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WS3500 Metago® RTU

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Technical Manual

Technical Manual

Westronic Systems
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This manual is based on information available at the time of publication. While every effort has been made to ensure its accuracy, the information contained herein may not cover all details or variations in hardware or software, nor may it provide every possible detail in connection with installation and operation.

Revision History

Date	Author	Comments
November 1, 2001	DR	Initial Customer Release
February 5, 2002	DR	Added information on the WS-ARM/1.
April 15, 2002	DR	Changed the total number of chassis that a WS3500 could support (page 11 Hardware Description).
May 29, 2002	DR	Added warning message when entering TL-1 commands. Updated AID, AIDSUBTYPE, and CONDDESCR definitions and TL-1 examples based on 3.01.13 firmware.
July 23, 2002	DR	Added a description on SNMP protocol based on 3.01.13 firmware.
August 14, 2002	DR	Updated SNMP protocol description based on firmware 3.01.16.
August 28, 2002	DR	Added a description about TABS protocol. Removed space in the TL-1 ADD-ROUTER example on page 51.
September 11, 2002	DR	Updated TABS protocol section. Added INACS protocol section.
October 9, 2002	DR	Added Console Configuration utility in the Software section.
December 16, 2002	DR	Added DS5000 protocol and serial expansion module schematic and pin designations for the connectors P1, P2, P3, & P4.
June 9, 2003	DR	Corrected COM 1 port definition.
September 4, 2003	TR/DR	Minor updates and additions to SNMP tables. Moved SNMP table definitions to an appendix. Updated Console Configuration options. Updated Figure 14 on page 38.
February 23, 2004	GB/TR	Minor syntax updates throughout. Added SET-POINT-PARAM and SET-TIMEZONE TL-1 commands.
July 2004	GB/TR	Minor updates
June 2005	DB	Address Change
August 2007	PH	Address Change, Minor Updates
August 2008	GB	Added Communication Module & E2A Protocol Information
November 2009	GB	Cleaned up Warranty information
March 2016	PL	General update, new features up to f/w version 4.03.04
August 2019	BH	New features to firmware 5.00.01, error fixes
July 2020	BH/DN	5.00.01 and formatting
April 2021	BH	5.02.01 and CMU license added

The SNMP implementation was developed based on a version of NET-SNMP. The copyright for that original code follows.

About this Manual

This manual is written as a guide for technicians who install and maintain the alarm collection systems in the field. This manual is divided up into the following sections:

- *Product Description* — this section provides an overview of the software packages, the hardware platform, and the supported interfaces and protocols.

- *Hardware Description* — this section gives an in-depth description of the WS3500 Metago® RTU. Included are basic board layouts depicting the jumper locations, pin out tables for the various connectors, and description of the front panel LEDs.

- *Hardware Installation* — this section describes how to install the WS3500 into a standard telecommunications rack and then power up the RTU.

- *Software Configuration* — this section describes how to modify the connection parameters on the RTU by issuing TL-1 commands through the Craft port. After the connection parameters have been configured correctly, the available software packages can be used to configure the ports on the RTU and download the database to the RTU.

- *Customer Support* — this section describes the warranty, repairs and other support options offered by Westronic.

- *WS3500 Supported TL-1 Messages* — this appendix provides details on the command and message fields that are supported on the TL-1 interface.

- *SNMP Point Table Definitions* — this appendix provides details on the fields available for use by the SNMP interface of the WS3500.

- *Acronyms and Abbreviations* — this appendix provides a summary of the frequently used acronyms and abbreviations found throughout the document.

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Chapter 1: Product Description

A remote telemetry system is a hierarchical organization of units designed to report and control transmission and switching equipment, as well as the facilities that house them. A Network Operations Center occupies the top of the hierarchy and collects data from the downstream Remote Terminal Units (RTUs), as well as other network elements.

The RTUs form the second level of the hierarchy. The WS3500 Metago® is a RTU that collects alarms through discrete contact-closure inputs and serial communications protocols, including Telemetry Byte Oriented Serial (TBOS), E2A (E-Telemetry) and others. These messages are collected from the Network Elements (NEs) and are reported to a host system via TL-1 (Transaction Language 1) or SNMP (Simple Network Management Protocol), using Transmission Control Protocol/Internet Protocol (TCP/IP).

The advanced alarm collection capabilities of the WS3500 make it a key element within a Telecommunications Network Management (TNM) environment. It acts as an Intelligent Network Element (INE) or as a mediation device for collecting alarms from legacy equipment.

The WS3500 has been tested by a 3rd party laboratory and has met all the requirements to achieve NEBS Level III certification.

The WS3500 system consists of three parts:

- Software
- Hardware Platform
- Interfaces

1.1 Software

To allow WS3500 to function as an INE, a database defining the point descriptions, point severities, Common Language Location Identifier (CLLI) codes and configuration data must be loaded into it.

All WS3500 RTUs with TL-1 or SNMP host reporting protocol are delivered with the Metago® Manager LITE software package. This PC based utility is compatible with Windows and supports the configuration of one WS3500 RTU at a time. Metago Manager Standard is also available and can support configurations for 100+ RTUs.

WS3500 RTUs are sold with different software licenses depending on the function of the serial input ports. Serial input ports are required for the following features:

- Reach through
- TBOS, TABS, Serial TABS-Reporting

- INACS, DS5PA, Modbus and E2A alarm collection protocols

All the above features require a license, except Reach through which is always available and requires no special license.

In addition to the software licenses for the serial ports, licensing is required for Metago InSite™. Metago InSite™ provides both local and remote users with a web browser interface, which provides the ability to view the alarms and database configuration of a WS3500 Metago™.

Metago® Manager LITE

Metago® Manager LITE is a PC-based software utility used to remotely configure the WS3500 RTU. With this software, the user can remotely do the following:

- Connect to the RTU and upload its configuration to the PC.
- Set the date and time on the RTU, enable/disable NTP
- Enable or disable InSite.
- Configure the communication parameters for the Ethernet and Line Modem settings. These parameters include the Target Identifier (TID), IP, router, and netmask addresses of the RTU.
- Configure the point definitions for the I/O modules.
- Configure the function and communication settings (data bits, parity, stop bits, and baud rate) of the RS-232/-485 serial input ports and the front RS-232 ports.
- Define and download the point database for the devices connected to the RTU.
- Define user accounts.
- Create input/output correlation rules, which can operate an output control, based upon an input.
- Upgrade the version of firmware installed on the RTU.
- View individual RTU log files.

Metago® Manager LITE software only allows for configuration of one RTU at a time.

Metago® Manager

The Metago® Manager software is designed primarily for use as a centralized database management tool. In addition to the features available in the Metago® Manager LITE software package, Metago® Manager can maintain more than one RTU at a time. It also supports the application of templates to simplify the database building process. The number of RTUs that can be maintained is based on the licensing purchased from Westronic.

Metago InSite™

Metago InSite™ allows both local and remote personnel to view the following displays for a WS3500 RTU via an Internet connection:

- Alarm summary

- Database summaries
- TL-1 event history file
- Operations log file, non-volatile log (optional via Manager setting)
- TBOS, TABS, INACS, DS5PA, E2A, Modbus and PPP
- Protocol analyzer for TABS/TBOS, E2A, Modbus, communication

In addition to viewing the above displays, users can also issue controls, force alarms and clear the above logs provided they have the correct password and permission level.

The Alarm Summary lists the alarm points from highest to lowest severity (color indicates the severity) that are being monitored by a specific RTU. Within each priority grouping, the alarms are listed in chronological order, from newest to oldest. The display is automatically refreshed every 60 seconds.

The Database Summary display lists all the points that have been provisioned and enabled in the Metago™ RTU database.

If the TBOS, TABS, INACS, DS5PA, E2A, Modbus or PPP driver license has been purchased, InSite also displays the alarms, parameters and status information on separate web pages.

Note: Please see the InSite™ manual (pn# 994-T066) for more information.

1.2 Hardware Platform

The WS3500 Metago® RTU easily mounts into a standard 19-inch or 23-inch communications rack (using the appropriate mounting brackets shipped with the unit). The RTU is 2 units high (3.5 inches). The unit operates on –48V DC power.

Designed for Electrostatic Discharge (ESD) resistance and use in telecommunication environments, the WS3500 is a rugged and dependable unit compatible with both Central Office and remote installations.

The WS3500 RTU has been designed to offer maximum flexibility when purchasing or expanding the device. Discrete inputs and outputs and the 8-port RS-232/-485 ports are mounted onto separate modules. In most cases, expansion is simply a matter of plugging the module into the appropriate slot in the RTU chassis. The RTU can be configured to support:

- Multiple RS-232 or RS485 Host ports
- One internal modem
- One or two 10MBs Half-Duplex Ethernet connection(s)
- Up to 512 discrete inputs and 64 discrete control outputs
- Up to twenty-four RS-232/-485 serial input ports
- One RS-232 Craft port
- One RS-232 Console port
- Any suitable combination of these items.

1.3 Interfaces

The following describes the WS3500 interfaces used to communicate with the various network elements.

Discrete Alarm Inputs

Discrete inputs consist of discrete alarm/status inputs, which have an internal wetting voltage referenced to the negative battery input. They are single line inputs whereby an *off* condition exists when the input is open and an *on* condition exists when the input is switched to ground (battery return) via the field wired devices.

Discrete Control Outputs

Each output can be configured as a normally closed or normally open Single-Pole Double-Throw Form C contact. The wiper of each control output is connected to a control common reference. The individual controls can operate in momentary, latched, or flash modes.

Serial Interface Functions

The main WS3500 chassis supports up to 26 serial interfaces. The Craft and COM 1 ports on the front of the Main Module are RS-232 serial ports. The main module card contains the circuitry for the eight RS-232/-485 serial ports which are located on the main RTU back plane (PORTS 1 – PORTS 8). Each optional Serial I/O expansion module contains eight additional RS-232/-485 ports.

The Craft port is an RS-232 asynchronous DCE serial port. It is accessed from the front of the Main Module, via a DB9 RS-232 straight-through cable to a terminal or computer. The standard Craft interface is TL-1. Through the Craft port, the user can view the autonomous TL-1 command/response messages and issue TL-1 commands. The typical port settings are 8 data bits, no parity, 1 stop bit, with a baud rate of 57600.

The COM1 port is an RS-232 asynchronous DCE serial port accessed from the front of the Main Module, via a DB9 RS-232 straight-through cable. The COM1 port is configured as a console port. The typical port settings are 8 data bits, no parity, 1 stop bit, with a baud rate of 57600.

The additional RS-232/-485 serial ports may be configured for: Reach through, TBOS, TABS, Serial TABS-Reporting, DS5PA, INACS, Modbus or PPP. Each port can be configured as a different interface. The ports on the optional serial expansion and communication modules have front panel Light-Emitting Diodes (LEDs) to indicate activity on the TX and RX channels of each port.

The port functions and settings are configured using the Metago® Manager utility. Refer to the *Metago® Manager Technical Manual* for further information.

1.4 Protocols

The following briefly describes the protocols currently supported by the WS3500.

TL-1 Protocol

TL-1 is a communications protocol used to integrate alarm, status, control, performance, test, and provisioning information from a telecommunications network. TL-1 uses ASCII-style messages designed such that information is human readable as it transfers from an NE or mediation device to the host. TL-1, which is compliant with Bellcore specification GR-833-CORE Issue 2, runs on standard transport technologies.

The TL-1 protocol has structured fields and syntax, but uses different syntax structures based on the message type. *Appendix A* describes the various TL-1 messages supported by the WS3500.

The WS3500 can also be used to route TL-1 messages from other NE's to the central office. In order to use this functionality a TL-1 route must be configured using Metago® Manager. Refer to the *Metago® Manager Users Guide* for further information.

TBOS Protocol

TBOS provides for three types of points: alarm points, status points, and remote control points. Alarm and status points are collected together, while command points are collected separately. All points (individual bits) are arranged in a strict hierarchy of characters, displays, and ports. Eight points (bits) are gathered into a character (byte), eight characters are gathered into a 64-point display, and 8 displays are gathered into a 512-point port. A port corresponds to one physical interface on a remote device.

The serial data interface between the remote device and the WS3500 is a four-wire serial data link conforming to EIA RS-422 standards. The TBOS communication has a data speed of 2400 bps, odd parity, eight data bits and two stop bits for down-stream monitoring.

TBOS protocol is a master-slave protocol. During communications with monitored equipment, the WS3500 acts as the master and the monitored equipment acts as the slave. Under TBOS rules, the master issues a poll or command character to the slave. The master waits a maximum of 200 milliseconds for a response character from the slave before polling again.

In normal operations, the WS3500 rotates through each character (or line) for each display in each port, requesting each reply character (one line of 8 points per character) in turn from the appropriate network element. To ensure accuracy, each scan request is made *four* times in succession and the results compared by the WS3500. If the replies from the monitored equipment are different a transmission error is assumed to have taken place; scanning is interrupted and a mismatch error is declared.

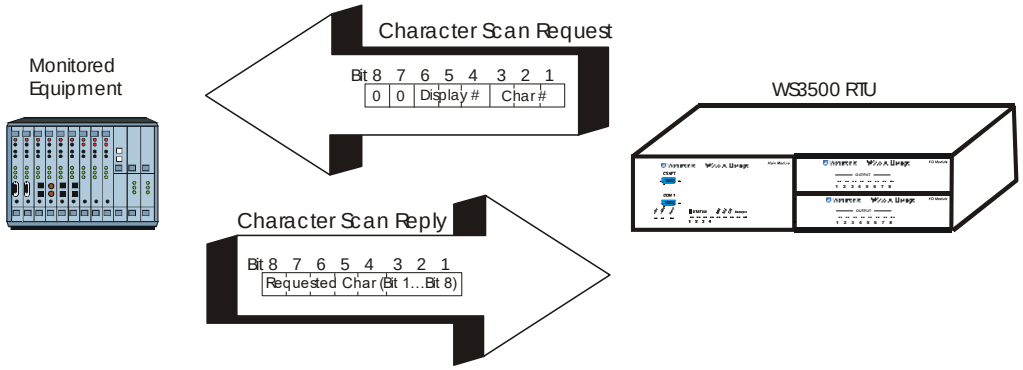


Figure 1 TBOS Alarm/Status Polling

This rotation may be interrupted by remote command requests, which take the form of a three-character set. The network element echoes each character of the request in sequence to acknowledge execution of the command. The second and third command characters sent by the WS3500 must follow within 80 milliseconds of receipt of the first and second command character acknowledgements, respectively.

The first character of the command sequence specifies the address number and the command type (latch, unlatch, momentary). The second character designates the point number (01 through 64) for which the command is intended. The third character is a fixed sequence of bits, used for security, which must accompany each command request.

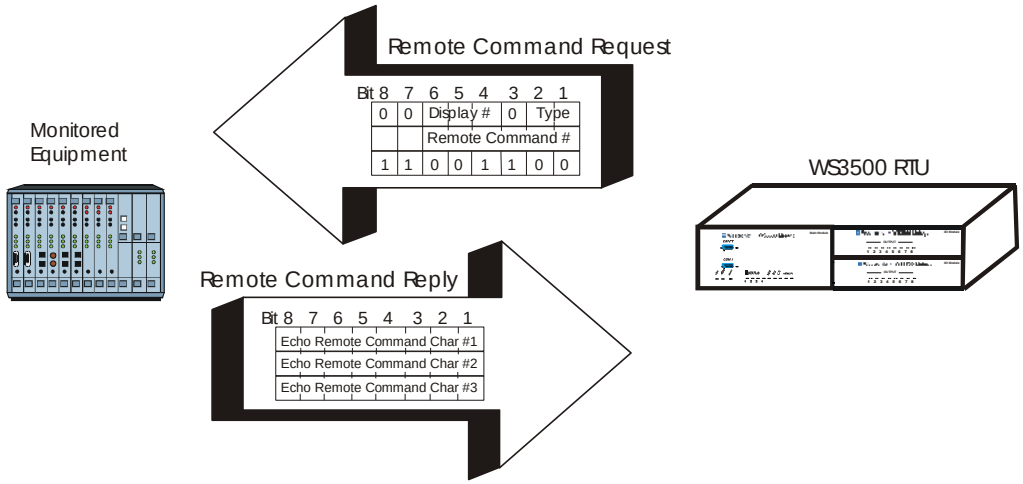


Figure 2 TBOS Remote Commands

SNMP

Please contact Westronic for the current MIB files for v1 and v2c.

The Simple Network Management Protocol (SNMP) is a simple request/response protocol that uses parts of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite. The network-management system issues a request, and managed devices (WS3500)

return responses. This behavior is implemented by using one of three protocol operations: Get, Set, and Trap.

GET

The GET command is used by the host SNMP manager to retrieve the current value of individual point parameters on the WS3500. It is also used to force a re-trap of all standing alarms, by doing a GET on the metagoAlarmSummary OID. This re-trapping is similar in function to the TL-1 RTRV-ALM command, which ensures that the host is in sync with the current alarms on the WS3500.

The GET command operates by requesting the OID number of specific point properties. Immediately following the OID of the point property are the index numbers related to the point AID (i.e. a discrete point would use `OID.<module number>.<point number>`). For index numbering of specific points, refer to the appendix titled *Appendix B: SNMP* Point Table Definitions in this manual.

Several standard SNMP OID numbers also return information specific to the WS3500 and the network interface card (NIC). The system information available through SNMP on the WS3500 is typically used by the SNMP host software for *Autodiscovery* requests. The following table contains the list of these OIDs.

OID Name	Description
sysDescr	WS3500 Firmware Version
sysObjectID	The base OID for the WS3500 (.1.3.6.1.4.1.10385.2.2)
sysContact	Email address for Westronic Technical Support (techsupport@westronic.com)
sysName	Name of the WS3500 (SID).
ifMtu	Size of the largest data unit, in octets that can be sent or received.
ifSpeed	Interface's current data rate capacity.
ifPhysAddress	MAC address of the WS3500.
ifOperStatus	Current status of the interface (1 – up, 2 – down, 3 – testing).
ifInUcastPkts	The number of the unicast packets received.
iflnNUcastPkts	The number of the non-unicast packets received.
IflnDiscards	The number of the discarded inbound packets without errors (buffer overflow).
ifInErrors	The number of inbound packets with errors in them.
ifOutUcastPkts	The number of transmitted unicast packets.
ifOutNUcastPkts	The number of transmitted non-unicast packets.
ifOutDiscards	The number of discarded without error packets (buffer overflow).
ifOutErrors	The number of outbound packets that could not be transmitted due to errors in them.

Table 1 Generic SNMP Data

GETNEXT

Currently the WS3500 is not configured to handle GETNEXT commands.

SET

The SNMP SET command is currently used to:

- Log a user onto the RTU via SNMP, and
- Operate a control point.

To operate a control point, the user must first login to the RTU over SNMP, so the two functions go hand in hand. After a control is operated, the user operating it is logged out automatically.

Metago_Login

The metago_Login field is used to login an existing user from the RTU user list into the SNMP user list. The SNMP user list stores the username, SNMP community, user access level and IP address the user is on. Only by using the same IP and community can the user then issue the control commands over SNMP. The user logs into the SNMP user list by sending `<username>^<password>` (a ^ indicates a space) to the OID of the metago_Login field. The RTU will reply to the login SET with either a confirmation message or an error message.

Operate

The Operate field (discreteCOperate, tbosCOperate, tabsCOperate, inacsCOperate ds5paCOperate, and ds5tCOperate) is used to operate a control output point connected to the WS3500. In order to issue a control the user must have logged into the SNMP user list. The command is issued to the OID found by `controlOperate.<point identifiers>` where the point identifiers are identical to those used for the GET command (See *Appendix B – SNMP Point Table Descriptions*). The command can be of the following text form:

Command	Description
C	The control will be closed indefinitely
O	The control will be opened indefinitely
F	The control will continuously flash on and off indefinitely
M	The control will be turned on for one second and then turn off
T^<time>	The control will be turned on for <time> in milliseconds. For example, T 60.

Table 2 Control Commands

Traps

Traps are used by the WS3500 to send asynchronous messages regarding point states and agent operational status. Traps are not confirmed by the WS3500, so if the monitoring station misses a SNMP trap the trap will go unnoticed. The trap messages are sent to the configured host IP addresses. Details for adding an SNMP host IP Address can be found in the *WS3500 — Metago® Manager Standard* and *LITE* manuals.

System Traps

The system trap on the WS3500 is currently only used to report when the SNMP agent is started. The trap only contains a single text field, which currently tells the user the SNMP agent is active. In the future this trap may be used to report failures on the WS3500.

On a *cold start* (when the WS3500 has rebooted) if the TCP/IP connection is established quick enough, the host will see the SNMP points clearing.

Alarm Traps

The alarm trap is used for reporting all events that occur on the WS3500 that would be reported via a TL-1 message, including diagnostic messages. Each alarm trap is simultaneously sent to each configured SNMP host IP address. The structure of an alarm

trap is defined in *Table 3*. See Appendix A Parameter Definitions for more details on Param 1 to 13.

Field	Format	Description
TimeStamp		
IP Source/Agent		Is the IP address of the RTU
ObjID		Is the WS3500
Specific		Metago_alarmtrap_v1
Param1	*TID*,metagoSysID;	The TID of the WS3500 sending the alarm message trap, for example `RTU13,Metago_sysid;`
Param2	*AID*,metagoMessageAID;	The AID of the point that just changed state.
Param3	*description*,metagoPointDescription;	The description of the point that just changed state.
Param4	*alarm*,metagoAlarmType;	The severity of the alarm being received. The possible values are: clear, notalarmed, routine, minor, major, and critical.
Param5	*state*,metagoAlarmState;	The state the point is changed to. Possible values are: cleared or.alarmed
Param6	*state*,metagoCLLI;	The CLLI code associated with the point in alarm.
Param7	*WG*,metagoWorkgroup;	The 2-character workgroup of the point changing state.
Param8	*atag*,metagoAlarmSeqTag;	The autonomous message tag (atag) in the TL-1 message.
Param9	*ocrdat*,metagoDate	The date the specific event occurred (ocrdat in the form MM-DD).
Param10	*ocrtm*,metagoTime	The time the specific event occurred (ocrtm in the form HH-MM-SS).
Param11	*aidtype,*metagoAIDType	Access Identifier Type
Param12	*condtype,*metagoCondType	Condition Type
Param13	*srveff,*metagoServiceAffecting	Service Effecting

Table 3 Trap Structure Definition

TABS Protocol

Telemetry Asynchronous Block Serial (TABS) is a master/slave protocol, with the WS3500 serving as the master while the monitored equipment serves as a slave. Under TABS protocol rules, the master issues a poll or command message to the monitored equipment and waits for a predefined time period for the monitored equipment to begin a response message. The WS3500 offers TABS in the forms of: serial TABS collection, TABS-IP collection, TABS-IP Reporting and serial TABS-Reporting.

