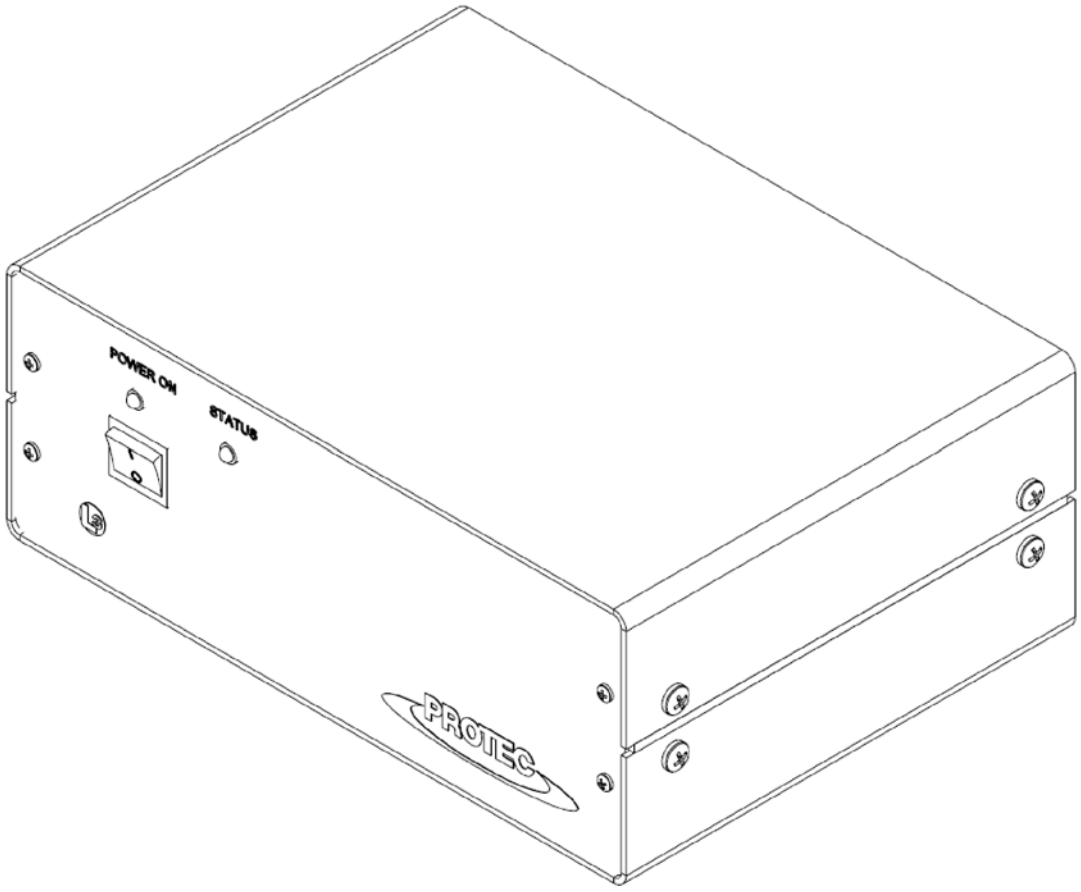
communications

PROTEC-D
AID to NAVIGATION (AtoN)
AUTOMATIC IDENTIFICATION SYSTEM (AIS)
INSTALLATION & OPERATION MANUAL



PROTEC-D AtoN AIS PART NUMBER:
ATN01-350-00

Initial Issue
Aug. 23/10

P/N: 165M1161-00

PROTEC-D AtoN AIS I&O Manual 165M1161-00
Initial Issue
August 23, 2010

EXPORT CONTROL STATEMENT AIS TECHNOLOGY / DATA:

"This technical data and software is considered as Technology Software Publicly Available (TPSA) No License Required (NLR) as defined in Export Administration Regulations (EAR) Part 737.7-11."

This manual contains date sensitive information. To verify the latest revision level of this manual, visit our document download site at http://www.L-3ar.net.

Inquiries should be addressed to:
L-3 Communications
Aviation Recorders Publications
Vendor Code: 06141
P. O. Box 3041
Sarasota, Florida 34230
Phone: (941) 371–0811
FAX: (941) 377–5591

GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This board was constructed in an ESD (electro–static discharge) protected environment. This is because most of the semiconductor devices used in this board are susceptible to damage by static discharge.

Depending on the magnitude of the charge, device substrates can be punctured or destroyed by contact or mere proximity of a static charge. The results can cause degradation of device performance, early failure, or immediate destruction.

These charges are generated in numerous ways such as simple contact, separation of materials, and normal motions of persons working with static sensitive devices.

When handling or servicing equipment containing static sensitive devices, adequate precautions must be taken to prevent device damage or destruction.

Only those who are thoroughly familiar with industry accepted techniques for handling static sensitive devices should attempt to service circuitry with these devices.

In all instances, measures must be taken to prevent static charge build–up on work surfaces and people handling the devices.

FCC Certification

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

REVISIONS			
Rev.	Reason/Description	Requested/ Changed By	Date
Init.	Initial issue of 165M1161–00, installation and operation manual for PROTEC-D Aid to Navigation (AtoN) Automatic Identification System (AIS).	MR/MR	08/23/10

THIS PAGE IS INTENTIONALLY LEFT BLANK.

SECTION 1

PROTEC-D AtoN AIS

INTRODUCTION

THIS PAGE IS INTENTIONALLY LEFT BLANK.

AtoN AIS Introduction

1.1. System Overview

The Aid to Navigation (AtoN) Automatic Identification System (AIS) is designed to be installed as an integral part of weather and navigation buoys to transmit warnings, navigational, and meteorological data to approaching vessels. Two versions of the AtoN AIS are available: Type 1 transmits output messages, while Type 3 transmits and receives messages.

In its most basic form, the unit transmits a report with the AIS AtoN's position in an ITU-R M. 1371 message 21. When the unit contains a daughterboard or it interfaces with the buoy's navigational and weather instrumentation, additional messages transmit navigational and meteorological data. A summary of all the messages processed by the AIS AtoN are defined in this section.

The L3 PROTEC-D AtoN AIS provides all AtoN capabilites for use in an office environment, such as a port authority.

1.2. AIS AtoN Messages

The AIS AtoN transmission schedule and VHF slot assignments are determined by a competent authority and used to configure the AIS AtoN prior to activation and installation. At a minimum, the AIS AtoN transmits message 21 and can be configured to transmit the optional messages 6, 8, 12, 14, 17, and 25. All of these messages are specified in ITU-R M.1371. This section briefly describes each message.

Table 1-1. Summary of AIS AtoN Messages

Msg ID	Message Type	Slot Length	Message Description/Application
6	Addressed Binary Message	1 to 5 (varies)	Binary payload that contains the MMSI, usually of a base station, which is designated to receive the message that is sent until it is acknowledged; May contain information about the AtoN equipment, such as meteorological and hydrological information that is obtained from a daughterboard or external sensors
8	Broadcast Binary Message	1 to 5 slots (varies)	Binary payload that broadcasts to any equipment that can receive it; May contain information about the AtoN equipment, such as meteorological and hydrological information that is obtained from a daughterboard or external sensors
12	Addressed Safety Related Message	1 to 5 slots (varies)	Safety-related text that is addressed to a specific MMSI, usually a base station; Message is sent until it is acknowledged; Warns of an AtoN malfunction

14	Broadcast Safety Related Message	1 to 5 slots (varies)	Safety–related text for broadcast communication that is received by all units that can receive the message; Warns of an AtoN malfunction
17	GNSS Broadcast Binary Message	1 to 5 slots (varies)	Differentially corrects GNSS positions to Differential Global Navigation Satellite System (DGNSS) positions; Should be transmitted by a base station, which is connected to a DGNSS reference source and configured to provide DGNSS data to receiving stations; Special option
21	Aids–to–Navigation Report	2 slots	AtoN position report that is usually transmitted every 3 minutes and is meant to be seen by all AIS transponders; Contains information about the AtoN, such as the origination MMSI, name of the AtoN (if applicable), and the type of AtoN (fixed or floating); Sends the Aid to Navigation Report and a warning to approaching vessels
25	AtoN Position Report	1	Intended for short, infrequent data transmissions and is designed to save bandwidth; Used for chaining

1.3. Technical Specifications

The AIS AtoN is fully compliant to the technical specifications:

- Defined in IEC 62320–2
- Defined in ITU.R M.1371-3
- IALA A–126

TDMA Transmitter

TX Frequency: 156.025 MHz - 162.025 MHz
Transmitter Power: 12.5 W max.
Channel Bandwidth: 25 kHz

Output

As defined in ITU.R.M.1371: Message 6, Message 8, Message 12, Message 14, Message 17, Message 21, and Message 25

Power Supply

12 VDC nominal $\pm$ 10 % (power to the unit is supplied by an AC converter which plugs into a standard wall receptacle).

Power Consumption for Message 21

Message 21 (FATDMA) every 3 minutes for 30 minutes (10 full cycles):

- Average Instantaneous Current: 14.2 mA (Vin = 12.0 Vdc)

- Average Instantaneous Power: 170 mW

Message 21 (RATDMA) every 3 minutes for 30 minutes (10 full cycles):

- Average Instantaneous Current: 125 mA (Vin = 12.0 Vdc)
- Average Instantaneous Power: 1500 mW

Power usage in continuous receive mode:

- Average Instantaneous Current: 323 mA (Vin = 12.0 Vdc)
- Average Instantaneous Power: 3880 mW

Environment

The PROTEC-D AtoN AIS is designed for a protected environment (such as an office), and is not hardened against the elements. As with any electronic equipment used in an office environment, the PROTEC-D AtoN AIS must be protected from water and extremes of temperature and/or humidity.

ISO

The PROTEC-D AtoN AIS is manufactured in Sarasota, Florida, United States of America, pursuant to ISO 9000.

1.4. Acronyms

ABM	Addressed Binary Message
ACK	Acknowledgment Message
AIS	Automatic Identification System
ARM	Advanced RISC Machine
AtoN	Aid to Navigation
BMS	Bandwidth Management Service
BNC	Bayonet Neill-Concelman Connector
CDV	Committee Draft for Vote
COG	Course Over Ground
DGNSS	Differential Global Navigation Satellite System
DGPS	Differential Global Positioning System
DSP	Digital Signal Processor
FATDMA	Fixed Access Time Division Multiple Access
FDIS	Final Draft International Standard
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
MMSI	Maritime Mobile Service ID
MPR	Message Payload Rebroadcast

NMEA	National Marine Electronics Association
NV	Non-Volatile
PLL	Phase-Locked Loop
RATDMA	Random Access Time Division Multiple Access
RF	Radio Frequency
SART	Search and Rescue Transponder
Tx	Transmitter
TNC	Threaded Neill-Concelman Connector
VDL	VHF Data-link
VDM	VHF Data-link Message
VDO	VHF Data-Link Own-Vessel Message
VHF	Very High Frequency
VSD	Voyage Static Data
VSWR	Vertical Standing Wave Ratio / Voltage Standing Wave Ratio

SECTION 2
PROTEC-D AtoN AIS

MECHANICAL DIMENSIONS
and
CONNECTORS

THIS PAGE IS INTENTIONALLY LEFT BLANK.

PROTEC-D AtoN AIS Mounting & Connections

The compact, single-box PROTEC-D AtoN AIS is designed to sit on a desktop or shelf, therefore there are no special mounting considerations other than assuring that there is a nearby AC outlet and convenient access to VHF and GPS antenna leads.

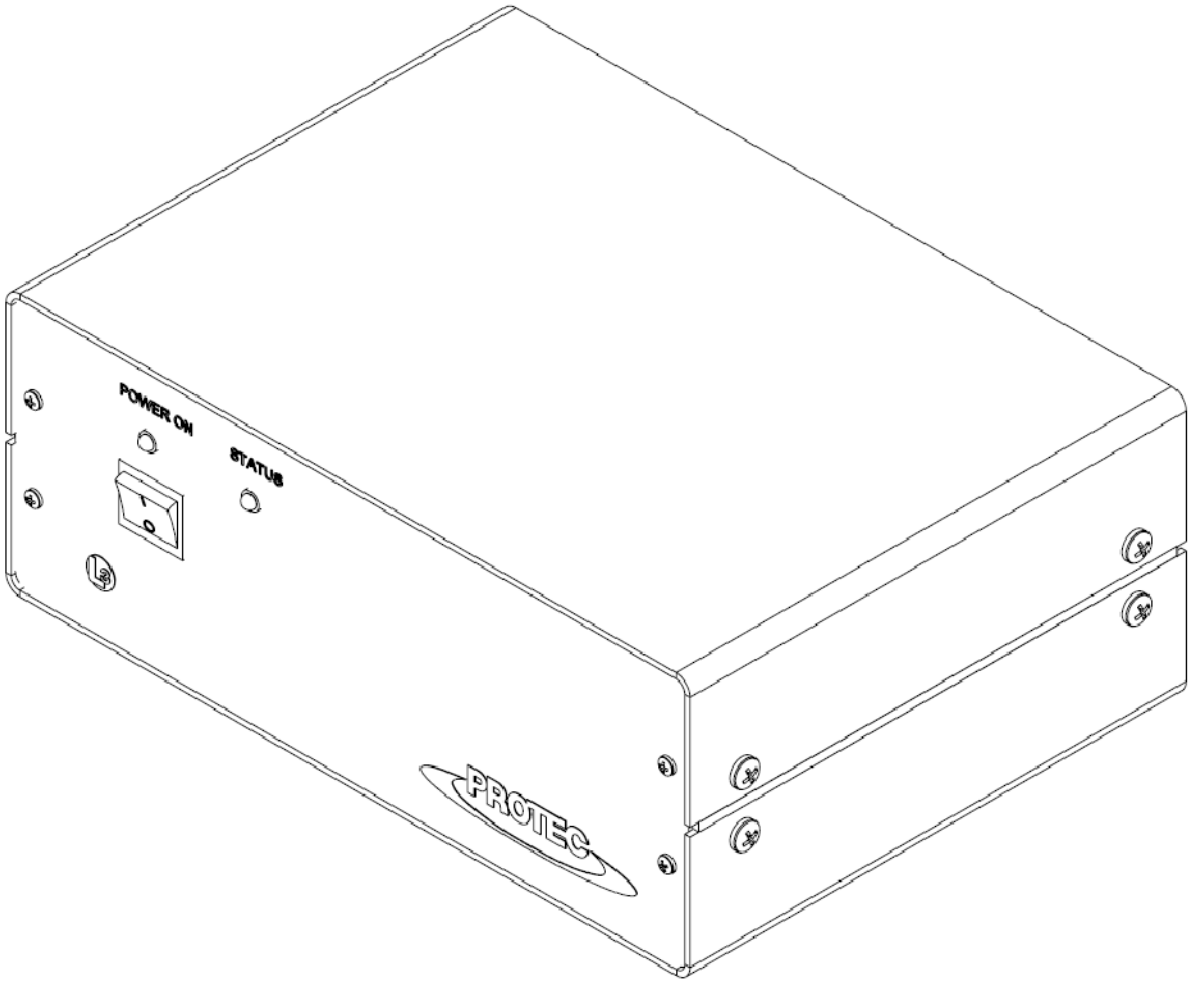


Figure 2-1. Desktop AIS AtoN

2.1. Dimensions

Figure 2-2 shows the dimensions of the PROTEC-D AtoN AIS unit.

