SIEMENS

INSTALLATION & MAINTENANCE

WAYSIDE ACCESS GATEWAY (WAG) A53457

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PROPRIETARY INFORMATION

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DOCUMENT HISTORY

Version	Release Date	Details of Change
A	September2005	New manual to replace SIG-00-04-22.
B	March 2006	Updated title page and all page footers to indicate 'B' Version of document. Page xi, GLOSSARY • Reworded definition for 'DNS' to read "…(Also known as Domain Name System)…" • Added definition for 'OSI' to read "Office System Interface – Functionally allowing…" • Added definition for 'PST' to read "Persistent Serial Tunneling – Functionally allowing…" Entire Document; • Changed all plural acronym references "WAGS" to "WAGs". • Entire documentRemoved all references to "WAG unit" and changed wording to "WAG" • Removed all references to menu option numbers such as "(#12", etc. • Removed all references to option number such as "(#6), etc. Section I • Renumbered and titled all paragraphs in Section 1 to coordinate the following changes to that section of this document. Page 1-4, paragraph 1.3 • Re-titled paragraph "PERSISTENT SERIAL TUNNELING…" • Provided diagram and verbiage to fully explain WAG communication through the LAN. • Changed the wording of all subparagraphs following Figure 1.2 to present a more accurate operational description for the WAG. Page 1-5, paragraph 1.4 • Re-titled paragraph "OFFICE SYSTEM INTERFACE (OSI)…" • Provided diagram and verbiage to fully explain WAG communication through the OSI and a SEAR II/SEAR IIi echelon. Page 1-9, subparagraph 1.5.1.5 Echelon Interface (J4) Characteristic • Removed hyphen (-) from the words "daisy chain" Page 1-11, subparagraph 1.6.5 Default Factory Settings • Expanded software definitions and default setting to match current software configuration Page 2-2, subparagraph 2.3.1, Connecting to Ethernet Radio A53325 • Changed subparagraph title to read, "Connecting to Safetran Ethernet Radio A53325" • Changed first sentence to read, "The following diagram shows the Safetran Ethernet Radio (A53325)…" Page 2-6, paragraph 2.3, EQUIPMENT CONNECTION TO WAG • Added subparagraph 2.3.5, Persistent Serial Tunneling Configuration, including Figures 2-5 and 2-6 to support text

		Page 2-7, paragraph 2.3, EQUIPMENT CONNECTION TO WAG • Added subparagraph 2.3.6, Office System Interface Configuration, including Figure 2-7 to support text Page 2-8, paragraph 2.4, CONFIGURATION USING TERMINAL EMULATION SOFTWARE, Step 3 • Added note "If the screen shown in figure 2-9…" Page 2-9, paragraph 2.4, CONFIGURATION USING TERMINAL EMULATION SOFTWARE, Step 4 • Changed "…WAG…" to "…WAGs…" Page 2-9, paragraph 2.4, CONFIGURATION USING TERMINAL EMULATION SOFTWARE, first **NOTE** • Changed last sentence in note to read, "Wait at least 3 seconds and then type +++ and wait 3 seconds for the system to command mode…" Page 2-10, paragraph 2.5, CONFIGURATION USING TELNET • Changed "**To Login Using…**" to read, "**To log in using…**" Page 2-12, paragraph 2.6, CONFIGURATION OF THE WAG UNIT, subparagraph 2.6.1 • Changed subparagraph title to read "Type 7 ATCS Address" and reworded entire subparagraph, adding Figure 2-13, Type 7 ATCS Address Configuration Screen with functional explanations Page 2-13, subparagraph 2.6.2, Type 3 ATCS Address • Item 1: replaced Figure 2-14 ATCS Address Screen with one that specifies the second line ATCS address item as, "Enter the NN…" Page 2-13, paragraph 2.6.2, Type 3 ATCS Address, subparagraph 2.6.2 • Changed subparagraph title to read "Type 3 ATCS Address" and reworded entire subparagraph, adding Figure 2-14, Type 3 ATCS Address Configuration Screen with functional explanations Page 2-15, paragraph 2.6, CONFIGURATION OF THE WAG, subparagrapl 2.6.4 • Reformatted paragraph to "unwrap" Figure 2-16 from the text for steps 1 through 4 Page 2-15, paragraph 2.6, CONFIGURATION OF THE WAG, subparagrapl 2.6.5 • Changed subparagraph title to read "WAG Test Mode" and reworded entire subparagraph to read "This function is for future…..". All subparagraphs in this section renumbered accordingly. Page 2-18, paragraph 2.6, CONFIGURATION OF THE WAG, subparagrapl 2.6.8 • Removed last sentence ("To specify the routing table never expires…") from step 2. Page 2-23, paragraph 2.6, CONFIGURATION OF THE WAG, subparagrapl 2.6.14

		• Changed second paragraph to read, “If a user…21 bits…display 255.255.248.000.” Page 2-30, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.16 WAG Circuit ID with appropriate figures Page 2-32, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.17 Routing Region Domain 1 with appropriate figures Page 2-34, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.18 Routing Region Domain 2 with appropriate figures Page 2-34, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.19 ATCS Server UDP Port Number with appropriate figures Page 2-35, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.20 Telnet Port Numbers with appropriate figures Page 2-36, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.21 Genisys Wait Poll Response with appropriate figures Page 2-37, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.22 ATCS Retry Wait with appropriate figures Page 2-38, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.23 ATCS Max Retries with appropriate figures Page 2-38, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.24 Genisys Poll Starting Station with appropriate figures Page 2-39, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.25 Genisys Poll Ending Station with appropriate figures Page 2-40, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.26 Fragile Telnet Connections with appropriate figures Page 2-41, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.27 Persistent Serial Tunnel with appropriate figures Page 2-42, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.27.1 Typical PST Configuration Parameter Settings with appropriate figures Page 2-43, paragraph 2.6, CONFIGURATION OF THE WAG

		• Added subparagraph 2.6.28 Primary and Secondary DNS with appropriate figures Page 2-43, Table 2-2 • Changed table section headings to read, “Settings on First Configuration Screen” and “Settings on Second Configuration Screen” • Reset left justification for verbiage in the first, left-hand cell of the table. Page 2-46, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.29 Default IP Gateway with appropriate figures Page 2-47, paragraph 2.6, CONFIGURATION OF THE WAG • Added subparagraph 2.6.30 WAG Site ID with appropriate figures Page 3-1, Table 3-1, WAG Unit Command • Reformatted table to include a column for ‘Shorthand’ symbols and added ‘Tunnel’ to the Command column with the appropriate Description Page 3-2, Item 1 under “To View the Status” • For XPORT channel, added “XPORT Link Status…” Page 3-3, paragraph 3.2 VIEWING THE STATUS • Added two subparagraphs that read “The last line of the XPORT….” and “In the event…” Page 3-3, paragraph 3.2, VIEWING THE STATUS • Added subparagraph 3.2.1.1 Additional Status Information When Configured of OSI Page 3-5, paragraph 3.6 • Re-titled paragraph “PERSISTANT SERIAL TUNNEL COMMAND” • Provided diagram and verbiage to fully explain WAG Persistent Serial Tunnel configuration • Renumbered the original paragraph 3.6 and all subsequent paragraphs to compensate for this change. Page 3-8, paragraph 3.10 • Re-titled paragraph “SENDING A ROUTE PING REQUEST” • Provided diagram and verbiage to fully explain the Route Ping command • Renumbered the original paragraph 3.10 and all subsequent paragraphs to compensate for this change. Page 3-9, paragraph 3.11 • Re-titled paragraph “TRACING AN INTERFACE” • Provided diagram and verbiage to fully explain the Trace command • Renumbered the original paragraph 3.11 and all subsequent paragraphs to compensate for this change. Page 3-14, paragraph 3.15 (originally 3.13 in the ‘A’ revision) • Added “To go to Command Mode temporarily…”; added (after To go

		to Data Mode) "(if the serial interface is configured…" and added note "Configuration changes are made with the WAG in Command Mode….." Page 3-17, paragraph 3.20 • Designated Log Entries matrix as Table 3-2, Log Entry Descriptions Page 3-21, Table 3-2 • For Classification Warning, Log Entry FLASH: ZMODEM transfer aborted, changed the Description to read "Means that the user either aborted…" Page 3-25, Table 3-2 • Added Classification Information for Log Entry "PST: Persistent request…", "PST: Persistent tunnel…" and "MM/YY HH:MMSS:mmm: DNS…" Page 3-25, paragraph 3.21 • Change **CAUTION** statement to read, "MAKE SURE….THE USER CANNOT RECOVER THE LOG AFTER IT HAS BEEN CLEARED." Page 5-2, Figure 5-2. Send File Pop-up Window • Replaced image with one more accurate and appropriate for this manual. Page 5-2, Figure 5-3. Zmodem File Send Screen • Replaced image with one more accurate and appropriate for this manual. Page 5-4, Figure 5-4. Zmodem File Receive Screen • Replaced image with one more accurate and appropriate for this manual. Page 6-2, paragraph 6.3 • Reformatted **CAUTION** statement to remove extra spacing in second line.
C	June 2006	Updated title page and all page footers to indicate 'C' Version of document. Page xi to xiii, • Glossary updated with missing acronyms and terms. Page 1-1 • Moved acronym (SSR) to first occurrence and capitalized 'radio.' • Deleted extra bullet and space. • Added bullet and the word "Bridges". Page 1-2 • Added full name to acronym at first occurrence. Page 1-3 • Added full name to acronym at first occurrence (two places). Page 1-4 • Replaced Figure 1-2 with new artwork. • Deleted "is" in first line of the second paragraph.

		• Added full name to acronym at the first occurrence. • Added “(which defaults to 10023)” • Added “(usually 10023)” Page 1-6 • Added full name to acronym at the first occurrence. Page 1-7 through 1-11 • Added paragraph 1.5 through paragraph 1.9 and figures 1-4 to 1-6. Page 1-11 • Renumbered to 1.10, Wag Hardware Interface heading. • Renumbered to figure 1-7 and reference in previous paragraph (1.10). • Added paragraph 1.10.1 Ports heading and associated sentence. Page 1-12 • Added paragraph headings 1.10.1.1 and 1.10.1.2. Page 1-13 • Added paragraph headings 1.10.1.3 through 1.10.1.5. Page 1-14 • Added paragraph headings 1.10.2, 1.11, 1.11.1 and 1.11.2. Page 1-15 • Added paragraph headings 1.11.3 through 1.11.5. Page 2-6 • Added new paragraph 2.3.5 Persistent Serial Tunneling Configuration. • Added figures 2-5 and 2-6. Page 2-7 • Added paragraph 2.3.6 Office System Interface Configuration. • Added figure 2-7. Page 2-9 • Added top paragraph. • Added Figure 2-6. • Added phrase “and without the operator selecting a menu option”. • Updated figure and paragraph references in the first note. Page 2-10 • Updated figure 2-8 with new screen shot. Page 2-11 • Updated figure 2-9 with new screen shot. Page 2-12 • Updated figure 2-11 with new screen shot. Page 2-13 • Updated figure 2-12 with new screen shot.

		Page 2-16 • Updated figure 2-15 with new screen shot. Page 2-17 • Added paragraphs entitled Serial Telnet While in Genisys ATCS Mode and Serial Telnet While in HDLC Mode. • Added “An Example of” to figure 2-16 and updated the figure with new artwork. Page 2-18 • Added “An Example of” to figure 2-17. Page 2-21 • Updated figure 2-21 with new screen shot. Page 2-23 • Updated figure 2-23 with new screen shot. Page 2-24 • Updated figure 2-24 with new screen shot. Page 2-33 and 2-34 • Added full name to acronym at the first occurrence. • Added paragraph 2.6.16. • Added figure 2-41. • Updated paragraph number to 2.6.17. • Updated figure reference to 2-42. Page 2-35 • Updated figure number to 2-43 and reference in following sentence. • Updated paragraph heading number to 2.6.18. • Acronym spelled out on the first occurrence on the previous page. Page 2-36 • Updated figure references (in two places) to 2-45. Page 2-37 • Updated figure reference to 2-46. • Updated paragraph heading to 2.6.19 (ripple for other paragraph headings on subsequent pages. • Updated paragraph references (two places) to 2.6.18. Ripple for other paragraph references on subsequent pages. • Acronym spelled out on the first occurrence previously. Page 2-44 • Updated figure 2-57 with new screen shot. Page 2-47 • Acronym spelled out on the first occurrence previously. Page 2-51 through 2-54 • Added paragraphs 2.6.32 through 2.6. 35. • Added figures 2-65 through 2-67.

		Page 3-1 • Added four new commands to WAG Commands table. Page 3-3 • Updated paragraph heading number to 3.2.1. Page 3-4 • Added paragraph 3.2.2. Page 3-6 • Acronym spelled out on the first occurrence previously. Page 3-9 • Updated screen shot within paragraph 3.11. Added “R” to list below in sentence. Page 3-12 • Added new paragraph entitled “To Trace IP Redundancy to Serial and Telnet”. Page 3-14 • Added new paragraph “Time Stamp on Trace”. Page 3-15 and 3-16 • To paragraph 3.18 second paragraph, added the phrase “on how to save displays to a file”. • Added “System” to run time:… on list. Page 3-28 through 3-30 • Added paragraph entitled “Event Log Streaming” and paragraphs 3.22 through 3.25. Page 5-1 • Updated figure 5-1 with new screen shot. Page 5-3 • Updated figure 5-4 with new screen shot. Page 6-1 • Changed paragraph 6.2 to read “7” instead of “6”. • Added number 7 and text to Table 6-1 table. Page 6-2 • Updated figure 6-3 with new screen shot.
C.1	June 2014	Rebrand for Siemens

NOTES, CAUTIONS, AND WARNINGS

Throughout this manual, notes, cautions, and warnings are frequently used to direct the reader's attention to specific information. Use of the three terms is defined as follows:

⚠ WARNING

WARNING

INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY. WARNINGS ALWAYS TAKE PRECEDENCE OVER NOTES, CAUTIONS, AND ALL OTHER INFORMATION.

⚠ CAUTION

CAUTION

REFERS TO PROPER PROCEDURES OR PRACTICES WHICH IF NOT STRICTLY OBSERVED, COULD RESULT IN A POTENTIALLY HAZARDOUS SITUATION AND/OR POSSIBLE DAMAGE TO EQUIPMENT. CAUTIONS TAKE PRECEDENCE OVER NOTES AND ALL OTHER INFORMATION, EXCEPT WARNINGS.

NOTE

NOTE

Generally used to highlight certain information relating to the topic under discussion.

If there are any questions, contact Siemens Industry Inc., Rail Automation Application Engineering.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Static electricity can damage electronic circuitry, particularly low voltage components such as the integrated circuits commonly used throughout the electronics industry. Therefore, procedures have been adopted industry-wide which make it possible to avoid the sometimes invisible damage caused by electrostatic discharge (ESD) during the handling, shipping, and storage of electronic modules and components. Siemens Industry, Inc., Rail Automation has instituted these practices at its manufacturing facility and encourages its customers to adopt them as well to lessen the likelihood of equipment damage in the field due to ESD. Some of the basic protective practices include the following:

- Ground yourself before touching card cages, assemblies, modules, or components.
- Remove power from card cages and assemblies before removing or installing modules.
- Remove circuit boards (modules) from card cages by the ejector lever only. If an ejector lever is not provided, grasp the edge of the circuit board but avoid touching circuit traces or components.
- Handle circuit boards by the edges only.
- Never physically touch circuit board or connector contact fingers or allow these fingers to come in contact with an insulator (e.g., plastic, rubber, etc.).
- When not in use, place circuit boards in approved static-shielding bags, contact fingers first. Remove circuit boards from static-shielding bags by grasping the ejector lever or the edge of the board only. Each bag should include a caution label on the outside indicating static-sensitive contents.
- Cover workbench surfaces used for repair of electronic equipment with static dissipative workbench matting.
- Use integrated circuit extractor/inserter tools designed to remove and install electrostatic-sensitive integrated circuit devices such as PROM's (OK Industries, Inc., Model EX-2 Extractor and Model MOS-40 Inserter (or equivalent) are highly recommended).
- Utilize only anti-static cushioning material in equipment shipping and storage containers.

For information concerning ESD material applications, please contact the Technical Support Staff at 1-800-793-7233. ESD Awareness Classes and additional ESD product information are also available through the Technical Support Staff.

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GLOSSARY

AAR:	Association of American Railroads
ARP:	Address Resolution Protocol
AServer:	AServer – Safetran (Siemens Rail Automation) ATCS Server (ASERVER.EXE) is a standalone executable program that manages statistical and diagnostic traffic in an ATCS (Automatic Train Control System) environment. Its primary function is to route Network Management System (NMS) data packets between endpoints in a LAN-based WCC network. Endpoints include WCC/FPD, WCM, PC workstations, ATCS-aware hardware devices and software services.
ATCS:	Advanced Train Control System - A set of standards compiled by the AAR for controlling all aspects of train operation.
BCM:	Base Control Module
CRC:	Cyclical Redundancy Check – A checksum for a data packet that is normally calculated and appended to the data so that the receiver can verify that no data was lost or corrupted during transit.
CTS:	Clear To Send – An indication/signal that the transmit line is ready to send or forward data.
DHCP:	Dynamic Host Configuration Protocol – An Internet protocol for automating the configuration of computers that use TCP/IP. DHCP can be used to automatically assign IP addresses, to deliver TCP/IP stack configuration parameters such as the subnet mask and default router, and to provide other configuration information.
DNS:	Domain Name Server – (also known as Directory Name Service) A distributed database of information associated with domain names, most importantly the IP address. A DNS allows easily remembered domain names to be automatically mapped to a machine's IP address.
Echelon®:	Twisted pair local area network.
ESD:	Electrostatic Discharge – A source of static electricity which can be harmful to low voltage components. A charge of built up static electricity within a person usually caused from rubbing on carpet or other similar material, especially during dry weather, and then discharged by touching some object. Use of Personal Protective

	Clothing and ESD prevention gear, such as grounding straps or floor pads, can help prevent ESD conditions.
GCP 4000:	Gate Crossing Predictor 4000 – A Siemens Rail Automation product that provides a train detection device used as part of a highway-railroad grade crossing warning system to provide a relatively uniform warning time.
GEO:	Geographic Signaling System – A Siemens Rail Automation product that is vital microprocessor-controlled signaling equipment. It monitors and controls switches, signals, and relays at wayside locations on the railroad.
HDLC:	High-level Data Link Control - A synchronous serial protocol for exchanging information. The default standard for serial communications between WCCs and BCPs.
HDLC UI:	High-Level Data Link Control Unnumbered Information
HD/Link:	Home Distant/Link – Siemens Rail Automation vital I/O assembly supporting a vital communications protocol.
HUB:	Ethernet hub - A device for connecting multiple Ethernet devices together making them act as a single segment.
iLOD:	Intelligent Light Out Detector – Siemens Rail Automation product used to detect light out conditions for crossing lamps.
IP:	See TCP/IP
LAN:	Local Area Network – A collection of devices, usually PCs or workstations, that are interconnected for the purpose of sharing data, typically on an Ethernet communications platform.
MAC:	Media Access Control – Describes a typically hard-wired machine address.
MODEM:	Modulator/Demodulator – A device that takes computer signals and converts them to signals that can pass across telephone lines and be reconverted back to computer signals at the distant end.
NEMA:	National Electrical Manufacturers Association
OCG:	Office Communication Gateway – Siemens Rail Automation office application providing front end processing and cluster controller functionality.

OSI:	Office System Interface – Functionality allowing communications between the SEAR II/SEAR IIi and the Office via the WAG.
Packet Switch:	Packet Switch - The process of routing and transferring data by means of addressed packets so that a channel is occupied during the transmission of the packet only, and upon completion of the transmission the channel is made available for the transfer of other traffic.
PST:	Persistent Serial Tunneling – Functionality allowing virtual connection between two WAGs and their serial interfaces.
RAW Echelon:	RAW Echelon - Echelon messages that are not ATCS messages.
RTS:	Request To Send – A signal that indicates that the originator is ready to send data to the destination site.
SEAR II or IIi:	Safetran Event Analyzer Recorder, Model II or Iii – Siemens Rail Automation product that is a non-vital stand-alone system designed to provide continuous real-time general purpose status monitoring and event recording for a wide range of functions associated with railroad wayside and grade crossing installations.
SNTP	Simple Network Time Protocol
SSR:	Spread Spectrum Radio
TCP/IP:	Transmission Control Protocol / Internet Protocol - The Internet protocol used to connect a world-wide inter-network of universities, research laboratories, military installations, organizations, and corporations. The TCP/IP includes standards for how computers communicate and conventions for connecting network and routing traffic.
TP:	Twisted Pair
UDP:	User Datagram Protocol - A transport protocol used primarily for the transmission of network management information. Not as reliable as TCP.
VSLIC:	Vital Safetran Logic I/O Controller – Siemens Rail Automation product used for monitoring and reporting of switch position information of hand throw switches in dark (non-signal) territories.

WAG:	Wayside Access Gateway – Siemens Rail Automation assembly A53457 converts Echelon® messages to Ethernet messages allowing Safetran equipment to use Ethernet Spread Spectrum radios A53325 for communications. WAG assembly A53457 also converts Echelon received messages to RS232 messages allowing the system to use modems for communication between Safetran equipment.
WAMS:	Wayside Alarm Management System – Siemens Rail Automation office application for monitoring and reporting of field alarm conditions.
WAN:	Wide Area Network
WCC/FPD Device	Wayside Communications (or Cluster) Controller/Field Protocol

SECTION 1
DESCRIPTION

1.0 DESCRIPTION

1.1 GENERAL

The Wayside Access Gateway (A53457) converts Echelon® messages to Ethernet messages. This lets Safetran (Siemens) equipment such as the HD/Link, use Ethernet Networks for communications. The Wayside Access Gateway (WAG) can also convert Echelon received messages to serial messages. This allows the system to use modems for communication between Safetran equipment.

⚠ WARNING

WARNING

THE WAG IS A NON-VITAL PRODUCT. IF USED IN A VITAL APPLICATION, EXTERNAL EQUIPMENT MUST PROVIDE VITALITY.

The Wayside Access Gateway can communicate with Ethernet-enabled devices such as:

- Safetran A53325 Ethernet Spread Spectrum Radio
- Routers
- Computers
- Hubs
- Bridges

The Wayside Access Gateway can also communicate with Echelon-enabled devices such as:

- HD/Link
- 4000 GCP
- GEO
- SEAR II/SEAR IIi
- VSLIC

Figure 1-1 on the following page shows an example of how devices in the field can be connected and the interaction between devices.

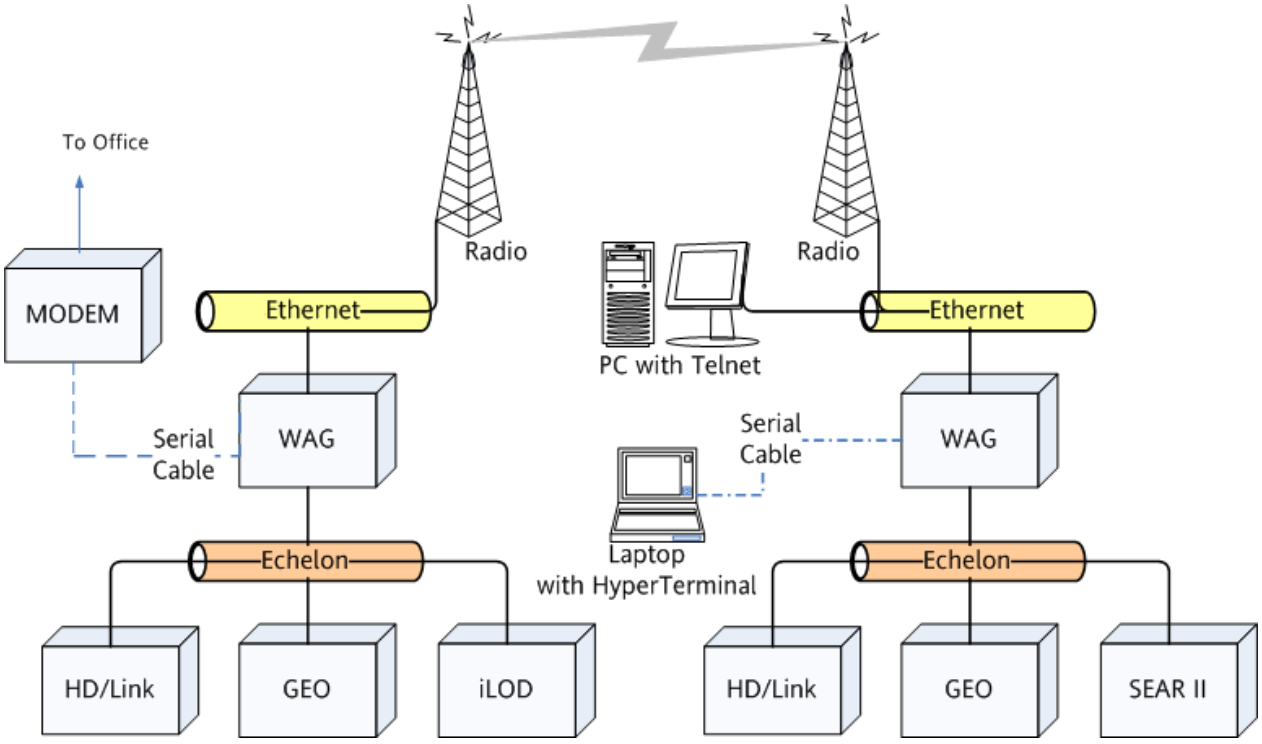


Figure 1-1. General Network Overview

1.2 WAG MESSAGE MANAGEMENT

Upon startup of a WAG, it has an empty routing table. As devices report and respond, the WAG dynamically updates the routing table.

When an Advanced Train Control System (ATCS) message comes into the WAG from the Ethernet, Echelon, or a serial port, the WAG checks its internal routing table to see if it has seen the address before. If the address is new, the WAG adds the source ATCS address of the message to its internal routing table. If the ATCS device is already in the routing table, the WAG updates the expiration timer in its routing table for that device.

After the routing table is updated, the WAG looks at the destination ATCS address of the message. If the destination ATCS address appears in the routing table, the message is sent to the destination device through the Ethernet, Echelon, or the serial port where the destination device can be reached. If the destination ATCS device is not known, the ATCS message is sent to the specified Broadcast Medium. During configuration, the user can specify the Broadcast Medium as Ethernet, Echelon, or serial port. For more information about configuring, see Section 2.

If an ATCS device is turned off or otherwise stops communicating, the WAG times out the routing table entry for the device and removes it from the routing table.

When a route to an ATCS device is in the routing table, indicating that it goes through a particular IP address on the Ethernet Local Area Network (LAN), but later appears on a different Internet Protocol (IP) address, the new IP address will be adopted. This can occur when a WAG within the network is swapped out with another WAG that has a different IP address configured. The client ATCS devices for the new WAG will now go through that WAG to reach the LAN. All WAGs will note the new IP address and will update the routing table accordingly.

The same is true for an Echelon Subnet/Node address. When an ATCS address is matched with a particular Echelon Subnet/Node address but later the WAG detects that the same ATCS address appears on a different Subnet/Node address, the new address will be adopted for that route.

The detection of two devices that have the same ATCS address can be a configuration conflict that exists in the ATCS network. Because of this conflict, the WAG will log an event after adopting the new address.

For Echelon devices, the logged event is:

- WARNING: 7.RRR.LLL.GGG.SS.DD Echelon Address conflict WW.XX to YY.ZZ

The ATCS address of the conflicting or altered routing is displayed with the old Echelon Subnet/Node address (WW.XX) and the new Subnet/Node address (YY.ZZ).

For IP changes/conflicts, the logged event is:

- WARNING: 7.RRR.LLL.GGG.SS.DD IP XX.XX.XX.XX to YY.YY.YY.YY

The ATCS address of the conflicting or altered routing is displayed with the old IP address (XX.XX.XX.XX) and the new IP address (YY.YY.YY.YY).

NOTE

NOTE

While the above logged events may indicate that there is a configuration conflict on the network, the re-addressed routing may be due to a user swapping out a device on the network.

WAGs collect statistical information about the source and destination devices and the interfaces that the message came in on and went out to.

WAGs also communicate with each other, periodically sending messages to each other conveying internal routing information. These messages are sent along the specified Broadcast Medium.

1.3 WAG HARDWARE INTERFACE

The front of the Wayside Access Gateway unit (see Figure 1-2) has 1 serial port, 5 LEDs, 3 network jacks, and 1 Echelon/power connector. These interface devices are described in the following paragraphs.

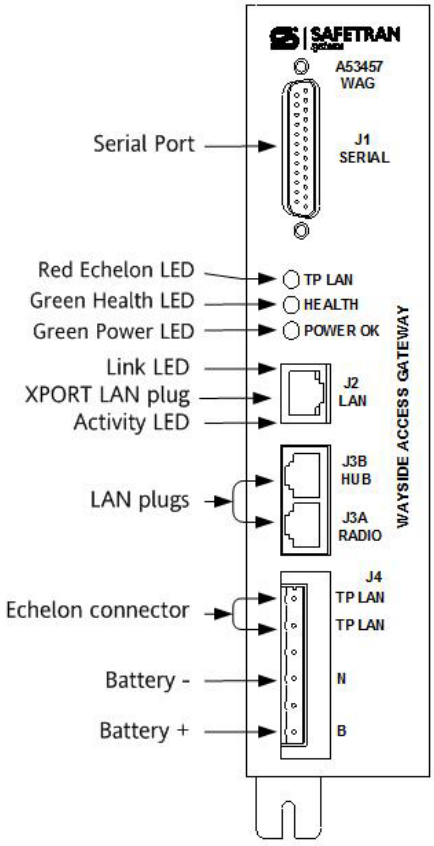


Figure 1-2. Wayside Access Gateway

1.3.1 Ports

The following table describes the WAG ports.

Table 1-1. WAG Ports

Port No.	Name	Description
J1	DB 25 Female RS232 serial port	Supports asynchronous operation with either internal or external transmit and/or receive clocking. The user can specify the data rate of the interface and the framing of bytes. Supports hardware handshaking using RTS, CTS, and other signals.
J2	RJ45 Ethernet interface	10Base-T and 100Base-T with auto-sensing. Includes 2 LEDs - a Link LED (top of J2) that displays amber for 10 Mbps or green for 100 Mbps and an Activity LED (bottom of J2) that displays half-duplex or full-duplex depending on activity level.

Port No.	Name	Description
J3A/J3B	Second Ethernet interface	Dual RJ45 connectors for inserting 12V DC at 1 Amp to power Safetran Ethernet Radio A53325. The wiring for J3A is non-standard.
J4	Echelon and power interface	6-Pin connector provides two pins for the twisted-pair Echelon interface. It also includes 2 pins for 9 Volts to 24 Volts DC battery power.

1.3.1.1 Pinouts for J1

The following table shows the pinouts for J1.

Table 1-2. Pinouts for J1

Pin Number	Name	I/O	Signal Description
6, 8, 10, 11, 20, 21, 22, 23, 25	Not Used	---	
2	TXD1-	O	Tx Data
3	RXD1-	I	Rx Data
4	RTSO1-	O	Ready To Send
5	CTSI1-	I	Clear To Send
1, 7	Ground	I	
9	RXC1+	I	Rx Clock
12	TXCI1+	I	Tx Clock
13	CTSI1+	I	Clear To Send
14	TXD1+	O	Tx Data
15	TXCI1-	I	Tx Clock
16	RXD1+	I	Rx Data
17	RXC1-	I	Rx Clock
18	TXCO1+	O	Tx Clock
19	RTSO1+	O	Ready To Send
24	TXCO1-	O	Tx Clock

1.3.1.2 Pinouts for J2

The following table shows the pinouts for J2.