TABS protocol provides address capability of 32 addresses (0 – 31). TABS addressing, allows a maximum of 32 TABS slaves to connect to a single serial channel connected to a single master. The master uses the TABS message address field to identify which slave is to accept and respond to each TABS command. Only the slave that is addressed in the command transmits a corresponding response message.

The WS3500 scans the monitored equipment for point data, and commands the monitored equipment to operate control points. The fundamental unit of information in TABS protocol is the display, which is a set of 64 input points and 64 control points. TABS monitored equipment contains one or more displays, depending on the number of defined input points and control points. TABS protocol supports up to a maximum of 65,536 displays for each TABS address. However, the WS3500 only supports short display addressing (0 - 255).

The WS3500 uses TABS Scan Changed Display and Scan All Displays polling features. Normal operation has TABS AS&C Scan Changed Displays exception polling with interleaved full updates. *Note*: if a TABS device reports that it does not support Scan Changed Displays through the TABS protocol AS&C Capability Byte, then the WS3500 always performs Scan All Displays polling for that device. Currently, the WS3500 performs a full update cycle sequentially on one of the configured TABS devices every tenth pass through the poll list configured on a port. This interleave may be made user configurable in the future.

Basic TABS controls can be set to momentarily turn on for 400 milliseconds. Some TABS equipment support special (additional) control types of latch on and off, and some support special momentary with time specified controls. The TABS equipment reports its control capability to the WS3500 through the TABS protocol AS&C Capability Byte. The WS3500 supports issuing all control types that a given TABS device supports. However, if the TABS equipment does not support a given control type then the WS3500 defaults the control request to the 400 milliseconds control type.

Note: For a more complete discussion of the TABS protocol, see COMPATIBILITY BULLETIN NO. 149, Issue 4, Maintenance Standards for Digital Transmission Systems, AT&T, November 1, 1989

INACS Protocol

The WS3500 Integrated Network Alarm and Control System (INACS) protocol data acquisition feature was developed for use with Saskatchewan Telecommunications INACS RTUs.

Following is a list of supported and unsupported INACS features:

- The INACS RTU prime communication mode is supported. INACS Dial-up modes are not supported.
- The WS3500 supports the INACS station addressing in the range from 1 to 2046. The WS3500 does not support INACS station address 0 (all station), and station address 2047 (reserved for dial-up).
- Data from the INACS RTU is acquired through an asynchronous serial port as a series of *lines*. The WS3500 supports 14 status lines, each status line containing 32 status points.
- The WS3500 supports the INACS momentary control points. These controls may be activated through the WS3500 TL-1 interface, or through the WS3500 InSite web server.

DS5000 Protocol

The WS3500 DS5000 Protocol Acquisition (DS5PA) feature was developed for use with the DS5000 RTU.

Following is a list of supported DS5000 features:

- The WS3500 supports the DS5000 station addressing in the range from 1 to 254.
- Data from the DS5000 RTU is acquired through an asynchronous serial port as a series of *lines*. The WS3500 supports status lines 1 to 256; line 1 is used for the DS5000 RTU system status points.
- Each status line supports 32 status points. Refer to *Table 4* for the default point descriptions.
- The WS3500 supports three DS5000 control types: DLON (Direct operate latch on control), DLOF (Direct operate latch off control), and DMON (Direct operate momentary control). The WS3500 does not include a momentary time variable for the DMON controls. The momentary control time is configured on the DS5000, so any input from the user (via InSite control web page or TL-1 command) is ignored.

Point	Description	Enabled	Severity	Normal State
1	RTU restart (power fail) flag	Yes	CR	Open
2	RTU mode ON or OFF line	Yes	CR	Open
3	DS5PA INPUT 3	No	NA	Open
4	DS5PA INPUT 4	No	NA	Open
5	DS5PA INPUT 5	No	NA	Open
6	DS5PA INPUT 6	No	NA	Open
7	DS5PA INPUT 7	No	NA	Open
8	DS5PA INPUT 8	No	NA	Open
9	More COS to report	Yes	CR	Open
10	TBOS port 1 status	Yes	CR	Open
11	TBOS port 2 status	Yes	CR	Open
12	TBOS port 3 status	Yes	CR	Open
13	TBOS port 4 status	Yes	CR	Open
14	TBOS port 5 status	Yes	CR	Open
15	TBOS port 6 status	Yes	CR	Open
16	TBOS port 7 status	Yes	CR	Open
17	TBOS port 8 status	Yes	CR	Open
18	DS5PA INPUT 18	No	NA	Open
19	DS5PA INPUT 19	No	NA	Open
20	DS5PA INPUT 20	No	NA	Open
21	DS5PA INPUT 21	No	NA	Open
22	DS5PA INPUT 22	No	NA	Open
23	DS5PA INPUT 23	No	NA	Open
24	DS5PA INPUT 24	No	NA	Open
25	DS5PA INPUT 25	No	NA	Open
26	DS5PA INPUT 26	No	NA	Open
27	DS5PA INPUT 27	No	NA	Open
28	DS5PA INPUT 28	No	NA	Open
29	DS5PA INPUT 29	No	NA	Open
30	DS5PA INPUT 30	No	NA	Open

Point	Description	Enabled	Severity	Normal State
31	DS5PA INPUT 31	No	NA	Open
32	DS5PA INPUT 32	No	NA	Open

Table 4 DS5000 System Status Point Definitions

E2A Protocol

E-Telemetry data communications (E2A) is a master/slave protocol, with the WS3500 serving as the master while the monitored equipment serves as a slave. Under E2A protocol rules, the master issues a poll or command message to the monitored equipment and waits for a predefined time period for the monitored equipment to begin a response message.

E2A protocol provides address capability of 256 addresses (1 – 256). E2A addressing, allows a maximum of 256 E2A slaves to connect to a single serial channel connected to a single master. The master uses the E2A message address field to identify which slave is to accept and respond to each E2A command. Only the slave that is addressed in the command transmits a corresponding response message.

The WS3500 scans the monitored equipment for point data, and commands the monitored equipment to operate control points. The fundamental unit of information in E2A protocol is the display, which is a set of 64 input points and 64 control points. E2A monitored equipment contains one or more displays, depending on the number of defined input points and control points. E2A protocol supports up to a maximum of 64 (1 - 64).

Basic E2A controls can be set to momentarily turn on for 300 milliseconds, latch on or latch off, and some support special momentary with time specified controls. The WS3500 supports issuing all control types supported by E2A devices.

Note: For a more complete discussion of the E2A protocol, see Special Report SR-TSY-000221, Issue 1, Bell Communications Research, June 1985

Modbus

The WS3500 supports Modbus RTU and Modbus TCP/IP. In both cases the WS3500 is the Master and collects holding registers (400001 – 465535 with data addresses configured as 1-65535 range). These holding registers are interpreted as: Discrete (16 discrete input points), Analog (16-bit analog value), Long Discrete (32 discrete input points), or Long Analog (32-bit analog value). The long registers both require two contiguous registers.

Figure 3 Typical 128 point WS3500 with 2x I/O modules

Chapter 2: Hardware Description

The WS3500 Metago® chassis is 3.5 inches high, 17.4 inches wide, and 10.3 inches in depth. The left side of the chassis houses the main module. The main module includes the main module circuit board (which contains the eight optional serial input ports), the CPU card, and any Ethernet or modem cards.

The right side of the chassis has two single height bays each capable of receiving an I/O module, an 8 port RS-232/-485 serial module or an 8 port communications module.

The main WS3500 RTU can support up to three additional discrete expansion chassis by interconnecting each chassis to the 34-pin dual-header connector on the back plane. If the WS3500 is only monitoring discrete inputs and outputs, it can support up to 512 discrete inputs and 64 control relay outputs. If the main WS3500 RTU instead chassis houses serial expansion or communication modules, then it can support up to a maximum of 384 discrete inputs and 56 control relay outputs using three discrete expansion chassis.

The following figure is an example of a WS3500 main RTU with one I/O and one serial plug-in module. The location and function of the front-panel indicators and controls are described below the figure.

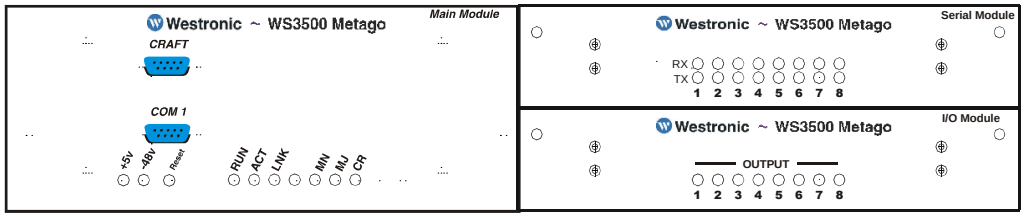


Figure 4 WS3500 - Front View

2.1 Main Module Front Panel Indicators and Buttons

Following is a list of the indicators and buttons found on the main module faceplate.

- *+5v* — the green LED is illuminated indicating the +5 volt CPU is powered up.
- *–48v* — the green LED is illuminated when the power leads are applied correctly.
- *Reset* button — When the Reset push button is pressed, the RTU resets. It is imperative that you do not reset the RTU during a firmware upgrade.
- *RUN* — Flashes once every second to indicate normal operation.
- *ACT* — Flashes to indicate LAN activity.
- *LNK* — Solid green when connected to a hub or router (LAN connection).
- *Not labelled* — Green LED, future use.
- *MN, MJ, and CR* — The software sets the MN (minor – amber), MJ (major – red), and CR (critical – red) alarm LEDs to indicate the overall alarm state of the monitored points.

Indicator	Color	Function
+5v	Green	Indicates the CPU has power.
-48v	Green	Indicates the unit is powered correctly.
RUN	Flashing Green	Indicates proper initialization and operation of the microcomputer and real-time operating system software.
	Green	Indicates a hardware or software failure.
ACT	Green	Indicates activity on the LAN.
	Not illuminated	Indicates no LAN activity.
LNK	Green	Indicates that the RTU is connected to a LAN..
	Not illuminated	Indicates that the RTU is not connected to the LAN.
Not labelled	Green	Future use.
MN	Amber	Indicates a minor alarm in the monitored equipment.
MJ	Red	Indicates a major alarm in the monitored equipment.
CR	Red	Indicates a critical alarm in the monitored equipment.
RX 1 – 8	Green	Receive data indication for a specific serial port. (LEDs are on the serial module only.)
TX 1 – 8	Green	Transmit data indication for a specific serial port. (LEDs are on the serial module only.)
1 – 8	Yellow/Green bi color	Indicates TX/RX of a specific expansion port. These LED's are on the E2A communications module only.
OUTPUT 1 - 8	Red	Indicates control status. Depending on the control issued, the LED may be solid, flashing, or momentarily turned on and off. (LEDs are on the I/O module only.)

Table 5 Front Panel Indicators

2.2 Main Module Secure Initialization Pattern

When you first run a WS3500 with SSH or SSL security features, self-signed certificates are generated. This is indicated through text output on the COM1 port as well as with a unique LED flash pattern. This procedure will blink the not labelled green LED as well as the MN amber LED.

2.3 Serial and Communication Module Front Panel Indicators

The 8-port RS-232/-485 serial plug-in module slides into either the lower or upper right-hand bays on the Metago™ main unit. The green TX and RX LEDs on the front panel indicate whether the end device is communicating with the WS3500. If the end device is being polled, the TX and RX LEDs on that port will alternately flash.

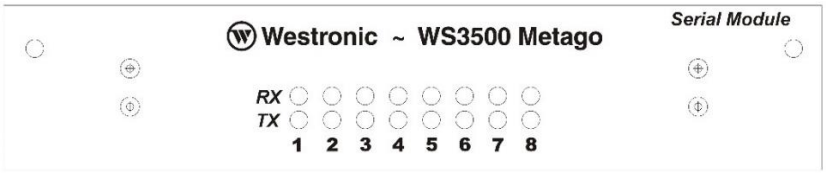


Figure 5 Serial Expansion Module Front Panel

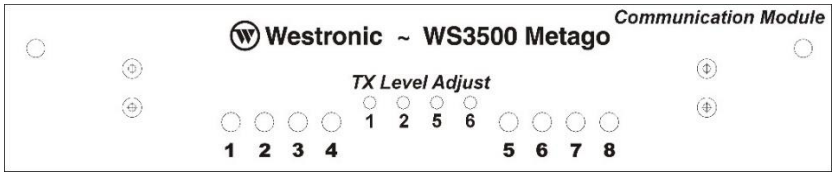


Figure 6 E2A/Communications Module Front Panel

Figure 5 shows the front panel of the optional Communications (E2A) module. The LED's for each active channel flicker green or yellow indicating TX and RX. For more detailed information, please see the E2A Supplement pn# 994-T080 shipped together with units that have this module installed.

2.4 I/O Module Front Panel Indicators

The I/O plug-in module slides into either the lower or upper right-hand bays of the Metago™ main unit or in the lower or upper right-hand bays in the expansion unit.

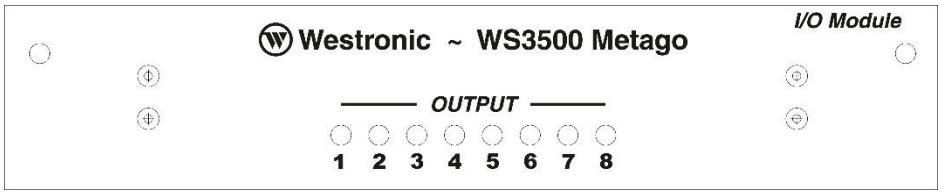


Figure 7 I/O Module Front Panel

The red OUTPUT LEDs correspond to the eight latching controls on each board. Depending on the control action issued, the LEDs illuminate in the following manner:

- *Momentary* — the LED will illuminate for a user-defined time, and then turn off.
- *Flash* — the LED will continually flash on and off, until the control is released.
- *Latch* — the LED will remain illuminated, until the control is released.

2.5 Plug-In Cards and Modules

The WS3500 capabilities are expandable with plug-in cards and modules installed in one of three locations known as A, B, and C.

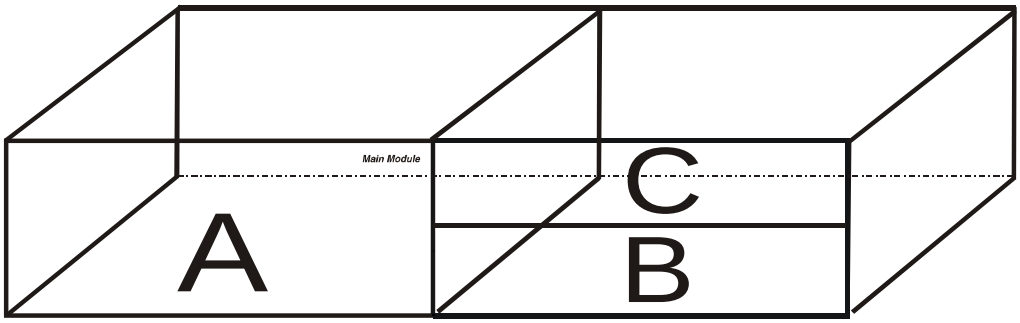


Figure 8 WS3500 – Module Locations

For a WS3500 Metago® main unit, location A houses the Main Module. The Main Module includes:

- Main Module printed circuit board (PCB)
- CPU card
- Modem card (optional) or 2nd Network Card (optional)

The cards are inserted into the vertical bus on the main module PCB. All the cards are enclosed in the Main Module housing and inserted into the left side of the chassis.

For an expansion unit, location A houses the Expansion module only.

Location B and C house either the lower and upper I/O modules and/or the 8-port RS-232/-485 Serial or Communication modules. The expansion chassis can only house I/O modules. In cases where the WS3500 is ordered without any discrete inputs or serial modules, blank faceplates are fastened to the front of the chassis in locations B and C.

2.6 Expansion Chassis Plug-In Modules

The Metago® main RTU can accommodate up to 128 discrete inputs and 16 relay outputs using two I/O plug-in modules, in locations B and C. (refer to the previous figure). Additional expansion chassis can be added to expand the capability of the RTU to a maximum of 512 discrete inputs and 64 relay outputs (Metago® main RTU and three expansion units). Serial Expansion/Communication cards are not supported in the Expansion Chassis.

The expansion chassis consists of I/O plug-in modules in the right-hand slots of the RTU chassis and an expansion module faceplate inserted into the left-hand side of the chassis.

2.7 Specifications

This section provides detailed information about the input power, environmental, characteristics and mechanical specifications of the WS3500 RTU. Also included is detailed data about the serial ports, discrete inputs, and discrete control outputs.

Input Power

The following shows typical power and electrical requirements of the WS3500:

- Input Voltage
  - -42V DC to –72V DC (nominal –48V DC)
- Maximum Operating Power Requirements
  - 28 Watts (no discrete inputs in alarm and 8 controls activated)
  - 52 Watts (64 discrete inputs in alarm and 8 controls activated)

Environmental Characteristics

The operating ambient temperature range for the WS3500 is 5 °C to 40 °C. The operating humidity range is 5% to 85 % non-condensing. (As specified by Telcordia GR-63)

Mechanical

The following lists the WS3500 mechanical characteristics:

- Dimensions
  - Width: 17.5 inches (44.7 cm)
  - Height: 3.5 inches (8.9 cm)
  - Depth: 10.3 inches (26.2 cm)
- Mounting
  - 19-inch (48.3 cm) rack mounting (using supplied mounting brackets)
  - 23-inch (58.4 cm) rack mounting (using supplied mounting brackets)
- Weight
  - 15 lbs (6.75 kg) maximum unpackaged; 21 lbs (9.5 kg) typical packaged
- Connectors
  - A and B Power: POWER (4 pins) — screw terminal block, accepts # 12 to # 22 AWG wire.
  - Serial Port Connections: PORT 1 – PORT 8 standard DB9 male connectors.

- Discrete and Control Output Connections: P1 – P4, Centronics (Amp-Champ™) 50-pin female connector.
- Chassis Expansion: shrouded header dual-row 34-pin connector. Interconnect cables are sold separately. The number of chassis used in your site configuration identifies the cable required.
- Modem: T3, RJ-11 female connector.
- Ethernet: T1 and T2, RJ-45 female connector.
- Craft and COM 1 connectors: standard DB9 female connectors.

Serial Ports

On the main RTU backplane and the Serial Module plug-in board, the asynchronous serial ports can be configured as

- RS-232, DTE (TX, RX, RTS, CTS, DCD, DTR, DSR, RI, GND)
- RS-485, DTE (TX+, TX-, RX+, RX-, GND)

The Craft and COM1 ports on the front of the Main Module are RS-232 only, DCE (TX, RX, RTS, CTS, DCD, DTR, DSR, RI, GND).

The optional serial or communication module plug-in boards use the four 50-pin connectors (P1, P2, P3, and P4) on the WS3500 backplane for the additional serial ports. Refer to *Table 17* , *Table 18* and *Table 19* for these pin designations.

Also available is optional cable pn# 977-T154-001 which brings each 50 pin connection out into 4x DB9-M for simplified connectivity.

Discrete Inputs

The following describes the discrete inputs:

- The I/O plug-in modules contain 64 inputs.
- Input voltage: is referenced to -48V DC
- Input current: is 0.74 mA – 3.1 mA per point
- Sampling rate: 10Hz
- Protection: sustain maximum transient voltages of 15 kV per Telcordia GR1089
- Logic Levels:

Input Power	Logic Level	Description
-48V DC	0 (Off) 1 (On)	-15V DC through –60V DC -7V DC through +5V DC

Discrete Control Outputs

The following describes the discrete control outputs:

- The I/O plug-in modules each contain 8 control outputs.
- Momentary, Latched, or Flash operations are set through the database configuration.
- Contact arrangement is SPDT Form C with a common reference applied to contact wiper.
- Contact Maximum Ratings:
    - 0.5 Amp at 60V DC
    - 30 Watts (maximum) switching power
    - 3.0 Amps at 60V DC maximum per I/O module

Routine Service and Maintenance

The WS3500 has no fans or filters that require routine maintenance or servicing.

As the WS3500 is modular in construction, faulty modules can be easily field replaced as described in the following chapter under “Module Substitution”.

Individual modules that require service should be returned to Westronic for repair through normal RMA procedures as outlined in Chapter 5 “Customer Support”.

Chapter 3: Hardware Installation

This chapter contains detailed installation instructions, tables, and diagrams that explain all the hardware configuration options, special material handling considerations and precautions that should be taken. Included are descriptions of the physical layout of the unit and optional equipment.

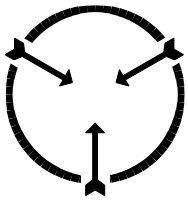
3.1 Handling Considerations and Precautions

Electrostatic discharge (ESD) precautions are necessary when handling WS3500 RTU modules due to Complementary Metal Oxide Semiconductor (CMOS) and NChannel Metal Oxide Semiconductor (NMOS) integrated circuits (ICs). These components are provided to maximize noise immunity and lower power consumption. If improperly handled, it is possible that CMOS and NMOS integrated circuits could become damaged due to ESD.

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

Observing the following precautions will significantly reduce static damage on CMOS or NMOS components. Thereby improving system reliability and reducing system downtime to specified limits.

- Before handling an RTU or any of its modules personnel should ensure that they are not carrying any static charges. This is accomplished by attaching an ESD wrist strap to the wrist and grounding the other end to a suitable ESD ground source, such as earth ground or bare metal on the equipment rack.
- After a module has been removed from the chassis, it should always be placed into an anti-static bag for transport or storage.
- If a module is removed for setting jumpers or field modification it should be removed by a person using an ESD wrist strap and placed on an anti-static workstation.
- At no time should any person other than those trained and authorized by Westronic Systems attempt to remove, replace or repair any component soldered to a Metago® module.