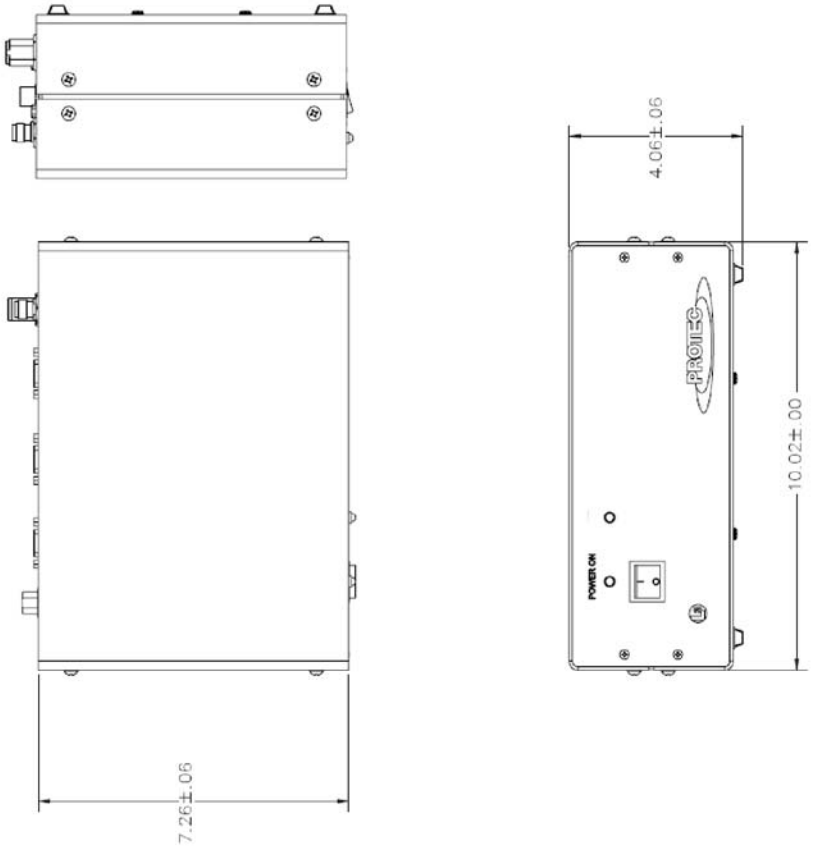


Figure 2-2. PROTEC-D AtoN AIS Dimensions

2.2. AtoN AIS Connections

Figure 2-3 illustrates the connectors on the PROTEC-D AtoN AIS. The standard AtoN AIS is delivered as a standalone unit without power supply, cables or antennas. The power supply, cables and antennas must be purchased separately.

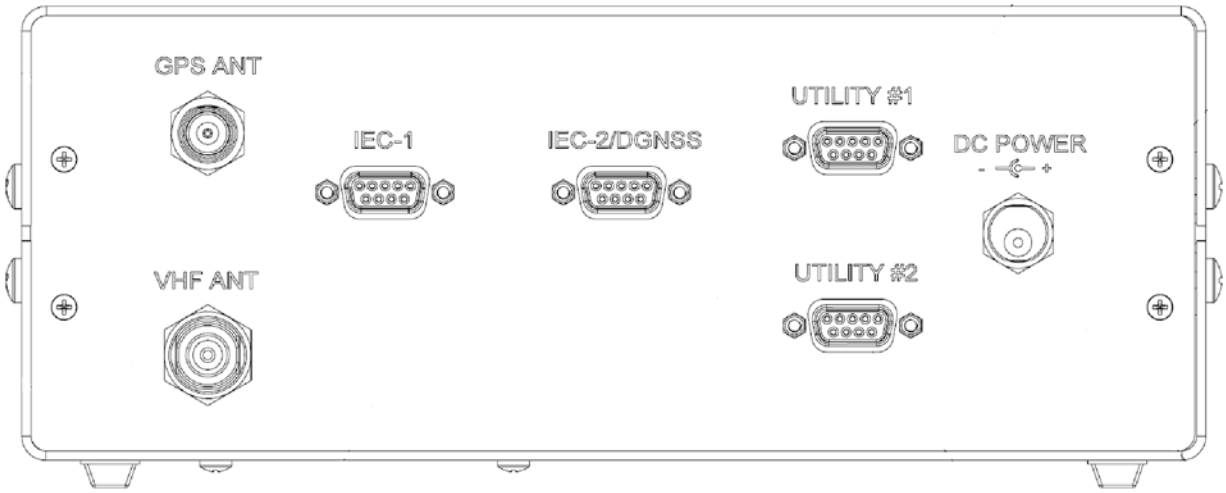


Figure 2-3. PROTEC-D AtoN AIS Connections

2.3. Power Connection

Power for the AtoN AIS unit is supplied by an AC adaptor that outputs 12VDC. Plug the adapter into a standard AC outlet, and then plug the power cable into the 12VDC connector on the unit (Figure 2-3). The LED above the power switch on the front panel illuminates when the unit is turned on.

2.4. GPS Connection

As shown in Figure 2-3, the GPS connector on the AtoN AIS unit is a female TNC, Amphenol 31-6111. A sample connector is Amphenol 31-2373, which can be used with cable numbers: RG-142 and RG-223.

2.5. RF (VHF) Connection

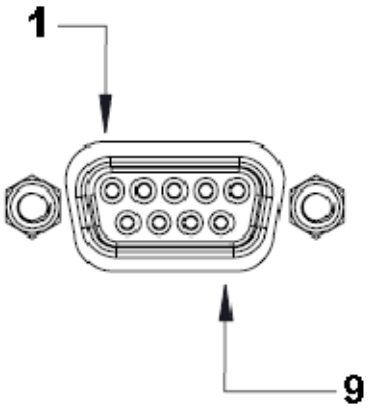
As shown in Figure 2-3, the RF (VHF) port on the AtoN AIS unit is a Type-N connector. The part number is Amphenol 82-6093-FRX. The connector on the cable is a male Type N. A sample connector is the Amphenol 082-5370, which can be used with cable numbers RG55, RG142, and RG223.

2.6. Status Indicator Light

As shown in Figure 2-1, the AtoN AIS is equipped with a status indicator light. This light illuminates if a valid UTC has been acquired. If the power light is on, but the status indicator light is not illuminated, it indicates that a valid UTC has not been acquired.

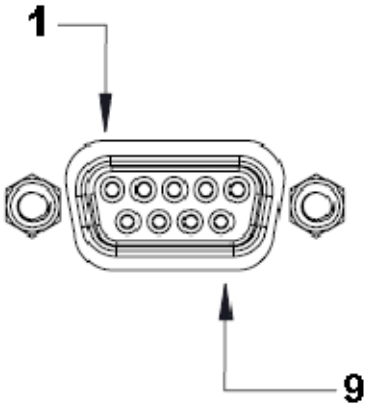
2.7. DB-9 Connector Pinouts

The AtoN AIS has four standard female DB-9 connectors on the rear panel, which are labeled IEC-1, IEC-2/DGNSS, Utility #1 and Utility #2. The pinout for each of these connectors is as follows, as shown in Figure 2-4 through Figure 2-7 :



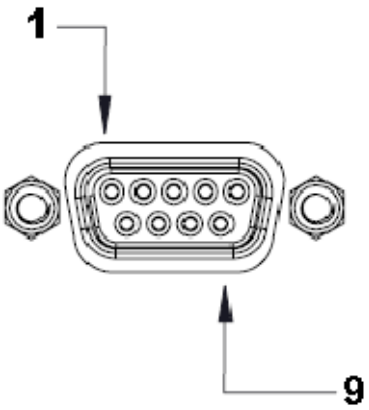
PIN	SIGNAL NAME
1	RESERVED
2	IEC–1–TXD
3	IEC–1–RXD
4	RESERVED
5	GROUND
6	RESERVED
7	RESERVED
8	RESERVED
9	RESERVED

Figure 2-4. IEC-1 Connector Pinout



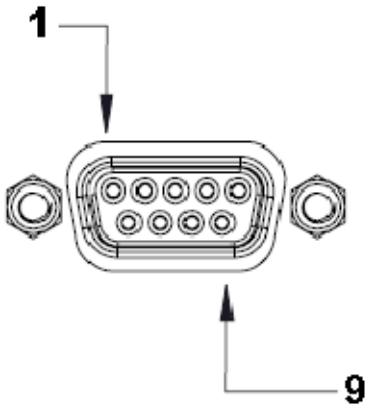
PIN	SIGNAL NAME
1	RESERVED
2	IEC–2/DGNSS–TXD
3	IEC–2/DGNSS–RXD
4	RESERVED
5	GROUND
6	RESERVED
7	RESERVED
8	RESERVED
9	RESERVED

Figure 2-5. IEC-2/DGNSS Connector Pinout



PIN	SIGNAL NAME
1	RESERVED
2	UTILITY #1(ARM)–TXD
3	UTILITY #1(ARM)–RXD
4	RESERVED
5	GROUND
6	RESERVED
7	RESERVED
8	RESERVED
9	RESERVED

Figure 2-6. Utility #1 Connector Pinout



PIN	SIGNAL NAME
1	RESERVED
2	UTILITY #2(DSP)–TXD
3	UTILITY #2(DSP)–RXD
4	RESERVED
5	GROUND
6	RESERVED
7	RESERVED
8	RESERVED
9	RESERVED

Figure 2-7. Utility #2 Connector Pinout

SECTION 3

PROTEC-D AtoN AIS

ANTENNA INSTALLATION

THIS PAGE IS INTENTIONALLY LEFT BLANK.

AIS AtoN Installation

NOTE: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

3.8. Install the VHF Antenna

Installation of a VHF antenna is as important to reliable communications as the transceiver itself. Figure 3-1 illustrates a typical VHF antenna setup.

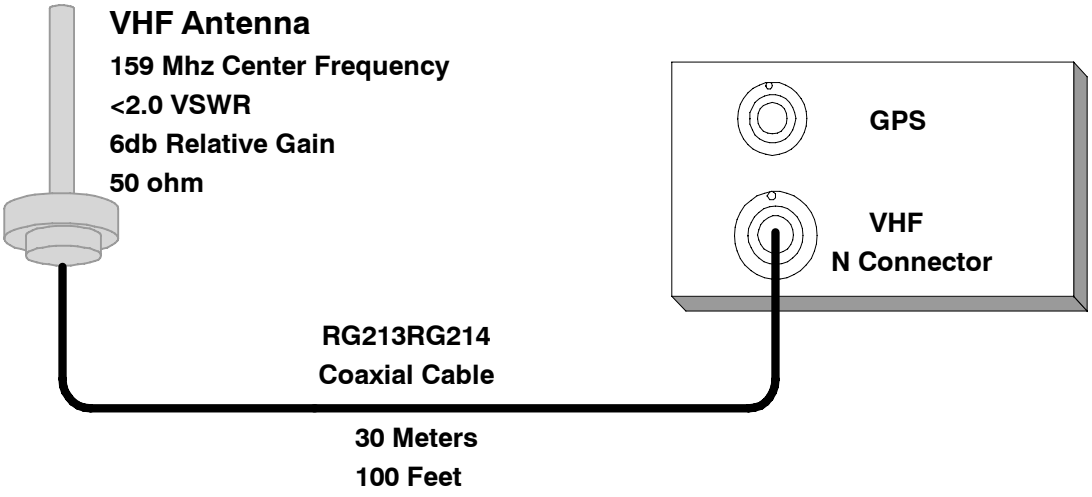


Figure 3-1. VHF Antenna Setup

Purchase a VHF marine band antenna from an established source and follow all of the manufacturer's instructions with particular attention to the cable routing and connector installation. When installing the VHF antenna, follow the cautions below.

- Place the antennas as high as practical and separate them as much as possible.
- Place the antenna in an elevated position with a minimum of 2 meters of clearance from all conductive material.
- Install the antenna away from large, vertical obstructions.
- Ensure that the antenna has a 360° line of sight to the horizon.

To install the VHF antenna, perform the following:

(1) Position the antenna mounting bracket on a rigid and structurally sound surface and install the antenna.

(2) Run the coaxial cable from the antenna to the AIS AtoN location.

(3) Trim the cable, leaving a few inches of slack at the AIS AtoN.

(4) Attach the connectors to the end of the coaxial cable. Solder the connection.

(5) To make sure that the cable is not shorted, check it with an ohm meter.

(6) Connect the cables to the AIS AtoN.

3.9. Install the GPS Antenna

Since the synchronization of internal transmission of the AtoN AIS relies on the accuracy of the time signal obtained from the GPS system, the correct installation of this antenna is crucial. To enhance good transmission, purchase a high quality GPS antenna from an established source and follow all of the manufacturer's instructions, paying particular attention to the cable routing and connector installation. Figure 3-2 illustrates a typical GPS antenna setup.