Table 1-3. Pinouts for J2

Pin No.	Name	I/O	Signal Description
1	TX+	O	Transmit data +
2	TX-	O	Transmit data -
3	RX+	I	Ethernet Receive data +
6	RX-	I	Ethernet Receive data -
4, 5, 7, 8	N/C		Not used

1.3.1.3 Pinouts for J3A/J3B

The following table shows the pinouts for J3A and J3B.

Table 1-4. Pinouts for J3A/J3B

J3A Pin No.	J3B Pin No.	Name	I/O	Signal Description
1	1	TX+	O	Radio Eth Transmit data +
2	2	TX-	O	Radio Eth Transmit data -
3	3	RX+	I	Radio Eth Receive data +
6	6	RX-	I	Radio Eth Receive data -
4, 5	N/C	+12VDC	O	Power for radio
7, 8	N/C	Digital Ground	O	Ground return for radio

1.3.1.4 Pinouts for J4

The following table shows the pinouts for J4.

Table 1-5. Pinouts for J4

Pin Number	Function
1	**TP LAN** – Twisted wire A (not polarity specific)
2	**TP LAN** – Twisted wire B (not polarity specific)
3	Not used
4	**N** – Battery input – negative terminal
5	Not used
6	**B** – Battery input – positive terminal

1.3.1.5 Echelon Interface (J4) Characteristics

• Data Transfer Rate:	1.25 Mbps
• Transmission Medium:	Level 4 (NEMA) twisted pair cable, shielded or unshielded, solid or stranded.
• Topology:	Bus (direct daisy chain).
• Number of Nodes:	No more than 8 (including any terminations used) in any 16-meter (53 feet) length of transmission cable, 16 maximum total per network segment.
• Termination:	Normally not needed
• Network Length:	53 feet (16m) recommended maximum, 426 feet (130m) absolute maximum per network segment (with certain restrictions).

NOTE

NOTE

Because of the nature of the Echelon LAN interface, make sure all devices connected to the LAN are contained entirely within the same signal case or bungalow.

1.3.2 LED Indicators

The front of the WAG has 5 LEDs.

- Green Health LED flashes to indicate good health.
- Red TP LAN LED flashes when Echelon transmits or receives a message frame.
- Green Power OK LED indicates the WAG is powered.
- XPort™ LAN Ethernet J2 connector has 2 LEDs that indicate the following:

Link LED (Top of J2)		Activity LED (Bottom of J2)	
Color	**Meaning**	**Color**	**Meaning**
Off	No Link	Off	No activity
Amber	10 Mbps	Amber	Half-Duplex
Green	100 Mbps	Green	Full-Duplex

1.4 PRODUCT SPECIFICATIONS

This section details the specifications for the Wayside Access Gateway. For examples of wiring other equipment to the WAG, see Section 2.

1.4.1 Physical Specifications

Standard 19" rack mount using relay rails.

1.4.2 Dimensions

H x W x D:	H. 9.75" (include mounting tab), W. 2.25", D. 7.5" 24.77 cm x 5.72 cm x 19.05sm)
Weight:	3 lbs. 7 oz (1.67 kilograms)

1.4.3 Power Specifications

Voltage:	Between 8.5V and 24V DC, 12V Nominal
Isolation:	2000VRMS, 60Hz, 60Sec

1.4.4 Environmental Specifications

Temperature:	-40 °F to +158 °F (-40 °C to +70 °C)
Humidity:	0 – 95% non-condensing

1.4.5 Default Factory Settings

- WAG Type 7 ATCS Address: 7.620.100.100.01.01
- WAG Type 3 ATCS Address: 3.620.10.1000
- Serial interface: RS232, 9600, None, 8, 1/NoFlow, RTS asserted
- Serial format is: Command mode
- WAG test mode: Disabled
- Echelon address: 01.01
- UDP ports are: 5000, 5001, 5002, 5003
- Route table expiry: 5400 seconds (90 minutes)
- Broadcast medium: IP Ethernet
- TCP ports are: 23, 6000, 6001, 6002
- DHCP Server: Disabled
- WAG IP Address: 10.232.53.40.
- Type 7 Route Length: 12 - - 7RRRLLLGGGSS
- IP Network Mask: 255.255.255.255
- Radio Site ID Bindings: No Bindings Configured
- WAG Circuit ID: 000.0.00 – Disabled
- Routing Region Domain 1: Disabled
- Routing Region Domain 2: Disabled
- ATCS Server UDP Port Number: 5361
- Telnet Port Numbers: (WAG: 23, Serial: 10023)
- Genisys Wait Poll Response: 800ms
- ATCS Retry Wait: 800ms
- ATCS Max Retrys: 3
- Genisys Poll Starting Station: 1
- Genisys Poll Ending Station: 16
- Fragile Telnet Connections: Enabled
- Persistent Serial Tunnel: Disabled
- Primary DNS: Disabled
- Secondary DNS: Disabled
- Default IP Gateway: Disabled
- Telnet Echo Enabled
- Serial Receive Clocks Internal
- Serial Transmit Clocks Internal
- Route RAW Echelon Disabled
- Route Unknown Outbound Echelon Disabled
- Telnet Password Disabled
- J1/J2 Jumper Detect Enabled
- Serial Max Idle 4
- DHCD Client Option Disabled

1.5 PERSISTENT SERIAL TUNNELING (PST) FUNCTIONALITY

In a Persistent Serial Tunneling (PST) application (see Figure 1-3), the WAG operates as a modem that enables serial devices to communicate via the LAN. The WAG converts the serial data into Ethernet packets and transmits the information onto the LAN. A second WAG at the other end converts the information back to serial data for use by the other serial device.

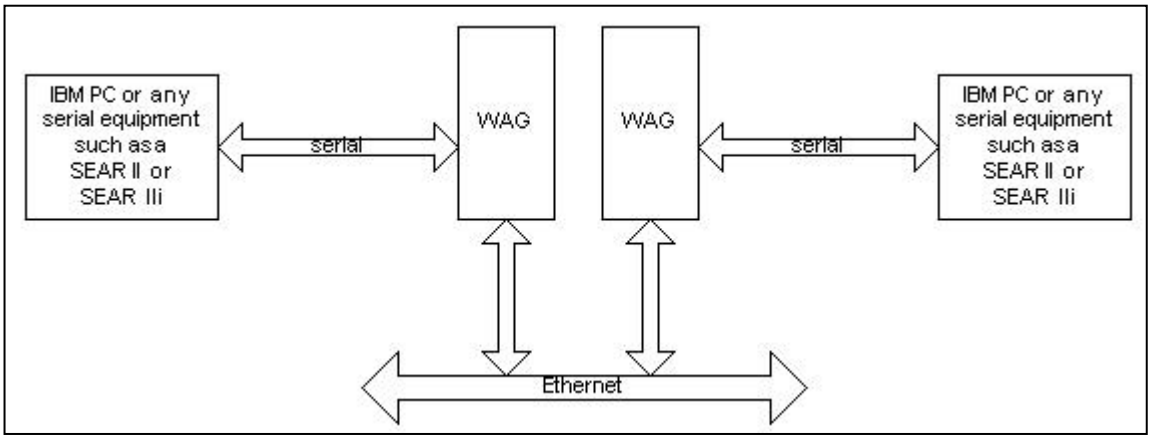


Figure 1-3. Persistent Serial Tunneling

WAGs are configured to communicate in pairs as illustrated above. When one or both of the WAGs in the paired system is configured with the "Persistent Serial Tunnel" IP address of the other WAG, it will attempt to establish a Transmission Control Protocol (TCP) connection to the other WAG at that IP address.

For most applications, only one WAG is configured to establish the connection, however, if both are configured to do so, the Tunnel will still be established. Typically the WAG that is physically located in the office is configured to establish the connection to the other WAG which may be in the field.

When the system is powered up, the WAG will attempt to establish the PST TCP connection to the WAG's "Serial Telnet" port number (which defaults to 10023).

In addition to other typical configuration requirements for the WAG, in general, the following are required for PST to work:

1. Both WAGs must be configured to have a serial interface format of RAW data mode.
2. One or both of the WAGs in the paired system must be configured with the IP address of the other WAG.
3. Both WAGs must be configured with the same Serial Telnet port number (usually 10023).
4. Both WAGs must also have that same Serial Telnet port number configured in its list of four TCP port numbers.

5. Both WAG Serial Interface baud rates must match the baud rate of the serial device that it is plugged into.

Once a Tunnel is established, serial data from any serial device(s) plugged into either WAG will be sent to the serial device(s) plugged into the other WAG.

When a Tunnel is established, if the tunnel is dropped for some reason, the WAG will attempt to re-establish the connection if the WAG is configured with a valid Serial Tunnel IP address and if the WAG is still in RAW data mode.

1.6 OFFICE SYSTEM INTERFACE (OSI) FUNCTIONALITY

When used in an Office System Interface (OSI) application (see Figure 1-4), the WAG operates as a message router between the office system and field devices operating on the LAN.

Refer to the diagram below for the following discussion.

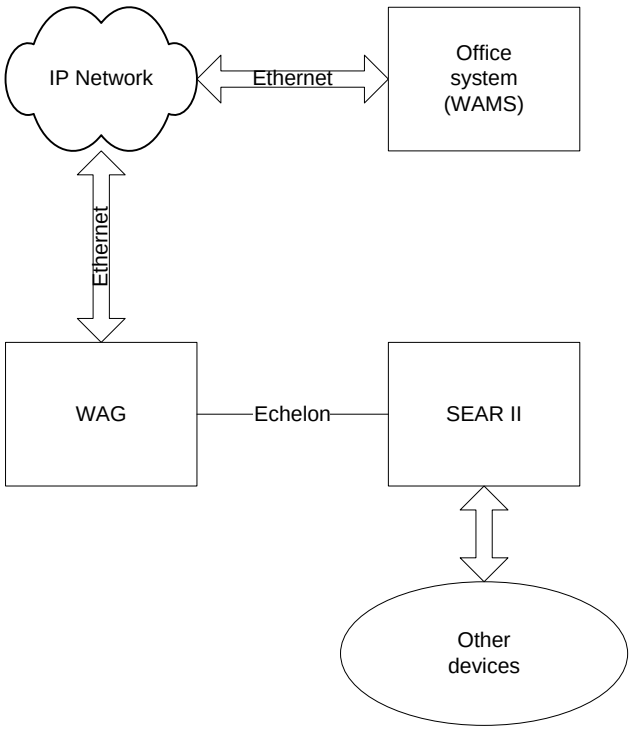


Figure 1-4. Office Systems Interface

The SEAR II/SEAR IIi sends an ATCS message to the WAG consisting of a source address of type 7 and a destination address of type 2. The 7 indicates that the source is a field device and the 2 indicates that the destination is an office device.

The WAG will look at the codeline designation (LLL) portion of the source ATCS address and will check its “Active route list” to determine whether it knows of any office device that is interested in the ATCS messages.

If a known route to an office device exists for that LLL, the WAG will send the ATCS messages to that IP address at the "ATCS Server User Datagram Protocol (UDP) Port number" configured into the WAG. The expiry timer for the "Active route list" entry for that LLL is refreshed.

If there is no known route toward the office for the LLL, the WAG will issue a "route request" out into the broadcast medium (which should be IP Ethernet) requesting anyone who is interested in the LLL to report the fact.

The "route request" is transmitted out into the "Routing Region Domain" IP addresses configured into the WAG. There are two "Routing Region Domains" possible, only one of which is required for proper OSI operation. If only one is configured with a valid IP address, the "route request" is sent out that one, otherwise if both are configured, a copy of the "route request" will be sent out both IP addresses.

The LLL is entered into the "Pending route links" list and a timer is started. The ATCS message is saved so that if an office device expresses interest in the LLL, the ATCS message can be sent.

If an office device responds with a "route update" for any pending LLLs, the WAG will move the "pending" entries into the "active" list and any pending ATCS message is sent to the office. At that time, the timer for the "pending" entry is marked as "Expired" and the timer for the newly created active entry is started.

If no activity for an LLL in the "Active route links" list is seen before the timer counts down to the end, the WAG will issue another "route request" for the LLL to determine whether the office device is still interested in the LLL.

If the office responds, the timer for that LLL entry is refreshed; otherwise as the timer continues to count down the WAG will issue the "route request" again, doing so three times before the LLL is moved from the "Active" list to the "Pending" list. Once the entry expires from the "Pending" list, it is marked as "Expired" until such time as the field device with that LLL attempts to send another message toward the office.

As this route discovery process takes place, if tracing is enabled for OSI, there will be trace information offered out the serial and Telnet session.

When a route to the office is known, ATCS messages may flow between the office and the field device. If tracing for OSI is enabled, every time an ATCS message is passed through WAG, it is traced out the serial and Telnet session.

NOTE

NOTE

The "status" command described later can be used to show the contents of the "Pending route links" list and the "Active route links" list.

In addition to other typical configuration requirements for the WAG, in general, the following are required for OSI to work:

1. The Type 3 ATCS address option must be configured with a proper address.
2. The WAG Circuit ID must be configured.
3. One or both of the Routing Region Domains must be configured with valid IP addresses or symbolic names.
4. The ATCS UDP Server Port Number must be configured with a valid port number.

1.7 BOOT LOADER RS485 J1/J2 JUMPER DETECTION

If the WAG is configured for RS485 Half-Duplex serial interface operation and if RS485 J1/J2 Jumper Detect is ENABLED (described below), then the Boot Monitor will perform automatic J1/J2 jumper detection.

On the WAG hardware there are two jumpers which are shipped from the factory as un-jumpered. These jumpers are used to connect the serial interface's Transmit and Receive signals together.

On the serial interface when J1/J2 are in place, pins 2 and 3 on J1 (transmit and receive) are tied together to form half of the balanced wire signaling. Pins 14 and 16 on J1 (secondary transmit data and secondary receive data) are tied together to form the second half of the balance wire signal.

The WAG's Boot Monitor can detect the presence of these jumpers by transmitting a test frame in RS232 mode and see if it loops back to its receiver. If the test frame is looped back, it means that the jumpers are in place.

Figure 1-5 shows the J1/J2 Jumper Auto Detect option, which defaults to enabling the J1/J2 Auto Detect. To disable this option, select "Disable J1/J2 Auto Detect" at the Enter option prompt. Select "Enable J1/J2 Auto Detect" to enable this option. Select "Exit without making a change" if no change is required.

```
Select the new J1/J2 Jumper Auto Detect option


         1:  Enable J1/J2 Auto Detect
         2:  Disable J1/J2 Auto Detect

         3:  Exit without making a change

Enter option (or ENTER for 'Enabled'):
```

Figure 1-5. J1/J2 Jumper Auto Detect Option

If J1/J2 jumper detection is disabled and the WAG is configured for RS485, the Boot Monitor assumes that the jumpers are in place, the WAG will immediately launch the executive software, not offering the usual boot menu.

If J1/J2 jumper detection is enabled and the Boot Monitor doesn't detect the transmitted test frame being looped back to it, the Boot Monitor will try again, up to four more times, performing a bit of a delay between each test.

If the Boot Monitor never sees the test frame come back to it, it decides that the J1/J2 jumpers are not in place. The boot menu will be offered and the WAG will default to operate in RS232 mode, ignoring the fact that it's configured for RS485.

The reason for this J1/J2 jumper detection is so that the operator can unplug the RS485 multidrop cable from the WAG, remove the J1/J2 jumpers, plug in his or her computer, and apply power on the WAG. When the WAG determines that the jumpers are not in place, the operator can be given a menu and can launch the executive software to reconfigure the WAG or to acquire its system event log.

NOTE: If an operator needs to configure the WAG and it's in RS485 mode and the operator doesn't want to open the WAG to remove the jumpers, the operator may Telnet into the WAG to perform the configuration. The operator must know the WAG's IP address.

1.8 EXTERNAL J1/J2 JUMPERS

The use of the J1/J2 Jumpers on the hardware can be moved off of the PC board and on to the connector plugged into the WAG's serial interface. This way the operator need never open the WAG to remove jumpers in the event he or she wants to access the WAG serially.

Having an RS485 Half-Duplex multidrop serial cable with pins 2 and 3 and pins 14 and 16 tied together, performs the same electrical function of the J1/J2 internal jumpers.

When an externally jumpered cable is plugged into the WAG, the test frames that are issued by the WAG are looped back to the WAG via the cable rather than the jumpers. When the cable performs the tie-up of the required signals, the J1 and J2 jumpers can remain removed and RS485 Half-Duplex will continue to work properly.

The benefit of having external signal ties is that the operator may simply unplug the RS485 cable, plug a computer into the WAG, and cycle power. With J1/J2 Jumper Auto Detect enabled, the WAG will determine that the jumpers are not present and the operator will be given a boot menu and from there will be able to access the WAG's configuration menus and log.

Once the operator is finished, the RS485 cable can be plugged back into the WAG and the WAG's power would be cycled. When the WAG issues its test frames, the WAG will go back to normal RS485 Half-Duplex operation.

1.9 J1/J2 JUMPER DETECT TEST FRAMES

The test frames issued by the WAG's boot monitor look something like the following:

:JT010232053192X:

When the operator has a computer plugged into the serial interface and the WAG starts testing whether the J1/J2 jumpers are in place, the operator may see these test frames.

The jumper detection test frames start with :JT to indicate a Jumper Test. It's followed by the IP address of the WAG which is then followed by an **X:** to indicate the end of the test frame.

1.10 RS485 OPERATION

When the WAG is configured for RS485, the WAG also must be configured for one of the Genisys ATCS protocols – Office if the WAG is to operate as a Bus Master or Field if the WAG is to operate as a Bus Slave. There must be only one WAG Bus Master configured as Genisys ATCS Office.

Figure 1-6 shows an example of a typical RS485 operational interconnection. Figures 1-7 and 1-8 show the RS485 cable interconnections used with this example, relying on the internal J1/J2 jumpers.

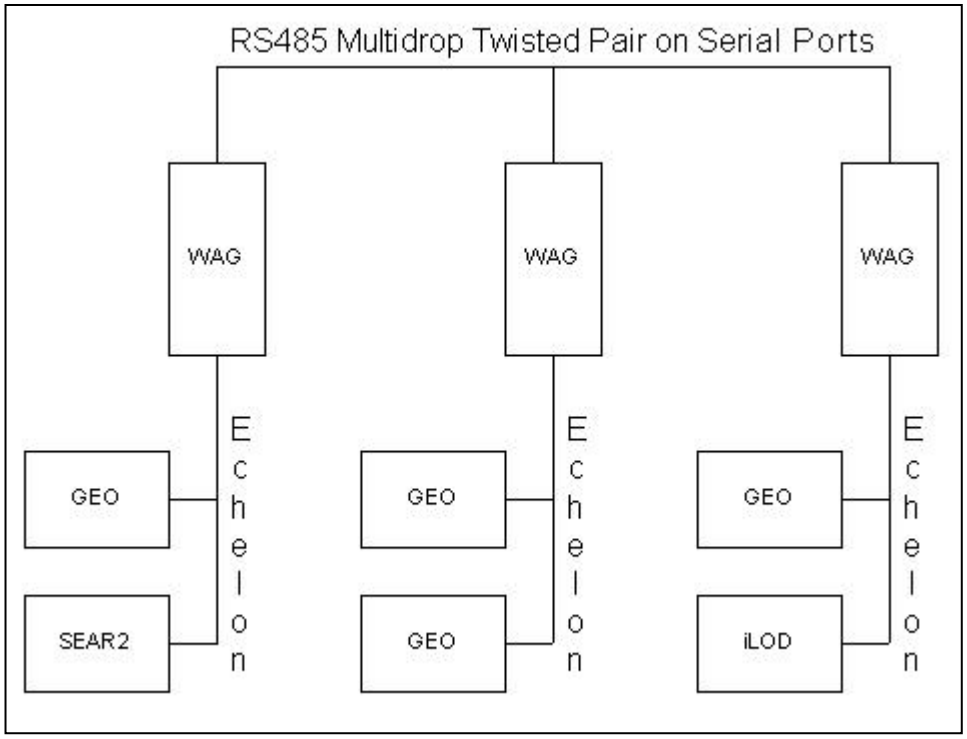


Figure 1-6. RS485 Operational Interconnection

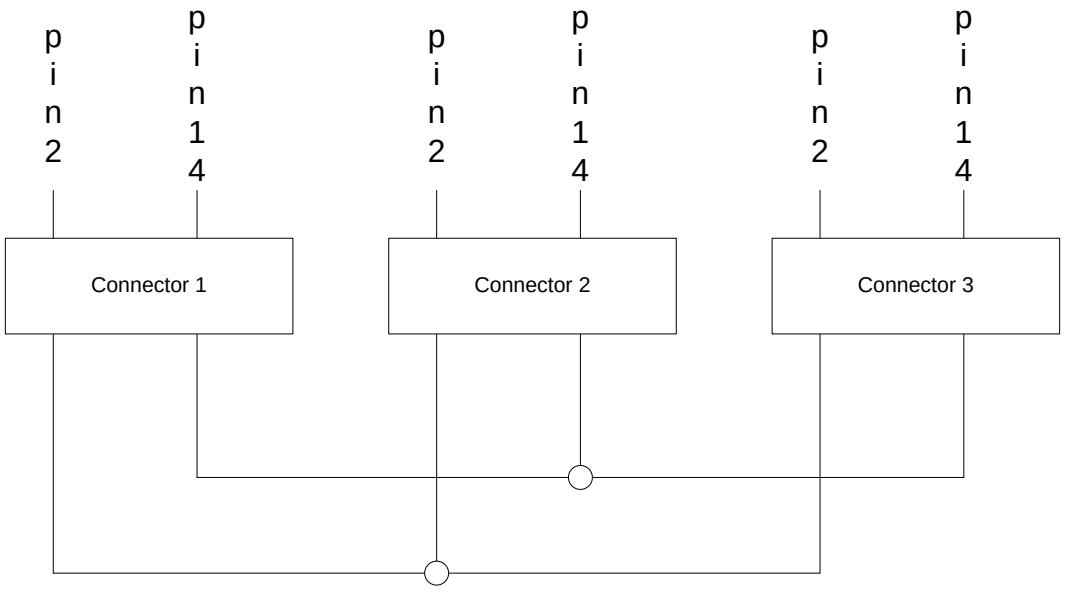


Figure 1-7. RS485 Cable Interconnections

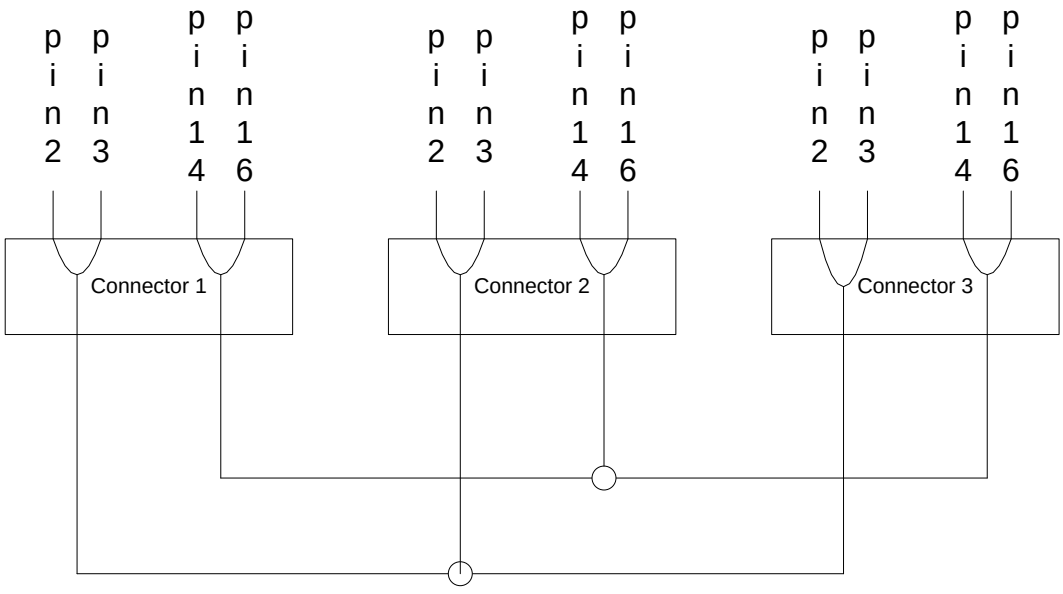


Figure 1-8. RS485 Cable Interconnections

1.11 **HDLC-UI OPERATION**

There are two modes of HDLC-UI operation. The first mode consists of an “HDLC Un-numbered Information frame” mode and the other mode consists of an “HDLC Raw Serial Tunnel” mode.

The HDLC-UI mode of operation allows ATCS messages that are encapsulated in HDLC UI frames to be sent and received on the serial interface. Such ATCS messages are routed according to the message’s ATCS destination address after their HDLC headers are removed.

The “HDLC Raw Serial Tunnel” mode of operation requires that the “Persistent Serial Tunnel” functionality be enabled. When the Tunnel is established, all forms of HDLC frames are sent and received on the serial interface complete with their HDLC headers, get conveyed across the Persistent Tunnel, and then are sent out the remote WAG’s serial interface which is also configured for HDLC Raw Serial Tunnel mode.

SECTION 2
INSTALLATION AND CONFIGURATION

2.0 INSTALLATION AND CONFIGURATION

2.1 PRE-STARTUP

Installing the WAG consists of:

- Physically mounting the unit
- Wiring the unit to power and connecting equipment
- Configuring the unit

The rest of this section explains these steps.

2.2 HARDWARE INSTALLATION

This section explains installing the WAG and getting it ready to connect equipment.

2.2.1 Hardware Mounting

Using the mounting tab and holes on the back of the unit, the WAG can be mounted on a standard 19" rack, or shelf, using standard relay rails. The mounting holes accept standard #10 mounting screws. After mounting, the unit needs to be wired to the power supply. The WAG may also be wall-mounted.

2.2.2 Wiring

Wire power to the connector on the WAG as follows:

1. Remove the supplied plug from the J4 connector.

⚠ WARNING

WARNING

USE A FERRITE BEAD ON B AND N TO PREVENT POTENTIALLY HARMFUL RF EMISSIONS FROM INTERFERING WITH NEARBY EQUIPMENT.

2. Wire the connector by using Level 4 (NEMA) twisted pair for the TP LAN connector and 14 to 18 gauge wire for the battery connector. Make sure to properly use ferrite beads on the power wires.

⚠ CAUTION

CAUTION

J3A IS FOR SAFETRAN ETHERNET RADIO A53325 AND USES A SPECIAL CABLE PROVIDED WITH THE RADIO. J3A IS NON-STANDARD AND HAS DC POWER PRESENT ON THE CONNECTOR. USE CAUTION WHEN WIRING TO OTHER EQUIPMENT.

3. Wire the WAG to equipment that will be used. With the exception of J3A, use standard RJ45 connectors.

2.3 EQUIPMENT CONNECTION TO WAG

There are numerous pieces of equipment that can be connected to the WAG. This section serves as a guide for connecting various devices to the WAG.

2.3.1 Connecting to Safetran Ethernet Radio A53325

The following diagram shows the Safetran Ethernet Radio (A53325) connected to the WAG.

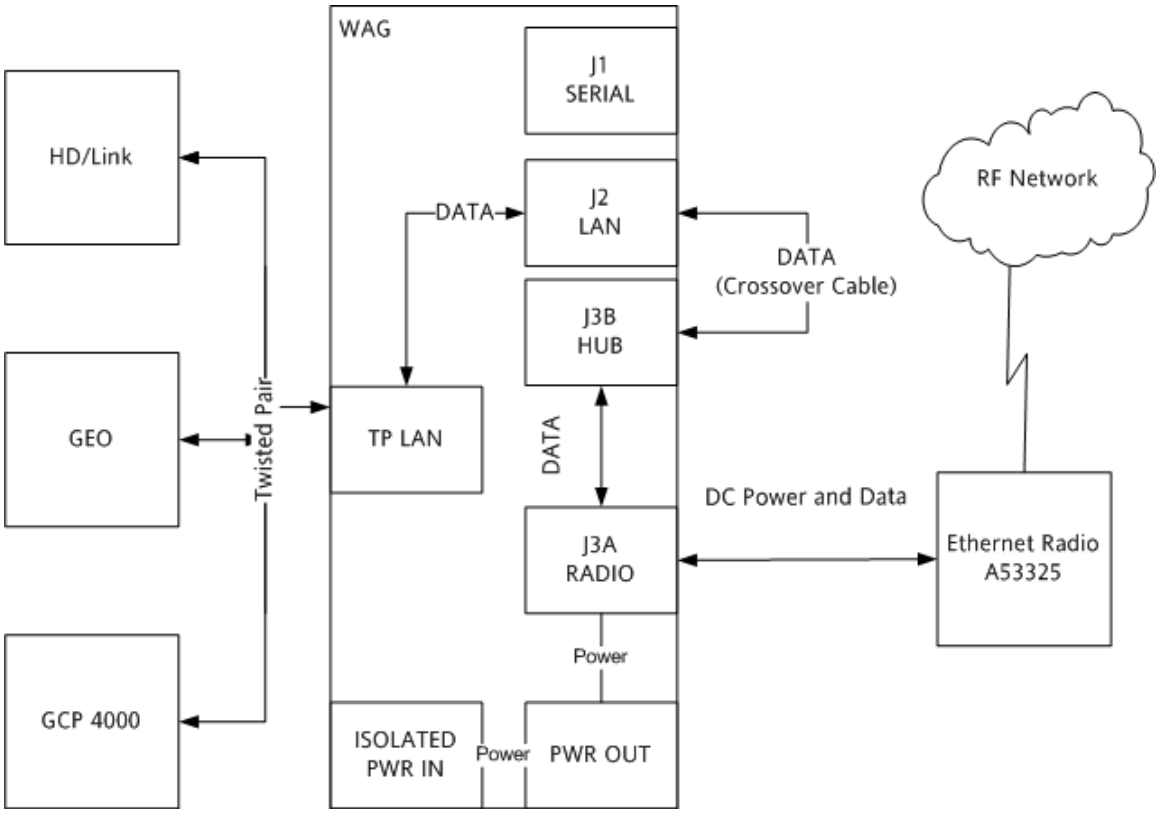


Figure 2-1. Safetran Ethernet Radio A53325

2.3.2 Connecting to an Ethernet Hub

The following diagram shows an Ethernet hub connected to the WAG.

