset externally via a rear panel connection.

Power for the WS2000 SmartScanner is provided by -24 or -48 Vdc. It has its own integral power supply for meeting on-board logic supply requirements.

Terminal block access for input site battery power connections, four-wire modem lines, MPU RUN and COS output contacts are available at the rear of the shelf. Serial port access for the 10 serial channels is available on eight-pin connectors at the rear of the unit, and access to discrete input/output logic points is available on two rear accessible 50 position delta-type connectors.

1.5 Wire-Wrap Interface Options

In addition to the rear panel connectors, there are three wire wrap interface options available for use with the WS2000. They are:

- Telzon Interface Assembly
- Rear Access Wire Wrap Assembly
- Front Access Wire Wrap Assembly

Each provides a method for wiring discrete and/or serial connections via wire wrap pins. They are explained in the following paragraphs. Pin-outs are listed in Section 2.

1.5.1 Telzon Interface Assembly

The Telzon termination panel (Figure 1-6) is a standard "Type 89 Block". It provides front panel wire-wrap access to all discrete and serial connections. Up to two (2) blocks can be mounted on the same mounting bar. Interconnecting cables are provided to accommodate all wire wrap interfaces. Refer to Section 2 of this guide for more detailed information on the Telzon assemblies.

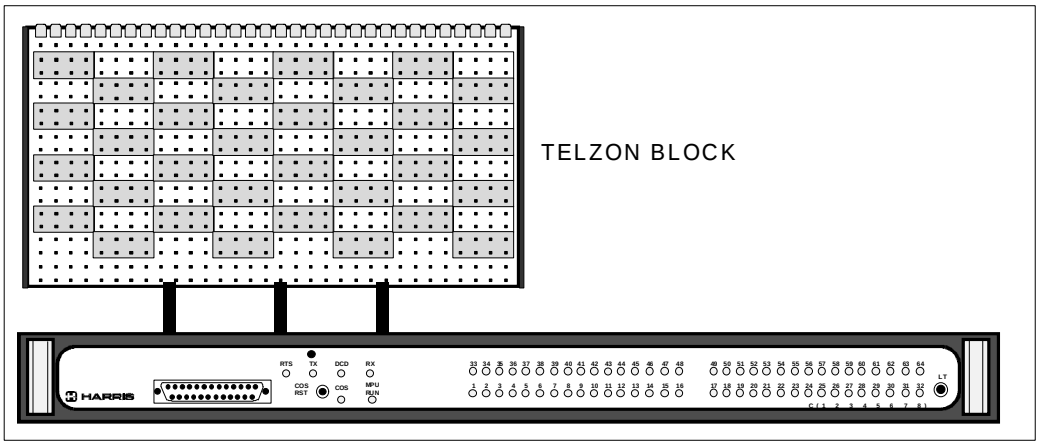


Figure 1-6. Telzon Interface Assembly

The Telzon Interface Assembly is ideally suited for central office installations where 4 vertical rack spaces (6") are available for the WS2000 unit and interface assembly. Features of this unit include:

- 64 discrete alarm inputs (status input and status input return)
- 16 discrete control outputs (form A only)
- 8 serial collection ports
- Host communications port

Part numbers for this unit are 533-T011 (23" mounting) and 533-T030 (19" mounting).

1.5.2 Rear Access Wire-Wrap Assembly

The Rear Access Interface Assembly is ideally suited for installations where only 1 vertical rack space (1**x**") is available for all alarm equipment. It preserves the 1 increment space for each WS2000 unit. The Rear Access Interface Assembly mounts onto the WS2000 back plane connectors and allows for all cabling connections via wire wrap pins. Features of this unit (part number 585-T034 for both 19" or 23" mounting) include:

- 64 discrete alarm inputs
- 16 discrete control outputs (form A or C)
- 8 data collection serial ports, 1 TBOS host port, and 1 CRAFT port.

1.5.3 Front Access Wire-Wrap Assembly

The Front Access Interface Assembly is suitable for controlled environment vault (CEV) installations, where there is limited rack space and front access to all connections is required. It requires 2U rack increments; one for itself and one for the WS2000, and provides wire wrap access to all discrete, serial, and power connections on the WS2000. Interconnecting cables are supplied with the unit to accommodate the wire wrap interfaces. Figure 1-7 is a depiction of the Front Access Interface Assembly.

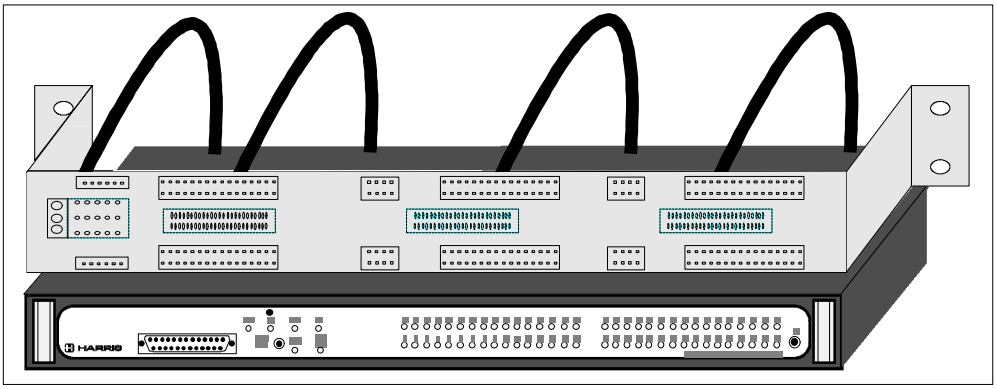


Figure 1-7. Front Access Interface Assembly

Features of this unit include:

- 64 discrete alarm inputs (status input and status input return)
- 16 discrete control outputs (form A)
- 8 serial collection ports
- 1 serial host port
- Power input
- Frame ground
- Local MPU RUN relay and audible alarm relay
- External ACO reset input

The part number for this unit is 533-T032 for the 19" or 23" mounting.

1.6 Specifications

This section provides detailed information on the electrical, environmental and mechanical specifications of the WS2000 product line. It also provides detailed data for the parallel, serial, host port and auxiliary interfaces.

1.6.1 Electrical

This section provides engineering data and electrical requirements for WS2000 alarm systems installation.

1.6.1.1 Typical Power Requirements

- Input Voltage Range: -20 to -60 Vdc
- Power requirements: 5.0W (No input sense currents)
  24.0W (64 inputs sense currents)
- Fusing of WS2000 units: Refer to Table 2-25

1.6.1.2 Switching Power

- External power is available from the WS2000 unit.
- Supply Outputs: + 5.0 Vdc ±5% @ 1.5A (maximum)
  +12.0 Vdc ±0% @ 400mA ea. (maximum)
  ±12.0 W total output power

1.6.2 Interfaces

This section provides detailed data on each of the WS2000 interfaces.

1.6.2.1 Parallel Interface

- WPIB (Peripheral Interface Bus)
- 8 WPIB Addresses assigned to WS2000 SmartScanner

1.6.2.2 Serial Ports

Host Port

- E-Telemetry protocol, asynchronous, 8 data bit characters, odd parity, 1 stop bits, 1200 bps
- RS-232/RS-422/RS-485 Selectable
- Optional: Harris 202T / V.23 MODEM, 1200 baud, Bell 202T/CCITT V.23 compliant, FSK, TX Output: +2 dBm (Max), RX sensitivity: -48 dBm (selectable, see paragraph 2.5.5), 2-Wire or 4-Wire modem
- Connectors: P6, P12, or TB1 (see Section 2 for specific connector applications)

TBOS/TABS Communications Ports 2-9

- Asynchronous, 8 data bit characters, odd parity, 1 stop bit (TABS), 2 stop bits (TBOS), 1200 or 2400 bps
- Channels 2-5 are RS-232/RS-422/RS-485 selectable
- Channels 6-9 are RS-422 only
- Connectors: P4, P11, P3, P10, P8, P1, P9 and P2 respectively (Channels 2-9 respectively)

WESMAINT (CRAFT) Port

- Asynchronous, 7-bit characters, even parity, 1 stop bit, 9600 bps
- RS-232
- +5 Vdc, ±12 Vdc
- PROGEN (Program Enable/EEPROM Write Enable)
- Connectors: P5 or front access DB25

1.6.2.3 Status/Alarm Inputs

- 32 or 64 photo-coupled inputs, arranged in groups of 8, with a single common for all inputs
- + Battery (Ground) Input Voltage, - Battery (-48/-24 Vdc) Common
- Input current: 3 to 5mA per point.
- Logic Levels for -24 Vdc system :
  - Logic 0: input open or -18 to -30 Vdc
  - Logic 1: input greater than -8.0 Vdc
- Logic Levels for -48 Vdc system :
  - Logic 0: input open -40 to -60 Vdc
  - Logic 1: input greater than -12.0 Vdc
- Logic level sensing may be inverted through maintenance port configuration set-up

1.6.2.4 Control Outputs

- 8 or 16 relay control outputs
- Momentary/latched operation set via either the CRAFT port or E2A Host.
- Contact Arrangement (Selectable per output): SPST Normally Open (Form A) or SPDT (Form C) with common voltage applied to contact wiper
- Contact Ratings: 2A @ 30 Vdc
  0.6A @ 110 Vdc
  60W (maximum) switching power

1.6.2.5 Auxiliary

- MPU RUN Relay Output: SPDT (Form C)
- COS Relay Output: SPDT (Form C)
- Output Contact Ratings: 1A @ 60 Vdc
- COS RESET input: + battery pulse

1.6.3 Environmental

- Operating ambient temperature range: 0C to +55C
- Humidity: < 95% non-condensing

1.6.4 Mechanical

The WS2000 hardware is described in the following paragraphs.

1.6.4.1 Dimensions

- Height - 1.75" (4.4 cm) Width - 17.373" (44.13 cm) Depth - 8.0" (20.3 cm)

1.6.4.2 Mounting

- 19" (48.26 cm) rack mounting, or
- 23" (58.42 cm) rack mount (with optional adapters)

1.6.4.3 Weight

- 5.3 lbs. (2.4 Kg.) maximum unpackaged
- 8 lbs. packaged

1.6.4.4 Connectors

- ***Power, analog and auxiliary connections:*** TB1 - 14 position, dual level, compression terminal block, accepts #14 to #24 AWG.
- ***Serial and digital host port connections:*** P1-P6, P8-P13 - 8 position, header terminal connectors. Mating connectors are manufactured by:
  - Methode: 1300-108-424 or 130F-108-424 (Harris part number 620-0077 or 690-T006/690-T007)
- ***WPIB connection:*** P7 - (2 X 17) 34 position, ribbon cable header. Mating connector manufactured by:
  - Amp: 746094-8 or Robinson Nugent: IDS-C34PK-SR-TR or Assman: AWP 34-7241

- ***Discrete and control output connections:*** J1, J2 - 50 position, female, Delta-type connectors. Mating connector manufactured by:
  - TRW part number 97-12500-180 or 97-12500-181 (Harris part number 620-0078)

1.7 Part Numbers

Table 1-3 lists Part Numbers for the WS2000 E2A with TABS SmartScanners, accessories and spares.

PART NUMBER	NAME	SERIAL PORTS	DISCRETE I/O		MODEM TYPE	PLUG IN
			INPUT	OUTPUT		
WS2000 E-Telemetry with TABS SmartScanners and Discrete Expanders						
590-T089	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	32	8	None	500-T088
590-T279	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	64	16	None	500-T094
590-T278	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	32	8	202T	500-T089
590-T280	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	64	16	202T	500-T095
590-0106	Discrete Expander	None	32	8	None	500-2006
590-0074	Discrete Expander	None	64	8	None	500-2004
Kits						
585-T043	E-Telemetry w/TABS kit *	8 TABS/TBOS	32	8	202T	500-T089
585-T041	E-Telemetry w/TABS kit **	8 TABS/TBOS	64	16	202T	500-T095
Accessories						
519-0300	WESMAINT Portable					
519-T001	Rack Mount WESMAINT					
567-T007	PC-WESMAINT Software					
533-T030	Telzon Wire-Wrap Block 19"		64	16		
533-T011	Telzon Wire-Wrap Block 23"		64	16		
533-T032	Front Access Interface Assy		64	16		
585-T034	Rear Access Interface Assy		64	16		
520-T001	Rack Mount 202T Modem				202T	
520-T007	Audible/Visual Alarm Panel					
620-0077	8-Pin Serial Connector					
620-0078	50-Pin Delta Connector					
990-0150	Serial Insertion Tool					
977-T042	JB3 Termination Plug					
585-0005	Serial Connector Kit (12 connectors, 1 tool)					
500-2000	Shelf Assembly					19"
994-T012	User Guide					
585-T055	Rack Adapters Kit					23"
Plug-Ins						
500-T088	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	32	8	None	N/A
500-T094	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	64	16	None	N/A
500-T089	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	32	8	202T	N/A
500-T095	E-Telemetry w/TABS SmartScanner*	8 TABS/TBOS	64	16	202T	N/A
500-2006	Discrete Expander		32	8	None	N/A
500-2004	Discrete Expander		64	8	None	N/A

* Consists of 590-T090, 620-0077 (10 ea.), 620-0078 (2 ea.) and 990-0150

** Consists of 590-T095, 620-0077 (10 ea.), 620-0078 (2 ea.) and 990-0150

Table 1-3. WS2000 E-Telemetry with TABS SmartScanner Equipment Part Numbers

1.8 Other Products from Harris

The following information is provided about other Harris products which are available to meet network and alarm system needs. Call **214-235-5292** and talk with a Harris representative to learn more about these and other Harris Network Support Systems.

1.8.1 C1000 "Centurion"

The C1000 Centurion complements many operation support systems by providing an economical and flexible means of collecting small to large quantities (32 - 256 points) of discrete alarm and status data, and converting them to simple, easy to handle TABS or TBOS interface.

Different versions of the C1000 allow communications with either a TABS or TBOS host. The C1000 can pass through polls for other addresses. This permits C1000 units to be daisy-chained for larger configurations, and permits the C1000 and local network elements telemetry data to be combined into a single channel. In some cases, data can be combined through a single modem.

The C1000 requires only 1 vertical space (1**x**") in either a 19" or 23" equipment rack, allowing it to be located as close as possible to the source of discrete interfaces. The result is a large reduction in the amount of wiring required to pick up alarm and status data. This reduction in wiring eliminates the possibility of losing data through unknown disconnected, moved or cut wiring. Serial and discrete interface are via standard DE9 and 50-Pin connectors, making installation and replacement exceptionally fast and simple.

The C1000 is equipped with two serial ports. The Host Port serves as a TABS or TBOS host communications interface and can be equipped with an optional 1200 baud Bell 202T compatible internal modem, allowing the C1000 to be located beyond the range of standard RS-422/RS-485 interfaces. The Expansion Port serves as a TABS or TBOS data collection interface. The housing can also accommodate up to eight 50 pin discrete interface connectors. This same housing is used with all of the different configurations.

1.8.2 WS1000 "Terminator"

The Terminator product line complements many operations and network management systems by providing an economical, flexible means of converting varying quantities of discrete (dry-contact) alarm, status and control data to a simple, easy-to-handle TABS or TBOS interface.

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

Small size and flexible mounting requirements allow placement of the unit close to the source of discrete interfaces. It may be mounted in an equipment bay or on a distribution frame as the application demands. This flexibility results in considerable 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 Terminator. All active components are located on the easily 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.

1.8.3 WS2000 "SmartScanner"

The SmartScanner product line offers the data collection and reporting capabilities necessary to make small remote telemetry units more flexible and efficient. SmartScanners combine compact design with the 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" or 23" racks. Other mountings are available.

A WS2000 Remote can be equipped with:

- 4 or 8 serial ports supporting user-selectable RS-232, RS-422, and RS-485 interfaces at 1200 and 2400 bps.
- 32 to 512 discrete alarm/status inputs and 8 to 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, and RS-485 at 1200 2400, and 9600 bps. An optional internal modem is available.

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

- Asynchronous and Synchronous serial
- Discrete inputs and outputs
- Analog and Pulse inputs

Some of the many types of serial protocols available include E-Telemetry (E2A format), TABS, TBOS and MCS-11

1.8.4 WS3000 "SuperScanner"

The WS3000 is a powerful telemetry unit that combines the most useful functions of discrete and serial alarm collection, mediation and access with a high-speed processor and large data base capacity. It is the ideal bridge between today's telemetry networks and the advanced protocols now appearing. With Ethernet and X.25 connectivity, data base capacity to over 30,000 data points, and the power to handle advanced ASN.1 and Q.3 protocols, the WS3000 is the choice of quality telecommunications carriers. WS3000 Remote features include:

- 8 serial ports supporting user-selectable RS-232, RS-422, and RS-485 interfaces from 1200 to 9600 bps.
- 32 to 512 discrete alarm/status inputs and 8 to 128 discrete control outputs. Can support up to 30,000 serial-based, discrete, control and analog points.
- Synchronous or asynchronous host port with DMA and host port interface at RS-232, RS-422 or RS-485 at up to 64000 bps. An optional 202T-compliant modem is also available.
- 8 Analog inputs. Cover up to 24 analog inputs with expanders.
- Modular software written in C
- Available suite of protocols includes TABS, TBOS, E2A, TELTRAC and TL1

- Custom protocols are available on a special assembly basis
- Host interfaces include X.25, CLNP, OSI 7 layer stack, Q-LAN, SONET-LAN and TCP/IP

1.8.5 WS5000 "Data Transport System"

The WS5000 is a versatile, powerful data hub which combines the tough reliability of a telemetry device with the advanced features of a data switch. Its high-speed serial and Ethernet channels fit into a small, cost-effective unit for use at the operations center of a central office or at remote sites. Its "install and forget" design makes it the perfect management tool for today's pervasive SONET or SDH Intelligent Network Elements.

While Intelligent Network Elements (INE) simplify operations, maintenance and surveillance, they also produce and require significantly more data for provisioning and administration. Equipped with advanced message protocols, such as TL1 and CMIP, INE can operate at rates ranging from 1200 bps up to Ethernet speeds of 10 Mbps. The need for abundant high-speed interfaces is clear.

So is the need for efficient data transfer. With carriers moving data from dedicated lines to CLNP, X.25 and TCP/IP routed networks, the ability to preserve equipment, training and installation investments has never been more important. The WS5000 provides a simple, upgradeable, easy-to-engineer, easy-to-support and easy-to-provision data switch and hub for today's complex data network requirements.

Section 2: Installation

2.1 Overview

This section describes how to perform installation and hardware configuration of the WS2000 E-Telemetry with TABS SmartScanner. The first paragraph describes handling considerations and precautions. Subsequent paragraphs provide details about how to install the unit. The final paragraphs describe the physical layout of the unit and available options.

2.2 Handling Considerations and Precautions

Caution is necessary when handling WS2000 modules due to Complementary Metal Oxide Semiconductor (CMOS) and NChannel Metal Oxide Semiconductor (NMOS) integrated circuits. These components are provided to maximize noise immunity and promote low power consumption. There is a possibility that CMOS and NMOS integrated circuits could become damaged due to high static voltage levels.

The CMOS and NMOS devices are equipped with protection diodes, but incorrect handling allowing excessive static energy to enter the devices may still cause device failure. Failure may not be readily detected and, in time, could lead to premature device failure.

Figure 2-2. Electrostatic Discharge (ESD) Warning

The following points are worth noting as they will significantly reduce static damage on CMOS or NMOS components thereby improving system reliability and keeping system downtime to specified limits.

- Before removing or inserting WS2000 modules, personnel should ensure that they are not carrying static charges. This can easily be done by grounding oneself (i.e., using a heel or wrist ESD strap).
- After a WS2000 module is extracted, it should always be placed into an anti-static bag or covering for transportation and storage.
- Repair work on WS2000 modules should be carried out on an anti-static work station with personnel grounded (i.e., wrist-straps and anti-static matting in work station).
- Extreme care should be exercised when handling CMOS/NMOS components. Try not to touch their pins and always place them in anti-static foam for storage and transportation.
- Ensure that de-soldering tools have static reduction. Some de-soldering tools can actually generate large static voltages that will damage CMOS and NMOS devices.

2.2.1 Module Substitution

The following important points should be kept in mind when replacing or substituting WS2000 modules for board diagnosis:

- Turn power off when removing or inserting modules. While the boards are designed to withstand removal and insertion with power on, it is recommended practice to always turn the system power supply off when substituting modules.
- Note boards jumper and mini-jumper arrangements. Ensure they are identical when substituting WS2000 modules. Failure to do so could cause module operational failure, point displacement because of incorrect board address, communication failure with the host and other mini-jumper related failures. Substitute WS2000 modules only with identical jumpering.
- Make sure the substitute board has the same part number and options as the original.
- When substituting modules make sure the EPROM and current firmware is installed on the substitute board. Always make sure when substituting or replacing EPROMS that the EPROM is properly placed in the socket with the correct pin alignment. Make sure all pins are inserted in the socket and that none are bent outward or inward.
- Make sure substitute WS2000 modules mate properly with the connectors at the rear of its bin. Never jam a board into position as this may damage rear connectors. Determine why the module does not easily plug into position. When plugging a module into position, a firm push with the thumbs on the lower portion of the front should be all that is required. Use the side handles to remove a module by gently rocking the module while drawing it from the bin until it is free of the rear connectors.

CAUTION: Remove the WESMAINT or Termination plug from front panel DB25 connector before power is applied or removed.

Actual module repair should be carried out only by qualified electronic personnel familiar with microcomputers and I/O interfacing. It is recommended that such personnel become more acquainted with the WS2000 by attending a training course where special circuit concepts and applications may be pointed out.

When returning a faulty module, please note the suspected problem, fault or symptom.

2.3 Installation Procedures

The following paragraphs describe how to install the WS2000 SmartScanner and ancillary products into a permanent location. Refer to the check list at the end of this section for a step-by-step WS2000 installation guide. After working through the installation steps the WS2000 unit is ready for software configuration. Refer to Sections 3 and 4 and the configuration check list in Section 3 for these procedures.

2.3.1 Installing the WS2000 Unit

The WS2000 SmartScanner requires 1 vertical space in a 19" standard telecommunications rack. Rack adapters are included with the unit for mounting in 23" wide racks. Figure 2-2 is an installation outline drawing of a SmartScanner or Discrete Expander unit.

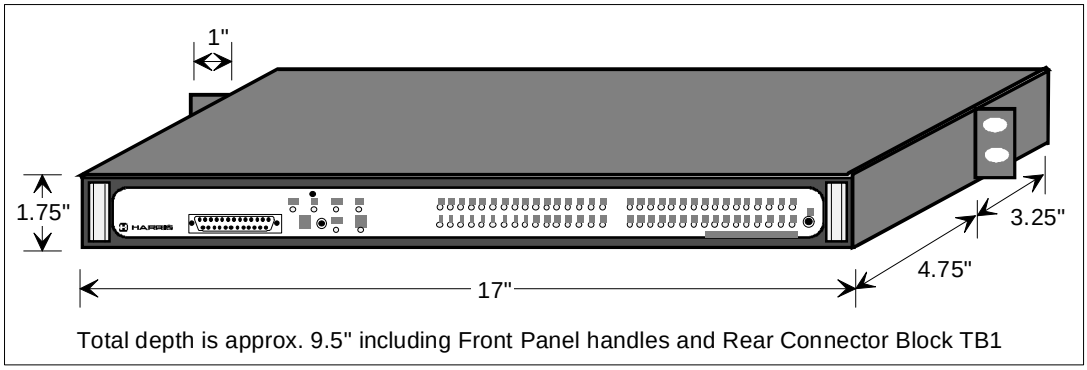


Figure 2-2. WS2000 E-Telemetry with TABS SmartScanner and Discrete Expander Outline Drawing

2.3.2 WS2000 Unit Inspection

Prior to power-up, remove the WS2000 main board assembly from its housing and confirm that the plug-on daughter boards are seated properly. Strap options have been preset in the factory; however, they can be changed per user requirements. Strap options for main board, daughter boards and back plane are listed in this section.

2.3.3 Cabling the Unit

Figure 2-11 is a rear view of the unit. It shows how the connections are grouped. Power, local annunciators, and host modem connections are made at TB1. All the RS-232/RS-422/RS-485 serial connections are made via eight pin connectors P1 through P6, and P8 through P13. All the discrete inputs are made via 50 pin connectors, J1 and J2. If discrete expanders are installed, they are connected at P7.

2.3.4 Rear Connector EIA Strap Selections

2.3.4.1 Serial Interfaces

The appropriate EIA straps must be installed or removed for each serial interface. Backplane jumper blocks Z1 and Z2 are used to strap in RS-422 terminations. Insert the jumper for RS-422 operation. Remove the jumper for RS-232/485 operation. Refer to Table 2-24.

2.3.4.2 Discrete Control Interfaces

Each discrete control interface can either operate FORM A or FORM C (Refer to paragraph 1.2.3). The desired form is selected using jumper blocks Z6 and Z8. Refer to Figure 2-12.

2.3.5 Serial Port Terminations

Table 2-1 shows the relationships between serial collection channels and rear termination designations.

CHANNEL NUMBER	CONNECTOR
1	P6, P12, or TB1
2	P4
3	P11
4	P3
5	P10
6	P8
7	P1
8	P9
9	P2
Wesmaint	P5

Table 2-1. Rear Panel Serial Port Connectors

The host communications channel is dedicated to serial channel 1 and is available at TB1 if an internal modem is installed in the WS2000. If no modem is installed, serial channel 1 is available at P6 (RS-422) and P12 (RS-232).

2.3.6 Connector Pin Assignments

The following Tables show the connector pin assignments. Table 2-2 shows the TB1 pin-outs. Table 2-3 shows the WESMAINT (P5) pin-outs. Table 2-4 shows the Channel 1 (P1 and P12) pin-outs. Table 2-5 shows the Channel 2-5 (P3, 4, 10 and 11) pin-outs. Table 2-6 shows the Channel 6-9 (P1, 2, 8, and 9) pin-outs. Table 2-7 shows Discrete Expander interface connector P7 pin-outs. Table 2-8 shows the J1 and J2 pin-outs for discrete inputs. Table 2-9 shows the pin-outs for the front panel JB3 CRAFT port. Table 2-10 (in paragraph 2.3.7) shows the control outputs on J1 and J2.