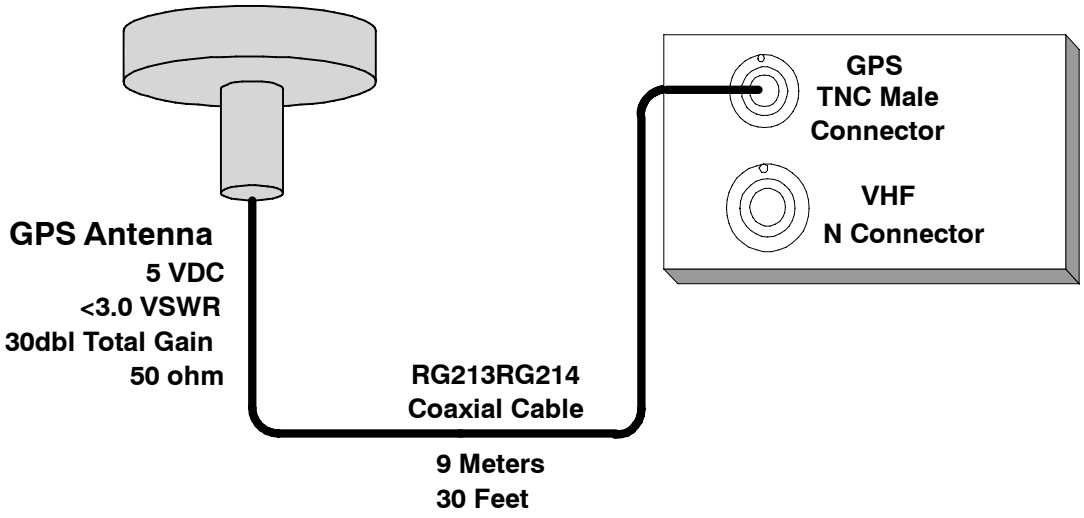


Figure 3-2. GPS Antenna Setup

When installing the GPS antenna, consider the following.

- Be sure no obstructions are between the antenna and the sky.
- Since GPS signals can be affected negatively by VHF transmissions, try to position the GPS antenna at least 3 meters from the VHF antenna.
- Position the antenna as high as possible to prevent ice or spray from negatively affecting signal reception.

To install the GPS antenna, perform the following:

(1) Position the antenna mounting bracket and/or antenna mast on a rigid, structurally sound surface.

NOTE: To reduce signal attenuation, use only high quality RG213/RG214 coaxial cable and keep the cable length as short as possible.

(2) Run the coaxial cable from the antenna to the transponder location.

(3) Trim the cable, leaving a few inches of slack at the AIS AtoN.

(4) To make sure that the cable is not shorted, check it with an ohm meter.

(5) Attach the connectors to the end of the coaxial cable. Solder the connection.

(6) Connect the cable to the AIS AtoN, and solder the connection.

THIS PAGE IS INTENTIONALLY LEFT BLANK.

SECTION 4

PROTEC-D AtoN AIS

CONFIGURATION

THIS PAGE IS INTENTIONALLY LEFT BLANK.

AtoN AIS Configuration

The transmit functions of the AIS AtoN must be configured prior to installation. Basically, the configuration specifies which messages are transmitted, how often they are sent, and the specific VHF data link (VDL) slot used to transmit them.

NOTE: All message assignments and intervals must be defined and approved by the appropriate competent authority, such as the local port authority where the AIS AtoN is installed.

4.1. Set Up HyperTerminal

Configuration is accomplished with a personal computer (PC), running any simple terminal emulator for the computer interface. This manual uses a Windows "HyperTerminal" screen as the computer interface tool. To begin configuration, connect 12 VDC power to the AIS AtoN. Connect the AIS AtoN's Utility #1 port to the computer's serial port. Turn on the unit. In the Microsoft Windows "Properties" window, set the "Port Settings" at "115200 Baud," "8 Data Bits," "No Parity," "1 Stop Bit," and "No Flow Control," as shown in Figure 4-1.

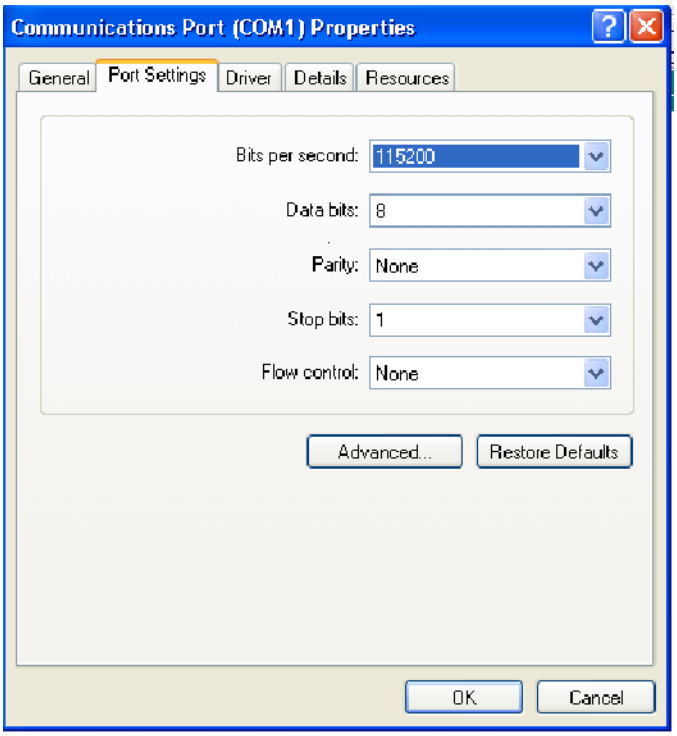


Figure 4-1. Set Up the Communications Port Properties

Once launched, trace output messages from the ARM processor in the AIS AtoN unit should appear in the "HyperTerminal" window, as shown in Figure 4-2.

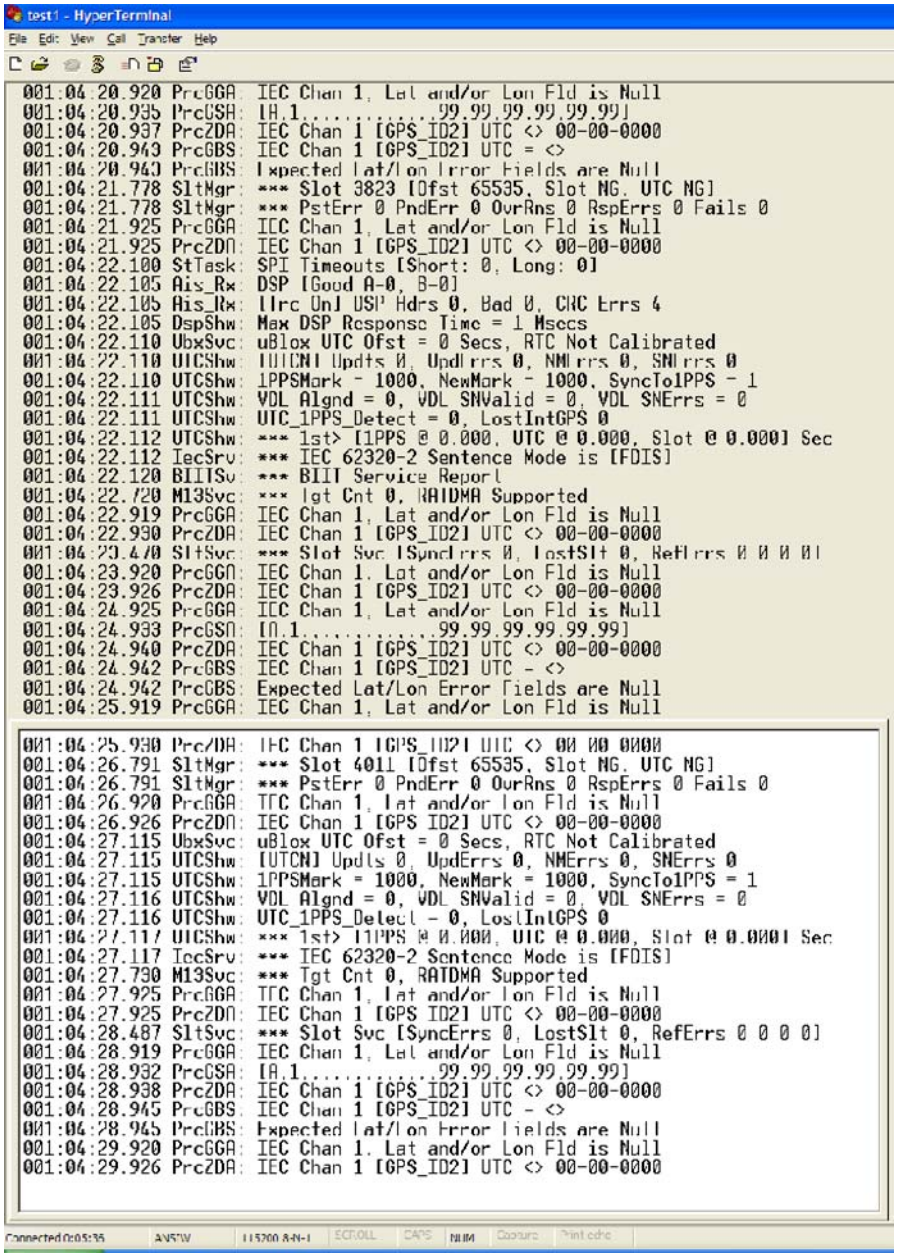


Figure 4-2. Typical Startup Screen with Trace Messages

4.2. Navigate the HyperTerminal

The HyperTerminal screen displays trace messages or the “System Configuration Menu,” which is described in the next section. Table 4-1 describes basic keys that are used to navigate these screens. Additional keys that are used in each individual screen are explained throughout this manual.

Table 4-1. HyperTerminal Key Descriptions

Key	Trace Message Screen Features	System Configuration Menu Features
ESC	Takes the screen out of sleep mode and begins to display trace messages again	Takes the user back to the previous screen; Displays a menu exit message in the main “System Configuration” menu
Space Bar	Stops and restarts the display of trace messages	Enables and disables some of the features by toggling them on or off
C	Opens the “System Configuration” menu	Not Applicable

4.3. System Configuration Menu

An intuitive set of screens set up under the “System Configuration Menu” provides users with the options needed to configure the AIS AtoN for maintenance-free use. To access this menu, press “C” in the “HyperTerminal” screen while it is transmitting trace messages. The window shown in Figure 4-3 appears.

NOTE: If trace messages are not displayed, press “ESC,” and a “Hit Any Key to Reboot” message appears. Press any key, so the system reboots. Press “C” to open the “System Configuration Menu.”

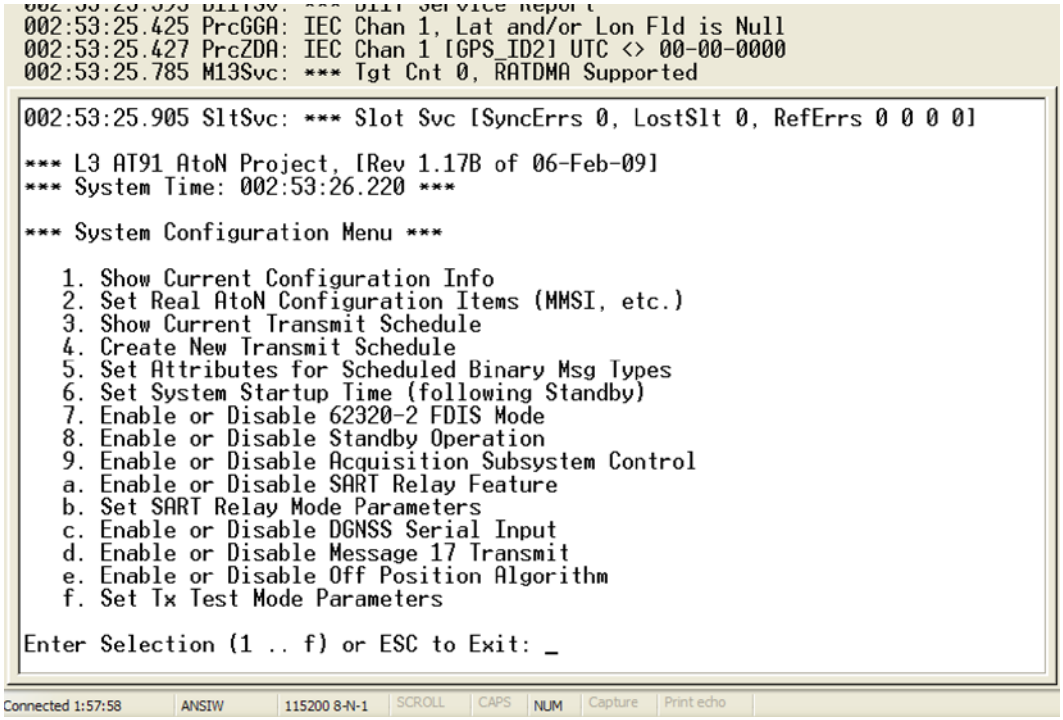


Figure 4-3. System Configuration Menu

To configure a specific feature, type in the menu number or letter associated with it, and this automatically opens self-explanatory options at the bottom of the screen.

NOTE: When these menus are used, normal AIS AtoN operation is terminated. Whether or not changes are made to the configuration when the menus are exited, the system automatically prompts the user to reboot with the "Hit Any Key to Continue..." message. Press any key, and the"Enter Selection (1 .. e) or ESC to Exit" message appears. Press "ESC," and then type in a number or letter to select a menu option.

4.3.1. Display the Current Transmit Configuration

When “1” is entered in the “System Configuration Menu,” the “Current Configuration Information” screen appears with a summary of the AIS AtoN’s existing setup, as show in Figure 4-4. Press any key to return to the main “System Configuration Menu.” Table 4-2 describes the parameters in this screen, which are some of the basic features in the AIS AtoN.