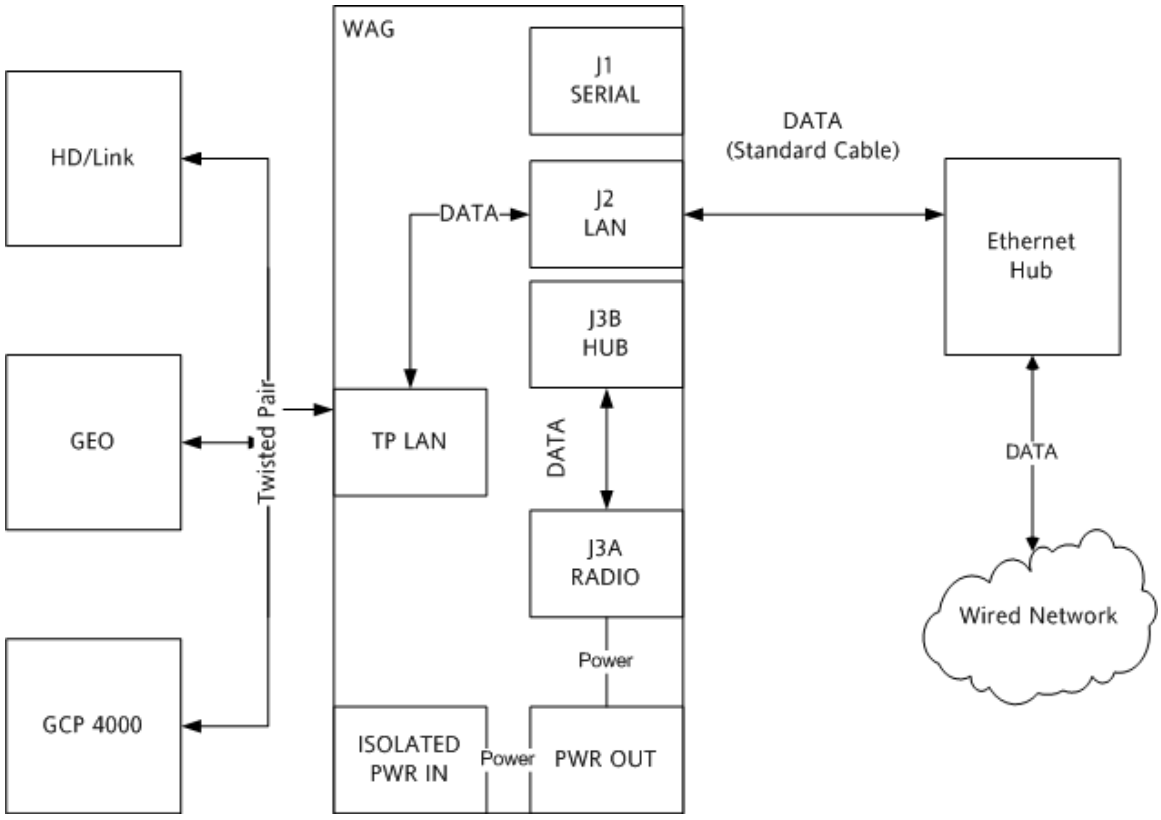


Figure 2-2. Ethernet Hub

2.3.3 Connecting to an Ethernet Hub and Safetran Ethernet Radio A53325

The following diagram shows an Ethernet hub and a Safetran Ethernet Radio (A53325) connected to the WAG.

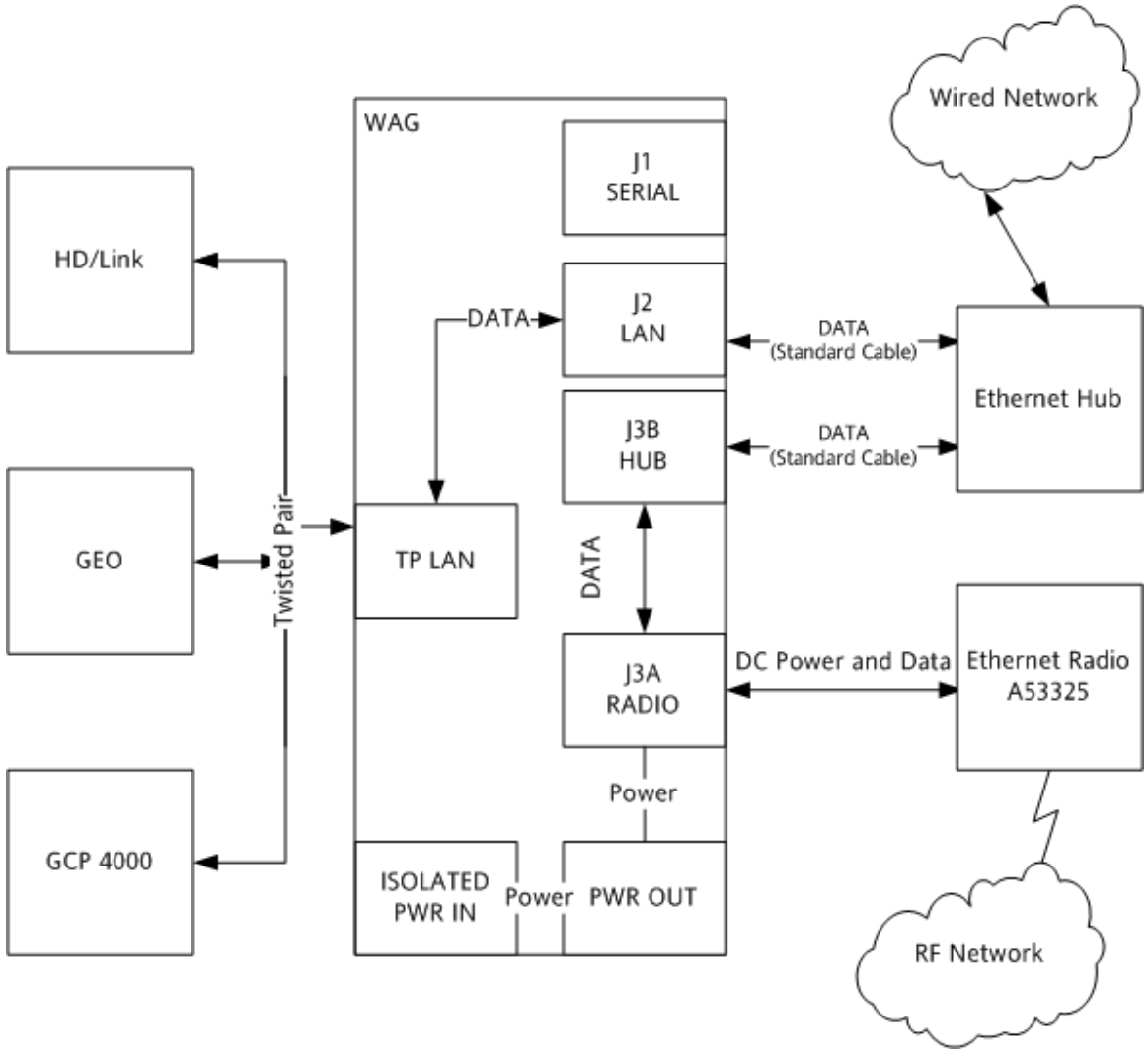


Figure 2-3. Ethernet Hub and Safetran Ethernet Radio A53325

2.3.4 Connecting Two Sites Using Modems

The following diagram shows connecting two sites using a pair of modems.

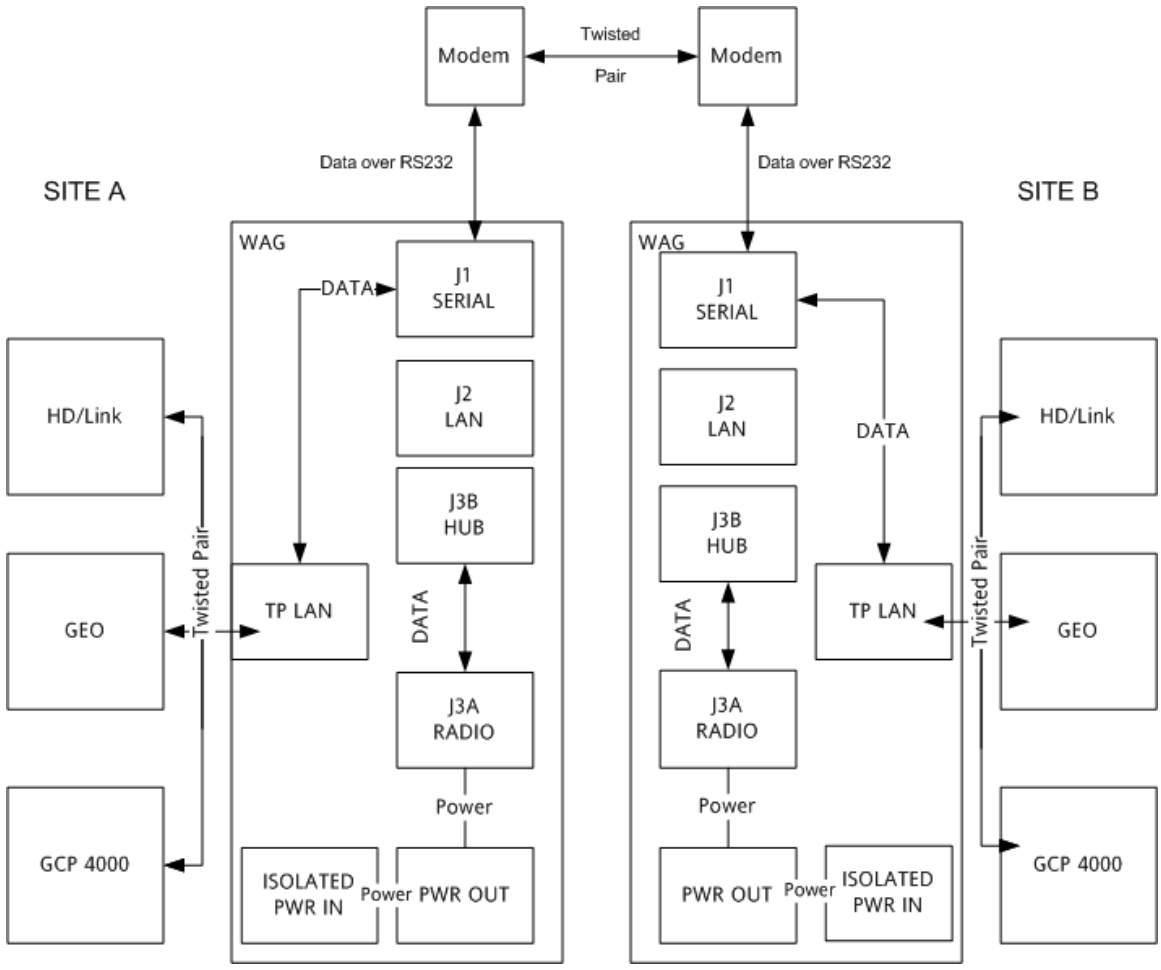


Figure 2-4. Connecting Two Sites Using Modems

2.4 CONNECTING USING TERMINAL EMULATION SOFTWARE

A terminal emulator, such as HyperTerminal from Microsoft®, can be used to interact with the WAG. HyperTerminal is included with the standard Windows® 9x/NT/2000/XP installation. The WAG uses ANSI terminal emulation.

To Connect Using HyperTerminal:

1. Connect a null modem cable to the WAG serial port labeled J1 and to the serial COM port of a PC laptop computer. Make sure the cable is a null cable or use a null modem adapter.
2. Match the PC/laptop COM port settings to the WAG serial port default settings. Use the following table.

Table 2-1. PC Serial Port Settings

Item	Setting
Baud	9600
Data bits	8
Parity	None
Stop Bits	1
Flow Control	None

NOTE

NOTE

If it is necessary to reset the WAG to the default configuration, remove the WAG cover and hold down the S3 button mounted on the board before performing the following step.

3. Apply power to the WAG. When the system is first powered up, the WAG boot monitor runs. The boot monitor allows for upgrades of executive software and performs some initial hardware testing. The following information appears on the screen showing the executive file is valid.

```
Boot Options (Valid Executive)
1.  Download Executive to WAG
2.  Download Configuration to WAG
3.  Download Xilinx to WAG
4.  Upload Configuration from WAG
5.  Run Debugger
6.  Run Executive
Choice >
```

Figure 2-5. WAG Terminal Emulation Boot Screen

The addition of number 7, Run Executive internal clocks, RS232, Command Mode allows for the WAG's serial interface to be configured to utilize external transmit clocks or external receive clocks, and for the WAG's serial interface to be configured for the HDLC-UI mode. This allows the operator to launch the WAG executive to use internal clocking in RS232 format into the Command Mode. If the WAG is configured for external clocks and/or HDLC mode, the operator may plug a laptop into the WAG, cycle power on the WAG, and tell the WAG that the executive should ignore the configuration options and execute with internal clocks, in RS232 mode, and in Command Mode.

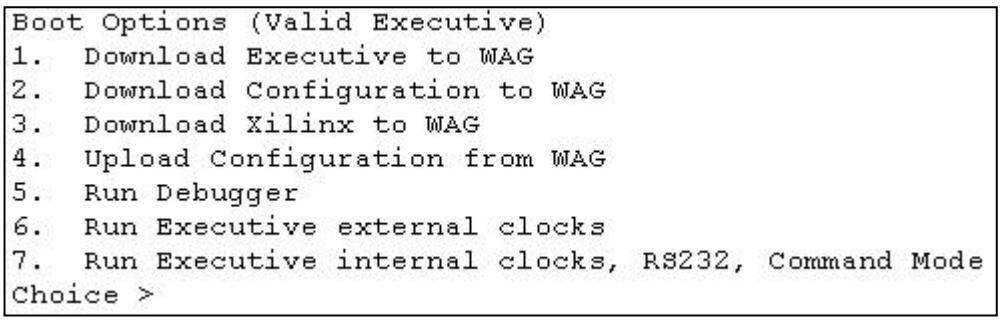


Figure 2-6. WAG Terminal Emulation Boot With Number 7 Screen

After 5 seconds and without the operator selecting a menu option, Figure 2-5 is replaced with the screen in figure 2-7.

NOTE

NOTE

If the screen shown in figure 2-7 does not appear and the statement "Boot Monitor complete. Running WAG Executive." appears at the bottom of figure 2-5; the WAG is not in command mode. Wait at least 3 seconds and then type +++ and wait 3 seconds for the system to go to command mode (see paragraph 3.15).

NOTE

NOTE

The following screen captures depict the WAG default settings. Actual results reported may be different.

```
Wayside Access Gateway (WAG) up and running.
   WAG ATCS Address: 7.620.100.100.01.01
   Configured IP address: 10.232.53.40
   IP network mask: 32 bits [255.255.255.255]
   Listening on UDP ports 5000, 5001, 5002, 5003
   Listening on TCP ports 23, 6000, 6001, 6002
   Local Echelon: 01.01
   Serial interface: Command, 9600,None,8,1/NoFlow
   Route table expiry: 5400 seconds
   Broadcast medium: IP Ethernet
   DHCP Server: Disabled
   Type 7 route length: 12 digits 7RRRLLLGGGSS
```

Figure 2-7. WAG Terminal Ready Screen

4. With the computer connected to the WAG and the terminal emulation software running, type con and press **ENTER** to modify the WAG configuration settings. The following screen appears.

```
WAGSetup.CFG contains the following:

          1:   WAG Type 7 ATCS Address: 7.620.100.100.01.01
          2:   WAG Type 3 ATCS Address: 3.620.10.1000
          3:   Serial: 9600,None,8,1/NoFlow,RTS:Asserted,RS232,RX:I,TX:I
          4:   Serial format is: Command mode
          5:   WAG test mode: disabled
          6:   Echelon address: 01.01
          7:   UDP ports are: 5000, 5001, 5002, 5003
          8:   Route table expiry: 5400 seconds
          9:   Broadcast medium: IP Ethernet
         10:   TCP ports are: 23, 6000, 6001, 6002
         11:   DHCP Server: Disabled
         12:   WAG IP Address: 10.232.53.40
         13:   Type 7 Address Route Length 12 -- 7RRRLLLGGGSS
         14:   Set IP Network Mask: 255.255.255.255
         15:   Radio Site ID Bindings

         16:   NEXT configuration menu
         17:   Set configuration to defaults
         18:   Exit without saving changes
         19:   Save changes then restart

Enter option: _
```

Figure 2-8. HyperTerminal Configuration Screen

To configure the WAG, go to the *Configuration of the WAG* Section (see Section 2-6).

2.5 CONNECTING USING TELNET

To connect the WAG using the Telnet software, perform the following steps:

To log in using Telnet software:

NOTE

NOTE

A Telnet connection may not be possible if the computer IP address and subnet mask do not allow access to the WAG configured IP address.

1. Open Telnet software.

2. If this is the first time connecting to the WAG, go to `10.232.53.40`, port `23`. If this is not the first time, connect to the previously specified IP address for the unit.

NOTE

NOTE

The Telnet session is dropped after configuration changes have been saved. If the WAG has been reconfigured, the IP address may not be 10.232.53.40.

When connected to the WAG, type `con` and press **ENTER**. The First Configuration Menu appears.

```
WAGSetup.CFG contains the following:

          1:   WAG Type 7 ATCS Address: 7.620.100.100.01.01
          2:   WAG Type 3 ATCS Address: 3.620.10.1000
          3:   Serial: 9600,None,8,1/NoFlow,RTS:Asserted,RS232,RX:I,TX:I
          4:   Serial format is: Command mode
          5:   WAG test mode: disabled
          6:   Echelon address: 01.01
          7:   UDP ports are: 5000, 5001, 5002, 5003
          8:   Route table expiry: 5400 seconds
          9:   Broadcast medium: IP Ethernet
         10:   TCP ports are: 23, 6000, 6001, 6002
         11:   DHCP Server: Disabled
         12:   WAG IP Address: 10.232.53.40
         13:   Type 7 Address Route Length 12 -- 7RRRLLLGGGSS
         14:   Set IP Network Mask: 255.255.255.255
         15:   Radio Site ID Bindings

         16:   NEXT configuration menu
         17:   Set configuration to defaults
         18:   Exit without saving changes
         19:   Save changes then restart

Enter option: _
```

Figure 2-9. First Configuration Menu

Select “NEXT configuration menu” for the Second Configuration Menu (see Figure 2-10). Select “NEXT configuration menu” for the Third Configuration Menu (see Figure 2-11). Refer to paragraph 2.6 for WAG configuration.

```
WAGSetup.CFG contains the following:

          1:   WAG Circuit ID: 000.0.00 (Disabled)
          2:   Routing Region Domain 1: Disabled
          3:   Routing Region Domain 2: Disabled
          4:   ATCS Server UDP Port number: 5361
          5:   Telnet Port Numbers (WAG: 23, Serial: 10023)
          6:   Genisys wait poll response: 300ms
          7:   ATCS Retry wait: 300ms
          8:   ATCS Max retries: 3
          9:   Genisys Poll Starting Station: 1
         10:   Genisys Poll Ending Station: 16
         11:   Fragile Telnet Connections: Enabled
         12:   Persistent Serial Tunnel: Disabled
         13:   Primary DNS: Disabled
         14:   Secondary DNS: Disabled
         15:   Default IP Gateway: Disabled

         16:   NEXT configuration menu
         17:   PREVIOUS configuration menu
         18:   Exit without saving changes
         19:   Save changes then restart

Enter option: _
```

Figure 2-10. Second Configuration Menu

```
WAGSetup.CFG contains the following:

         1:   Change WAG Site ID
         2:   Enable/Disable IP Redundancy: Currently Normal - Disabled
         3:   Redundant Slave Poll Period: 10 seconds
         4:   Redundant SEAR2 Poll Period: 10 seconds
         5:   Redundant Slave ATCS address: 7.000.000.000.00.00
         6:   Telnet Echo: Enabled
         7:   Route Raw Echelon: No
         8:   Route unknown outbound Echelon: No
         9:   Telnet Password: Disabled
         10:  RS485 J1/J2 Jumper Detect: Enabled
         11:  DHCP Client option: Disabled









         17:   PREVIOUS configuration menu
         18:   Exit without saving changes
         19:   Save changes then restart

Enter option: _
```

Figure 2-11. Third Configuration Menu

2.6 CONFIGURATION OF THE WAG

After connecting to the WAG using a terminal emulator or using Telnet, the WAG can be configured. The following paragraphs describe how to enter the new configuration. After the changes have been completed, the changes should be saved.
Configuration options are described in the order they appear on the WAGSetup.CFG configuration screens (Configuration Menu).

2.6.1 Type 7 ATCS Address

The WAG can be assigned both Type 7 and Type 3 ATCS addresses. This enables the WAG to handle any ATCS message of either type that it sees. See paragraph 2.6.2 for directions on changing Type 3 addresses.

Changing the Type 7 ATCS address lets the user specify the Type 7 ATCS address for the WAG on the network. The Type 7 address for each unit uses the field wayside equipment ATCS address format 7.RRR.LLL.GGG.SS.DD. The address segments are as follows:

RRR	The railroad number.
LLL	Line Segment designation.
GGG	A unique number for each group within that line segment.
SS	Sub-node Field used to further differentiate traffic within a group to an individual device.
DD	Device Field used to further differentiate traffic internally in the equipment being addressed.

Make sure that a unique and valid Type 7 ATCS address is configured for each piece of equipment used on the network.

To Assign Type 7 ATCS Address:

1. On the First Configuration Menu, select “WAG Type 7 ATCS Address” to be changed. The Type 7 ATCS Address screen (see Figure 2-12) appears.

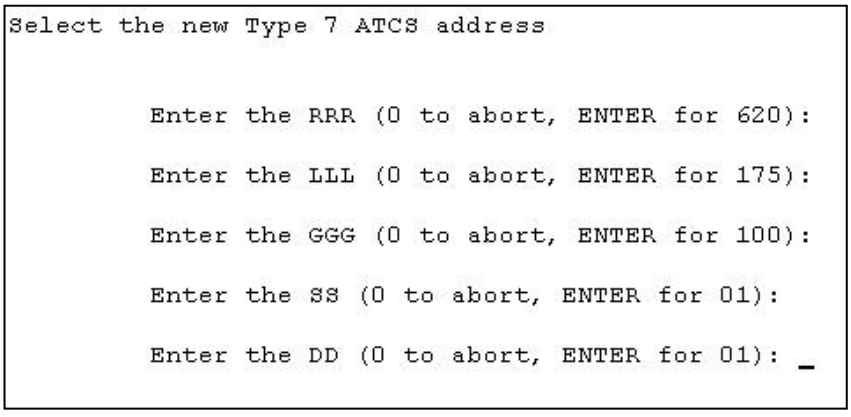


Figure 2-12. Type 7 ATCS Address Configuration Screen

2. Do the following:

a. To keep any of the current displayed values, press **ENTER**.
b. To enter a new value, type the first 3 digits of the new Type 7 ATCS address (RRR) and press **ENTER**.
c. To enter a new value, type the second 3 digits of the new Type 7 ATCS address (LLL) and press **ENTER**.
d. To enter a new value, type the third 3 digits of the new Type 7 ATCS address (GGG) and press **ENTER**.
e. To enter a new value, type the fourth 2 digits of the new Type 7 ATCS address (SS) and press **ENTER**.
f. To enter a new value, type the fifth 2 digits of the new Type 7 ATCS address (DD) and press **ENTER**.

   When finished, the user will be returned to the First Configuration Menu. The new Type 7 ATCS address is displayed.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save the changes and restart the WAG.

2.6.2 Type 3 ATCS Address

The WAG can be assigned both Type 3 and Type 7 ATCS addresses. This enables the WAG to handle any ATCS message of either type that it sees. See paragraph 2.6.1 for directions on changing Type 7 addresses.

Changing the Type 3 ATCS address lets the user specify the Type 3 ATCS address for the WAG on the network. The Type 3 address for each unit uses the field wayside equipment ATCS address format 3.RRR.NN.DDDD. The address segments are as follows:

RRR The railroad number.
NN Node number.
DDDD Base device number.

To Assign Type 3 ATCS Address:

1. On the First Configuration Menu, select "WAG Type 3 ATCS Address" to be changed. The Type 3 ATCS Address screen (see Figure 2-13) appears.

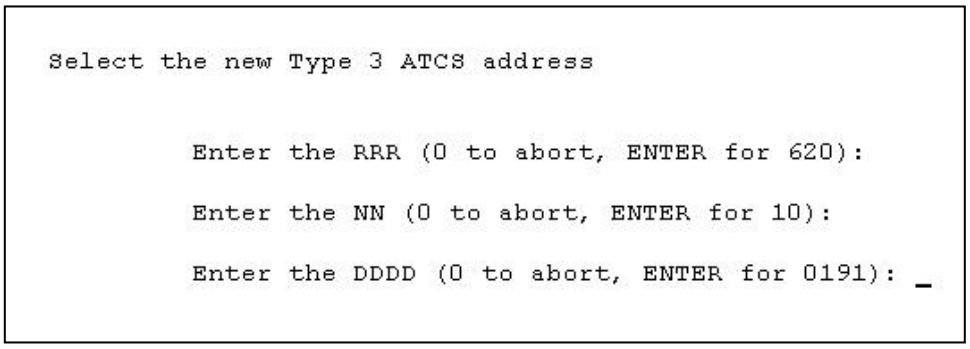


Figure 2-13. Type 3 ATCS Address Screen

2. Do the following:

   a. To keep all of the current displayed values, press **ENTER**.

   b. To enter a new value, type the first 3 digits of the new Type 3 ATCS address (RRR) and press **ENTER**.

   c. To enter a new value, type the second 2 digits of the new Type 3 ATCS address (SS) and press **ENTER**.

   d. To enter a new value, type the third 4 digits of the new Type 3 ATCS address (DDDD) and press **ENTER**.

   When finished, the user will be returned to the First Configuration Menu. The new Type 3 ATCS address is displayed.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.3 Serial Port Interface

The user can make changes to the serial interface baud rate configure the number of data and stop bits on the serial interface, enable or disable the flow control, and the ability to insert parity bits. If the user changes the baud rate from the default of 9600, the baud rate for the computer the WAG is connected to will also need to be changed.

To Change the Serial Port:

1. On the First Configuration Menu, select serial port to be changed. The Serial Port selection screen appears.

```
Select changes to serial port:
    9600,None,8,1/NoFlow,RTS:Asserted,RS232,RX:I,TX:I

     1: 1200            12: 7 Data bits        23: RX Clock Internal
     2: 2400            13: 8 Data bits        24: RX Clock External
     3: 4800            14: 1 Stop bit         25: TX Clock Internal
     4: 9600            15: 2 Stop bits        26: TX Clock External
     5: 19200
     6: 38400           16: No flow control    27: Set max idle: 4
     7: 57600           17: Hardware flow
     8: 115200          18: RTS Normal
                        19: RTS Asserted
     9: None parity
    10: Odd parity      20: Set for RS232
    11: Even parity     21: Set for RS422
                        22: Set for RS485

    28: Set to default (9600,None,8,1/NoFlow,RTS:Normal,RS232,RX:I,TX:I)
    29: Abandon all changes
    30: Accept current values

Enter option: _
```

Figure 2-14. Serial Port Interface Screen

2. Select a desired serial port change and press **ENTER**. Repeat for each desired change.

3. To exit without making a change, select “Abandon all changes”.

4. To enable the changes, select “Accept current values”.

   When finished, the user will be returned to the First Configuration Menu. The new serial interface settings are displayed.

5. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.4 Serial Format

Changing the serial format can be selected from the following communication protocols:

- RAW
- Genisys ATCS Office
- Genisys ATCS Field
- HDLC UI
- Command mode

To Change the Serial Format:

1. On the First Configuration Menu, select the serial format to be changed. The Serial format selection screen appears.

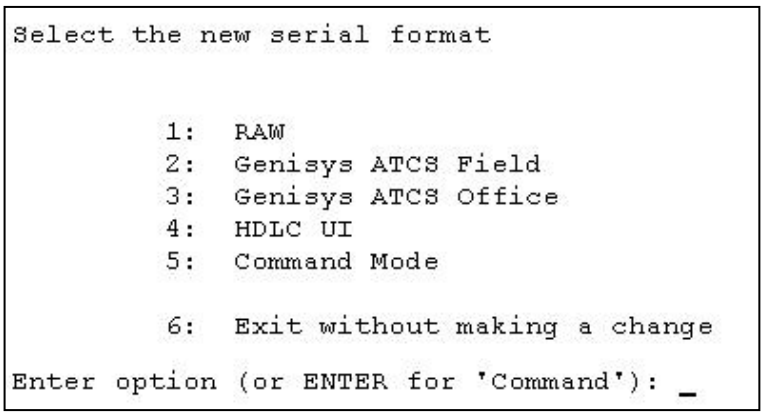


Figure 2-15. Serial Format Screen

2. To keep the current configuration, press **ENTER**. If not, make a selection and press **ENTER**.

3. To exit without making a change, select "Exit without making a change".

   When finished, the user will be returned to the First Configuration Menu. The new serial format setting is displayed.

4. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

Serial Telnet While in Genisys ATCS Mode

When the WAG is configured with a serial interface of either Genisys ATCS protocol (Office or Field), any attempt to establish a TCP connection to the Serial Telnet port will be disallowed.

Such a connection attempt will cause the TCP connection to be established and then immediately be disconnected. The TCP connection is allowed for a brief period of time to log that a connection was attempted and disconnected.

TCP connections are disallowed to the WAG's serial interface when the interface is configured for Genisys because the assumption is that the interface is being used for important communications to other serial devices. This prevents the operator from interfering with the communications assumed to be taking place on the serial interface.

Serial Telnet While in HDLC Mode

When a TCP connection is attempted to the serial interface of a WAG that's configured for HDLC, if the WAG isn't configured for Persistent Serial Tunnel, the WAG will immediately disconnect the TCP connection.

The Persistent Serial Tunnel TCP connection is allowed because the HDLC device is allowed to tunnel, but the TCP connections are not allowed to the serial interface if there is no persistent tunnel. This prevents an operator from interfering with any HDLC communications that are taking place on the serial interface.

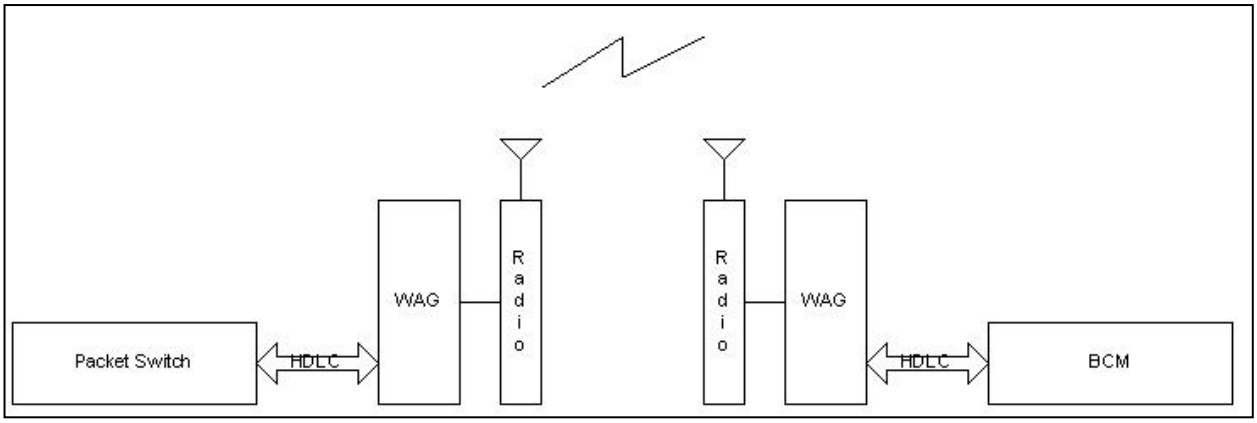


Figure 2-16. An Example of HDLC Tunneling

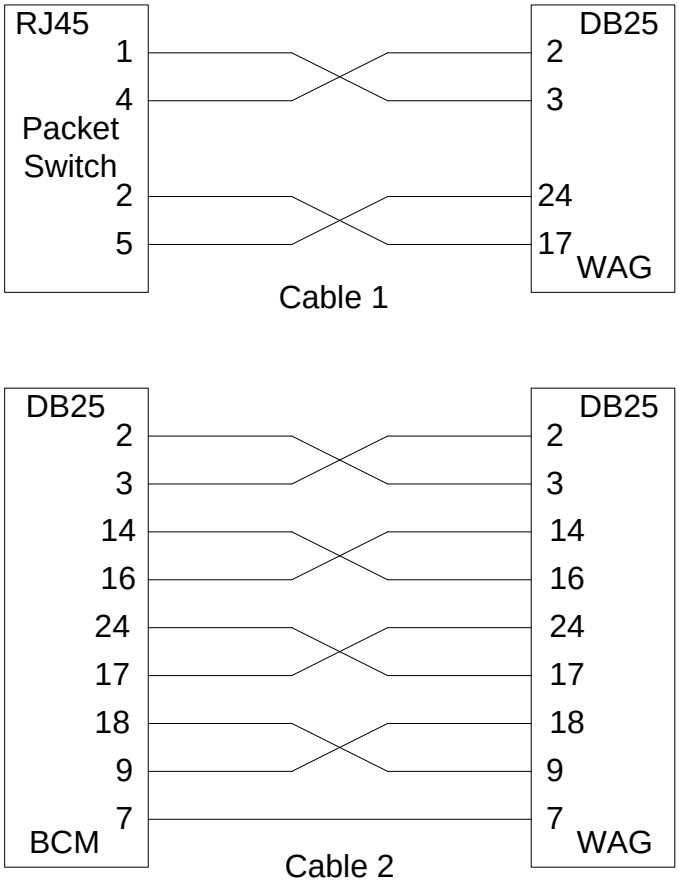


Figure 2-17. An Example of HDLC Tunneling Cable Interconnections

2.6.5 WAG Test Mode

This function is for future application and is not operational at this time. Leave it Disabled.