Static Sensitive
Maintain Antistatic Protection

3.2 Module Substitution

The following important points should be kept in mind when replacing or substituting WS3500 modules:

- Always remove power from the RTU when removing or inserting modules.

  NOTE: Do not attempt to 'hot swap' modules in a WS3500. Severe damage to the unit may result. Both A and B fuses must be removed prior to servicing. Always control power to the WS3500 by removing the appropriate A & B fuses from the main fuse panel.

- Remove the module from the front of the chassis by alternately turning each screw counter-clockwise 360 degrees until the screws are away from the internal bracket. The module should then slide easily out of the chassis.
- Note the module cabling and jumper arrangements. Ensure that they are identical when substituting modules. Failure to do so could cause module operational failure, point displacement because of an incorrect board address, communication failure with the host and other related failures. Substitute modules only with identical cabling and jumper settings.
- When substituting the CPU card on the Main Module make sure the current firmware has been installed and the network configuration parameters are correct for that site (i.e. RTU IP, netmask, and router addresses, TID of the RTU, and any other configuration settings, and point database).
- To insert a module into the chassis, slide the module onto the track guide until the screws touch the internal brackets. Then alternately turn each screw clockwise 360 degrees until the screws are tight. The tightening of the screws will gently insert the module into the rear connectors. Never force a module into position because this can damage the rear connectors. In case of insertion problems, determine why the module does not easily plug into position and adjust accordingly.

Only qualified electronics service personnel who are familiar with microcomputers and general electronic practices should attempt servicing the WS3500. It is also recommended that such personnel take a WS3500 training course to learn product-specific concepts and applications.

3.3 Installation Procedures

The following paragraphs describe how to install the WS3500 Metago® RTU, expansion chassis, and ancillary products into a rack location.

WARNING! This device is NOT compatible with Power Over Ethernet (POE). Verify there is no power on the ethernet cable before connecting to this unit.
Use of a POE connection may permanantly damage this device.

Installing the WS3500 RTU

The WS3500 RTU chassis mounts into a standard telecommunications rack. Two sets of mounting brackets (19" and 21") along with the necessary screws are shipped with each RTU.

The chassis has two locations for mounting the brackets. There is the option of attaching the brackets either in the middle of the chassis or at the front of the chassis.

The jumper options on the various cards enclosed in the Main Module have been set according to the original purchase order. Each main RTU is shipped with a WS3500 Metago® Configuration Sheet that lists the function and communication settings for all of the serial ports. If nothing has changed since the original order, follow the installation instructions listed below and do not remove any of the modules.

If the requirements have changed, the jumper settings on each module may need to be changed. Jumper options for the main board, CPU card, modem card, I/O modules, and Serial Expansion Modules are listed on *pages 35 - 41*.

To install the chassis into a rack, follow the proceeding steps:

1. Attach the desired mounting brackets to the sides of the chassis, with the screws provided.
2. Mount the chassis in the desired rack location.
3. If there are expansion chassis, insert the expansion ribbon cable (shipped with the expansion unit) into the connector labeled EXPANSION CHASSIS (on the backplane) to each expansion chassis and to the Main RTU. The expansion chassis may be mounted either above or below the Main RTU.
4. Use minimum #14 American Wire Gauge (AWG) wire and appropriate ground lug to connect the Earth Ground to the Chassis Ground stud on the backplane of each unit. Stud size is 8-32. Torque 16-19 in/lb.

Figure 9 Connecting Earth Ground

5. Use #18 AWG wire to connect the power and ground terminals on each RTU to the frame fuse panel. See photo below.

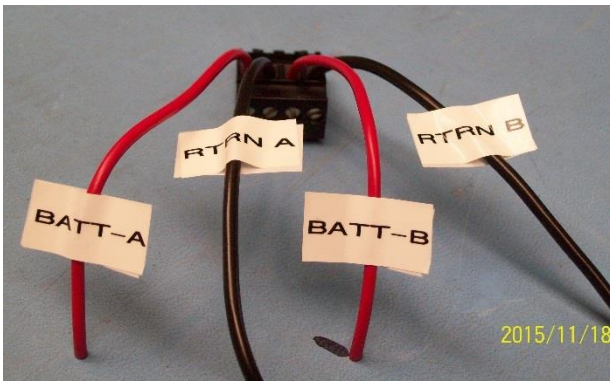


Figure 10 Wiring of DC power connector

Each unit has redundant power feeds (labeled A and B). You have the option to connect each chassis to power A or power B or to both.

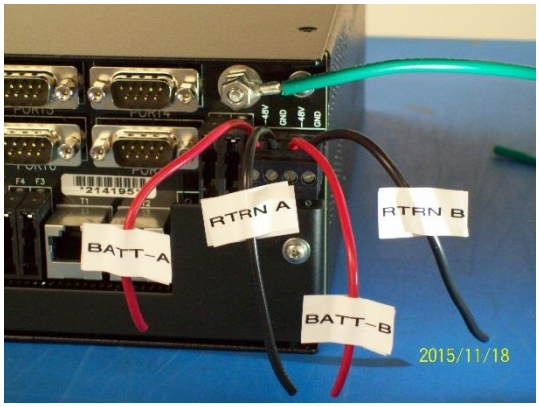


Figure 11 Backplane showing power and ground connected

6. Install a 3-Amp grasshopper fuse in locations designated: F1, F2, F3, and F4 of the backplane. These fuses plus two spares are part of the pn# 585-3507 kit included with each WS3500.
7. Insert a 2 Amp – Slow Blow fuse in the frame fuse panel to power up the unit. If you wired both the A and B sides of the RTU, then each line requires a 2 Amp fuse. ***Note*:** If both A and B power are connected, then both fuses must be removed to fully power down the RTU.
8. Verify that on the Main RTU, the green +5, –48 V are illuminated and the RUN LED is flashing once every second. If the RTU is connected to a LAN, then the LNK LED should be illuminated and the ACT LED will flash based on the activity on the LAN.

   On an expansion chassis, the green –48V LED should be illuminated.
9. Configure the RTU with the proper TID, IP address, router address, and netmask address by issuing TL-1 commands via the Craft port or using the

configuration console via the COM port. Refer to the *Software* Configuration section on *page 61*, for further information.

10. Connect to the RTU, using Metago® Manager software and configure the communication settings, serial ports, and point definitions for all the devices. Download the configuration to the RTU and allow it to reboot.
11. Remove A & B power to the RTU then wire inputs, outputs, and serial ports.
12. Power up the RTU again.
13. Verify the discrete, serial ports, and host connections.
14. Connect the RTU to the host.

Note: If the RTU already contains the database and the connection parameters, steps 9 and 10 are not necessary.

Main Board

The serial port settings of the WS3500 are factory pre-configured to meet customer requirements and generally do not require changing in the field. In order to access the serial port jumpers it is necessary to remove the CPU card and (if installed) the modem or 2nd NIC card first. Please contact Westronic Technical support for more information if a change to port settings is required.

The following figure shows the jumper and connector locations on the main board. Ports 1-4 are shown as set to RS232 and ports 5-8 are shown as set to RS485. *Table 6* and *Table 7* describe the jumper settings and connectors on the main board.

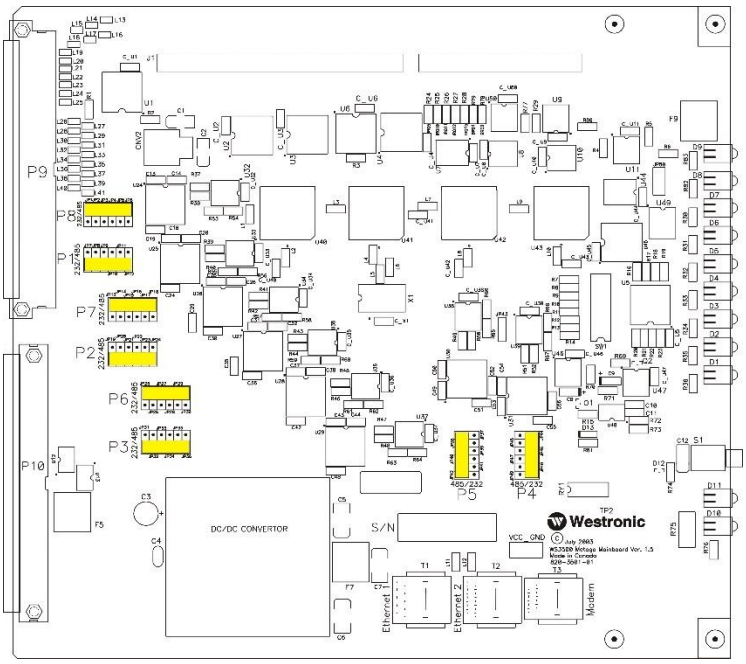


Figure 12 Main Board Layout

Table 6 Main Board Jumper Settings, explains the Serial Port jumper settings on the Main Module.

Block	Purpose	Jumper Settings
P1	Port 1 is an RS-232 port.	JP7 - JP12 jumpers installed towards the 232 label.
	Port 1 is an RS-485 port	JP7 - JP12 jumpers installed towards the 485 label.
P2	Port 2 is an RS-232 port	JP19 – JP24 jumpers installed towards the 232 label.
	Port 2 is an RS-485 port	JP19 – JP24 jumpers installed towards the 485 label.
P3	Port 3 is an RS-232 port	JP31 – JP36 jumpers installed towards the 232 label.
	Port 3 is an RS-485 port	JP31 – JP36 jumpers installed towards the 485 label.
P4	Port 4 is an RS-232 port	JP44 – JP49 jumpers installed towards the 232 label.
	Port 4 is an RS-485 port	JP44 – JP49 jumpers installed towards the 485 label.
P5	Port 5 is an RS-232 port	JP37 – JP42 jumpers installed towards the 232 label.
	Port 5 is an RS-485 port	JP37 – JP42 jumpers installed towards the 485 label.
P6	Port 6 is an RS-232 port	JP25 – JP30 jumpers installed towards the 232 label.
	Port 6 is an RS-485 port	JP25 – JP30 jumpers installed towards the 485 label.
P7	Port 7 is an RS-232 port	JP13 – JP18 jumpers installed towards the 232 label.
	Port 7 is an RS-485 port	JP13 – JP18 jumpers installed towards the 485 label.
P8	Port 8 is an RS-232 port	JP1 – JP6 jumpers installed towards the 232 label.
	Port 8 is an RS-485 port	JP1 – JP6 jumpers installed towards the 485 label.
JP43	Future use	Factory setting: pin 2-3 hardwired
JP50	Future use	Factory setting: pin 1-2 hardwired

Table 6 Main Board Jumper Settings

Aside from the jumper settings on the Main board, there are internal cables which must be connected to the various cards that reside in the ISA vertical bus. The following table describes the cables and the position they must be in to function properly.

Connector	Condition	Purpose
VCC GND	Future use.	Future use.
Ethernet LEDs	Future use.	Future use.
SW1(where equipped)	Factory setting: all sections ON	Future use
T1(Ethernet1), T2 (Ethernet 2)	A 10BaseT cable runs from the LAN connector on the CPU card to T1. If the unit is equipped with an optional dual NIC card, the 2nd cable runs from the card to T2.	Provides a LAN connection for the RTU.
T3 (Modem)	A phone line which runs from the LINE connector of the optional modem card to T3 on the Main board.	Provides the RTU with the capability to connect via a dial-up modem. This cable will not be present if the optional modem card is not installed.

Table 7 Main Module Cabling

CPU card

Any work on the WS3500 Main Module MUST be performed in a static safe environment by personnel familiar with the precautions required for sensitive electronic equipment.

To access the CPU card, if a modem or NIC card is installed in the vertical bus above the CPU card, it must be removed first.

If the CPU card needs to be removed for any reason, the rear support bracket should be removed from the vertical bus to facilitate easier access to the CPU card. Once this is done, the CPU card easily slides in and out of the vertical bus connector.

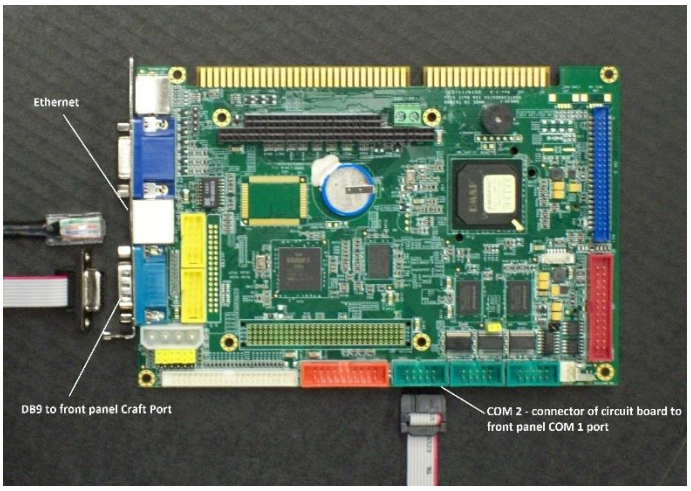


Figure 13 Connectors on the CPU Board

To install the CPU card:

1. The CPU should be inserted into the vertical bus slot labeled J2.
2. The CPU card should be attached to the nylon standoffs on the main board using two 4-40 screws and washers.
3. Gently re-install the vertical bus bracket and secure it to the vertical bus with two 4-40 screws & washers, to the underside of the main board with one 4-40 screw, and to the CPU card with one 4-40 screw with flat and star washer.
4. Connect the CRAFT ribbon cable running from the Craft card attached to the back of the faceplate to the COM1- DB9 male connector on the CPU card. Secure the cable to the connector using two 4-40 x 3/8 screws and washers.
5. Connect the COM1 ribbon cable running from the Craft card attached to the back of the faceplate to the 10-pin header labeled COM2 on the CPU card.
6. If present, re-install the modem or 2nd network card and secure with screw. Reconnect modem or network cable as appropriate.
7. Verify security of all hardware and correct placement of cables prior to re-installing the Main Module back in the WS3500 chassis.

Modem Card (Optional)

If the WS3500 RTU is going to be connected to the host via an internal modem, the main module must contain a modem card.

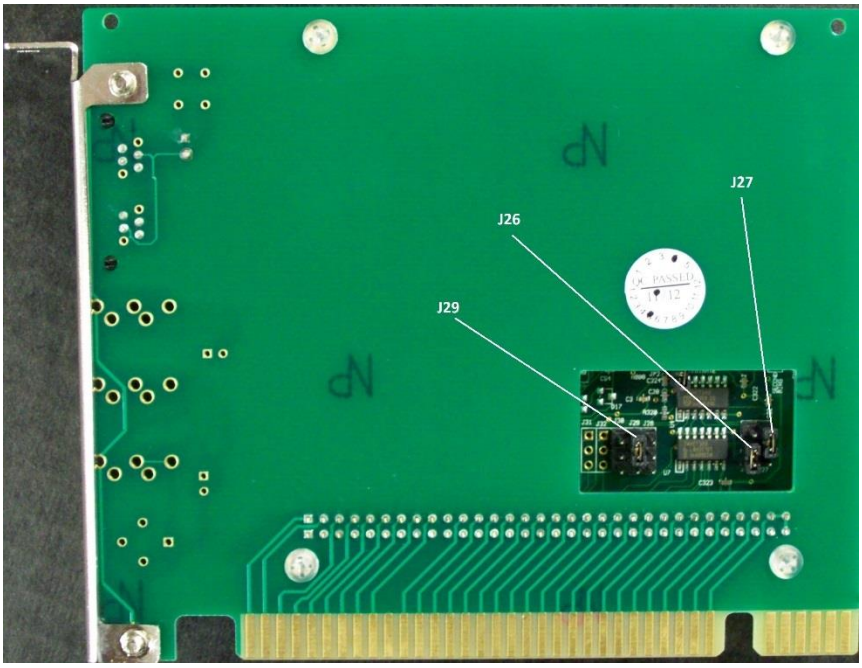


Figure 14 Modem Card Jumper Configuration

The modem card is set at the factory to use IRQ5 and COM3. Should the modem configuration need to be verified, the IRQ jumper is installed across pins 1 and 2 on J29 as shown in Figure 14 above. The COM port configuration is set by a jumper across pins 1 and 2 of J26 and across pins 2 and 3 of J27, also shown in Figure 14.

The modem card:

1. Should be inserted into the vertical bus slot labeled J4.
2. The card should be secured to the vertical bus bracket with flat & star washers and a 4-40 x ¼ screw.
3. Connect one end of the phone cable into the modem's LINE and plug the other end into the T3 (Modem) connector on the main board.

Craft Card

The Craft card is attached to the back of the Metago® Main Module faceplate. There are no jumpers on the card.

There are two ribbon cables running from the Craft card. Both of these cables are connected to the CPU card. The CRAFT (CN1) ribbon cable is attached to the male DB9 connector labeled COM1 on the CPU card. The COM1 (CN2) ribbon cable is attached to COM2 on the CPU card.

I/O Modules (Optional)

Each I/O module contains 64 discrete inputs and 8 control relay outputs. An RTU chassis can accommodate up to two I/O modules (128 discrete inputs and 16 control points). Additional expansion chassis can be added immediately above or below the Main RTU to expand the capacity of the RTU to a maximum of 512 discrete inputs and 64 control points.

Each I/O module must be configured to a unique board address. The position of the switches on SW2 determines the board address.

The default setting for a main RTU with two I/O modules is to have the lower I/O module set to address 1 and the upper I/O module in the chassis set to address 2. Default setting for all expansion chassis is with the lower I/O card set to address 3 and the upper I/O card (where applicable) set to address 4. Hence re-addressing of cards in the field will only be required for installations of 257 points or more.

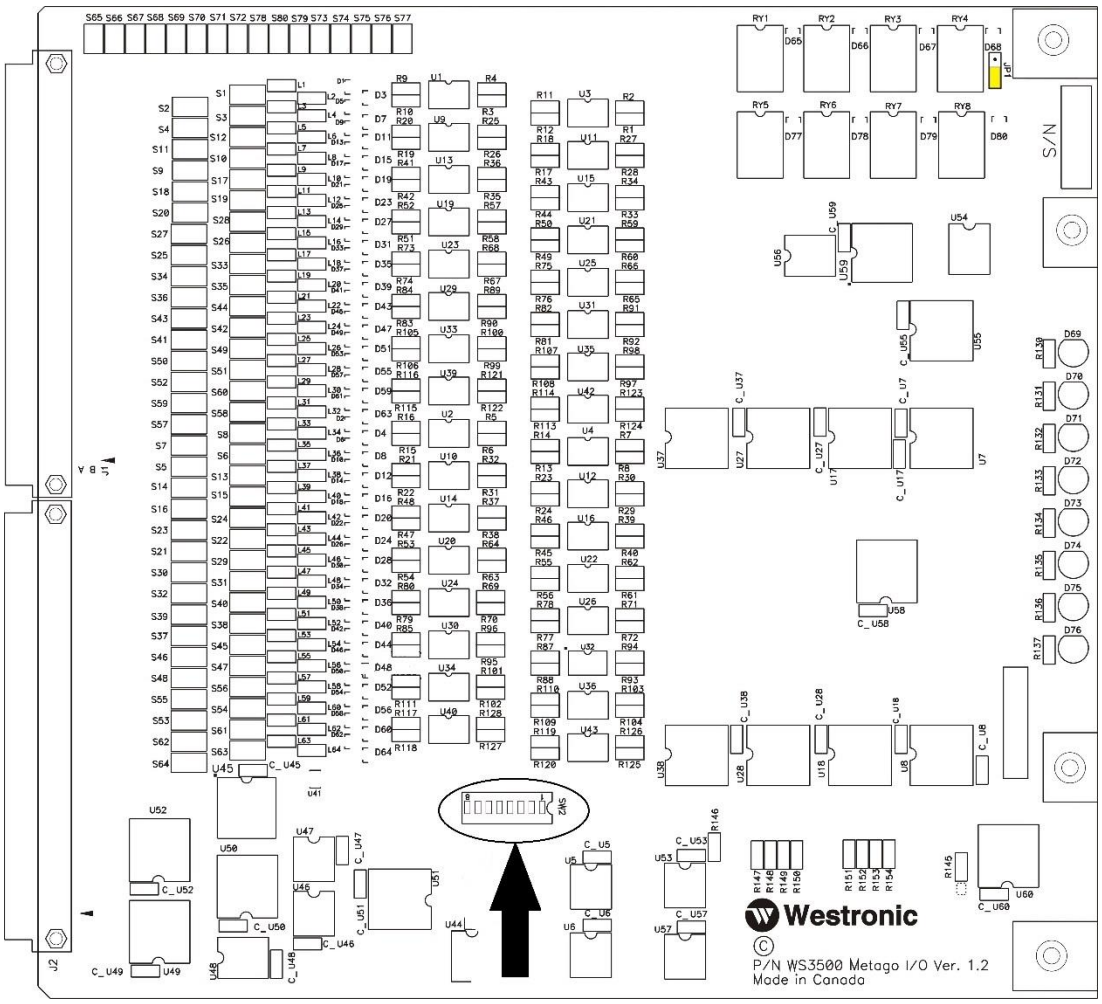


Figure 15 I/O Module Layout and DIP switch location

The following table outlines the dipswitch settings for the I/O modules.

I/O Module 1		Discrete input points 1 - 64 Control points 1 - 8
I/O Module 2		Discrete input points 65 - 128 Control points 9 - 16
I/O Module 3		Discrete input points 129 - 192 Control points 17 - 24
I/O Module 4		Discrete input points 193 - 256 Control points 25 - 32
I/O Module 5		Discrete input points 257 - 320 Control points 33 - 40
I/O Module 6		Discrete input points 321 - 384 Control points 41 - 48
I/O Module 7		Discrete input points 385 - 448 Control points 49-56
I/O Module 8		Discrete input points 449 - 512 Control points 57 - 64

Table 8 I/O Module Address Settings

Each I/O module is also equipped with the ability to configure the Relay common reference using jumper JP1, which is located in the upper right of *Figure 15*.