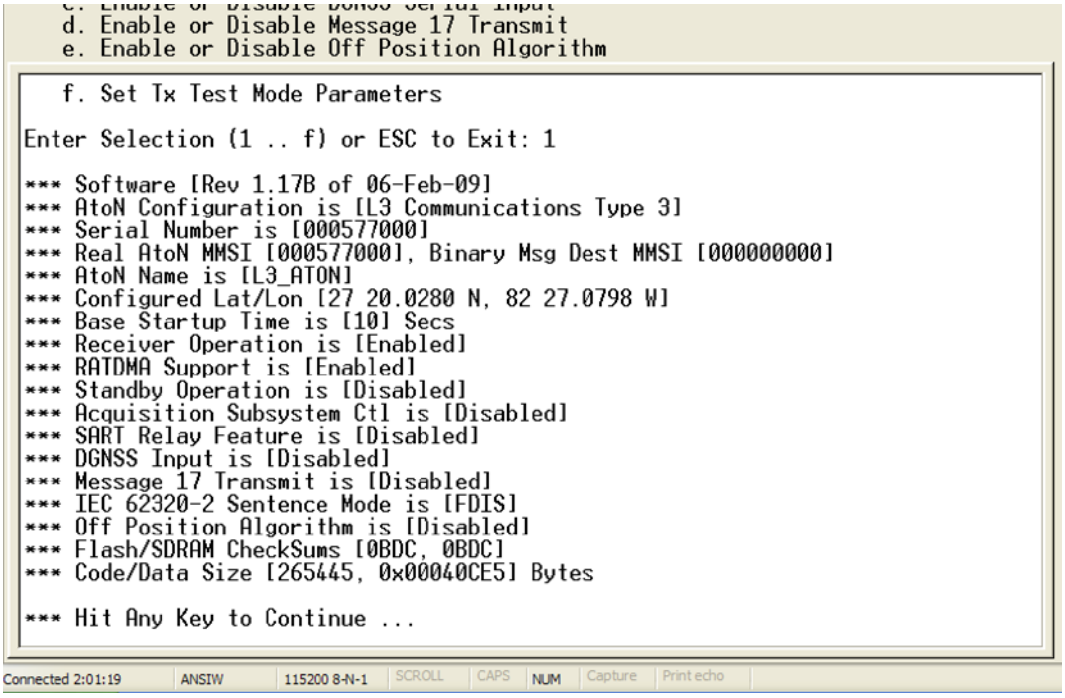


Figure 4-4. View the Current Configuration Information Screen

Table 4-2. Current Configuration Field Descriptions

Field	Description
Software	Displays the revision of the software currently running on the AtoN
AtoN Configuration	Describes the type of AIS AtoN unit
Serial Number	Displays the serial number of the AIS AtoN unit
MMSI	Shows the MMSI of the AIS AtoN, which is set at “0” as a factory default
AtoN Name	Displays the name of the AIS AtoN I.D. string
Configured Lat/Lon	Indicates the charted location (latitude and longitude) of the AtoN, as it is shown on international charts

Field	Description
Base Startup Time	Defines the wake up time needed to prepare for a transmission; When an AtoN wakes up from Standby mode, it must acquire UTC time; Normally, this process takes 10 seconds or less (default setting); In areas where GPS reception is poor, or Standby times are longer than 10 minutes, this setting can be changed to wake up sooner.
Receiver Operation	Indicates whether or not the AIS AtoN has its receivers turned on
RATDMA Support	Indicates whether or not RATDMA transmissions are enabled
Standby Operation	Indicates whether Standby (Sleep) mode is enabled to conserve battery life
Acquisition Subsystem Control	Should be enabled when a daugtherboard is installed in the AIS AtoN; Manages the interface between the motherboard and daugtherboard; Enables extended MPR operations
SART Relay Feature	Shows whether or not the AIS AtoN is set to receive a Search and Rescue Transponder (SART) message, which the AIS AtoN repeats for a pre-defined amount of time; Overrides power saving settings; Factory test only; Leave disabled
DGNSS Input	Indicates whether data is accepted from an external DGNSS receiver; Disables IEC port if enabled; Factory test only; Leave disabled
Message 17 Transmit	Shows whether Message 17 corrections are transmitted; Factory test only; Leave disabled
IEC 62320-2 Sentence Mode	Displays the 62320-2 mode, which is either “CDV” or “FDIS”
Off-Position Algorithm	Shows whether an optional algorithm is used to calculate off-position; Factory test only; Leave disabled
Flash SDRAM CheckSums	Duplicate numbers indicate that the software image is loaded properly
Code Data Size	Indicates the size of the code file

4.3.2. Set the MMSI

To set the MMSI, enter “2” in the main “System Configuration Menu,” and the option to change the MMSI appears, as shown in Figure 4-5. Hit “M,” and the screen shown in Figure 4-5 appears. If needed, change the MMSI, and press “Enter.” When the “Hit Any Key to Continue...” message appears, press any key to return to the main “System Configuration Menu.”

NOTE: The MMSI is controlled by a competent authority and must be a legitimate number. The factory default is “0.”

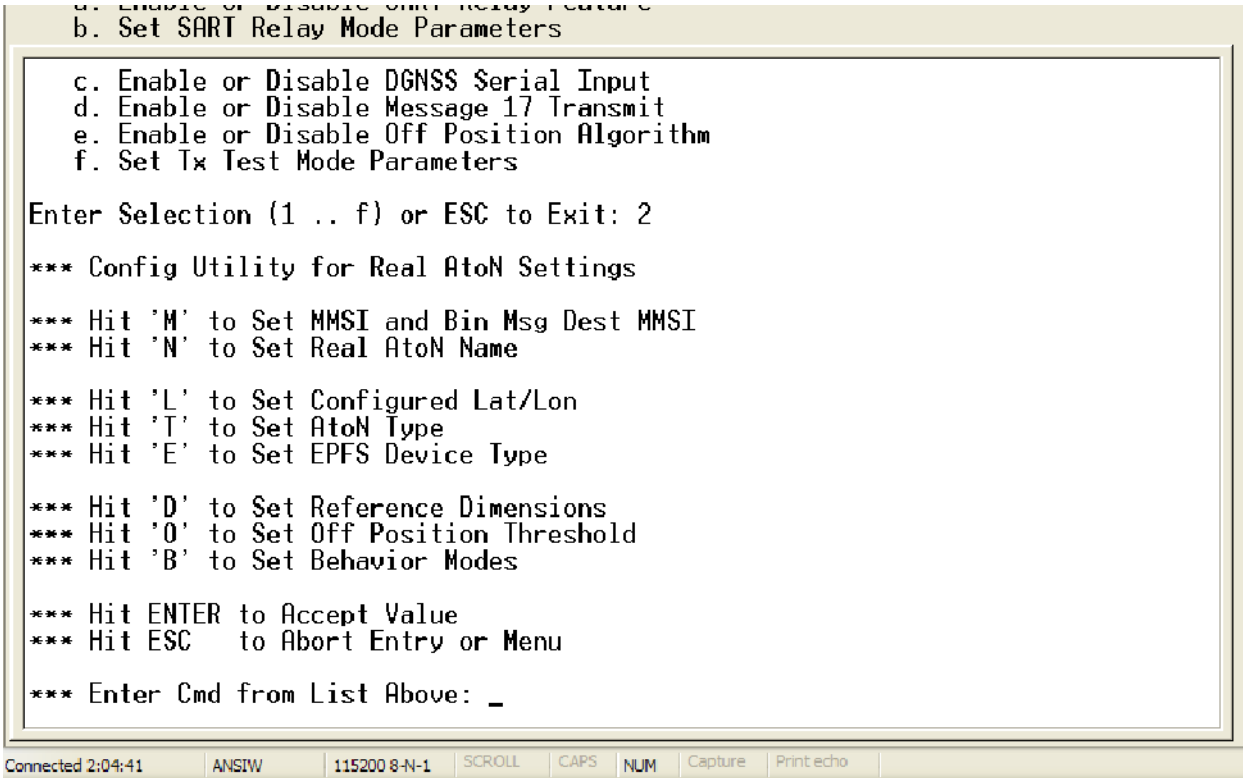


Figure 4-5. AtoN Configuration Screen

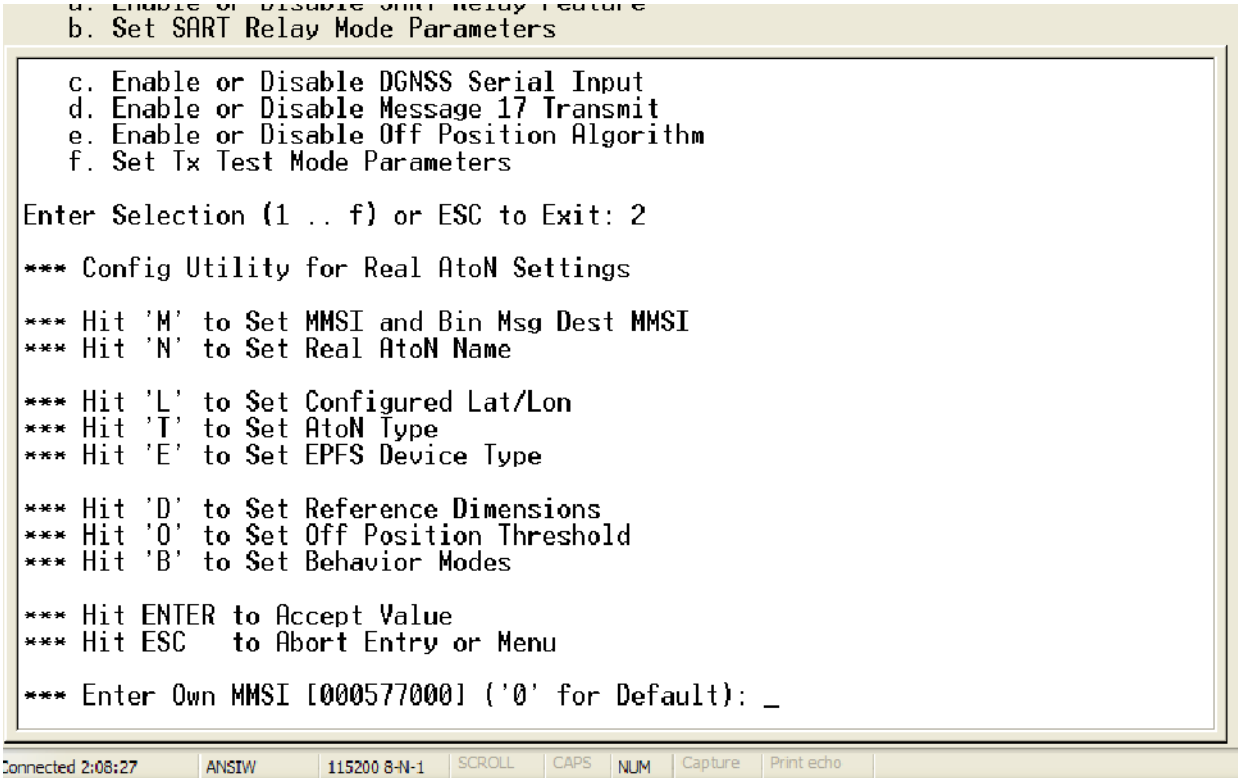


Figure 4-6. Change MMSI Screen

4.3.3. Set the Latitude and Longitude

The latitude/longitude feature tells the system where the AIS AtoN is supposed to be located, according to international charts. The AIS AtoN compares the latitude and longitude information with GPS data to determine whether or not the unit has drifted from its charted position. When the unit is off-position, Message 21 indicates an "off-position" status.

To set the latitude, enter "2" in the "System Configuration Menu," followed by "L" in the AtoN Configuration Menu, and the "Latitude" option appears, as shown in Figure 4-7. Enter the "Degrees" and "Minutes" and press "Enter." When the "Longitude" option appears (Figure 4-8), type in the "Degrees" and "Minutes" and press "Enter," then press "ESC" to return to the System Configuration Menu."