TERMINAL BLOCK TB1		
FUNCTION	**PIN**	
Power	1	- BATTERY Input
	3	+ BATTERY Input (Battery Return)
	13	Earth GND (Chassis GND)
MPU RUN	2	N.O.
Relay (K2)	4	COM
Output	6	N.C.
COS	5	N.O.
Relay (K1)	7	COM
Output	9	N.C.
4 - Wire	10	TIP TX
(Channel 1)	8	RING TX
	14	TIP RX
	12	RING RX
2 - Wire	10	TIP TX/RX
(Channel 1)	8	RING TX/RX
COS	11	COS RESET

Table 2-2. Terminal Block TB1 Connector

RACK MOUNT WESMAINT CONNECTOR P5	
PIN	**FUNCTION**
1	TX (RS-232)
2	RX (RS-232)
3	PROGEN
4	COMMON (+ BATTERY)
5	-12 Vdc
6	+5 Vdc
7	+12 Vdc
8	Not Used

Table 2-3. WESMAINT Channel Connector P5 Pin-out

CHANNEL 1 PIN-OUTS					
CONNECTOR	**PIN**	**FUNCTION**	**CONNECTOR**	**PIN**	**FUNCTION**
P6	1	RTS -	P12	1	TX
(Host port)	2	RTS +	(Host port)	2	RTS
(RS-422/-485)	3	Not Used	(RS-232)	3	CTS
	4	COM (0 Vdc)		4	COM (0 Vdc)
	5	RX -		5	RX
	6	RX +		6	DCD
	7	TX -		7	Not Used
	8	TX +		8	Not Used

Table 2-4. Channel 1 Serial Port Pin-outs

CHANNELS 2 - 5 PIN-OUTS			
		FUNCTION	
CONNECTORS	PIN	RS-232	RS-422/485
CH 2 - P4	1	TX	
CH 3 - P11	2	RTS (RS-232)	
CH 4 - P3	3	CTS (RS-232)	
CH 5 - P10	4	COM (0 Vdc)	COM (0 Vdc)
	5	RX	RX -
RS-232/422/485	6		RX +
	7		TX -
	8		TX +

Table 2-5. Channels 2 - 5 Serial Port Pin-outs

CHANNELS 6 - 9 PIN-OUTS		
CONNECTOR	PIN	FUNCTION
CH 6 - P8	1	Not Used
CH 7 - P1	2	Not Used
CH 8 - P9	3	Not Used
CH 9 - P2	4	COM (0 Vdc)
	5	RX -
RS-422	6	RX +
	7	TX -
	8	TX +

Table 2-6. Channels 6 - 9 Serial Port Pin-outs

WPIB INTERFACE (P7) PIN-OUTS					
PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
1	-12 Vdc	13	DI2	25	AO5
2	+12 Vdc	14	DI7	26	DO1
3	+5 Vdc	15	DI6	27	DO0
4	+V1 (Control Relay Coil Voltage)	16	DI5	28	0 Vdc
5	I/O RST	17	AO1	29	DO4
6	ID	18	AO0	30	DO3
7	STB	19	0 Vdc	31	DO2
8	DI1	20	AO4	32	DO7
9	DI0	21	AO3	33	DO6
10		22	AO2	34	DO5
11	DI4	23	AO7		
12	DI3	24	AO6		

Table 2-7. Westronic Peripheral Interface Bus (WPIB) P7

INPUTS 1-32	J1 PIN	INPUTS 33-64	J2 PIN
BAT RTN	9	BAT RTN	9
Input 1	10	Input 33	10
Input 2	35	Input 34	35
Input 3	11	Input 35	11
Input 4	36	Input 36	36
Input 5	12	Input 37	12
Input 6	37	Input 38	37
Input 7	13	Input 39	13
Input 8	38	Input 40	38
Input 9	14	Input 41	14
Input 10	39	Input 42	39
Input 11	15	Input 43	15
Input 12	40	Input 44	40
Input 13	16	Input 45	16
Input 14	41	Input 46	41
Input 15	17	Input 47	17
Input 16	42	Input 48	42
Input 17	18	Input 49	18
Input 18	43	Input 50	43
Input 19	19	Input 51	19
Input 20	44	Input 52	44
Input 21	20	Input 53	20
Input 22	45	Input 54	45
Input 23	21	Input 55	21
Input 24	46	Input 56	46
Input 25	22	Input 57	22
Input 26	47	Input 58	47
Input 27	23	Input 59	23
Input 28	48	Input 60	48
Input 29	24	Input 61	24
Input 30	49	Input 62	49
Input 31	25	Input 63	25
Input 32	50	Input 64	50

Table 2-8. Status/Alarm Inputs J1 and J2

PIN	FUNCTION	PIN	FUNCTION
2	Receive	13	-12 Vdc
3	Transmit	18	+5 Vdc
7	Common	25	Program Write Enable
11	+12 Vdc		

Table 2-9. WESMAINT Connector JB3

2.3.7 Control Outputs and Analog Inputs

Each control output can be set to either FORM A or FORM C contact closure. A detailed description of FORM A and FORM C is provided in paragraph 1.3.1. Jumper Block Z6 determines control output contact configurations for controls 1 through 8. Jumper Block Z8 determines control output contact configurations for controls 9 through 16. Pin 34 on both Connector J1 and J2 provide the control common voltage for FORM C. Control output pin-outs are shown in Table 2-10.

CONTROL POINT	J1 PIN	FORM A	FORM C	CONTROL POINT	J2 PIN	FORM A	FORM C
1	1		N.C.	9	1		N.C.
	26	N.O.	N.O.		26	N.O.	N.O.
2	2		N.C.	10	2		N.C.
	27	N.O.	N.O.		27	N.O.	N.O.
3	3		N.C.	11	3		N.C.
	28	N.O.	N.O.		28	N.O.	N.O.
4	4		N.C.	12	4		N.C.
	29	N.O.	N.O.		29	N.O.	N.O.
5	5		N.C.	13	5		N.C.
	30	N.O.	N.O.		30	N.O.	N.O.
6	6		N.C.	14	6		N.C.
	31	N.O.	N.O.		31	N.O.	N.O.
7	7		N.C.	15	7		N.C.
	32	N.O.	N.O.		32	N.O.	N.O.
8	8		N.C.	16	8		N.C.
	33	N.O.	N.O.		33	N.O.	N.O.
N/A	34	COM	COM	N/A	34	COM	COM

Table 2-10. Control Outputs 1 - 16 and Analog Inputs 1 - 8 (J1 and J2)

2.3.8 Rack Mount Modem Panel Connections

The power and digital signals for the rack mount modem panel are derived from the WS2000 via a special cable, P/N 977-0032. One end of the cable is fanned out into two connectors, J4 and J5.

NOTE: Older versions of this cable had these two connectors labeled as J1 and J2 respectively.

If both a rack mount modem and a rack mounted WESMAINT are used, another cable is available that connects power and data for both. It is P/N is 977-T055.

Connector J5 is mated with P5 on the WS2000 unit. This connection provides the necessary ±12 Vdc power. Connector J4 is mated with any of the "P" connectors for data collection channels 2 through 5 (i.e., P3, P4, P10 or P11) on the WS2000 unit. It provides the RS-232 signals to the modem module from the data collection channel on the unit. Mount connector J4 to the corresponding data collection serial channel mating connector. The other end of the cable is a single male DB25 connector (P1). This connection is mated to J1 on the rack mount modem panel. The rack mount modem connection points are shown in Figure 2-21 and Table 2-11.

PIN	TERMINAL BLOCK TB1	CONNECTOR J1
	FUNCTION	FUNCTION
1	Transmit TIP +	N/A
2	Transmit RING -	Transmit
3	Receive RING -	Receive
4	Receive TIP +	Request to Send (RTS)
5	Ground	Clear to Send (CTS)
6	Ground	Data Set Ready (DSR)
7	N/A	Common
8	Signal Ground	Data Carrier Detect (DCD)
9	+12 Vdc	+12 Vdc
10	-12 Vdc	-12 Vdc
11	N/A	+12 Vdc
13	N/A	-12 Vdc
20	N/A	Data Terminal Ready (DTR)
22	N/A	Ring Indicator (RI)

Table 2-11. Rack Mount Modem Panel Connections

2.3.9 TELZON Termination Panel

The TELZON termination panel provides wire wrap access to all discrete and serial connections on the WS2000 (except Modem connections). TELZON Interface Assemblies can be ordered in either 19" or 23" rack sizes. Refer to Tables 2-12 through 2-14.

ITEM	ORDER #	SERIAL PORTS	DISCRETE I/O		HOST?	RACK SIZE
			INPUTS	OUTPUTS		
1	533-T011	8	64	16	Yes (2)	23"
2	533-T030	8	64	16	Yes (2)	19"

Table 2-12. TELZON Interface Assembly Ordering Information

533-T011			
ITEM	**QTY**	**HARRIS P/N**	**DESCRIPTION**
1	1	640-T002	TELZON Wire Wrap Block
2	2	977-T003	3' Discrete I/O Cable (for Connectors A and B)
3	1	977-T070	3' Serial I/O Cable (for Connector C)
4	1	953-T003	23" Mounting Bar
5	1		Designation Label for Inside Door

Table 2-13. 533-T011 Configuration

533-T030			
ITEM	**QTY**	**HARRIS P/N**	**DESCRIPTION**
1	1	640-T002	TELZON Wire Wrap Block
2	2	977-T003	3' Discrete I/O Cable (for Connectors A and B)
3	1	977-T070	3' Serial I/O Cable (for Connector C)
4	1	953-T091	19" Mounting Bar
5	1		Designation Label for Inside Door

Table 2-14. 533-T030 Configuration

2.3.9.1 Connections and Cabling

Each TELZON termination panel has three connectors. Two provide access to the wire wrap terminations for the discrete I/O, the other provides access to the wire wrap terminations for the serial and digital host port communications I/O. The termination panel is connectorized with standard delta style female 50 pin connectors.

A maximum of three cables are needed to utilize the full capacity of the termination panel. These cables are three feet long, and come with the TELZON panel. The two discrete I/O cables have both ends terminated with standard male delta style 50 pin right angle connectors. Each of these cables supports 32 discrete alarm/status inputs and 8 discrete control outputs. The third cable has one end terminated with a standard male delta style 50 pin right angle connector, the other end is "fanned" out into eight or ten Molex female 8 pin connectors. Refer to Figure 2-24 and Table 2-33 for interconnections between the WS2000 and the termination panel.

2.3.9.2 Wire Wrap Features

Each discrete input on the TELZON termination panel is a dry contact input with two wire wrap pins for connection. One is the dry contact input and the other is a return. Each group of 32 returns is bussed together and terminated onto a "Com" wire wrap pin. The 8 serial collection ports are interconnected RS-422 or RS-485 and are represented by four wire wrap pins. They are transmit tip/ring and receive tip/ring. The digital host communications port can be interconnected RS-232, RS-422 or RS-485. The RS-232 connection is made by six wire wrap pins. They are transmit, receive, ground, request-to-send, clear-to-send, and data carrier detect. The RS-422 and RS-485 connection is made by four wire wrap pins (transmit tip/ring and receive tip/ring).

2.3.10 Front Access Wire Wrap Kit

The Front Access Wire Wrap Kit (Figure 2-3) is intended for any SmartScanner application where front access is available to the unit. Wire wrap panel is one rack space, thus providing a two rack space footprint of the SmartScanner unit, making this kit ideal for CEV or rear access restricted installation.

The front access wire wrap kit (part number 533-T032) contains the parts listed in Table 2-15.

PART NUMBER	QUANTITY	DESCRIPTION
510-T001	1	Wire Wrap Panel
977-T048	2	Discrete Cables (C&D)
977-T047	1	Serial Cable (B)
977-T046	1	TB1 Cable (A)
953-1001	2	23" Rack Adapters
900-0008	4	Rack Adapter Screws

Table 2-15. Front Access Wire Wrap Kit Components

The cables provided in the kit connect the front access panel directly to the SmartScanner as illustrated in Figure 2-3.

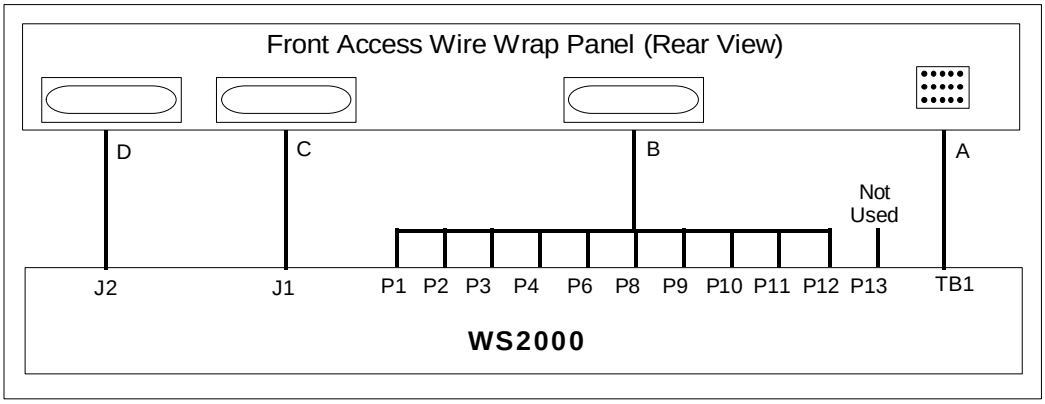


Figure 2-3. SmartScanner Front Access Wire Wrap Panel Connections

Tables 2-16 through 2-19 list the pin outs for each of the connections between the SmartScanner and the front panel access wire wrap kit.

FROM FRONT WIRE WRAP CONNECTOR A		TO SmartScanner TB1	
PIN	**FUNCTION**	**PIN**	**WIRE COLOR CODE**
1	Battery Ground (+)	TB1-3	Red
2	Battery Input (-)	TB1-1	Black
3	Chassis Ground	TB1-13	Green
A1	202T Modem TX Tip	TB1-10	Orange
A2	202T Modem TX Ring	TB1-8	White
A3	MPU Run Relay N.O.	TB1-2	White/Black
A4	MPU Run Relay Common	TB1-4	Red/Black
A5	MPU Run Relay N.C	TB1-6	Green/Black
A6	No connection		
D1	202T Modem RX Tip	TB1-14	Blue/White
D2	202T Modem RX Ring	TB1-12	Blue
D3	COS Run Relay N.O.	TB1-5	Black/White
D4	COS Run Relay Common	TB1-7	Red/White
D5	COS Run Relay N.C.	TB1-9	Green/White
D6	External COS Reset	TB1-11	Blue/Black

Table 2-16. Analog/Power/Auxiliary Host Port Connections with Front Wire Wrap Panel

CONNECTOR B		CONNECTOR B	
PIN	**FUNCTION**	**PIN**	**FUNCTION**
A7	CH2 RS-422 TX -	C7	CH6 RS-422 TX -
A8	CH2 RS-422 RX -	C8	CH6 RS-422 RX -
A9	CH2 Cable Shield Ground	C9	CH7 Cable Shield Ground
A10	CH3 RS-422 TX -	C10	CH7 RS-422 TX -
A11	CH3 RS-422 RX -	C11	CH7 RS-422 RX -
A12	CH4 RS-422 TX -	C12	CH8 RS-422 TX -
A13	CH4 RS-422 RX -	C13	CH8 RS-422 RX -
A14	CH4 Cable Shield Ground	C14	CH9 Cable Shield Ground
A15	CH5 RS-422 TX -	C15	CH9 RS-422 TX -
A16	CH5 RS-422 RX -	C16	CH9 RS-422 RX -
A17	CH1 RS-422 TX -	C17	CH1 RS-232 TX
A18	CH1 RS-422 RX -	C18	CH1 RS-232 CTS
A19	CH1 Cable Shield Ground	C19	CH1 RS-232 RX
B7	CH2 RS-422 TX +	D7	CH6 RS-422 TX +
B8	CH2 RS-422 RX +	D8	CH6 RS-422 RX +
B9	CH3 Cable Shield Ground	D9	CH6 Cable Shield Ground
B10	CH3 RS-422 TX +	D10	CH7 RS-422 TX +
B11	CH3 RS-422 RX +	D11	CH7 RS-422 RX +
B12	CH4 RS-422 TX +	D12	CH8 RS-422 TX +
B13	CH4 RS-422 RX +	D13	CH8 RS-422 RX +
B14	CH5 Cable Shield Ground	D14	CH8 Cable Shield Ground
B15	CH5 RS-422 TX +	D15	CH9 RS-422 TX +
B16	CH5 RS-422 RX +	D16	CH9 RS-422 RX +
B17	CH1 RS-422 TX +	D17	CH1 RS-232 RTS
B18	CH1 RS-422 RX +	D18	CH1 RS-232 Signal Ground
B19	No Connection	D19	CH1 RS-232 DCD

Table 2-17. Serial Port Connections for Front Wire Wrap Panel

CONNECTOR C		CONNECTOR C	
PIN	**FUNCTION**	**PIN**	**FUNCTION**
A20	Control Output 1	C20	Control Output 2
A21	Control Output 3	C21	Control Output 4
A22	Control Output 5	C22	Control Output 6
A23	Control Output 7	C23	Control Output 8
A24	Status Input 1	C24	Status Input 2
A25	Status Input 3	C25	Status Input 4
A26	Status Input 5	C26	Status Input 6
A27	Status Input 7	C27	Status Input 8
A28	Status Input 9	C28	Status Input 10
A29	Status Input 11	C29	Status Input 12
A30	Status Input 13	C30	Status Input 14
A31	Status Input 15	C31	Status Input 16
A32	Status Input 17	C32	Status Input 18
A33	Status Input 19	C33	Status Input 20
A34	Status Input 21	C34	Status Input 22
A35	Status Input 23	C35	Status Input 24
A36	Status Input 25	C36	Status Input 26
A37	Status Input 27	C37	Status Input 28
A38	Status Input 29	C38	Status Input 30
A39	Status Input 31	C39	Status Input 32
B20	Control Output 1 Return	D20	Control Output 2 Return
B21	Control Output 3 Return	D21	Control Output 4 Return
B22	Control Output 5 Return	D22	Control Output 6 Return
B23	Control Output 7 Return	D23	Control Output 8 Return
B24-39	Status Input Returns 1-31	D24-39	Status Input Returns 2-32

Table 2-18. J1 Discrete Input/Output Connections for Front Wire Wrap Panel

CONNECTOR D		CONNECTOR D	
PIN	**FUNCTION**	**PIN**	**FUNCTION**
A40	Control Output 9	C40	Control Output 10
A41	Control Output 11	C41	Control Output 12
A42	Control Output 13	C42	Control Output 14
A43	Control Output 15	C43	Control Output 16
A44	Status Input 33	C44	Status Input 34
A45	Status Input 35	C45	Status Input 36
A46	Status Input 37	C46	Status Input 38
A47	Status Input 39	C47	Status Input 40
A48	Status Input 41	C48	Status Input 42
A49	Status Input 43	C49	Status Input 44
A50	Status Input 45	C50	Status Input 46
A51	Status Input 57	C51	Status Input 48
A52	Status Input 49	C52	Status Input 50
A53	Status Input 51	C53	Status Input 52
A54	Status Input 53	C54	Status Input 54
A55	Status Input 55	C55	Status Input 56
A56	Status Input 57	C56	Status Input 58
A57	Status Input 59	C57	Status Input 60
A58	Status Input 61	C58	Status Input 62
A59	Status Input 63	C59	Status Input 64
B40	Control Output 9 Return	D40	Control Output 10 Return
B41	Control Output 11 Return	D41	Control Output 12 Return
B42	Control Output 13 Return	D42	Control Output 14 Return
B43	Control Output 15 Return	D43	Control Output 16 Return
B44-59	Status Input Returns 33-63	D44-59	Status Input Returns 32-64

Table 2-19. J2 Discrete Input/Output Connections for Front Wire Wrap Panel

2.3.11 Rear Access Wire Wrap Kit

The Rear Access Wire Wrap Kit (Figure 2-4) is intended for any SmartScanner application where rear access is available to the unit. The wire wrap kit "snaps" into connectors on the back of a SmartScanner.

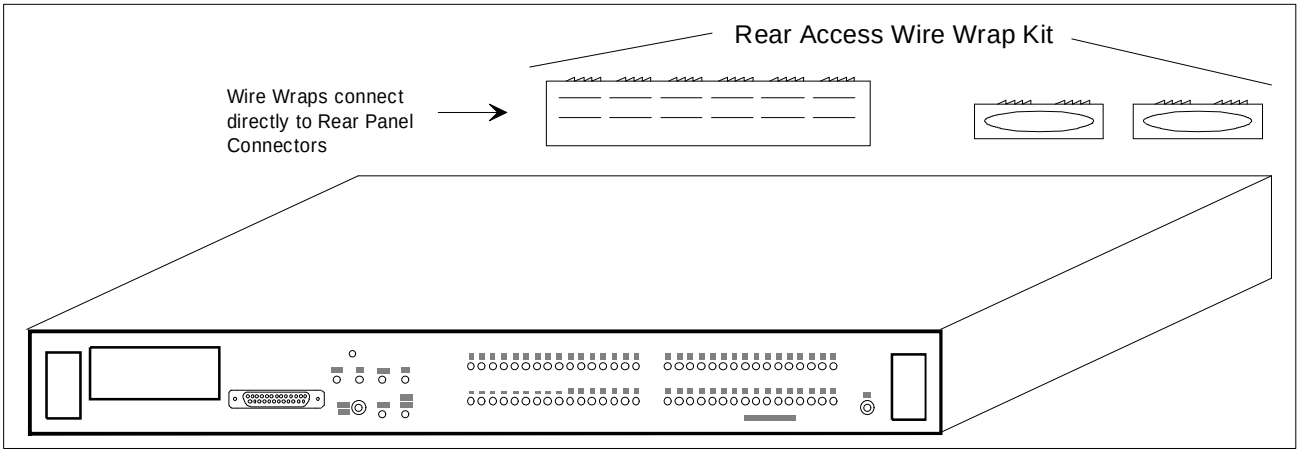


Figure 2-4. SmartScanner and Rear Access Wire Wrap Kit

The wire wrap kit preserves the one rack space footprint of the SmartScanner unit, making this kit ideal for CPE or cabinet installations. J1 and J2 spider wire wrap connectors provide alarm input pins and a single ground return pin. Control pins are available for Form A or Form C contacts. Serial port pins provide all serial input/output signals on the SmartScanner. It (part number 585-T034) contains the parts listed in Table 2-20.

PART NUMBER	QUANTITY	DESCRIPTION
620-T030	2	50 Pin Spider Wire Wrap Connectors
517-T003	1	Serial Termination Wire Wrap Board

Table 2-20. Rear Access Wire Wrap Kit Components

Figure 2-5 shows the J1 and J2 connectors, and Figure 2-6 shows the serial connectors.

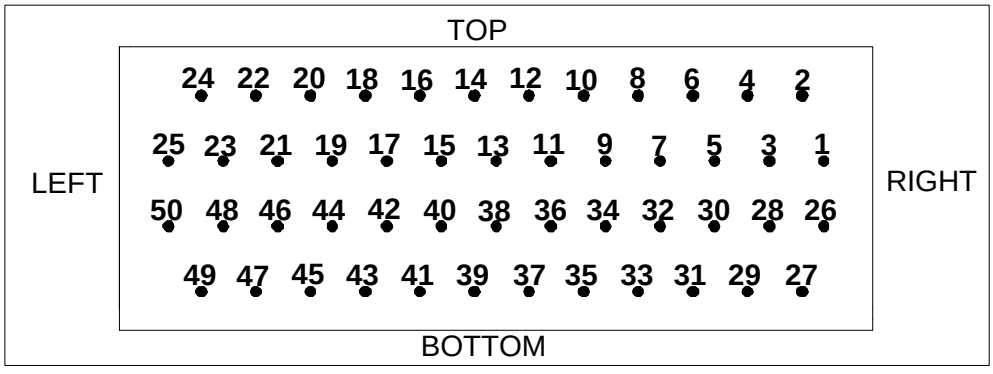


Figure 2-5. Rear Access Wire Wrap Panel Discrete Pin Locations

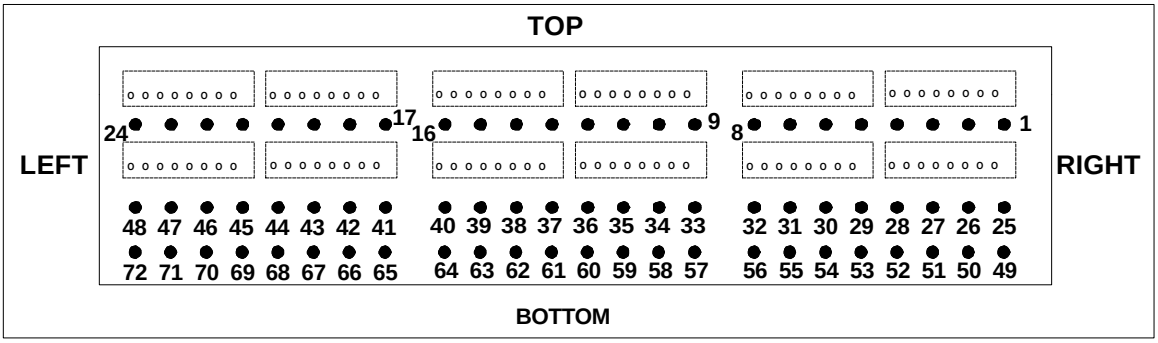


Figure 2-6. Rear Access Wire Wrap Panel Serial Pin Locations

Pin outs for the Rear Access Wire Wrap assemblies are listed in Tables 2-21 through 2-23.