2.6.6 Echelon Address

Changing the Echelon address lets the user specify the Echelon address the WAG has on the twisted pair Echelon network. The user should ensure that a unique Echelon address is used for each piece of equipment on the network.

Prior to starting, ensure the user has available the complete Echelon address to be used.

NOTE

NOTE

If the WAG is being used with the 53201 HD/LINK Vital I/O, leave the default settings of subnet 01 and node 01.

To Assign an Echelon Address:

1. On First Configuration Menu, select "Echelon address" to be changed. The Change Echelon Address configuration screen appears prompting for the subnet address (first two digits of Echelon address).

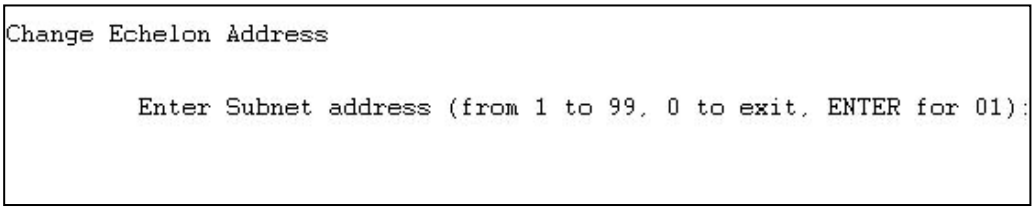


Figure 2-18. Echelon Configuration Screen

2. Do the following:

   a. To keep the current subnet address value, press **ENTER**. To enter a new value, type the two digits of the new Echelon subnet address and press **ENTER**.

NOTE

NOTE

Set the subnet field to 1 to use with Safetran equipment. It is recommended to set the node address to the same value as the sub-node field of the Type 7 ATCS Address.

   The Change Echelon Address configuration screen next prompts for the node address (second two digits of Echelon address).

   b. To keep the current node address value, press **ENTER**. To enter a new value, type the two digits of the new Echelon node address and press **ENTER**.

   When finished, the user will be returned to the First Configuration Menu. The new Echelon address is listed.

3. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.7 UDP Port Assignments

If two or more WAGs need to communicate with each other across the Ethernet, the Slot #1 UDP port number configured in all WAGs must be the same. However, the user may choose to isolate WAGs from conflicting with each other by configuring the Slot #1 UDP port numbers differently.

UDP port numbers 9999 and 10000 are protected. The user cannot specify these port numbers.

To Assign UDP Port Numbers:

1. On the First Configuration Menu, select “UDP ports” assignments to be changed. The UDP port assignment screen appears. The UDP port assignment defaults are; 5000, 5001, 5002, and 5003.

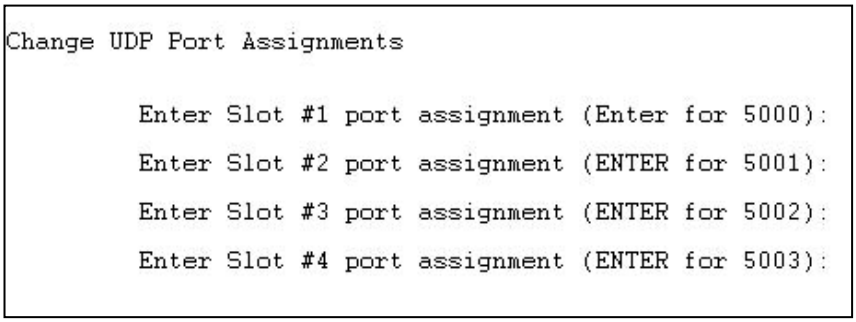


Figure 2-19. UDP Port Assignment Screen

UDP Port Assignment Screen

2. To keep the current UDP port assignment, press **ENTER**. If not, enter the assignment value for slots 1 through 4 and then press **ENTER**.

   When finished, the user will be returned to the First Configuration Menu. The UDP assignments are listed.

3. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.8 Router Expiration Timer

If a device is turned off or otherwise stops communicating, the WAG Router Expiration timer starts running. When the timer expires, the routing table entry for the device is removed from the routing table. The user can specify the time period before a device is timed-out.

The Router Expiration timer is set to 5400 seconds by default.

To Specify a Router Expiration Time:

1. On First Configuration menu, select "Route table expiry" timer to be set. The Router expiry timer configuration screen appears.

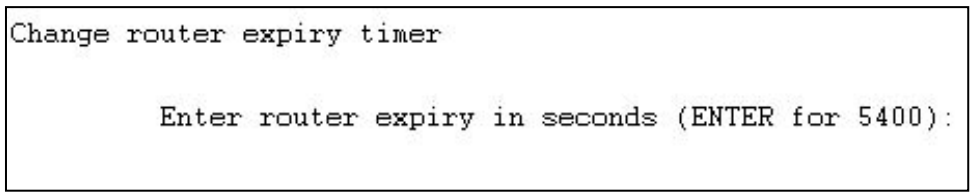


Figure 2-20. Router Expiry Timer Screen

2. To keep the current displayed value, press **ENTER**. To enter a new value, type the number of seconds desired.

NOTE

NOTE

The routing table is cleared with every power cycle of the WAG, regardless of the timer value.

When finished, the user will be returned to the First Configuration Menu. The Route Table Expiry timer setting is listed.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.9 Broadcast Medium

The broadcast medium is the channel on which the WAGs talk to each other. Typically this is the Ethernet interface; however Ethernet, Echelon, or serial can be selected as the broadcast medium.

The broadcast medium is set to IP Ethernet Interface by default.

To Configure the Broadcast Medium:

1. On the First Configuration Menu, select "Broadcast medium" to be changed. The Broadcast interface screen appears.

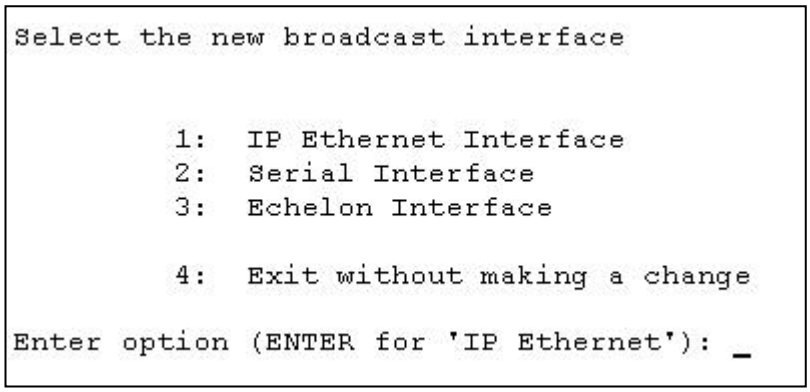


Figure 2-21. Broadcast Interface Screen

2. Select the desired broadcast medium and press **ENTER**.

3. To exit without making a change, select “Exit without making a change”..

   When finished, the user will be returned to the First Configuration Menu.

4. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.10 TCP Port Assignments

TCP port assignments are available when connection based messaging is to be used by the WAGs to communicate across the Ethernet. Both WAGs must have the same port number configured for serial Telnet.

TCP port numbers 9999 and 10000 are protected. The user cannot specify these port numbers.

To Assign TCP Port Numbers:

1. On the First Configuration Menu, select “TCP ports” assignments to be changed. The TCP configuration screen appears. The TCP port assignment defaults are; 23, 6001, 6001, and 6002.

NOTE

NOTE

Socket number 23 is the Internet standard number (or “well known socket number”) for Telnet. Well known socket number 10023 provides a Telnet session that directly accesses the WAG serial interface. Any of the four TCP slots may be configured to either well known socket numbers for this mode of operation.

```
Change TCP Port Assignments

        Enter Slot #1 port assignment (ENTER for 23):
        Enter Slot #2 port assignment (ENTER for 6000):
        Enter Slot #3 port assignment (ENTER for 6001):
        Enter Slot #4 port assignment (ENTER for 6002):
```

Figure 2-22. TCP Configuration Screen

2. To keep the current TCP port assignments, press **ENTER**. If not, enter the assignment value for slots 1 through 4 and then press **ENTER**.

   When finished, the user will be returned to the First Configuration Menu. The TCP port numbers are shown.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.11 DHCP Server

The Dynamic Host Configuration Protocol (DHCP) server (or Site ID) can be enabled or disabled depending on whether the WAG is required to provide configuration information for up to five A53325 Safetran Ethernet Radios. When DHCP is enabled, the WAG will support the A53325 Safetran Ethernet Radio operation running Linear Network Software.

To Change the DHCP Server:

1. On the First Configuration Menu, select "DHCP server" to be changed. The DHCP Server screen appears.

```
Select the new DHCP Server option


        1:  Enable DHCP Server
        2:  Disable DHCP Server

        3:  Exit without making a change

Enter option (ENTER for 'Disabled'): _
```

Figure 2-23. DHCP Server Screen

2. To keep the current configuration, press **ENTER**. If not, make a selection and press **ENTER**.

3. To exit without making a change, select “Exit without making a change”.

   When finished, the user will be returned to the First Configuration Menu.

4. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.12 WAG IP Address

Changing the WAG IP address allows the user to specify the IP address the WAG has on the network. The user should ensure that a unique IP address is used for each unit on the network.

The default WAG IP Address is 10.232.53.40. Prior to starting, ensure the user has available the complete IP address to be used.

To Assign WAG IP Address:

1. On the First Configuration Menu, select “WAG IP Address” to be assigned. The Change WAG IP Address screen displays.

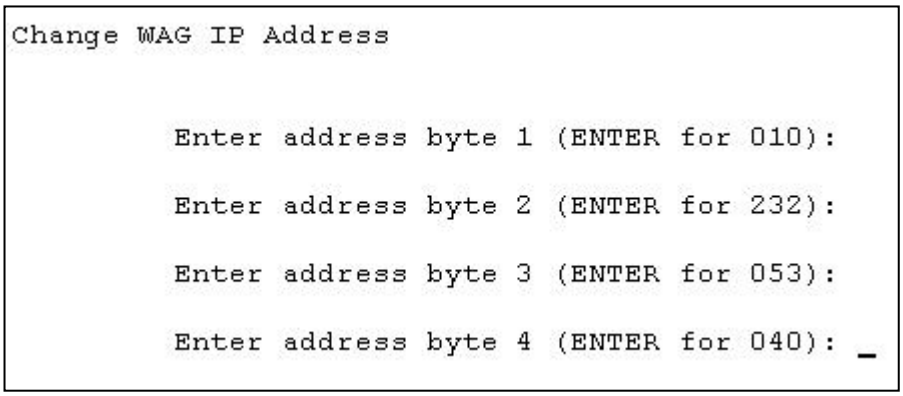


Figure 2-24. Change WAG IP Address Screen

2. To keep the current WAG IP address default, press **ENTER**. If not, enter the address bytes 1 through 4 and then press **ENTER**.

   The user will be returned to the First Configuration Menu.

3. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.13 Type 7 Address Route Length

The significant number of ATCS address digits to be used for determining how to route the ATCS messages can be configured. The allowable values are from 4 digits to 14 digits. A setting of 004 digits displays 7.RRR and routes everything for a particular railroad out to a particular interface. A setting of 014 digits displays the full Type 7 ATCS address (7RRRLLLGGGSSDD) and routes only specific addressed messages to a particular interface.

Typically, 12 significant digits are used (default 7RRRLLLGGGSS) which designates a particular hardware while the DD part of the address designates a particular software application located within that hardware.

The WAG routing table stores the ATCS address of a device that the WAG hears communicating as well as the device's interface. If the device was heard on the Ethernet interface, the IP address of the device that sent the ATCS message is recorded. If the interface was Echelon, the Subnet/Node or Unique Neuron ID of the ATCS device is recorded.

This configuration setting tells the router how many digits to use when searching the destination ATCS address of a message against the routing table to determine which interface to route the ATCS message to.

To Change the Type 7 Address Route Length:

1. On the First Configuration menu, select "Type 7 Address Route Length" of the WAG to be changed. The Type 7 Address Route Length Address screen appears.

```
Change Type 7 Address Route Length
Select number of digits from 4 to 14

        Enter number of digits (ENTER for 012 - 7RRRLLLGGGSS): _
```

Figure 2-25. Type 7 Address Route Length Screen

2. To keep the current configuration, press **ENTER**. If not, make a selection by entering a number from 4 to 14 and then press **ENTER**.

   The user will be returned to the First Configuration Menu. The Type 7 Address Route Length is displayed.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.14 IP Network Mask

The WAG Ethernet interface can be configured to use a particular subnet mask when communicating on the LAN.

The bit number offered indicates the number of subnet mask bits reading from left to right. If a user requests a subnet mask of 21 bits, the mask would display 255.255.248.000.

To Change the IP Network Mask:

1. On First Configuration Menu, select "IP Network Mask" to be changed. The change IP Network Mask screen appears.

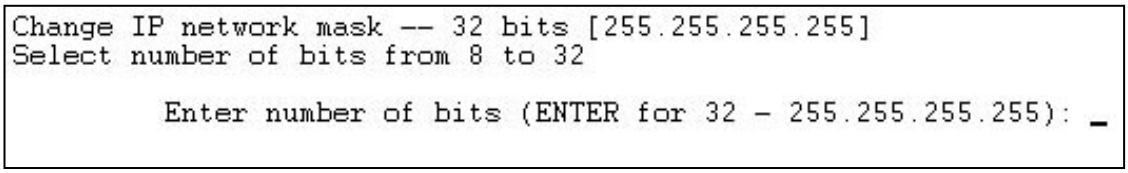


Figure 2-26. Change IP Network Mask Screen

2. To keep the current configuration, press **ENTER**. If not, enter the number of bits from 8 to 32 and then press **ENTER .**

   The user will be returned to the First Configuration Menu. The Type 7 Address Route Length is displayed.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.15 Radio Site ID Bindings

When the WAG is enabled to be a DHCP Server, the WAG can provide A53325 Ethernet Communications Radios running Linear Network Software with configuration information.

If the WAG is configured to send radios their own set of configuration, the installer must configure at least one "binding" into the WAG. Since the WAG allows for up to five radios to be configured, five DHCP bindings can be configured via the Radio Site IDs screen.

NOTE

NOTE

If a DHCP configured radio must be replaced ensure that the WAG is restarted after installation of the new radio.

To Configure the Radio Site ID Bindings:

1. On the First Configuration Menu, select "Radio Site ID Bindings" to be set. The Radio Site IDs/DHCP Bindings screen appears.

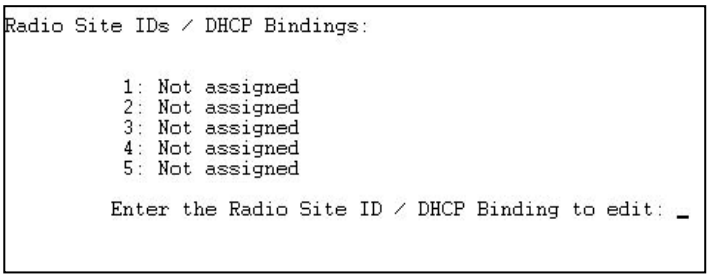


Figure 2-27. Radio Site IDs/DHCP Bindings Screen

2. Select one of the five bindings to create or to edit (binding 1 for this description). When the first binding is selected, the DHCP Binding 1 screen appears.

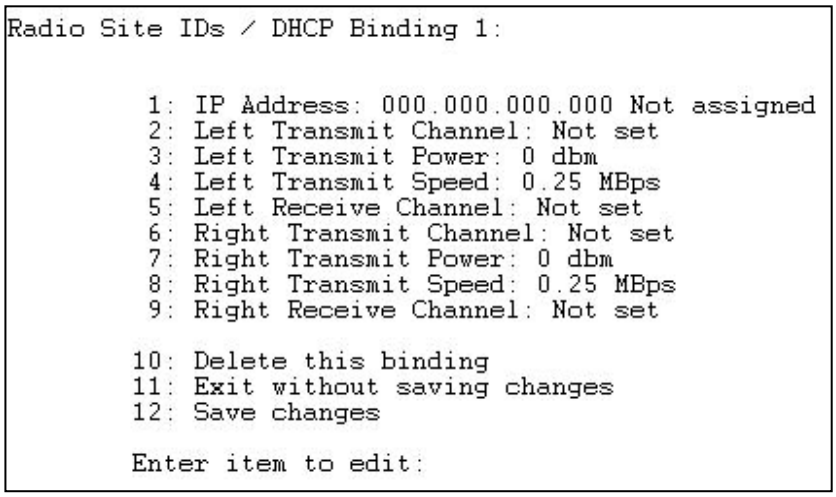


Figure 2-28. DHCP Binding Screen

The Binding IP Address is the address sent to the radio. The radio will configure to the IP address as its own.

3. To assign an IP Address to a Binding, select "IP Address" on the DHCP Binding screen. The Change Binding IP Address screen appears.

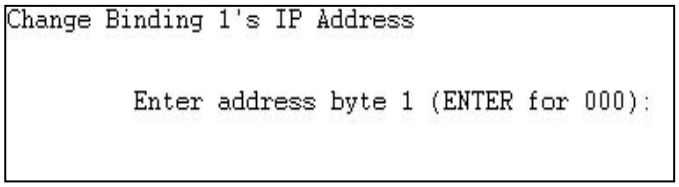


Figure 2-29. Change Binding IP Address Screen

4. To keep the current IP address default, press **ENTER**. If not, enter the address for bytes 1 through 4 and then press **ENTER**.

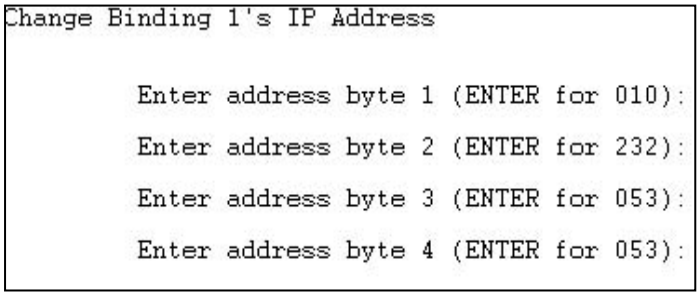


Figure 2-30. Change Binding IP Address Bytes 1 through 4 Screen

The user will be returned to the DHCP Binding Screen.

5. Select change binding "Left transmit channel". The Change Binding Left Transmit Channel screen appears.

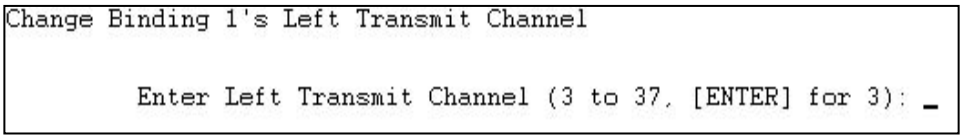


Figure 2-31. Change Binding Left Transmit Channel Screen

6. To keep the transmit channel default, press **ENTER**. If not, enter the transmit channel from 3 to 37 and then press **ENTER**.

The user will be returned to the DHCP Binding Screen.

7. Select change binding "Left transmit power". The Change Binding Left Transmit Power screen appears.

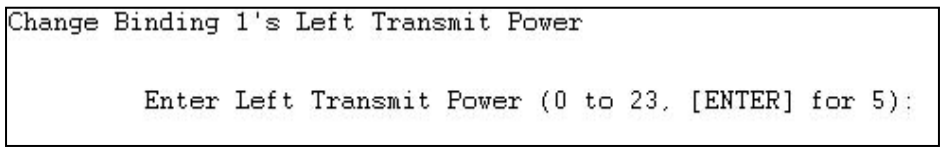


Figure 2-32. Change Binding Left Transmit Power Screen

8. To keep the transmit power default, press **ENTER**. If not, enter the transmit power from 0 to 23 and then press **ENTER .**

   The user will be returned to the DHCP Binding Screen.

9. Select change binding “Left transmit speed”. The Change Binding Left Transmit Speed screen appears.

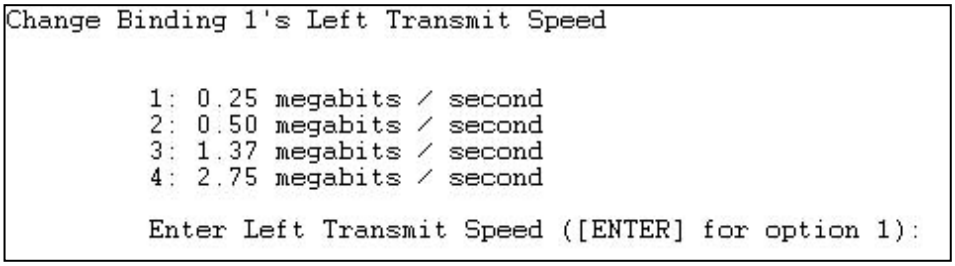


Figure 2-33. Change Binding Left Transmit Speed Screen

10. To keep the transmit speed default, press **ENTER**. If not, select the option number for the desired transmit speed and then press **ENTER .**

    The user will be returned to the DHCP Binding Screen.

11. Select change binding “Left receive channel”. The Change Binding Left Receive Channel screen appears.

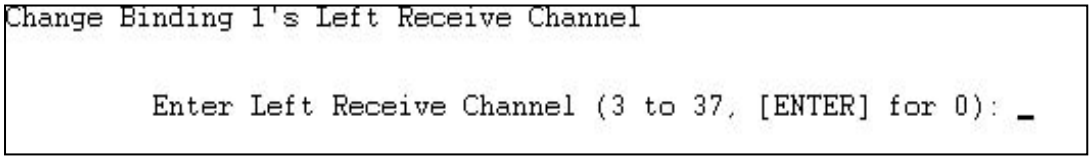


Figure 2-34. Change Binding Left Receive Channel Screen

12. To keep the left receive channel default, press **ENTER**. If not, select the channel number from 3 to 37 and then press **ENTER .**

    The user will be returned to the DHCP Binding Screen.

13. Select change binding “Right transmit channel”. The Change Binding Right Transmit Channel screen appears.

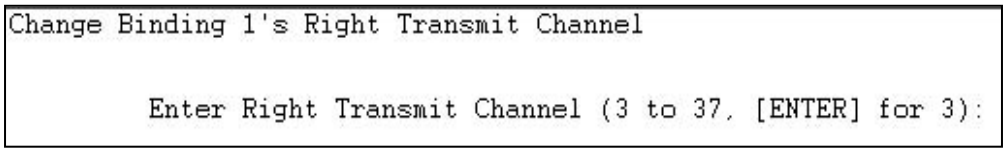


Figure 2-35. Change Binding Right Transmit Channel Scree.

14. To keep the right transmit channel default, press **ENTER**. If not, select the channel number from 3 to 37 and then press **ENTER**.

    The user will be returned to the DHCP Binding Screen

15. Select change binding "Right transmit power". The Change Binding Right Transmit Power screen appears.

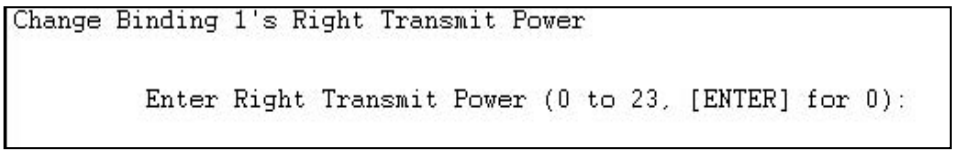


Figure 2-36. Change Binding Right Transmit Power Screen

16. To keep the transmit power default, press **ENTER**. If not, enter the transmit power from 0 to 23 and then press **ENTER**.

    The user will be returned to the DHCP Binding Screen.

17. Select change binding "Right transmit speed". The Change Binding Right Transmit Speed screen appears.

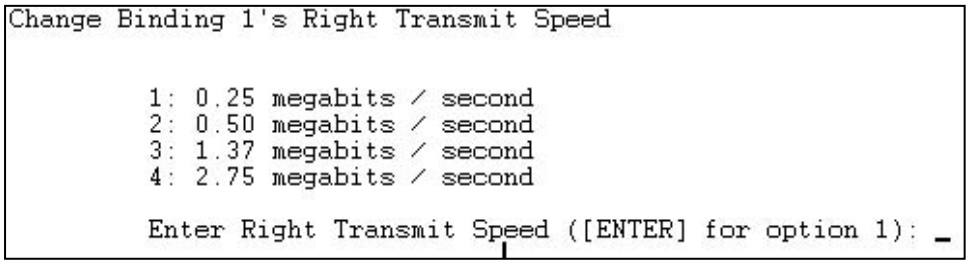


Figure 2-37. Change Binding Right Transmit Speed Screen

18. To keep the transmit speed default, press **ENTER**. If not, select the option number for the desired transmit speed and then press **ENTER**.

    The user will be returned to the DHCP Binding Screen.

19. Select change binding "Right receive channel". The Change Binding Right Receive Channel screen appears.

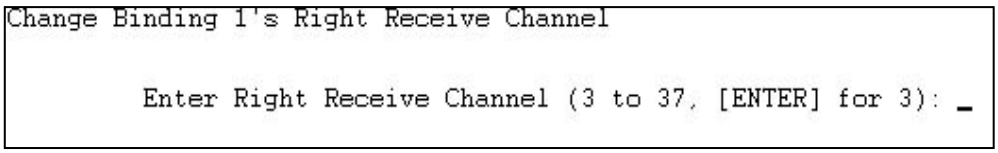


Figure 2-38. Change Binding Right Receive Channel Screen

20. To keep the right receive channel default, press **ENTER**. If not, select the channel number from 3 to 37 and then press **ENTER**.

21. The user will be returned to the DHCP Binding Screen. Select one of the following options (21, 22 or 23):

22. To save changes, select “Save changes”.

23. To exit without making a change, select “Exit without saving changes”.

24. To delete the binding entirely, select “delete this binding”.

25. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

After a binding has been configured, the following is displayed on the Radio Site IDs/DHCP Binding screen.

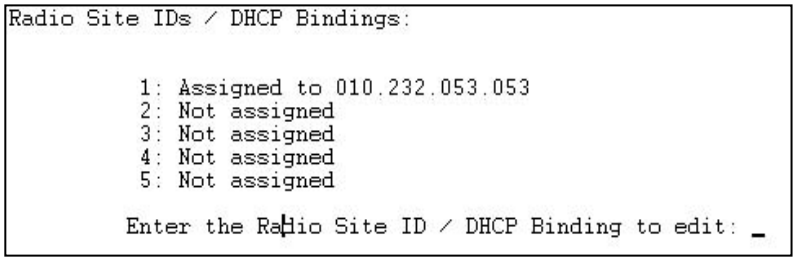


Figure 2-39. Radio Site IDs/DHCP Bindings Screen – After Binding Configuration

26. To view or edit binding information, select the binding option number and press **ENTER .** The following figure is an example of the selected binding after it has been configured.

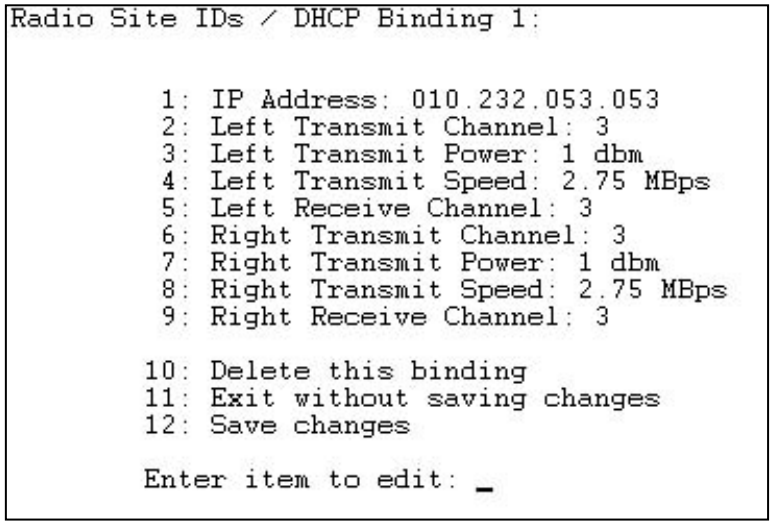


Figure 2-40. Selected Binding Screen – After Binding Configuration

NOTE

NOTE

If a DHCP configured radio must be replaced, ensure that the WAG is restarted after installation of the new radio.

2.6.15.1 If More than One Radio is Co-Located with a DHCP Serving WAG

Typically, only one radio will be configured by a DHCP serving WAG. In the event that more than one radio is co-located with a DHCP serving WAG, the following describes the performance of the WAG in this circumstance:

- An A53325 Ethernet Communications Radio always initiates the request for configuration.

- If the radio already knows an IP address it would like to have assigned, it will ask the WAG for that IP address; otherwise the radio is not configured and does not offer an IP address "hint", informing the WAG that it has no preference.
- The WAG will receive the configuration request and will examine the hardware MAC address of the radio and any IP address "hint" the radio might have offered, and then check its configured bindings to determine which are in use and which are available for the radio.

- If the radio is re-requesting a binding that has already been issued, the WAG will inform the radio that its binding is still valid. The radio will re-establish their hold on bindings about once every 10 hours to ensure WAG has the proper configuration information should the WAG lose power. If this occurs, the radio informs the WAG of its configuration so that the WAG can mark the associated binding as being assigned.

- The WAG will select the first available, unassigned binding to offer the radio. Multiple radios co-located with a WAG are issued bindings on a first-asked, first-served basis.

- After the WAG selects an available binding to offer the radio, the WAG will issue an ICMP PING frame to determine whether any other device on the LAN has been assigned the candidate IP address. Typically, the ICMP PING results in an Address Resolution Protocol (ARP) request being sent first. If any device responds to the ARP frame, the WAG will send the actual ICMP to the MAC address reported in the ARP. When a device reports back with an ICMP PING response, this indicates the candidate IP address is already being used and the WAG will select the next available unassigned binding.

- If no device responds to the PING, the WAG will offer the binding to the radio. The radio will then indicate that the binding is acceptable, allowing the WAG to grant a firm lease on the binding and record the binding as assigned to that radio.

If DHCP serving is disabled or there are no configured bindings, the WAG will ignore all DHCP requests. If all configured bindings are already assigned and a radio requests configuration, the WAG will ignore the DHCP request from that radio.

Site installation of radios with DHCP configuration is important to install and configure properly. Whether it is the simple installation of one radio and one or more WAGs, or more complex with multiple radios and one DHCP serving WAG, the WAG has the ability to trace DHCP requests and replies. Additionally, the diagnostic command “status” offers information about the five possible bindings (if assigned), so that the user may view a radio and its assigned binding.

The DHCP Serving process is specifically designed so that if a radio is destroyed, a new one may be installed without having to configure the radio because the WAG will perform this function. The radio only has to be configured to request DHCP configuration. Further description concerning DHCP tracing and details about the status report on assigned bindings can be found in Section 3.

2.6.16 DHCP Client

The WAG may be configured to automatically acquire its IP address and IP Subnet Bitmask from a DHCP Server. When the WAG’s DHCP Client is configured for “Automatic,” every time the WAG acquires power it will issue a DHCP request. When the DHCP Server responds, the WAG will adopt the offered IP address.

In the event a DHCP Server does not respond, the WAG will issue its request for IP configuration periodically until it gets a response. During the time that the WAG is waiting for a DHCP Server to offer an IP address, the WAG will utilize the IP address that it’s currently configured with.