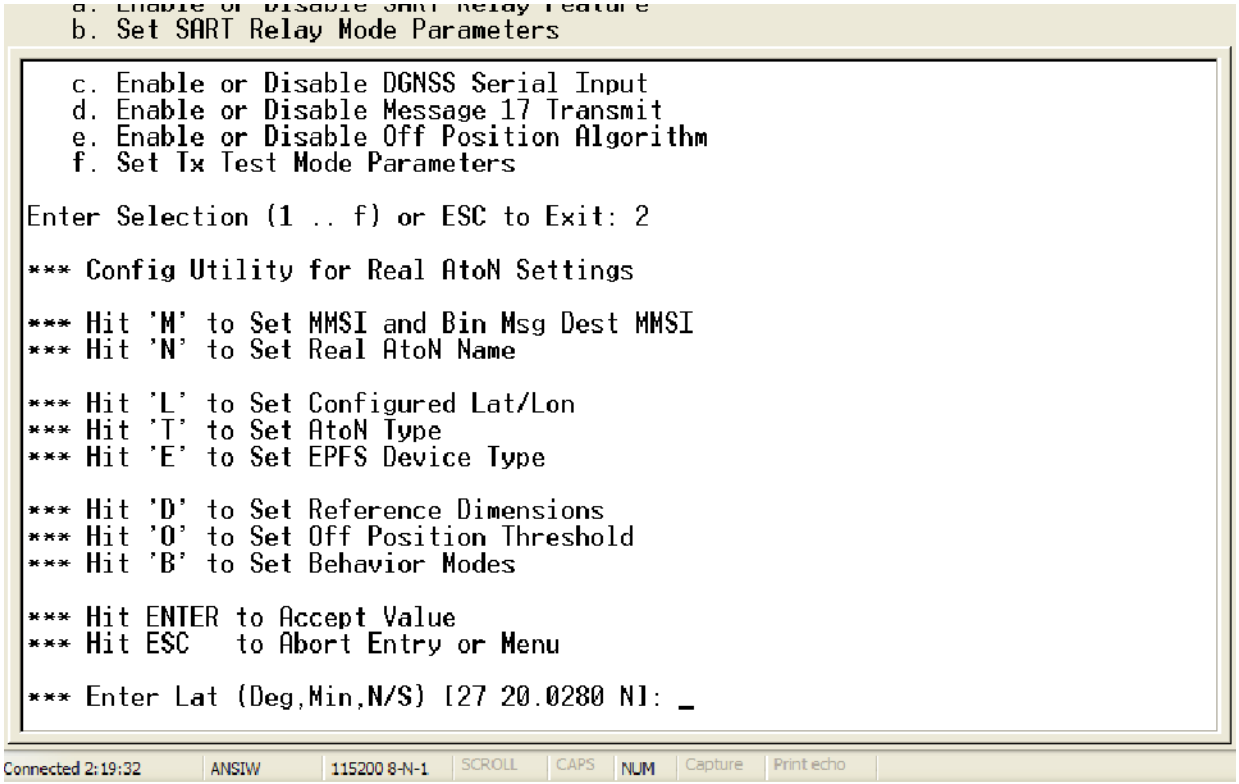


Figure 4-7. Set the Latitude

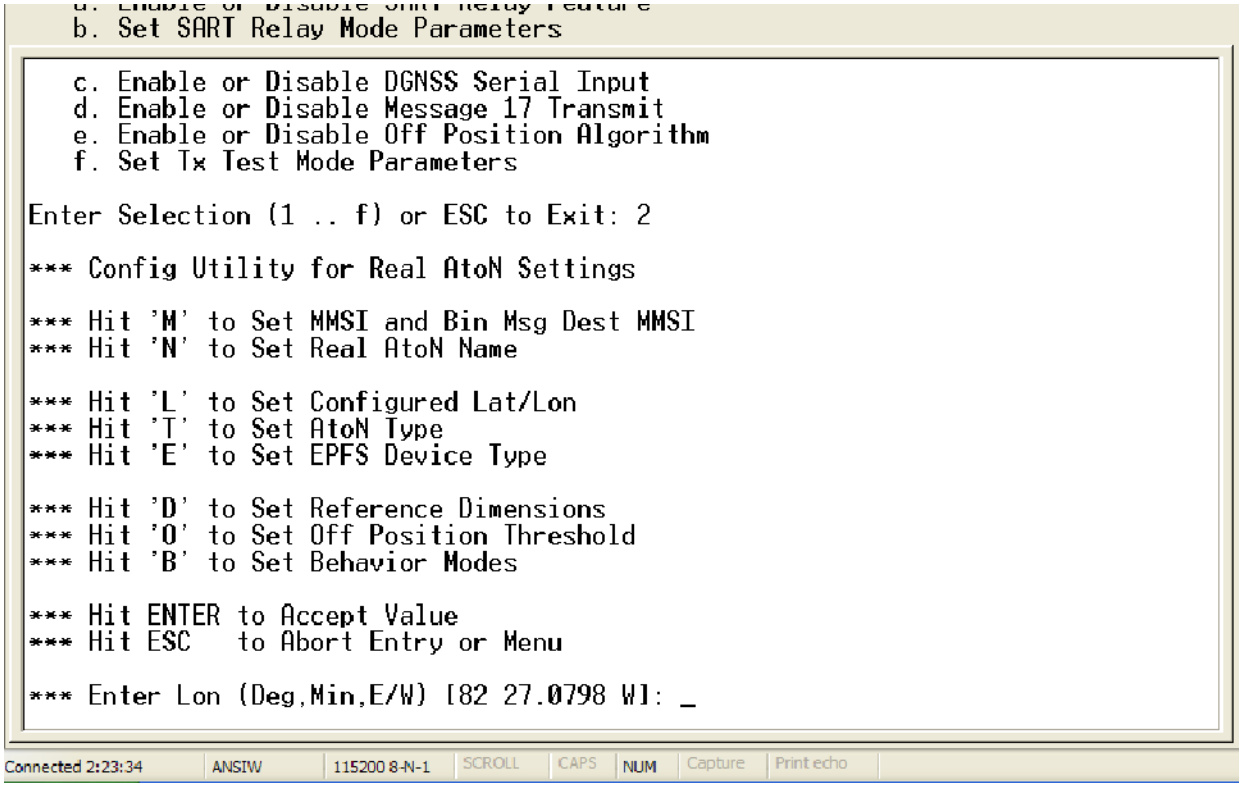


Figure 4-8. Set the Longitude

4.3.4. View the Current Transmit Schedule

To view the ”Current Transmit Schedule,” enter “3” in the System Configuration Menu, and the screen shown in Figure 4-9 displays a summary. Press any key to return to the “System Configuration Menu.”

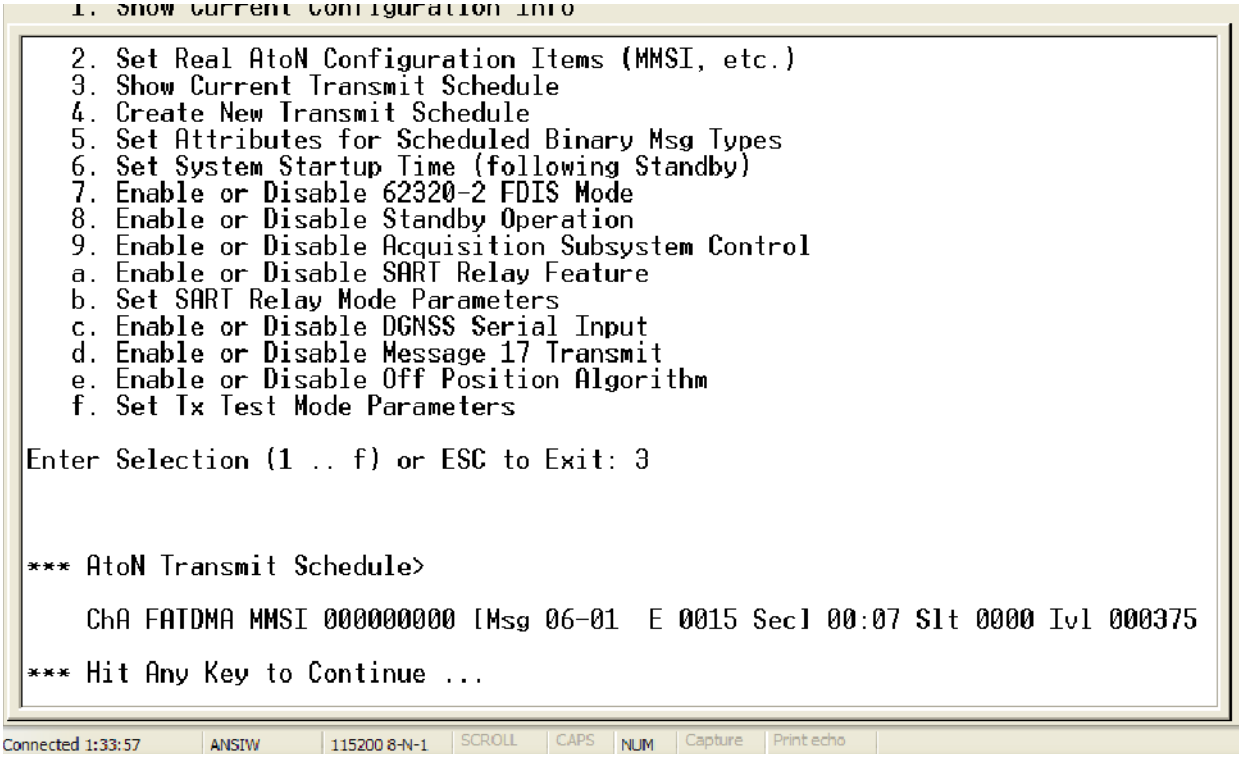


Figure 4-9. View the Current Transmit Schedule

NOTE: This schedule is an example only.

4.3.5. Add or Replace Transmit Schedules

To set the transmit data, enter “4” in the main “System Configuration Menu,” and the screen in Figure 4-10 opens with the message “Adds or Replaces Schedule for Specified MsgID.” Table 4-3 describes the configurable fields displayed in the last line of the screen.

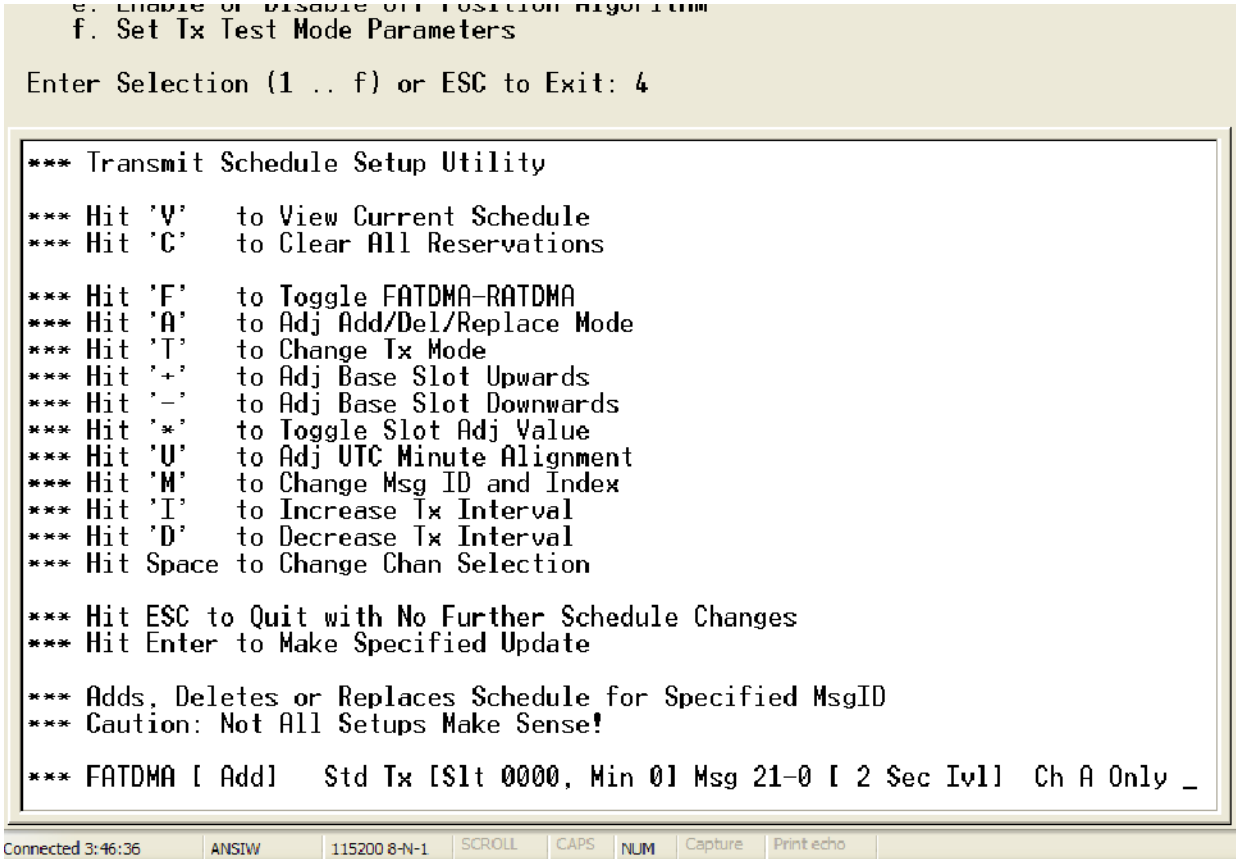


Figure 4-10. Change the Transmit Schedule

Table 4-3. Transmit Schedule Setup Utility Field Descriptions

Field	Key Stroke	Description
FATDMA / RATDMA	F	Enables the user to toggle between the FATDMA and RATDMA formats
[Add] [Rplc] [Del]	A	Tells the unit that the user is either adding a new transmit schedule or replacing or deleting the existing schedule

Field	Key Stroke	Description
Tx	T	Toggles between “Std” (Standard) and “Back2Back” forms of transmission; Typically set to “Std,” but special test scenarios might require “Back to Back” transmissions
[**Slt 0009**, Min 1]	“Shift” “+”	Sets the slot on which to transmit the message; Press “Shift” and “+” (plus sign) key to increase the value of the “base” or “anchor” slot by increments of either 1 or 10, depending upon how the adjustment is set with the “Shift” and “*” keys
[**Slt 0009**, Min 1]	“–”	Decreases the value of the “base” or “anchor” slot by increments of either 1 or 10, depending upon how the adjustment is set with the “Shift” and “*” keys
[**Slt 0009**, Min 1]	“Shift” *	Toggles the amount the base slot is adjusted between increments of either 1 or 10, allowing for fine control over the slot
[Slt 0009, **Min 1**]	U	Changes the Universal Coordinated Time (UTC) by increments of 1 minute, ranging from 0 to 9 minutes
Msg	M	Cycles through the message types to select a message to configure
[10 Sec Ivl]	I	Increases the time between message transmissions by cycling the slot adjustment to within a range of 2 seconds and 30 minutes (decreases the transmission rate)
[10 Sec Ivl]	D	Decreases the time between message transmissions by cycling the slot adjustment to within a range of 2 seconds and 30 minutes (increases the transmission rate)
Ch A Only / Ch B Only / Ch A/B	Space Bar	Selects the type of channel used to transmit the message
Action Key	V	Displays a current view of the schedule
Action Key	C	Clears all current reservations

After making a change and pressing the “ENTER” button, the “AtoN Transmit Schedule” appears with the message “Hit Any Key to Continue...” Press any key, and the “Transmit Schedule Setup Utility” screen reappears. Press “Esc” in the main “Transmit Schedule Utility” screen to return to the main “System Configuration Menu.”

4.3.6. Set Preparation Time for Scheduled Binary Messages

The Binary Message Prep Time feature defines the preparation time needed to acquire the information contained in the binary message payload, such as meteorological or hydrological records. To create scheduled binary messages, enter “5” in the “System Configuration Menu,” and the option shown in Figure 4-11 appears. For information on binary messages, see a description in the “Introduction” section of this manual.

To select a message, press “M” to scroll through the available message types and select one. Press “I” to increase the preparation time by 5 seconds each time the key is hit. Press “D” to decrease preparation time by 5 seconds each time the key is hit. Press “G” to toggle the GPS antenna on or off.

When the changes are complete, press “Enter,” and the “AtoN Transmit Schedule” appears. Press “Esc,” and the “Binary Msg Prep Time Setup” reappears. Press “Esc” again to return to the “System Configuration Menu.”