CONNECTOR J1		CONNECTOR J1	
PIN	**FUNCTION**	**PIN**	**FUNCTION**
1	Control Relay 1 Form C - N.C.	26	Control Relay 1 Form A or C - N.O.
2	Control Relay 2 Form C - N.C.	27	Control Relay 2 Form A or C - N.O.
3	Control Relay 3 Form C - N.C.	28	Control Relay 3 Form A or C - N.O.
4	Control Relay 4 Form C - N.C.	29	Control Relay 4 Form A or C - N.O.
5	Control Relay 5 Form C - N.C.	30	Control Relay 5 Form A or C - N.O.
6	Control Relay 6 Form C - N.C.	31	Control Relay 6 Form A or C - N.O.
7	Control Relay 7 Form C - N.C.	32	Control Relay 7 Form A or C - N.O.
8	Control Relay 8 Form C - N.C.	33	Control Relay 8 Form A or C - N.O.
9	Ground	34	Control Relay Common Voltage
10	Status/Alarm Input 1	35	Status/Alarm Input 2
11	Status/Alarm Input 3	36	Status/Alarm Input 4
12	Status/Alarm Input 5	37	Status/Alarm Input 6
13	Status/Alarm Input 7	38	Status/Alarm Input 8
14	Status/Alarm Input 9	39	Status/Alarm Input 10
15	Status/Alarm Input 11	40	Status/Alarm Input 12
16	Status/Alarm Input 13	41	Status/Alarm Input 14
17	Status/Alarm Input 15	42	Status/Alarm Input 16
18	Status/Alarm Input 17	43	Status/Alarm Input 18
19	Status/Alarm Input 19	44	Status/Alarm Input 20
20	Status/Alarm Input 21	45	Status/Alarm Input 22
21	Status/Alarm Input 23	46	Status/Alarm Input 24
22	Status/Alarm Input 25	47	Status/Alarm Input 26
23	Status/Alarm Input 27	48	Status/Alarm Input 28
24	Status/Alarm Input 29	49	Status/Alarm Input 30
25	Status/Alarm Input 31	50	Status/Alarm Input 32

Table 2-21. J1 Discrete Input/Output Connections for the Rear Access Wire Wrap Assembly

CONNECTOR J2		CONNECTOR J2	
PIN	**FUNCTION**	**PIN**	**FUNCTION**
1	Control Relay 9 Form C - N.C.	26	Control Relay 9 Form A or C - N.O.
2	Control Relay 10 Form C - N.C.	27	Control Relay 10 Form A or C - N.O.
3	Control Relay 11 Form C - N.C.	28	Control Relay 11 Form A or C - N.O.
4	Control Relay 12 Form C - N.C.	29	Control Relay 12 Form A or C - N.O.
5	Control Relay 13 Form C - N.C.	30	Control Relay 13 Form A or C - N.O.
6	Control Relay 14 Form C - N.C.	31	Control Relay 14 Form A or C - N.O.
7	Control Relay 15 Form C - N.C.	32	Control Relay 15 Form A or C - N.O.
8	Control Relay 16 Form C - N.C.	33	Control Relay 16 Form A or C - N.O.
9	Ground	34	Control Relay Common Voltage
10	Status/Alarm Input 33	35	Status/Alarm Input 34
11	Status/Alarm Input 35	36	Status/Alarm Input 36
12	Status/Alarm Input 37	37	Status/Alarm Input 38
13	Status/Alarm Input 39	38	Status/Alarm Input 40
14	Status/Alarm Input 41	39	Status/Alarm Input 42
15	Status/Alarm Input 43	40	Status/Alarm Input 44
16	Status/Alarm Input 45	41	Status/Alarm Input 46
17	Status/Alarm Input 47	42	Status/Alarm Input 48
18	Status/Alarm Input 49	43	Status/Alarm Input 50
19	Status/Alarm Input 51	44	Status/Alarm Input 52
20	Status/Alarm Input 53	45	Status/Alarm Input 54
21	Status/Alarm Input 55	46	Status/Alarm Input 56
22	Status/Alarm Input 57	47	Status/Alarm Input 58
23	Status/Alarm Input 59	48	Status/Alarm Input 60
24	Status/Alarm Input 61	49	Status/Alarm Input 62
25	Status/Alarm Input 63	50	Status/Alarm Input 64

Table 2-22. J2 Discrete Input/Output Connections for the Rear Access Wire Wrap Assembly

PIN	CHANNEL & FUNCTION	PIN	CHANNEL & FUNCTION
1	CH4 RS-422 TX +	37	CH3 Ground
2	CH4 RS-422 TX -	38	CH3 RS-232 CTS
3	CH4 RS-422 RX +	39	CH3 RS-232 RTS
4	CH4 RS-422 RX -/RS-232 RX	40	CH3 RS-232 TX
5	CH4 Ground	41	CH1 RS-422 TX Clock +
6	CH4 RS-232 CTS	42	CH1 RS-422 RX Clock +
7	CH4 RS-232 RTS	43	CH1 RS-422 TX +
8	CH4 RS-232 TX	44	CH1 RS-422 TX -
9	CH2 RS-422 TX +	45	CH1 RS-422 RX +
10	CH2 RS-422 TX -	46	CH1 RS-422 RX -
11	CH2 RS-422 RX +	47	CH1 RS-422 RTS +
12	CH2 RS-422 RX - /RS-232 RX	48	CH1 RS-422 RTS -
13	CH2 Ground	49	CH6 RS-422 TX +
14	CH2 RS-232 CTS	50	CH6 RS-422 TX -
15	CH2 RS-232 RTS	51	CH6 RS-422 RX +
16	CH2 RS-232 TX	52	CH6 RS-422 RX -
17	WESMAINT Time Input	53	CH8 RS-422 TX +
18	WESMAINT +12V	54	CH8 RS-422 TX -
19	WESMAINT +5V	55	CH8 RS-422 RX +
20	WESMAINT -12V	56	CH8 RS-422 RX -
21	WESMAINT Ground	57	CH5 RS-422 TX +
22	WESMAINT Program Enable	58	CH5 RS-422 TX -
23	WESMAINT RS-232 RX	59	CH5 RS-422 RX +
24	WESMAINT RS-232 TX	60	CH5 RS-422 RX - /RS-232 RX
25	CH7 RS-422 TX +	61	CH5 Ground
26	CH7 RS-422 TX -	62	CH5 RS-232 CTS
27	CH7 RS-422 RX +	63	CH5 RS-232 RTS
28	CH7 RS-422 RX -	64	CH5 RS-232 TX
29	CH9 RS-422 TX +	65	CH1 RS-422 TX Clock -
30	CH9 RS-422 TX -	66	CH1 RS-422 RX Clock -
31	CH9 RS-422 RX +	67	CH1 RS-232 DCD
32	CH9 RS-422 RX -	68	CH1 RS-422 RS - /RS-232 RX
33	CH3 RS-422 TX +	69	CH1 Ground
34	CH3 RS-422 TX -	70	CH1 RS-232 CTS
35	CH3 RS-422 RX +	71	CH1 RS-232 RTS
36	CH3 RS-422 RX - /RS-232 RX	72	CH1 RS-232 TX

Table 2-23. Serial Port Connections for the Rear Access Wire Wrap Assembly

2.3.12 PC-Wesmaint Connections

The PC-WESMAINT software package (P/N 567-T007) provides WESMAINT interface, upload, download and display configuration features. Refer to the PC-WESMAINT User Manual for more detailed information.

Connection of a PC to the WS2000 SmartScanner requires the PC-WESMAINT cable (included in the software package) and possibly the DE9 to DB25 adapter. Connect the cable to the COM1 or COM2 port on the PC. If the PC has a 25 pin COM port, use a DE9 to DB25 converter between the PC-WESMAINT cable and the COM port. Next, connect the 25 pin connector of the PC- WESMAINT cable to the WESMAINT port on the front panel of the WS2000 SmartScanner. Pin-outs for the front panel connector are shown in Table 2-9. If an extension cable is required, use a standard RS-232 cable between the WESMAINT cable and the WS2000. Refer to Section 4 for WESMAINT operation.

NOTE: TO AVOID EEPROM CORRUPTION, THE PC-WESMAINT CABLE MUST BE DISCONNECTED WHEN POWERING THE WS2000 UP AND DOWN.

2.4 Powering the Unit

2.4.1 Without Discrete Expanders

Power to the unit should be provided from a fuse panel. The input voltage range is -20 to -60 Vdc. Use #14-24 AWG power wire. Ensure the plug-in board assembly is installed and the power input wire terminated before inserting the fuse into the fuse bay.

Each SmartScanner unit has a maximum load of 24W (with all discrete inputs active on the WS2000 and including utilization of a rack mount modem). Refer to Table 2-25 for fusing requirements. Figure 2-14 shows where power is terminated on the unit.

Power-up the WS2000 SmartScanner by installing the appropriate fuse at the power distribution panel. The front panel MPU RUN LED should light and remain lit.

Connect the PC or portable WESMAINT Unit to the DB25 connector on the front, or the rack mount WESMAINT Unit to P5 on the rear of the SmartScanner. If no display is present, press DSPY. If nothing appears on the screen or the message "EEPROM CORRUPT" appears, a memory problem has occurred. Contact Harris Customer Service for assistance.

CAUTION: DO NOT POWER DOWN THE WS2000 WITHOUT FIRST DISCONNECTING THE PORTABLE WESMAINT UNIT. EEPROM CORRUPTION MAY OCCUR.

When a WESMAINT is connected to P5 on the rear of the unit, a jumper plug must be inserted in the front panel DB25 connector for configuration changes to take effect. Refer to paragraph 4.1. Disconnect the jumper plug prior to powering down the WS2000.

The termination plug is not required when viewing the unit's configuration or running diagnostic menus. The unit may be powered down with the rack mount WESMAINT unit connected, without affecting the EEPROM.

The SmartScanner has no password control at initial installation and turn-up time. If a password is required for the installed unit, refer to Section 4.

2.4.2 With Discrete Expanders

2.4.2.1 Unit Turn-Up

If the SmartScanner has Discrete Expander Units connected to it, and the Discrete Expander Units share the same fuse as the SmartScanner, remove the WPIB cable connector, P7, from the SmartScanner's backplane. Pull all the Discrete Expander plug-ins out from their shelves about 1" from the backplane. If the SmartScanner has Discrete Expander Units connected to it, and the Discrete Expander Units have separate fusing from the SmartScanner, remove the WPIB cable connector, P7, from the SmartScanner's backplane. Removal of Discrete Expander plug-ins is not required.

2.4.2.2 Discrete Expander Turn-Up

Power down the SmartScanner and reconnect the WPIB cable to the connector on the SmartScanner. Verify each Discrete Expander Unit's address. Note that each Discrete Expander has a unique address. Install Discrete Expander plug-ins into their shelves. Physically inspect the WPIB cable assembly to ensure the P7 connections on all interconnected shelves are seated correctly over the proper pins. Perform the power-up procedures outlined in paragraph 2.4.1. To verify the Discrete Expander units are communicating properly with the SmartScanner, connect the WESMAINT to the SmartScanner and perform the following steps:

1. Configure the SmartScanner. Refer to Section 3.3
2. Configure the discrete points of each Discrete Expander to a chosen host output display number. Refer to Section 4.3.2.2 to perform display assignments for the Discrete Expanders.
3. Put the SmartScanner unit in Normal Mode. Refer to Section 4.3.2.1.
4. Activate several latching controls on each discrete expander (Section 4.3.1.5). An audible relay closure should be heard within the unit. If the unit's status loop back straps (Z7 and Z9) are inserted on the backplane, the control point LED should turn on or off in conjunction with the relay closure. Exercising several control points on each Discrete Expander verifies proper communication between the SmartScanner and the Discrete Expander unit(s).

2.5 Strapping and Wiring

The following text, figures and tables provide strapping and wiring information required to configure the WS2000 and associated modules, boards and expander options.

Main Boards can be of four types. They are referred to as Type 1, Type 2, Type 3 and Type 4. Compare the board in the unit with Figures 2-7, 2-8, 2-9, and 2-10 to determine which type is installed

NOTE: ALL STRAPPING OPTIONS HAVE BEEN PRESET AT THE FACTORY.

2.5.1 Main Board Strapping

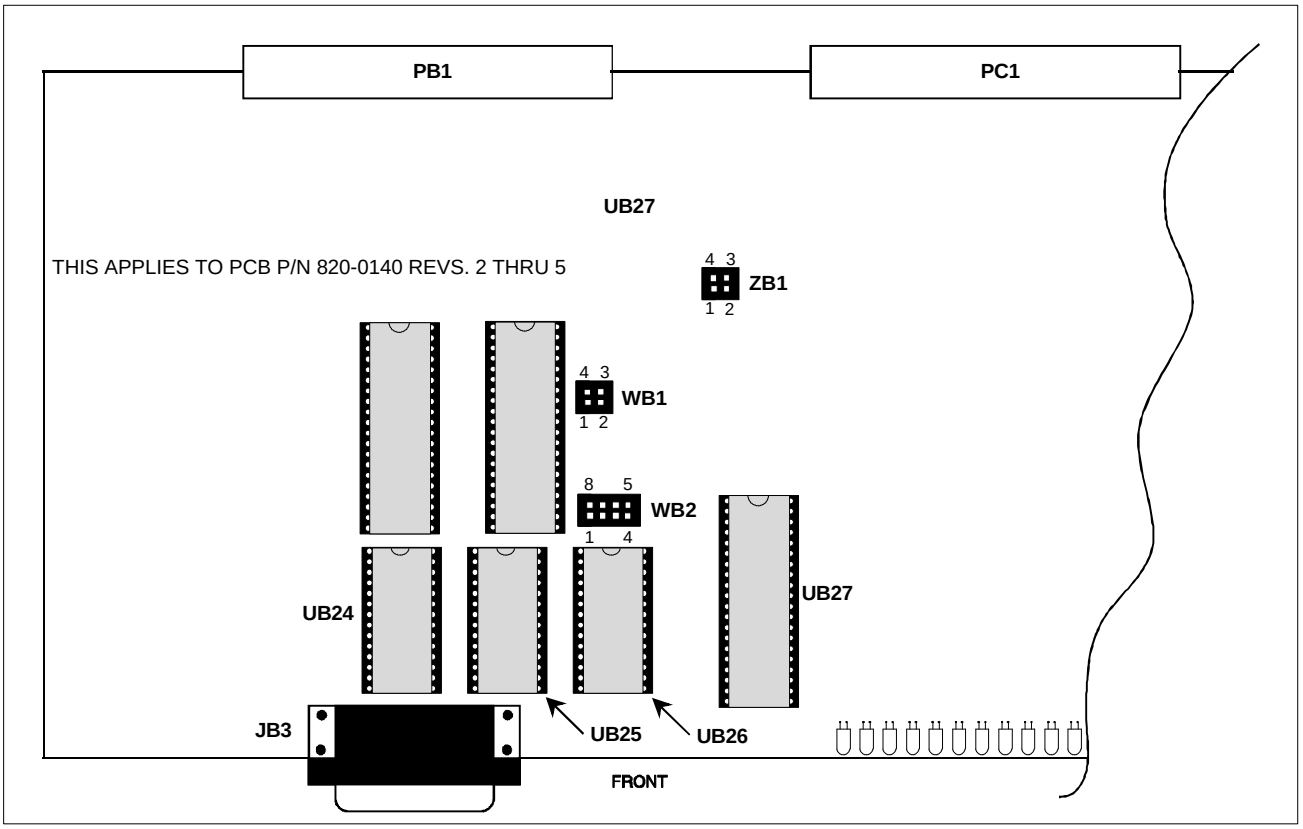


Figure 2-7. Type 1 Main Board Strapping

BLOCK	CONDITION	PURPOSE
ZB1	1 and 2 Installed	I/O Reset Enable
	3 and 4 Installed	Watch Dog Enable
WB1	1 and 2 Installed	CH1 RTS from Main Board. Remove when sourced by serial expansion board.
	3 and 4 Installed	CH1 Tx from Main Board. Remove when sourced by serial expansion board.
WB2	1 and 2 & 7 and 8 Installed	32k EPROM (27C256)
	2 and 7 & 3 and 6 Installed	32k EEPROM (28C256)
	3 and 6 Installed	8k EEPROM (28C64)
	4 and 5 Installed	32k RAM (65256)
	None	8k RAM (62640)

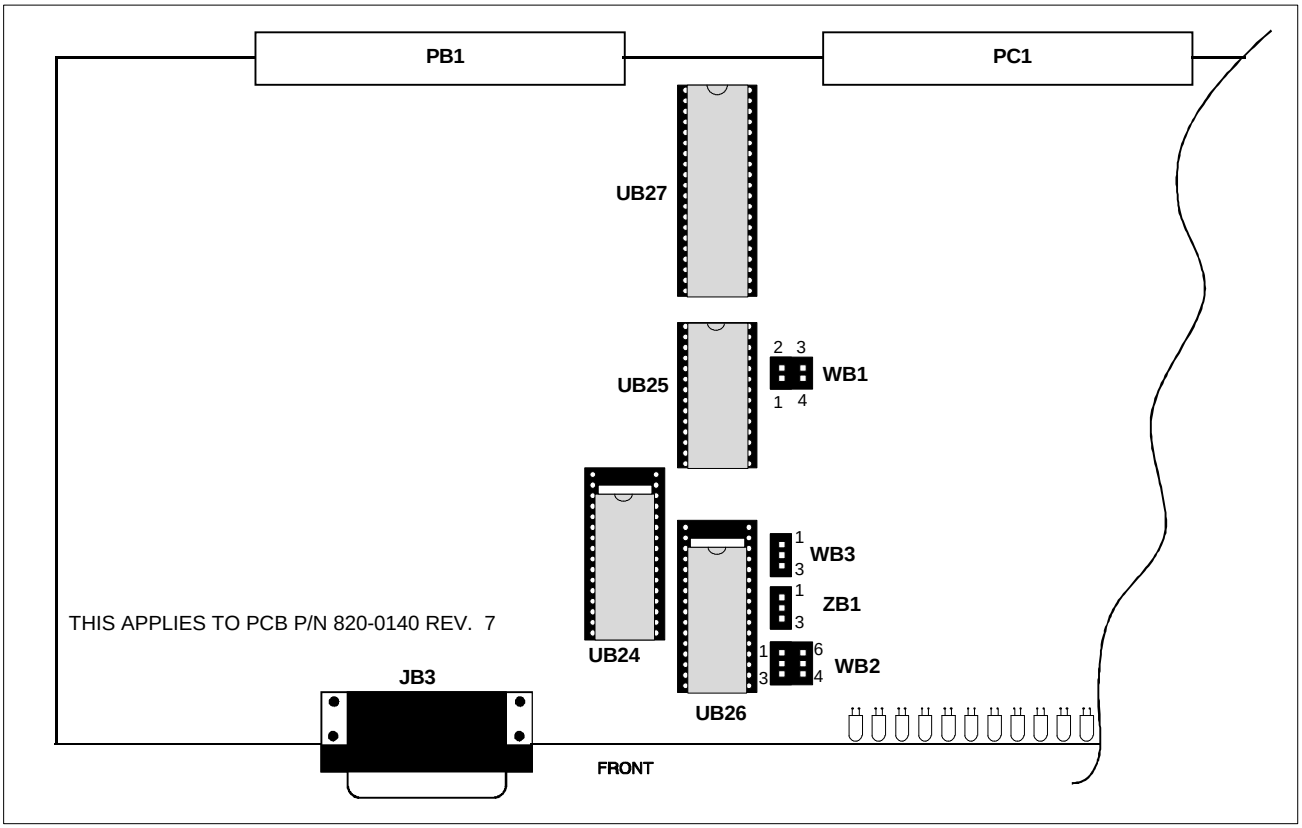


Figure 2-8. Type 2 Main Board Strapping

BLOCK	CONDITION	PURPOSE
WB1	1 and 4 Installed	CH1 RTS from Main Board. Remove when sourced by serial daughter board.
	2 and 3 Installed	CH1 Tx from Main Board. Remove when sourced by serial daughter board.
WB2	1 and 6 Installed	Address range of UB24 RAM. **DO NOT INSTALL**.
	2 and 5 Installed	Address range of UB24 RAM. **DO NOT INSTALL**.
	3 and 4 Installed	UB25 EEPROM (Write Enable)
WB3	1 and 2 Installed	UB26 is 32 pin device
	2 and 3 Installed	UB26 is 28 pin device
ZB1	Not Installed	Watch Dog Enabled

NOTE: When U24 and U26 are 28 pin devices, they must be inserted in the pins closest to the FRONT of the board.

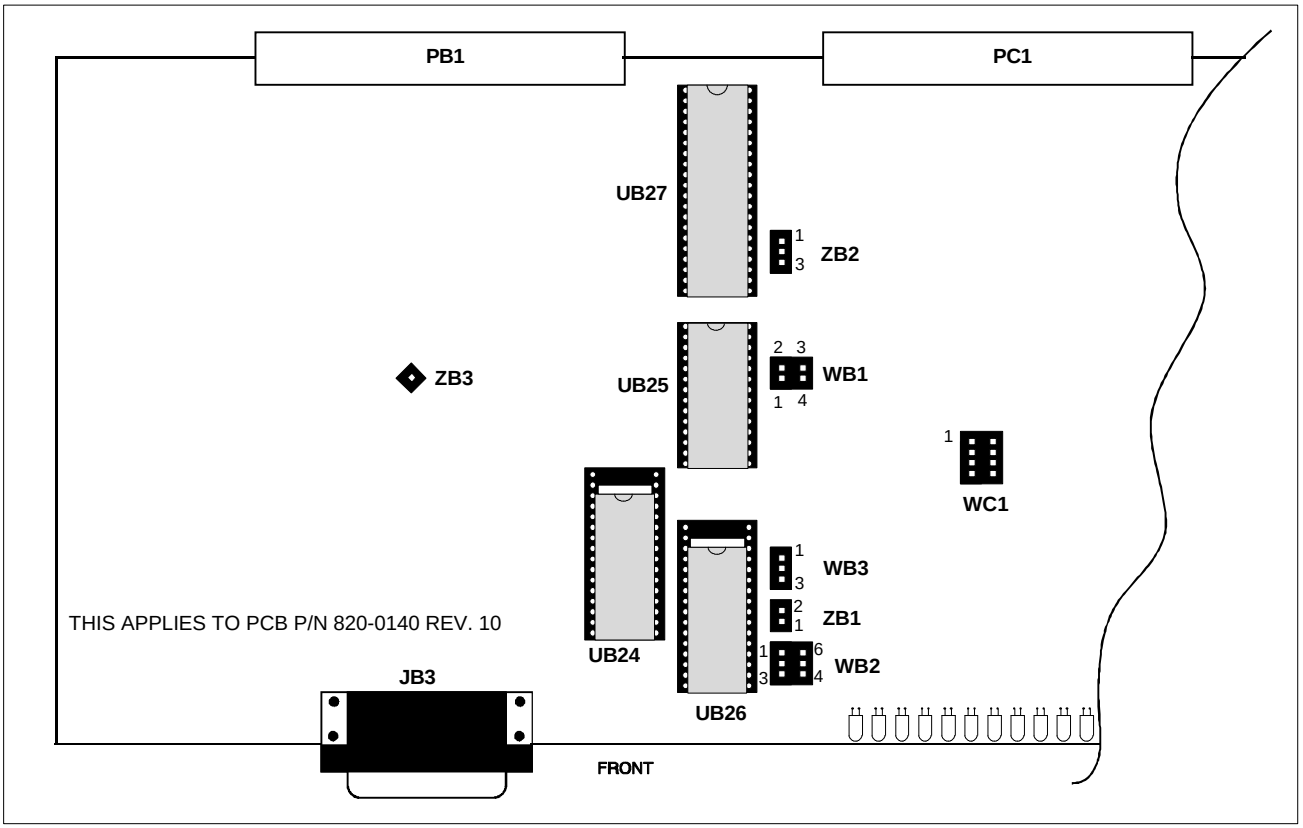


Figure 2-9. Type 3 Main Board Strapping

BLOCK	CONDITION	PURPOSE
WB1	1 and 4 Installed	CH1 RTS from Main Board. Remove when sourced by serial daughter board.
	2 and 3 Installed	CH1 Tx from Main Board. Remove when sourced by serial daughter board.
WB2	1 and 6 Installed	Address range of UB24 RAM.
	2 and 5 Installed	Address range of UB24 RAM.
	3 and 4 Installed	UB25 EEPROM (Write Enable)
WB3	1 and 2 Installed	UB26 is 32 pin device
	2 and 3 Installed	UB26 is 28 pin device
ZB1	Not Installed	Watch Dog Enabled
ZB3	Installed	For Testing Purposes
WC1	Not Used	Board ID

NOTE: When U24 and U26 are 28 pin devices, they must be inserted in the pins closest to the FRONT of the board.

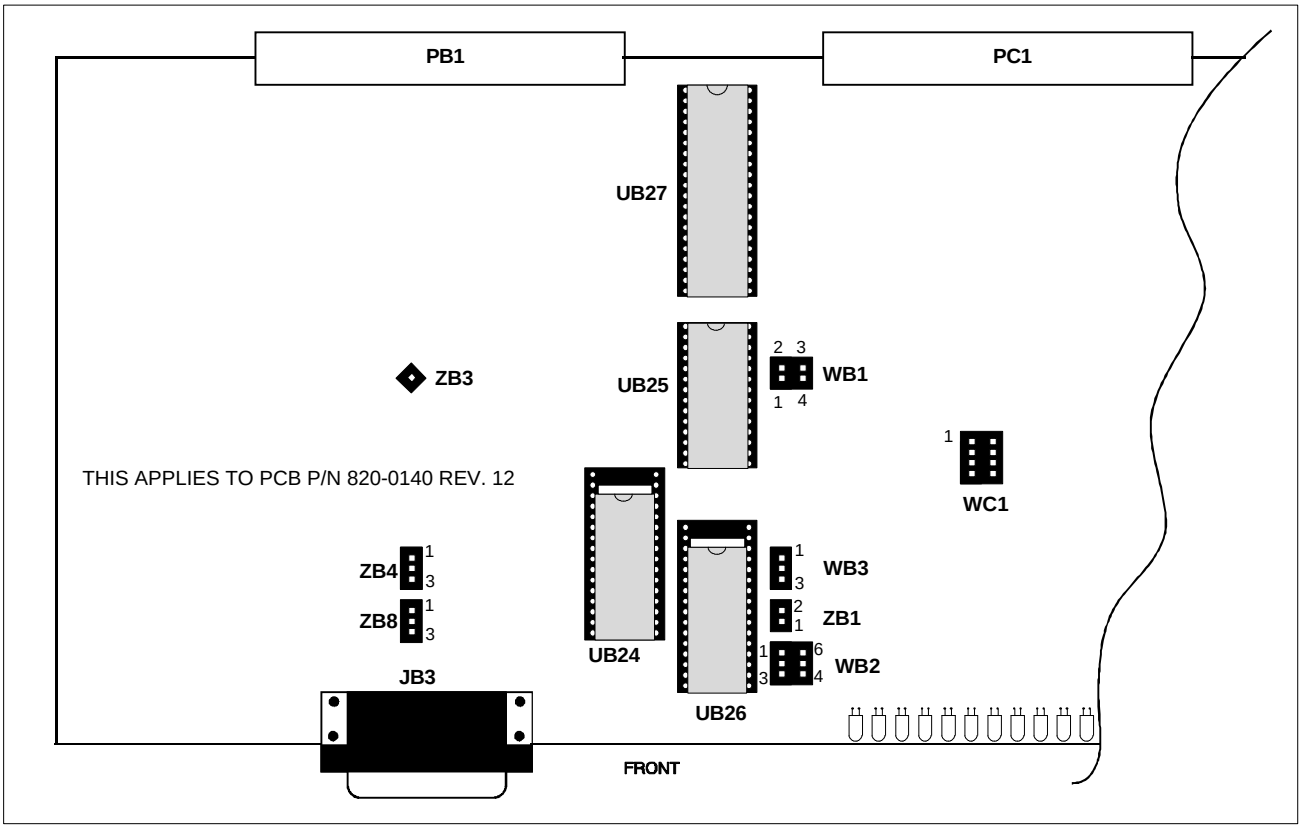


Figure 2-10. Type 4 Main Board Strapping

BLOCK	CONDITION	PURPOSE
WB1	1 and 4 Installed	CH1 RTS from main board. Remove when sourced by serial daughter board.
	2 and 3 Installed	CH1 TX from main board. Remove when sourced by serial daughter board.
WB2	1 and 6 Installed	Address range of UB24 RAM.
	2 and 5 Installed	Address range of UB24 RAM.
	3 and 4 Installed	Write enable, when UB25 is EEPROM
WB3	1 and 2 Installed	UB26 is 32 pin device
	2 and 3 Installed	UB26 is 28 pin device
WC1	Not Used	Board ID
ZB1	1 and 2 Installed	Install to disable watchdog timer.
ZB2	1 and 2 Installed	UB25 bank switchable
	2 and 3 Installed	Not applicable
ZB3	1	Test point
ZB4	1 and 2 Installed	UB25 bank switchable
	2 and 3 Installed	Not applicable

NOTE: When U24 and U26 are 28 pin devices, they must be inserted in the pins closest to the FRONT of the board.