The following shows the DHCP Client screen.

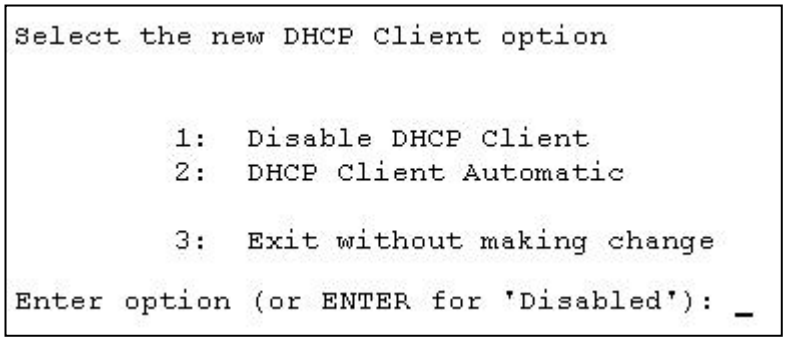


Figure 2-41. DHCP Client

2.6.17 WAG Circuit ID

Every WAG that is operating as a gateway to the office must have a unique Circuit ID. The Circuit ID is used by the office to know which WAG on the Ethernet LAN ATCS messages should be routed to in order to reach type 7 devices that the WAG is connected to.
The WAG Circuit ID consists of three data fields and defaults to 000.0.00 (Disabled).

To Change the WAG Circuit ID:

1. On the Second Configuration Menu, select "WAG Circuit ID" to be changed. The Change WAG Routing Region screen appears.

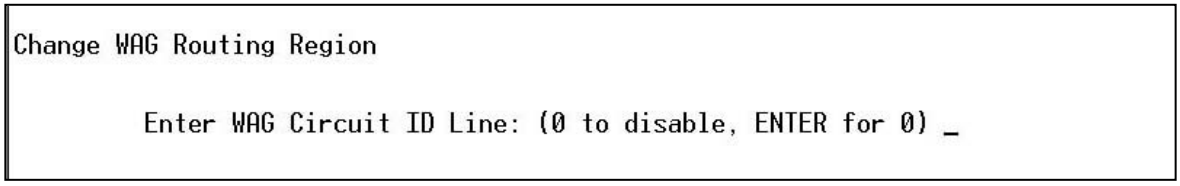


Figure 2-42. Change WAG Routing Region Screen – Initial Screen

2. From this initial screen (Figure 2-42), do one of the following:
   a. To leave the three digits of the first field of a currently assigned WAG Circuit ID unchanged, press **ENTER**. Go to step 3.
   b. To change the three digits of the first field of the WAG Circuit ID, type the digits and then press **ENTER**. Entry can be any value from 1 to 999. Go to step 3.
   c. To disable the WAG Circuit ID and set it to the default value, enter 0 (zero) and then press **ENTER**. The user is returned to the Second Configuration Menu.
3. From the screen in figure 2-43, do one of the following:
   a. To leave the digit of the second field of a currently assigned WAG Circuit ID unchanged, press **ENTER**. Go to step 4.

b. To change the digit of the second field of the WAG Circuit ID, type the digit and then press **ENTER**. Entry can be any value from 1 to 3. Go to step 4.

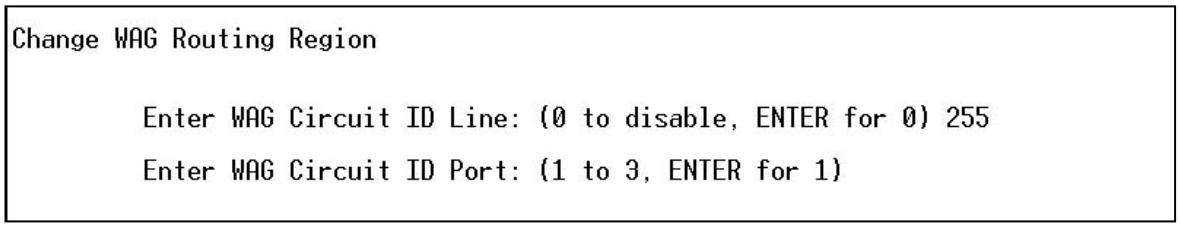


Figure 2-43. Change WAG Routing Region Screen – After Digits Entered In First Field

4. From the screen in figure 2-44, do one of the following:
   a. To leave the digits of the third field of a currently assigned WAG Circuit ID unchanged, press **ENTER**.
   b. To change the digits of the third field of the WAG Circuit ID, type the digits and then press **ENTER**. Entry can be any value from 1 to 15.

   The user will be returned to the Second Configuration Menu. The WAG Circuit ID is displayed.

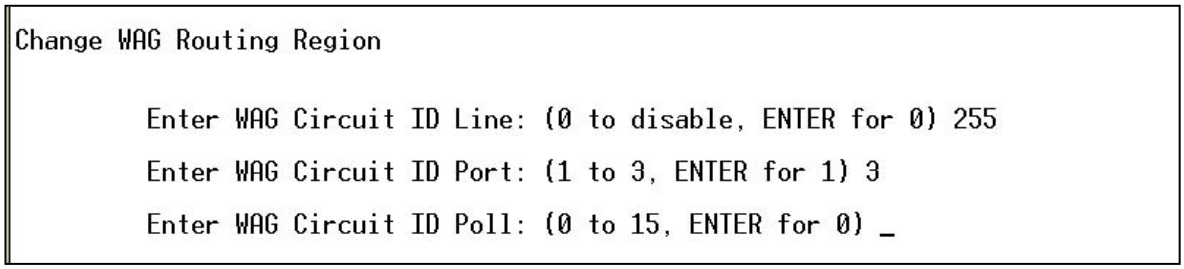


Figure 2-44. Change WAG Routing Region Screen – After Digits Entered In Second Field

5. Prior to exiting the First Configuration Menu, "Save changes then restart" to save changes and restart the WAG.

2.6.18 Routing Region Domain 1

Routing Region Domain 1 consists of four data fields and is intended to contain an IP address (if the first field is set to 0, the function is disabled). The IP address can be a single IP address (unicast) or it can be a multicast or broadcast address such as 255.255.255.255.

This address is typically the IP address of a Packet Switch that handles the necessary LLL routing regions, or a computer running the Office Communications Gateway (OCG) software that will handle the routing regions. This address can also be the IP address of AServer.

If a broadcast IP address is configured here (all 255s) then "route request" messages sent by the WAG to resolve the route for an LLL will be broadcast on the Ethernet LAN.

If a DNS (Directory Name Services) server is configured into the WAG, symbolic names for the Domain may be provided and the WAG will look up the IP address for the symbolic name.

This function defaults to Disabled.

To Change Routing Region Domain 1:

1. On the Second Configuration Menu, select "Routing Region Domain 1" to be changed. The Change Routing Region Domain One screen appears (figure 2-45).

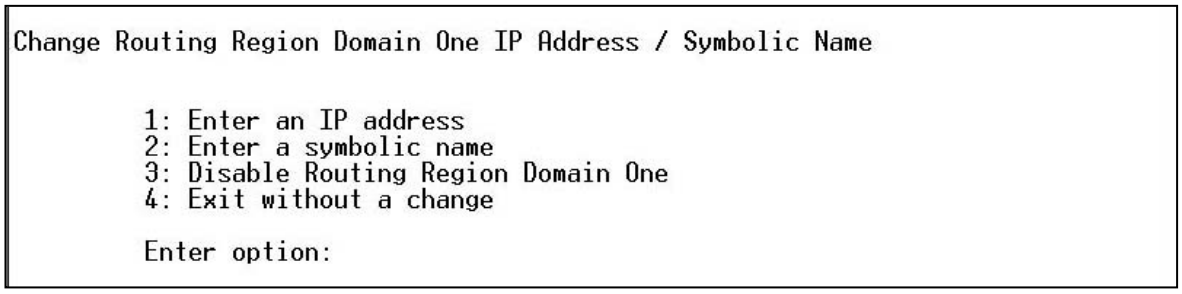


Figure 2-45. Change Routing Region Domain One - Initial Screen

2. From this initial screen, do one of the following:
   a. To enter or change an IP Address, select "Enter an IP address" and then press **ENTER**. Go to step 3.
   b. To enter or change a symbolic name, select "Enter a symbolic name" and then press **ENTER**. Go to step 4.
   c. To disable Routing Region Domain 1, select "Disable Routing Region Domain One" and then press **ENTER**. The user is returned to the Second Configuration screen.
   d. To exit this function without making changes, select "Exit without a change" and then press **ENTER**. The user is returned to the Second Configuration screen.
3. From the screen in figure 2-45 If "Enter an IP Address" was selected, then do one of the following (see Figure 2-46):
   a. To disable Routing Region Domain 1, enter 0 (zero) in the first data field and then press **ENTER**. The user will be returned to the Second Configuration Menu.
   b. To leave the first data field of the current IP Address unchanged, press **ENTER**.
   c. To change the first data field of the IP Address, type the digit(s) and then press **ENTER**. Entry can be any value from 1 to 255.
   d. Repeat step b or c above for each of the four data fields. After the fourth data field is filled, the user will be returned to the Second Configuration Menu.

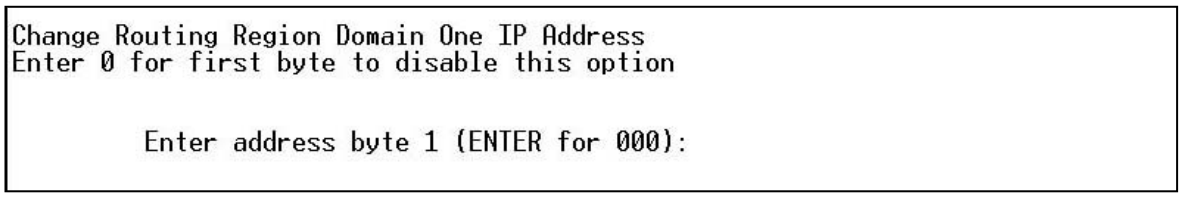


Figure 2-46. Change Routing Region Domain One - IP Address Screen

4. On the Symbolic Name screen (figure 2-47), enter the symbolic name for Routing Region Domain 1. Entries can consist of up to 40 characters including A-Z, 1-9 and 0, periods (.) and dashes (-). After entering the symbolic name, press **ENTER**.

   The user will be returned to the Second Configuration Menu.

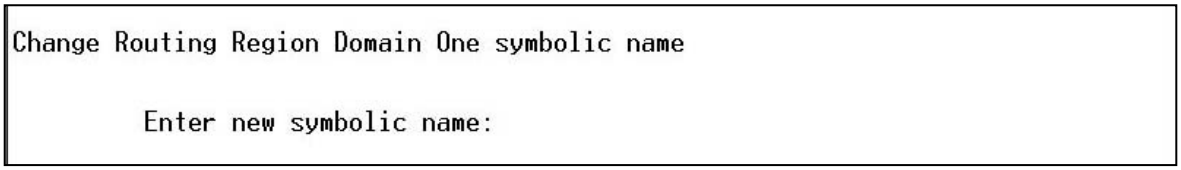


Figure 2-47. Change Routing Region Domain One – Symbolic Name Screen

5. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.19 Routing Region Domain 2

Routing Region Domain 2 is identical to Routing Region Domain 1 described in paragraph 2.6.18 above. If this function is configured with a valid IP address, copies of every "route request" message the WAG sends will be transmitted out this IP address as well as Domain 1.

Two "domains" are provided in the event a router is located somewhere on the LAN that provides redundant paths from the WAG to the office equipment.

If a DNS server is configured into the WAG, symbolic names for the Domain may be provided and the WAG will look up the IP address for the symbolic name.

This function defaults to Disabled.

Refer to paragraph 2.6.18 for instructions on how to set Routing Region Domain 2. The Routing Region Domain 2 option is on the Second Configuration Menu.

2.6.20 ATCS Server UDP Port Number

Office devices usually listen for "route request" and other messages on a specific UDP port number. The default port number is 5361, however it is configuration setting.

To change the ATCS Server UDP Port Number:

1. On the Second Configuration Menu, select "ATCS Server UDP Port number" to be changed. The Change ATCS Server UDP Port Number screen appears.

```
Change ATCS Server UDP Port Number

        Enter ATCS Server UDP Port: (ENTER for 5361) _
```

Figure 2-48. Change ATCS Server UDP Port Number Screen

2. To keep the current ATCS Server UDP Port Number, press **ENTER**. If not, enter the new port number and then press **ENTER.** Entry can be any value from 0 to 65535.

   The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.21 Telnet Port Numbers

Because there are routers, bridges, and hubs that block Telnet port 23 for security reasons, the "well known" Telnet and Serial Telnet port numbers have been made configuration setting. This will allow the user to change the numbers to values that are not blocked.

The default values for this function are 23 for the WAG Telnet port and 10023 for the Serial Telnet port.

To change the Telnet Port Numbers:

1. On the Second Configuration Menu, select "Telnet Port Numbers" to be changed. The Change Telnet Port Numbers screen (see Figure 2-49) appears.

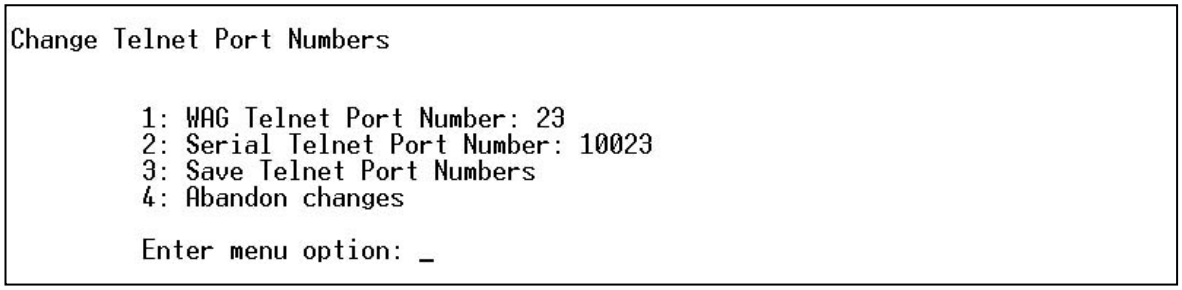


Figure 2-49. Change Telnet Port Numbers Screen

2. Do one of the following:
   a. To change the WAG Telnet Port Number, select WAG Telnet Port Number option number and press **ENTER**. Go to step 3.
   b. To change the Serial Telnet Port Number select Serial Telnet Port Number option number and press **ENTER**. Go to step 4.
3. From the screen in figure 2-50, press **ENTER** to keep the current port number value or enter the new WAG Telnet Port Number and then press **ENTER.** Entry can be any value from 0 to 65535. The default is 23.

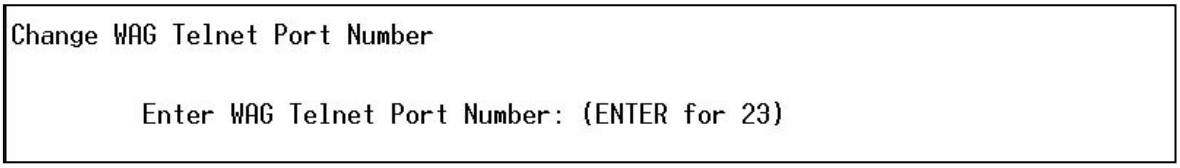


Figure 2-50. Change WAG Telnet Port Number Screen

4. From the screen in figure 2-51, press **ENTER** to keep the current port number or enter the new Serial Telnet Port Number and then press **ENTER.** Entry can be any value from 0 to 65535. The default is 10023.

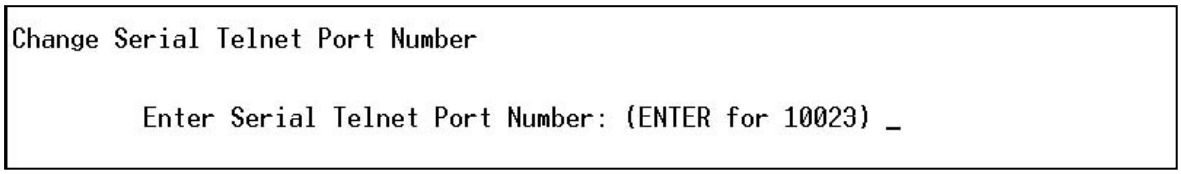


Figure 2-51. Change Serial Telnet Port Number Screen

5. From the Change Telnet Port Numbers Menu (figure 2-49) do one of the following:
   a. To save the new Telnet port number entries, select "Save Telnet Port Numbers" option number and then press **ENTER**.
   b. To abandon any changes, select "Abandon changes" option number and then press **ENTER**.

6. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.22 Genisys Wait Poll Response

The Genisys wait poll response is used when the serial interface is configured for Genisys ATCS Office. It designates the amount of time to wait before sending a Genisys poll.

The default value is 800ms.

To set the Genisys Wait Poll Response Time:

1. On the Second Configuration Menu, select “Genisys wait poll response” Wait Timer to be set. The Change Genisys Poll Response Wait Timer screen appears.

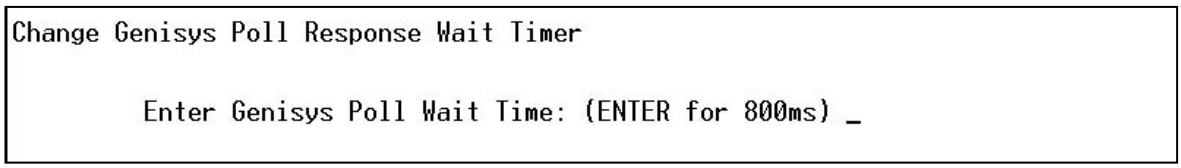


Figure 2-52. Change Genisys Poll Response Wait Timer Screen

2. To keep the current timer setting, press **ENTER**. To change the timer setting, enter the new value and then press **ENTER**. Entry can be any value from 20 to 65535.

   The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select “Save changes then restart” to save changes and restart the WAG.

2.6.23 ATCS Retry Wait

The ATCS Retry Wait is used when the serial interface is configured for Genisys ATCS Office. It designates the amount of time to wait before re-sending an ATCS message that has not been acknowledged.

The default value is 800ms.

To set the ATCS Retry Timeout:

1. On the Second Configuration Menu, select “ATCS Retry wait” Timer to be set. The Change ATCS Retry Timeout screen (see Figure 2-53) appears.

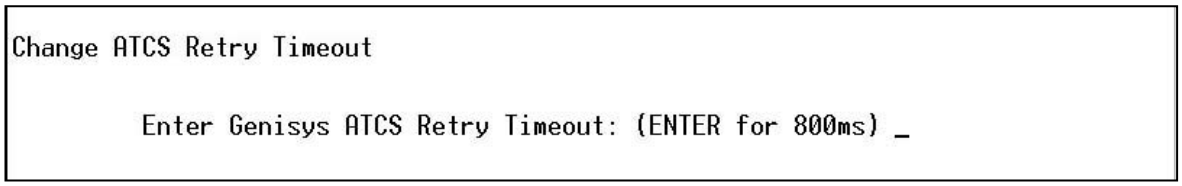


Figure 2-53. Change ATCS Retry Timeout Scree

2. To keep the current timer setting, press **ENTER**. To change the timer setting, enter the new value and then press **ENTER**. Entry can be any value from 20 to 65535.

   The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.24 ATCS Max Retries

ATCS Max Retries is used when the serial interface is configured for Genisys ATCS Office. It designates the number of times to retry the sending of an ATCS message before giving up after waiting for an acknowledgement.

The default value is 3.

To set the ATCS Max Retries value:

1. On the Second Configuration Menu, select "ATCS Max retries" count to be set. The Change Genisys ATCS Maximum Retry Count screen appears.

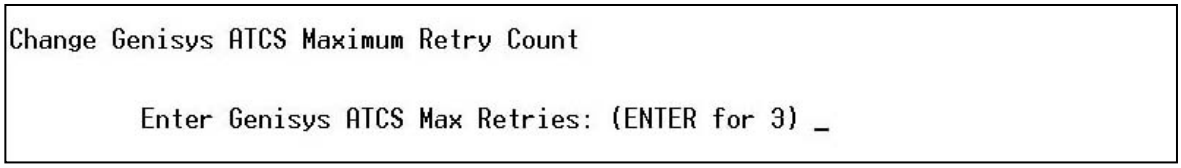


Figure 2-54. Change ATCS Retry Timeout Screen

2. To keep the current retry count setting, press **ENTER**. To change the retry count setting, enter the new value and then press **ENTER**. Entry can be any value from 0 to 255.

   The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.25 Genisys Poll Starting Station

The Genisys poll starting station is used when the serial interface is configured for Genisys ATCS Office. It designates the starting station number to poll.

The default value is 1.

To set the Genisys Poll Starting Station:

1. On the Second Configuration Menu, select "Genisys Poll Starting Station" to be changed. The Change Genisys Starting Station Polling Number screen appears.

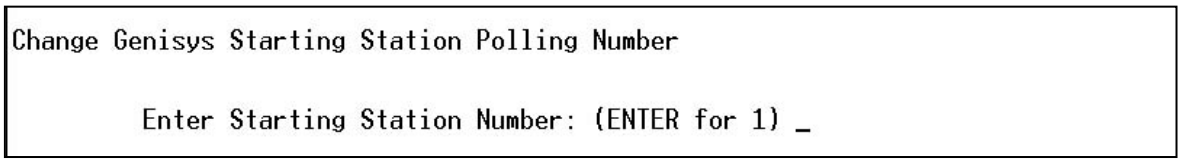


Figure 2-55. Change Genisys Starting Station Polling Number Screen

2. To keep the starting station number setting, press **ENTER**. To change the starting station number setting, enter the new value and then press **ENTER.** Entry can be any value from 0 to 64.

   The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.26 Genisys Poll Ending Station

The Genisys poll ending station is used when the serial interface is configured for Genisys ATCS Office. It designates the ending station number to poll.

The default value is 16.

To set the Genisys Poll Ending Station:

1. On the Second Configuration Menu, select "Genisys Poll Ending Station" to be changed. The Change Genisys Ending Station Polling Number screen appears.

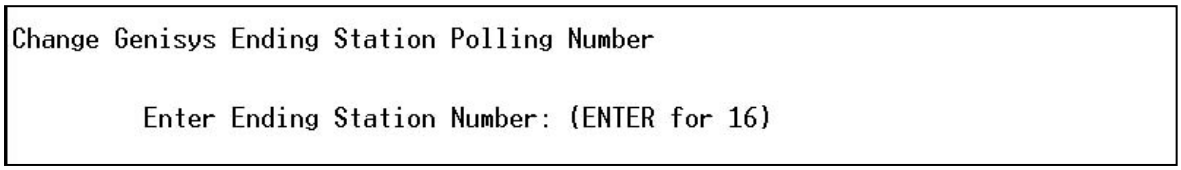


Figure 2-56. Change Genisys Ending Station Polling Number Screen

2. To keep the ending station number setting, press **ENTER**. To change the ending station number setting, enter the new value and then press **ENTER.** Entry can be any value from 0 to 64.

   The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.27 Fragile Telnet Connection

When the Fragile Sockets function is enabled, if a Telnet or Serial Telnet connection exists to a WAG and someone else attempts to make a connection, the old connection is dropped in favor of the new one, allowing a user to steal the connection.

When the Fragile Sockets function is disabled, if a Telnet or Serial Telnet connection exists and someone else tries to make the connection, the attempted connection is refused and the original owner keeps the connection.

The Fragile Sockets function defaults to ENABLED so that people may walk away from their computers or leave for the day and others may seize control of the connection.

To enable/disable Fragile Telnet Connections:

1. On the Second Configuration Menu, select "Fragile Telnet Connections" function to be enabled/disabled. The Select the new Fragile Telnet Connections Option screen appears.

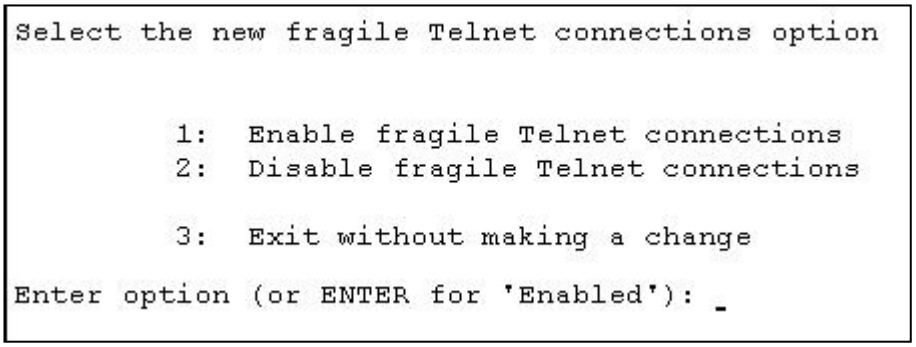


Figure 2-57. Select the new Fragile Telnet Connections Option Screen

2. Select the desired Fragile Telnet Connections option and press **ENTER**.

The user will be returned to the Second Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.28 Persistent Serial Tunnel

Each WAG is provided with the IP address or symbolic name of the remote WAG using the "Persistent Serial Tunnel" configuration option. If the first byte of the IP address is configured with 0, the PST functionality is disabled.

The value defaults to DISABLED.

To change the Persistent Serial Telnet IP Address or Symbolic Name:

1. On the Second Configuration Menu, select "Persistent Serial Tunnel" Telnet IP Address or Symbolic Name to be changed. The Change Persistent Serial Telnet IP Address screen appears.

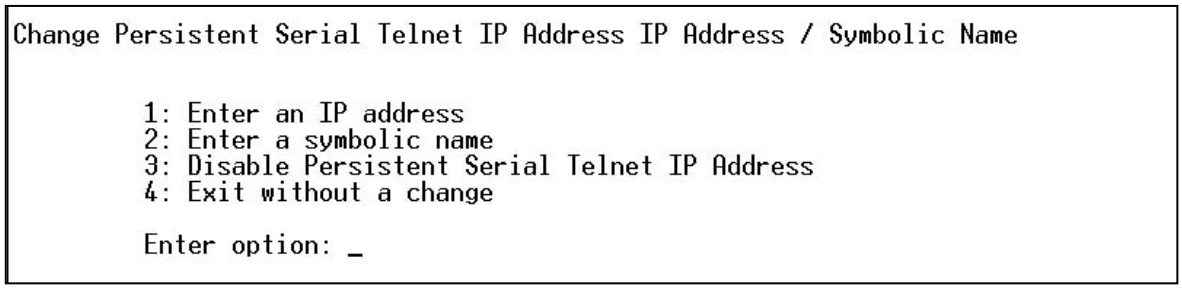


Figure 2-58. Change Persistent Serial Telnet IP Address Screen

2. Do one of the following:
   a. To change or enter the IP Address, select "Enter an IP address" option number and press **ENTER**. Go to step 3.
   b. To change or enter the Symbolic Name, select "Enter a Symbolic name" option number and press **ENTER**. Go to step 4.
   c. To disable the Persistent Serial Telnet function, select "Disable Persistent Serial Telnet IP Address" option number and press **ENTER**. The user will be returned to the Second Configuration Menu. Go to step 5.
   d. To exit the Persistent Serial Telnet function without making changes, select "Exit without a change" option number and press **ENTER**. The user will be returned to the Second Configuration Menu. Go to step 5.

3. From the screen in figure 2-59, do one of the following:

a. To disable the Persistent Serial Telnet IP Address enter 0 (zero) in the first data field and then press **ENTER**. The user will be returned to the Second Configuration Menu.
b. To leave the first data field of the current IP Address unchanged, press **ENTER**.
c. To change the first data field of the IP Address, type the digit(s) and then press **ENTER**. Entry can be any value from 1 to 255.
d. Repeat step b or c above for each of the four data fields. After the fourth data field is filled, the user will be returned to the Second Configuration Menu. Go to step 5.

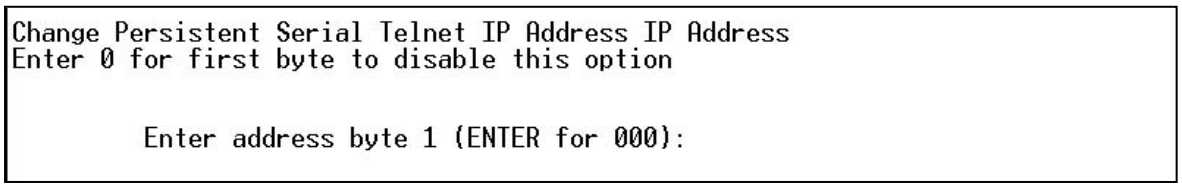


Figure 2-59. Change Persistent Serial Telnet IP Address Screen

4. On the screen in figure 2-60, enter the symbolic name for the Persistent Serial Telnet IP Address. Entries can consist of up to 40 characters including A-Z, 1-9 and 0, periods (.) and dashes (-). After entering the symbolic name press **ENTER**.

   The user will be returned to the Second Configuration Menu. Go to step 5.

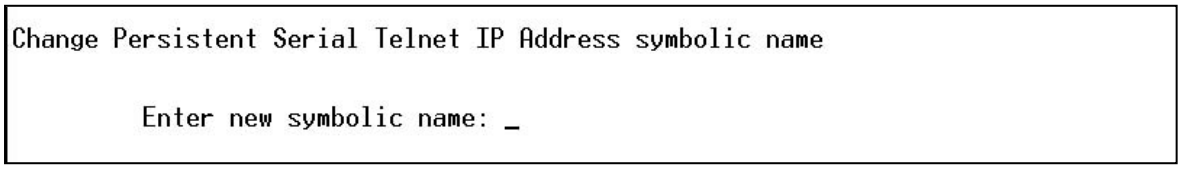


Figure 2-60. Change Persistent Serial Telnet IP Address Symbolic Name Screen

5. Prior to exiting the Second Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.28.1 Typical PST Configuration Parameter Settings

The following table shows typical configuration settings for a WAG using the Persistent Serial Tunnel function.

Table 2-2. Typical WAG Configuration Settings For PST Function

Settings on First Configuration Screen	
WAG Type 7 ATCS Address:	**7.620.300.301.01.01**
WAG Type 3 ATCS Address:	**3.620.30.3000**
Serial interface:	**115200,None,8,1/NoFlow**
Serial format is:	**RAW**
WAG test mode:	**disabled**
Echelon address:	**01.01**
UDP ports are:	**5000, 5001, 5002, 5003**
Route table expiry:	**120** seconds
Broadcast medium:	**IP Ethernet**
TCP ports are: DHCP Server:	**23, 10023, 6001, 6002 Disabled**
WAG IP Address:	**10.232.53.42**
Type 7 Address Route Length	**12** -- 7RRRLLLGGGSS
Set IP Network Mask:	**255.255.255.255**
Settings on Second Configuration Screen	
WAG Circuit ID:	**000.0.00** (Disabled)
Routing Region Domain 1:	**Disabled**
Routing Region Domain 2:	**Disabled**
ATCS Server UDP Port number:	**5361**
Telnet Port Numbers	(**WAG: 23, Serial: 10023**)
Genisys wait poll response:	**800ms**
ATCS Retry wait:	**800ms**
ATCS Max retries:	**3**
Genisys Poll Starting Station: Genisys Poll	**1**
Ending Station:	**16**
Fragile Telnet Connections:	**Enabled**
Persistent Serial Tunnel:	**010.232.053.043**

2.6.29 Primary and Secondary DNS

These are the IP addresses of one or two DNS servers that are somewhere on the user's WAN. If the Domain One, Domain Two, or Default Gateway for the WAG is configured to use symbolic names rather than hard-coded IP addresses, either the primary DNS or the secondary DNS must be configured with a valid IP address.

When the WAG powers up, it waits for the XPORT component to indicate that it is ready to carry IP Ethernet traffic. The WAG then checks to see if there are any symbolic names configured in the Domain One, Domain Two, or Default Gateway fields.