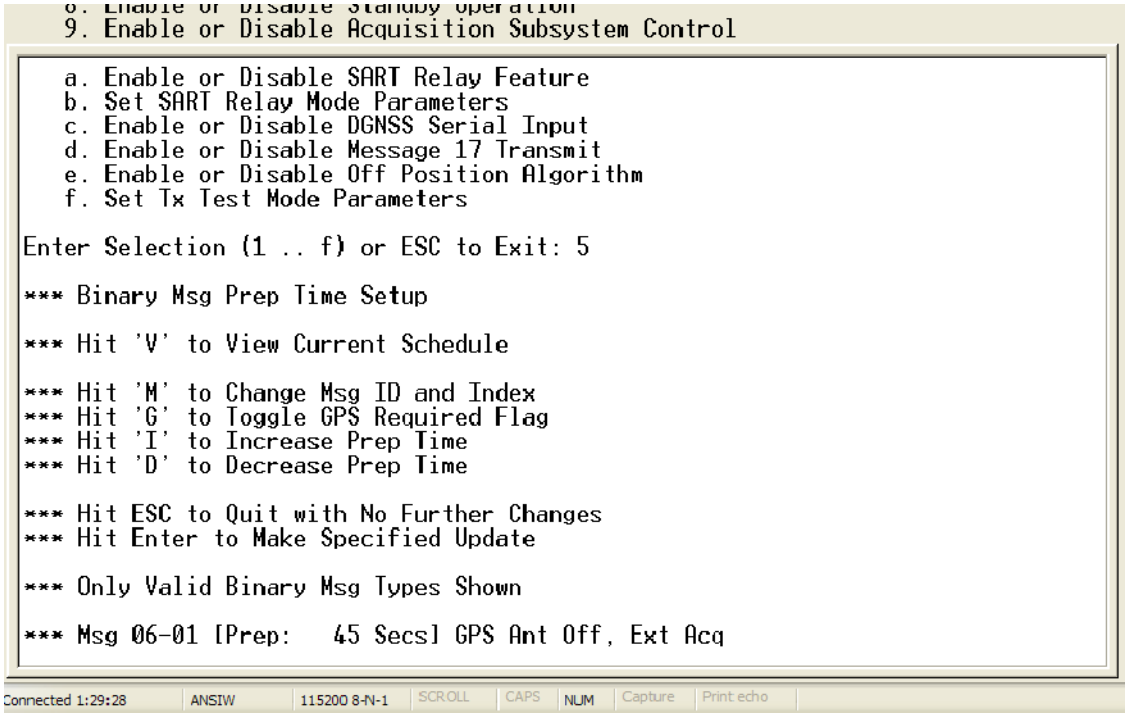


Figure 4-11. Set the Binary Message Prep Time

4.3.7. Set Post-Standby Startup Time

In order to save power, the AIS AtoN goes into standby mode when it does not have an imminent event to process. The “System Startup Time” defines when the mother-board needs to wake up from standby mode to prepare for a transmission.

To set the start-up time following standby of the unit, enter “6” in the main “System Configuration Menu,” and Figure 4-12 appears. Press “I” to increase the value by 1 second each time the key is hit or “D” to decrease the time by 1 second each time it is hit. The range of startup times is between 10 and 30 seconds. Press “Enter” to accept the changes, and the “Press Any Key to Continue...” message appears. Hit any key to return to the System Configuration Menu.

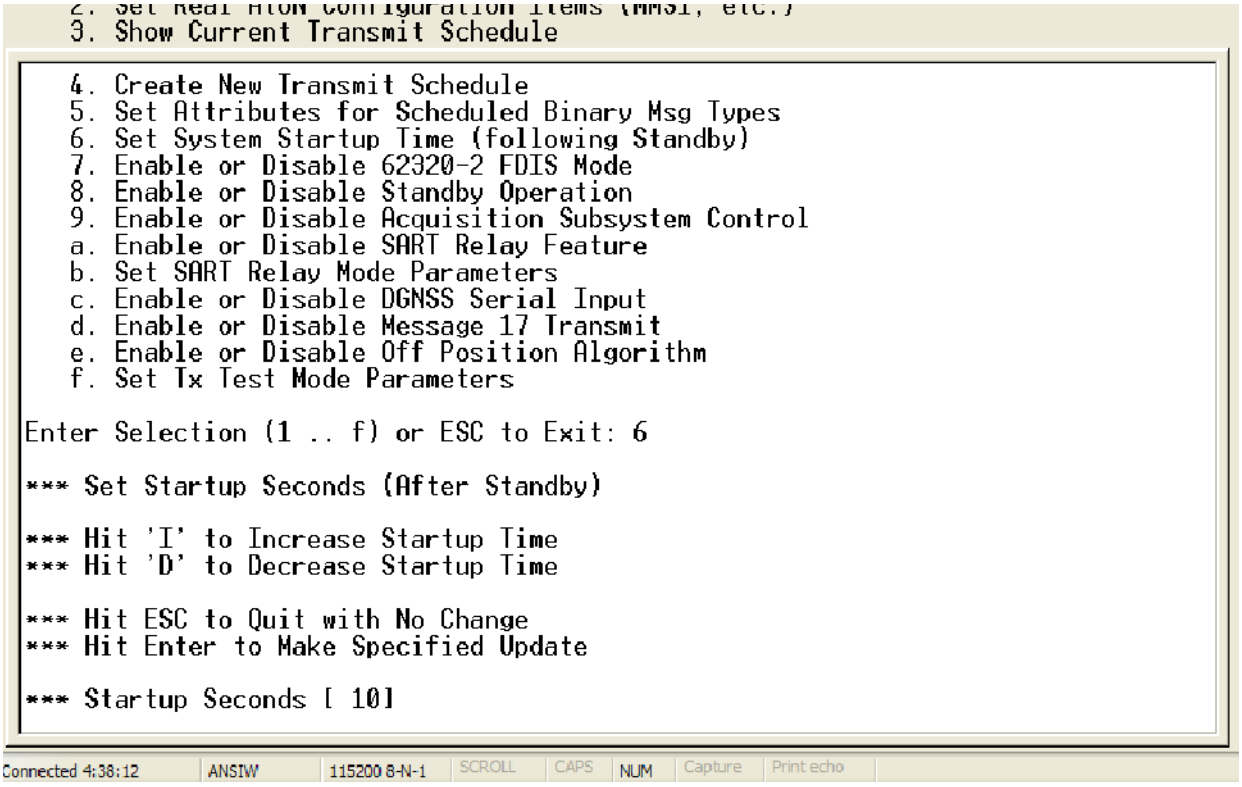


Figure 4-12. Set the Post-Startup Time

4.3.8. Set the 62320-2 Mode

The “62320-2 Mode” can be either “CDV” or “FDIS.” Enter “8” in the main “System Configuration Menu,” and Figure 4-13 appears. Press the “Space Bar” to toggle between the modes. Hit the “Enter” key, and the “Hit Any Key to Continue...” message appears. Press any key to return to the System Configuration Menu.

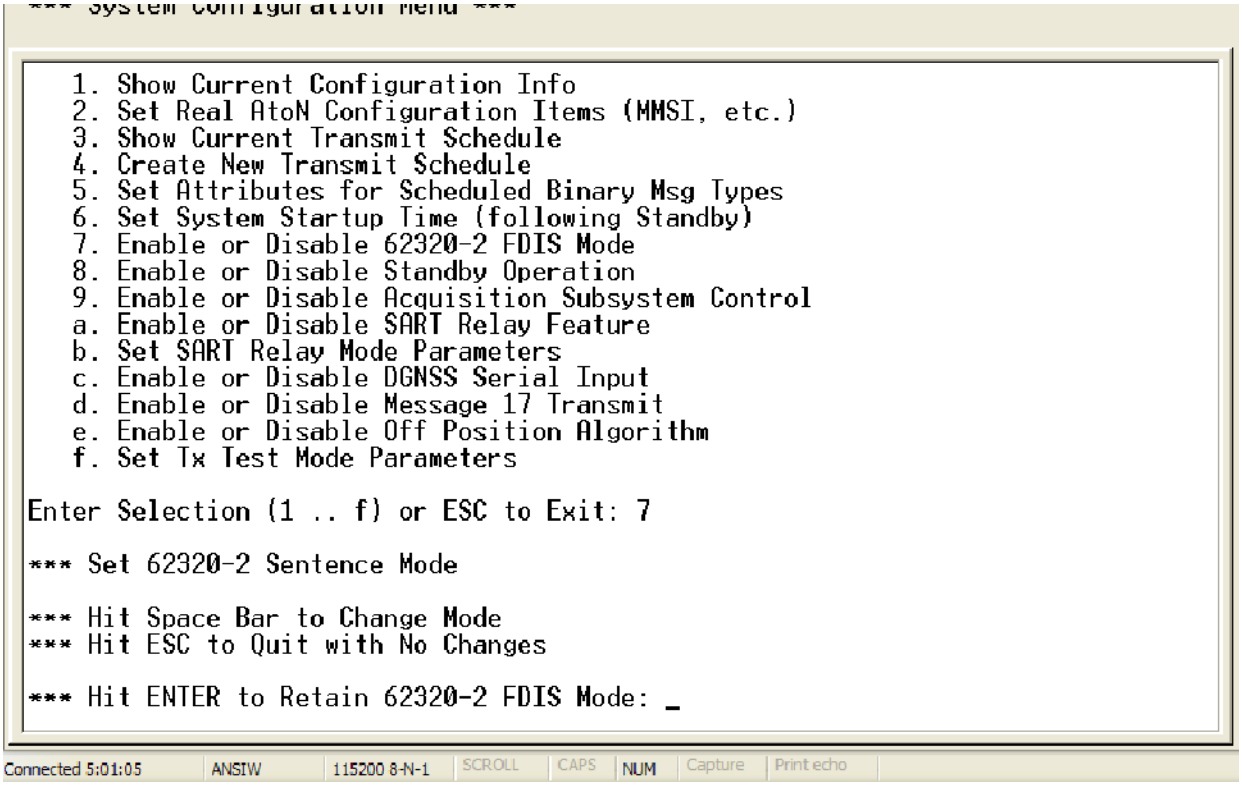


Figure 4-13. Set the 62320-2 FDIS Mode

NOTE: The document that defines the technical specification for AtoN performance is named IEC 62320-2. There are two versions that cause slight changes in AtoN behavior. Contact the Competent Authority to determine the version with which the AtoN must comply.

4.3.9. Toggle the Standby Option Off or On

In order to maximize power efficiency, the “Standby Operation” should remain enabled. To turn the standby option on or off, enter “8” in the System Configuration Menu, and the screen shown in Figure 4-14 opens. Press the “Space Bar” to toggle Standby mode “on” or “off.” Hit the “Enter” key, and the “Hit Any Key to Continue...” message appears. Press any key to return to the System Configuration Menu.

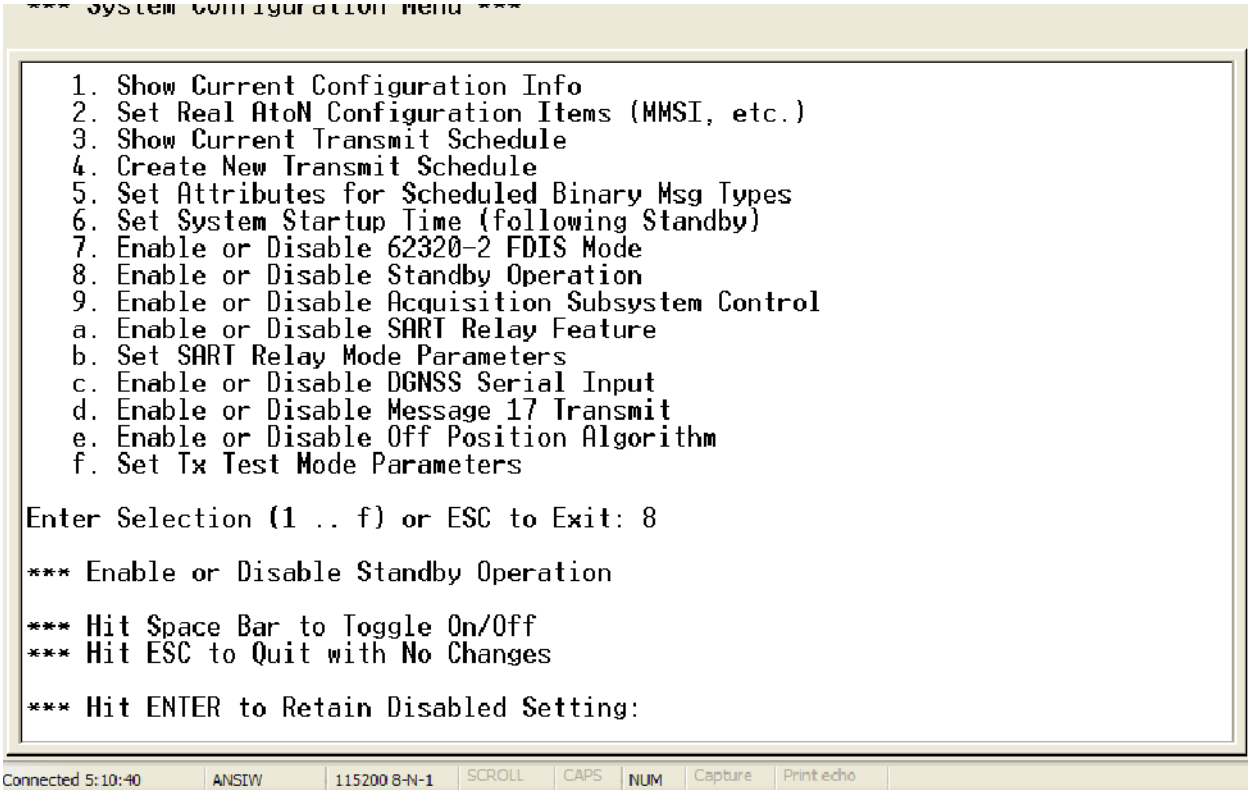


Figure 4-14. Turn Standby Operation On or Off

4.3.10. Control the Acquisition Subsystem

When a daugtherboard is installed in the AIS AtoN, the “Acquisition Subsystem Control” manages the interface between the motherboard and daugtherboard. This feature also enables extended MPR operations, which provide payloads for some optional messages. To control the acquisition subsystem, enter “9” in the main System Configuration Menu, and the screen shown in Figure 4-15 open. Press the “Space Bar” to enable or disable the acquisition mode. When the “Hit Any Key to Continue...” message appears, press any key to return to the System Configuration Menu.