2.5.2 Rear Panel Connectors and Strapping

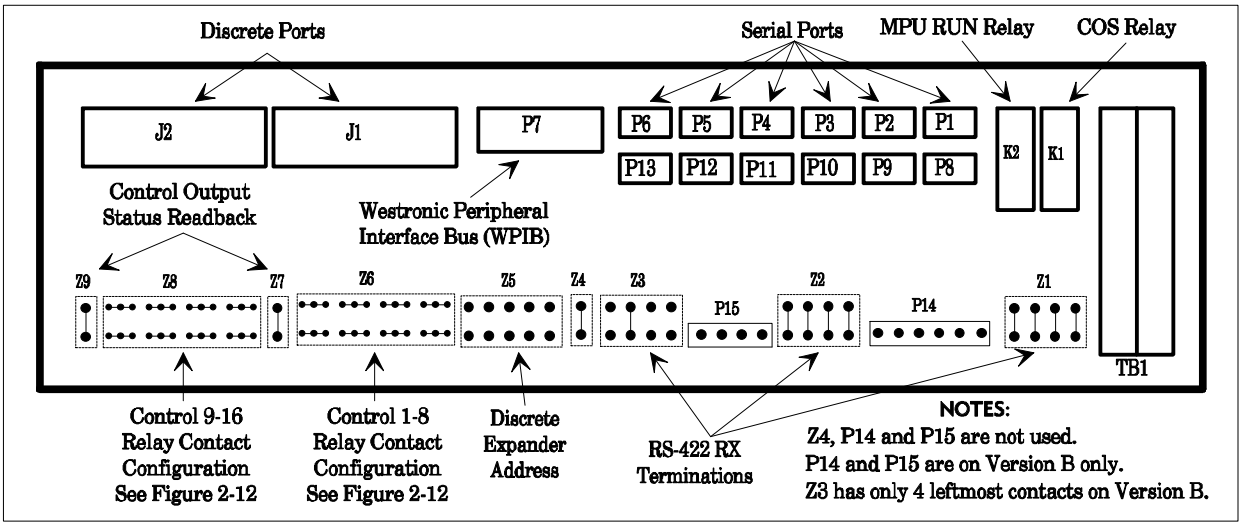


Figure 2-11. Rear Panel Connector and Strap Locations

Table 2-24 and Figure 2-12 show the strapping for Z1, Z2, Z3, Z5, Z6 and Z8.

Z1 Z2 Z3		
BLOCK	**PINS**	**FUNCTION**
Z1	1-8	CH 9 Rx
	2-7	CH 8 Rx
	3-6	CH 7 Rx
	4-5	CH 6 Rx
Z2	1-8	CH 2 Rx
	2-7	CH 3 Rx
	3-6	CH 4 Rx
	4-5	CH 5 Rx
Z3	1-8 (1-4 Ver B)	CH 1 CTS
	2-7(2-3 Ver B)	CH 1 Rx
	3-6	CH 1 RxC
	4-5	CH 1 TxC

Z5		
EXPANDER	**WESMAINT ADDRESS**	**STRAP PINS**
0	00	NONE
1	08	5-6
2	10	4-7
3	18	5-6, 4-7
4	20	3-8
5	28	3-8, 5-6
6	30	3-8, 4-7
7	38	3-8, 4-7, 5-6

Table 2-24. Z1, Z2, Z3 and Z5 Strapping

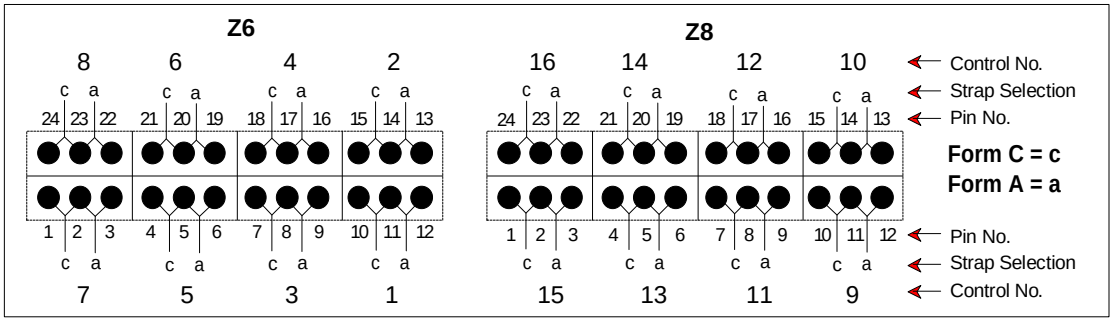


Figure 2-12. Z6 and Z8 Strapping

2.5.2.1 Fuse Requirements

NUMBER OF DISCRETE EXPANDERS INSTALLED	GMT FUSE		TYPE 70 FUSE	
	-24 Vdc IN	-48 Vdc IN	-24 Vdc IN	-48 Vdc IN
0	1 1/3 A	3/4 A	1 1/3 A	3/4 A
1	2 A	1 1/3 A	2 A	1 1/3 A
2	2 1/2 A	2 A	2 A	2 A
3	3 A	2 1/2 A	3 A	2 A
4	3 1/2 A	3 A	5 A	3 A
5	4 A	3 1/2 A	5 A	5 A
6	5 A	4 A	5 A	5 A
7	5 A	5 A	5 A	5 A

Table 2-25. Fusing Requirements

2.5.2.2 CRAFT Port Connections

Table 2-26 shows the P5 rear panel connection and JB3 front panel connection. Figure 2-13 shows pin locations for the front panel DB25 connector (JB3).

CONNECTOR	TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
P5	RS-232	Tx	Rx	Progen	COM	-12Vdc	+5Vdc	+12Vdc
CONNECTOR	**TYPE**	**PIN 2**	**PIN 3**	**PIN 7**	**PIN 11**	**PIN 13**	**PIN 18**	**PIN 25**
Front Panel (DB25)	RS-232	Tx	Rx	COM	+12Vdc	-12Vdc	+5Vdc	Progen

Table 2-26. Craft Port Connections

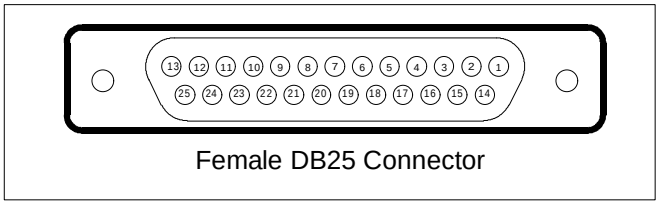


Figure 2-13. Front Panel connector JB3

2.5.2.3 Host Port Connections

Table 2-27 shows Host port connections when there is no installed Modem.

CONNECTOR	TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
P6	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
P6	RS-485	RTS-	RTS+	N/A	GND	Rx-	Rx+	Tx-	Tx+
P12	RS-232	Tx	RTS	CTS	GND	Rx	DCD	N/A	NA/

Table 2-27. Host Port Connections (No Modem)

Table 2-28 shows Host port connections on TB1 with an installed Modem.

TYPE	PIN 8	PIN 10	PIN 12	PIN 14
2 Wire	Tx/Rx-	Tx/Rx+	N/A	N/A
4 Wire	Tx-	Tx+	Rx-	Rx+

Table 2-28. Host Port Connections (With 202T Modem)

2.5.2.4 Terminal Board TB1 Connections

Figure 2-14 shows all TB1 connections

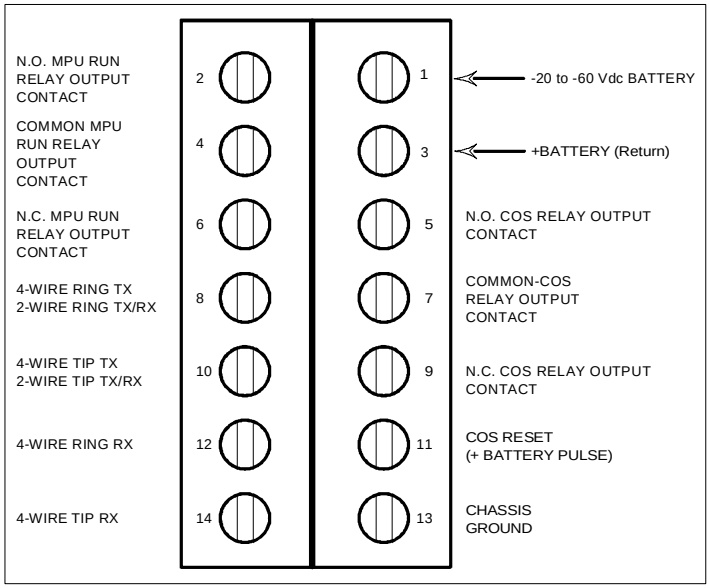


Figure 2-14. Rear Panel TB1 Pin-outs

2.5.2.5 TABS/TBOS Serial Ports Connections

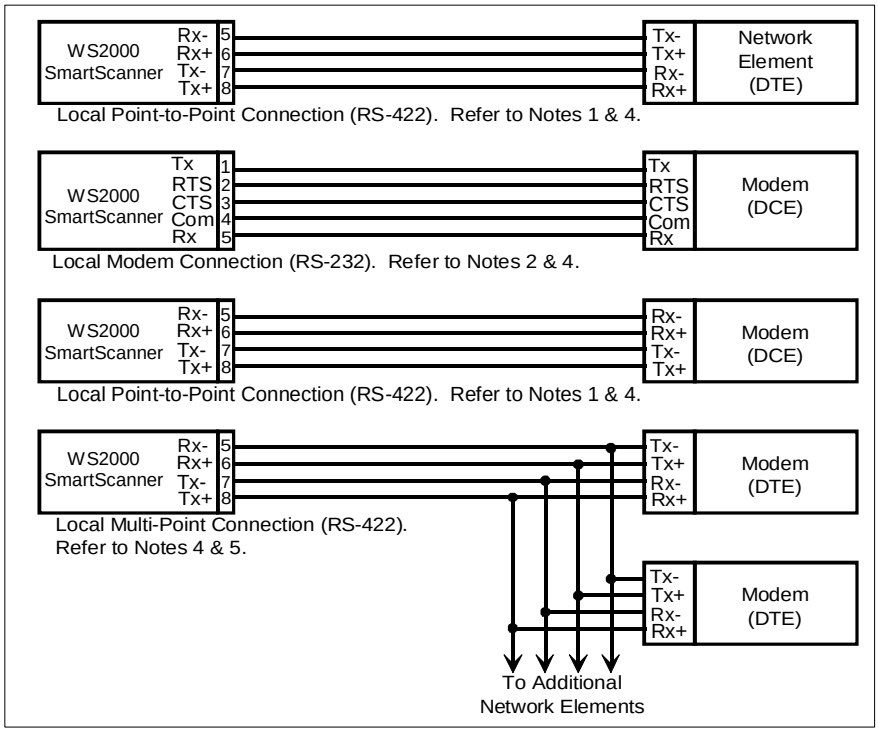


Figure 2-15. TBOS Port Interface Connections

NOTE 1: Any of the serial data collection ports (2-9) can be used to interconnect network elements via RS-422. The WS2000 is considered DTE equipment. If the network element to be connected is DTE, the transmit signal lines from the WS2000 terminate into the receive inputs of the network element. The receive signal lines from the WS2000 terminate into the transmit outputs of the network element.

NOTE 2: Serial data collection ports 2-5 can be used to interconnect to networks via RS-232. This connection is suitable for use with 202T modems. If the modem to be connected is DCE, the transmit signal lines from the WS2000 terminate into the transmit outputs of the modem. The receive signal lines from the WS2000 terminate into the receive inputs of the modem.

NOTE 3: All 8 serial data collection ports can be used to interconnect to networks via RS-422. This connection is suitable for use with 202T modems. If the modem to be connected is DCE, the transmit signal lines from the WS2000 terminate into the transmit outputs of the modem. The receive signal lines from the WS2000 terminate into the receive inputs of the modem.

NOTE 4: Common terminology for balanced line connections are plus (+) and minus (-). Other naming conventions are:

Plus (+) = tip (T) = true (T) = letter (A). Minus (-) = ring (R) = false (F) = letter (B).

NOTE 5: All 8 serial data collection channels can be multi-point. The first 4 ports can be either switched (RS-485) or constant carrier (RS-422), and the last 4 ports are constant carrier only.

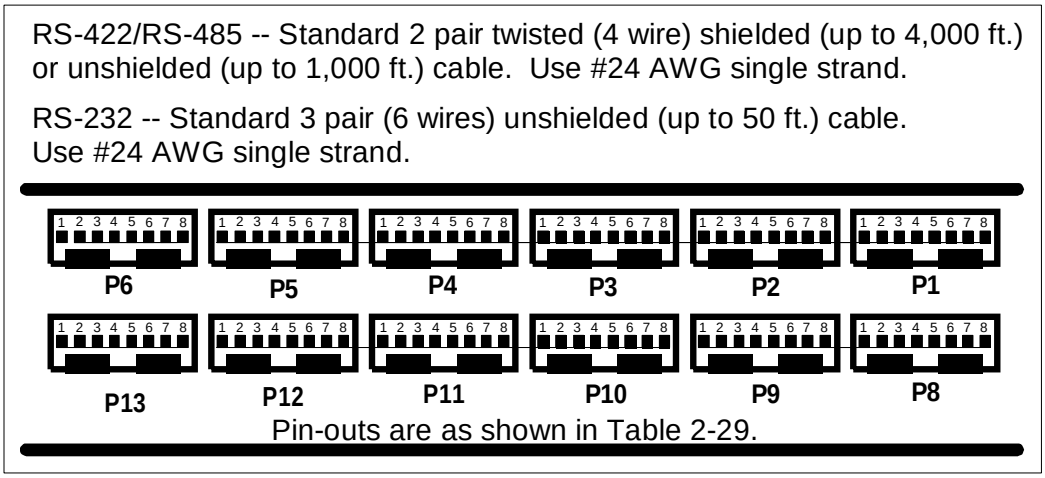


Figure 2-16. Serial I/O Interface

The connector is a straight 8 Pin female connector, Harris Part Number. A connector crimp tool is available, Harris Part Number 990-0150. Table 2-29 delineates the pin connections.

CONNECTOR	PORT	CHAN. NUMBER	TYPE	PIN							
				1	2	3	4	5	6	7	8
P4	1	2	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	1	2	RS-485	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	1	2	RS-232	Tx	RTS	CTS	GND	Rx	N/A	N/A	N/A
P11	2	3	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	2	3	RS-485	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	2	3	RS-232	Tx	RTS	CTS	GND	Rx	N/A	N/A	N/A
P3	3	4	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	3	4	RS-485	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	3	4	RS-232	Tx	RTS	CTS	GND	Rx	N/A	N/A	N/A
P10	4	5	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	4	5	RS-485	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
	4	5	RS-232	Tx	RTS	CTS	GND	Rx	N/A	N/A	N/A
P8	5	6	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
P1	6	7	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
P9	7	8	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+
P2	8	9	RS-422	N/A	N/A	N/A	GND	Rx-	Rx+	Tx-	Tx+

Table 2-29. Serial Port Pin Assignments

2.5.2.6 Discrete Connections

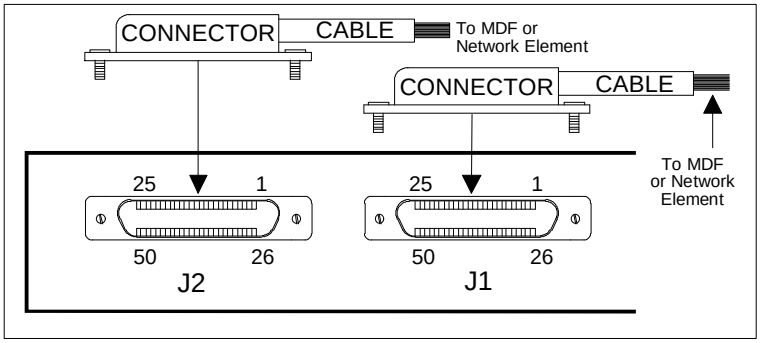


Figure 2-17. Interface for Discrete I/O

The cable is a standard 25 pair unshielded telephone cable; 24 AWG single strand. The connector is Harris Part Number 620-0078 or TRW Part Number 97-12500-180. Tables 2-30 and 2-31 delineate the J1 and J2 pin-outs.

J1 PIN	FUNCTION
1	Control Output 1 Form C - N.C.
2	Control Output 2 Form C - N.C.
3	Control Output 3 Form C - N.C.
4	Control Output 4 Form C - N.C.
5	Control Output 5 Form C - N.C.
6	Control Output 6 Form C - N.C.
7	Control Output 7 Form C - N.C.
8	Control Output 8 Form C - N.C.
9	Ground
10	Status/Alarm Input 1
11	Status/Alarm Input 3
12	Status/Alarm Input 5
13	Status/Alarm Input 7
14	Status/Alarm Input 9
15	Status/Alarm Input 11
16	Status/Alarm Input 13
17	Status/Alarm Input 15
18	Status/Alarm Input 17
19	Status/Alarm Input 19
20	Status/Alarm Input 21
21	Status/Alarm Input 23
22	Status/Alarm Input 25
23	Status/Alarm Input 27
24	Status/Alarm Input 29
25	Status/Alarm Input 31

J1 PIN	FUNCTION
26	Control Output 1 Form A or C - N.O.
27	Control Output 2 Form A or C - N.O.
28	Control Output 3 Form A or C - N.O.
29	Control Output 4 Form A or C - N.O.
30	Control Output 5 Form A or C - N.O.
31	Control Output 6 Form A or C - N.O.
32	Control Output 7 Form A or C - N.O.
33	Control Output 8 Form A or C - N.O.
34	Control Output Common Voltage
35	Status/Alarm Input 2
36	Status/Alarm Input 4
37	Status/Alarm Input 6
38	Status/Alarm Input 8
39	Status/Alarm Input 10
40	Status/Alarm Input 12
41	Status/Alarm Input 14
42	Status/Alarm Input 16
43	Status/Alarm Input 18
44	Status/Alarm Input 20
45	Status/Alarm Input 22
46	Status/Alarm Input 24
47	Status/Alarm Input 26
48	Status/Alarm Input 28
49	Status/Alarm Input 30
50	Status/Alarm Input 32

Table 2-30. J1 Pin Assignments

J2 PIN	FUNCTION	J2 PIN	FUNCTION
1	Control Out 9 Form C - N.C.	26	Control Out 9 Form A or C - N.O.
2	Control Out 10 Form C - N.C.	27	Control Out 10 Form A or C - N.O.
3	Control Out 11 Form C - N.C.	28	Control Out 11 Form A or C - N.O.
4	Control Out 12 Form C - N.C.	29	Control Out 12 Form A or C - N.O.
5	Control Out 13 Form C - N.C.	30	Control Out 13 Form A or C - N.O.
6	Control Out 14 Form C - N.C.	31	Control Out 14 Form A or C - N.O.
7	Control Out 15 Form C - N.C.	32	Control Out 15 Form A or C - N.O.
8	Control Out 16 Form C - N.C.	33	Control Out 16 Form A or C - N.O.
9	Ground	34	Control Out Common Voltage
10	Status/Alarm In 33	35	Status/Alarm In 34
11	Status/Alarm In 35	36	Status/Alarm In 36
12	Status/Alarm In 37	37	Status/Alarm In 38
13	Status/Alarm In 39	38	Status/Alarm In 40
14	Status/Alarm In 41	39	Status/Alarm In 42
15	Status/Alarm In 43	40	Status/Alarm In 44
16	Status/Alarm In 45	41	Status/Alarm In 46
17	Status/Alarm In 47	42	Status/Alarm In 48
18	Status/Alarm In 49	43	Status/Alarm In 50
19	Status/Alarm In 51	44	Status/Alarm In 52
20	Status/Alarm In 53	45	Status/Alarm In 54
21	Status/Alarm In 55	46	Status/Alarm In 56
22	Status/Alarm In 57	47	Status/Alarm In 58
23	Status/Alarm In 59	48	Status/Alarm In 60
24	Status/Alarm In 61	49	Status/Alarm In 62
25	Status/Alarm In 63	50	Status/Alarm In 64

Table 2-31. J2 Pin Assignments

2.5.2.7 Discrete Expander Cabling

Discrete Expander cables are available from Harris as follows:

2 Connectors (WS2000 and 1 Discrete Expander) P/N 963-0003
3 Connectors (WS2000 and 2 Discrete Expanders) P/N 962-0004
4 Connectors (WS2000 and 3 Discrete Expanders) P/N 962-0005
5 Connectors (WS2000 and 4 Discrete Expanders) P/N 962-0006
6 Connectors (WS2000 and 5 Discrete Expanders) P/N 962-0007
7 Connectors (WS2000 and 6 Discrete Expanders) P/N 962-0012
8 Connectors (WS2000 and 7 Discrete Expanders) P/N 962-0013

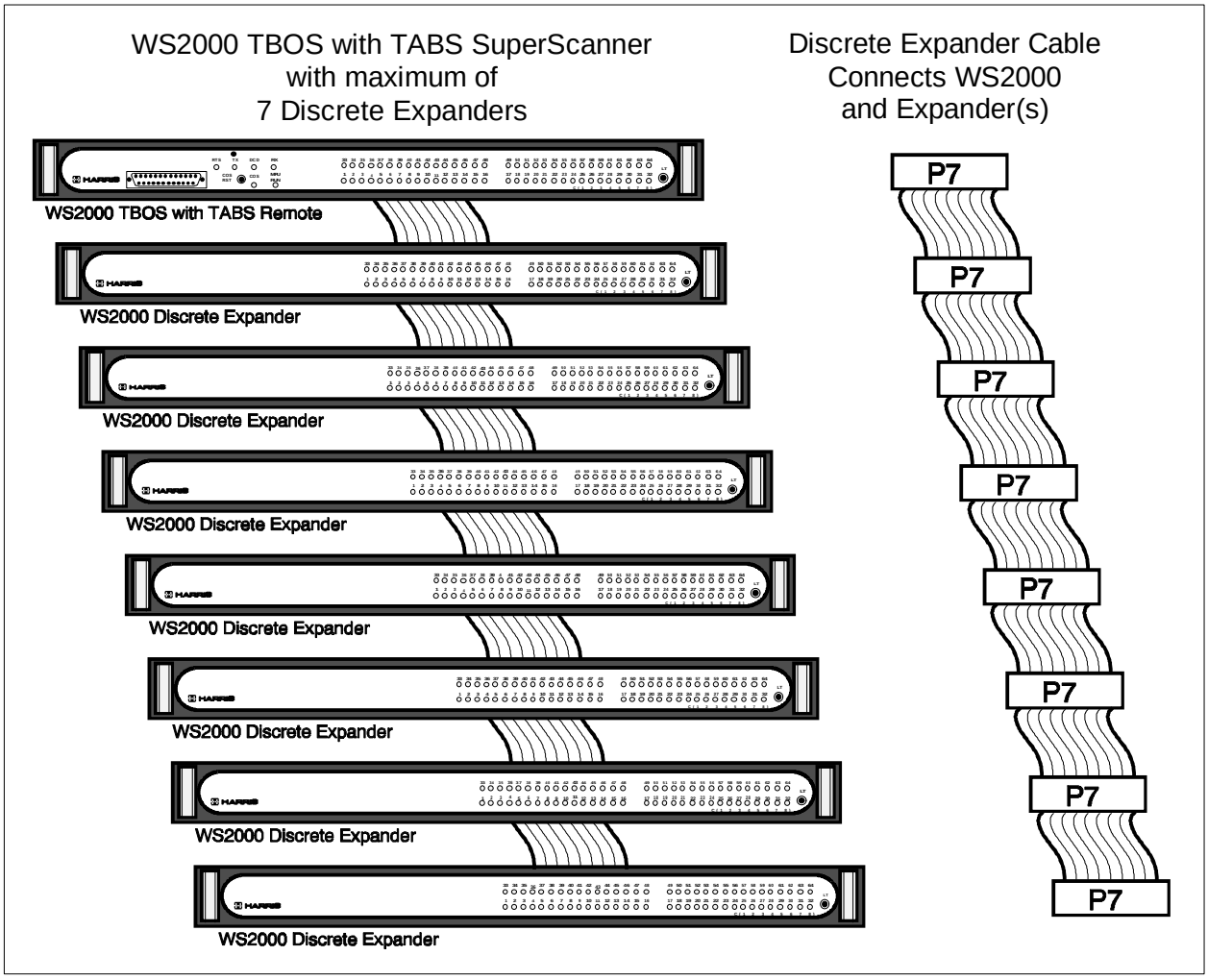


Figure 2-18. SmartScanner to Discrete Expander(s) Interface Connections

2.5.3 Rack Mount Modem Strapping and Connections

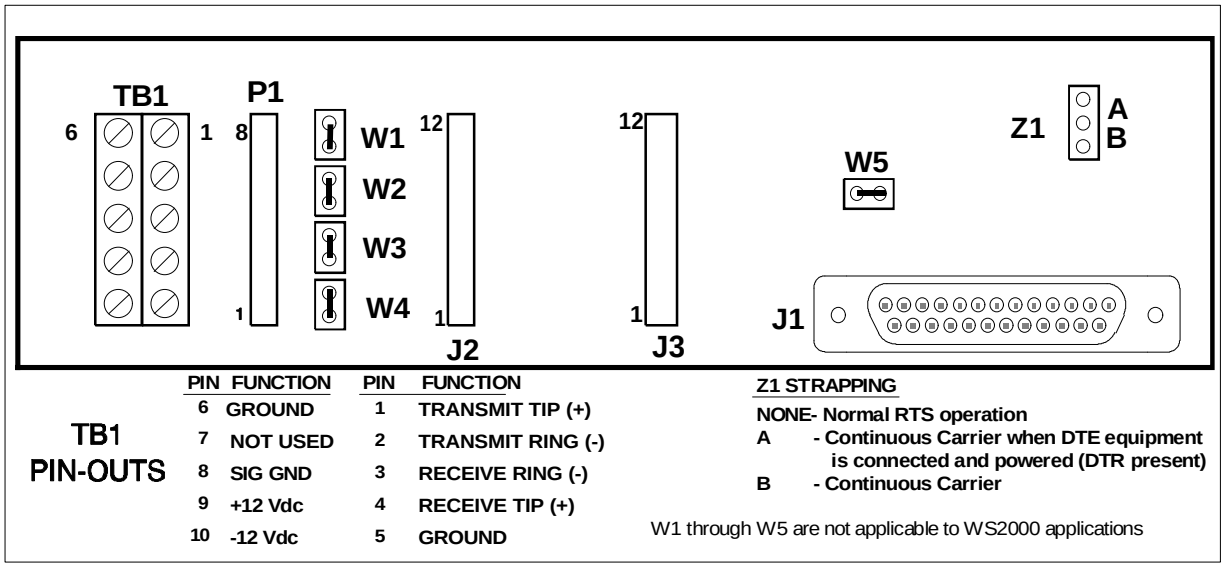


Figure 2-19. Rack Mount Modem Strapping

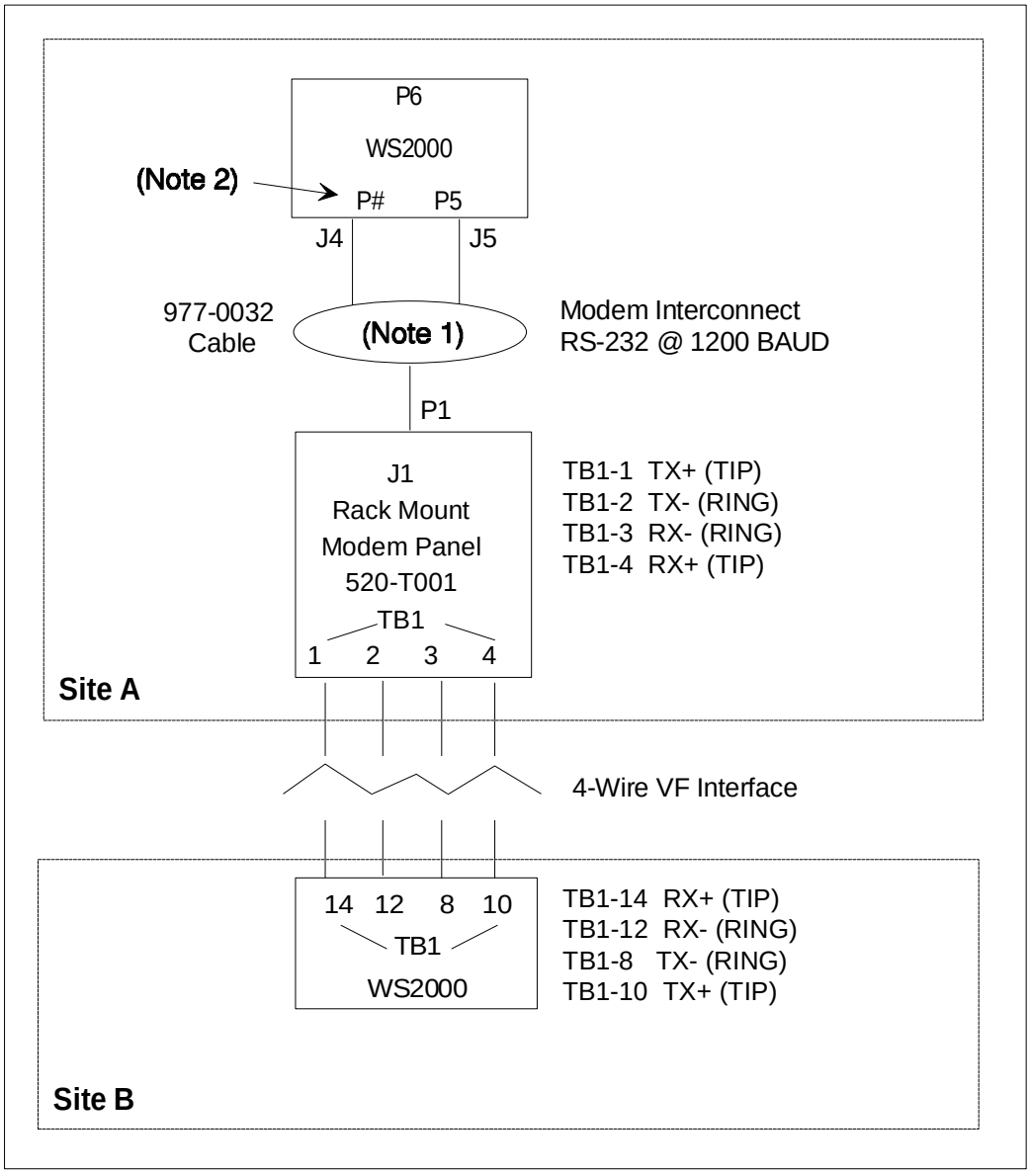


Figure 2-20. Rack Mount Modem Interconnection Diagram

Figure 2-20 Notes:

NOTE 1: J5 was labeled J1 and J4 was labeled J2 in early versions of cable 977-0032

NOTE 2: J4 can be connected to P3 (Ch. 4), P4 (Ch. 2), P10 (Ch. 5) or P11 (Ch. 3).

2.5.4 202T Modem Module Strapping

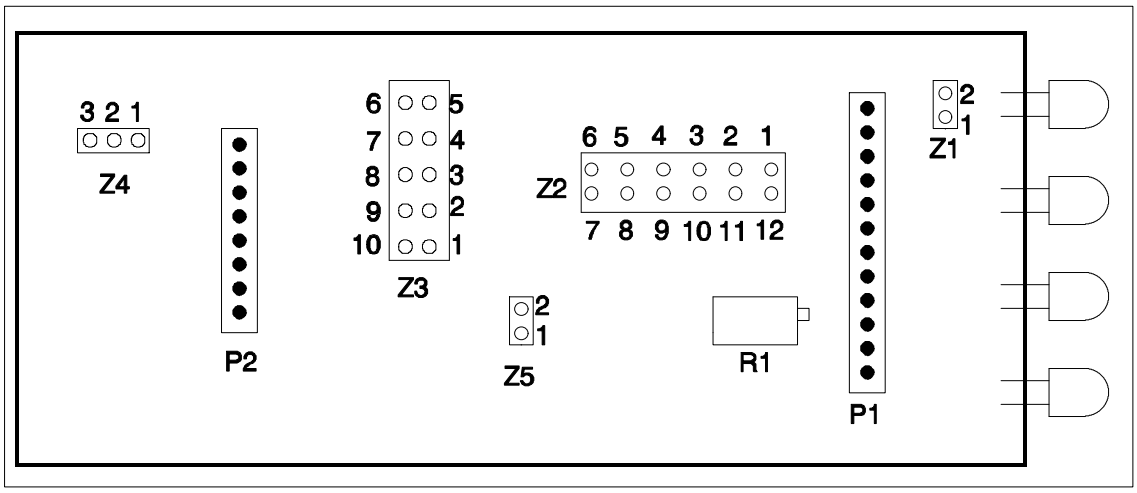


Figure 2-21. 202T Modem Module Strapping

Figure 2-21 Notes:

Z1 - N/A

Z2 - Pins 1 & 12 provide receiver squelch on request-to-send line, and should be installed for 2 wire half duplex mode. Pins 2 through 11 select the mode. Refer to Table 2-32.

Z3 - Sets receive signal sensitivity. Refer to Table 2-32.

Z4 - Pins 1 & 2 select two wire operation. Pins 2 & 3 select four wire operation.

Z5 - MUST be installed.

R1 - Adjusts the transmit output level. Clockwise rotation increases output level.

MODEM MODE SELECT STRAPPING					
MODE	Z2 STRAP PINS				
	2-11	3-10	4-9	5-8	6-7
2W/202	IN	OUT	IN	IN	IN
2W/202/EQ	OUT	OUT	IN	IN	IN
2W/V.23	IN	OUT	OUT	IN	IN
2W/V.23/EQ	OUT	OUT	OUT	IN	IN
4W/202	IN	OUT	IN	IN	OUT
4W/202/EQ	OUT	OUT	IN	IN	OUT
4W/V.23	IN	OUT	OUT	IN	OUT
4W/V.23/EQ	OUT	OUT	OUT	IN	OUT

RECEIVE SIGNAL SENSITIVITY					
Rx	Z3 STRAP PINS				
LEVEL	1-10	2-9	3-8	4-7	5-6
-6dBm	IN	IN	IN	IN	IN
-12dBm	OUT	OUT	OUT	OUT	IN
-18dBm	OUT	OUT	OUT	IN	OUT
-24dBm	OUT	OUT	IN	OUT	OUT
-30dBm	OUT	IN	OUT	OUT	OUT
-36dBm	IN	OUT	OUT	OUT	OUT
-42dBm	OUT	OUT	OUT	OUT	OUT

Table 2-32. 202T Modem Z2 and Z3 Strapping

2.5.7 External Audible/Visual Alarm Panel

The HARRIS External Audible/Visual Alarm Panel can be connected to the COS relay outputs located on TB1 to provide both audible and visual standing alarm summary indications. The external alarm panel is equipped with an audible annunciator, audible alarm disable toggle switch, ACO button and alarm summary LED. P5 IN receives power from P5 on the rear of the WS2000. P5 OUT passes the information on P5 out, so it may be used by other equipment, for example, a PC WESMAINT. Figure 2-22 shows the front and rear panels, and Table 2-33 defines the TB1 and P5 connections.

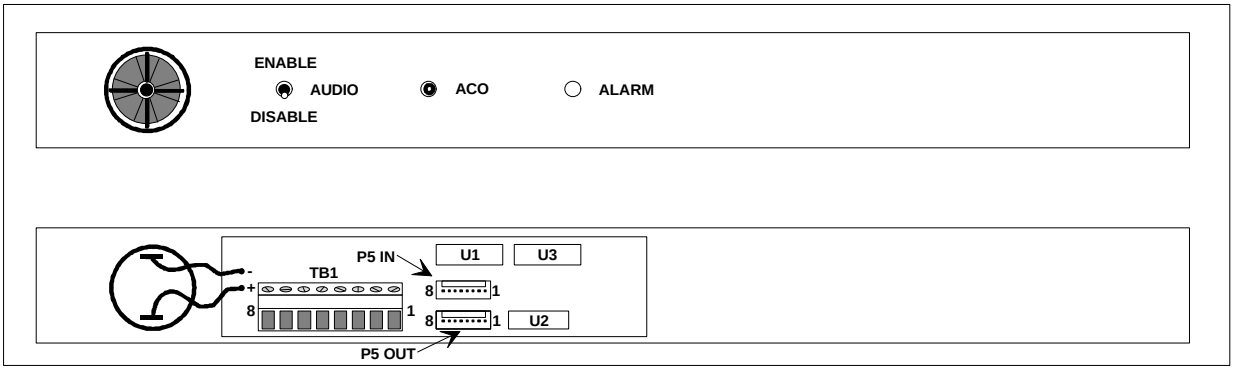


Figure 2-22. External Audible Alarm Panel

CONNECTOR	PIN	FUNCTION	CONNECTOR	PIN	FUNCTION
TB1	1	Audio Com	P5 IN / P5 OUT	1	TX
	2	Audio N.C.		2	RX
	3	Audio N.O.		3	Prog EN
	4	LED Com		4	Com
	5	LED N.C.		5	- 12 Vdc
	6	LED N.O.		6	+5 Vdc
	7	COS Com		7	+12 Vdc
	8	COS N.O.		8	N/A

Table 2-33. Audible/Visual Alarm Panel Pin-outs

2.5.8 TELZON Termination Panel

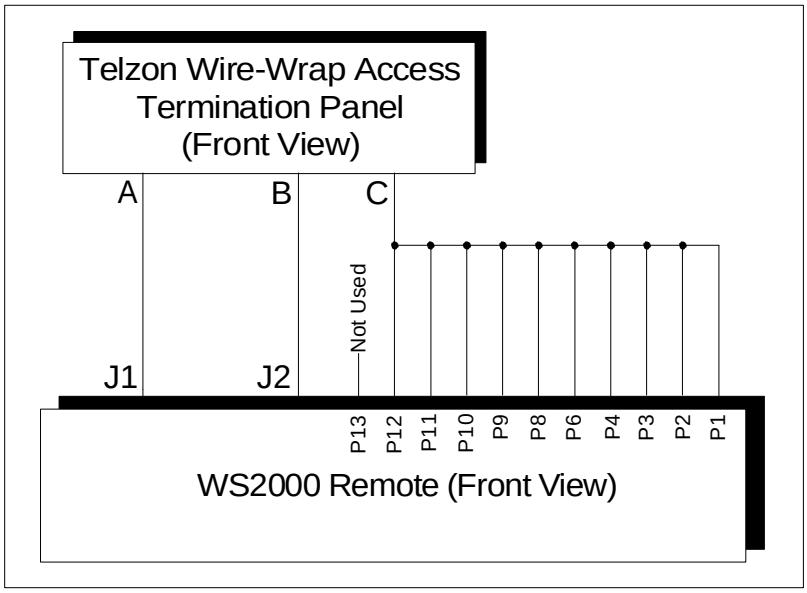


Figure 2-23. TELZON Termination Block Interconnections

TELZON WIRE IDENTIFICATION			
WIRE COLORS	**WS2000 PLUG**	**SERIAL PORT**	**CHANNEL**
Orange - Yellow Orange - Red	P1	6 (TBOS)	7
Blue - Yellow Blue - Red	P8	5 (TBOS)	6
Brown - Yellow Brown - Red	P2	8 (TBOS)	9
Green - Yellow Green - Red	P9	7 (TBOS)	8
Green - Black Green - White	P3	3 (TBOS/TABS)	4
Brown - Black Brown - White	P10	4 (TBOS/TABS)	5
Blue - Black Blue - White	P4	1 (TBOS/TABS)	2
Orange - Black Orange - White	P11	2 (TBOS/TABS)	3
Slate - Black Slate - White	P6	TBOS Host RS-422	1
Green - Violet Brown - Violet Slate - Violet	P12	TBOS Host RS-232	1

Table 2-34. TELZON Cable Wire Colors

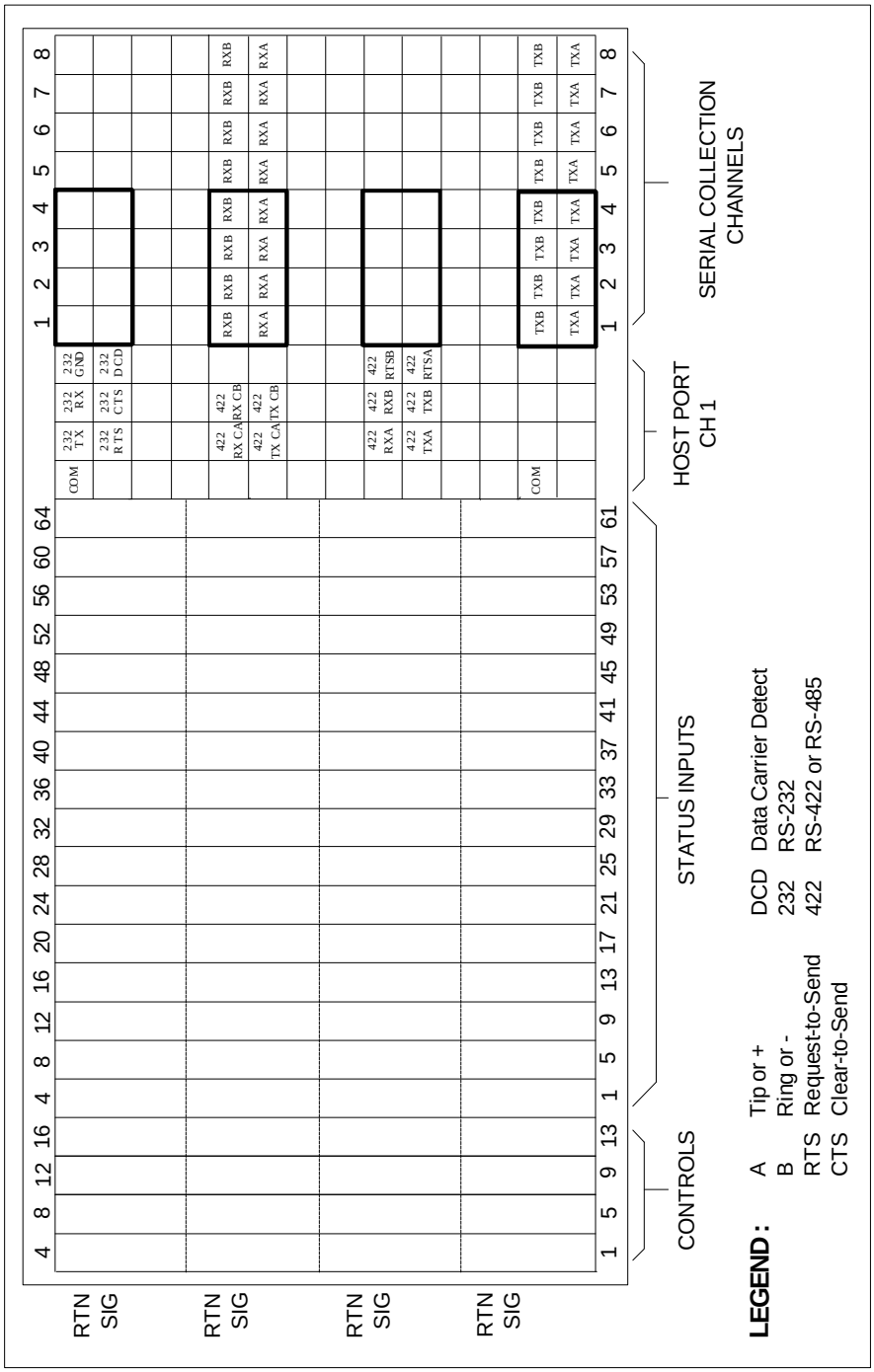


Figure 2-24. TELZON Block Wire Wrap Designations

2.6 Installation Check List

Use the following check list when installing the WS2000 hardware:

1. Mount the unit

2. Verify default strapping:
   - Main board
   - Modem board
   - Discrete I/O daughter board

3. Cable the unit
   - Verify serial port connections (DTE/DCE or DTE/DTE)
   - Verify discrete connections

The unit is now ready to be configured for software. Refer to Section 3 for configuration information and Section 4 for WESMAINT reference material.

Section 3: Configuration

3.1 Overview

This section contains configuration information for the WS2000. It is composed of three major parts:

- An overview of the configuration process
- A methodology for organizing configuration parameters
- A detailed set of instructions for configuring a WS2000

The WS2000 comes from the factory with a default configuration. Refer to Appendix A.

The WS2000 allows operation centers to monitor and control diverse groups of transmission and switching equipment by converting the serial and discrete information to a format which is understood by the center. Before the WS2000 can perform this conversion, it must be informed (configured) about the characteristics of the equipment which it is interfacing with.

The first part of Section 3 discusses each parameter which must be configured. These parameters include:

- The physical characteristics and communications rate of each serial interface: RS-232, RS-422, RS-485.
- Mapping Alarm and Control information from remote equipment to the format used by the operations center.
- Other attributes that affect how alarm/status information is to be reported to the operations center.

3.2 Configuration Overview

This section provides an overview of the elements that compose a maintenance operations system. An understanding of these elements is helpful when configuring the WS2000.

A maintenance system is a hierarchical organization of units designed to report and control digital transmission equipment. The top of the hierarchy is occupied by a centralized Operation System. The Operation System collects data from Remote Telemetry Units on a polled basis.

The Remote Telemetry Units form the second level of the hierarchy. The WS2000 is a Remote Telemetry Unit that processes information from monitored equipment and discrete inputs on a polled basis. The monitored equipment and discrete inputs are the base of the hierarchy.

3.2.1 Scan Points

The basic unit of information processed by the WS2000 is a **Scan Point**. A Scan Point is a binary signal provided by the monitored equipment that indicates some aspect of its condition. The Scan Points are defined by the manufacturer of the monitored equipment. Scan Points are active either high or low. The invert attribute allows Scan Point status to be inverted before it is processed. In this manner, the Remote Telemetry Unit can process the status, regardless of the electronic output of the monitored equipment.

The Scan Point data is processed by the WS2000 before it is reported to the Operation System. This processing is accomplished according to various attributes defined in a **Process List**.

3.2.2 Process Lists

A Process List is a set of attribute definitions for each of the 64 scan points in a display. Each display that is processed by a WS2000 must have a process list associated with it.

The Process List defines a Scan Point as either an **Alarm Point** or a **Status Point**. Scan Points that are classified as alarm points will cause a Change-of-State indication when the status of the Scan Point goes from a low to a high state. Alarm points also result in local alarm annunciation via the COS LED. Alarm points can also be defined as **Bipolar Alarms**. A bipolar alarm causes a Change-of-State indication when the status of the Scan Point changes state (Both High to Low and Low to High). Status points are informative and never cause a Change-of-State indication.

Scan Points can be active when they are high or low. The invert attribute allows Scan Point status to be inverted before it is processed. That is, when the Scan Point status is low, it will be processed as if it were high. When the Scan Point status is high, it will be treated as if it were low.

A Process List may define a memory attribute for each Scan Point. If a Scan Point has memory (sometimes referred to as stretch), any changes in Scan Point status will be held by the WS2000 until they are reported to the Operation System.

Several pre-defined process lists are supplied in the default configuration database of the WS2000. Any of the pre-defined process lists can be customized, deleted or copied. New process lists can be created from scratch, or generated by copying and modifying an existing process list.

3.2.3 Control Points

Control Points are provided by the monitored equipment to effect some aspect of its operations. Typical uses of Control Points are to silence alarm indications or to restart microprocessor based equipment. Like Scan Points, the actual meanings of the Control Points are also defined by the manufacturer of the monitored equipment.

Some Control Points are bipolar and require a latching command (on or off). Other Control Points require only a momentary command (pulse).

3.3 Serial Interfaces

Communications between the monitored equipment, the WS2000, and the operations center is accomplished via a serial interface. A serial interface can be described as a physical connection which is used to transport information. The rules which govern the transport of the information are called a protocol. Each WS2000 is equipped with 10 serial Channels: 1 host port, 8 data collection ports and 1 Craft port.

3.3.1 Physical Connections

The WS2000 supports three types of physical connections for serial interfaces: RS-232, RS-422 (point-to-point physical interfaces), and RS-485 (multi-point interface). Serial channels 1 through 5 support all three types of physical level interfaces. Channels 6 through 9 support RS-422 only. Channel 10 (Craft interface) is RS-232 only. Refer to Section 1 for more information on the interface characteristics of each channel.

3.3.2 Handshaking

Serial channels 1 through 5 on the WS2000 provide the RTS handshaking signal when operated in RS-232 mode. Serial channel 1 also provides an RS-422 RTS signal. When channel 2 through 5 are operated in RS-232 mode, RTS is asserted 10-20 milliseconds before data transmission begins, and is de-asserted after the data transmission has completed. When operating in RS-422 mode, the RTS signal is asserted on power up and is never de-asserted. Some channels provide pins for CTS and DCD handshake signals, however these signals are not used by the WS2000. Refer to Section 1 for detailed information on the interface parameters of each channel.

3.3.3 Serial Communications

Each serial interface communicates at a configurable speed of 1200 or 2400 bps.

Channel 10 is used to interface with the WESMAINT and PC-WESMAINT for configuration and local monitoring of the WS2000. Channel 10's configuration parameters are fixed and cannot be altered. WESMAINT functions are described in detail in Chapter 4 of this document. Refer to Section 1 for specific information on channel interface parameters. The TBOS and TABS protocols are employed between the WS2000 and the monitored equipment. TBOS and TABS normally utilizes the RS-422 physical layer interface with a channel speed of 2400 baud.

3.3.4 TBOS Protocol Organization

The Telemetry Byte Oriented Serial (TBOS) protocol is a master/slave protocol. During communications with monitored equipment, the WS2000 acts as the master, and the monitored equipment acts as the slave. When communicating with network elements, the WS2000 acts as the host, and the network element is the slave. Under the rules for TBOS, the master issues a poll or command character to the slave. The master will wait up to 200ms for a response character from the slave.

3.3.4.1 Displays

The master scans the slave for Scan Point data, and commands the slave to operate Control Points. The fundamental unit of information organization in the TBOS protocol is the Display. A Display is a set of 64 Scan Points and 64 Control Points. Each set of Scan Points has a corresponding set of Control Points defined. Monitored equipment may contain one or more Displays depending upon the number of Scan Points and Control Points defined. TBOS supports a maximum of eight Displays (512 points) per serial port.

3.3.4.2 Characters

Displays are organized into Characters. A Character is a set of eight Scan Points. Since there are 64 Scan Points in a Display, each Display contains eight Characters. The Character is the smallest unit of information transferred by the TBOS protocol.

3.3.4.3 Scan List

A Scan List is used by the WS2000 to control the polling of Characters in a Display. When all of the Scan Points in a Display are active, the Scan List is set up so that all Characters are polled. If one or more Characters in a Display are not active, the Scan List can be set up so that the inactive Characters are never polled. By polling only the active Characters in each Display, the WS2000 can process the Display more efficiently. A Scan List can also be used to disable Scan Character (consisting of 8 scan points) processing for newly installed, but untested equipment.

Note: To insure proper operation of the TBOS protocol, it is necessary to poll at least two characters on a given TBOS serial channel.

3.3.4.4 TBOS Commands and Responses

TBOS messages sent by the master are of two types; scan requests and command requests. Each TBOS scan request identifies which Display and Character the TBOS master is polling for. The requested character is returned by the TBOS slave. Each TBOS command request identifies which Display and Control Point the Master wants to control. In addition, each command request identifies the type of control (latch, unlatch, or momentary).

3.3.5 TABS Protocol Organization

TABS is an acronym for Telemetry Asynchronous Block Serial protocol.

TABS is a master/slave protocol. The WS2000 acts as the master, and the monitored equipment acts as the slave. Under the rules for TABS, the master will issue a poll or command message to the monitored equipment and will wait up to 500ms for the monitored equipment to begin a response message. TABS messages can be up to 261 bytes in length.

TABS provides the ability to address a particular remote using a number ranging from 0 to 31. This TABS addressing is also known as the Monitored Equipment Frame Address (MEFA). It allows up to 32 TABS slaves to be connected to a single serial channel and to be connected to a single master. The master will use the address field of the TABS message to identify which slave is to accept and respond to each TABS command. Only the slave which was addressed in the command will transmit a corresponding response message.

The TABS protocol provides a number of message sets for monitoring and or controlling various forms of data.

3.3.5.1 TABS Alarm Surveillance and Control

The Alarm surveillance and control message set is similar to the TBOS protocol in that it is used to transport scan point and control information to monitor TABS equipment.

3.3.5.2 Displays (MEDN)

The WS2000 SmartScanner scans the monitored equipment for Scan Point data and commands the monitored equipment to operate Control Points. The fundamental unit of information organization in the TABS protocol is the Display. A Display is a set of 64 Scan Points and 64 Control Points. Each point can report status and can address a control. The display is the smallest unit of information transferred by the alarm surveillance and control message set.

Monitored equipment may contain one or more Displays depending upon the number of Scan Points and Control Points defined. TABS supports a maximum of 65535 Displays per TABS address. The TABS input display is known as MEDN, Monitored Equipment Display Number.

3.3.5.3 Characters

Displays are organized into Characters. A Character is a set of eight Scan Points. Since there are 64 Scan Points in a Display, each Display contains eight Characters.

3.3.5.4 Scan List

A Scan List is used by the WS2000 to control the reporting of Characters in a Display. When all of the Scan Points in a Display are active, the Scan List is set up so that all Characters are reported. If one or more Characters in a Display are not active, the Scan List can be set up so that alarms in inactive Characters are reported to the operations center as all zeroes.