The default setting of JP1 is to have pins 2 and 3 connected together as shown in Figure 15. This brings the Relay common out to pin 34 of backplane connectors J1 (lower module) and J3 (upper module) with NO reference to Ground, Signal ground, or 48 volt battery. Thus the user can externally chose the wiper reference depending on their individual control output requirements.

The optional setting of JP1 is to have pins 1 and 2 connected together. This ties the Relay common wiper reference to Signal Ground internally in the WS3500.

Serial Expansion Modules (Optional)

A WS3500 RTU chassis can accommodate up to two serial expansion or communication modules, each module with 8 serial ports.

Each serial expansion or communication module must be configured to a unique board address. The position of the JP1 jumper and SW2 dipswitch determine the board address. Typically the lower slot position in the RTU chassis is designated as board 1 and the upper slot position as board 2.

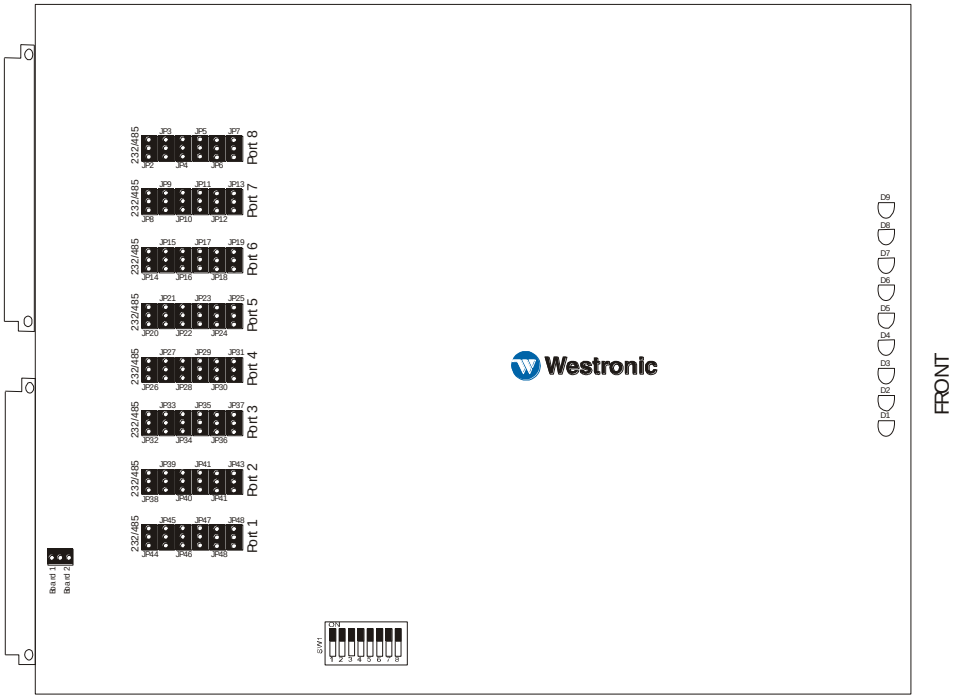


Figure 16 Serial Expansion Module Layout

Connector	Settings	Illustration
SW2	1, 2, 6, 7, & 8 set to ON. 3, 4, & 5 set to OFF.	
JP1	Jumper set to Board 1.	

Table 9 Serial Expansion Module - Board 1 Settings

Connector	Settings	Illustration
SW2	1, 6, 7, & 8 set to ON. 2, 3, 4, & 5 set to OFF.	
JP1	Jumper set to Board 2.	

Table 10 Serial Expansion Module - Board 2 Settings

Communication/E2A Module (Optional)

Units equipped with this module will have a supplemental manual, pn# 994-T080 included with the shipment. Please consult this supplement for specific details regarding configuration, adjustment and use of the Communications module.

Backplane

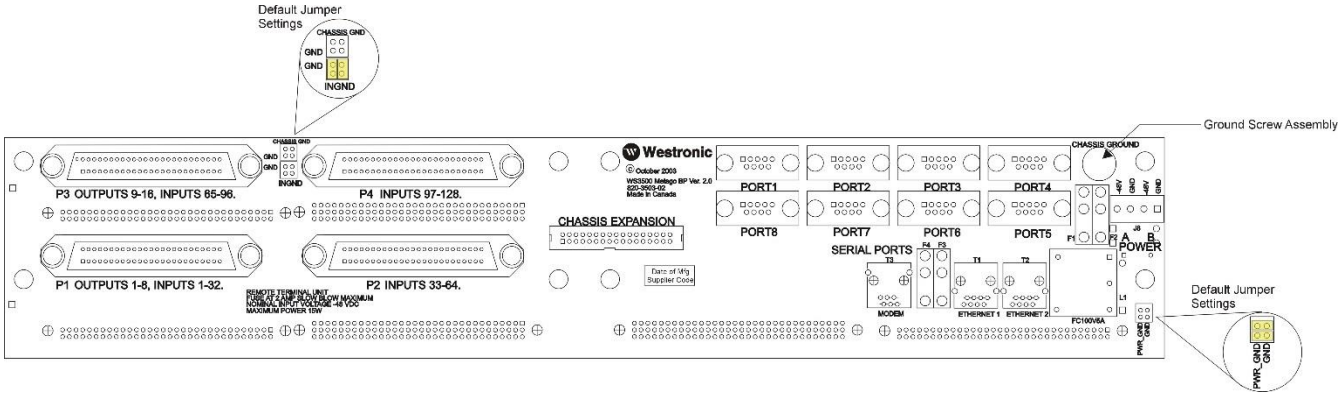


Figure 17 Rear View of the WS3500 RTU

The following connectors are found on the backplane:

- Four 50-pin-F Amp Champ™ connectors labeled P1, P2, P3, and P4 are used to connect the discrete inputs. P1 and P3 are also used to connect the control outputs.
- CHASSIS GND (Earth Ground), GND (Signal Ground) and INGND (Discrete Alarm input Common) jumpers are used to connect Alarm Common signals to Signal Ground, and (optionally) Chassis Ground on the RTU to Signal Ground.

  These jumpers are located between P3 and P4 of the backplane. There are two groups of four pins each.

  The factory default for the lower group of pins is to have INGND (alarm common) signals attached to GND (signal ground) on the RTU by placing the jumpers vertically on the lower group of pins. This requires returning alarm signals to use Pin 9 of their respective 50 pin connector as listed on pages 45- 48. If the end devices are tied to ground and use a single wire for alarming, then the jumpers should be placed in the NULL position (horizontally across the pins).

  The factory default for the upper group of pins is to have GND (signal ground) separate from Chassis Gnd. No jumpers are supplied for these pins, which is equivalent to having jumpers placed horizontally across them.
- 34-pin connector labeled CHASSIS EXPANSION is used to attach any WS3500 expansion chassis to the main RTU.
- RS-232/-485 serial connections are made via the DB9 connectors labeled Port 1 to Port 8.
- Host connections are made via the Ethernet connector (T1) and/or the MODEM connector (T3) if the RTU has a modem card. A second Ethernet connector (T2) is available for dual Ethernet on units equipped with the optional dual NIC card.
- F3 is a 3 Amp grasshopper fuse on the RING modem line.
- F4 is a 3 Amp grasshopper fuse on the TIP modem line.
- The CHASSIS GROUND stud is used to connect the chassis ground to Earth ground.
- The POWER terminal block is used to wire the RTU to –48V and PWR_GND. The connector has two power blocks A and B.

- F1 is a 3 Amp grasshopper fuse on the "A" -48 volt input.
- F2 is a 3 Amp grasshopper fuse on the "B" -48 volt input.
- The PWR_GND is the ground (battery return) of the - 48 volt power supply. It can be connected to GND (signal ground) using jumpers. **Factory default** is to tie PWR_GND and GND together by placing the appropriate jumpers horizontally across the pins. **NOTE:** These jumpers are located at lower right of backplane in the illustration above.

Serial Input Port Cabling

The following figure illustrates the portion of the backplane containing the serial port connectors. These ports are only used on the Main WS3500 and are not used on the expansion chassis.

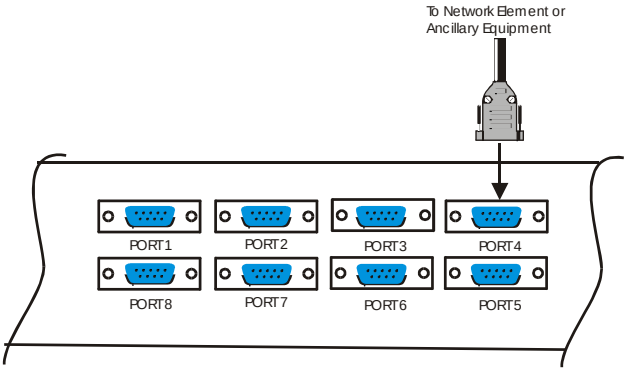


Figure 18 Serial Port Connections on the Main RTU Backplane

Each serial port may be configured as a RS-232 port or a RS-485 port. The ports are configured via jumpers on the main board; refer to the section on the Main Board on page 39 for jumper settings.

The cabling used, should be as follows:

- **RS-485** should be a standard 2 pair twisted (4 wires) shielded (up to 4,000 feet) or unshielded (up to 1,000 feet), 24 AWG single strand.

- **RS-232** should be a standard 3 pair (6 wires) unshielded (up to 50 feet) cable, 24 AWG single strand.

Any of the serial ports on the backplane may be configured as RS-485 ports. The rear serial ports of the WS3500 are considered to be Data Terminal Equipment (DTE). If the NE connected to, is DTE, the WS3500 transmit signal lines terminate into the NE receive inputs and the WS3500 receive signals terminate into the NE transmit outputs (transmit-receive crossover connection).

Pin	Function
1	Not Used
2	TX+
3	TX-
4	Not Used
5	Signal Ground
6	Not Used
7	RX-
8	RX+
9	Not Used
Shell	Chassis Ground

Table 11 RS-485 Rear Serial Port Pin Designations

When the WS3500 rear serial ports are configured as RS-232, they are considered to be DTE. If the device you are connecting to is Data Communications Equipment (DCE), the WS3500 transmit signal lines terminate into the end device transmit inputs and the WS3500 receive signal lines terminate into the end device receive outputs (a straight-through connection).

Pin	Function
1	DCD
2	RXD
3	TXD
4	DTR
5	Signal Ground
6	DSR
7	RTS
8	CTS
9	RI
Shell	Chassis Ground

Table 12 RS-232 Rear Serial Port Pin Designations

Discrete Input and Output Connectors (P1 to P4)

The following figure illustrates the portion of the backplane containing the discrete input and output connectors. The connectors are the standard Amp Champ™ 50-pin-Female style connectors.

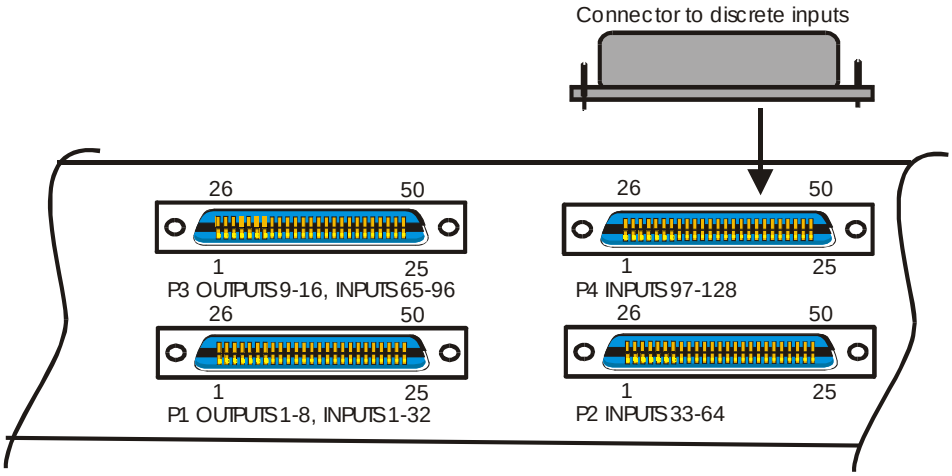


Figure 19 Discrete Input and Output Connectors

The following tables list the pin out designations for P1, P2, P3, and P4 connectors.

***Note*:** Factory default is to tie Pin 9 of the I/O Amp Champ™ connectors (P1 to P4) to Signal Ground of the RTU. This is accomplished by placing the jumpers vertically on the pins labeled GND and INGND on the backplane as shown in Figure 17. If you already tie your alarm input signals to ground at their source and only run one wire back to the RTU, then the two ground reference jumpers should be placed in the horizontal position. The preferred (factory default) method is to use the Signal Ground on the RTU as the input common to prevent a ground loop. This default setting requires that alarm common (returns) are tied to pin 9 (INGND) of their respective 50 pin connector as listed below so the discrete alarms operate correctly.

The Relay Common, pin 34 on the I/O Amp Champ™ connectors P1 and P3, is shipped with no connection to either Signal Ground or the Discrete Input Common. This is intended to prevent ground currents. See notes on I/O board jumper JP1 in the I/O module section for more details.

Function	Pin		Function
Relay 1 Normally Closed	1	26	Relay 1 Normally Open
Relay 2 Normally Closed	2	27	Relay 2 Normally Open
Relay 3 Normally Closed	3	28	Relay 3 Normally Open
Relay 4 Normally Closed	4	29	Relay 4 Normally Open
Relay 5 Normally Closed	5	30	Relay 5 Normally Open
Relay 6 Normally Closed	6	31	Relay 6 Normally Open
Relay 7 Normally Closed	7	32	Relay 7 Normally Open
Relay 8 Normally Closed	8	33	Relay 8 Normally Open
INGND	9	34	Relay Common
Discrete Input 1	10	35	Discrete Input 2
Discrete Input 3	11	36	Discrete Input 4

Function	Pin		Function
Discrete Input 5	12	37	Discrete Input 6
Discrete Input 7	13	38	Discrete Input 8
Discrete Input 9	14	39	Discrete Input 10
Discrete Input 11	15	40	Discrete Input 12
Discrete Input 13	16	41	Discrete Input 14
Discrete Input 15	17	42	Discrete Input 16
Discrete Input 17	18	43	Discrete Input 18
Discrete Input 19	19	44	Discrete Input 20
Discrete Input 21	20	45	Discrete Input 22
Discrete Input 23	21	46	Discrete Input 24
Discrete Input 25	22	47	Discrete Input 26
Discrete Input 27	23	48	Discrete Input 28
Discrete Input 29	24	49	Discrete Input 30
Discrete Input 31	25	50	Discrete Input 32

Table 13 Discrete Pin Designations Connector P1

Function	Pin		Function
GND	1	26	GND
GND	2	27	GND
Not Connected	3	28	Not Connected
Not Connected	4	29	Not Connected
Not Connected	5	30	Not Connected
Not Connected	6	31	Not Connected
Not Connected	7	32	Not Connected
Not Connected	8	33	Not Connected
INGND	9	34	Not Connected
Discrete Input 33	10	35	Discrete Input 34
Discrete Input 35	11	36	Discrete Input 36
Discrete Input 37	12	37	Discrete Input 38
Discrete Input 39	13	38	Discrete Input 40
Discrete Input 41	14	39	Discrete Input 42
Discrete Input 43	15	40	Discrete Input 44
Discrete Input 45	16	41	Discrete Input 46
Discrete Input 47	17	42	Discrete Input 48
Discrete Input 49	18	43	Discrete Input 50
Discrete Input 51	19	44	Discrete Input 52
Discrete Input 53	20	45	Discrete Input 54
Discrete Input 55	21	46	Discrete Input 56
Discrete Input 57	22	47	Discrete Input 58
Discrete Input 59	23	48	Discrete Input 60
Discrete Input 61	24	49	Discrete Input 62
Discrete Input 63	25	50	Discrete Input 64

Table 14 Discrete Pin Designations for Connector P2

Function	Pin		Function
Relay 9 Normally Closed	1	26	Relay 9 Normally Open
Relay 10 Normally Closed	2	27	Relay 10 Normally Open
Relay 11 Normally Closed	3	28	Relay 11 Normally Open
Relay 12 Normally Closed	4	29	Relay 12 Normally Open
Relay 13 Normally Closed	5	30	Relay 13 Normally Open
Relay 14 Normally Closed	6	31	Relay 14 Normally Open
Relay 15 Normally Closed	7	32	Relay 15 Normally Open
Relay 16 Normally Closed	8	33	Relay 16 Normally Open
INGND	9	34	Relay Common
Discrete Input 65	10	35	Discrete Input 66
Discrete Input 67	11	36	Discrete Input 68
Discrete Input 69	12	37	Discrete Input 70
Discrete Input 71	13	38	Discrete Input 72
Discrete Input 73	14	39	Discrete Input 74
Discrete Input 75	15	40	Discrete Input 76
Discrete Input 77	16	41	Discrete Input 78
Discrete Input 79	17	42	Discrete Input 80
Discrete Input 81	18	43	Discrete Input 82
Discrete Input 83	19	44	Discrete Input 84
Discrete Input 85	20	45	Discrete Input 86
Discrete Input 87	21	46	Discrete Input 88
Discrete Input 89	22	47	Discrete Input 90
Discrete Input 91	23	48	Discrete Input 92
Discrete Input 93	24	49	Discrete Input 94
Discrete Input 95	25	50	Discrete Input 96

Table 15 Discrete Pin Designations for Connector P3

Function	Pin		Function
GND	1	26	GND
GND	2	27	GND
Not Connected	3	28	Not Connected
Not Connected	4	29	Not Connected
Not Connected	5	30	Not Connected
Not Connected	6	31	Not Connected
Not Connected	7	32	Not Connected
Not Connected	8	33	Not Connected
INGND	9	34	
Discrete Input 97	10	35	Discrete Input 98
Discrete Input 99	11	36	Discrete Input 100
Discrete Input 101	12	37	Discrete Input 102
Discrete Input 103	13	38	Discrete Input 104
Discrete Input 105	14	39	Discrete Input 106
Discrete Input 107	15	40	Discrete Input 108
Discrete Input 109	16	41	Discrete Input 110
Discrete Input 111	17	42	Discrete Input 112
Discrete Input 113	18	43	Discrete Input 114
Discrete Input 115	19	44	Discrete Input 116
Discrete Input 117	20	45	Discrete Input 118
Discrete Input 119	21	46	Discrete Input 120
Discrete Input 121	22	47	Discrete Input 122
Discrete Input 123	23	48	Discrete Input 124
Discrete Input 125	24	49	Discrete Input 126
Discrete Input 127	25	50	Discrete Input 128

Table 16 Discrete Pin Designations for Connector P4

Discrete Inputs

The WS3500 discrete logic inputs are internally referenced to the negative battery input. They are single line inputs where an *off* condition exists when the input is open or tied to -Battery. An *on* condition is asserted when the input is referenced to +Battery. For the WS3500 operating on –48V DC, the alarm input is detected as follows:

- Off, if the voltage differential between the input and return is greater than 40 volts.
- On, if the voltage differential is less than 12 volts.

Control Relay Outputs

The WS3500 is shipped with Form C contact wiring. Each control point provides one normally open (NO) contact and one normally closed (NC) contact. Each of the 8 control points has a common wiper reference (Relay Common).

P1 to P4 Pin Outs when used for Serial Expansion & Communication Modules

When a WS3500 contains a serial expansion or communication module, the P1 to P4 connectors on the backplane are used as the serial ports for the module. Connectors P1 and P2 are for the serial module in the lower slot of the chassis and connectors P3 and P4 are for the serial module in the upper slot of the chassis. An optional cable is available (pn# 977-T154-001), which breaks out the 50 pin connector to 4 DB9 male connectors.

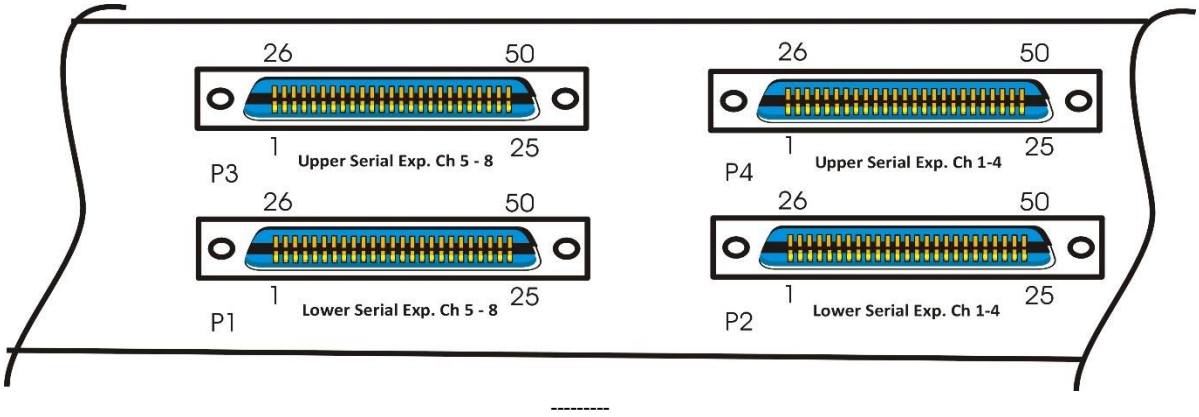


Figure 20 Close-up of P1 – P4 when used with Serial Modules

The following tables contain the pin out designations for P1, P2, P3, and P4 connectors.