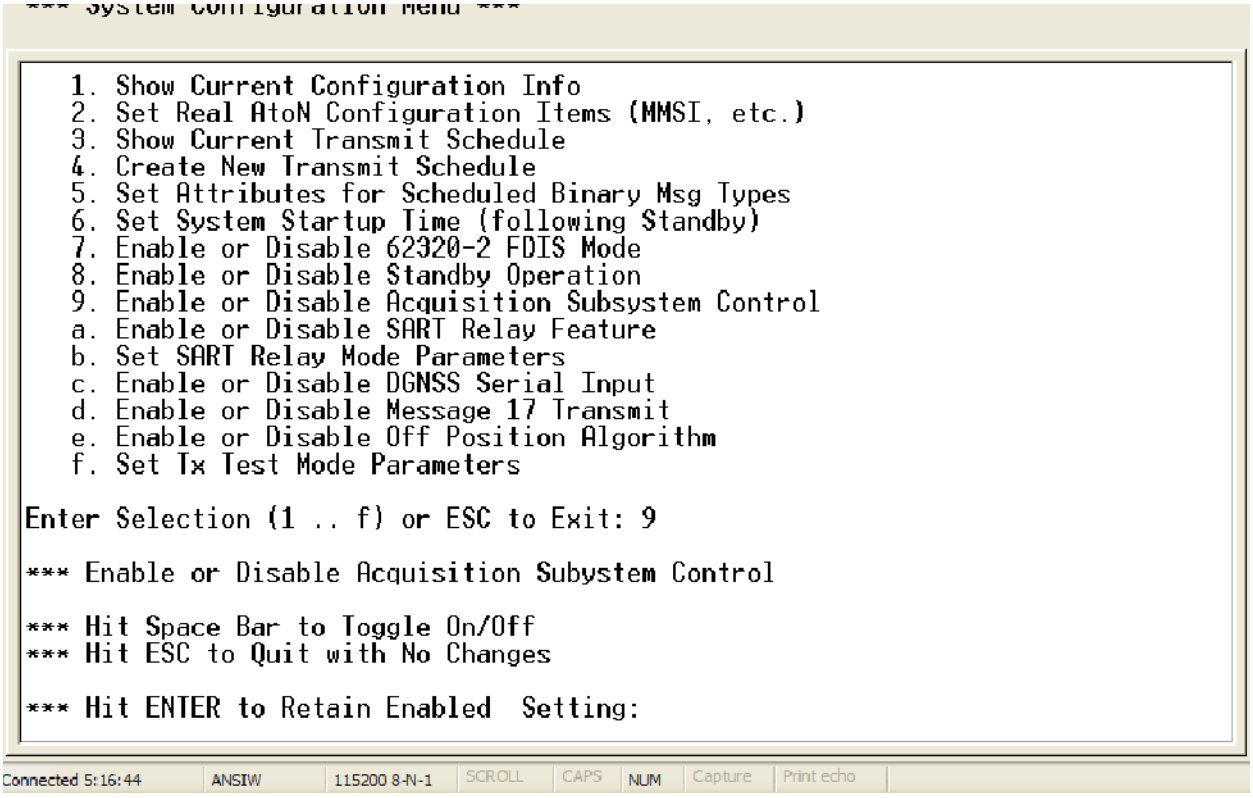


Figure 4-15. Control the Acquisition Subsystem

4.3.11. Enable or Disable the SART Relay Feature

When the “SART Relay Feature” is enabled, the AIS AtoN receives a SART message and repeats the message at an established interval for a pre-defined amount of time. This feature overrides power saving settings.

To enable or disable SART transmissions, enter “a” in the main System Configuration Menu, and the screen shown in Figure 4-16 appears. Press the “Space Bar” to enable or disable the SART Relay feature. When the “Hit Any Key to Continue...” message appears, press any key to return to the System Configuration Menu.

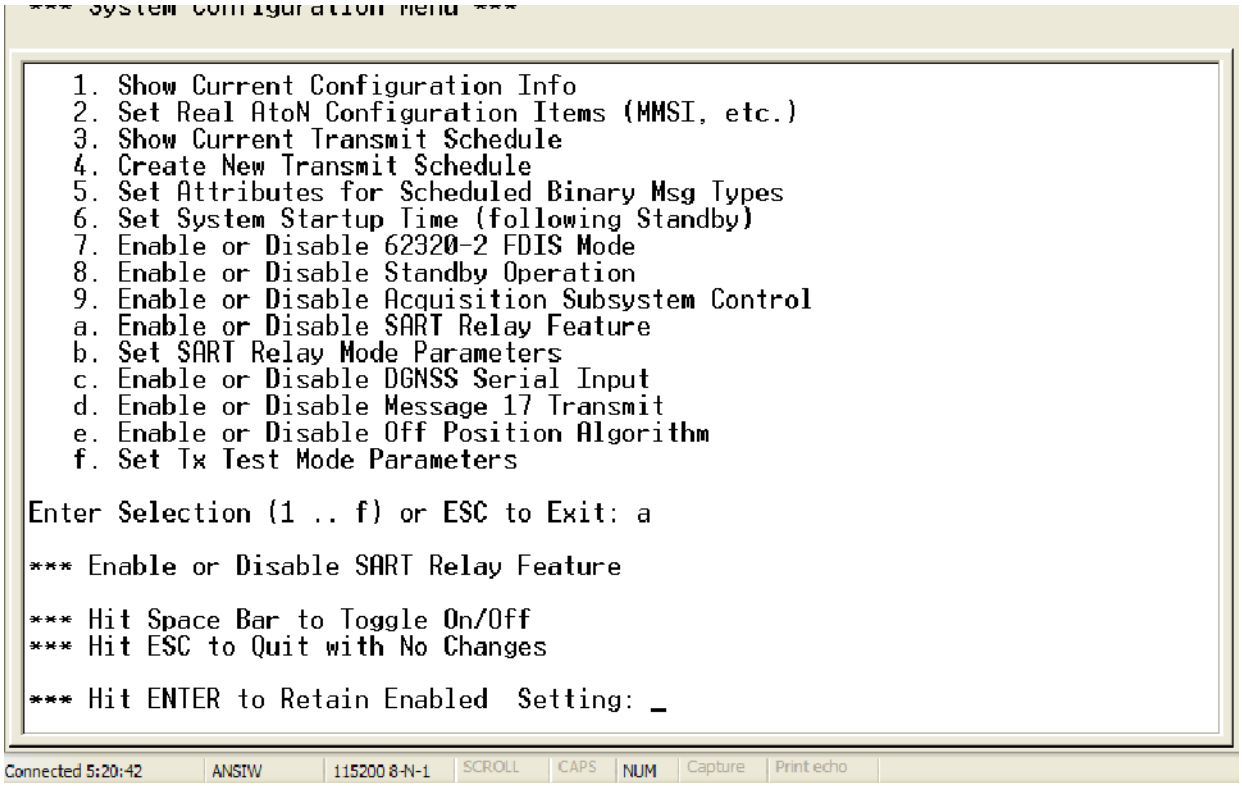


Figure 4-16. Enable or Disable the SART Relay Feature

NOTE: This is a factory test that should remain disabled.

4.3.12. Set the SART Relay Parameters

The “SART Relay Mode” requires that the “Interval” and “Duration” parameters be defined. The “Interval” parameter determines how often the message is retransmitted, and the “Duration” parameter sets how long the unit continues to repeat the message. To establish the SART parameters, enter “b” in the System Configuration Menu, and Figure 4-17 appears.

Press “I” to increase the interval of minutes between each transmission by 1 minute each time the key is hit, and decrease it by 1 minute each time “D” is pressed. The interval can be set between 1 to 10 minutes.

To set how long the unit continues to repeat the message, press “Shift” and “+” to increase the “Duration” by 1 minute and “-” to decrease the amount by 1 minute. This range can be set from 3 to 600 minutes. Hit “Enter,” and the “Hit Any Key to Continue...” message appears. Press any key to return to the System Configuration Menu.

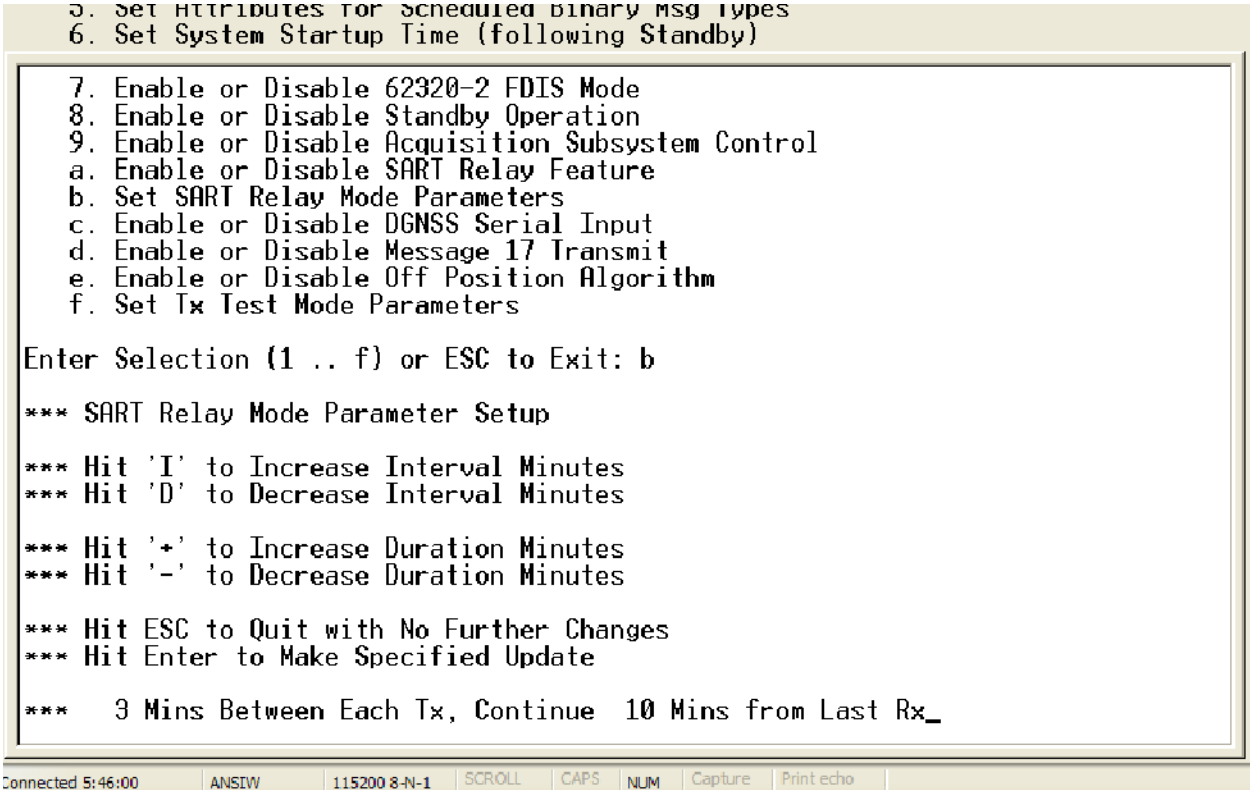


Figure 4-17. Set SART Relay Mode Parameters

4.3.13. Enable or Disable DGNSS

This is a feature used to test the AIS AtoN.

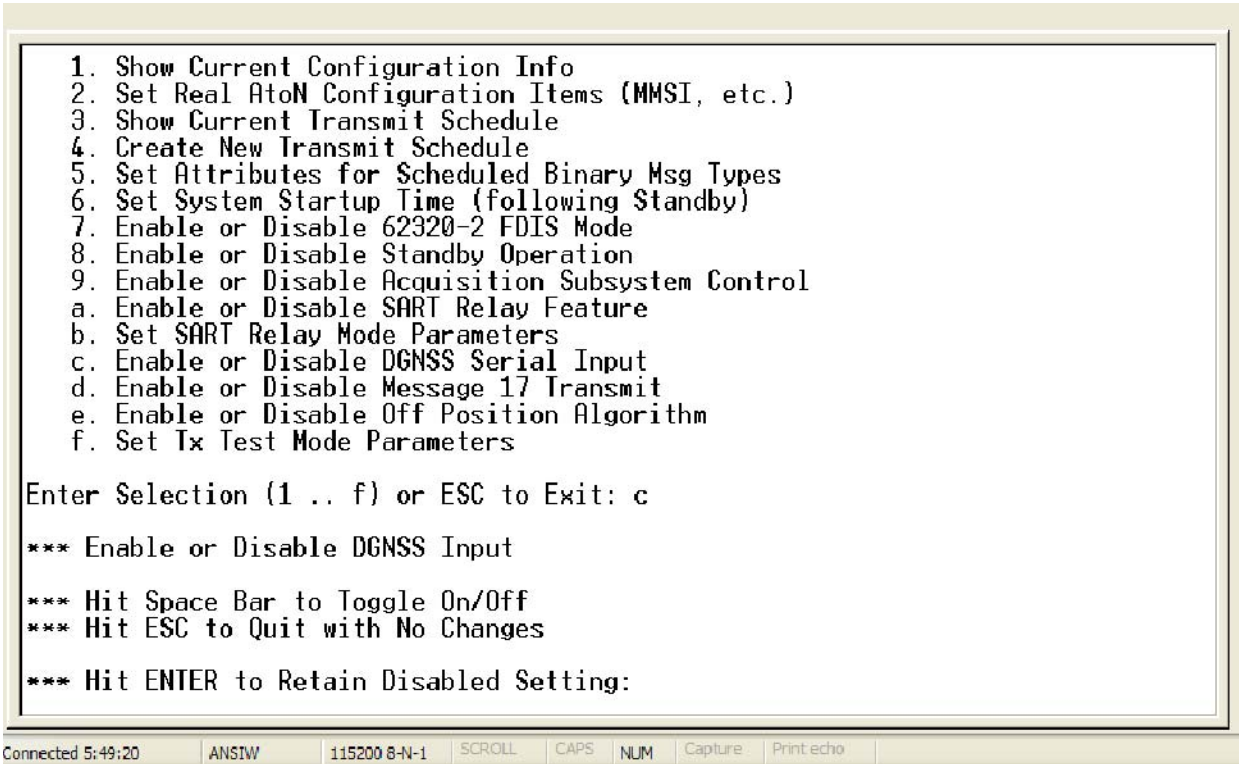


Figure 4-18. Enable or Disable the DGNSS Serial Input

NOTE: This is a factory test that should remain disabled.