Notice that in TABS (as opposed to TBOS) a disabled character is still reported, but the scan points within that character are set to zero. Disabling characters for displays collected using TABS ports prevents unwanted alarm data from being reported, but does not improve the efficiency of the port.

3.3.6 E-Telemetry Protocol Organization

E-Telemetry is a master/slave protocol. When the WS2000 is connected to the operations center, the operations center acts as the master and the WS2000 acts as the slave.

3.3.6.1 Displays

The smallest addressable unit of information in the E-Telemetry protocol is a Display. An E-Telemetry Display is a set of 64 Scan Points and 64 Momentary Control Points. Each Scan Point has a corresponding Momentary Control Point. The master scans the slave for Scan Point data and commands the monitored equipment to operate Control Points. Each point can report status and can address a control. The E-Telemetry protocol supports 64 displays but four of them are used for protocol overhead, (Displays 1-4). As a result, the WS2000 can report a maximum of 3840 Scan Points (64 Scan Points x 60 Displays) or 60 displays worth of information using E-Telemetry protocol.

In the E-Telemetry Protocol only 512 Control Points can execute latching commands. The WS2000 maps these 512 Control Points to Displays 5 through 12.

3.3.6.2 Characters

Displays are organized into Characters. A Character is a set of eight Scan Points. Since there are 64 Scan Points in a Display, each Display contains eight Characters.

3.3.6.3 Scan List

A Scan List is used by the WS2000 to control the reporting of the Characters in a Display. When all of the Scan Points in a Display are active, the Scan List is set up so that all Characters are reported. However, when one or more Characters in a Display are not active, the Scan List can be set up so that alarms in inactive Characters are never reported. In this case, the disabled character is reported to the operations center as all zeroes.

3.3.7 Display Mapping

The WS2000 E-Telemetry with TABS SmartScanner can report up to 60 displays (64 points each) of alarm and status information to the operations center and can also accept control commands for up to 60 displays. These displays are addressed and understood by the operations center and must be mapped (translated) to the displays which are used by the monitored equipment connected to the WS2000 using TABS, TBOS or discrete interfaces.

Displays numbers which are understood by the operations center are referred to as ***output displays***. Display numbers which correspond to the monitored equipment are referred to as ***input displays.***

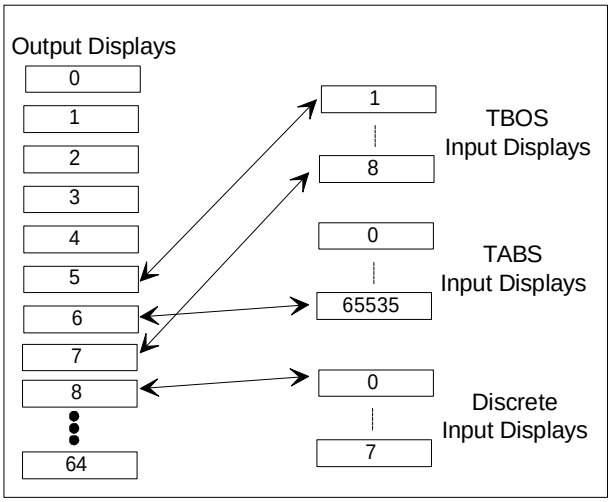


Figure 3-1. Alarm Status and Control Point Mapping

When one of the output displays is mapped, it is assigned to either a specific input display on one of the serial channels or to a specific group of 64 discrete inputs on the main board, or one of the expander units. When a serial port is configured as a TBOS port, it can support up to 8 displays of information, numbered 1 though 8.

When a serial port is configured as a TABS port, it can address up to 32 TABS remotes with each having a theoretical maximum of 65535 displays. The WS2000 allows an alarm planner to select any 60 input displays from any combination of these sources, and map each of those displays to output displays 5-64, to be reported to the operations center.

When a display is mapped, both the scan points and the control points associated with that display are mapped identically. It is not possible to map the scan points for a specific display separately from the control points.

3.4 Configuration Templates

It is useful to plan the configuration setup before configuring the WS2000. The following configuration templates provide a method of defining serial Channel characteristics, custom Process Lists, and verifying Input to Output Display mappings. They are intended to be copied and used to organize and document your configuration.

Once the configuration templates have been completed, they can be used as a guide during WS2000 installation and programming.

Three configuration templates are provided:

- Serial Channel Configuration
- Display Configuration
- Process List Configuration

Note: Appendix A shows default configuration templates and the attributes of the pre-defined process lists.

3.4.1 Serial Channel Configuration Template

The Serial Channel Configuration Template is shown in Appendix A. To configure a WS2000 serial channel, the following information must be defined:

- The interface type of the channel. The interface type can be RS-232 (point-to-point), RS-422 (point-to-point) or RS-485 (multi-point).
- The communications rate of the channel (1200 or 2400 bps).

The serial channel configuration template provides a row for each of the configurable serial channels of the WS2000. Each row has a column to define each of the types of information described previously.

3.4.2 Display Configuration Template

The Display Configuration Template is shown in Appendix A. To configure a WS2000 display, the following information must be defined:

- The physical source of the data to be stored in the display, either a serial channel number (channel 2-9) or the WPIB address for a block of discrete data points. Refer to Section 2 for details on WPIB addresses.
- The input display for data being gathered from serial channels.

- The number of a Process List that defines the desired attributes for the data points within the display. Refer to Appendix B for pre-defined Process Lists.
- A list of the Characters within the display which should be scanned and reported. For example, scan characters 1 and 2 in Display #5 will only scan/report scan points 1 through 16 on Display #5.

The output display configuration template provides a row for each of the output displays reportable by the WS2000. Each row has a column to define each of the types of information described above.

When the source of the data to be stored in the display is a serial Channel, ignore the column for the Discrete WPIB Address. Similarly, when the source of the data to be stored in the display is a block of discrete data points, ignore the columns for the Channel number and Input Display number.

Note

When a TABS or TBOS port fails to retrieve data for any of its assigned displays, the first 63 scan points of the display will be set to 0 while the 64th point is set to a 1. It is therefore recommended that point 64 on any display being assigned to a serial port be classified as a bipolar alarm to facilitate the detection of the failure by the operations center.

3.4.3 Process List Configuration Template

The Process List Configuration Template is shown in Appendix A. To configure a WS2000 Process List, a list number must be selected and some combination of data point attributes must be assigned to each data point in the Display. Possible attributes for each data point are:

- **bipolar** Classifying a data point as a bipolar alarm will cause the point to be reported as a change when it goes from high to low as well as from low to high. The change-of-state (COS) indicator will be illuminated on both transitions. Bipolar has no meaning for points which are not also classified as alarms.
- **invert** Invert the state of the data before processing.
- **memory** Latch any change of state until it is reported.
- **alarm** Classifying a data point as an alarm point, as opposed to a status point will cause it to be reported as a change when it goes from a low to a high state. The COS indicator on the front panel of the WS2000 will also illuminate when the data point goes from a low to a high state.
- **status** Scan point which is not classified as an alarm point and is not reported in response to a change request.

The Process List configuration template provides a row for defining the number of the proposed Process List and a space for each point in the display. Each entry in the Process List configuration template should be filled out to indicate which attributes apply to the corresponding point. A summary section is included on the form so the Process List configuration can be identified.

It is recommended that the first letter of each attribute be used to specify that attribute for each point. (**Note:** Status is represented by a blank space and is used only by itself.) It is further recommended that the attributes

be listed in the order in which they appear on the WESMAINT display to facilitate entry and verification of the configuration. The process list attributes are always listed by the WESMAINT display in the following order:

B A M I

where:

B = Bipolar
A = Alarm
M = Memory
I = Inverted

This attribute list indicates that the corresponding point is a bipolar alarm with memory and is inverted before it is processed.

3.5 WS2000 Step-by-Step Configuration

This section delineates the step-by-step procedures for configuring a WS2000 TBOS using the WESMAINT terminal. It is assumed that the reader is familiar with the material presented in the Configuration Overview and Configuration Templates sections.

3.5.1 Configuring the Serial Channels

Configuration begins with defining the physical characteristics and protocols for the serial channels. During configuration, verify that the RS-422/RS-485 straps, located on the rear of the WS2000, are correct. Refer to the Installation section for details on strapping and cabling options for serial ports.

1. Enter CONFIG MODE. For details on entering CONFIG MODE, refer to the WESMAINT Operating Mode section of the WESMAINT Reference, located elsewhere in this guide.

1. For each serial channel to be configured:

   A. Select the Serial Channel Interface function. For details on the operation of this function, refer to the Serial Channel Interface section of the WESMAINT Reference.

   A. Select a serial channel.

   A. View the protocol for the selected channel (TABS, TBOS, E-Telemetry). Change the protocol if necessary.

   A. View the interface type of the selected channel (RS-232, RS-422, RS-485). Change the interface type if necessary.

   A. View the communications rate of the selected channel (1200 or 2400 bps). Change the rate if necessary.

3.5.2 Configuring the Process Lists

The WS2000 is provided with many pre-defined process lists. Appendix B shows all pre-defined lists. If none of the pre-defined lists provide a set of scan point attributes which match the requirements of the displays to be reported, new lists can be built from scratch, or by modifying an existing list.

Enter CONFIG MODE and select the Configure Lists function. For details refer to Section 4.

When generating a new Process Attribute List, select either the CREATE LIST, DUPLICATE LIST, or MODIFY LIST function. If the new Process List closely resembles an existing list, the fastest way to configure it may be via the duplicate and modify functions. If the new list bears little resemblance to an existing list, the fastest way to configure it may be via the create function.

When changing an existing list, use either the DELETE LIST, CREATE LIST or MODIFY LIST function. The choice will depend upon how different the existing list is from the new list. If the number of changes that need to be made is small, then the fastest way to configure the list may be via the MODIFY LIST function. If a large number of changes need to be made, it may be faster to delete the existing list and start fresh, via the CREATE LIST function. If the attributes in the new Process List are identical for many of the Scan Points, configuration is faster if the AUTO PROPAGATE feature is turned on. The Auto Propagate function takes the attribute(s) assigned to the first Scan Point and "copies" the attribute(s) to the remaining Scan Points in the Process List.

3.5.3 Configuring the Displays

Now that the serial ports and process lists are prepared, you are ready to map and configure the output displays. (**Note:** The Output Displays are defined as those which are reported to the Operations Center. The Input Displays are those from the monitored equipment.) Output displays must be mapped to an input serial channel or a block of discretes. When an display is mapped to a serial channel, the display must also be mapped to an input display. Once mapped, a process list can be assigned to the display and a character scan list can be defined for the display.

- Enter CONFIG MODE. For details on entering CONFIG MODE, refer to the WESMAINT Operating Mode section of the WESMAINT Reference.
- Select the Configure Display function. For details on the operation of this function, refer to the Configure Display section of the WESMAINT Reference.
- Select each output display to be configured using the arrow keys or the Point (PT) key.
    1. If the source of data for this Display is a TABS Input Display:
        a. Specify the serial channel for this Display (2-9).
        b. Specify the TABS address for the monitored equipment which reports this display (0-31).
        c. Specify TABS Input Display number for this Display (0-65535).
        d. Specify the Process List number for this Display.
        e. Specify the Scan List for this Display.
    2. If the source of data for this Display is a TBOS Input Display:
        a. Specify the serial channel (2-9) for this Display.
        b. Specify TBOS Input Display number (1-8) for this Display.
        c. Specify the Process List number for this Display.
        d. Specify the Scan Character List (1, 2, 3, 4, 5, 6, 7, 8) for this Display.
    3. If the source of data for this Display is Discrete Input:
        a. Specify channel as D for discretes for this display.
        b. Specify the expander number (1-7, or 0 for main board).
        c. Specify the Process List number for this Display.
        d. Specify the Scan Character List for this Display.
    4. If this Display is a spare, specify the Display as "spare" by entering channel number 0.

3.5.4 Verifying the New Configuration

- Enter NORMAL mode. For details on entering NORMAL mode, refer to the WESMAINT Operating Mode section of the WESMAINT Reference.
- Select the Serial Channel Interface function.
  1. Select each serial Channel that was configured.
  1. Verify the protocol selected for each serial Channel.
  1. Verify the Interface Type of the selected Channel.
  1. Verify the Baud Rate of the selected Channel.
- Select the Configure Lists function.
  1. Select each Process List that was configured.
  2. Verify the Process List attributes via VIEW LIST function.
- Select the Configure Displays function.
  1. Select each Output Display using the arrow keys or the Point (PT) key.
  2. If the data source is a TBOS input:
     a. Verify the TBOS serial Channel.
     b. Verify the TBOS Input Display number.
     c. Verify the Process List number.
     d. Verify the Scan List number.
  3. If the data source is a TABS input:
     a. Verify the TABS serial Channel.
     b. Verify the TABS input address (MEFA).
     c. Verify the TABS Input Display number (MEDN).
     d. Verify the Process List number.
     e. Verify the Scan List number.
  4. If the data source is discrete input:
     a. Verify the expander number.
     b. Verify the Process List number.
     c. Verify the Scan List number.

  Select the Configure E-Telemetry address function. Verify the E-Telemetry address for this SmartScanner.

3.6 Configuration Check List

Use the following check list when configuring the WS2000 E-Telemetry with TABS SmartScanner.

1. Enter CONFIG mode
2. Configure serial channel interfaces
3. Configure Process Lists
4. Configure displays
5. Adjust modem transmit level (-10dB is default)
6. Enter NORMAL mode

Section 4: Maintenance Interface

4.1 Interface Hardware

The WS2000 Maintenance Unit, the WESMAINT, is a multi-functional local display that provides user interface with the WS2000. It is available in either a rack mount or portable version. Refer to Figure 4-1. The front panel consists of 16 hexadecimal keys, 16 function keys, and a 16 character LED display. Power for the WESMAINT unit is supplied through the serial cable which is connected to JB3 or P5 on the WS2000.

In addition to the rack mount and portable WESMAINT, Harris offers a PC-WESMAINT Software Package which provides a WESMAINT interface using a PC as the "WESMAINT" unit. In addition to the WESMAINT function, the PC-WESMAINT software can retrieve, view, and download WS2000 SmartScanner configuration information. In the absence of a WESMAINT or PC-WESMAINT, configuration can be accomplished via a VT100 terminal using equivalent ASCII characters.

4.2 Cabling

If the rack mount WESMAINT unit is used, connect it to P5 on the rear of the WS2000. Harris recommends connecting the portable WESMAINT Unit, PC-WESMAINT, or VT100 terminal to JB3, the DB25 connector on the front of the WS2000. A PC or VT100 terminal can be connected to P5 using the terminations shown in Table 4-1.

When using a rack mount WESMAINT connected to P5, install a termination plug (jumpering pins 18 and 25) on JB3. This plug is available from Harris, P/N 977-T042.

NOTE: Install this plug only AFTER power has been applied,

and remove it BEFORE power is removed.

The WESMAINT Unit or VT100 should display menu choices when the Command (CMD) and Display (DSPY) keys are pressed. This indicates that the WS2000 is operating properly and is ready to be configured according to the site requirements. If nothing appears on the screen or the message **"EEPROM CORRUPT"** appears, a memory problem has occurred. Figure 2-17 and Table 2-20 identify the individual pins on JB3.

P5 (REAR PANEL)	JB3 (FRONT PANEL)	PC-WESMAINT OR VT100 (9-PIN SERIAL PORT)
Pin 2 RX	Pin 2 RX	Pin 3 RX
Pin 1 TX	Pin 3 TX	Pin 2 TX
Pin 4 COM	Pin 4 COM	Pin 5 COM
No Jumpers Required	Jumper 18 to 25	Jumper 7 to 8 & 4 to 6 (PC ONLY)

Table 4-1. PC and VT100 Maintenance Connections

4.3 Selecting a WESMAINT Function

When using a rack mount WESMAINT unit, the initial display reads "WESMAINT READY". When using a portable or PC WESMAINT, the display is initially blank. If CMD is pressed, the display reads "WESMAINT MODE". If DSPY is pressed, the display reads "VERSION NUMBER". Keypad entries can then be accepted by the software. There are two types of WESMAINT functions:

- Display - to view data
- Command - to program data

The menu of display functions is accessed by pressing the DSPY key. The menu of command functions is accessed by pressing the CMD key. Both the DSPY and CMD keys are active at all times.

Pressing either the DSPY or CMD key will cause the first function title in that menu to be displayed. The list of function titles may be viewed by pressing the UP or DOWN arrow keys, see Display Menu Tree or Command Menu Tree elsewhere in this section.

To access a function, press the DSPY key if the function is in the Display menu or the CMD key if the function is in the Command menu. Manipulate the UP and DOWN arrow keys until the function title is displayed, then press the SEL (SELECT) key. A function may be exited or aborted at any time by pressing the DSPY or CMD keys again.

4.3.1 WESMAINT Unit Key Layout

Figure 4-1 is an illustration of the WESMAINT panel and its key pads.

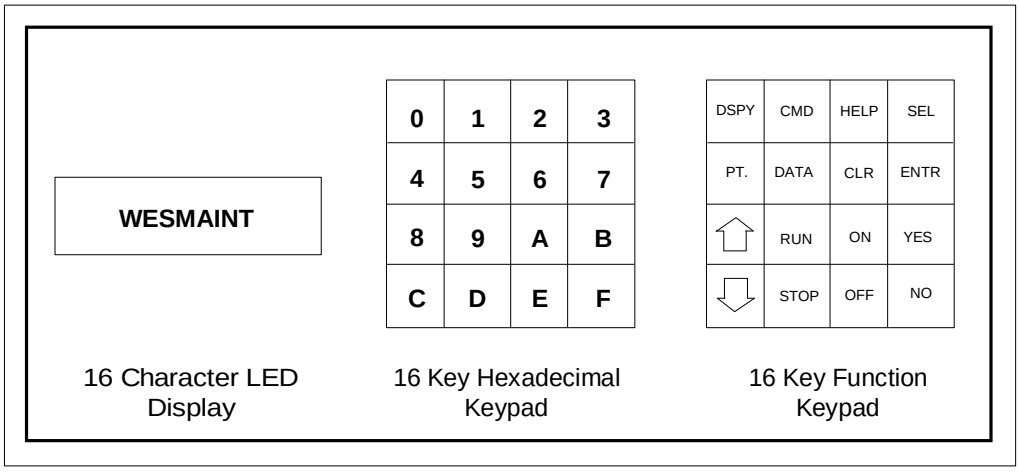


Figure 4-3. WS2000 Maintenance Unit

4.3.2 ASCII Terminal Key Layout

Table 4-2 provides an ASCII cross reference of the WESMAINT function keys if a VT100 terminal is being used instead of a WESMAINT.

WESMAINT KEY	ASCII CHARACTER
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	:
B	;
C	<
D	=
E	>
F	?

WESMAINT KEY	ASCII CHARACTER
DSPY	@
CMD	A
HELP	B
SEL	C
PT	D
DATA	E
CLR	F
ENTR	G
UP ARROW	H
RUN	I
ON	J
YES	K
DOWN ARROW	L
STOP	M
OFF	N
NO	O

Table 4-2. WESMAINT ASCII Terminal Functional Equivalency

The craft firmware driver in the WS2000 issues a carriage return ("CR") character after each line.

The WS2000's Tx/Rx characters consist of one start bit, seven data bits, even parity, and one stop bit at a baud rate of 9600.

CAUTION: If using a PC, the arrow key may cause a "?" prompt to appear on the screen at which point the WS2000 appears to lock up. The question mark prompt is a mode on the WS2000 that allows a PC ASCII file to be loaded into the EEPROM. To get out of the question mark prompt "lock up", perform the following steps.

@

Carriage Return

@

These steps should bring back the Version Number or WESMAINT Mode menu.

4.3.3 Operator Prompts

When using the WESMAINT/VT100 to program a WS2000, the software will prompt the user for information. These operator prompts are explained in the following text.

4.3.3.1 Question Mark (?)

Certain functions are questions followed by a question mark (?). These questions require a YES or NO response. Press the YES or NO key as appropriate.

4.3.3.2 Numerical Input Prompt (^)

Certain functions require the input of numerical data from the operator. When the numerical input prompt (^) is displayed, key in the appropriate data using the hex keypad. After keying in the data, press the ENTR key to signal the end of data entry. If a mistake is made in entering data, and noticed before the ENTR key is pressed, the operator may press the CLR key to erase the data and start over. Pressing the ENTR key without entering any data is equivalent to entering the value 0.

4.3.3.3 Alternate Input Prompt (@)

Certain functions require that the Hex keypad be remapped to include second function mappings as follow:

0=G 1=H 2=J 3=K 4=L 5=M 6=N 7=P 8=R

4.4 Display Menu Functions

This section contains detailed descriptions of all WESMAINT functions. The descriptions outline the formats of the displayed data, indicate which keys are active, and provide step-by-step operating procedures.

For a discussion of how to use the various WESMAINT functions to configure a WS2000, refer to Section 3. More information about the WS2000 configuration elements such as Process Lists, Displays, and Channels, is included in the Overview of Section 3.

Note that some WESMAINT functions are valid only in NORMAL mode, some in CONFIG mode, and that some functions are valid in either mode. For a discussion of NORMAL vs. CONFIG mode, see the section on the WESMAINT MODE function.

Table 4-3 shows the functions that are accessed from the DSPY menu, and Figure 4-2 the display menu hierarchy.

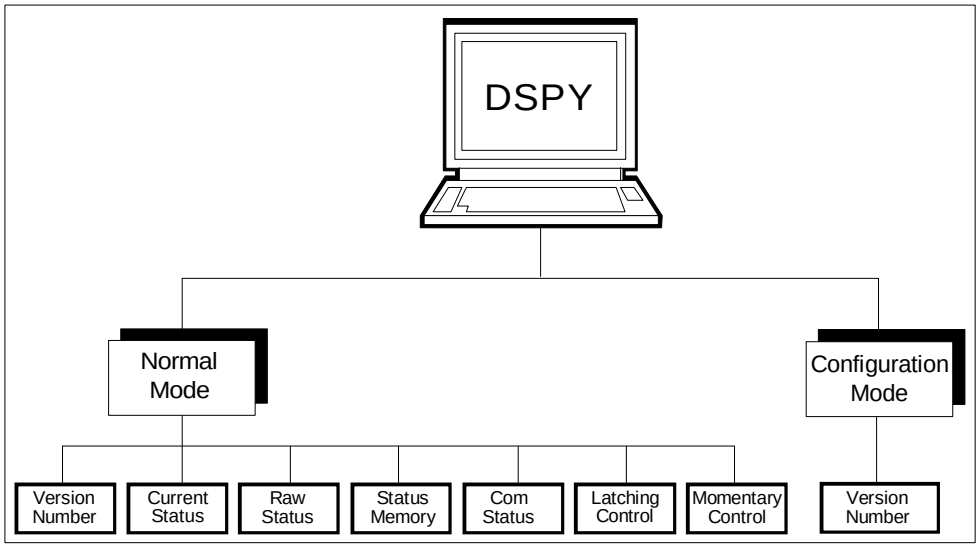


Figure 4-2. Display Menu Tree

FUNCTION TITLE	PURPOSE
VERSION NUMBER	View software load ID string
CURRENT STATUS	View processed input data
RAW STATUS	View unprocessed input data
STATUS MEMORY	View status memory data
COM STATUS	View channel communication data
LATCHING CONTROL	Latch discrete or serial outputs
MOMENTARY CONTROL	Pulse discrete or serial outputs

Table 4-3. Display Menu Functions

4.4.1 Version Number (Software Load Identification)

This section describes how to use the WESMAINT to view the current version of software in the WS2000.

MENU

DSPY

PURPOSE

To view the software load identification stored in the EPROM. This identification should be used to report any problems with the WS2000 firmware.

SCREEN FORMAT

When the function is selected, the screen will show the content of the stored software load identification.

KEYS USED

The following keys are active while this function is selected:

- **UP:** Scroll software load identification in a forward direction.
- **DOWN:** Scroll software load identification in a backwards direction.
- **STOP:** Stops scrolling software load identification.
- **RUN:** Starts scrolling software load identification.

VALID MODES

NORMAL, CONFIG

OPERATION

The steps below must be followed in order to view the software revision in the WS2000.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "VERSION NUMBER" appears on the screen.
3. Press the SEL key. The software version information will then scroll across the screen.

Exit the Function

To exit this function, press the DSPY or CMD key.

4.4.2 Current Status

The following describes how to view the current status of the WS2000 input data.

MENU

DSPY

PURPOSE

To view the status of input data as it will be seen by the master station. This data has been processed according to the point attributes defined in the related Process Lists. Refer to the Section 3 in this guide for a discussion of Process Lists.

SCREEN FORMAT

The screen format for this function is:

Cxx-y zzzzzzzz

where:

C	=	Current Status Menu
xx	=	output display number 5-64)
yy	=	character number (1-8)
zzzzzzzz	=	data bit status

Note the data bits are shown from least significant bit (LSB) on the left to most significant bit (MSB) on the right, e.g., bits 1, 2, 3, 4, 5, 6, 7, 8.

A flashing asterisk (*) indicates that the status memory bit is on for one or more of the points shown. This indicates that a change has occurred on a data point that has alarm attributes that have not yet been reported to the master station. If any of the data points shown have both alarm and memory attributes, the state shown may or may not be the current state of the input. Once the alarm is reported to the master station, the asterisk (*) disappears.

KEYS USED

The following keys are active when this function is selected:

- **UP**: Advance to the next character in the current output display or to the first character in the next output display.
- **DOWN:** Back up to the previous character in the current output display or to the last character in the previous output display.
- **POINT (PT):** Select a particular output display and character for viewing.
- **CLEAR (CLR)**: Clear status memory bits for character on screen.

Note: The CLR key affects the data that will be reported to the master station. This key is primarily intended to be used when the WS2000 is in an off-line diagnostic mode. When the WS2000 is in an on-line mode, this command should be used with discretion.

VALID MODES

NORMAL mode only

OPERATION

The steps below are required in order to view the current status of the WS2000 input data.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "CURRENT STATUS" appears on the screen.
3. Press the SEL key.

Select Other Displays/Characters

1. Press the UP key to view the next character of the current output display or the first character of the next output display.
2. Press the DOWN key to view the previous character of the current output display or the last character in the previous output display.
3. Press the PT. key to select a specific output display and character for viewing.
   - The WESMAINT screen will prompt with "DISPLAY=". Enter the desired output display number (5-64) on the hex keypad and press the ENTER key.
   - The WESMAINT screen will prompt with "CHARACTER=". Enter the desired character number (1-8) on the hex keypad and press the ENTER key.

Exit the Function

To exit this function, press the DSPY or CMD key.

Clear Status Memory Bits

Press the CLR key to clear the status memory bits for the current output display and character.

4.4.3 Raw Status

The following describes how to view the input data of the WS2000 prior to processing of the information.

MENU

DSPY

PURPOSE

To view the status of raw input data before processing according to the point attributes defined in the related Process Lists. Refer to the Configuration section elsewhere in this guide for a discussion of Process Lists.