Connector P1 & P3		Connector P2 & P4	
Pin	Signal	Pin	Signal
1	GND	1	GND
2	GND	2	GND
3	N/C	3	N/C
4	N/C	4	N/C
5	N/C	5	N/C
6	N/C	6	N/C
7	N/C	7	N/C
8	N/C	8	N/C
9	INGND	9	INGND
10	N/C	10	N/C
11	TX+ 8	11	TX+ 4
12	TX- 8	12	TX- 4
13	N/C	13	N/C
14	N/C	14	N/C
15	TX+ 7	15	TX+ 3
16	TX- 7	16	TX- 3
17	N/C	17	N/C
18	N/C	18	N/C
19	TX+ 6	19	TX+ 2
20	TX- 6	20	TX- 2
21	N/C	21	N/C
22	N/C	22	N/C
23	TX+ 5	23	TX+ 1
24	TX- 5	24	TX- 1

Connector P1 & P3		Connector P2 & P4	
Pin	Signal	Pin	Signal
25	N/C	25	N/C
26	GND	26	GND
27	GND	27	GND
28	N/C	28	N/C
29	N/C	29	N/C
30	N/C	30	N/C
31	N/C	31	N/C
32	N/C	32	N/C
33	N/C	33	N/C
34	N/C	34	N/C
35	N/C	35	N/C
36	RX- 8	36	RX- 4
37	RX+ 8	37	RX+ 4
38	N/C	38	N/C
39	N/C	39	N/C
40	RX- 7	40	RX- 3
41	RX+ 7	41	RX+ 3
42	N/C	42	N/C
43	N/C	43	N/C
44	RX- 6	44	RX- 2
45	RX+ 6	45	RX+ 2
46	N/C	46	N/C
47	N/C	47	N/C
48	RX- 5	48	RX- 1
49	RX+ 5	49	RX+ 1
50	N/C	50	N/C

Table 17 RS-485 Serial Expansion Designations for P1, P2, P3, & P4

Connector P1 & P3		Connector P2 & P4	
Pin	Signal	Pin	Signal
1	GND	1	GND
2	GND	2	GND
3	N/C	3	N/C
4	N/C	4	N/C
5	N/C	5	N/C
6	N/C	6	N/C
7	N/C	7	N/C
8	N/C	8	N/C
9	INGND	9	INGND
10	DCD 8	10	DCD 4
11	RXD 8	11	RXD 4
12	TXD 8	12	TXD 4
13	DTR 8	13	DTR 4
14	DCD 7	14	DCD 3
15	RXD 7	15	RXD 3
16	TXD 7	16	TXD 3
17	DTR 7	17	DTR 3
18	DCD 6	18	DCD 2
19	RXD 6	19	RXD 2

Connector P1 & P3		Connector P2 & P4	
Pin	Signal	Pin	Signal
20	TXD 6	20	TXD 2
21	DTR 6	21	DTR 2
22	DCD 5	22	DCD 1
23	RXD 5	23	RXD 1
24	TXD 5	24	TXD 1
25	DTR 5	25	DTR 1
26	GND	26	GND
27	GND	27	GND
28	N/C	28	N/C
29	N/C	29	N/C
30	N/C	30	N/C
31	N/C	31	N/C
32	N/C	32	N/C
33	N/C	33	N/C
34	N/C	34	N/C
35	DSR 8	35	DSR 4
36	RTS 8	36	RTS 4
37	CTS 8	37	CTS 4
38	RI 8	38	RI 4
39	DSR 7	39	DSR 3
40	RTS 7	40	RTS 3
41	CTS 7	41	CTS 3
42	RI 7	42	RI 3
43	DSR 6	43	DSR 2
44	RTS 6	44	RTS 2
45	CTS 6	45	CTS 2
46	RI 6	46	RI 2
47	DSR 5	47	DSR 1
48	RTS 5	48	RTS 1
49	CTS 5	49	CTS 1
50	RI 5	50	RI 1

Table 18 RS-232 Serial Expansion Designations for P1, P2, P3, & P4

Connector P1 & P3		Connector P2 & P4	
Pin	Signal	Pin	Signal
1	GND	1	GND
2	GND	2	GND
3	N/C	3	N/C
4	N/C	4	N/C
5	N/C	5	N/C
6	N/C	6	N/C
7	N/C	7	N/C
8	N/C	8	N/C
9	INGND	9	INGND
10	DCD8	10	DCD4
11	RXD8	11	RXD4
12	TXD8	12	TXD4
13	DTR8	13	DTR4
14	N/C	14	N/C

Connector P1 & P3		Connector P2 & P4	
Pin	Signal	Pin	Signal
15	RXD7	15	RXD3
16	TXD7	16	TXD3
17	N/C	17	N/C
18	N/C	18	N/C
19	RXD6 / TX+ (Tip) 6 - 202T	19	RXD2 / TX+ (Tip) 2 - 202T
20	TXD6 / TX- (Ring) 6 - 202T	20	TXD2 / TX- (Ring) 2 - 202T
21	N/C	21	N/C
22	N/C	22	N/C
23	RXD5 / TX+ (Tip) 5 - 202T	23	RXD1 / TX+ (Tip) 1 - 202T
24	TXD5 / TX- (Ring) 5 - 202T	24	TXD1 / TX- (Ring) 1 - 202T
25	N/C	25	N/C
26	GND	26	GND
27	GND	27	GND
28	N/C	28	N/C
29	N/C	29	N/C
30	N/C	30	N/C
31	N/C	31	N/C
32	N/C	32	N/C
33	N/C	33	N/C
34	N/C	34	N/C
35	DSR8	35	DSR4
36	RTS8	36	RTS4
37	CTS8	37	CTS4
38	RI8	38	RI4
39	N/C	39	N/C
40	RTS7	40	RTS4
41	CTS7	41	CTS4
42	N/C	42	N/C
43	N/C	43	N/C
44	RTS6 / RX- (Ring) 6 - 202T	44	RTS2 / RX- (Ring) 2 - 202T
45	CTS6 / RX+ (Tip) 6 - 202T	45	CTS2 / RX+ (Tip) 2 - 202T
46	N/C	46	N/C
47	N/C	47	N/C
48	RTS5 / RX- (Ring) 5 - 202T	48	RTS1 / RX- (Ring) 1 - 202T
49	CTS5 / RX+ (Tip) 5 - 202T	49	CTS1 / RX+ (Tip) 1 - 202T
50	N/C	50	N/C

Table 19 RS-232/202T Comm. Module Designations for P1 to P4

Front RS-232 Serial Ports

The front of the main module of the RTU has two DB9-F RS-232 serial ports. One is labeled **Craft** the other **COM 1**. Both ports are DCE.

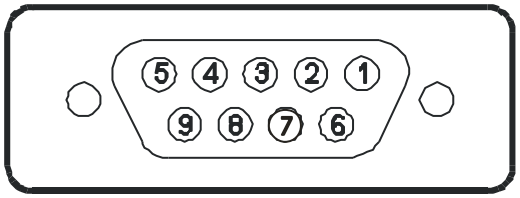


Figure 21 Front DB9 RS-232 Serial Port Connector

The Craft port is configured at the factory as a TL-1 port. Connect a straight through DB9 cable from the Craft port to the serial port on a PC. Use a terminal emulator configured as 8 data bits, no parity, 1 stop bit, and a baud rate of 57600 baud to connect to the TL-1 interface.

Pin	Function
1	DCD
2	TXD
3	RXD
4	DTR
5	Signal Ground
6	DSR
7	CTS
8	RTS
9	RI
Shell	Chassis Ground

Table 20 RS-232 Serial Port Pin Designations for Craft and Com

The COM1 port is provided on the main module to support local configuration of communication parameters. Connect a straight through DB9 cable from the COM1 port to the serial port on a PC. Use a terminal emulator configured as 8 data bits, no parity, 1 stop bit, and a baud rate of 57600 baud to connect to the configuration interface.

Expansion Chassis

Up to three expansion chassis can be connected to the main WS3500 RTU. The chassis are connected to each other through a 34-pin ribbon cable (shipped with the expansion unit) inserted into the CHASSIS EXPANSION connector on the back of each unit. The expansion chassis can be mounted either above (as in *Figure 22*) or below the main RTU.

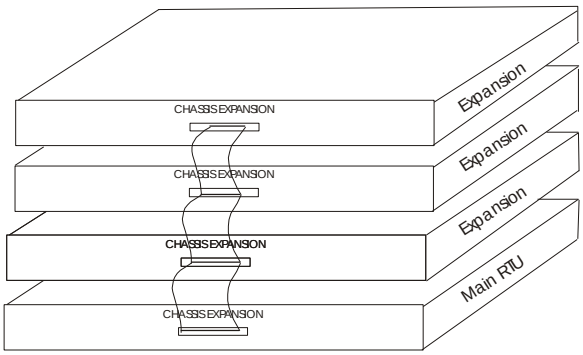


Figure 22 Expansion Chassis Configuration

The Expansion Chassis backplane is the same as the main RTU, except that the serial ports (Port 1 to Port 8) are not functional.

3.4 Power Connections

The following figure illustrates the portion of the backplane containing the power connections.

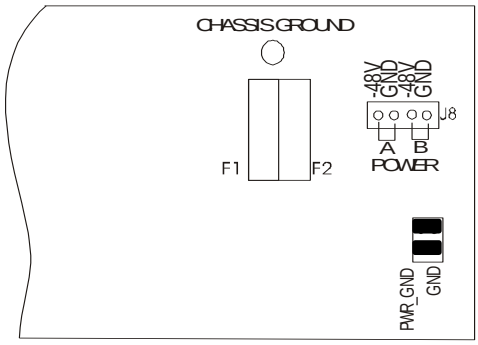


Figure 23 Power Connection and Power Fuse Location

The J8 connector provides two redundant power inputs labeled A and B. Power should be provided via a #14 - #18 AWG power wire. The nominal input voltage is –48V DC. The maximum power is 52 Watts. The –48V DC input requires a maximum 2 Amp slow blow fuse.

3 Amp fuses must be inserted into F1 and F2. F1 fuses power for the A -48 volt input and F2 fuses power for the B –48 volt input.

The CHASSIS GROUND stud is used to connect the chassis ground to Earth ground. Each unit should be connected to Earth ground, using minimum #14 AWG wire.

The PWR_GND is the ground (Battery Return) of the - 48 volt power supply. It can be connected to GND (signal ground) using jumpers. **Factory default** is to jumper PWR_GND and GND together. (Jumpers are placed horizontally across the pins as illustrated above).

3.5 Ethernet Connection (s)

WARNING! This device is NOT compatible with Power Over Ethernet (POE). Verify there is no power on the ethernet cable before connecting to this unit.
Use of a POE connection may permanantly damage this device.

Note: Local Router/Switch settings should be 10 Mbps half-duplex for correct operation of the WS3500

1. Connect one end of a 4-pair, 24 AWG category 5 (CAT5) network cable to the router (on the network) and the other end to the T1 connector on the Main RTU backplane. On standard WS3500 with single Ethernet, only T1 is activated.
2. Verify connectivity to the RTU over the LAN.
3. For WS3500 with the optional dual NIC card, T2 must also be connected to the network. The IP, Router and Netmask for this optional connection can only be configured via Metago Manager and this configuration must be performed prior to testing the connectivity of T2. Presence of the 2nd network card can be verified by looking at the product label on the top of the unit where it will show "Eth 2x" or "Dual NIC" in the feature listing; or by powering down the unit and checking the main module for the presence of a network card in vertical bus socket J4.

   There are various ways to verify connectivity. You can ping the RTU, connect to the RTU using Metago® Manager, or access Metago InSite™ and verify that it appears in a browser window.

   NOTE: Ethernet connections from remote hosts can be regulated through use of the Access Control List (ACL). For information on ACL configuration, please refer *944-T061 WS3500 - Metago Manager* user documentation.

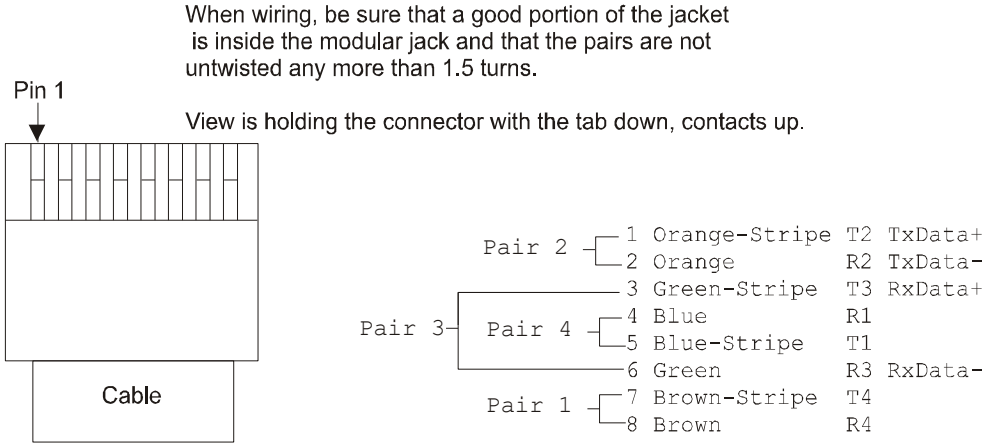


Figure 24 CAT5 Network Cable Wiring

3.6 Modem Connection (optional)

A standard phone cable is used to connect the RTU to a telephone jack. Follow the steps below to connect the internal modem of the RTU to a telephone jack.

1. Turn the cable so that the small connecting lever faces up.
2. Insert the cable into the main RTU's RJ11 connector (labeled T3) on the backplane, until it clicks.
3. Plug the other end of the cable into an RJ11 wall jack.

Chapter 4: Software Configuration

The WS3500 is shipped with default connection parameters and a default database. The RTU must be re-configured to be compatible with the network that it is being connected to.

There are two methods covered in this manual describing how to change the connection parameters. Method one is using the Console Configuration utility via the COM1 port. This utility is menu driven and is usually the preferred method for setting communication parameters. The second method is issuing TL-1 commands via the Craft port.

The two methods are described below.

4.1 Console Configuration Utility

The Console Configuration utility is activated when a user logs in on the console port. The Console Configuration utility allows the user to view or modify the WS3500 communication parameters (IP, netmask, and router addresses; and the SID), and to restart the RTU.

Configuring the Connection Parameters — Quick Reference

The following steps are a quick reference to modify the connection parameters on the WS3500.

1. Log on to the console port (COM 1).
2. Access the Modify Configuration option and perform all of the following operations:
   - Set the IP address.
   - Set the Router address.
   - Set the Netmask address.
   - Set the SID.
   - Return to the Main Menu
3. Select Restart RTU, at the WS3500 Configuration Menu. This operation initializes the new configuration on the RTU. If this step is not performed, your changes are not downloaded to the RTU.

Logging On

To log on to the Console Configuration utility, do the following:

1. Power up the RTU.
2. The WS3500 Com port is DCE. Connect a standard RS-232 DB9 straight through cable to the COM1 port of the RTU and the other end of the cable to the PC serial port.
3. Start a PC terminal emulator session on the PC (e.g. TeraTerm, Hyperterm). The port settings depend on the RTU configuration. The default settings are 8 data bits, no parity, 1 stop bit, and baud rate of 57600 and no flow control.
4. Hit the <Enter> key until the **login**: prompt appears.

5. Input the username at the **login:** prompt (default username is **MTC**) and press <Enter>. The **password:** prompt will appear.
6. Input the password at the **password:** prompt (default password is **shipping**) and press <Enter>. The WS3500 Configuration Menu will appear as follows;

```
login: MTC
Password:

VER4.03.04

WS3500 Configuration Menu:

1) View   Configuration.
2) Modify Configuration.
3) Ping.
4) Logs.
8) Restart RTU.

E) Exit
```

7. Input the number related to the desired option and press <Enter> at the **>** prompt.

Viewing the Configuration

To view the configuration of the RTU, enter **1** and press <Enter> at the **>** prompt. The configuration of the RTU is displayed in the terminal session, followed by the WS3500 Configuration Menu.

```
Build Version: VER5.00.01 Built:Dec 23 2019 13:35:31

SID: TestIPv6   Software version(CFG): 5.00.01
IP      : 10.0.100.44 config=0
netmask : 255.255.0.0
defroute: 10.0.100.2
CDPD IP : 172.16.6.4
CDPD rt : 172.16.6.5
Modem IP: 0.0.0.0
Modem rt: 0.0.0.0
SSH Disabled on Upgrade Port
SSH Disabled on TL1 Port
telnet port: 23 upgrade port: 26 secure TL1 port: 0 secure upgrade port: 22
OEM: 3 display: 0
expansion: 16 http: 1
Speed: 10 MB, Duplex: Half
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
user:            passwd:              user:            passwd:
485 ports
port:01 setting:0x3512 func:0x000a     port:02 setting:0x3512 func:0x000a
port:03 setting:0x3512 func:0x000a     port:04 setting:0x3512 func:0x000a
port:05 setting:0x3512 func:0x000a     port:06 setting:0x3512 func:0x000a
port:07 setting:0x3512 func:0x000a     port:08 setting:0x3512 func:0x000a
232 ports
port:01 setting:0x3812 func:0x0007     port:02 setting:0x3812 func:0x0008
port:03 setting:0x3812 func:0x000a     port:04 setting:0x3812 func:0x000a
Serial Exp Card:1 Type:0 Addr:0 IRQ:0
Serial Exp Card:2 Type:0 Addr:0 IRQ:0
CPU_Type: 007f1f10
Light Addr: 0x4200 Dial out num: 000-0000
TimeZone: MST7MDT,M3.2.0/2,M11.1.0/2
VER5.00.01(10.0.100.44)

Routing tables

Internet:
Destination        Gateway            Flags
default            10.0.100.2         UG
10.0.0.0/16        link#2             U
10.0.100.2         link#2             UHL
127.0.0.1          127.0.0.1          UH
```

Modifying the Connection Parameters

To access the Modify Configuration Menu, enter **2** at the WS3500 Configuration Menu and press <Enter>. The WS3500 Modify Configuration Menu will appear follows:

```
User: MTC  Level:5  Access Granted.

WS3500 Modify Configuration Menu:

SSH Disabled on Upgrade Port.
SSH Disabled on TL1 Port

1) Set IP Address.
2) Set Netmask.
3) Set Router.
4) Set SID.
5) Set Upgrade Port.
6) Set Telnet TL1 Port.
7) Set MODEM IP.
8) Set MODEM Router IP.
9) Set MODEM Dial String.
S) Enable SSH on Telnet TL1 Port.
U) Enable SSH on Upgrade Port.
M) Set MODEM Enable/Disable.
T) Set Timeout for COM1 Config Menu

R) Return to Main Menu.
```

>From this menu, the communication parameters of the WS3500 can all be altered – IP address, Netmask address, Router address, and SID. Once any of the communication parameters have been altered, the RTU must be reset. The Communication parameter changes are not taken into effect until after the RTU has been reset.

Setting the IP Address

1. At the **>** prompt, input **1** and press <Enter>.
2. At the **`Enter IP:`** prompt input the IP address of the RTU and press <Enter>. This will cause the following confirmation message to appear:
   - **`IP address set to: xxx.xxx.xxx`**
3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Netmask Address

1. At the **>** prompt, input **2** and press <Enter>.
2. At the **`Enter Netmask:`** prompt input the Netmask address of the RTU and press <Enter>. This will cause the following confirmation message to appear:
   - **`Netmask set to: xxx.xxx.xxx`**

3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Router Address

1. At the **>** prompt, input **3** and press <Enter>
2. At the **`Enter Router:`** prompt input the Router address of the RTU and press <Enter>. The following confirmation message will appear
   - **`Router IP set to: xxx.xxx.xxx.`**
3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the SID

1. At the **>** prompt, input **4** and press <Enter>.
2. At the **`Enter SID: prompt`** input the SID of the RTU and press <Enter>. The following confirmation message will appear
   - **`SID set to:`.[SID]**
     - The SID is a maximum of 20 characters and is used to identify the RTU. The value of SID is limited to letters, digits, and hyphens.
3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Upgrade Base Port

1. At the **>** prompt, input **5** and press <Enter>.

```
SSH not enabled on Upgrade Port. Port is unsecured.


PLESE NOTE: THE LEGACY PORT IS NO LONGER LISTED OR
CONFIGURED. PLEASE ENTER THE REAL PORT. (DEFAULT 26)

Current Upgrade port is 26  Enter new Upgrade Port:
```

2. At the **`Enter new Upgrade Port:`** prompt input the upgrade port of the RTU and press <Enter>. The following confirmation messages will appear
   - **`Port set to: xx`**
   - **`Current Upgrade port is xx`**
3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Telnet Port

1. At the **>** prompt, input **6** and press <Enter>.

```
SSH not enabled on TL1 Port. Port is unsecure.


Current Telnet TL1 Port is 23,  Enter new Telnet TL1 Port
```

2. At the **`Enter new Telnet TL1 port:`** prompt input the telnet port of the RTU and press <Enter>. The following confirmation message will appear

   - **`Port set to: xx`**

3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Modem IP

1. At the **>** prompt input **7** and press <Enter>.

2. At the **`MODEM IP address is (XXX.XXX.XXX.XXX), Enter new IP address:`** prompt input the new modem IP address and press <Enter> The following confirmation message will appear:

   - **`MODEM IP address set to: XXX.XXX.XXX.XXX`**

3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Modem Router IP

1. At the **>** prompt input **8** and press <Enter>.

2. At the **`MODEM Router IP address is (XXX.XXX.XXX.XXX), Enter new IP address:`** prompt input the new modem router IP address and press <Enter> The following confirmation message will appear:

   - **`MODEM Router IP address set to: XXX.XXX.XXX.XXX`**

3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Setting the Modem Dial String

1. At the **>** prompt input **9** and press <Enter>.

2. At the **`Input Dial String:`** prompt input the new modem dial string and press <Enter> The following confirmation message will appear:

   - **`Set Dial String:XXXXXXX`**

If there are no other communication parameter changes to be made, return to the main menu and reset the RTU. Otherwise proceed to the next step.

Enable SSH on Telnet TL1 Port

1. Pressing ‘S’ from the WS3500 Modify Configuration Menu will toggle SSH on the TL1 port. It will also change option 6 from Set Telnet TL1 Port to Set SSH TL1 Port.

   NOTE: Enabling SSH will disable the unsecure port and the SSH TL1 Port will need to be set through option 6 -> Set SSH TL1 Port.

Enable SSH on Upgrade Port

1. Pressing 'U' from the WS3500 Modify Configuration Menu will toggle SSH on the Upgrade (Manager configuration) port. It will also change option 5 from Set Upgrade Port to Set SSH Upgrade Port.

   NOTE: Enabling SSH will disable the unsecure port and the SSH Upgrade Port will need to be set through option 5 -> Set SSH Upgrade Port

Setting the Modem Enable/Disable

1. At the **>** prompt input **M** and press <Enter>.
2. One of the following confirmation messages will appear:
   - **MODEM ENABLED**
   - **MODEM DISABLED**
3. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU.

   NOTE: MODEM ENABLED will only take effect on units equipped with and licensed for a dial up modem.