If there is at least one symbolic name, the WAG checks to see if there is a valid DNS IP address configured in either the Primary, Secondary or both DNS configuration fields.

If there are, the WAG will ask the DNS servers on the Ethernet LAN what the IP addresses are for the symbolic names. The primary DNS server is asked first and if no answer is received or if the primary DNS server does not know the IP address, the secondary DNS server is asked.

If either server provides an IP address, that IP address is used for the Domain One, Domain Two, or Default Gateway as needed. If neither DNS knows the IP address for the symbolic names, the IP addresses for Domain One, Domain Two, and/or the Default Gateway -- if they used symbolic names -- will remain unresolved and the OSI system will not operate at all.

In the event an Active Route expires (gets moved to the Pending list and then expires), the WAG will discard all of its resolved IP addresses and the symbolic names are once again sent through the look-up process to resolve their IP addresses.

This is very important because disaster recovery factors into this behavior. In the event links to office devices break and are expired, a user may configure a new IP address into one or both of the DNS servers, pointing the office machines to another geographical location somewhere on the Network.

Because of that disaster recovery process, the WAG is required to detect the loss of the office links (by timing out the Active, then Pending routes) and then discarding the resolved IP addresses which may or may not be valid any longer.

Then the WAG, after discarding the old resolved IP addresses, will again ask the DNS servers what the IP addresses are for the symbolic names. In the event a user reconfigured the IP address for the symbolic names in the DNS servers, the servers will inform the WAG of what the new IP addresses are.

This means that if there are a hundred WAGs in the network and an office facility is destroyed or loses power, the WAGs do not need to be reconfigured. Only the DNS server configuration needs to be reconfigured and all WAGs will eventually ask the DNS server what the new IP address is for the symbolic names.

These Primary and Secondary DNS values default to: Disabled

To change the Primary DNS IP Address:

1. On the Second Configuration Menu, select “Primary DNS” IP Address to be changed. The Change Primary DNS IP Address screen appears.

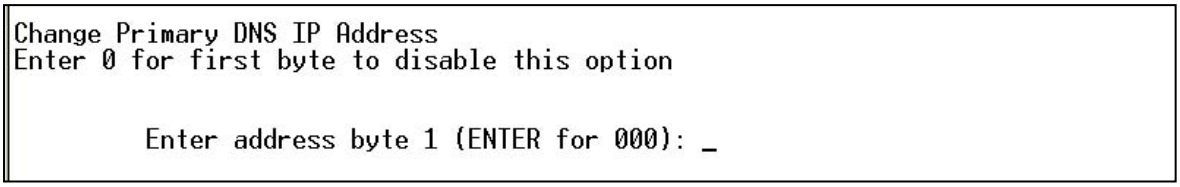


Figure 2-61. Change Primary DNS IP Address Screen

2. From the screen in figure 2-61, do one of the following:
   a. To disable the Primary DNS IP Address enter 0 (zero) in the first data field and then press **ENTER**. The user will be returned to the Second Configuration Menu. Go to step 3.

b. To leave the first data field of the current IP Address unchanged, press **ENTER**.
c. To change the first data field of the IP Address, type the digit(s) and then press **ENTER**. Entry can be any value from 1 to 255.
d. Repeat step b or c above for each of the four data fields. After the fourth data field is filled, the user will be returned to the Second Configuration Menu. Go to step 3.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

To change the Secondary DNS IP Address:

1. On the Second Configuration Menu, select "Secondary DNS" IP Address to be changed. The Change Secondary DNS IP Address screen appears.

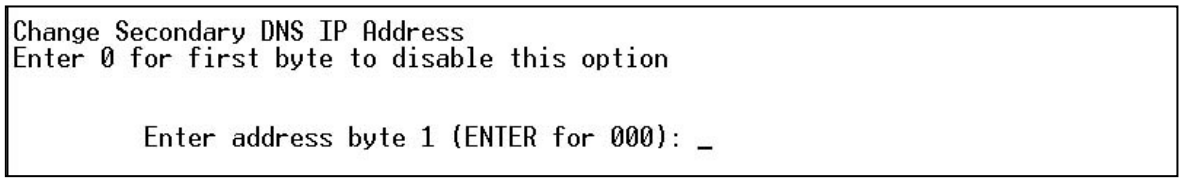


Figure 2-62. Change Secondary DNS IP Address Screen

2. From the screen in figure 2-62, do one of the following:
   a. To disable the Secondary DNS IP Address enter 0 (zero) in the first data field and then press **ENTER**. The user will be returned to the Second Configuration Menu. Go to step 3.
   b. To leave the first data field of the current IP Address unchanged, press **ENTER**.
   c. To change the first data field of the IP Address, type the digit(s) and then press **ENTER**. Entry can be any value from 1 to 255.
   d. Repeat step b or c above for each of the four data fields. After the fourth data field is filled, the user will be returned to the Second Configuration Menu. Go to step 3.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.30 Default IP Gateway

The Default Gateway can only be configured with an IP address. The Default Gateway allows Ethernet IP traffic to be sent from the WAG to different subnets. In the event a destination IP device can not be reached on the WAG subnet, the WAG will send the IP message to the Default Gateway, and the Default Gateway will be responsible for sending the message to its actual destination.

If the Default Gateway is configured for Disabled, then Ethernet messages that are addressed to IP devices that are not on the subnet configured for the WAG will be discarded by the WAG since the destination IP device is considered unreachable.

Often, Default Gateways are bridges, routers, or some other device on the LAN that maintains its own route tables so that it knows how to forward Ethernet messages into and between subnets.

This Default IP Gateway value default is: Disabled.

To change the Default Gateway IP Address:

1. On the Second Configuration Menu, select "Default IP Gateway" Address to be changed. The Change Default Gateway IP Address screen appears.

Figure 2-63. Change Default Gateway IP Address Screen

2. From the screen in figure 2-63, do one of the following:
   a. To disable the Default Gateway IP Address enter 0 (zero) in the first data field and then press **ENTER**. The user will be returned to the Second Configuration Menu. Go to step 3.
   b. To leave the first data field of the current IP Address unchanged, press **ENTER**.
   c. To change the first data field of the IP Address, type the digit(s) and then press **ENTER**. Entry can be any value from 1 to 255.
   d. Repeat step b or c above for each of the four data fields. After the fourth data field is filled, the user will be returned to the Second Configuration Menu. Go to step 3.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

2.6.31 WAG Site ID

The WAG Site ID is a unique ASCII string used to identify the WAG location.

To change the WAG Site ID:

1. On the Third Configuration Menu, select "Change WAG Site ID" to be changed. The Change WAG Site Name screen appears.

```
Change WAG Site Name

        Enter Site Name: (ENTER for ''): _
```

Figure 2-64. Change WAG Site Name Screen

2. On the screen in figure 2-64, do one of the following:
   a. To retain the current WAG Site Name, press **ENTER**.
   b. To change the WAG Site Name, enter an ASCII string of up to 40 characters. Entries can consist of A-Z, 1-9 and 0, and ASCII symbols. After entering the site name, press **ENTER**.

   The user will be returned to Third Configuration Menu.

3. Prior to exiting the First Configuration Menu, select "Save changes then restart" to save changes and restart the WAG.

4. Following the save, the WAG Site ID can be viewed using the SCON command to show the current configuration.

2.6.32 Route RAW Echelon: No

In previous executive software releases for the WAG, RAW Echelon frames (such as those received from an iLOD) were sent to all other WAGs, which then transmitted the Echelon frame out their Echelon interfaces.

The WAG executive software releases, A01E and later, support this as a configuration setting option. When it's configured to NO, any RAW Echelon messages that come into the WAG from its Echelon interface are ignored.

The WAG defaults this configuration setting to: NO.

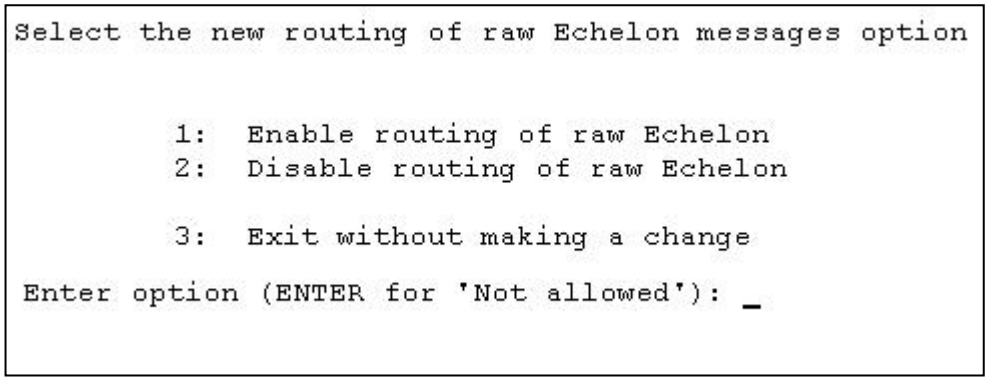


Figure 2-65. RAW Echelon Message Option

2.6.33 Route Unknown Outbound Echelon: No

Prior to release of executive software releases for the WAG, any Echelon frame that was received from the Broadcast Medium was routed out the WAG's Echelon interface despite the fact that the WAG may not have seen the intended destination device on the Echelon interface.

The WAG's usual routing behavior dictates that before the WAG can route an ATCS message to an ATCS device, it must have heard from the destination device first. In previous releases of the executive software, WAG would go ahead and route Echelon messages out its Echelon interface even if the destination ATCS device wasn't in its route table.

When this field is configured as YES, the WAG will continue to route Echelon messages for devices it hasn't seen yet out its Echelon interface.

When this field is configured as NO, the WAG will not route Echelon ATCS messages out its Echelon interface unless it's heard from the intended destination ATCS device first and thus the device is in its route table.

When configured for NO, the internal routing of the WAG is consistent across all interfaces in that it must hear from the device and know of its existence before attempting to route ATCS messages to unseen devices.

The WAG defaults this configuration setting to: NO.

```
Select the new routing of unknown Echelon messages option


         1:  Enable routing of unknown Echelon
         2:  Disable routing of unknown Echelon

         3:  Exit without making a change

Enter option (ENTER for 'Not allowed'): _
```

Figure 2-66. Unknown Outbound Echelon Message Option

2.6.34 Telnet Password: Disabled

If a Telnet password has been defined for the WAG, an operator enters the password (maximum of 20 characters) upon establishing a Telnet session, which will allow commands to be issued to the WAG.

If a password is required, any time the operator enters a command, yet hasn't offered the password yet, the command that was entered will be ignored. If the operator persists in entering commands, every third attempt the operator will be asked to offer the Telnet Password.

The WAG defaults this configuration setting to: DISABLED.

```
Select the Telnet Password option


         1:  Disable Telnet Password
         2:  Enter a Telnet Password

         3:  Exit without making a change

Enter option (ENTER for 'Disabled'): _
```

Figure 2-67. Telnet Password Option

2.6.35 RS485 J1/J2 Jumper Detect: Enabled

This configuration parameter is discussed in the Boot Monitor sections (2.4 and 6.2) of this document.

The WAG defaults this configuration setting to: ENABLED.

SECTION 3
OPERATION

3.0 OPERATION

3.1 INTRODUCTION

This section explains the available commands with respect to the WAG.

Table 3-1. WAG Commands

Command	Shorthand	Description
?	?	Gets a list of keyboard commands.
Break	bre	Breaks to the boot monitor.
Command	com	Returns the WAG serial interface to command mode from Telnet.
Config	con	Allows changes to the WAG configuration.
Data	dat	Returns the WAG serial interface to data mode.
log1	log1	Shows the event log.
log2	log2	Clears the log.
Log3	Log3	Enables/disables event log streaming.
Ping	pin	Sends a PING to an IP address.
Project	pro	Shows system level information about the WAG.
Reqip	reqip	Request a new IP address from a DHCP server.
Restart	res	Reboots the WAG.
Revisions	rev	Displays all WAG software version information.
Routes	rou	Shows the route table.
Rping	rpi	Pings a route ID.
Sconfig	sco	Shows current configuration settings.
Smac	sma	Shows MAC addresses in the route table.
Status	sta	Displays status information of system operation.
Sdate	sda	Sets the current date.
Stime	sti	Sets the time of day.
Testmode	tes	Sets/stops the WAG test mode (0, 1, 2, or 3).
Trace	tra	Traces one or more interfaces.
Ttimes	ttimes	Displays WAG task usage.
Tunnel	tun	Connects RAW serial interface tunnel.
Verbosity	ver	Sends run-time messages out serial interface when unit is in command mode.
Wagreport	wagreport	Search for and report other WAGs.
Winkwag	win	Sends WINK request to a WAG.
Xfiles	xfi	Uploads and downloads files.

NOTE

NOTE

The WAG serial interface must be in Command mode before the following commands will work.

When performing any of the commands described in the following paragraphs, the user can save the information to a file. For more information, see the documentation for the terminal emulation software or for the Telnet application.

3.2 VIEWING THE STATUS

The user can view the status and the log for the WAG. The status shows the operating system status information, serial interface status, router information, XPort information, and Echelon information. This information helps the user verify system operation.

To View the Status:

1. Type `status` and press Enter. The status information appears, similar to the following:

```
Status of Wayside Access Gateway:
---------------------------------
Operating System:
Serial mem pool  0x6C0F8,    21 got,    21 put, 30 remain
XPORT mem pool   0x6EFD8,  1021 got,  1021 put, 30 remain
Echelon mem pool 0x74D98,     0 got,     0 put, 30 remain
End mem pools    0x77C78
Total of 9233 sends, 9178 released (55 in use)
Memory: OKAY, 314784 free, 313292 largest, Sequence: 2

Serial channel:
Sent 120 frames, received 21 frames
116 transmit chokes encountered
Serial interface max baud: 115200
Router status: (3003 messages routed)
Entity Echelon:  00000000 from, 00000000 to
Entity Serial:   00000000 from, 00000000 to
Entity XPort:    00003003 from, 00000000 to
Entity Unknown:  00000000 from, 00000000 to
Local routes:    00000001 sent, 00000000 received
Ignored same:    00000000

XPORT channel:
XPORT 00-20-4a-81-e7-37
XPORT 10.232.53.50, netmask 255.255.255.255 (32 bits)
XPORT Version 9V846-A01B, Jul 27 2005 13:30:34
XPORT 42422 bytes, checksum: 1B424600
Sent 1010 frames, received 1021 frames
UDP sent to XPORT 1001, sent to 68302 3003
TCP sent to XPORT 0, sent to 68302 0
XPORT Alive requests 1 with 2 replies
XPORT serial clock: 115200
XPORT Link Status: UP, 10 MBit

DHCP Server:
There were 10 ignored DHCP discovers
Bind 01: MAC 00-0d-94-00-3a-c2 to IP 010.232.053.053
       : Discovers: 2, Requests: 1

Echelon Channel:
Dupe Address Detect timer: 0
echelon_activity        0  collission_activity        0
collission_detect       0  delayed_transmissions      0
scc1_bsy_count          0  scc1_tx_count           1000
```

```
scc1_rx_count           0  scc1_eof_count           0
good_count              0  bad_count                0
do_transmit_repeat      0  12_dups_discarded        0
```

The last line of the XPORT information in the status example on the previous page shows an entry for “XPORT Link status”. This line pertains to the Ethernet link and informs the user whether the link is UP or DOWN. If the link is UP, the data rate of the link is also indicated (10 Mbit or 100 Mbit).

In the event the link is down, possibly because the Ethernet cable is unplugged from J2 or because the radio plugged into the WAG is not powered, the link status will be indicated on this line as DOWN.

NOTE

NOTE

If the user types status 1, additional information about the stack space usage for the tasks of the WAG will be displayed immediately below “Memory: OKAY”.

2. Type `status 1` and press Enter. The stack space usage information appears below “Memory:” similar to the following:

```
Run Queue:   task_serial_key  (01-02)  24 stack use
Run Queue:   task_serial_out  (03-04)  11 stack use
Run Queue:   task_xport_out   (07-08)  15 stack use
Run Queue:   task_app_timer   (08-09)  12 stack use
Delayed:     task_led         (00-01)  15 stack use
Delayed:     task_echelon_out (05-06)  12 stack use
Mailbox:     task_serial_in   (02-03)  18 stack use
Other Que:   task_echelon_in  (04-05)  13 stack use
Other Que:   task_xport_in    (06-07)  39 stack use
Other Que:   task_router      (09-10)  44 stack use
Other Que:   Raw/Command In   (10-11)  13 stack use
```

NOTE

NOTE

The “xx stack use” indicated at the right side of the example above is the maximum percentage of stack space used by that task and is only used by Siemens Rail Automation personnel to ensure that allocated task stack space does not become exhausted.

3.2.1 Additional Status Information When WAG Configured for OSI

When the WAG is configured for OSI, two additional lists of information are maintained: Active Route Links and Pending Route Links, both of which are associated with OSI. When the WAG receives an ATCS message that is intended for the office (the destination ATCS address of the messages all start with type 2), the WAG looks at the LLL of the source device and calls it a “routing region” after adding 5000 decimal to it.

When the “status” command is entered by the user, an additional block of status information is provided (only if a valid Circuit ID is configured into the WAG). This additional information appears following the Echelon Channel information at the end of the status listing. An example of this information is shown below.

```
Office Communication Circuit ID 140.1.01:
   Received: L3: 31, L4: 132, Others: 10531, Unknown: 662
   Toward office count: 47, Discarded pending count: 0
   Active route links:
      Region Link            Timer
      9999   010.232.053.148 00127
      5112   010.232.053.148 00067
   Pending route links:
      Region Link            Timer
      9999   Pending         Expired
      5873   Pending         00075
      5610   Pending         00004
```

The “Active route links” section shows the routes that an office device has expressed an interest in. In this example, the office device with IP address 10.232.53.148 has indicated that it is interested in receiving all ATCS messages from any device that has the LLL of 112. It also indicates that it is the computer where Network Management System messages may be sent. (Region 9999 is a special region number indicating Network Management.)

Entries in the “Pending route links” section indicate which routes are waiting for an office device to express interest in them. The example shown above indicates that WAG has ATCS traffic from two devices, one with an LLL of 873 and the other with an LLL of 610.

The WAG has sent “route update requests” messages out the two “Routing Region Domains” that are configured into the WAG. These “Routing Region Domains” are IP addresses which may be single IP addresses of a computer running AServer, a computer running OCG, or a Packet Switch. The IP address configured into a “Routing Region Domain” may also be a broadcast IP address; either multicast or broadcast.

3.2.2 Genisys Status Report

If the WAG is configured for RS485 Half-Duplex and Genisys ATCS Office, when the operator types the “status” command, the report section for Genisys offers some useful information about the Genisys ATCS Field devices that it is communicating with.

3.3 VIEWING THE ROUTING TABLE

This command shows information in the route table.

To View the Routing Table:

Type `routes` and press Enter. The route table information appears, similar to the following:

```
FF.SNT.NOD  Timer  Interface         Port  Address              Sent    Received
41.001.003  0120   Echelon                 7.620.020.010.03.02 073269  073249
00.000.000  0120   010.232.053.041   -UDP- 7.620.020.020.03.02 073249  146500
00.000.000  0120   010.232.053.041   -UDP- 7.620.020.020.03.03 040259  000000
00.000.000  0099   010.232.053.041   -UDP- 7.620.123.123.12.10 002152  000000
```

3.4 VIEWING MAC ADDRESSES

This command shows the user any MAC addresses of devices in the routing table.

To View the MAC Address Information:

Type `smac` and press Enter. The MAC information appears, similar to the following:

```
smac
IP Address       Hardware MAC address   ATCS Address
010.232.053.041  00-20-4a-81-e7-40      7.620.020.020.03.02
010.232.053.041  00-20-4a-81-e7-40      7.620.020.020.03.03
010.232.053.041  00-20-4a-81-e7-40      7.620.123.123.12.10
```

3.5 VIEWING THE WAG CONFIGURATION

This command shows the current configuration settings for the WAG.

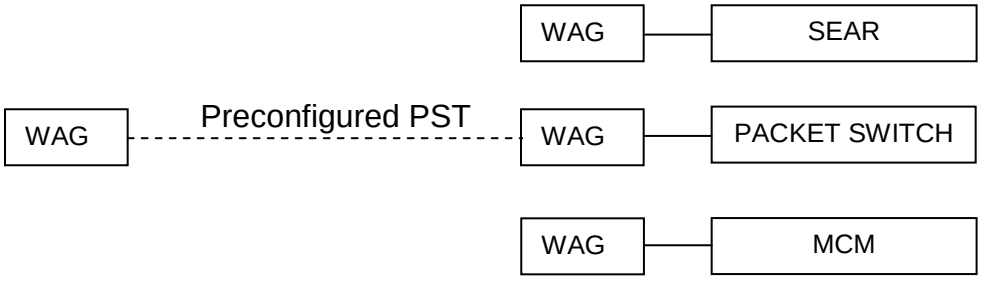
To View the Configuration:

Type `sconfig` and press Enter. The configuration information appears, similar to the following:

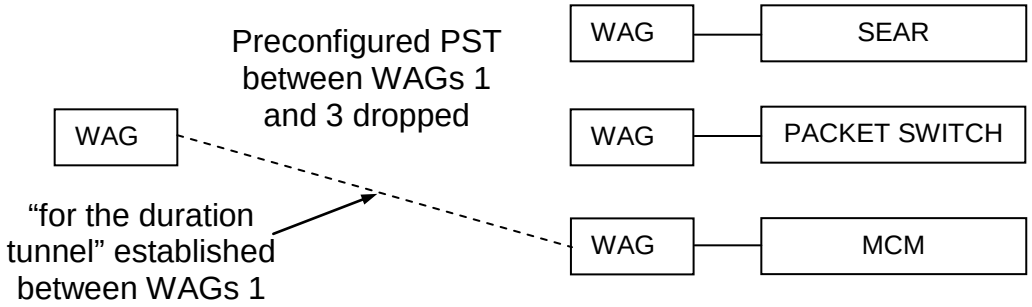
```
Wayside Access Gateway (WAG) up and running.
   WAG ATCS Address: 7.620.100.100.01.01
   Configured IP address: 10.232.53.40
   IP network mask:  32 bits [255.255.255.255]
   Listening on UDP ports 5000, 5001, 5002, 5003
   Listening on TCP ports 23, 6000, 6001, 6002
   Local Echelon: 01.01
   Serial interface: Command, 9600, None, 8, 1/NoFlow
   Route table expiry: 5400 seconds
   Broadcast medium: IP Ethernet
   DHCP Server: Disabled
   Type 7 route length: 12 digits 7RRRLLLGGGSS
```

3.6 PERSISTENT SERIAL TUNNEL COMMAND

If two WAGs are configured for a PST, the tunnel will be established by one of the WAGs at power up. In the diagram below WAGs 1 and 3 are configured for the PST.



At any time after the tunnel is established, the user can drop the tunnel and establish a "for the duration tunnel" with another WAG as described below.



To drop the tunnel once it is established:

Once the PST is established, the user may drop the tunnel by typing `tun` and pressing Enter.

To establish a "for the duration tunnel":

If there is no Tunnel established and there is no Persistent Serial Tunnel IP address configured into the WAG, the user may manually request a "for the duration tunnel" to a remote WAG by typing `tun` followed by the IP address of the remote WAG.

For example, if the user types: tun 10.232.53.55

The WAG will show: Attempting Serial Tunnel to 10.232.53.55

This "for the duration tunnel" requires that both WAGs:

- have the same Serial Telnet port numbers configured into them.
- are listening on those port numbers by having them in their four "TCP ports are" configuration options.
- have their Serial Interface format configured for RAW.

If the “for the duration tunnel” is established, the user is not shown anything when the connection is made; however, anything sent by the user, such as from HyperTerm, will be sent out the serial interface of the remote WAG. This is because once the tunnel is established, the WAG, which the user used to request the connection, will immediately be placed into Data Mode.

If the “for the duration tunnel” can not be established for any of the following reasons, the user is not shown anything either.

- The remote WAG is not powered up.
- The remote WAG is not connected to the LAN.
- The remote WAG is not configured for the same Serial Telnet number.
- The remote WAG is not configured for RAW.
- The remote WAG is not in Data Mode.

Since the connection is not established, the WAG will remain in Command Mode.

3.7 CHANGING THE DIAGNOSTIC VERBOSITY LEVELS

The WAG sends run-time messages out the serial interface when the serial interface is in Command Mode. Each run-time message is assigned a verbosity level at which it is displayed. The allowable verbosity levels are 0 through 65534, however only 1 through 10 are significant.

1 - No logging of diagnostic information.
10 - Enables the logging of diagnostic information regarding multipart ATCS messages.

To Change the Verbosity Levels:

1. Type `verbosity` and press Enter. The current verbosity information appears.
2. To change the level, type `verbosity` *nn* and press Enter, where *nn* is a number from 1 to 10.

3.8 SEND WINK REQUEST TO A WAG

This command is used to allow the user to visually confirm which WAG the user is talking to.

When the user enters the `winkwag` command followed by an ATCS address, the WAG will send a wink command to that particular WAG causing the Health LED to flash quickly for a period of time. And if the user types `wink` followed by a Type 7 ATCS address, the WAG with that type 7 address on the broadcast medium will wink.

To Use the Winkwag Command:

Type `wink` and press Enter. The Health LED on the particular WAG flashes rapidly.

3.9 SENDING A PING TO AN IP ADDRESS

The Ping command accepts an IP address and causes the WAG to issue an ICMP PING frame out the Ethernet interface. If a response from a device with that offered IP address is received, the WAG will display a sequence number to the Ping response.

To Use the Ping Command:

Type `ping` and an IP address and then press Enter. The ping information appears, similar to the following:

```
ping 10.232.48.226
Sending ICMP PING to 10.232.48.226
PING Response sequence 0x3436
```

The sequence number is a pseudo random value that changes every time a PING is issued. In the event no response is detected by the WAG, the "Ping Response" line displayed above will not appear.

3.10 SENDING A ROUTE PING REQUEST

This is a diagnostic command that is very useful for determining whether a communications path exists between the WAG and an office system.

To Use the Route Ping Command:

Type `rping` followed by a route region number and then press Enter.

For example, if a user wants to know whether the WAG can talk to AServer in the office, the user can type: **`rping 9999`**

NOTE

NOTE

9999 is the special Route Region number that means "Network Management System".

And if the office hears the "Route Ping" request that the WAG sends, it will respond causing the WAG to display the IP address of the office device: **`RPING: 9999 is at 010.232.048.030`**

If the office does not hear the Route Ping or if the response from the office does not make it back to the WAG, the WAG will not display the "is at" message which lets the user know that bi-directional communications is not working.

If the user wants to know whether the WAG can communicate with a Packet Switch or an OCG on the LAN, the Rping command is used with a Route Region number that is a normal codeline number.

For example, if a Packet Switch, OCG or other office device is running codeline 110 and the user types: **`rping 110`**

The WAG will display: **`RPING: Searching for 110`**

After the Packet Switch, OCG or other office device responds, the WAG will display:

`RPING: 110 is at 010.232.054.015`

That informs the user that the office device is able to speak with the WAG in both directions.
It should be noted that some office devices will respond to an Rping request immediately whereas other office devices may take several seconds to respond. In elaborate networks, which may include radios, responses could take more than 10 seconds to be received and displayed by the WAG.

3.11 TRACING AN INTERFACE

The Trace command allows tracing of several interfaces. The user must specify an option after the Trace command or the following will be displayed:

```
Invalid syntax for TRACE command.
Try:  TRACE { X E S P D I N R O }
    X - Trace XPORT Ethernet LAN Interface to Serial
    E - Trace Echelon LON Interface to Serial and Telnet
    S - Trace Serial Interface to Telnet
    P - Trace Persistent TCP Serial Tunnel to Event Log
    D - Trace DHCP to Serial and Telnet
    I - Trace Office System Interface to Serial and Telnet
    N - Trace DNS Server to Serial and Telnet
    R - Trace IP Redundancy to Serial and Telnet
    O - Off, stop trace
Current trace: NONE
```

The user can enable or disable a trace of one interface at a time. This is accomplished by typing either X, E, S, P, D, I, R or N after the Trace command. To disable a trace, the user would type `trace O`.

To Trace an Ethernet (XPort) Interface:

The tracing of an interface provides the user the ability of displaying interface messages. This function provides the user with information in such cases where software or cable problems have occurred.

Type `trace X` and then press Enter. The Ethernet information appears, similar to the following:

```
trace X
XPORT activity will trace to the serial interface
XOUT 4 bytes
04 00 08 00                                             ....
XIN 20 bytes
14 00 89 20 00 00 00 00 00 00 00 00 00 00 f7 a2   ... ............
3e 4b 45 00                                             >KE...
XOUT 4 bytes
04 00 08 00                                             ....
XIN 20 bytes
14 00 89 20 00 00 00 00 00 00 00 00 00 00 f7 a2   ... ............
3e 4b 45 00                                             >KE...
XOUT 4 bytes
04 00 08 00                                             ....
XIN 20 bytes
14 00 89 20 00 00 00 00 00 00 00 00 00 00 f7 a2   ... ............
3e 4b 45 00                                             >KE...
XOUT 4 bytes
04 00 08 00                                             ....
```

When the Trace is enabled, the HEX values of input messages to the interface (whether it is XPort, Serial or Echelon), and output messages from the interface are displayed. An ASCII representation of the printable characters is also displayed within the trace.

The tracing of Ethernet results in the trace being sent only out the serial interface. If a Telnet session is running, the trace information will not be sent to the Telnet screen. Because a deadly loop would result, the WAG will not allow tracing of the Ethernet interface to be sent out the Ethernet interface.

To Trace an Echelon Interface:

The tracing of Echelon information will go out both the serial interface and to a Telnet session if one is running.

Type `trace E` and then press Enter. The Echelon information begins as follows:

```
trace E
Echelon activity will trace to serial port and Telnet
```

To Trace a Serial Interface:

The tracing of Serial information will only be sent to an existing Telnet connection. Because a deadly loop would result, the WAG will not send trace serial information out the serial interface.

Type `trace S` and then press Enter. The Serial information begins as follows:

```
Trace S
Serial activity will trace to a Telnet session
```

To Trace a Persistent TCP Serial Tunnel to Event Log:

The Trace a Persistent TCP Serial Tunnel to Event Log option is for debugging purposes.

Type `trace P` and then press Enter. The Persistent TCP Serial Tunnel to Event Log information begins as follows:

```
trace P
Serial Tunnel activity will trace to Event Log
```

When tracing is enabled for Persistent Serial Tunneling, the following entries may be placed into the system event log:

```
PST: Persistent request to 010.232.053.043
PST: Persistent Tunnel was dropped
```

To Trace DHCP Site ID Information:

DHCP Site ID information displays the exchange of information between the WAG and an A53325 Ethernet Radio, provided that the WAG is configured to be a DHCP Server. When a radio asks for configuration or the WAG offers configuration, this exchange will be displayed out the serial interface and any Telnet session that may be running.