SCREEN FORMAT

The screen format for this function is:

Rxx-y zzzzzzzz

where:

R	=	Raw Status Menu
xx	=	output display number (5-64)
yy	=	character number (1-8)
zzzzzzzz	=	data bit status

Note the data bits are shown from least significant bit (LSB) on the left to most significant bit (MSB) on the right, e.g., bits 1, 2, 3, 4, 5, 6, 7, 8.

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next character in the current output display or to the first character in the next output display.
- **DOWN:** Back up to the previous character in the current output display or to the last character in the previous output display.
- **POINT (PT):** Select a particular output display and character for viewing.

VALID MODES

NORMAL mode only

OPERATION

The following steps must be followed in order to view the raw status of the WS2000 input data.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "RAW STATUS" appears on the screen.
3. Press the SEL key.

Select Other Displays/Characters

1. Press the UP key to view the next character of the current output display or the first character of the next output display.
2. Press the DOWN key to view the previous character of the current output display or the last character in the previous output display.
3. Press the PT key to select a specific output display and character for viewing.
   - The WESMAINT screen will prompt with "DISPLAY=". Enter the desired output display number (5-64) on the hex keypad. Then press the ENTER key.
   - The WESMAINT screen will prompt with "CHARACTER=". Enter the desired character number (1-8) on the hex keypad. Then press the ENTER key.

Exit the Function

To exit this function, press the DSPY or CMD key.

4.4.4 Status Memory

The information below describes how to view the unreported change of state of a data point.

MENU

DSPY

PURPOSE

To view the points that have the status memory bit on. This indicates that a data point, which has the memory attribute, has experienced an unreported change of state.

SCREEN FORMAT

The screen format for this function is:

Mxx-y zzzzzzzz

where:

M	=	Status Memory Menu
xx	=	output display number (5-64)
y	=	character number (1-8)
zzzzzzzz	=	data bit status

Note the data bits are shown from least significant bit (LSB) on the left to most significant bit (MSB) on the right, e.g., bits 1, 2, 3, 4, 5, 6, 7, 8.

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next character in the current output display or to the first character in the next output display.
- **DOWN:** Back up to the previous character in the current output display or to the last character in the previous output display.
- **POINT (PT):** Select a particular output display and character for viewing.

VALID MODES

NORMAL mode only

OPERATION

The steps below are required in order to access the Status Memory menu.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "STATUS MEMORY" appears on the screen.
3. Press the SEL key.

Select Other Displays/Characters

1. Press the UP key to view the next character of the current output display or the first character of the next output display.
2. Press the DOWN key to view the previous character of the current output display or the last character in the previous output display.
3. Press the PT key to select a specific output display and character for viewing.
   - The WESMAINT screen will prompt with "DISPLAY=". Enter the desired output display (5-64) on the hex keypad. Then press the ENTER key.
   - The WESMAINT screen will prompt with "CHARACTER=". Enter the desired character number (1-8) on the hex keypad. Then press the ENTER key.

Exit the Function

To exit this function, press the DSPY or CMD key.

4.4.5 Com Status (Communications Status)

The following describes how to view the communication status of incoming/outgoing alarm information. This menu provides information on each channel's data to indicate if data is being transmitted and received, and if frame, parity, overrun, or time-out errors are present.

MENU

DSPY

PURPOSE

To view the status of each channel 1-9 or 1-5 (depending on hardware).

SCREEN FORMAT

The general format for the screen is:

CHxx aa bb c

where:

CH	=	Channel
xx	=	channel number 1-9
aa	=	transmit
bb	=	receive
c	=	frame, parity, overrun or time-out

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next channel
- **DOWN:** Back up to the previous channel
- **POINT (PT):** Select a specific channel
- **DATA:** Displays total number of bytes
- **CLEAR (CLR):** Returns error count to zero

VALID MODES

NORMAL mode only

OPERATION

The following steps are required to access the Communication Status menu.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "COM STATUS" appears on the screen.
3. Press the SEL key.

Select Another Channel

1. Press the UP key to select the next channel.
2. Press the DOWN key to back up to the previous channel.
3. Press the PT key to select a specific channel. The WESMAINT screen will prompt with "CHANNEL=". Enter the desired channel number (1-9) on the hex keypad. Then press the ENTER key.

Exit the Function

To exit this function, press the DSPY or CMD key.

View Total Count

1. Press the DATA key to view total number of transmitted bytes.
2. Press the DATA key again to view the total number of received bytes.
3. Press the DATA key again to view the total number of parity errors.
4. Press the DATA key again to view the total number of overrun errors.
5. Press the DATA key again to view the total number of frame errors.
6. Press the DATA key again to view the total number of time-out errors.

Reset to Zero

Press the CLR key to return count to zero.

4.4.6 Latching Control

The following describes how to operate latching commands for discrete control outputs on the WS2000 SmartScanner.

MENU

DSPY

PURPOSE

To operate the discrete outputs in latching mode or to cause a latching control command to be sent via a data collection port to monitored equipment.

The WS2000 local discrete outputs and inputs (status and control) are mapped together. Controls are accessed on points 1-8 or 1-16 (depending on hardware). Status is collected on points 1-32 or 1-64 (depending on hardware).

The WS2000 may be strapped to allow 16 of the input points to read back the state of the 16 control outputs. when this strapping option is installed, the state of the first eight control points, 1-8, will be read back on status inputs 25-32, while the state of the second eight control points, 9-16, will be read back on status inputs 57-64.

SCREEN FORMAT

The general format for the screen is:

DSP xx PT yy

where:

DSP	=	Display
xx	=	output display number (5-64)
PT	=	Point
yy	=	discrete output point number (1-64)

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next control point
- **DOWN:** Back up to the previous control point
- **POINT (PT):** Select a specific control point
- **ON:** Energize the currently selected control point
- **OFF:** De-energize the currently selected discrete output
- **HELP:** Display a brief help message

VALID MODES

NORMAL mode only

OPERATION

The steps below are required for latching of discrete control points on the WS2000.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "LATCHING CONTROL" appears on the screen.
3. Press the SEL key.

Select Another Control Point

1. Press the UP key to select the next control point.
2. Press the DOWN key to back up to the previous control point.
3. Press the PT key to select a specific control point.
   - The WESMAINT screen will prompt with "DISPLAY=". Enter the desired output display number (5-64) on the hex keypad. Then press the ENTER key.
   - The WESMAINT screen will prompt with "POINT=". Enter the desired control point number (1-64) on the hex keypad. Then press the ENTER key.

Exit the Function

To exit this function, press the DSPY or CMD key.

Operate the Selected Control Point

- Press the ON key to energize the selected control point.
- Press the OFF key to de-energize the control point.

4.4.7 Momentary Control

This section describes how to operate a momentary command for discrete control outputs on the WS2000 SmartScanner.

MENU

DSPY

PURPOSE

To operate the discrete outputs in momentary mode or to cause a momentary control command to be sent via a data collection port to monitored equipment.

The WS2000 local discrete outputs and inputs (status and control) are mapped together. Controls are accessed on points 1-8 or 1-16 (depending on hardware). Status is collected on points 1-32 or 1-64 (depending on hardware).

The WS2000 may be strapped to allow 16 of the input points to read back the state of the 16 control outputs. When this strapping option is installed, the state of the first eight control points, 1-8, will be read back on status inputs 25-32, while the state of the second eight control points, 9-16, will be read back on status inputs 57-64.

SCREEN FORMAT

The general format for the screen is:

DSP xx PT yy zz

where:

DSP	=	Display
xx	=	output display number (5-64)
PT	=	Point
yy	=	point number (1-64)
zz	=	operating indicator (ON)

Note: The operating indicator is normally blank, or (OFF).

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next screen for current display or the first point in the next display.
- **DOWN:** Back up to the previous point in the current display or the last point in the previous display.
- **POINT (PT):** Select a specific display/point.
- **ON:** Operate the currently selected point and briefly turn the operating indicator on.

VALID MODES

NORMAL mode only

OPERATION

The following steps explain how to initiate momentary control commands to control points.

Select the Function

1. Press the DSPY key.
2. Press the UP key until the function title "MOMENTARY CONTROL" appears on the screen.
3. Press the SEL key.

Select Another Control Point

1. Press the UP key to select the next control point.
2. Press the DOWN key to back up to the previous control point.
3. Press the PT key to select a specific control point.

- The WESMAINT screen will prompt with "DISPLAY=". Enter the desired output display number (5-64) on the hex keypad. Then press the ENTER key.
- The WESMAINT screen will prompt with "POINT=". Enter the desired control point number (1-16) on the hex keypad. Then press the ENTER key.

Exit the Function

To exit this function, press the DSPY or CMD key.

Operate the Selected Control Point

Press the ON key to energize the selected control point.

4.5 Command Menu Functions

Figure 4-3 shows the CMD menu hierarchy and identifies the functions that are accessed from it.

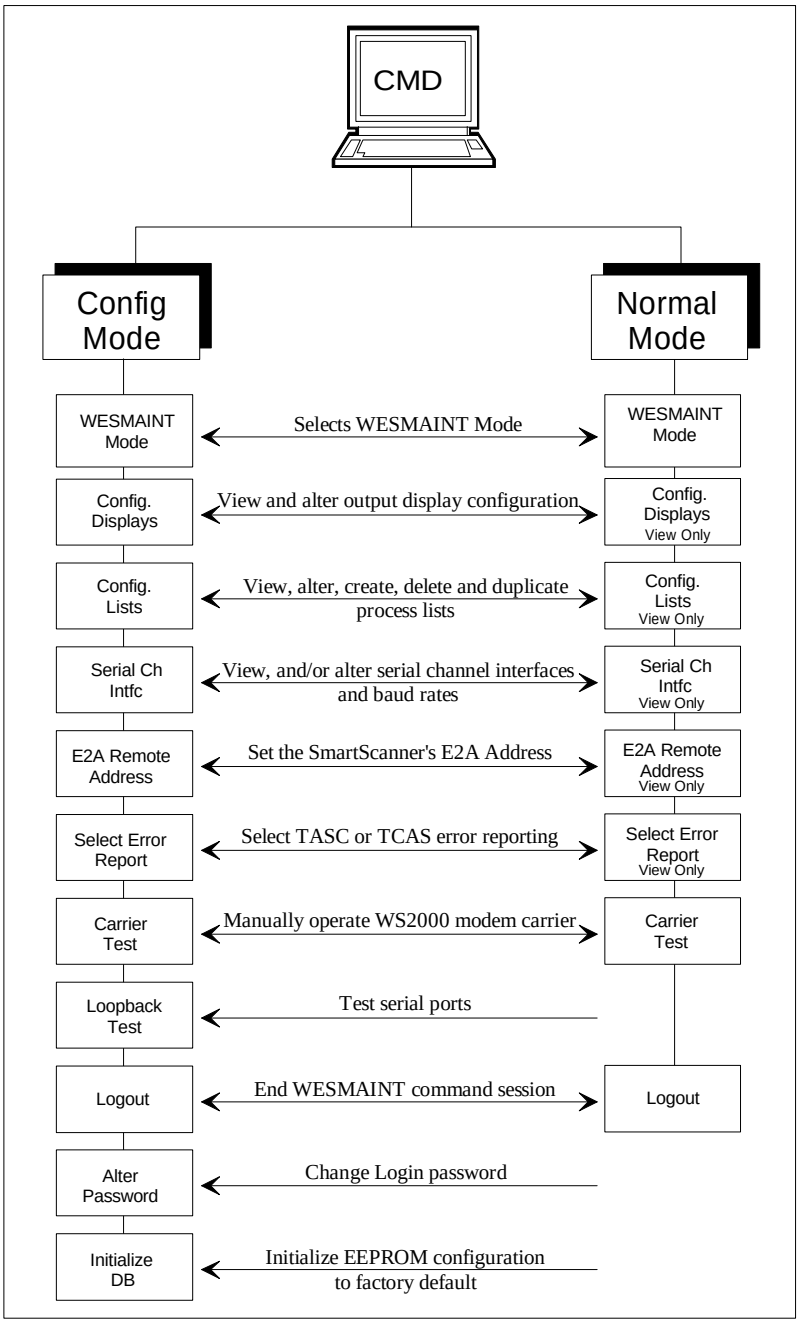


Figure 4-3. Command Menu Tree

4.5.1 WESMAINT Mode

The following describes how to change the WS2000 SmartScanner from a configuration mode for changing data to a normal mode of operation for processing information.

MENU

CMD

PURPOSE

To view/alter the WESMAINT operating mode. Note that some functions can operate in both NORMAL and CONFIG mode while other functions can operate in only one of the two operating modes. Each function description has a section labeled "VALID MODES" that identifies the valid mode(s) for that function.

SCREEN FORMAT

One of two messages will appear, depending on the current operating mode. They are:

NORMAL MODE

or

CONFIG MODE

KEYS USED

The following keys are active while this function is selected:

- **UP:** Display a potential operating mode
- **DOWN:** Return to the current operating mode
- **YES:** Select the new operating mode

VALID MODES

NORMAL, CONFIG

OPERATION

The following steps are required to alter the operating status of the WS2000 from a normal operating mode to a configuration mode.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "WESMAINT MODE" appears on the screen.
3. Press the SEL key.

Change Current Operating Mode

To change the current operating mode, press the UP key to display the new operating mode. The following notes apply:

- If changing from NORMAL mode to CONFIG mode, the screen will prompt "CONFIG MODE?" Press the YES key to enter CONFIG mode.

  If the YES key is pressed, the screen will briefly show the message "STOPPING TASKS" to indicate that normal WS2000 functions are being shut down in preparation for entering CONFIG mode.

- If changing from CONFIG mode to NORMAL mode, the WESMAINT screen will prompt "NORMAL MODE?" Press the YES key to restart the WS2000 and resume normal operation.

  If the YES key is pressed, the screen will briefly show the message "INITIALIZING" to indicate that normal WS2000 functions are being restarted in preparation for entering NORMAL mode.

Exit the Function

To exit this function, press the DSPY or CMD key.

4.5.2 Config Displays (Configure Displays)

The following describes how to configure the output displays of the WS2000 SmartScanner. Figure 4-4 shows the screen hierarchy.

MENU

CMD

PURPOSE

To view and/or change the output displays configuration.

SCREEN FORMAT

Each display has three configurable components: the data SOURCE, the process LIST, and the SCAN list. Three separate screens are used to show this information.

Source-

Serial

For displays where data originates from a serial port, the SOURCE screen will show the output TABS display number, protocol (TABS or TBOS), TABS address if needed, data collection port number, and the display number for the collected data.

Refer to Section 2 for the physical location of channels 2-9.

NOTE: The first four displays are reserved for the E-Telemetry protocol

Display 01 = Change Index
Display 02 = Any Index
Display 03 = Error Index
Display 04 = RSS Index

ww pppp CyDzzzzz

where:

ww=	E2A output display number (5-64)
pppp=	TBOS or TABS data source, or Tann for TABS data source where nn is the TABS address of the data source
C=	Channel
y=	Serial channel number 2-9
zzzzz=	Input display number, TBOS 1-8, TABS 0-65535

Discretes

For output displays where data originates from the WS2000 discrete inputs, the SOURCE screen will show the expander address for the discrete inputs:

xx DISC WPyy

where:

xx = E-Telemetry output display number (5-64)
DISC = Discrete
WP = WPIB
yy = WPIB address for inputs

Spare

If an output display is not configured (spare), the SOURCE screen will show:

xx SPARE

List-

The Process LIST screen shows the selected process list number for the output display:

xx LIST yyyy

where:

xx = E-Telemetry output display number (5-64)
LIST = List
yyyy = process list identifier number

A process list identifier of 0000 indicates no process list attributes have been selected and that the points in the display will be processed as "status without memory".

Scan-

The SCAN list screen indicates which of the eight characters in each display are valid. Invalid characters will not be scanned by the WS2000, and the data bits will be constantly held at 0. The SCAN list screen shows the numbers of the valid characters:

xx SCAN zzzzzzzz

where:

xx	=	E-Telemetry output display number (5-64)
SCAN	=	Scan List
zzzzzzzz	=	valid character number(s) (1-8), i.e., 1 2 3 4 5 6 7 8

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to next screen for current output display or first screen of next output display.
- **DOWN:** Back up to previous screen for current output display or last screen of previous output display.
- **POINT (PT):** Select a specific output display.
- **DATA:** Change configuration of output display.

VALID MODES

CONFIG mode only

OPERATION

The following steps describe how to configure an output display.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "CONFIG DISPLAYS" appears on the screen.
3. Press the SEL key.
4. To exit this function, press the DSPY or CMD key.

Select Another Screen or Output Display

1. Press the UP key to advance to the next screen on the current output display or to the last screen on the previous output display.
2. Press the DOWN key to back up to the previous screen on the current output display or to the last screen on the previous output display.
3. Press the PT key to select a specific output display. The WESMAINT screen will prompt "DISPLAY=". Enter the desired output display number (5-64) using the hex keypad. Then press the ENTER key.

Change the Data Source for a Display

1. Select the desired output display using the steps outlined above.
2. Press the DATA key. The WESMAINT screen will prompt "CHANNEL=". Execute one of the following procedures:
3. If the data source is to be an Input Display collected on a serial input:
4. Enter the channel number (2-9) using the hex keypad. Then press the ENTER key. Refer to Section 2 for the physical location of channels 2-9.
5. If this is a TABS channel, the WESMAINT screen will prompt for a TABS address "TABS ADDR =". Input a TABS address (0-31) using the hex keypad. Then press the ENTER key. This step is not for TBOS channels.

6. The WESMAINT screen will then prompt for an input display number "DISPLAY=". Enter the desired display number (0-65535) using the hex keypad. Then press the ENTER key.
7. If the data source is to be DISCRETE inputs, press the "D" key on the hex keypad. Then press the ENTER key. The WESMAINT screen will then prompt "EXPANDER=". Enter the expander number of the discrete inputs using the hex keypad. Then press the ENTER key.
8. To configure the display as a SPARE, press the "0" key on the hex keypad. Then press the ENTER key.

Change the Process LIST

1. Select the LIST screen of the desired output display using the steps previously outlined.
2. Press the DATA key. The WESMAINT screen will prompt "LIST=".
3. Enter the Process List identifier code using the hex keypad. Then press the ENTER key.
4. If the selected Process List is not contained in the Remote configuration, the WESMAINT screen will briefly display the message "NO SUCH LIST" and will prompt again for a list number.

Note: To view, alter, create, duplicate and delete Process Lists, the CONFIGURE LISTS function is used.

Change the SCAN List

1. Select the SCAN screen of the desired output display using the steps previously outlined.
2. Press the DATA key. The WESMAINT screen will prompt "SCAN=".
3. Enter the numbers of the characters to be scanned using the hex keypad (e.g., to scan characters 1, 2, and 8 enter 128). Then press the ENTER key. To disable scanning of all characters in the display, press only the ENTER key.

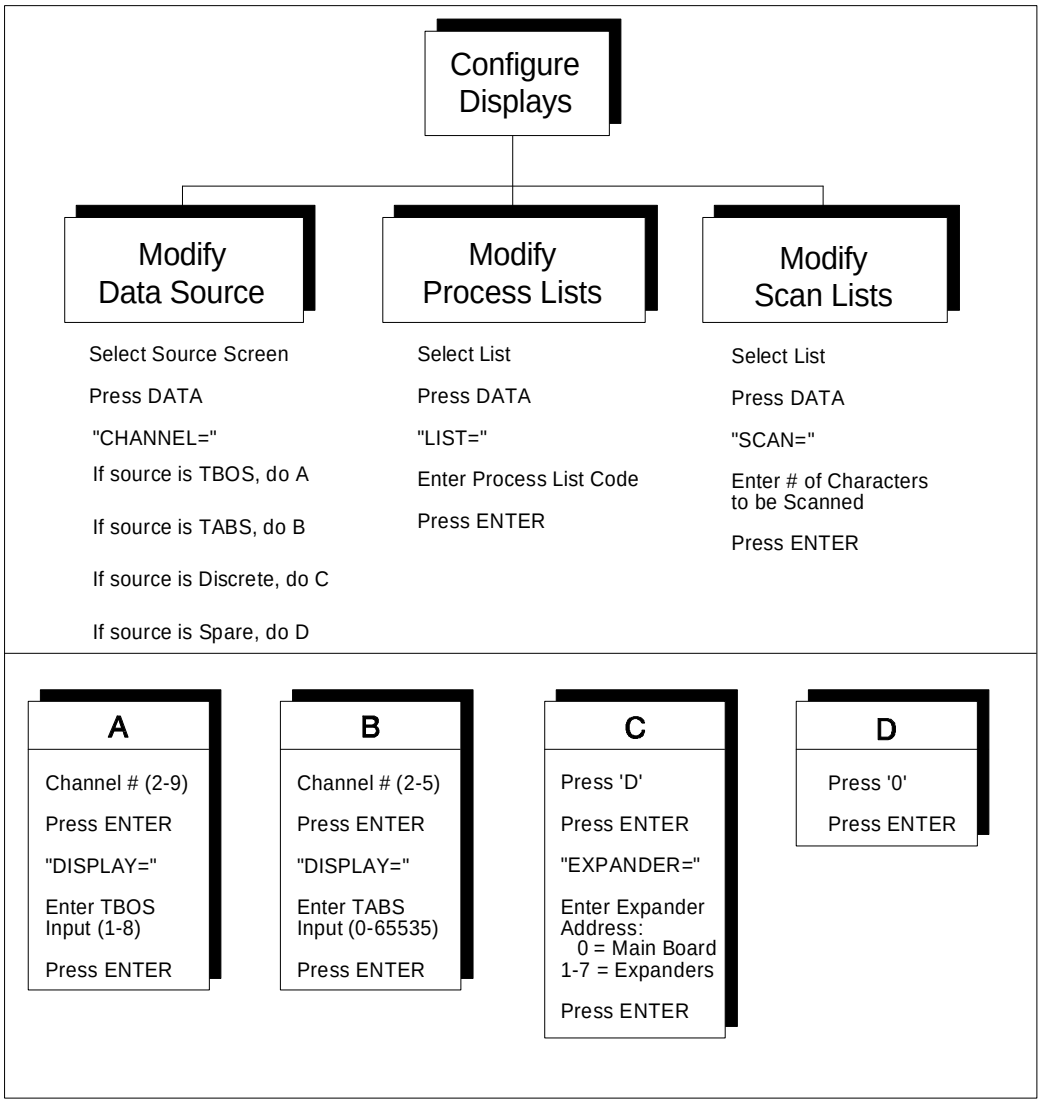


Figure 4-4. Configure Displays Menu Tree

4.5.3 Config Lists (Configure Process Attribute Lists)

This section describes how to view, create, modify, or delete configuration Process Lists in the WS2000. Figure 4-5 shows the screen hierarchy.

MENU

CMD

PURPOSE

To view and/or modify process list attributes. This function also allows process lists to be CREATED, DELETED and DUPLICATED.

SCREEN FORMAT

The screen format for this function is:

LST xxxx yy aaaa

where:

LST =	Process List
xxxx =	process list identifier number
yy =	point number (1-64)
aaaa =	point attributes (see below)

Each point in a process list has four attributes. They are:

B = bipolar alarm enable A = alarm enable M = change of state memory enable I = invert state

These attributes may be enabled or disabled individually for each point. If all the attributes are disabled, the point is processed as "status without memory" and is displayed as a blank space.

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next point in the current list.
- **DOWN:** Back up to the previous point in the current list.
- **POINT (PT):** Select a list to view and/or modify.

Note: The following keys are active in MODIFY mode only:

- **RUN:** Enable bipolar attribute
- **STOP:** Disable bipolar attribute
- **ON:** Enable alarm attribute
- **OFF:** Disable alarm attribute
- **YES:** Enable memory attribute
- **NO:** Disable memory attribute
- **DATA:** Toggle invert attribute
- **CLR:** Clear all attributes
- **ENTR:** Store modified process list

VALID MODES

VIEW Process List	NORMAL mode, CONFIG mode
MODIFY Process List	CONFIG mode only
CREATE Process List	CONFIG mode only
DUPLICATE Process List	CONFIG mode only
DELETE Process List	CONFIG mode only

OPERATION

The following steps are required to view, modify, create, or delete a Process List identifier code.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "CONFIG LISTS" appears on the screen.
3. Press the SEL key.
4. To exit this function, press the DSPY or CMD key.

VIEW Process List Attributes

If the REMOTE is in NORMAL mode, process lists may be viewed only. The screen will briefly show "VIEW LIST" and then prompt for a list identifier. Proceed with step 3 below.

1. Select the function using the steps described above.
2. The WESMAINT screen should show "VIEW LIST?". If not, press the NO key until it does. Then press the YES key.
3. The WESMAINT screen will prompt for a list identifier "LIST NUMBR=". Enter the four digit list identifier using the hex keypad. Then press the ENTER key.
4. Use the UP and DOWN keys to view the attributes of the points in the list.
5. Press the PT key to select a different list for viewing and follow the procedure from step 3.

MODIFY List Attributes

1. Select the function using the steps previously described.
2. Press the NO key until the screen shows "MODIFY LIST?". Then press the YES key.
3. The WESMAINT screen will prompt for a list identifier "LIST NUMBR=". Enter the four digit list identifier using the hex keypad. Then press the ENTER key.
4. The screen will prompt "AUTO PROPAGATE?". Press the YES key to enable the AUTO PROPAGATE mode or the NO key to disable it.

Note: If AUTO PROPAGATE mode has been selected, changing the attributes of one point will affect the attributes of all subsequent (higher) points in the list.

5. Use the UP and DOWN keys to view the attributes of the points in the list.

6. Use the RUN, STOP, ON, OFF, YES, NO, DATA, and CLR keys to modify the attributes of the point displayed on the screen. The function of these keys is described in the KEYS USED section of this function.
7. Press the ENTER key to store the modified attributes in the non-volatile memory of the WS2000. The WESMAINT screen will prompt "STORE LIST?". Press the YES key to store the list or the NO key to continue with modifications.

Note: Pressing the PT, SEL, DSPY, or CMD keys before storing a modified list will cause all modifications to be ignored.

Create a New Process List

1. Select the function using the steps previously described.
2. Press the NO key until the screen shows "CREATE LIST?". Then press the YES key.
3. The WESMAINT screen will prompt for a list identifier "LIST NUMBR=". Enter the four digit list identifier using the hex keypad. Then press the ENTER key.
4. If the entered list number does not already exist, then a new list will be created, and the MODIFY LIST function will be invoked automatically. Proceed from step 4 in the MODIFY LIST procedure.
5. If the entered list number already exists, the screen will briefly show the message "LIST EXISTS NOW" followed by the prompt "MODIFY LIST?". Press the YES key to modify the existing list or the NO key to select another operations.
6. If after step 3 the screen shows "NO SPACE LEFT", then an existing list must be deleted to make room for the new one. The screen will prompt "DELETE LIST?" Follow the procedure for deleting a list.

Note: The WS2000 EEPROM has space for 100 Process Lists.