Setting COM1 Timeout

1. At the **>** prompt input **T** and press <Enter>.
2. The following confirmation messages will appear:

```
>t
Current timeout is 0 minutes,  Enter new Timeout in minutes:
```

3. The available range of timeout is from 0 (timeout disabled) to 65535 minutes. Suggested time is 2-5 minutes.
4. If there are no other communication parameter changes to be made, return to the main menu and reset the RTU.

Ping Command

Use this command to ping the configured router or other upstream device. This will reset the ARP table quickly following an IP change or new installation so that network connectivity can be verified without a delay.

1. At the **>** prompt of the WS3500 Configuration Menu, input **3** and press <Enter>. The following message will appear. In the first example a valid network address of 10.0.100.25 was entered:

```
Host to ping: 10.0.100.25

PING 10.0.100.25 (10.0.100.25): 56 data bytes
64 bytes from 10.0.100.25: icmp_seq=0 ttl=127 time=5 ms
64 bytes from 10.0.100.25: icmp_seq=1 ttl=127 time=2 ms
64 bytes from 10.0.100.25: icmp_seq=2 ttl=127 time=2 ms
64 bytes from 10.0.100.25: icmp_seq=3 ttl=127 time=2 ms
64 bytes from 10.0.100.25: icmp_seq=4 ttl=127 time=2 ms

----10.0.100.25 PING Statistics----
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 2/2/5 ms   variance = 5 ms^2
```

2. In this second example an invalid network address was entered or network communications were not available.

```
Host to ping: 10.0.100.70

PING 10.0.100.70 (10.0.100.70): 56 data bytes

----10.0.100.70 PING Statistics----
5 packets transmitted, 0 packets received, 100% packet loss
```

3. At the end of the ping sequence the unit automatically returns to the WS3500 Configuration Menu.

Retrieving Logs via the CLI interface

Beginning with firmware version 4.3.4 the ability to retrieve TL1 and Operation Logs from the COM port has been added.

1. At the **>** prompt of the Configuration menu, input **4** and press <Enter>. The WS3500 Show Logs menu will appear:

```
WS3500 Show Logs Menu:

1) Show TL1 Log.
2) Show Operations Log.

R) Return to Previous Menu.
```

2. From the Show Logs Menu, Input **1** and press <Enter> for access to the TL1 Log. In this example, the default level 5 “MTC” user is logged in but all users from Level 1 up can access this menu.

```
User: MTC  Level:5  Access Granted!!
Select the medium to view TL1 Logs:

1) Screen Break
2) No Screen Break

R) Return to Previous Menu.
```

3. Choose option 1 for TL1 log retrieval with screen breaks, or option 2 for No screen breaks. At the end of the log retrieval the menu will return to the form shown above.

4. From the Show Logs Menu, Input **2** and press <Enter> for access to the Operation Logs. In this example, the default level 5 "MTC" user is logged in but any Level 5 user can access this menu.

```
User: MTC  Level:5  Access Granted!!
Select the medium to view Operation Logs:

1) Screen Break
2) No Screen Break

R) Return to Previous Menu.
```

5. Choose option 1 for Operation log retrieval with screen breaks, or option 2 for No screen breaks. At the end of the Operation log retrieval the menu will return to the form shown above.

6. From either log, press **R** and then press <Enter> to return to the WS3500 Configuration menu.

Restarting the RTU

When changes have been made to a RTU's communication parameters, the system must be reset before the changes take effect. During a reset, the RTU will temporarily be out of service on the network.

1. At the **>** prompt, input **8** and press <Enter>. The following confirmation message will appear:
   - **`This command cold start the RTU, are you sure (Y/N)?`**
2. Input **y** and press <Enter>. The RTU will reboot.

4.2 Issuing TL-1 Commands via the Craft Port

NOTE:

The Backspace key is not usable when connected to a TL-1 terminal session. If an error is made, the best option is to press the semi-colon key and begin entering the command again.

1. Power up the RTU.
2. Connect one end of a DB9 straight through cable to the CRAFT port of the RTU and the other end of the cable to the PC serial port.
3. Start a terminal emulator session on the PC (e.g. TeraTerm, Hyperterm, etc.). The port settings depend on the RTU configuration. The default settings are 8 data bits, no parity, 1 stop bit, and baud rate of 57600 and no flow control.
4. Input a semi-colon to verify you have a connection. A deny message should appear in the window, similar to the following:

```
   RTU134 15-12-19 11:29:52
M   DENY
   ICNV
;
```

5. Change the default communication parameters, by entering the following TL-1 commands into the emulator session on the PC, substituting the correct value for each parameter. A parameter is displayed in *italics*.

TL-1 Message Syntax	**Example**
ACT-USER::*uid*:*ctag*::*pid*;	ACT-USER::MTC:ct::shipping;
SET-IP:::*ctag*::*ip_address*;	SET-IP:::ct::172.16.6.135;
ADD-ROUTER:::*ctag*::*netmask*,*routerip*;	ADD-ROUTER:::ct::255.255.255.0,172.16.6.1;
SET-SID:::*ctag*::*new-sid*;	SET-SID:::ct::CLGYABRTU1;
SET-TELNET:::*ctag*::*telnet_port_number*;	SET-TELNET:::ct::1500;
SET-MODEM-NUM:::*ctag*::*dial_string*;	SET-MODEM-NUM:::ct::4032508304
INIT-SYS:::*ctag*::1;	INIT-SYS:::ct::1;

6. Restart the RTU, using the INIT-SYS TL-1 command, to allow the new parameters to take effect.

If more information regarding the TL-1 commands is required please refer to *Appendix A, WS3500 Supported TL-1 Messages*.

Chapter 5: Customer Support

Westronic Systems, Inc. is committed to providing the customer with the best possible support for maintaining Westronic products. We take pride in providing quick access to knowledgeable staff that can help with technical support, training and repairs.

The following section describes the two year standard warranty agreement provided for all Westronic products. Subsequent sections outline our customer support, repair policy, annual support agreements and training courses.

5.1 Two-Year Standard Warranty

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

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

This warranty is in effect provided that:

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

This warranty excludes damage due to fire, flood, lightning, or any other abnormal conditions.

This warranty for Westronic Systems equipment is in lieu of all other expressed warranties. Westronic Systems does not authorize any person to assume, on its behalf, any other obligation or liability.

Westronic Systems 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.

5.2 Customer Support

Customer support during business hours is also covered under the limited warranty. Customers can call Westronic at (403) 250-8304 or toll free at 1-877-253-8304 to request assistance or to discuss a potential problem with a device. Our business hours are 08:00 to 17:00 Mountain Standard Time, Monday through Friday, excluding Canadian statutory

holidays. The time required to respond to a call will vary according to when the call was received.

5.3 Standard Repair Policy

All equipment requiring repair, which has been manufactured by Westronic Systems and used in accordance with Westronic Systems instructions, will be repaired and shipped to the customer as follows:

Under Warranty	-	within 10 business days.
Out of warranty	-	within 30 business days.
Expedited	-	within 5 business days (subject to expediting fee)
Discontinued	-	specific agreement

Westronic Systems will advise of any significant delays that may arise.

Please contact the Westronic RMA Coordinator for more information.

When Service is Required

Provide written notification of the problem and obtain a return authorization number and shipping instructions from the Return Material Department Coordinator. RMAs can also be requested online, via our website **www.westronic.com** through the Support page.

1. All returns must have the Return Material Authorization Number conspicuously marked on the outside of the shipping container.
2. All equipment must be returned prepaid to the Westronic repair facility.
3. Repaired equipment will have a one year warranty from the date of repair.
4. All repaired equipment will be shipped to the Customer by best means available as determined by Westronic Systems unless prearranged otherwise. Expedited shipping methods will be paid by the Customer.

RMA Enquiries

Contact: Return Material Coordinator
Telephone: (403) 250-8304
FAX: (403) 263-2174
email: rma@westronic.com

Equipment Return Address

Westronic Systems
#200, 550 – 71st Avenue SE
Calgary, Alberta, Canada T2H 0S6

Repair Charges

Equipment covered under warranty will be repaired at no charge to the Customer. When requested by the Customer, equipment repair can be expedited. Contact the Return Material Coordinator for details.

Non-warranty equipment will be repaired at a standard charge based on equipment type. This equipment will be repaired in the standard 30 working day period. The repair period

will begin from receipt of the faulty equipment at the Westronic Systems repair center. For repair charges, please contact the Return Material Coordinator.

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

5.4 Annual Support Agreements

Westronic offers Annual Support and Maintenance Agreements for Westronic products. Support and Maintenance Agreements are available for equipment less than five years old. OEM products are not included in this offering. The annual support agreement must be purchased and paid for prior to the expiration of the two-year standard warranty.

We welcome the opportunity to provide quotations for annual support and maintenance contracts, please contact one of our sales staff for more information.

5.5 Product Training

Westronic offers a number of training courses. They include hardware, software, product installation, configuration, and support. These training courses are typically customized for a client's requirements and the technical level of the participants.

Westronic can offer these at the client location, via web conferencing, or at the Westronic facility. Please contact one of our sales staff with your requirements to obtain a quotation.

Appendix A: WS3500 Supported TL-1 Messages

This appendix provides details of all the command and message fields that are supported by the WS3500 TL-1 interface. All messages have been adopted from GR-833-CORE Issue 2 standards.

All TL-1 commands can be issued through the CRAFT port (as long as the CRAFT port is still configured as a Craft port) or through a TCP/IP Telnet session.

Parameter Definitions

The following are the definitions of the parameters found in most of the TL-1 messages. Parameters that are unique to a message will be defined under the description of that particular message.

`AID` Access Identifier (maximum of 14 characters) is used to identify the entity in the NE to which the message pertains. The AID consists of letters, digits, and hyphens.

`AIDTYPE` Access Identifier Type is a free form text field used in conjunction with the AID field to provide additional details about a point. Maximum length is 10 characters including letters, digits and hyphens.

`ALMCDE` Alarm code (2 characters) which indicates the severity of the message. If multiple alarms are being reported, then the ALMCDE is the highest severity of the reported alarms. Valid values are shown in *Table 21 Alarm Code Types*.

Value	Meaning
*C	Critical Alarm
**	Major Alarm
*^	Minor Alarm
A^	Automatic Message

Table 21 Alarm Code Types

`ATAG` Automatic message tag (5 characters) is a parameter that is used by the Operating System (OS) to determine if any autonomous messages were missed. The WS3500 uses whole numbers (1 - 65535) for this field.

`CLLICODE` Common Language Location Identifier (11 characters) is a parameter that is used to identify the location of an alarm point.

`CONDDESCR` Condition Description (50 characters) is a parameter that contains the detailed text description of the alarm or event. It is comprised of a maximum of 50 characters (use of punctuation characters is not recommended). This parameter is always enclosed with slash-quote (/") delimiters.

`CONDEFF` Condition Effect (2 characters) is a Parameter that indicates the effect of the event on the current condition of the NE. The event may initiate a standing condition, which can later be retrieved using the RETRIEVE-CONDITION command, or may initiate a basic condition on the NE for an extended time period. Valid values are:

* CL Standing condition cleared
* SC Standing condition raised

* TC Transient condition

CONDTYPE Condition Type (25 characters) is a parameter that identifies the type of event, condition or alarm indication being reported. Complete lists of valid values are found in *GR-833_CORE Appendix C*.

All digital alarms (i.e. DISCRETE, TBOS, TABS, INACS, etc.) will have a CONDTYPE value of GP.

ANALOG alarms will have one of the CONDTYPE values from *Table 22 Analog CONDTYPE Values*: Note: the *units* field in *Table 22* is the textual representation of the engineering units for the monitored values, as configured in the database (i.e. °F).

Value	Description
T-HIHI-*units*	HIHI limit exceeded
T-HI-*units*	HI limit exceeded
T-LO-*units*	LO limit exceeded
T-LOLO-*units*	LOLO limit exceeded

Table 22 Analog CONDTYPE Values

CONTSTATE Control State (4 characters)is a parameter that is used to indicate the state of an external control. The common values are in *Table 23 CONTSTATE Values*.

Value	Description
OPER	Operated
RLS	Released
NA	Not Applicable (i.e. dur=MNTRY)

Table 23 CONTSTATE Values

CTAG Correlation Tag (maximum of 6 characters) is a parameter used to correlate the input and response messages. CTAG is assigned by the OS and is an alphanumeric identifier for the point.

DATABASE Database Binary file format, for internal use only.

DUR Duration (5 characters) is a parameter that Indicates the duration of the external control operation. Valid values are shown in *Table 24 Valid DURATION Values* below:

Value	Description
CONTS	Continuous duration
MNTRY	Momentary duration
FLASH	Sequenced ON and OFF continuously

Table 24 Valid DURATION Values

ERRCDE Error Code (4 characters) is a parameter that describes why a command was rejected or failed.

Error Code	Description
ENRS	Equipage, Not equipped for Restoration.
FRNR	RTU Does Not Reply.

Error Code	Description
ICNV	Invalid Command Input. The command is not recognized or not supported.
IDNV	Invalid Data Parameter. The value of a data parameter is invalid or exceeds monitored range.
IDRG	Invalid Range. A parameter falls outside the allowable range.
IICT	Invalid CTAG input. The CTAG is blank.
IIFM	Input data format wrong.
IISP	Input syntax or punctuation wrong.
IITA	Invalid Target Identifier. The TID syntax is bad or the indicated TID is not monitored by the RTU.
INUP	Non-Null Unimplemented Parameter Input. A parameter which is not used by the RTU was input.
IPMS	Parameter Missing or too many parameters.
IPNV	Input parameter not valid
PLNA	Privilege, Login Not Active
SSRE	Status, System Resources Exceeded

Table 25 Error Message Codes

MONVAL — Monitored Value (Analog only) is a numeric representation of the monitored value. This value is reported as engineering units derived from the scaling factors in the database.

NTFCNCDE — Notification code (2 characters) is the parameter indication the severity of the individual alarms or events in a response or autonomous message. Valid values are shown in X below:

Value	Description
CR	Critical Alarm
MJ	Major Alarm
MN	Minor Alarm
RN	Routine Alarm
NA	Not Alarmed
CL	Clear Alarm

Table 26 Valid NTFCNCDE Values

OCRDAT — Occurrence Date (5 characters) is the parameter that identifies the date when the specific event occurred. The form is MM-DD, where MM = month (1-12) and DD = day (1-31).

OCRTM — Occurrence Time (8 characters) is the parameter that identifies the time of day the specific event occurred. The form is HH-MM-SS, where HH=hour of day (0-23), MM=minute of hour (0-59), and SS=second of minute (0-59).

PID — Password (maximum of 10 characters) must be a minimum of 1 character (cannot start with a number).

SID — Source identifier (20 characters) is the parameter that identifies the source of the TL-1 message. This parameter can be configured independently of the TID to give greater granularity with regards to alarms.

SRVEFF — Service Effecting (3 characters) is the parameter that identifies the effect on service caused by the standing or alarm condition. Valid values include the following:

SA =Service-effecting condition
NSA = Not service-effecting condition

`THLEV` Threshold Level (Analog only) is the numeric value of the threshold, indicated by CONDTYPE that has been exceeded. This threshold value is reported in engineering units derived from the scaling factors in the database.

`TID` Target Identifier (20 characters) is the parameter that identifies the target NE to which a command is directed.

- The value of TID is limited to letters, digits, and hyphens.
- The value of TID may be null when the OS directly interfaces with the target NE.
- The recommended value for the TID, when it is used, is the target's CLLI code.

`UID` User identification (maximum of 10 characters) must be 1- 10 alphanumeric characters.

`UAP` User Access Privilege (1 character) with valid levels 1 – 5 that are set by an Administrator.

`WG` Work Group (2 characters) is a two-character user definable field downloaded to the alarm point database.

Supported TL-1 Command/Response Messages

This section describes the TL-1 messages supported by the WS3500. Each command description gives the command level, input format, normal and error responses, and in many cases, examples of input commands and normal responses.

Each message is assigned an access level. There are five levels (1, 2, 3, 4, and 5). Each user is assigned an access level that allows use of all commands with that level or lower. For example, a user with an access level of 4 can issue all the commands that have an access level of 1, 2, 3, or 4.

The notations used in this document correspond to those of the *GR-833-CORE Issue 2* and are as appear in *Table 27 Common Documentation Notations* below:

<cr>	A carriage return character in American Standard Code for Information Interchange (ASCII).
<lf>	A line feed character in ASCII.
^	The ^ character indicates a blank (space character) that must appear in the message.
[ ]	One or more parameters (including delimiters) enclosed within brackets [ ] indicates that parameters are optional.
{ | | }	A list of two or more parameters enclosed within braces { } and separated by a pipe | indicates that one (and only one) of the parameters must be selected from the list.
( )	The parentheses are used to enclose a group of symbols for the following operators "*" and "+". The parentheses are not transmitted.

*	The asterisk is a post-fix operator that indicates the preceding symbol or group of symbols (enclosed in parentheses) may occur zero or more times.
+	The plus sign is a post-fix operator that indicates the preceding symbol or group of symbols (enclosed in parentheses) may occur one or more times.
UPPERCASE	Uppercase characters in format expression shall appear as they are in the message.
Italics	Italics are used to indicate parameters that are NOT defined in the parameter definitions section. These definitions will be defined below the input format of that message.

Table 27 Common Documentation Notations

NOTE:

Backspace does not function when entering TL-1 commands. If a mistake is made while entering a TL-1 command, press the semi-colon key and start over.

ACT-USER (Activate User) (Level 1)

Activate User logs a user in to the WS3500. Each TL-1 command has an associated privilege level that is checked against the privilege level of the current user logged in before the command is executed. To execute a TL-1 command, a user with the appropriate privilege level must first use the ACT-USER command to log on. The password and username are case sensitive. The ACT-USER command leaves an entry in the TL-1 Operations Log every time it is performed successfully.

Note: CANC-USER (Cancel User) is used to log off the current user.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
ACT-USER:[tid]:uid:ctag::pid;
```

Example

```
ACT-USER::MTC:ct::shipping;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 12:52:38
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 09:40:54
M  ctag01 DENY
   IPNV
;
```

ADD-ROUTER (Add Router) (Level 4)

The ADD-ROUTER command adds a router and netmask entry to the WS3500 TCP/IP routing tables. The router address must be on the same subnet as the RTU. Only one router can be set for the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
ADD-ROUTER:[tid]::ctag::netmask,routerip;
```

Where:

- *netmask* is the destination sub network address. Unspecified portions of the sub network address are expressed as 0 (for example, 255.255.255.0). An entry of 0.0.0.0 in this field indicates that the specified router serves as the default router when a specific router entry for the sub network address is not entered.
- *routerip* is the IP address of the router used to reach the specified sub network address. This IP address must be fully specified and must reside on the same sub network as the WS3500.

Example

```
ADD-ROUTER:::ct::255.255.255.0,0.0.0.0;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 14:40:53
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:00:46
M  ct DENY
   IDNV
;
```

CANC-USER (Cancel User) (Level 1)

Cancel User is used to log the current user off of the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
CANC-USER:[tid]:uid:ctag;
```

Example

```
CANC-USER::MTC:ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 14:45:58
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:02:33
M  ct DENY
   IPMS
;
```

CLEAR-OPLOG (Clear Operations Log) (Level 5)

The Clear Operations Log command clears all entries from the operations log. The command is the same whether the log is set to non-volatile mode via Manager or if it is in the regular mode.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
CLEAR-OPLOG:[tid]::ctag;
```

Examples

```
CLEAR-OPLOG;
CLEAR-OPLOG:RTU134::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:35:22
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:47:15
M  ct DENY
   PLNA
;
```

CLEAR-TL1LOG (Clear TL1 Log) (Level 3)

The Clear TL1 Log command clears all event history from the TL-1 log. The command is the same whether the log is set to non-volatile mode via Manager or if it is in the regular mode.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
CLEAR-TL1LOG:[tid]::ctag::1;
```

Examples

```
CLEAR-TL1LOG;
CLEAR-TL1LOG:RTU134::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:35:22
M   COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:47:15
M  ct DENY
   PLNA
;
```

CON-DWN (Connection Downstream) (Level 1)

Connection Downstream is one of two commands used for controlling the connection of a WS3500 to a downstream device when managed by TL-1 routing. The connection from the downstream device to the WS3500 is typically via wireless modem. This command will allow the WS3500 to re-establish its downstream connection to the downstream device with the given TID.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
CON-DWN:[tid]::ctag;
```

Example

```
CON-DWN:MODEMTEST::ct;
```

Normal Response

```
<cr><lf><lf>
^^^tid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag;^COMPLD<cr><lf>
;
```

Example

```
   MODEMTEST 15-11-26 14:31:11
M  ct; COMPLD
;
```

This will followed by a string giving notification of the successful socket opening.

Example

```
   RTU134 15-11-26 14:32:13
A  00033 REPT EVT EQPT
   "TL1R0 MODEMTEST:GP,TC,11-26,14-32-13,Open Sock,:\"10.0.100.94 Open\","
;
```

Error Response

```
<cr><lf><lf>
```

```
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:07:49
M  ct DENY
   ICNV
;
```

DCON-DWN (Disconnect Connection Downstream) (Level 1)

Disconnect Connection Downstream is the second of two commands used for controlling the connection of a WS3500 to a downstream device when managed by TL-1 routing. The connection from the downstream device to the WS3500 is typically via wireless modem. This command will allow the WS3500 to break its connection to the downstream device with the TID specified for a period of time ranging from 1 minute to 90 minutes. If no time is specified the default period is 5 minutes.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
DCON-DWN:[tid]::ctag::[time];
```

Example

```
DCON-DWN:MODEMTEST::ct::1;
```

Normal Response

```
<cr><lf><lf>
^^^tid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
;DCON-DWN:MODEMTEST::ct::1;

   MODEMTEST 15-11-26 14:39:33
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:07:49
M  ct DENY
   ICNV
;
```

DLT-USER-SECU (Delete User Security) (Level 5)

Delete User Security allows any user with a permission level of 5 to remove an entry from the valid users list. The user issuing this command cannot delete themselves.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
DLT-USER-SECU:[tid]:uid:ctag;
```

Example

```
DLT-USER-SECU::James:ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:05:15
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:07:49
M  ct DENY
   ICNV
;
```

ED-PID (Edit Password ID) (Level 2)

Edit Password ID is used to edit a user's password. The *oldpid* must match the current password for that user. The *newpid* will become the password for the specified user once this command is executed. Passwords and user identifiers (uid) are case sensitive.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
ED-PID:[tid]:uid:ctag::oldpid,newpid;
```

Where:

- *oldpid* is the original password (pid) to be modified.
- *newpid* is the new password. The pid must be a minimum of 1 character and a maximum of 10 characters.

Example

```
ED-PID::James:ct::Jamespass,Johnspass;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:18:50
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:32:07
M  ct  DENY
   ICNV
;
```

ENT-USER-SECU (Enter User Security) (Level 5)

Enter User Security is used to add a new user. The new user ID (newuid) becomes effective upon confirmation of the instruction.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
ENT-USER-SECU:[tid]:newuid:ctag::newpid,,uap;
```

Where:

- *newuid* is the new user id. Must consist of 1 – 10 alphanumeric characters.
- *newpid* is the new password. Must be a minimum of 1 character and a maximum of 10 characters.