Type `trace D` and then press Enter. The DHCP Site ID information appears, similar to the following:

```
Inbound DHCP Request, Ethernet, MAC length 6, hops 0, Transaction:
29397be1
   Client IP: 000.000.000.000, Your IP: 000.000.000.000
   Client MAC: 00-0d-94-00-3a-c2
   Remaining options:
   Option: 053 (35) length 001 bytes: 001 Discover
   Option: 055 (37) length 006 bytes: 001 002 003 00c 03c 02b
   Option: 051 (33) length 004 bytes: 000 009 03a 080
DHCP Sending ping 0x4dd8 to 10.232.53.53
Inbound DHCP Request, Ethernet, MAC length 6, hops 0, Transaction:
3bfclab0
   Client IP: 000.000.000.000, Your IP: 000.000.000.000
   Client MAC: 00-0d-94-00-3a-c2
   Remaining options:
   Option: 053 (35) length 001 bytes: 001 Discover
   Option: 055 (37) length 006 bytes: 001 002 003 00c 03c 02b
   Option: 051 (33) length 004 bytes: 000 009 03a 080
DHCP Offer of binding was presented
Inbound DHCP Request, Ethernet, MAC length 6, hops 0, Transaction:
3bfclab1
   Client IP: 000.000.000.000, Your IP: 000.000.000.000
   Client MAC: 00-0d-94-00-3a-c2
   Remaining options:
   Option: 053 (35) length 001 bytes: 003 Request
   Option: 055 (37) length 006 bytes: 001 002 003 00c 03c 02b
   Option: 054 (36) length 004 bytes: 00a 0e8 035 02a
   Option: 051 (33) length 004 bytes: 000 000 08c 0a0
   Option: 050 (32) length 004 bytes: 00a 0e8 035 035
   Option: 060 (3c) length 011 bytes: 041 052 032 034 030 032
   037 02d 04c 04e 057
DHCP Acknowledge of binding was presented
```

As the above displays, an inbound DHCP request with “Discover” for a radio was received from the radio with a MAC address of 00-0d-94-00-3a-c2. The WAG then tested its configured binding by issuing an ICMP PING to IP address of 10.232.53.53 to see if it was being used.

While waiting for a possible response to the PING, the radio sent another DHCP request. The WAG decided that the PING response time was long enough and not having received one, elected to provide the binding to the radio indicated by the trace “DHCP offer of binding was presented.”

The radio then sent another DHCP request with “Request” to the WAG echoing back the binding information that WAG had offered. The WAG then informed the radio that it acknowledges that the binding is agreeable to both ends of the handshake. Typically, after the handshake, the radio will stop sending DHCP requests yet may periodically repeat the process 5 to 10 hours later depending on the operating rules within that radio.

To Trace Office System Interface to Serial and Telnet:

The Trace Office System Interface to Serial and Telnet option is for debugging purposes.

Type `trace I` and then press Enter. The Office System Interface to Serial and Telnet information begins as follows:

```
trace I
Office activity will trace to serial port and Telnet
```

When tracing is enabled for the Office System Interface, the following messages can be displayed real time out the serial and Telnet interfaces:

```
OSI: Inbound 2.RRR.NN.DDDD to 7.RRR.LLL.GGG.SS.DD
OSI: Route Request for RRR to Domain One
OSI: Route Request for RRR to Domain Two
OSI: Outbound 7.RRR.LLL.GGG.SS.DD to 2.RRR.NN.DDD
OSI: XID Request from 2.RRR.NN.DDDD [XXX.XXX.XXX.XXX]
OSI: Health request from 2.RRR.NN.DDDD [XXX.XXX.XXX.XXX]
OSI: LON request from 2.RRR.NN.DDDD [XXX.XXX.XXX.XXX]
OSI: Configuration request from 2.RRR.NN.DDDD [XXX.XXX.XXX.XXX]
OSI: MCP Loopback from 2.RRR.NN.DDDD to 7.RRR.LLL.GGG.SS.DD
OSI: Log request from 2.RRR.NN.DDDD to 7.RRR.LLL.GGG.SS.DD
OSI: Update RRR to XXX.XXX.XXX.XXX
OSI: Refresh RRR to XXX.XXX.XXX.XXX
OSI: Loopback request/response to XXX.XXX.XXX.XXX
```

To Trace IP Redundancy to Serial and Telnet:

The Trace IP Redundancy to Serial and Telnet is for debugging purposes.

Type `trace R` and then press ENTER. The WAG will display, "IP Redundancy will trace to serial and Telnet session".

When the trace of IP Redundancy is enabled, the following types of trace information may be displayed:

IPR: Indi Remote OK: NO, Active: NO, Remote Ech: NO

This indicates that the WAG is sending an Indication message to the Ladder Logic device it is being controlled by (typically a SEARii.)

There are three other status reports in the example shown above.

- "Remote OK: NO" indicates that the remote WAG is not currently communicating with the WAG being traced.
- "Active: NO" indicates that the WAG being traced is not running as Active/Primary.
- "Remote Ech: NO" indicates that the remote WAG is considered to not have any Echelon clients.

IPR: Indi Remote OK: YES, Active: YES, Remote Ech: YES

This indicates that the WAG is sending an Indication message to its Ladder Logic device and that the remote WAG is in communication with the WAG being traced, the WAG is also Active/Primary, and that the remote WAG has Echelon clients in its route table.

IPR: Ctrl Go active: NO, Go inactive: NO

This indicates that the WAG has received a Control message from its Ladder Logic controller.

To Trace DNS Server to Serial and Telnet:

The Trace DNS Server to Serial and Telnet option is for debugging purposes.

Type `trace N` and then press Enter. The DNS Server to Serial and Telnet information begins as follows:

```
trace N
DNS activity will trace to serial and Telnet session
```

While DNS trace is enabled, the following types of information may be displayed:

```
DNS: Name [symbolic.name] at XXX.XXX.XXX.XXX
```

This indicates the IP address of the symbolic name that has successfully been looked up in the DNS server.

```
DNS:  Asking XXX.XXX.XXX.XXX for [symbolic.name]
```

This indicates that the WAG is sending a DNS request to the IP address of the indicated DNS server asking for the IP address of the symbolic name.

```
DNS: Primary Failed for [symbolic.name]
```

This indicates the primary DNS server did not have an entry for the indicated symbolic name.

```
DNS:  Secondary Failed for [symbolic.name]
```

This indicates the secondary DNS server did not have an entry for the indicated symbolic name.

Time Stamp on Trace

The A01E release or later release of the executive software will have the time stamps added to the trace reports that the operator can request. Each trace has an accompanying timestamp so that it is easier for an operator to see when things happen.

3.12 SETTING THE CURRENT DATE

The `sdate` command provides the WAG the current date. If the user types the `sdate` command without any arguments, the WAG will display the acceptable syntax for setting the current date.

Type `sdate` followed by the date in `DD.MM.YY` format and then press Enter.

3.13 SETTING THE CURRENT TIME

The `stime` command provides to the WAG the current time. If the user types the `stime` command without any arguments, the WAG will display the acceptable syntax for setting the current time.

Type `stime` followed by the time in `HH.MM.SS` format and then press Enter.

3.14 UPLOADING/DOWNLOADING FILES

The `xfiles` command allows the user to upload or download files to/from the WAG. The use of the file transfer menu provides an easy method for installers to load the WAG with software. Refer to Section 5 for more information on this function.

3.15 DATA/COMMAND MODE FROM A SERIAL INTERFACE

In Command mode, the `data` command changes the WAG serial interface to Data mode if the serial interface is configured for a data protocol. When the WAG is in Data Mode, all frames received on the serial interface are treated as frames intended for a serial protocol.

The serial protocol that the messages are dispatched to depends upon what the serial interface is configured for. For more information, see Section 2.

When the serial interface is configured for Command Mode, typing the `data` command does nothing.

To go to Command Mode temporarily when the serial interface is configured for a data mode:

Wait two or more seconds after WAG becomes operational in data mode and type +++.
Pause for two seconds and a serial message appears showing the interface is in Command Mode.

To go to Data Mode (if the serial interface is configured for a data protocol):

Type `data` and press Enter.

NOTE

NOTE

Configuration changes are made with the WAG in Command Mode. If the user makes configuration changes and saves those changes, the WAG will restart with the new configuration but will come up in Data Mode if the serial interface is configured for a serial protocol.

3.16 RETURNING THE SERIAL INTERFACE TO COMMAND MODE FROM A TELNET SESSION

The user can not use the +++ sequence in a Telnet session to return the serial interface to Command mode. Type `command` in the Telnet session to return the serial interface to Command mode. If the command was entered from the serial interface, whether in Data mode or Command mode, nothing will happen.

3.17 RESTARTING THE WAG

This command restarts the WAG. Information in the system events log and error log are retained. Any TCP connections, including Telnet, will be lost when the restart command is initiated.

To Restart The WAG:

Type `restart` and press Enter. The WAG reboots.

3.18 VIEWING SOFTWARE INFORMATION

The user can see information about the software in the WAG.

The information can be saved to a file. For more information on how to save displays to a file, see the documentation for the terminal emulation software or for the Telnet application.

To View the Software Information:

Type `project` and press Enter. The software information appears, similar to the following:

```
Information about Wayside Access Gateway project:
   Current Date / Time:       01/01/00 00:08:10.067
   RTOS RAM start: ..........0x200
   RTOS RAM end: ............0x69200 (430080 bytes)
   Zerovars start: ..........0x69200
   Zerovars end: ............0x6C030 (11824 bytes)
   Fixed Buff start: ........0x6C030
   Fixed Buff end: ..........0x7D330 (70400 bytes)
   Fixed Buff Remaining: .....0x104 (260 bytes)
   System Log start: ........0x7D330
   System Log end: ..........0x7FB30 (10240 bytes, 102 lines)
   Unallocated Heap start: ...0x7FB50
   Unallocated Heap end: .....0x80000 (1200 bytes)
   Executable start: ........0x230004
   Executable end: ..........0x24B40A (111622 bytes)
   System run time: .........0 days, 18 H 13 M 55 S
```

NOTE

NOTE

The Current Date / Time will be displayed if the date and time has been set; otherwise the time elapsed since the WAG acquired power will be displayed
.
The Project run time will display the amount of time elapsed since the WAG acquired power however, if the date and time are set, the Project run time will continue to display elapsed time.

3.19 REVIEWING THE LOGS

The log shows the user system information and any problems the WAG might have encountered. Only the last 102 events are stored in the log.

The user can save this information to a file. For more information, see the documentation for the terminal emulation software or for the Telnet application.

To View the Log:

Type `log1` and press Enter. The log information appears, similar to the following:

```
--- Displaying 101 entries in the log ---
00.17.10.58: WARNING: Received XPORT slipped
00.00.00.10: Route Add Serial 7.620.123.123.12.10
00.00.00.16: XPORT IP Address: 010.232.053.040
00.00.00.56: Route Add Echelon 001.003 type 41 7.620.020.010.03.02
00.00.00.59: Route Add Serial 7.620.020.020.03.02
00.00.00.59: Route Add Serial 7.620.020.020.03.03
00.00.01.23: TCP 010.232.053.025 on port 23 Connected
00.00.01.51: Diagnostic verbosity changed from 1 to 2
00.00.02.00: Diagnostic verbosity changed from 2 to 10
00.00.02.18: Diagnostic verbosity changed from 10 to 9
00.00.07.52: TCP 010.232.053.025 on port 23 Disconnected
00.00.21.46: TCP 010.232.053.025 on port 23 Connected
00.00.21.46: Route Add XPORT 10.232.53.41 7.620.020.020.03.03
00.00.21.47: Route Add XPORT 10.232.53.41 7.620.020.020.03.02
00.00.21.48: CONFIG command received
00.00.22.03: RESTART command received
00.00.00.00: Wayside Access Gateway Started
00.00.00.00: Route Add XPORT 10.232.53.41 7.620.020.020.03.02
00.00.00.00: Route Add XPORT 10.232.53.41 7.620.020.020.03.03
00.00.00.00: Route Add Echelon 001.003 type 41 7.620.020.010.03.02
00.00.00.01: Route Add XPORT 10.232.53.41 7.620.123.123.12.10
00.00.00.16: XPORT IP Address: 010.232.053.040
00.00.01.24: TCP 010.232.053.025 on port 23 Connected
00.00.01.26: CONFIG command received
00.00.01.37: TCP 010.232.053.025 on port 23 Disconnected
00.00.02.23: Route Drop 7.620.020.010.03.02
00.00.02.26: TCP 010.232.053.025 on port 6001 Connected
00.00.02.26: TCP 010.232.053.025 on port 6002 Connected
00.00.02.26: Route Drop 7.620.020.020.03.03
00.00.02.27: Route Drop 7.620.020.020.03.02
00.00.02.41: Route Add XPORT 10.232.53.25 7.123.123.123.12.02
00.00.02.41: Route Add XPORT 10.232.53.25 7.123.123.123.12.03
00.00.02.41: Route Add XPORT 10.232.53.41 2.123.12.3401
00.00.02.41: Route Add XPORT 10.232.53.41 2.123.12.3402
00.00.02.41: Route Add XPORT 10.232.53.41 2.123.12.3403
00.00.38.26: Route Drop 7.123.123.123.12.02
00.00.38.26: Route Drop 7.123.123.123.12.03
00.00.38.26: Route Drop 2.123.12.3401
00.00.38.26: Route Drop 2.123.12.3402
00.00.38.26: Route Drop 2.123.12.3403
00.00.38.42: TCP 010.232.053.025 on port 23 Connected
00.00.38.57: TCP 010.232.053.025 on port 6001 Disconnected
00.00.38.57: TCP 010.232.053.025 on port 6002 Disconnected
00.00.38.57: TCP 010.232.053.025 on port 6001 Connected
00.00.38.57: TCP 010.232.053.025 on port 6002 Connected
00.00.39.06: Route Add XPORT 10.232.53.25 7.123.123.123.12.02
00.00.39.06: Route Add XPORT 10.232.53.25 7.123.123.123.12.03
00.00.39.06: Route Add XPORT 10.232.53.41 2.123.12.3401
00.00.39.06: Route Add XPORT 10.232.53.41 2.123.12.3402
00.00.39.06: Route Add XPORT 10.232.53.41 2.123.12.3403
00.00.45.57: TCP 010.232.053.025 on port 23 Disconnected
00.00.46.22: Route Drop 7.123.123.123.12.02
```

```
00.00.46.22: TCP 010.232.053.025 on port 6001 Disconnected
00.00.46.22: Route Drop 7.123.123.123.12.03
00.00.46.22: TCP 010.232.053.025 on port 6002 Disconnected
00.00.47.34: Route Drop 2.123.12.3401
00.00.47.34: Route Drop 2.123.12.3402
00.00.47.34: Route Drop 2.123.12.3403
00.01.53.10: BREAK command received
00.00.00.00: Wayside Access Gateway Started
00.00.00.03: Route Add XPORT 10.232.53.41 7.620.123.123.12.10
00.00.00.16: XPORT IP Address: 010.232.053.040
00.00.00.16: CONFIG command received
00.01.28.13: Diagnostic verbosity changed from 1 to 10
00.01.28.55: Route Add Serial 7.777.777.777.77.77
00.01.30.15: Route Add Echelon 001.003 type 41 7.620.020.010.03.02
00.01.30.23: Route Add XPORT 10.232.53.41 7.620.020.020.03.02
00.01.30.23: Route Add XPORT 10.232.53.41 7.620.020.020.03.03
00.01.30.34: Diagnostic verbosity changed from 10 to 10
00.01.30.40: Diagnostic verbosity changed from 10 to 9
00.01.30.54: Route Drop 7.777.777.777.77.77
00.01.31.17: Route Add Serial 7.777.777.777.77.77
00.01.33.37: Route Drop 7.777.777.777.77.77
00.01.35.07: CRASH: 0x0003 st 21E5 ad 00000001 ins 21FC
00.01.35.07: st 2000 bad 00232B2C ret 00232C7C
00.01.35.07: D0: 00200000   A0: 00100000
00.01.35.07: D1: 00200001   A1: 00100001
00.01.35.07: D2: 00200002   A2: 00100002
00.01.35.07: D3: 00200003   A3: 00100003
00.01.35.07: D4: 00200004   A4: 00100004
00.01.35.07: D5: 00200005   A5: 00100005
00.01.35.07: D6: 00200006   A6: 00100006
00.01.35.07: D7: 00200007   A7: 000575DE
00.00.00.00: Wayside Access Gateway Started
00.00.00.00: Route Add Echelon 001.003 type 41 7.620.020.010.03.02
00.00.00.00: Route Add XPORT 10.232.53.41 7.620.020.020.03.02
00.00.00.01: Route Add XPORT 10.232.53.41 7.620.020.020.03.03
00.00.00.16: XPORT IP Address: 010.232.053.040
00.00.00.47: Route Add XPORT 10.232.53.41 7.620.123.123.12.10
00.00.12.53: Diagnostic verbosity changed from 1 to 11
00.00.13.07: Diagnostic verbosity changed from 11 to 10
00.00.13.17: Diagnostic verbosity changed from 10 to 2
00.01.03.42: WARNING: Received XPORT slipped
```

3.20 **LOG ENTRIES**

Log entries are divided into three levels:

- Fatal messages are used by Siemens Rail Automation personnel to diagnose system errors. If a fatal problem occurs and gets logged, the WAG will restart itself.
- Warnings are used by Siemens Rail Automation personnel to diagnose system errors or an unexpected problem. If a warning occurs, the software continues to operate. The WAG continues normally after the warning is logged.
- Informational messages inform the user about normal expected WAG operations.

The log entries are described in table 3-2.

Table 3-2. Log Entry Descriptions

Classification	Log Entry	Description
Fatal	`CRASH! Point of failure: <code>`	A code number for Siemens Rail Automation personnel to determine where a software crash occurred.
Fatal	`CRASH: <0xXXXX> st <YYYY> ad <ZZZZZZZZ> ins <WWW>`	A fatal software or hardware error occurred. Information about the crash is saved in the log. The information includes the numeric contents of the CPU registers and information about what code was running when the crash occurred. Used by Siemens Rail Automation personnel for troubleshooting.
Fatal	`ERROR: Memory address <x> invalid!`	Indicates that a programming error occurred. Used by Siemens Rail Automation personnel for troubleshooting.
Fatal	`ERROR: Ser no RX buf!`	A flood of inbound serial data occurred that the WAG could not handle properly. Used by Siemens Rail Automation personnel for troubleshooting.
Fatal	`ERROR: Ser out exceeded! <x>`	Used by Siemens Rail Automation personnel to determine how an extremely large block of serial data was requested to be sent out the serial interface.
Fatal	`ERROR: Ser out no TX buf!`	Used by Siemens Rail Automation personnel for troubleshooting.
Fatal	`Fail relmem at <x>`	Indicates that a programming error occurred. Used by Siemens Rail Automation personnel for troubleshooting.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Fatal	`XPORT is not responding.`	Means there is a hardware error or that the XPort is improperly configured.
Fatal	`WAG's IP address <xx.xx.xx.xx> is already in use!`	Another device on the Ethernet LAN has the same IP address as the configured IP address of the WAG.
Fatal	`Error: Fixed memory pool <x> exhausted`	Indicates a programming error. Used by Siemens Rail Automation personnel for troubleshooting.
Fatal	`FLASH: Couldn't erase boot sectors!`	There is a problem with erasing FLASH ROM.
Fatal	`FLASH: Couldn't erase application sectors!`	There is a problem with erasing FLASH ROM.
Fatal	`FLASH: Couldn't write boot sectors!`	There is a problem with writing FLASH ROM.
Fatal	`FLASH: Couldn't write application sectors!`	There is a problem with writing FLASH ROM.
Warning	`ERROR: ECH RX Not first`	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	`ERROR: Ser RX Not first`	Means that a serial interface error occurred. Used by Siemens Rail Automation personnel for troubleshooting.
Warning	`ERROR: Ser TX Not first`	Means that an outbound serial message was attempted to be transmitted out a transmit buffer descriptor table entry that was not the next expected buffer. Used by Siemens Rail Automation personnel for troubleshooting.
Warning	`ERROR: XPT RX Not first`	Means that an inbound Ethernet message was received by a receive buffer descriptor table entry that was not the next expected buffer. The WAG corrects itself and continues without a problem.
Warning	`ERROR: XPT TX Not first`	Means that an outbound Ethernet message attempted to transmit out a transmit buffer descriptor table entry that was not the next expected buffer. The WAG corrects itself and continues without a problem.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Warning	`Flushed XPORT input on invalid.`	Means that an unknown message was received by the Ethernet XPort component and that the message was discarded along with any others that might have been queued up in the serial pipe between the XPort component and the WAG main CPU. The entry means a loss of either UDP or TCP traffic or possibly the loss of a maintenance message that gets routinely passed from the XPort to the WAG main CPU. Typically the log means that a great deal of Ethernet inbound traffic is occurring and an inbound frame had to be discarded.
Warning	`WAG has invalid configuration`	On power-up, the WAG conducts checks on its own configuration. If anything is incorrect, the WAG selects a default set of configuration and then makes this log entry before it starts operating.
Warning	`WARNING: Echelon device shares our Echelon address`	Means that the WAG discovered an Echelon device on the Echelon interface, which has the same subnet and node address as itself. Correct the problem by reconfiguring either the WAG Echelon address or by reconfiguring the Echelon address of the other device.
Warning	`WARNING: Received XPORT slipped *`	Means that a message received on the Ethernet XPort interface was missing its first byte. May not indicate a problem since the first byte is always a zero. This entry is intended for Siemens Rail Automation personnel for troubleshooting. (* only if verbosity level is greater than 1)
Warning	`WARNING: <7.RRR.LLL.GGG.SS.DD> Echelon Address conflict <ww.xx> to <yy.zz>`	Means the indicated ATCS address was originally heard as subnet/node address WW.XX, however now it is heard as subnet/node address YY.ZZ. This indicates that more than one device shares an ATCS address or that a user moved/reconfigured an ATCS device on the Echelon interface.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Warning	WARNING: <7.RRR.LLL.GGG.SS.DD> IP <xx.xx.xx.xx> to <yy.yy.yy.yy>	Means the indicated ATCS address was originally heard on the indicated 4 byte IP address, however now it appears on the second 4 byte IP address. This indicates that more than one IP device is sharing an ATCS address or that a user moved/reconfigured an ATCS device on the Ethernet LAN.
Warning	WARNING: Inbound range with <xxx>	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon1, unknown APDU	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon2, unknown code	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon3, unknown APDU bcast	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon4, ignore diag	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon5, unsupported APDU address format	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon6, unsupported TPDU address format	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon8, unsupported PDU format	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon9, unsupported TPDU address format	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon10, unsupported PDU format	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	Warn: Echelon11, unknown message type	Used by Siemens Rail Automation personnel for troubleshooting.
Warning	FLASH: Transfer <file name> failed, code: <x>	Indicates that a file transfer using the XFILES command to upload/download failed. The failed file name is displayed along with a failure code that is used by Siemens Rail Automation personnel.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Warning	FLASH: ZMODEM transfer aborted	Means that the user either aborted an XFILES file transfer or that the function timed out.
Warning	FLASH: Bad boot code offered	Indicates the XFILES command was used to send new boot code to the WAG; however the WAG determined the boot code was not valid so the file was not saved.
Warning	FLASH: Bad configuration offered	Indicates the XFILES command was used to send a configuration file to the WAG; however, the WAG determined the configuration file was not valid so the file was not saved.
Warning	FLASH: Obsolete configuration offered	Indicates that an old configuration file does not match the new executive code so the WAG did not save the file.
Warning	FLASH: Bad application code offered	Indicates the XFILES command was used to try to send executive code to the WAG; however, the WAG determined the code was not WAG executive code so the file was not saved.
Informational	TEST: err <x> box <y> time <z>	Indicates that a programming error occurred. Used by Siemens Rail Automation personnel for troubleshooting.
Informational	FLASH: New boot code saved	Indicates the user successfully used the XFILES command to send new boot code to the WAG. The WAG stored the new boot code.
Informational	FLASH: New configuration saved	Indicates the user successfully used the XFILES command to send a configuration file to the WAG. The WAG stored the new configuration.
Informational	FLASH: ZMODEM boot code uploaded	Indicates the existing boot code of the WAG was successfully sent to the user's computer using the XFILES command.
Informational	FLASH: ZMODEM application code uploaded	Indicates the existing executive code of the WAG was successfully sent to the user's computer using the XFILES command.
Informational	FLASH: ZMODEM configuration uploaded	Indicates the existing configuration of the WAG was successfully sent to the user's computer using the XFILES command.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Informational	`Received request to WINK`	Indicates the WAG was asked to “wink” its Health LED.
Informational	`ATCS: Multipart *`	Means that a large ATCS message was broken into multiple parts by the WAG before it was routed. (* only if verbosity level is greater than 9)
Informational	`BREAK command received`	Someone entered the BREAK command from either the serial interface or from a Telnet session.
Informational	`CONFIG command received`	Someone entered the CONFIG command from either the serial interface or from a Telnet session.
Informational	`Diagnostic verbosity changed from <x> to <y>`	The logging verbosity level was changed. Shows the old value and the new value.
Informational	`Leaving test mode`	The WAG is done with a test.
Informational	`Performing factory test mode`	Someone requested a factory test either from the serial interface or from a Telnet session.
Informational	`Performing screen test mode`	Someone requested a factory serial port screen test either from the serial interface or from a Telnet session.
Informational	`Performing spew test mode`	Someone requested a factory spew test either from the serial interface or from a Telnet session.
Informational	`RESTART command received`	Someone entered the RESTART command from either the serial interface or from a Telnet session.
Informational	`Route Add Echelon <xxx.yyy> type <z> <w>`	A new ATCS address of an Echelon device was added to the WAG routing table. The subnet and node address are listed with the Foreign Frame type of the device in addition to the ATCS address. XXX = subnet YYY = node W = ATCS address Z = frame type
Informational	`Route Add Serial <ATCS addr>`	A new ATCS address of a serial device was added to the WAG routing table. The entry shows the ATCS source address.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Informational	Route Add Unknown <ATCS addr>	Means the creation of an internal routeable device that is internal to the WAG itself. Symbolic, internal ATCS devices can be created by the WAG for such things as testing or loop-back tests.
Informational	Route Add XPORT <IP addr> <ATCS addr>	Means a new ATCS address for a device detected on the Ethernet LAN was added to the WAG routing table. The IP address and the ATCS address of the device is logged. Typically the device is a type 2 Office device across a TCP connection. However the WAG allows any ATCS-capable device on the Ethernet LAN to send it ATCS messages to route.
Informational	Route Drop <ATCS add>	Means an ATCS address of a routable device that has been removed from the WAG route table. The entry expired. If the device was on a TCP connection, the TCP connection has been disconnected.
Informational	Route Drop UNID <neuron ID>	Means an Echelon device that is addressed with a Unique Neuron Identifier address has been removed from the WAG routing table because it expired.
Informational	Service button pressed	Means that the Echelon service button was pressed.
Informational	TCP <IP addr> < port#>	Connected / Disconnected Means the IP address and the Ethernet port number of TCP connections that are made and dropped.
Informational	Wayside Access Gateway Started	Means that the WAG restarted either from a cold power up or from a warm start.
Informational	XMODEMBOOT command received	Someone entered the XMODEMBOOT command from either the serial interface or from a Telnet session.
Informational	XPORT IP Address: <IP addr>	Means the IP address of the WAG as reported by the XPort component.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Informational	DHCP <xx.xx.xx.xx> assigned to <yy-yy-yy-yy-yy-yy>	Means the 4 byte IP address that was assigned to a radio with the indicated 6 byte MAC address. When DHCP server is enabled and at least one binding configured into the WAG, the IP address in that binding is given to the radio that asks for it. A log is kept of the binding and IP address that is assigned to a radio.
Informational	DHCP Activity is taking place on LAN	Indicates that there are devices on the Ethernet LAN requesting DHCP configuration. DHCP activity can be computers, radios, or any IP-based device. When logged, the WAG hears the DHCP requests and responds accordingly.
Informational	CONFIG: No configurables were changed	Indicates that the user requested configuration and either exited without making or saving any changes.
Informational	CONFIG: Configuration has been changed	Indicates that the user made configuration changes to the WAG.
Informational	CONFIG: Radio binding <x> <yyy.yyy.yyy.yyy> has been changed	Indicates that the IP address of a particular binding (from 1 to 5 inclusive) was changed by the user.
Informational	USER access via Telnet	Indicates that the user accessed the WAG through a Telnet session.
Informational	USER access via Serial Port	Indicates that the user accessed the WAG through a serial port.
Informational	ZMODEMBOOT command received	Indicates that a user entered the ZMODEMBOOT command from either the serial interface or from a Telnet session.
Informational	PST: Persistent request to xxx.xxx.xxx.xxx	Indicates that the WAG has sent a request to the remote WAG to establish the configured Persistent Serial Tunnel.
Informational	PST: Persistent tunnel was dropped	Indicates that a Persistent Serial Tunnel was dropped.

Table 3-2 continued		
Classification	**Log Entry**	**Description**
Informational	`MM/YY HH:MM:SS:mmm: DNS: [symbolic.name] is xxx.xxx.xxx.xxx`	Indicates the symbolic name that was passed to a DNS server which resulted in the name being resolved to the indicated IP address. MM = month YY= year HH = hour MM = minute SS = second mm = millisecond
Informational	`NTP: We got our date and time updated`	When the WAG receives a response from a Simple Network Time Protocol (SNTP) Server, the WAG will log the fact.
Informational	`Genisys station YY went inactive`	When the WAG is operating in Genisys ATCS Office mode, if a Field station that previously heard drops out of communication and doesn't respond after 30 seconds, the fact that the station was dropped gets logged.
Informational	`WAGs Report In request was issued`	When the "WAGREPORT" command is issued (described later) this system event is logged by the WAG that issued the request.
Informational	`Responded to WAGs Report In request`	When another WAG on the LAN is used to issue a "WAGREPORT" command (described later) this system event is logged by the WAG that hears the request and responds to it.

3.21 CLEARING THE LOG

Clearing the log removes the information in the log. It does not delete any configuration or routing table information.

⚠ CAUTION

CAUTION

MAKE SURE THE USER WANTS TO CLEAR THE LOG INFORMATION FROM THE WAG. THE USER WILL NOT BE PROMPTED FOR CONFIRMATION AND THE USER CANNOT RECOVER THE LOG AFTER IT HAS BEEN CLEARED.

To Clear the Log:

Type `log2` and press Enter. The log information is deleted.

Event Log Streaming

You can also request the WAG to display system event logging as they occur.

Type log 3 and then press ENTER. The WAG will report, "Event log streaming: Enabled"

To disable event log streaming, type "log 3" and press enter again and the WAG will report "Event log streaming: Disabled"

3.22 REQIP

The WAG has the ability to request from a DHCP Server an IP address and an IP Subnet Bitmask. The WAG will act as a DHCP client.

In order for this to work, the WAG's currently configured IP address, Subnet Mask, and Default Gateway must be such that the DHCP server can be seen by the WAG.

If a DHCP Server responds to the WAG and offers the WAG a new set of IP configuration, the WAG will adopt the new values and will store them in its FLASH ROM Configuration, then the WAG will restart.

After the WAG restarts, it will take approximately 30 to 40 seconds for the new configuration to be established in the WAG's XPORT component.

REQIP via Service Button

The operator may hold down the S3 Service Button mounted on the PC board of the WAG for 10 seconds and once the button is released, the WAG will issue a DHCP Request just like it's done when an operator uses the REQIP command.

Of course using this Service Button method requires that the WAG's cover be removed to access the button.

3.23 WAGREPORT

This is a hidden command, not shown when the operator requests a list of command by entering a question mark. It's not shown in the command list because its use has some minor security issues.

The command causes the WAG to ask if there are any other WAGs on the LAN and if there are to report their existence back to the WAG making the request. If any report back, the WAG will display the IP address and the executive software version of the WAGs that report back.

It looks something like this:

```
Sending 'WAGs Report In' request to all WAGs
WAG 7.620.190.100.01.01 is reporting: 9V842-A01E1-Test  from 10.232.53.190
WAG 7.620.198.100.01.01 is reporting: 9V842-A01E0-Test  from 10.232.53.198
```

Only WAGs which have executive software versions A01E or greater will respond to the poll and all WAGs that have older software will not be displayed.

This allows an operator to be able to connect to a WAG serially or through Telnet and find out what the IP addresses are of all other WAGs on the LAN – or at least those WAGs that can be reached using the WAG's IP Subnet Mask setting.

3.24 TTIME

The TTIMES command is used to query the WAG's operating system about how much of the main CPU's time is spent executing the various tasks in the WAG. The command is intended to be used by Siemens Rail Automation engineering during development however installers and maintainers might find the information informative.