Create a DUPLICATE of a List

1. Select the function using the steps described above.
2. Press the NO key until the screen shows "DUPLICATE LIST?" Then press the ENTER key.
3. The WESMAINT screen will prompt for the list identifier of the list to copy "DUP FROM=". Enter the four digit list identifier using the hex keypad. Then press the ENTER key.
4. If the list specified in step 3 does not exist, the screen will briefly show "NO SUCH LIST". Repeat step 3 above.
5. Once the FROM list has been selected, the screen will prompt "DUP TO=". Enter the list identifier to be assigned to the new list using the hex keypad. Then press the ENTER key.
6. If the list specified in step 5 already exists, then the screen will show "LIST EXISTS NOW" followed by the prompt "OVERWRITE?". Press the YES key to overwrite the existing list or the NO key to repeat step 5.
7. If the list specified in step 5 does not exist already, it will be created using the attributes from the list specified in step 3. The screen will then prompt "MODIFY LIST?". Press the YES key to enter the MODIFY mode or the NO key to select another operation.

8. If after step 6 the screen shows "NO SPACE LEFT", then an existing list must be deleted to make room for the new one. The screen will prompt "DELETE LIST?". Follow the procedure for deleting a list.

DELETE a Process List

1. Select the function using the steps previously described.
2. Press the NO key until the screen shows "DELETE LIST?" Then press the YES key.
3. The WESMAINT screen will prompt for a list identifier "LIST NUMBR=". Enter the four digit list identifier using the hex keypad. Then press the ENTER key.
4. If the entered list exists, the screen will briefly show "LIST DELETED", followed by the prompt "VIEW LIST?".
5. If the list specified in step 3 does not exist, the screen will briefly show "NO SUCH LIST". Repeat step 3.

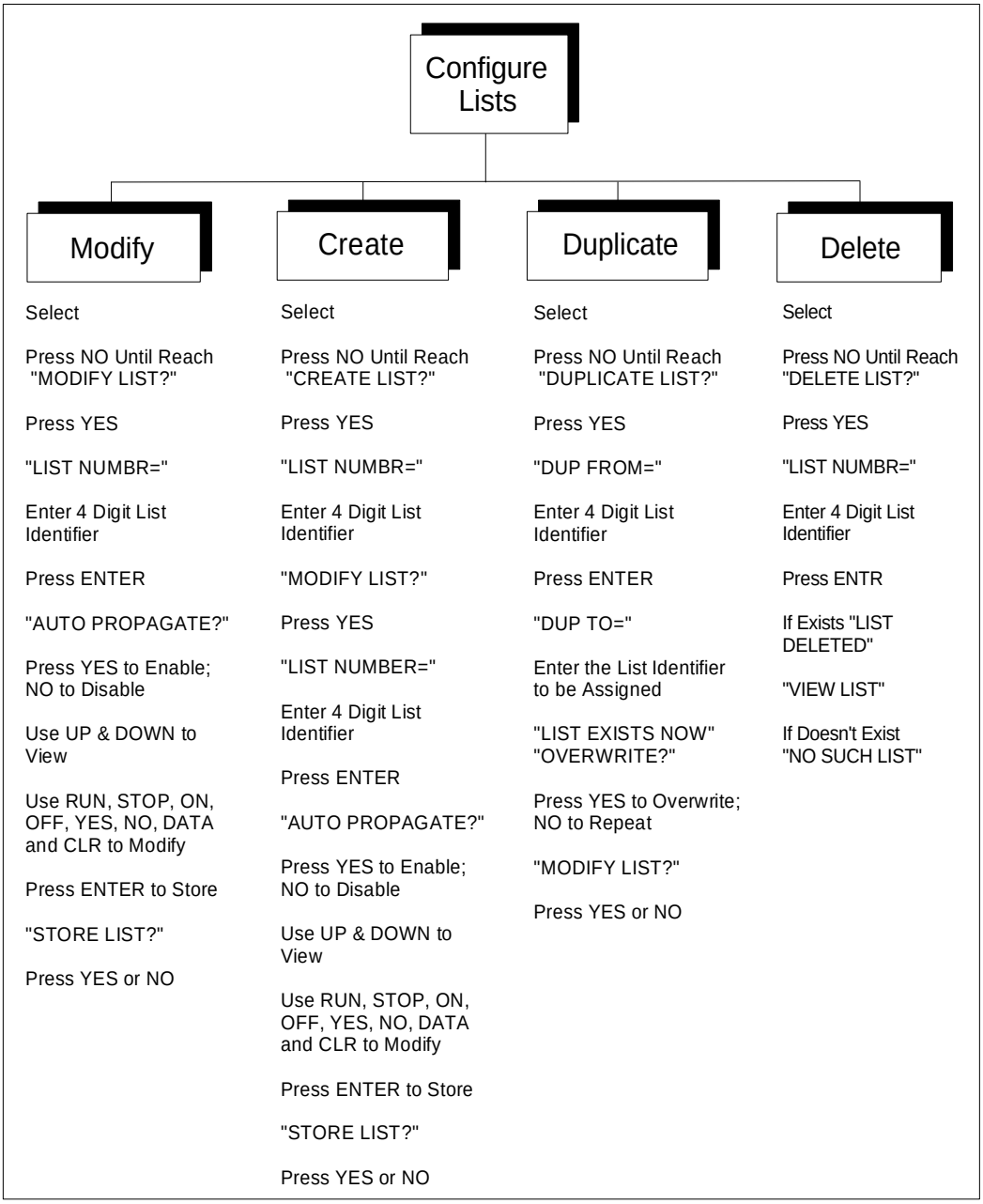


Figure 4-5. Configure Process Attribute Lists Menu Tree

4.5.4 Serial Ch Intfc (Serial Channel Interface)

This section describes how to set the electrical interface type and its baud rate for the WS2000 serial ports. Figure 4-6 shows the screen hierarchy.

MENU

CMD

PURPOSE

To view/alter data collection protocols, the electrical interface specification (i.e., RS-232, RS-422, or RS-485) or the baud rate (i.e., 1200 baud, 2400 baud) for the serial channels.

SCREEN FORMAT

The initial screen format for this function is:

CHx = pppp

where:

CH = Channel
x = Channel number 1-9
pppp = HOST (E2A cannot be changed)
TBOS or TABS (data collection port)

Note that Channel 1 is used to communicate with the Control Center, while Channels 2 through 9 are used to collect data via the TBOS or TABS Input Displays.

Note: When a channel's protocol is changed, all displays mapped to that channel are made spare.

The next screen format for this function displays the electrical interface specification. The format for the screen is as follows:

CHx = RSeeee

where:

CH = Channel
x = Channel number 1-9
RS = RS
eeee = 232, 485 or 422

The final screen for each channel displays the baud rate for that channel. The format for the screen is as follows:

CHx = yyyy BAUD

where:

CH = Channel
x = Channel number (1-9)
yyyy = 1200 or 2400
BAUD = BAUD

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to interface type or baud rate of current channel or to protocol type of next channel.
- **DOWN:** Back up to baud rate of previous channel or to previous display for this channel.
- **POINT (PT):** Select a new channel.
- **DATA:** Change displayed configuration data for current channel.

VALID MODES

View data	NORMAL, CONFIG
Modify data	CONFIG mode only

OPERATION

The following explains how to view and modify the serial channel interface and baud rate of the WS2000 serial ports.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "SERIAL CH INTFC" appears on the screen.
3. Press the SEL key.
4. To exit this function, press the DSPY or CMD key.

View Serial Channel Configuration Data

1. After the SEL key is pressed, the function displays the protocol type of the current channel (Channel 1 - "HOST").
2. Press the UP key to display the interface type of the current channel.
3. Press the UP key again to display the baud rate of the current channel.
4. Press the UP key again to make the next channel the current channel and to display its protocol type. Note that the channel numbers automatically "wrap" from 9 to 1.
5. Press the UP key again to display the interface type for the new current channel.
6. Press the UP key again to display the baud rate for the new current channel.
7. Repeat steps 3 and 7 to display the interface type and baud rate data for the other channels.
8. The DOWN key works similarly to the up key. By pressing the DOWN key the previous display for the current channel is accessed or the last display (BAUD rate) for the previous channel is accessed. When at channel 1 and the DOWN key is pressed, the display wraps around to channel 9. Similarly, when at channel 9 and the UP key is pressed, the display wraps to Channel 1.
9. Press the PT key to select a specific channel. The WESMAINT screen will prompt with "CHANNEL=". Enter the desired Channel number 1-9 using the hex keypad. Then press the ENTR key. Continue with Step 3 to view the baud rate of the selected channel.

Change Protocol Type

1. Select the desired Channel using the procedures described above. Make sure that the Protocol Type is being displayed.
2. Press the DATA key. The WESMAINT screen will prompt "TABS?" or TBOS?".
3. Press the YES key to select the new protocol (TABS or TBOS).
4. Otherwise, press the NO key. The display will prompt with the original protocol.
5. Press the YES key to select the original Protocol type. Successive NO key inputs will change between the "TABS?" and "TBOS?" prompts

Note: Channel 1 cannot have its Protocol type changed.

Change Interface Type

1. Select the desired channel using the procedures described in the "Viewing Serial Channel Configuration Data section. Make sure that the interface type is being displayed.
2. Press the DATA key. The WESMAINT screen will prompt "RS-232/485?".
3. Press the YES key to select RS-232/RS-485 interface.
4. Otherwise, press the NO key. The display will prompt "RS-422?".
5. Press the YES key to select RS-422 interface, or the NO key to re-display RS-232/485 prompt.

Note: Channels 6-9 cannot be configured to the RS-232/485 interface.

Change Baud Rate

1. Select the desired channel using the procedures described in the "Viewing Serial Channel Configuration Data section.
2. Press the DATA key. The WESMAINT screen will prompt "1200 BAUD?".
3. Press the YES key to select 1200 BAUD.
4. Otherwise, press the NO key, and the display will prompt "2400 BAUD?".
5. Press the YES key to select 2400 BAUD or the NO key to re-display the 1200 baud prompt.

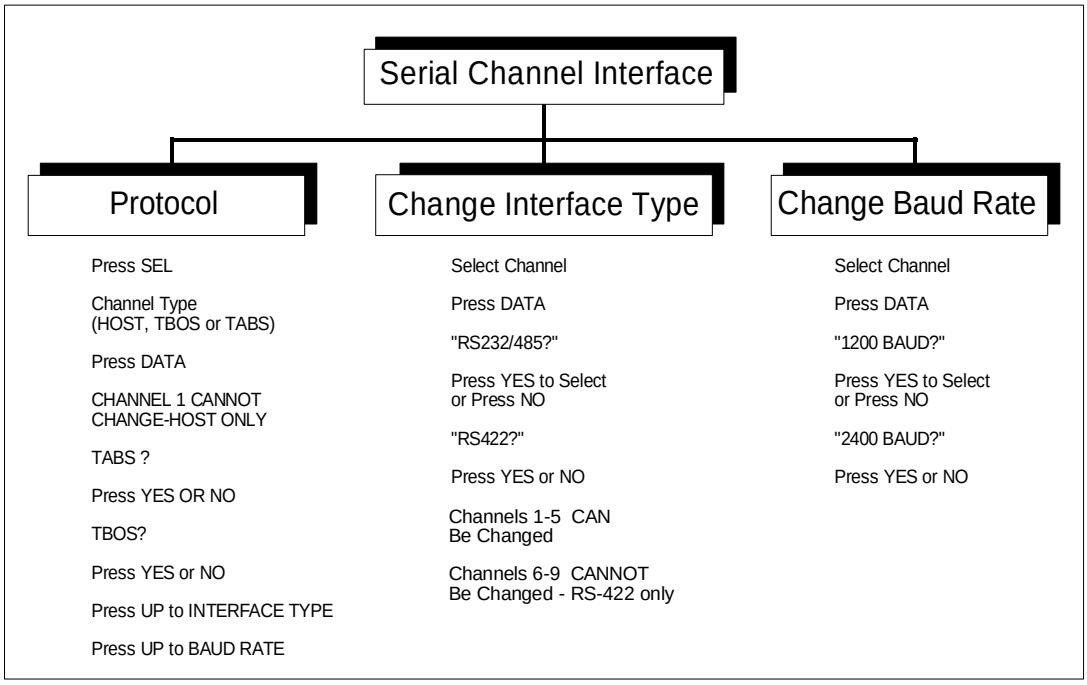


Figure 4-6. Configure Serial Channels and Baud Rates Menu Tree

4.5.5 E2A Remote Address

This section explains how an operator may view, insert, or modify the WS2000.

MENU

CMD

PURPOSE

To view and/or alter the E-Telemetry address of the WS2000.

SCREEN FORMAT

The screen format for this function is:

REM ADDR= xxx

where;

xxx = E-Telemetry address

KEYS USED

The following keys are active while this function is selected:

- **DATA:** Change the E-Telemetry address.

VALID MODES

NORMAL, CONFIG

OPERATION

The following steps are required for inserting or modifying the E-Telemetry address.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "REMOTE ADDRESS" appears on the screen.
3. Press the SEL key.

Modify E2A Address

1. Press the DATA key to change the E2A address.
2. The “REM ADDR=^” prompt appears. Enter the desired address (1-256) using the hex keypad, then press ENTR.

Exit the Function

1. To exit this function, press the DSPY or CMD key.

4.5.6 Select Error Reporting

The following text explains how an operator may select the error reporting format of the WS2000.

MENU

CMD

PURPOSE

To select either TASC or TCAS error reporting formats.

SCREEN FORMAT

The screen format for this function is:

TASC?
or
TCAS?

KEYS USED

- **UP:** Display the next selection
- **DOWN:** Return to the previous selection
- **DATA:** Display the next selection
- **YES:** Choose the current selection
- **NO:** Display the next selection

VALID MODES

CONFIG (NORMAL - View data only)

OPERATION

The steps below explain how to view or modify the Error Reporting format.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "SEL ERROR RPTR" appears on the screen.
3. Press the SEL key. TASC or TCAS will be displayed depending on the current configuration setting.
4. Press the UP, DOWN, DATA or NO key to view the next selection.
5. Press the YES key to choose the selection.

Exit the Function

To exit this function, press the DSPY or CMD key.

4.5.7 Carrier Test

This section describes how to perform a carrier test on the WS2000 host port.

MENU

CMD

PURPOSE

To manually operate the REMOTE carrier signal for testing purposes.

SCREEN FORMAT

The screen format for this function is:

CARRIER ON

or

CARRIER OFF

KEYS USED

The following keys are active while this function is selected:

- **ON:** Manually turn carrier on.
- **OFF:** Return to normal operation.

VALID MODES

NORMAL, CONFIG

OPERATION

The steps below explain how to perform the Carrier Test function on the WS2000 host port.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "CARRIER TEST" appears on the screen.
3. Press the SEL key.

Modify Carrier Status

1. Press the ON key to force the carrier ON.
2. Press the OFF key to force the carrier OFF (return to normal operation).

Exit the Function

To exit this function, press the DSPY or CMD key.

4.5.8 Loop Back Test

The following describes how to do a loop back test on the input serial ports of the WS2000.

MENU

CMD

PURPOSE

To perform diagnostics on the serial ports. The serial port transmits a set of bytes and expects to receive the data back on the same serial port. The wiring for loop back connectors is indicated in Table 4-4.

RS-422 CONNECTOR
Pin 1 (Not Used)
Pin 2 (Not Used)
Pin 3 (Not Used)
Pin 4 (Com)
Pin 5 (RX-)
Pin 6 (RX+)
Pin 7 (TX-)
Pin 8 (TX+)
Note: To loop back an RS-422 connection, jumper pin 5 to pin 7 and jumper pin 6 to pin 8.

RS-232 CONNECTOR
Pin 1 (TX)
Pin 2 (RTS)
Pin 3 (CTS)
Pin 4(Com)
Pin 5 (RX)
Pin 6 (DCD)
Pin 7 (Not Used)
Pin 8 (Not Used)
Note: To loop back an RS-232 connection, jumper pin 1 to pin 5 and jumper pins 2 and 3 to pin 6.

Table 4-4. Wiring for RS-422 and RS-232 Loop Back Connectors

SCREEN FORMAT

The screen format for this function is:

CHxx Px Fx, where,

CH = Channel
xx = Channel number 1-9
Px = Pass x number of times
Fx = Fail x number of times

KEYS USED

The following keys are active while this function is selected:

- **UP:** Advance to the next channel.
- **DOWN:** Backup to the previous channel.
- **ON:** Press to start the test.
- **OFF:** Press to stop the test.
- **CLEAR (CLR):** Resets the pass and fail counters.

VALID MODES

CONFIG only

OPERATION

Following connection of the appropriate wires on the serial port, the following steps are required to perform the loop back test.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "LOOP BACK TEST" appears on the screen.
3. Press the SEL key.

Select Channels

1. Press UP key to go to the next channel.
2. Press the DOWN key to go to the previous channel.
3. Press the PT key to select a specific channel. The WESMAINT screen will prompt with "CHANNEL=". Enter the desired Channel number using the hex keypad. Then press the ENTR key.

Run Loop Back Test

1. Connect the appropriate loop back connector to the serial channel.
2. Press the ON key to start the test. Either the pass or fail count will increment.
3. To turn off the test press the OFF key. The test will also be turned off if the UP or DOWN key is pressed, or the function is changed.
4. Pressing the CLR key resets the pass and fail counts to 0 without stopping the test.

Exit the Function

To exit this function, press the DSPY or CMD key.

4.5.9 Logout

This section describes how to log out of the WS2000 SmartScanner when a password is used.

MENU

CMD

PURPOSE

To end a command session. No new commands can be selected until a password is supplied. Also see the ALTER PASSWORD command.

SCREEN FORMAT

When this function is selected, the screen will display the following message:

LOGOUT COMPLETE

KEYS USED

No keys are active when this function is selected. Logout is performed automatically upon function selection.

VALID MODES

NORMAL, CONFIG

OPERATION

The following steps should be performed to log out of the WS2000 when a password is used.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "LOGOUT" appears on the screen.
3. Press the SEL key.
4. To select another command, press the DSP or the CMD key.

4.5.10 Alter Password

The following explains how to enable, disable and change a password on the WS2000.

MENU

CMD

PURPOSE

To change the password stored in the Serial EEPROM. This function also disables or enables the password function.

SCREEN FORMAT

When the function is selected the screen will display:

"PASSWORD=^".

KEYS USED

Use any of the keys in the hex keypad to enter a four digit password. To store the new password, press the ENTER key. If a mistake is made in keying in the password, press the CLR key.

Note: The password "0000" disables the password function. Any other password value enables the password function. When the password function is disabled, the unit will not request a password when it is powered up, and the LOGOFF command has essentially no effect.

VALID MODES

CONFIG only

OPERATION

The following steps are required to alter the WS2000 password.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "ALTER PASSWORD" appears on the screen.
3. Press the SEL key and the prompt "PASSWORD" appears.
4. Answer the prompt with a four digit number, using any of the keys on the hex keypad (0-9, A-E).
5. Answer the prompt "CONFIRM:" by reentering the same four digit number.
6. If the two passwords match, the message "CHANGED!" will appear on the display. This message indicates that the password has been stored in the Serial EEPROM.

   If the two passwords are different, the message "NOT CHANGED!" will appear on the display. This message indicates that the old password is still in effect. After a brief pause, the function title "ALTER PASSWORD" is displayed. To change the password, repeat steps 3 through 5.

Exit the Function

To exit this function, press the DSPY or CMD key.

Note: When passwords are enabled, the WS2000 will not allow commands to be executed until the password is entered. Password prompting occurs automatically after a LOGOUT command is executed.

Also note that the WS2000 will NOT execute an automatic logout when the operator unplugs the WESMAINT unit (or hangs up the phone when connected via a modem). If the WS2000 goes through a reset sequence (e.g., power is cycled on the unit), it will require the operator to login if passwords are enabled. If security is desired, the LOGOUT command must be used.

4.5.11 Initialize DB

This section describes steps required to initialize the WS2000 data base function. It resets the WS2000 data configuration back to the factory default.

MENU

CMD

PURPOSE

To reset the EEPROM data configuration back to the factory default.

SCREEN FORMAT

The following function will be displayed:

"INITIALIZE DB"

VALID MODES

CONFIG only

OPERATION

The following steps explain how to activate the "Initialize DB" function.

Select the Function

1. Press the CMD key.
2. Press the UP key until the function title "INITIALIZE DB" appears on the screen.
3. Press the SEL key
4. Answer the prompt "ARE YOU SURE?" with YES or NO.
5. If YES was chosen "WRITING..." will appear on the screen. This will take 1 to 30 seconds.
6. "INITIALIZE DB " will appear on the screen.

Exit the Function

To exit this function, press the DSPY or CMD key.

Note: Before making changes to the configuration, go to NORMAL mode (see WESMAINT MODE) to verify unit initialization. Return to the CONFIG mode to insert new configuration(s).

Appendix A: Default Configuration Templates

Serial Channel Configuration Template

SERIAL CHANNEL NUMBER	SERIAL PROTOCOL	INTERFACE TYPE	BAUD RATE
1	HOST (E-TELEMETRY)	RS-232 RS-485 (Default)	1200 (Default) 2400
2	TABS /TBOS	RS-232 RS-422 (Default)	1200 2400 (Default)
3	TABS /TBOS	RS-232 RS-422 (Default)	1200 2400 (Default)
4	TABS /TBOS	RS-232 RS-422 (Default)	1200 2400 (Default)
5	TABS /TBOS	RS-232 RS-422 (Default)	1200 2400 (Default)
6	TABS /TBOS	RS-422	1200 2400 (Default)
7	TABS /TBOS	RS-422	1200 2400 (Default)
8	TABS /TBOS	RS-422	1200 2400 (Default)
9	TABS /TBOS	RS-422	1200 2400 (Default)

Default Process List Configurations

List	Points	Attributes
0001	1 - 64	BAM
118A	1 - 64	AM
119A	1 - 48	AM
	49 - 64	A
120A	1 - 32	AM
	33 - 64	A
121A	1 - 16	AM
	17 - 64	A
122A	1 - 64	A
123A	1 - 48	AM
124A	1 - 36	AM
	37 - 48	A
125A	1 - 24	AM
	25 - 48	A
126A	1 - 12	AM
	13 - 48	A
127A	1 - 48	A
128A	1 - 32	AM
129A	1 - 24	AM
	25 - 32	A
130A	1 - 16	AM
	17 - 32	A
131A	1 - 8	AM
	9 - 32	A
132A	1 - 32	A
133A	1 - 16	AM
134A	1 - 12	AM
	13 - 16	A
135A	1 - 8	AM
	9 - 16	A
136A	1 - 4	AM
	5 - 16	A
137A	1 - 16	A
138A	1 - 64	STATUS
139A	1 - 16	BA

List	Points	Attributes
140A	1 - 32	BA
141A	1 - 48	BA
0118	1 - 63	AM
	64	BA
0119	1 - 48	AM
	49 - 63	A
	64	BA
0120	1 - 32	AM
	33 - 63	A
	64	BA
0121	1 - 16	AM
	17 - 63	A
	64	BA
0122	1 - 63	A
	64	BA
0123	1 - 48	AM
	64	BA
0124	1 - 36	AM
	37 - 48	A
	64	BA
0125	1 - 24	AM
	25 - 48	A
	64	BA
0126	1 - 12	AM
	13 - 48	A
	64	BA
0127	1 - 48	A
	64	BA
0128	1 - 32	AM
	64	BA
0129	1 - 24	AM
	25 - 32	A
	64	BA

List	Points	Attributes
0130	1 - 16	AM
	17 - 32	A
	64	BA
0131	1 - 8	AM
	9 - 32	A
	64	BA
0132	1 - 32	A
	64	BA
0133	1 - 16	AM
	64	BA
0134	1 - 12	AM
	13 - 16	A
	64	BA
0135	1 - 8	AM
	9 - 16	A
	64	BA
0136	1 - 4	AM
	5 - 16	A
	64	BA
0137	1 - 16	A
	64	BA
0138	64	BA
0139	1 - 16, 64	BA
0140	1 - 32, 64	BA
0141	1 - 48, 64	BA
9999	6 - 16	M
	17 - 24	AM
	25 - 32	BAM
	33 - 40	I
	41 - 48	IM
	49 - 56	AMI
	57 - 64	BAMI
C200	1 - 64	AMI

B=BIPOLAR A=ALARM M=MEMORY I=INVERT

Appendix B: Repair & Warranty Policy

This section contains the standard repair policy and the standard warranty policy currently in effect by Harris Network Support Systems.

Standard Repair Policy

All equipment requiring repair which has been manufactured by Harris Corp. and used in accordance with Harris Corp. instructions will be repaired and shipped to the customer within twenty working days from receipt of the faulty equipment at Harris' repair facility.

Repair Charges

Equipment covered under warranty will be repaired at no charge to the Customer within the standard 20 working day period. Repairs requiring a faster repair and return period can be repaired within 7 working days for an expediting fee of $150.00.

Non-warranty equipment will be repaired at a standard charge based on equipment type. This equipment will be repaired in the standard 20 working day period. The repair period will begin from receipt of copy of purchase order at Harris Corp. For repair charges, please contact the Return Material Department Coordinator.

Repair of discontinued products will be determined on a quotation basis only.

When Service is Needed

1. Provide written or verbal notification of the problem and obtain a return authorization number and shipping instructions from the Return Material Department Coordinator.
2. All returns should have the Return Material Authorization Number marked on the outside of the shipping container.
3. All equipment must be returned prepaid to the Harris repair facility.
4. Repaired equipment will have a six month warranty from the date of repair or for the un-expired portion of the original warranty.
5. All repaired equipment will be shipped to the Customer by best means available as determined by Harris Corp., unless otherwise prearranged. Expedited shipping methods will be paid by the Customer.

Customer Service Inquiries
Contact: Return Authorization Coordinator
Telephone: (214) 235-5292
Fax: (214) 235-5299

Equipment Return Address
Harris Network Support Systems
1850 N. Greenville Avenue
Suite 184

Tech. Support: (800) 890-5292 Richardson, TX 75081 USA

Standard Warranty Policy

This warranty is issued by Harris Corp. for standard manufactured products sold within the United States and Canada.

Harris Corp. warrants to the original customer that all standard equipment manufactured by Harris Corp. will be free from defects in material and workmanship for a period of 24 months from date of shipment from the Harris Corp. factory.

This warranty is in effect provided that:

- the equipment is used and serviced in accordance with Harris Corp. instructions.
- the equipment has been properly stored and installed.
- the equipment has not been altered or repaired without prior authorization from Harris Corp.
- the equipment has not been used in conjunction with defective or inferior third party equipment which could result in damage to Harris Corp. equipment.

This warranty for Harris Corp. made equipment is in lieu of all other express warranties. Harris Corp. does not authorize any person to assume, on its behalf, any other obligation or liability.

Harris Corp. is not responsible for loss of time, inconvenience, loss of use of equipment or other consequential damages.

This warranty is not intended to disclaim, exclude or limit any rights under any federal, state, or provincial statute. To the extent that any part of this warranty is inconsistent with any such statutes, that part shall not be applicable.