Example

```
ENT-USER-SECU::John:ct::Doe,,3;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:28:46
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:32:07
M  ctg DENY
   IPMS
;
```

INIT-SYS (Initialize System) (Level 4)

Initialize System causes a warm restart of the WS3500. Initialize System executes the same startup routine that occurs when the RTU powers up.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
INIT-SYS:[tid]::ctag::1;
```

Example

```
INIT-SYS:::ct::1;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:35:22
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:47:15
M  ct DENY
   ICNV
;
```

OPR-EXT-CONT (Operate External Control) (Level 3)

Operate External Control instructs the WS3500 to operate an external control, such as a relay activation. The control can be momentary (MNTRY), latched (CONTS), or flash (FLASH). The control can be released by using the RLS-EXT-CONT command. The OPR-EXT-CONT command inserts an entry in the TL-1 Operations Log every time it is performed successfully.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
OPR-EXT-CONT:[tid]:aid:ctag::,dur;
```

Where *dur* relates to the type of the control that is issued. The dur types are:

- CONTS the control is to remain on, until the control is released.
- MNTRY control is turned on for a specific amount of time, and then it is released.
- FLASH the control is toggled on and off continuously.

Examples

```
OPR-EXT-CONT::DISCRETEC-1-1:ct::,CONTS;
OPR-EXT-CONT::DISCRETEC-1-8:ct::,MNTRY;
OPR-EXT-CONT::DISCRETEC-2-1:ct::,FLASH;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:47:08
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:55:24
M  ct DENY
   IIFM
;
```

RLS-EXT-CONT (Release External Control) (Level 3)

Release External Control instructs the WS3500 to release an external control, such as a relay deactivation. The control release can be momentary (MNTRY), continuous (CONT), or flash (FLASH). The RLS-EXT-CONT command inserts an entry in the TL-1 Operations Log every time it is performed successfully.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RLS-EXT-CONT:[tid]:aid:ctag::,dur;
```

Where *dur* relates to the type of the control that is issued. The *dur* types are:

- CONTS the control is to remain on, until the control is released.
- MNTRY control is turned on for a specific amount of time, and then it is released.
- FLASH the control is toggled on and off continuously.

Examples

```
RLS-EXT-CONT::DISCRETEC-1-1:ct::,CONTS;
RLS-EXT-CONT::DISCRETEC-1-8:ct::,MNTRY;
RLS-EXT-CONT::DISCRETEC-2-1:ct::,FLASH;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:47:08
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:55:24
M  ct DENY
   IIFM
;
```

RTRV-ALM (Retrieve Alarm) (Level 1)

Retrieve Alarm instructs the WS3500 to return information on alarms currently in an alarm state. The returned alarms are sorted first by their SID and then sorted second according to their severity.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-ALM:[tid]:[aid]:ctag;
```

Examples

```
RTRV-ALM:::ct;
RTRV-ALM;
```

Normal Response (No Alarms)

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:51:56
M  ct COMPLD
;
```

Normal Response (One or More Alarms)

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
(^^^"aid,aidtype:ntfcncde,condtype,srveff,ocrdat,ocrtm,
cllicode,:conddescr,wg"<cr><lf>)
;
```

Example

```
   RTU134 15-11-20 15:55:12
M  ct COMPLD
   "DISCRETE-1-1,DIGITAL:CR,GP,NSA,07-24,15-54-50,CALGARY,:FLOOD
RM1,EN"
   "HEALTH-2-1,DIGITAL:MJ,GP,NSA,07-24,15-54-51,CALGARY,:ARM PORT 2
ADDR 1,SW"
   "ARM-2-1-4,ANALOG:MN,T-LO-mAmp,NSA,05-27,17-09-28,CALGARY,:Analog
Point 4,EN"
```

```
   "TBOS-1-1-2,DIGITAL:MJ,,NSA,05-27,17-07-10,CALGARY,:48v High
VOLT,EN”
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:59:07
M  ct DENY
   ICNV
;
```

RTRV-ALM-ENV (Retrieve Alarm Environmental) (Level 1)

Retrieve Alarm Environmental instructs the WS3500 to return information only on alarms currently in an alarm state which are also flagged via Manager as Environmental. When these points have a blank SID field, returned alarms are presented by AID. If the Alarms have unique SID's they are sorted by SID.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-ALM-ENV:::ctag;
```

Examples

```
RTRV-ALM-ENV:::ct;
RTRV-ALM-ENV;
```

Normal Response (No Alarms)

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:51:56
M  ct COMPLD
;
```

Normal Response (One or More Alarms)

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
(^^^"aid,aidtype:ntfcncde,condtype,srveff,ocrdat,ocrtm,
cllicode,:conddescr,wg"<cr><lf>)
;
```

Example

```
;RTRV-ALM-ENV:::ct;

   RTU134 15-11-26 12:55:13
M  ct COMPLD
   "DISCRETE-1-3,DIGITAL:NA,GP,NSA,11-26,12-46-23,,:\"Temperature Low\","
   "DISCRETE-1-5,DIGITAL:RN,GP,NSA,11-26,12-46-23,,:\"Furnace 1 activated\","
   "DISCRETE-1-6,DIGITAL:CR,GP,NSA,11-26,12-46-23,,:\"A-C compressor overheat\","
   "DISCRETE-1-7,DIGITAL:RN,GP,NSA,11-26,12-46-23,,:\"Dehumidifier activated\","
>

   AAA 15-11-26 12:55:13
M  ct COMPLD
   "DISCRETE-1-4,DIGITAL:NA,GP,NSA,11-26,12-46-23,,:\"Temperature High\","
>

   BB 15-11-26 12:55:13
M  ct COMPLD
   "DISCRETE-1-1,DIGITAL:MN,GP,NSA,11-26,12-46-23,,:\"A-C Evaporator Lo Temp\","
>

   ZZZ 15-11-26 12:55:13
M  ct COMPLD
   "DISCRETE-1-2,DIGITAL:NA,GP,NSA,11-26,12-46-23,,:\"Humidity\","
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:59:07
M  ct DENY
   ICNV
;
```

RTRV-HDR (Retrieve Header) (Level 1)

Retrieve Header requests that the WS3500 reply with a normal response indicating COMPLD. The information of interest in the reply is the reply itself, along with information about the RTU itself, such as the sid, date and time. This message is commonly used as a heartbeat message to ensure that the RTU is still connected and responding.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-HDR:[tid]::ctag;
```

Example

```
RTRV-HDR:RTU134::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 15:51:56
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:59:07
M  ct DENY
   ICNV
;
```

RTRV-HELP (Retrieve Help) (Level 1)

Retrieve Help instructs the WS3500 to send information on supported TL-1 messages. A list of all supported commands for the logged in security level will be retrieved.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-HELP:[tid]::ctag;
```

Example

```
RTRV-HELP:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
(^^^/*^help information^*/<cr><lf>)
;
```

Example (Rtrv-Help for a Level 1 User)

```
   RTU134 15-11-20 16:08:23
M  ct COMPLD
   /* ACT-USER */
   /* CANC-USER */
   /* RTRV-HELP */
   /* RTRV-ALM-ENV */
   /* RTRV-ALM */
   /* RTRV-HDR */
   /* RTRV-IP */
   /* RTRV-TL1LOG */
   /* RTRV-MODEM-NUM */
   /* RTRV-ROUTER */
   /* RTRV-TELNET */
   /* RTRV-VAL */
   /* RTRV-VER */
   /* RTRV-OPLOG */
;
```

Example (Rtrv-Help for a Level 3 User)

```
   RTU134 15-11-20 16:10:21
M  ct COMPLD
   /* ACT-USER */
   /* CANC-USER */
   /* ED-PID */
   /* RTRV-HELP */
   /* OPR-EXT-CONT */
   /* RLS-EXT-CONT */
   /* RTRV-ALM-ENV */
   /* RTRV-ALM */
   /* RTRV-HDR */
   /* RTRV-IP */
   /* RTRV-TL1LOG */
   /* RTRV-MODEM-NUM */
   /* RTRV-ROUTER */
   /* RTRV-TELNET */
   /* RTRV-VAL */
   /* RTRV-VER */
   /* RTRV-OPLOG */
   /* CLEAR-TL1LOG */
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:59:07
M  ct DENY
   ICNV
;
```

RTRV-IP (Retrieve IP Address) (Level 1)

Retrieve IP Address returns the CONFIG, RSVD, and MODEM IP addresses. Config is the RTU IP address, RSVD is an IP address reserved for future usage and MODEM is the IP address of the Line modem.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-IP:[tid]::ctag;
```

Example

```
RTRV-IP:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
^^^"CONFIG IP ADDRESS^=^current_ip_address"<cr><lf>
^^^"RSVD IP ADDRESS^=^CDPD_ip_address"<cr><lf>
^^^"MODEM IP ADDRESS^=^Modem_ip_address"<cr><lf>
;
```

Example

```
   RTU134 15-11-20 08:02:06
M  ct COMPLD
   "CONFIG IP ADDRESS = 172.16.6.134"
   "RSVD IP ADDRESS = 0.0.0.0"
   "MODEM IP ADDRESS = 172.16.4.2"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:59:07
M  ct DENY
   ICNV
;
```

RTRV-MODEM-NUM (Retrieve Modem Number) (Level 1)

Retrieve modem number will return the dial-out phone number of the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-MODEM-NUM:[tid]::ctag;
```

Example

```
RTRV-MODEM-NUM:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
^^^"MODEM NUMBER^=^modem_number"<cr><lf>
;
```

Example

```
   RTU134 15-11-20 08:16:13
M  ct COMPLD
   "MODEM NUMBER = 8765309"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:14:14
M  ct DENY
   IITA
;
```

RTRV-OPLOG (Retrieve Operations Log) (Level 1 or Level 5)

The RTRV-OPLOG command retrieves the logged control operations contained in a circular buffer of 512 entries. When using current firmware and Manager (4.03.04 and 4.4.1 respectively at the time of this writing) RTRV-OPLOG can either be a Level 1 command, or it can be forced to a Level 5 command by choosing the "No System Info" option of the System tab in Manager. Note: By using any older firmware and/or provisioning via older versions of Manager, RTRV-OPLOG is a level 1 command only. The following messages are logged:

- Discrete control operation requests via TL-1 and InSite
- TL-1 command failures
- TL-1 activate user commands
- All login attempts, both successful and unsuccessful
- Configuration uploads/downloads using Manager
- Live point changes

Note: the log file is not retained after a reset with firmware 4.01.xx and older firmware. It is optionally a non-volatile log with firmware 4.02.05 and newer when provisioned with current Manager.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-OPLOG:[tid]::ctag;
```

Example

```
RTRV-OPLOG:::ct;
```

Normal Response With No Messages In The Log File

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-04-20 15:13:08
M  ct COMPLD
;
```

Normal Response With Messages In The Log File

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
"date^time^year:[control_issued]User:uid,^Level:uap,
^via^application,^control_response.,^"<cr><lf>
;
```

Example

```
   RTU134 19-08-14 07:39:56
M   COMPLD

"Wed Aug 14 07:37:33 2019:[ACT-USER::]
User:MTC, Level:5, via TL1, Activate User Accepted., "

"Wed Aug 14 07:37:44 2019:[ACT-USER::]
User:MTC, Level:5, via TL1, Activate User Rejected - IPNV!, "

"Wed Aug 14 07:38:44 2019:[opr-ext-cont::DISCRETEC-1-1:::,CONTS]
User:MTC, Level:5, via TL1, Operate Ext Control Issued., "

"Wed Aug 14 07:39:28 2019:[DISCRETE]
User:MTC, Level:5, via InSite, Operate Request Issued., 1s Momentary."

"Wed Aug 14 07:39:48 2019:[DISCRETE]
User:Joe, Level:-5, via InSite, Operate Request Rejected - User Login
FAILED!, "
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 09:08:17
M  ct DENY
   IITA
;
```

RTRV-ROUTER (Retrieve Router) (Level 1)

Retrieve Router will return the current router address and netmask of the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-ROUTER:[tid]::ctag;
```

Example

```
RTRV-ROUTER:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
^^^"ROUTER^=^router_address"<cr><lf>
^^^"NETMASK^=^netmask_address"<cr><lf>
;
```

Example

```
   RTU134 15-11-20 08:57:24
M  ct COMPLD
   "ROUTER = 0.0.0.0"
   "NETMASK = 255.255.255.0"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 09:08:17
M  ct DENY
   IDNV
;
```

RTRV-TELNET (Retrieve Telnet Port Number) (Level 1)

Retrieve Telnet Port Number will return the current port number used for TELNET sessions.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-TELNET:[tid]::ctag;
```

Example

```
RTRV-TELNET:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
^^^"TELNET_PORT^=^telnet_port_number"<cr><lf>
;
```

Example

```
   RTU134 15-11-20 08:59:07
M  ct COMPLD
   "TELNET_PORT = 23"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 09:07:17
M  ct DENY
   IDNV
;
```

RTRV-TL1LOG (Retrieve TL1 Log) (Level 1)

Retrieve TL1 Log returns the contents of the TL-1 event log. The TL-1 event log contains the last 1024 autonomous messages.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-TL1LOG:[tid]::ctag;table
```

Example

```
RTRV-TL1LOG:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^atag^REPT-ALM-EQPT<cr><lf>
(^^^"aid:ntfcncde,condtype,srveff,ocrdat,ocrtm,cllicode,
:\”conddescr\”,wg"<cr><lf>)+
;
```

Example

```
   RTU134 19-08-14 08:33:33
M   COMPLD
;

   RTU134 19-08-14 08:32:59
A  00026 REPT ALM EQPT
   "DISCRETE-1-25:NA,GP,NSA,08-14,08-32-59,,:\"DISCRETE INPUT 25\","
;

   DWNSTRM_SID 19-08-14 08:33:23
** 00027 REPT ALM AID_TYPE
   "DISCRETE-1-26:MJ,GP,SA,08-14,08-33-06,CLLI,:\"DISCRETE INPUT
26\",EN"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   IITA
;
```

RTRV-USER-SECU (Retrieve User Security) (Level 5)

Retrieve User Security retrieves a list of users and their privilege levels. Only the user names and user levels are returned. To see information for all users, set *uid* to ALL, for a specific user use their *uid*.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-USER-SECU:[tid]:uid:ctag;
```

Example (for a specific user)

```
rtrv-user-secu::MTC:ct;
```

Example (all users)

```
rtrv-user-secu::ALL:ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
[^^^"uid:uap"<cr><lf>]…
;
```

Example (for a specific user)

```
   RTU134 15-11-20 09:42:31
M  ct COMPLD
   "MTC:5"
;
```

Example (all users)

```
   RTU134 15-11-20 09:49:57
M  ct COMPLD
   "MTC:5"
   "Billy:3"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   IPMS
;
```

RTRV-VAL (Retrieve Analog Value) (Level 1)

Retrieve Analog Value retrieves the current value of an analog point.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-VAL:[tid]:aid:ctag;
```

Example

```
RTRV-VAL::ARM-2-1-4:ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
[^^^"aid:ntfcncde,T-condtype-units,
srveff,ocrdat,ocrtm,cllicode,,currvalue,threshold:conddescr,wg"<cr><lf>
]
;
```

Example:

```
   RTU134 15-11-20 11:21:18
M  ct COMPLD
   "ARM-2-1-4:MN,T-LO-mAmp,NSA,11-20,11-21-18,
CLGRTEST,,6.0596,6.0010:TRUE INPUT VOLTAGE, EN"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

RTRV-VER (Retrieve Software Version) (Level 1)

Retrieve Version will return the current version of software that is running on the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
RTRV-VER:[tid]::ctag;
```

Example

```
RTRV-VER:::ct;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
^^^"SOFTWARE_VERSION^=^software_version"<cr><lf>
;
```

Example

```
   RTU134 15-11-20 09:57:15
M  ct COMPLD
   "SOFTWARE_VERSION = 4.02.05"
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-DAT (Set Date and Time) (Level 4)

Set Date and Time will set the system date and time on the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
SET-DAT:[tid]::ctag::YYMMDD,HHMMSS;
```

Example

```
SET-DAT:::::151120,102034;
SET-DAT:::ct::151120,102034;
SET-DAT:RTU134::ct::151120,102034;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:20:34
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-IP (Set IP Address) (Level 4)

Set IP Address will set the IP address of the RTU. The new IP address will not take effect until the RTU is restarted. Refer to the command INIT-SYS for information on restarting the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
SET-IP:[tid]::ctag::ip_address;
```

Where *ip_address* is the IP address of the RTU. An IP address consists of four numbers between 0 and 255, separated by periods, for example 10.0.100.36

Example

```
SET-IP:::ct::10.0.100.36;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU130 15-11-20 10:24:08
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-MODEM-NUM (Set Modem Number) (Level 4)

Set Modem Number will set the dial-out phone number of the RTU. The change will not take effect until the RTU is restarted. Refer to the command INIT-SYS for information on restarting the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
SET-MODEM-NUM:[tid]::ctag::dial_string;
```

Where, *dial_string* is a maximum of 15 characters. You may enter standard HAYES AT commands along with the modem number within this string.

Example

```
SET-MODEM-NUM:::ct::8675309;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:34:05
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-POINT-PARAM (Set Point Parameters) (Level 4)

The Set Point Parameters TL-1 Command allows manipulation of point properties within the WS3500 database. The changes will be written to the database and take effect immediately. Because of the complexity of this command, it is recommended all point changes to the database be made through Metago® Manager rather than by using this command.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
SET-POINT-PARAM:[tid]::ctag::{point_number|aid},DIGITAL[,report[,
Cllicode[,conddescr[,wg[,sid[,aid[,aidtype[,{ALM|EVT}
[,alarmstate[,ntfcncde[,condtype[,{condeff|srveff}]]]]]]]]]]];
```

Where:

- *point_number* is the point index number in the WS3500 Database
- *report* is a boolean value (TRUE or FALSE) to indicate if the point is enabled. Can also be represented by a 1 for TRUE and a 0 for FALSE.
- *alarmstate* is a Boolean value used to indicate when the point in question is in alarm. A TRUE value indicates the point is in alarm when it's state is 1, and a FALSE indicates it's in alarm when it's state is 0.

Example

```
SET-POINT-PARAM:::gs::DISCRETE-1-1,DIGITAL,TRUE,Rack241,/"DDM1000
_Power_Indicator/",EN,WESTRONIC1,RTU134,WESTRONIC11,ALM,TRUE,CR,GP,SA;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:36:02
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-SID (Set System Identifier) (Level 4)

Set System Identifier will set the sid of the RTU. The original sid will be used in the response from the RTU. The new sid will be used thereafter for commands and responses on all existing sessions.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
SET-SID:[tid]::ctag::new_sid;
```

Where *new_sid* is the new source identifier to be used. The *new_sid* parameter follows the same formatting rules as SID.

Example

```
SET-SID:::ct::Metago130;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:36:02
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-TELNET (Set Telnet Port Number) (Level 4)

Set Telnet Port Number will set the TCP/IP port number used for Telnet sessions. The port numbers can range from 0-65535 although the standard Telnet port number is 23. If port 23 is not desired the recommended range is 5001-65535 as the range 0-1024 have pre-defined specific purposes and the range 1025-5000 are used as short-lived client ports.

Note: the new value will not take effect until the RTU is restarted. Refer to the INIT-SYS command for information on restarting the RTU.

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the WS3500 will return an intermediate acknowledgement response. Refer to *Acknowledgement Messages* later in this appendix.

Input Format

```
SET-TELNET:[tid]::ctag::telnet_port_number;
```

Where *telnet_port_number* is the TCP/IP port number used for the Telnet sessions. The standard Telnet port number is 23. If port 23 is not used, the recommended range is 5001 to 65535.

Example

```
SET-TELNET:::ct::5005;
```

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:45:15
M  ct COMPLD
;
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

SET-TIMEZONE (Set Time Zone) (Level 4)

The Set Time Zone command on the WS3500 is used to change the offset from Greenwich Mean Time (GMT) and also set whether daylight savings time will be used. If the value set does not correspond to a value in *Table 28 Valid Time Zone Codes* then a invalid condition may occur.

Note: the new value will not take effect until the RTU is restarted. Refer to the INIT-SYS command for information on restarting the RTU.

Input Format

`SET-TIMEZONE:[tid]::ctag::`*`timezone_code`*`;`

- Where *timezone_code* is a value from *Table 28 Valid Time Zone Codes*.