The amount of time that the WAG spends idle and not performing any other task's functions is a good indication as to how busy a WAG is. Typically WAG's idle times will be greater than 80%.

The number of operating system "ticks" gives some indication as to how much processor time each task is using. For example, if the "task_echelon_in" task is busy, its "ticks" will be a higher number than most of the other tasks.

When the TTIMES command is entered, the display offered will be sorted by the busiest tasks first.

Total ticks: 255849, Idle Task: 250949 (About 98 percent)
- Task task_serial_key: 4623
- Task task_serial_in: 72
- Task task_serial_out: 61
- Task task_xport_in: 42
- Task task_xport_out: 28
- Task task_app_timer: 21
- Task task_led: 16
- Task task_router: 13
- Task task_echelon_out: 9
- Task Raw/Command In: 8
- Task task_echelon_in: 7

3.25 **REVISIONS**

The REV command will display the software revision and other information about the software running in the WAG.

Xilinx
  Checksum: 0x52D7F8AF
  Name: XIL_DATA
  9V858-A01C Ver 1.4
Boot Monitor
  CRC: 0x11B25884
  Version: 9V841-A01E1-Test
  Date: May 30 2006
Executive
  CRC: 0x92FA3BD4
  Version: 9V842-A01E1-Test
  Date: May 30 2006 16:27:11
XPORT
  Checksum: 0x224F0000
  Version: 9V846-A01E0
  Date: Mar 24 2006 13:01:06
Configuration
  Version: 2

SECTION 4
TROUBLESHOOTING

4.0 TROUBLESHOOTING

4.1 INTRODUCTION

This section helps the user solve common problems.

4.2 DEVICES NOT TALKING TO EACH OTHER ON NETWORK

Typically, the problem is an improperly configured WAG.

If two or more WAGs are supposed to communicate with each other across the Ethernet, the UDP port number configured in all WAGs must be the same. If one or more Slot #1 UDP port numbers are different, that WAG cannot communicate with the other WAG using different port numbers.

There are four UDP slot numbers provided. The first UDP slot number is used by all WAGs that need to communicate with each other. The other three are UDP port numbers that the WAG listens to for other UDP traffic it is interested in.

Because the user can configure UDP Slot #1, many WAGs can exist on an Ethernet LAN and they can be configured to communicate, not communicate, or to form subgroups of WAGs.

An example of this is: six WAGs on the Ethernet LAN, two of which use a UDP Slot #1 port number of 6100, while the other four use UDP Slot #1 port number 9420. The two subgroups cannot communicate to the other. The WAG in each subgroup can communicate among themselves.

Check the UDP port number configuration and verify that the same port numbers are used in UDP Slot #1. If the numbers are not the same, change the port numbers to be the same.

Ensure the broadcast medium is the same for all WAGs.

4.3 ENTRIES NOT IN ROUTING TABLE

Normally, when an expected ATCS address does not appear in the route table, there is a communications problem between the device and the WAG. If the device has not communicated with the WAG recently, the entry in the route table expired.

Check that twisted-pair LAN cable is secured into the connector of the Echelon device and that the correct inputs are used.

Verify that the device not appearing in the route table is able to communicate with the WAG.

1. If the device is an Echelon device, verify the device is transmitting on the Echelon. Examine the TP LAN LED on the WAG. Every time the WAG receives a frame on the Echelon, the LED flashes.

   If there is more than one device on the Echelon interface, turn the other devices off, leaving the device that is not appearing in the table powered up. This way, it is the only device sending frames.

   If the TP LAN LED does not flash when the device sends in messages, there is a communications problem on the Echelon interface between the device and the WAG.

   If the TP LAN is flashing, the WAG is receiving message frames. In this case, 3 conditions could be preventing the device from appearing in the route table:

- The ATCS message is being discarded because it is badly formatted, has an invalid CRC, or contains other faulty addressing information. If this is the case, use the `status` command from the serial interface in Command Mode to see bad CRC counts on the Echelon interface. To solve the problem, isolate the Echelon device and fix the device.

  - The device is transmitting to the WAG less frequently than the route table expiration timer, adding the route entry and then removing it. If this is the case, type `log 1` on the serial interface in Command Mode to see the route being added and dropped repeatedly. To solve the problem, increase the route table expiry timer.

  - The Type 7 address route length configured into the WAG may not be what the site installer intended. For example, if the route length is configured for 10 digits (7.RRR.LLL.GGG), then all ATCS addresses that share the same RRR, LLL, and GGG will have a single entry in the route table. The first ATCS address heard from with the RRR, LLL, and GGG is offered in the route table display and the operator should know that this represents all routable ATCS addresses that share those field values. To solve the problem, the installer should leave the number of routable digits at 12. If the user wants to see all entities within every ATCS device, the route length should be set to 14 digits. However the route table would list all DD variants for all ATCS addresses thus making the display of the route table very large. This may prevent proper operation of some connected devices.

2. If the device is on the serial interface, the serial interface may not be configured for the proper data mode. Typically ATCS serial devices use the Genisys protocol. Configure the serial interface on the WAG for Genisys ATCS Office.

   If the interface is correct, check the baud rate of the serial interface to make sure that the rate is the same as that of the serial ATCS device connected to the WAG serial interface. If a modem is being used, check that the modem is operating properly.

If the serial interface is configured properly and the serial baud rate is correct, use a protocol analyzer to confirm the serial ATCS device is sending ATCS messages to the WAG.

If the serial ATCS device is sending messages, the messages may be the problem. The WAG does not add the device to the route table if the ATCS message is badly formatted, has a bad address, or the CRC is invalid.

If faulty messages are the problem, check the serial interface configuration to see if the ATCS device sending in the frames needs to be fixed.

If the ATCS messages being received are valid, the route table expiration timer may be too short. Increase the route expiry timer value.

3. If the device is on the Ethernet IP interface, the device may not appear in the WAG route table because of an incorrectly configured IP address or subnet mask. The user should verify that the Ethernet interface is linked by observing that the LED located on the J2 connector is lit. Refer to the following for LED information:

Link LED (Top of J2)		Activity LED (Bottom of J2)	
Color	**Meaning**	**Color**	**Meaning**
Off	No Link	Off	No activity
Amber	10 Mbps	Amber	Half-Duplex
Green	100 Mbps	Green	Full-Duplex

NOTE

NOTE

The configurable network subnet mask bits and the IP address of all devices should be checked. See Section 2 for information on configuration of the IP network mask.

Verify that all devices that network with WAG are configured with the same subnet mask as WAG. The WAG will discard any message from a network device whose subnet mask is different.

Another cause can be routers, bridges, hubs, firewalls, or other IP devices between the WAG and the ATCS device that is not appearing. Any one of these devices can be blocking the communication path between the two end devices. If this is the case, remove all devices between the ATCS device and the WAG to simplify the path and to confirm that the devices can communicate successfully. Then install normal devices on the path until the failure is isolated. At that point, reconfigure the router, bridge, or other device causing the problem.

Another cause is a duplicated IP address. If the configured IP address of the WAG or the ATCS device is already being used, the devices will have problems communicating.

To isolate the problem, power off the WAG or the ATCS device on the LAN. On the computer, open a DOS window and ping the IP addresses for both devices. If a ping response is received, another device shares an IP address the user wants to use. To solve the problem, ping the next sequential IP address until the user finds an IP address that is not being used. Assign it to the ATCS device or the WAG.

Be careful to avoid assigning an IP address that is already assigned elsewhere on a device that is currently powered down. When that device is powered up in the future the user will see this problem again.

4.4 WAG LIGHTS ARE OFF

Typical reasons for the POWER OK LED to be off include:

- The B/N battery leads on the J4 connector do not have power applied
- The polarity on the B/N battery leads is reversed
- The voltage is out of specification

To diagnose the above problems, use a voltmeter to verify that the power supply is within voltage specification and that the polarity is correct.

- The power connector can be faulty, either a broken connector or the wires to the connector are broken or shorted. Use a voltmeter at the B/N pins to verify that the power is getting to the pins.

It is possible that the hardware is damaged such that the DC to DC converter inside is not working. Because the LED is hard-wired to be ON when power is applied, if power is good at the B/N pins at the battery connector, the DC/DC converter may be damaged. Verify the voltage at the B/N pins are within specification and the correct polarity.

If power is correct, send the WAG in for repair.

4.5 WAG WILL NOT COMPLETE THE BOOT PROCESS

The user might see the boot menu appear over and over again on a terminal emulator. Typically this failure shows the menu, pauses for 5 seconds, and then shows the menu again.

If this occurs, the Executive software stored in the WAG FLASH ROM is corrupted. The user must download a new Executive to the WAG using the boot menu option. For more information about this procedure, see Section 5.

Another way the user can see this failure is when the boot menu appears on the terminal emulator screen, the Executive boots successfully, but the Executive code either does not appear to run or it runs for a short period of time.

In this case, download new Executive to the WAG using the boot menu option. If the problem persists, the fault may be a hardware error - either a RAM error or a faulty FLASH ROM.

If the user downloads new Executive software and the problem persists, send the WAG in for repair.

4.6 BOOT MENU DOES NOT APPEAR

Typically, if the WAG boot menu will not appear on the terminal emulator after power-up, an unknown baud rate is configured for the serial interface. If the terminal emulator baud rate does not match the WAG configured baud rate, turning on the WAG might result in non-ASCII characters appearing on the terminal emulator.

The other likely candidate for the problem is a faulty serial cable. Always use a simple null-modem serial cable with at least three conductors:

- Transmit
- Receive
- Signal Ground

The Transmit and Receive signals should be crossed between the computer and the WAG.

If the user performs both of the above items and still cannot see the boot menu, perform a default configuration request. Do the following:

1. Carefully open the WAG.
2. Locate the Echelon Service button marked S3 on the board.
3. Hold down the Echelon Service Button. Apply power to the unit and release the button. The WAG is forced to select a default configuration, setting the baud rate of the serial interface to 9600 baud, and to Command Mode.

NOTE

NOTE

The WAG will also default to the following values:
No parity, Data bits to 8, Stop bits to 1, and Flow control is disabled.

If the boot menu on the serial interface still does not appear, try connecting a different computer. If the problem persists, send the WAG in for repair.

4.7 CANNOT TELNET TO WAG

The WAG ships from Siemens Industry, Inc. with TCP Slot #1 configured for well-known TCP port number 23, the Internet Telnet port number. Any of the TCP slots can be configured with well-known port number 23 and the user can Telnet to the WAG.

If the user cannot Telnet into the WAG, the most likely problem is that none of the four TCP slot numbers is configured for port number 23. In this case, simply verify the configured port numbers and make one of them 23. Another common problem that should be checked is the Telnet port number being used by the Telnet Client. If the WAG is configured to listen on port 23 for Telnet connections, make sure that your Telnet Client is attempting to establish a connection to port 23.

If one of the slots is configured for port 23 and your Telnet Client is also configured to establish a connection to port 23 yet the user still cannot Telnet to the unit, there may be a basic Ethernet connectivity problem to the WAG. Open a DOS window on a computer that is also connected to the same Ethernet LAN that the WAG is connected to.

NOTE

NOTE

Before pinging WAG, verify that the computer subnet address matches that of the WAG.

Perform a PING command. If PING does not get any responses, there is a bad Ethernet cable, a bad Ethernet connection, or perhaps a bad Ethernet radio, switch, hub, or router -- or possibly a firewall is interfering. Evaluate those possibilities and make corrections.

If PING is not successful and the LAN looks good, isolate the problem by simplifying the Ethernet connection, if possible, to eliminate network faults.

If PING successfully returns responses, and if any of the TCP slots is configured for port 23, and Telnet still does not work properly, try a different computer or a different Telnet client.

If the problem persists, send the WAG in for repair.

4.8 MULTIPLE WAGS HAVE SAME IP ADDRESS

Each WAG must have a unique IP address. If 2 or more units share the same IP address, the user can see intermittent problems or a total failure in communications.

In the event that the WAG detects another device is using its configured IP address, the following message will be displayed out the serial interface and an entry is placed into the system event log:

```
ERROR: WAG's IP address XX.XX.XX.XX is already in use!
```

NOTE

NOTE

The above logged event will be displayed approximately once every 10 seconds until the problem is corrected. If the WAG IP address is altered to remove the conflict or another device on the LAN is reconfigured to correct the problem, the WAG power must be cycled to reset the problem reporting.

It is possible there is a shared IP address even if the user does not see it in the routing table. Examine the configuration of all WAGs on the Ethernet LAN.

To help isolate the problem WAG, open a DOS window on a computer connected to the same Ethernet LAN and PING the suspect IP address. Now power down each WAG individually, performing a PING after each power removal, until the PING responses disappear.

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SECTION 5
MAINTENANCE

5.0 MAINTENANCE

5.1 INTRODUCTION

There are no adjustments in the WAG. If a unit is suspected of being faulty, it should be replaced. No field repairs should be attempted. No other periodic field maintenance is required.

Procedures for uploading and downloading files to and from the WAG can be accomplished from the boot screen or from the terminal ready screen. An example of each method is described in this section.

5.2 DOWNLOADING SOFTWARE TO WAG USING XFILES COMMAND

NOTE

NOTE

The xfiles command is to be used only with the serial interface. If the user attempts to run this command via Telnet sessions, the file transfer will fail.

1. Type `xfiles` and then press Enter. The ZMODEM file transfer menu will be displayed.

```
ZMODEM file transfer menu of options

         1: Download Boot Code to WAG
         2: Download Application Code to WAG
         3: Download Configuration to WAG
         4: Download XPORT Firmware to WAG
         5: Upload WAG Boot Code to computer
         6: Upload WAG Application Code to computer
         7: Upload WAG Configuration to computer
         8: Exit file transfer menu

Enter option: _
```

Figure 5-1. ZMODEM File Transfer Menu

2. From the ZMODEM file transfer menu, select the applicable software type to download by choosing the applicable download option (Options 1 through 4).

3. “Waiting to receive ZMODEM <type of file>” is displayed on the file transfer screen.

4. Select “Send file” from the Transfer menu. The Send File pop-up screen will be displayed.

Figure 5-2. Send File Pop-up Window

5. Select the file location of the software to be downloaded. Set the file transfer protocol to Zmodem and then click Send. The Zmodem File Send screen will be displayed.

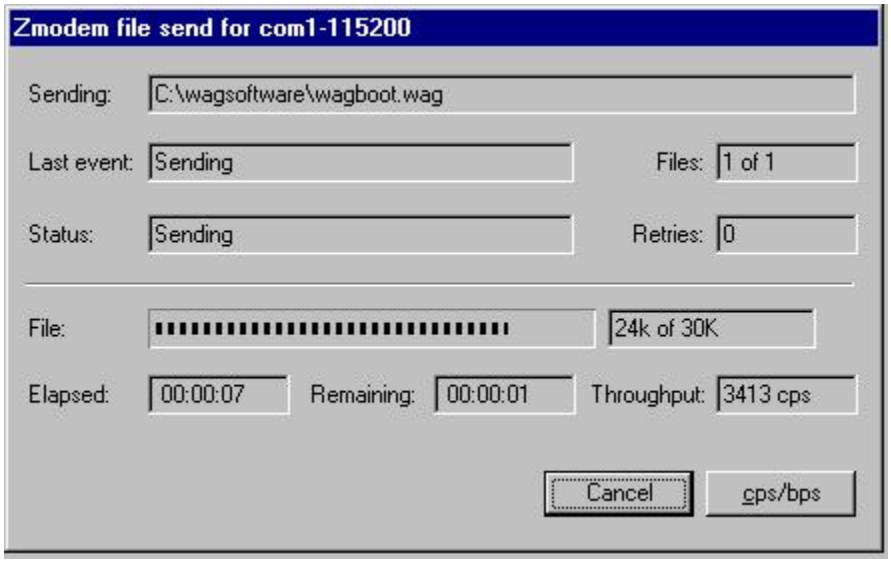

Figure 5-3. Zmodem File Send Screen

6. When the download is complete, restart the WAG.

5.3 UPLOADING SOFTWARE FROM WAG USING XFILES COMMAND

NOTE

NOTE

The xfiles command is to be used only with the serial interface. If the user attempts to run this command via Telnet sessions, the file transfer will fail.

1. Type xfiles and then press Enter. The ZMODEM file transfer menu will be displayed.

```
ZMODEM file transfer menu of options

          1: Download Boot Code to WAG
          2: Download Application Code to WAG
          3: Download Configuration to WAG
          4: Download XPORT Firmware to WAG
          5: Upload WAG Boot Code to computer
          6: Upload WAG Application Code to computer
          7: Upload WAG Configuration to computer
          8: Exit file transfer menu

Enter option: _
```

Figure 5-4. ZMODEM File Transfer Menu

2. From the ZMODEM file transfer menu, select the applicable software type to upload by choosing the applicable upload option (Options 5 through 7).

3. "Waiting to send ZMODEM <type of file>" is displayed on the file transfer screen.

4. Select "Receive file" from the Transfer menu. The Receive File pop-up screen will be displayed.

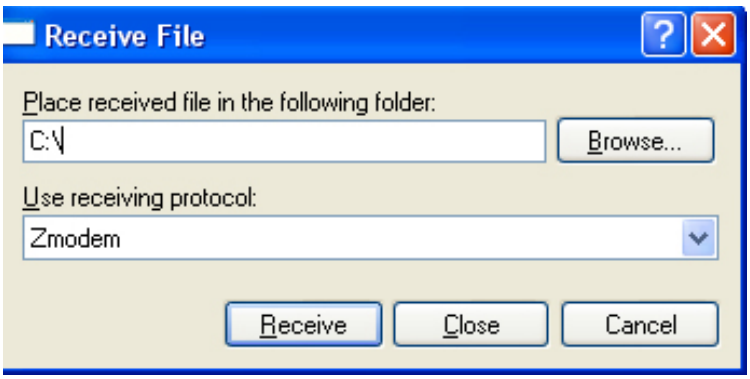

Figure 5-5. Receive File Pop-up Window

5. Select the file location of the software to be uploaded. Set the file transfer protocol to Zmodem and then click Receive. The Zmodem File Receive screen will be displayed.

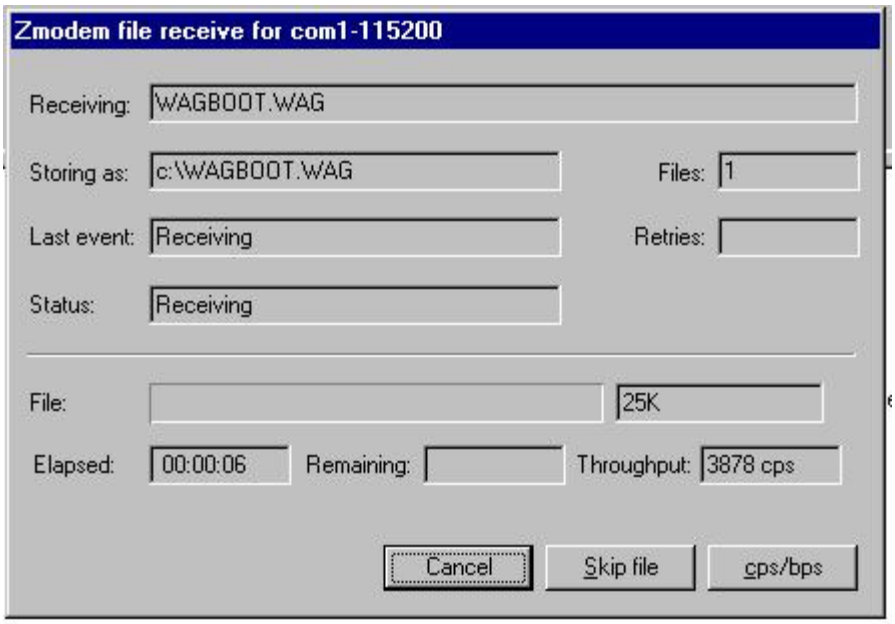

Figure 5-6. Zmodem File Receive Screen

6. When the upload is complete, restart the WAG.

5.4 UPGRADING WAG VIA BOOT OPTIONS SCREEN

The user/installer can upgrade the executive software using a HyperTerminal or another terminal emulator. To download files to the WAG from the boot screen (figure 5-7), follow the procedures described in paragraph 5.2.

```
Boot Options (Valid Executive)
1.  Download Executive to WAG
2.  Download Configuration to WAG
3.  Download Xilinx to WAG
4.  Upload Configuration from WAG
5.  Run Debugger
6.  Run Executive
Choice >
```

Figure 5-7. WAG Boot Screen

After the new executive software is sent to WAG, the WAG automatically stores the new software in FLASH memory. If the update is not successful and the software was improperly stored or simply does not run properly, the boot code remains unaffected.

The executive software file name is WAGEXEC_*x*.BIN, where *x* is a version letter or number.

SECTION 6
USING ADVANCED OPTIONS

6.0 USING ADVANCED OPTIONS

6.1 INTRODUCTION

This section explains the advanced options of the Wayside Access Gateway (WAG). The information in this section is to be used under the supervision of Siemens Rail Automation personnel.

6.2 BOOT MENU OPTIONS

The Boot Options Screen appears for 5 seconds when the user first boots the WAG. The Boot Options Screen includes the following 7 options:

Table 6-1. List of Boot Options

1. Download Executive to WAG	See Section 5
2. Download Configuration to WAG	See Section 5
3. Download Xilinx to WAG	See Section 5
4. Upload Configuration from WAG	See Section 5
5. Run Debugger	See Section 6
6. Run Executive	Runs the executive software in the WAG
7. Run Executive internal clocks, RS232, Command Mode	Run if the WAGs serial interface is configured to utilize external transmit clocks or external receive clocks Runs if the WAGs serial interface is configured for HDLC-UI mode

To View the Boot Options Screen:

1. With the terminal emulation software connected to the WAG, restart the WAG. The Boot Options Screen appears.

```
Boot Options (Valid Executive)
1.  Download Executive to WAG
2.  Download Configuration to WAG
3.  Download Xilinx to WAG
4.  Upload Configuration from WAG
5.  Run Debugger
6.  Run Executive
Choice >
```

Figure 6-1. Boot Options Screen

2. Within 5 seconds, the user must make a selection and press Enter.

6.3 DEBUGGING FROM THE BOOT MENU

If required, the user/installer can troubleshoot the WAG by performing the following procedures.

⚠ CAUTION

CAUTION

THE FOLLOWING PROCEDURE SHOULD ONLY BE PERFORMED IF DIRECTED BY A SIEMENS RAIL AUTOMATION EMPLOYEE. IF THIS PROCESS IS PERFORMED INCORRECTLY, DAMAGE TO THE WAG CAN OCCUR.

To Debug from the Boot Menu:

1. Restart the WAG.

```
Boot Options (Valid Executive)
1.  Download Executive to WAG
2.  Download Configuration to WAG
3.  Download Xilinx to WAG
4.  Upload Configuration from WAG
5.  Run Debugger
6.  Run Executive
Choice >
```

Figure 6-2. Boot Options Screen

2. At the **Choice** prompt, press **5** and then press Enter within five seconds. At the next prompt, type `help` and press Enter. The list of available commands is displayed.

```
WAG Debugger Commands:
mem                 Show memory
version             Show version
help                List commands
flash_erase         Erase flash ROM
flash_program       Program flash ROM
wrmem               Write memory
wrblock             Write memory block
exception           Exception test
exit                Exit debugger

[WAG Debugger] 348936 RAM in use, 150504 RAM available
Type 'help' for a list of commands
>
```

Figure 6-3. Debugger Commands List

3. Start the debugging process. The available commands are as follows:

• `exit`	Exits debugger
• `exception`	Displays CPU diagnostic information
• `flash_erase`	Erases flash ROM
• `flash_program`	Programs flash ROM
• `help`	Lists available commands
• `mem`	Shows memory
• `version`	Shows version
• `wrblock`	Writes memory block
• `wrmem`	Writes memory

Note: The following paragraphs provide detailed descriptions of these commands.

4. When done, type `exit` and press Enter.

6.3.1 Available Commands and Description

mem – Show Memory

This command determines whether a RAM address has a hardware problem or determines if a particular FLASH ROM sector is empty. Use this command only under the direction of a Siemens Rail Automation employee.

The MEM command takes either one or two arguments.

```
mem [starting address in HEX] [optional number of bytes in decimal]
```

The contents of memory at the starting address are shown. If the user does not request the optional number of bytes, the first 128 bytes of memory are shown. Otherwise the requested number of bytes are shown.

version – Show version

The version of the WAG Boot Monitor appears with the date and time that the boot code was compiled.

help – Lists available commands

Shows a list of the available debugging commands.

flash_erase – Erase flash ROM
This command erases the contents of one or more sectors of FLASH ROM. Two arguments are required:

```
flash_erase [starting address in HEX] [number of bytes in decimal]
```

If the user tries to erase ROM sectors that contain the boot code, configuration, or Xilinx code, the WAG reports "You are not allowed to erase PROTECTED ROM!" If the starting address is an address in RAM, the WAG reports "You are not allowed to erase RAM!"

After the requested FLASH sector or sectors are erased, the WAG returns to the debugging prompt. If there was a failure and the requested sector or sectors could not be erased, the WAG reports "`flash_erase: erase failed`!"

flash _program – Program flash ROM

This command copies data from one area of memory into an area of FLASH ROM. This command is useful for saving boot code, Xilinx code, configuration, or executive code into an otherwise unused FLASH sector. Typically, the user will only use this command when directed by a Siemens Rail Automation employee. Additionally, the user can capture blocks of RAM and save them to otherwise unused FLASH ROM.

This command requires three arguments:

```
flash_program [destination address in HEX] [source address in HEX]
[number of bytes in decimal]
```

The contents of the source memory address are copied into the destination FLASH ROM address for the number of bytes offered.

wrmem – Write memory

This command allows the user to change the contents of a memory address. This command is useful for performing RAM tests to detect hardware errors.

The command requires two arguments:

```
wrmem [memory address in HEX] [new value in decimal]
```

wrblock – Write memory block

This command allows the user to fill a block of memory with an incremental test pattern. This command is useful for testing a block of RAM for hardware errors.

The command requires two arguments:

`wrblock [starting RAM address in HEX] [number of bytes in decimal]`

The first starting address is written with a 00, the next memory address is written with a 01 and so forth, wrapping at 255 back to 0 until all requested bytes are filled with the test pattern.

exception – Exception test

This command is used by Siemens Rail Automation personnel to exercise the fatal error recovery capabilities of the WAG software. The test loads the registers of the internal CPU with known values and then forces a fatal error to ensure that the accurate contents of the CPU registers are displayed in the event of an actual fatal error.

After the user types `exception`, an example of the following diagnostic information is displayed:

```
CRASH: We got an error vector 0x0003! (3 dec)
State: ................ 21E5
Access address: ....... 00000001
CPU instruction: ...... 21FC
Status Reg: ........... 2000
Bad code address: ..... 00202424
Stack return address:.. 002025A0
D0: 00200000   A0: 00100000
D1: 00200001   A1: 00100001
D2: 00200002   A2: 00100002
D3: 00200003   A3: 00100003
D4: 00200004   A4: 00100004
D5: 00200005   A5: 00100005
D6: 00200006   A6: 00100006
D7: 00200007   A7: 00005F3E
```

Figure 6-4. Exception Test Diagnostic Information

exit – Exit debugger

This command exits back to the Boot menu.

6.4 UPGRADING THE XILINX CODE

Xilinx code is stored in the WAG FLASH memory. To update the WAG Xilinx, when the WAG is first powered up, the boot code shows a menu through the WAG serial interface. One of the options is "`Download Xilinx to WAG`" allowing a Terminal Emulator with the ZMODEM protocol to send new Xilinx to the WAG. See section 5 for instructions.

After new Xilinx code is sent to the WAG, the new code is automatically stored in the WAG FLASH memory and the boot code restarts, displaying the boot menu again.

If an invalid and non-Xilinx file is uploaded to the WAG, the WAG will reject the file. However if a valid but not a "WAG" Xilinx file (not intended for use by the WAG) is uploaded, the WAG will accept the file. If this occurs, the WAG will become unusable and will need to be returned to the factory for repair.

If a file with a file name other than XILWAG_*x*.BIN is sent to the WAG, the WAG will not save the new file to FLASH memory. The user will be prompted that the new file was not saved along with the correct file name that is needed.

⚠ CAUTION

CAUTION

THIS PROCEDURE SHOULD ONLY BE PERFORMED IF INSTRUCTED BY SIEMENS RAIL AUTOMATION PERSONNEL. THE WAG CAN BE DAMAGED IF NOT PERFORMED PROPERLY.

After the new code is sent to the WAG, the unit automatically stores the new software in FLASH memory.

⚠ CAUTION

CAUTION

ENSURE THAT THE XILINX FILE IS VALID FOR WAG USAGE PRIOR TO UPGRADING THE WAG. IF THE WRONG XILINX FILE IS LOADED, THE WAG WILL BECOME INOPERABLE AND WILL NEED TO BE RETURNED FOR REPAIR

Refer to Section 5 for the procedures to upgrade the WAG Xilinx software.

6.5 TROUBLESHOOTING COMMANDS

This section describes additional troubleshooting commands that can be used.

6.5.1 Using TESTMODE

The TEST command puts the WAG into test mode. If TEST is entered without an argument, Test Mode 0 is selected. If a test is under way and any TEST command is entered, the current test is stopped and the new test is started.

`TEST 0` Test 0 sends 1000 test frames to the Echelon and the Ethernet interfaces. If another WAG is connected to the LAN, it echoes the frames back to the WAG under test. After 1000 frames are sent, a status report shows how many frames were sent and how many were received on both interfaces. The user will also see a PASS / FAIL indicator.

`TEST 1` Test 1 is a Spew Test. A test frame is transmitted out the Ethernet and Echelon interfaces once a second until the test is stopped.

`TEST 2` Test 2 is a serial port test that sends a test message out the serial interface until the test is stopped.

TEST 3 Same as Test 0. This test runs until it is stopped.
To leave this mode, type `test` and press Enter.

6.5.2 Using XDUMP

The XDUMP command asks the Ethernet XPort component to send back a block of its internal RAM memory so that the application code can display it out the serial interface. The command accepts a single argument, in decimal, of the starting RAM address the XPort is required to dump.

When `xdump 3240` is typed, the following is displayed:

```
xdump 3240
XPORT Memory dump address 0ca8 with 128 bytes
6c 6f 61 64 20 66 61 69 6c 65 64 2e 20 56 61 6c   load failed. Val
69 64 20 69 73 20 25 32 73 00 43 48 45 43 4b 53   id is %2s.CHECKS
55 4d 20 45 52 52 4f 52 20 21 21 0a 0d 00 43 6f   UM ERROR !!...Co
70 79 72 69 67 68 74 20 32 30 30 33 2c 20 4c 61   pyright 2003, La
6e 74 72 6f 6e 69 78 20 49 6e 63 2e 00 54 69 6d   ntronix Inc..Tim
65 00 46 41 54 41 4c 20 45 52 52 4f 52 20 00 2f   e.FATAL ERROR ./
53 65 74 75 70 20 6d 65 6d 6f 72 79 3a 20 43 6f   Setup memory: Co
6e 74 61 63 74 20 74 65 63 68 20 73 75 70 70 6f   ntact tech suppo
```

Figure 6-5. Xdump Block Display

The XDUMP command always requests blocks of 128 however, since XPort only maintains 64K of RAM, if the operator requests a starting address closed to the end of RAM, a partial block may be displayed. For example, if a user types `xdump 65480`, the following partial block will be displayed:

```
xdump 65480
XPORT Memory dump address ffc8 with 55 bytes
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
00 00 00 00 00 00 00 00 f2 ff 9a 0d 1a 58 00 02   .............X..
5a af 00 00 00 00 99 0f 52 00 fc ff 1d 0e bb 0b   Z.......R.......
52 00 44 01 3c 03 02                              R.D.<...R
```

Figure 6-6. Xdump Partial Block Display

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