Example

`SET-`**`TIMEZONE`**`:::ct::`**`EST5EDT,M3.2.0/2,M11.1.0/2;`**

Daylight Savings	No Daylight Savings	Timezone
ENI12ENI	ENI12	(GMT-12:00) Eniwetok, Kwajalein
MID11MID	MID11	(GMT-11:00) Midway Island, Samoa
HAW10HAW	HAW10	(GMT-10:00) Hawaii
AKS9AKD,M3.2.0/2,M11.1.0/2	AKS9	(GMT-09:00) Alaska
PST8PDT,M3.2.0/2,M11.1.0/2	PST8	(GMT-08:00) Pacific Time (US & Canada); Tijuana
MST7MDT,M3.2.0/2,M11.1.0/2	MST7	(GMT-07:00) Mountain Time (US & Canada)
ARI7ARI	ARI7	(GMT-07:00) Arizona
CST6CDT,M3.2.0/2,M11.1.0/2	CST6	(GMT-06:00) Central Time (US & Canada)
SAS6SAS	SAS6	(GMT-06:00) Saskatchewan
GMN6GMN,M4.1.0/2,M10.5.0/2	GMN6	(GMT-06:00) Mexico City, Tegucigalpa
EST5EDT,M3.2.0/2,M11.1.0/2	EST5	(GMT-05:00) Eastern Time (US & Canada)
IND5IND	IND5	(GMT-05:00) Indiana (East)
BOG5BOG	BOG5	(GMT-05:00) Bogota, Lima, Quito
AST4ADT,M3.2.0/2,M11.1.0/2	AST4	(GMT-04:00) Atlantic Time (Canada)
CAR4CAR	CAR4	(GMT-04:00) Caracas, La Paz
SAN4SAN,M10.2.6/0,M3.2.6/0	SAN4	(GMT-04:00) Santiago
NST3:30NDT,M3.2.0/2,M11.1.0/2	NST3:30	(GMT-03:30) Newfoundland
BRA3BRA,M11.1.0/2,M2.5.0/2	BRA3	(GMT-03:00) Brasilia
BUE3BUE	BUE3	(GMT-03:00) Buenos Aires, Georgetown
MAS2MAD,M3.5.0/2,M9.5.0/2	MAS2	(GMT-02:00) Mid-Atlantic
AZO1AZO,M3.5.0/2,M10.5.0/2	AZO1	(GMT-01:00) Azores, Cape Verde Is.
GMT0GMT,M3.5.0/2,M10.5.0/2	GMT0	(GMT) Greenwich Mean Time : Dublin, Edinburgh, Lisbon, London
CAS0CAS	CAS0	(GMT) Casablanca, Monrovia
BEL-1BEL,M3.5.0/2,M10.5.0/3	BEL-1	(GMT+01:00) Belgrade, Bratislava, Budapest, Ljubljana, Prague
SAR-1SAR,M3.5.0/2,M10.5.0/3	SAR-1	(GMT+01:00) Sarajevo, Skopje, Sofija, Warsaw, Zagreb

BRU-1BRU,M3.5.0/2,M10.5.0/3	BRU-1	(GMT+01:00) Brussels, Copenhagen, Madrid, Paris, Vilnius
AMS-1AMS,M3.5.0/2,M10.5.0/3	AMS-1	(GMT+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
ABI-2ABI,M3.5.0/3,M10.5.0/4	ABI-2	(GMT+02:00) Athens, Bucharest, Istanbul
BEI-2BEI,M3.5.0/0,M10.5.6/0	BEI-2	(GMT+02:00) Beirut
CAI-2CAI,M4.5.4/0,M9.5.4/0	CAI-2	(GMT+02:00) Cairo
HEL-2HEL,M3.5.0/3,M10.5.0/4	HEL-2	(GMT+02:00) Helsinki, Riga, Tallinn
JER-2JER,M3.5.5/2,M9.3.0/2	JER-2	(GMT+02:00) Jerusalem
HAR-2HAR	HAR-2	(GMT+02:00) Harare, Pretoria
MOS-3MOS,M3.5.0/2,M10.5.0/3	MOS-3	(GMT+03:00) Moscow, St. Petersburg, Volgograd
BAG-3BAG,M4.1.0/3,M10.1.0/4	BAG-3	(GMT+03:00) Baghdad, Kuwait, Riyadh
NAI-3NAI	NAI-3	(GMT+03:00) Nairobi
TEH -3:30TEH,M3.1.0/2,M9.4.2/2	TEH-3:30	(GMT+03:30) Tehran
ABU-4ABU	ABU-4	(GMT+04:00) Abu Dhabi, Muscat
BAK-4BAK,M3.5.0/4,M10.5.0/5	BAK-4	(GMT+04:00) Baku, Tbilisi
KAB-4:30KAB	KAB-4:30	(GMT+04:30) Kabul
EKA-5EKA,M3.5.0/2,M10.5.0/3	EKA-5	(GMT+05:00) Ekaterinburg
ISL-5ISL	ISL-5	(GMT+05:00) Islamabad, Karachi, Tashkent
BOM-5:30BOM	BOM-5:30	(GMT+05:30) Bombay, Calcutta, Madras, New Delhi
ADT-6ADT	ADT-6	(GMT+06:00) Astana, Dhaka
ANT-6ANT,M3.5.0/2,M10.5.0/3	ANT-6	(GMT+06:00) Almaty, Novosibirsk
BAN-7BAN	BAN-7	(GMT+07:00) Bangkok, Hanoi, Jakarta
BEJ-8BEJ	BEJ-8	(GMT+08:00) Beijing, Chongqing, Hong Kong, Urumqi
KLS-8KLS	KLS-8	(GMT+08:00) Kuala Lumpur, Singapore
TAI-8TAI	TAI-8	(GMT+08:00) Taipei
PER-8PER	PER-8	(GMT+08:00) Perth
SEO-9SEO	SEO-9	(GMT+09:00) Seoul
OSA-9OSA	OSA-9	(GMT+09:00) Osaka, Sapporo, Tokyo
YAK-9YAK,M3.5.0/2,M10.5.0/3	YAK-9	(GMT+09:00) Yakutsk
DAR-9:30DAR	DAR-9:30	(GMT+09:30) Darwin
ADE -9:30ADE,M10.5.0/2,M3.5.0/3	ADE-9:30	(GMT+09:30) Adelaide
CAN-10CAN,M10.5.0/2,M3.5.0/3	CAN-10	(GMT+10:00) Canberra, Melbourne, Sydney
BRI-10BRI	BRI-10	(GMT+10:00) Brisbane
HOB-10HOB,M10.1.0/2,M3.5.0/3	HOB-10	(GMT+10:00) Hobart
VLA-10VLA,M3.5.0/2,M10.5.0/3	VLA-10	(GMT+10:00) Vladivostok
GUA-10GUA	GUA-10	(GMT+10:00) Guam, Port Moresby
MAG-11MAG	MAG-11	(GMT+11:00) Magadan, Solomon Is., New Caledonia
FIJ-12FIJ	FIJ-12	(GMT+12:00) Fiji, Kamchatka, Marshall Is.
AUC-12AUC,M10.1.0/2,M3.3.0/3	AUC-12	(GMT+12:00) Auckland, Wellington

Table 28 Valid Time Zone Codes

Normal Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^COMPLD<cr><lf>
;
```

Example

```
   RTU134 15-11-20 10:45:15
M  ct COMPLD
```

Error Response

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
M^^ctag^DENY<cr><lf>
^^^errcde<cr><lf>
;
```

Example

```
   RTU134 15-11-20 11:34:42
M  ct DENY
   ICNV
;
```

Acknowledgement Messages

If within 2 seconds of receiving a command, a completed or deny response message cannot be sent, the RTU will return an intermediate acknowledgement response. The various acknowledgements are detailed in the sections that follow.

IP (In Progress)

The In Progress acknowledgement indicates that the command has been initiated. This acknowledgement will produce subsequent output messages, which give a termination report or a termination report and command results.

Output Format

```
IP<cr><lf>
<
```

NA (No Acknowledgement)

Under abnormal conditions, NA should be sent when a command has been accepted but control of the processing has been lost, making correct acknowledgement impossible. Initiation or execution of the requested command is uncertain. This acknowledgement can also be used to respond to a command that is garbled during transmission. Once this acknowledgment is issued, no further response is expected.

Output Format

```
NA<cr><lf>
<
```

RL (Repeat Later)

The Repeat Later acknowledgement indicates that the requested action cannot be executed now because of unavailable resources caused by system overload, excessive queue lengths, busy programs, etc. The command may be tried again later. Once this acknowledgment is issued, no further response is expected.

Output Format

```
RL<cr><lf>
<
```

Autonomous Messages

REPT-ALM (Report Alarm)

Report Alarm is generated by the RTU to report the occurrence of alarmed events. In general, an alarmed event causes a standing condition that has immediate or potential impact on the operation or performance of the entity. Some form of maintenance effort is required to restore normal operation or performance of the entity after the event has occurred.

Message Format

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
almcde^atag^REPT^ALM^{EQPT|COM}<cr><lf>
(^^^"aid:ntfcncde,condtype,srveff,ocrdat,ocrtm,cllicode,[,[monval],[thl
ev]]:\conddescr\,wg"<cr><lf>);
```

Example-1

```
   RTU130 15-11-20 09:46:44
A  00129 REPT ALM EQPT
   "DISCRETE-1-1:CR,GP,NSA,11-20,09-46-44,NA,\”Discrete Critical\”,NA"
;
```

Example-2

```
   RTU12 16-02-26 12:31:09
A   00026 REPT ALM EQPT
   "DISCRETE-1-4:RN,GP,NSA,02-26,12-31-09,,:\"DISCRETE INPUT 4\",TR"
;
```

REPT-EVT (Report Event)

Report Event is generated by the RTU to report the occurrence of non-alarmed events. The event being reported may be the change of a status or the occurrence of an irregularity, which by itself is not severe enough to warrant an alarm notification. An event is usually indicative of a maintenance condition, which does not require immediate attention.

The WS3500 can be configured to send a heartbeat event message. The heartbeat message is continuously sent at a configured time interval. For additional information on configuring the WS3500 heartbeat message please consult the *994-T061 Metago Manager Documentation*

Message Format

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
A^^atag^REPT^EVT^{EQPT|COM}<cr><lf>
(^^^"aid:condtype,condeff,ocrdat,ocrtm,cllicode,\”conddescr\”,wg"<cr><l
f>);
```

Example-1

```
   RTU17 15-11-20 08:49:45
A  00151 REPT EVT EQPT
   "Upgrade:GP,TC,11-20,08-49-45,CLLI,\”OUT OF SERVICE\”,WG"
;
```

Example-2

```
   RTU12 16-02-26 11:44:46
A  00157 REPT EVT EQPT
   "DIAGS-6:GP,TC,02-26,11-44-46,,:\"10 m HEARTBEAT 125\","
;
```

REPT-ALM-ENV (Report Alarm Environment)

Report Alarm Environment is generated by the RTU to report the occurrence of an environmental alarm.

These alarms can also be retrieved either together with all other standing alarms using the ‘RTRV-ALM;’ command, or separately using the ‘RTRV-ALM-ENV;’ command as described earlier in this section of the manual.

Message Format

```
<cr><lf><lf>
^^^sid^YY-MM-DD^HH:MM:SS<cr><lf>
A^^atag^REPT^ALM^ENV^<cr><lf>
(^^^"aid:ntfcncde,condtype,ocrdat,ocrtm,:\”conddescr\”"<cr><lf>);
```

Example

```
   RTU12 16-02-26 11:16:45
*   00153 REPT ALM ENV
   "DISCRETE-1-8:MN,GP,02-26,11-16-45,:\"DISCRETE INPUT 8 Alarm-Env-for
Manual\""
;
```

Appendix B: SNMP Point Table Definitions

This appendix lists the SNMP Point Table definitions. When an SNMP GET command is issued, the values of the variables found in the point table are retrieved from the WS3500 database.

*Note: the **x** in the Selected Variable OID column in each table indicates the point requested.*

Discrete Point Tables

For each discrete point, there is a discrete input point table definition or a discrete output point definition.

discretePointTable

The discrete point table is used to access information stored about the discrete input points reported by the WS3500. All data in this table is retrieved using an OID with the form of `OID.<module number>.<point number>`.

Selected Variable OID	Description
discreteAID.x=	The AID of the discrete point being requested.
discreteCurrentState.x=	The current operational state of the point (open or closed).
discreteAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
discreteAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
discreteEnabled.x=	Whether the point is enabled or disabled.
discreteWorkGroup.x=	The 2-character workgroup designation of the point.
discreteCLLI.x=	The 11-character CLLI code of the point.
discreteDescription.x=	The 50-character point description.

Table 29 discretePoint Table Definition

discreteCPoint Table

The discreteCPoint table is used to access information stored about the discrete control points reported by the WS3500. All data in this table is retrieved using an OID with the form of OID.<module number>.<point number>.

Selected Variable OID	Description
discreteCAID.x=	The AID of the point being requested.
discreteCCurrentState.x=	The current operational state of the point (open or closed).
discreteCAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
discreteCAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
discreteCEnabled.x=	Whether the point is enabled or disabled.
discreteCWorkGroup.x=	The 2-character workgroup designation of the point.
discreteCCLLI.x=	The 11-character CLLI code of the point.
discreteCDescription.x=	The 50-character point description.

Table 30 discreteCPoint Table Definition

Health Point Table

For each point type, there are associated health points. To retrieve information on a particular health point, you must issue a GET command on the healthPointTable.

healthPointTable

The health point table is used to access information stored about the health points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<address>`.

Selected Variable OID	Description
healthAID.x=	The AID of the point being requested.
healthCurrentState.x=	The current operational state of the point (open or closed).
healthAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
healthAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
healthEnabled.x=	Whether the point is enabled or disabled.
healthWorkGroup.x=	The 2-character workgroup designation of the point.
healthCLLI.x=	The 11-character CLLI code of the point.
healthDescription.x=	The 50-character point description.

Table 31 healthPoint Table Definition

TBOS Point Tables

For each TBOS point, there is a TBOS input point table (tbosPointTable) definition or a TBOS output point table (tbosCPointTable) definition.

tbosPointTable

The TBOS point table is used to access information stored about the TBOS input points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<display number>.<point number>`.

Selected Variable OID	Description
tbosAID.x=	The AID of the point being requested.
tbosCurrentState.x=	The current operational state of the point (open or closed).
tbosAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
tbosAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
tbosEnabled.x=	Whether the point is enabled or disabled.
tbosWorkGroup.x=	The 2-character workgroup designation of the point.
tbosCLLI.x=	The 11-character CLLI code of the point.
tbosDescription.x=	The 50-character point description.

Table 32 tbosPoint Table Definition

tbosCPointTable

The tbosCPoint table is used to access information stored about the TBOS control points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<display number>.<point number>`.

Selected Variable OID	Description
tbosCAID.x=	The AID of the point being requested.
tbosCCurrentState.x=	The current operational state of the point (open or closed).
tbosCAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
tbosCAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
tbosCEnabled.x=	Whether the point is enabled or disabled.
tbosCWorkGroup.x=	The 2-character workgroup designation of the point.
tbosCCLLI.x=	The 11-character CLLI code of the point.
tbosCDescription.x=	The 50-character point description.

Table 33 tbosCPoint Table Definition

TABS Point Tables

For each TABS point, there is a TABS input point table (tabsPointTable) definition or a TABS control point table (tabsCPointTable) definition.

tabsPointTable

The tabsPoint table is used to access information stored about the TABS input points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<address>.<display number>.<point number>`.

Selected Variable OID	Description
tabsAID.x=	The AID of the point being requested.
tabsCurrentState.x=	The current operational state of the point (open or closed).
tabsAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
tabsAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
tabsEnabled.x=	Whether the point is enabled or disabled.
tabsWorkGroup.x=	The 2-character workgroup designation of the point.
tabsCLLI.x=	The 11-character CLLI code of the point.
tabsDescription.x=	The 50-character point description.

Table 34 tabsPoint Table Definition

tabsCPointTable

The tabsCPoint table is used to access information stored about the TABS control points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<address>.<display number>.<point number>`.

Selected Variable OID	Description
tabsCAID.x=	The AID of the point being requested.
tabsCCurrentState.x=	The current operational state of the point (open or closed).
tabsCAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
tabsCAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
tabsCEnabled.x=	Whether the point is enabled or disabled.
tabsCWorkGroup.x=	The 2-character workgroup designation of the point.
tabsCCLLI.x=	The 11-character CLLI code of the point.
tabsCDescription.x=	The 50-character point description.

Table 35 tabsCPoint Table Definition

INACS Point Tables

There are three point tables for INACS points: INACS input points (inacsPointTable), INACS control points (inacsCPointTable), and the INACS FB point (inacsfbPointTable).

inacsPointTable

The INACS point table is used to access information stored about the INACS input points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.<line number>.<point number>`.

Selected Variable OID	Description
inacsAID.x=	The AID of the point being requested.
inacsCurrentState.x=	The current operational state of the point (open or closed).
inacsAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
inacsAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
inacsEnabled.x=	Whether the point is enabled or disabled.
inacsWorkGroup.x=	The 2-character workgroup designation of the point.
inacsCLLI.x=	The 11-character CLLI code of the point.
inacsDescription.x=	The 50-character point description.

Table 36 inacsPoint Table Definition

inacsCPointTable

The inacsC point table is used to access information stored about the INACS control points reported by the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.<line number>.<point number>`.

Selected Variable OID	Description
inacsCAID.x=	The AID of the point being requested.
inacsCCurrentState.x=	The current operational state of the point (open or closed).
inacsCAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
inacsCAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
inacsCEnabled.x=	Whether the point is enabled or disabled.
inacsCWorkGroup.x=	The 2-character workgroup designation of the point.
inacsCCLLI.x=	The 11-character CLLI code of the point.
inacsCDescription.x=	The 50-character point description.

Table 37 inacsCPoint Table Definition

inacsfbPointTable

The inacsfbPointTable is used to access information stored about the INACS F-Bit points reported to the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.`

Selected Variable OID	Description
inacsfbAID.x=	The AID of the point being requested.
inacsfbCurrentState.x=	The current operational state of the point (open or closed).
inacsfbAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
inacsfbAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
inacsfbEnabled.x=	Whether the point is enabled or disabled.
inacsfbWorkGroup.x=	The 2-character workgroup designation of the point.
inacsfbCLLI.x=	The 11-character CLLI code of the point.
inacsfbDescription.x=	The 50-character point description.

Table 38 inacsfb Point Table Definition

DS5000 Point Tables

There are four different DS5000 Protocol Acquisition (DS5PA) point tables: DS5000 discrete inputs (ds5paPointTable), DS5000 discrete controls (ds5paCPointTable), the DS5000 TBOS inputs (ds5tPointTable), and the DS5000 TBOS controls (ds5tCPointTable)

ds5paPointTable

The ds5paPointTable is used to access information stored about the DS5PA discrete input points reported to the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.<line number>.<point number>.`

Selected Variable OID	Description
ds5paAID.x=	The AID of the point being requested.
ds5paCurrentState.x=	The current operational state of the point (open or closed).
ds5paAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
ds5paAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
ds5paEnabled.x=	Whether the point is enabled or disabled.
ds5paWorkGroup.x=	The 2-character workgroup designation of the point.
ds5paCLLI.x=	The 11-character CLLI code of the point.
ds5paDescription.x=	The 50-character point description.

Table 39 ds5paPoint Table Definition

ds5paCPointTable

The ds5paCPointTable is used to access information stored about the DS5PA discrete control points reported to the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.<point number>.`

Selected Variable OID	Description
ds5paCAID.x=	The AID of the point being requested.
ds5paCCurrentState.x=	The current operational state of the point (open or closed).
ds5paCAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
ds5paCAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
ds5paCEnabled.x=	Whether the point is enabled or disabled.
ds5paCWorkGroup.x=	The 2-character workgroup designation of the point.
ds5paCCLLI.x=	The 11-character CLLI code of the point.
ds5paCDescription.x=	The 50-character point description.

Table 40 ds5paCPoint Table Definition

ds5tPointTable

The ds5tPointTable is used to access information stored about the DS5PA TBOS input points reported to the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.<DS5000 port number>.<TBOS display>.<point number>.`

Selected Variable OID	Description
ds5tAID.x=	The AID of the point being requested.
ds5tCurrentState.x=	The current operational state of the point (open or closed).
ds5tAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
ds5tAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
ds5tEnabled.x=	Whether the point is enabled or disabled.
ds5tWorkGroup.x=	The 2-character workgroup designation of the point.
ds5tCLLI.x=	The 11-character CLLI code of the point.
ds5tDescription.x=	The 50-character point description.

Table 41 ds5t Point Table Definition

ds5tCPointTable

The ds5tCPointTable is used to access information stored about the DS5PA TBOS control points reported to the WS3500. All data in this table is retrieved in the form of `OID.<port number>.<station number>.<DS5000 port number>.<TBOS display>.<point number>`.

Selected Variable OID	Description
ds5tCAID.x=	The AID of the point being requested.
ds5tCCurrentState.x=	The current operational state of the point (open or closed).
ds5tCAlarmedState.x=	The operational state the point is in that causes it to go into alarm (open or closed). This value is opposite of how the point is defined in Metago Manager. In Metago Manager, the normal state is defined as either open or closed.
ds5tCAlarmSeverity.x=	The severity of the alarm. Values are clear, notalarmed, routine, minor, major, and critical.
ds5tCEnabled.x=	Whether the point is enabled or disabled.
ds5tCWorkGroup.x=	The 2-character workgroup designation of the point.
ds5tCCLLI.x=	The 11-character CLLI code of the point.
ds5tCDescription.x=	The 50-character point description.

Table 42 ds5tCPoint Table Definition

Appendix C: Acronyms and Abbreviations

This section contains the acronyms and abbreviations found throughout this manual. Although each acronym and abbreviation is explained when first introduced, this listing consolidates the acronyms and abbreviations.

bps	Bits per second.
CLLI	Common Language Location Identifier.
CMOS	Complementary Metal Oxide Semiconductor.
CPU	Central Processor Unit
DCE	Data Communications Equipment
DS5PA	DS5000 Protocol Acquisition
DTE	Data Terminal Equipment
E2A	E-Telemetry
EMCP	Electronic Modular Control Panel
ESD	Electrostatic Discharge
I/O	Input/Output
IID	Instruction Identifier
INACS	Integrated Network Alarm & Control System
LAN	Local Area Network
LED	Light Emitting Diode
NE	Network Element
NEBS	Bellcore Network Equipment Building Standards
NIC	Network Interface Controller
NMOS	Nchannel Metal Oxide Semiconductor
PC	Personal Computer
PIDs	Parameter Identifiers
RMA	Return Material Authorization
RTU	Remote Terminal Unit

SNMP	Simple Network Management Protocol
SPDT	Single-Pole Double-Throw (Form C contact)
TABS	Telemetry Asynchronous Block Serial
TBOS	Telemetry Byte Oriented Serial
TCP/IP	Transmission Control Protocol/Internet Protocol
TL-1	Transaction Language 1
TMN	Telecommunications Network Management
Vdc	Volts Direct Current

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