4.3.14. Enable or Disable Message 17 Transmission

This is a feature used to test the AIS AtoN. Message 17 is used to differentially correct GNSS positions to DGNSS positions. It should be transmitted by a base station, which is connected to a DGNSS reference source, and configured to provide DGNSS data to receiving stations.

To enable or disable the transmission of Message 17, enter “d” in the main System Configuration Menu. As shown in Figure 4-19, press the “Space Bar” to enable or disable input. Hit “Enter,” and the “Hit Any Key to Continue...” message appears. Press any key to return to the System Configuration Menu.

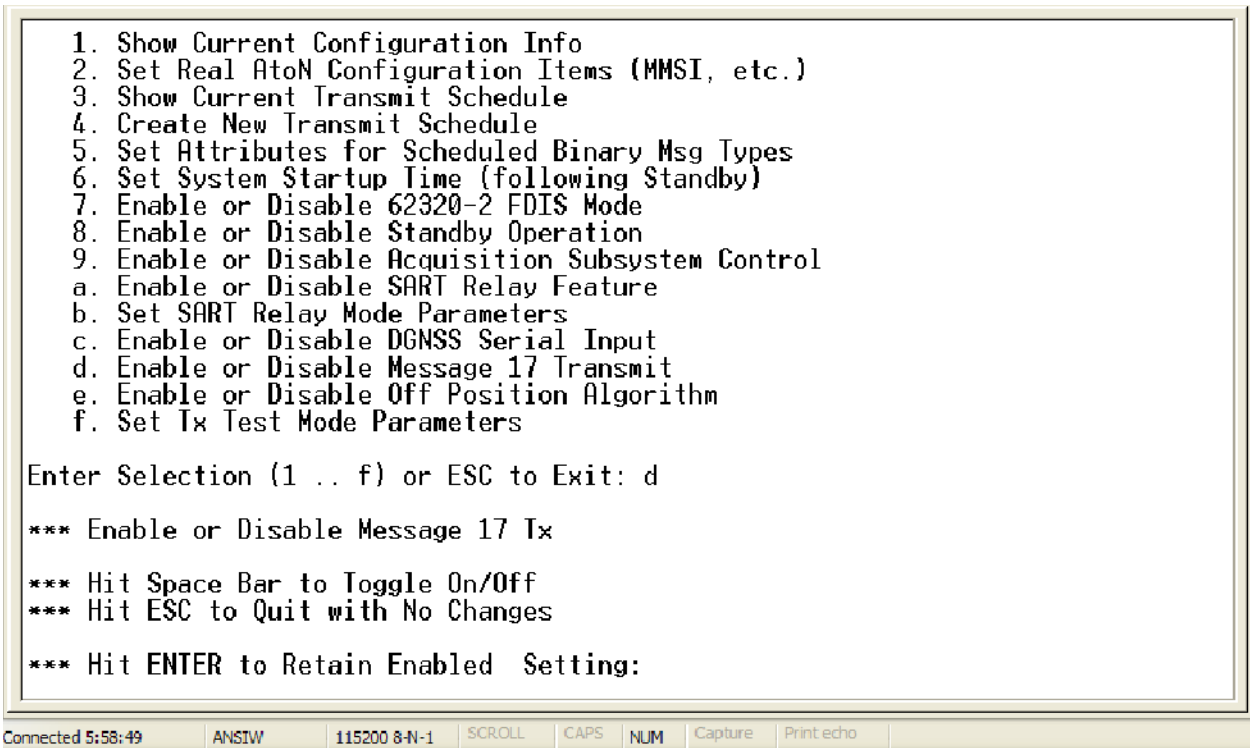


Figure 4-19. Enable or Disable Message 17 Transmission

NOTE: This is a factory test that should remain disabled.

4.3.15. Enable or Disable the Off-Position Algorithm

This feature is an extended algorithm that controls the AIS AtoN off-position flag in Message 21. To enable or disable the extended algorithm, enter “e” in the System Configuration Menu. As shown in Figure 4-20, press the “Space Bar” to enable or disable input. Hit “Enter,” and the “Hit Any Key to Continue...” message appears. Press any key to return to the System Configuration Menu.

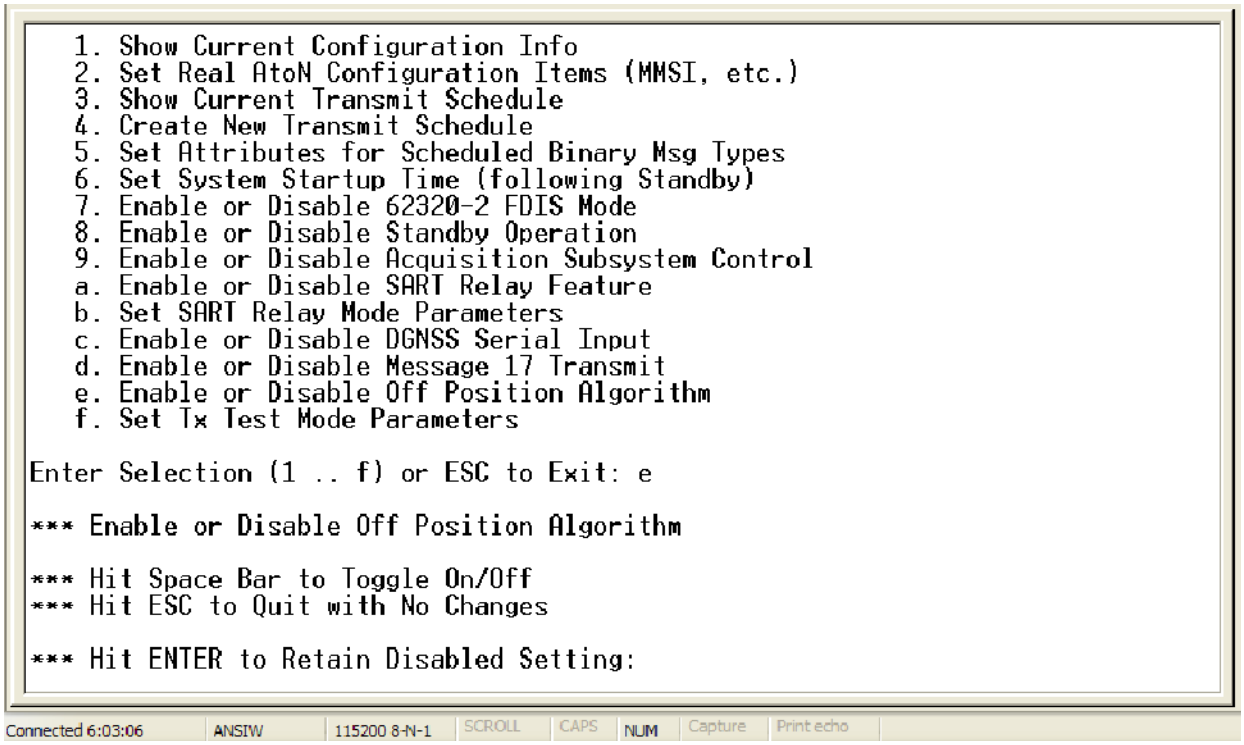


Figure 4-20. Enable or Disable AIS AtoN Position Report

NOTE: This is a factory test that should remain disabled.

4.3.16. Set the Tx Test Mode

This is a feature used to test the AIS AtoN by simulating a given percentage of use of the VDL and a number of unique targets. To set the Tx test mode parameters, enter “F” in the System Configuration Menu, and the screen shown in Figure 4-21 displays the options.

Press “I” to increase the “VDL Load” by 10 percent each time the key is hit and “D” to decrease it by 10 percent. Press “Shift” and “+” to increase the “Target Count” and “-” to decrease it.

Hit the “Space Bar” to toggle through the available channels and select one.

Hit the “Enter” key and the “Hit Any Key to Continue...” message appears. Press any key to return to the System Configuration Menu.

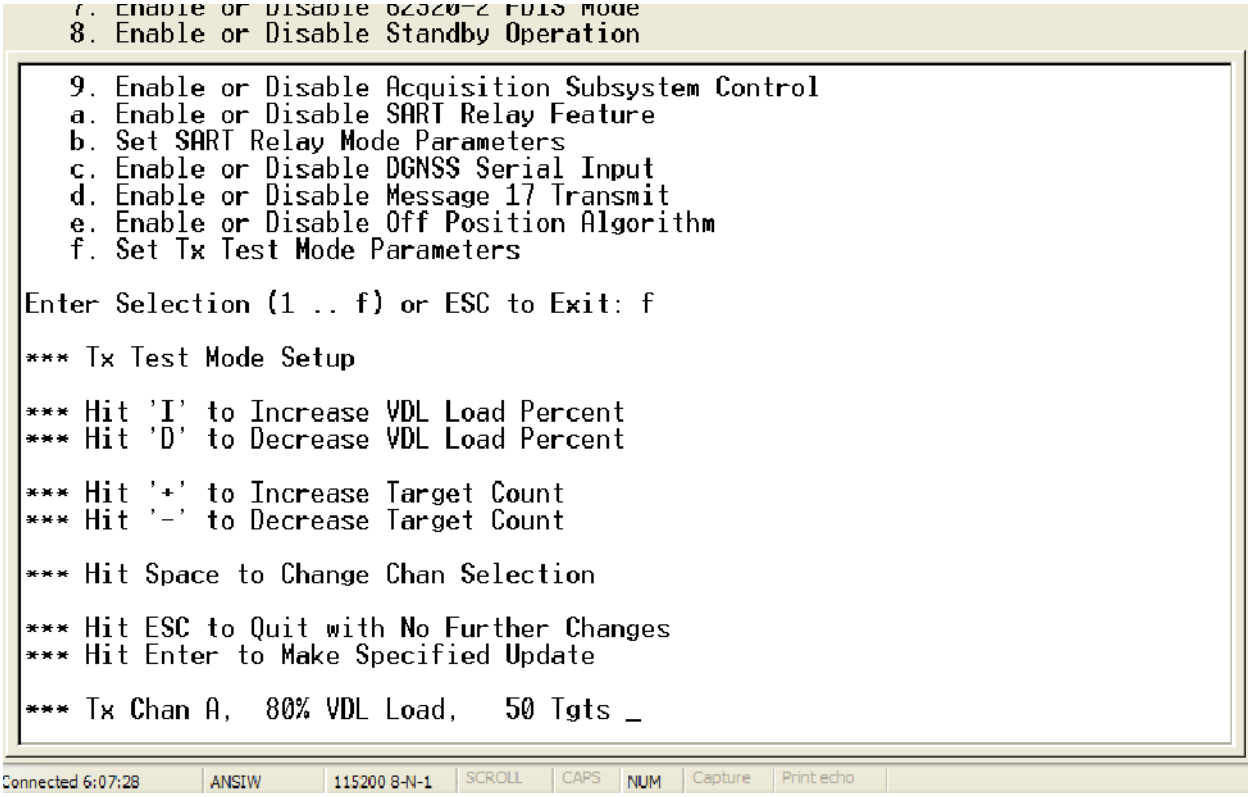


Figure 4-21. Set the Tx Test Mode Parameters

NOTE: This is a factory test that should remain disabled.

4.4. Reset the AIS AtoN From the ARM HyperTerminal Console

When the AIS AtoN is running and trace messages are displayed on the ARM HyperTerminal console, the unit can be reset at any time by holding the “Ctrl” key and typing “C” twice quickly. This eliminates the need to cycle the power and restart the AIS AtoN. Trace messages should scroll through the HyperTerminal screen.

4.5. Troubleshoot the HyperTerminal

Since the HyperTerminal provides a direct portal to the AtoN CPU, in rare circumstances it may stop displaying trace messages. Use the following instructions to display trace messages.

(1) Press “ESC,” and a “Hit Any Key to Reboot” message appears. Press any key, so the system reboots.

(2) If messages are not displayed once the unit is reset or a key is pressed, close the HyperTerminal screen and re-open it.

(3) If trace messages are not displayed after shutting down and re-opening the HyperTerminal screen, do the following.

i. Shut down the computer and the turn off the AIS AtoN.

ii. Unplug all connections to the unit.

iii. Plug the connectors back into the unit, restart the AIS AtoN, and re-open the HyperTerminal screen.

4.6. Resolve Failure Mode

The AtoN handles antenna failures, based upon whether the problem occurs during a transmission or reception of a message.

4.6.1. For a Transmission Fault and Disabled Antenna

A disabled antenna is detected by the AIS AtoN DSP as an antenna with a high VSWR during the transmission of a message. If a high VSWR is detected, the DSP stops transmission before a message completes transmission.

4.6.2. For Reception Fault

The AIS AtoN uses a frequency synthesizer that incorporates a digital Phase Locked Loop (PLL). If both receivers are locked, a “Lock Detect” status signal is sent, indicating that the receivers are functioning. In Type 3 AtoNs, if either or both receivers fail to lock then the “Lock Detect” status indicates a fault, and RATDMA transmissions are stopped on the receiver that is not locked.

THIS PAGE IS INTENTIONALLY LEFT BLANK.

APPENDIX A

DESKTOP AtoN

ADDITIONAL FEATURES

THIS PAGE IS INTENTIONALLY LEFT BLANK.

Additional Features

A.1. Type 1 AIS AtoN Station Alternatives

In addition to Message 21, the controller will compose optional output messages to the VDL, using FATDMA, as described in Table 1.

Table 1. Summary of optional Type 1 AIS AtoN Station messages

Msg ID	Message name	Message description	Application examples
6	Binary addressed message	Binary data for addressed communication	Monitoring of AtoN lantern, power supply, etc.
8	Binary broadcast message	Binary data for broadcast communication	Meteorological and hydrological data
12	Addressed safety related message	Safety related data for broadcast communication	Warn AtoN malfunctioning
14	Broadcast safety related message	Safety related data for broadcast communication	Warn AtoN malfunctioning

A.2. Type 3 AIS AtoN Station - Alternatives

The Type 3 AIS AtoN Station alternatives include all the Type 1 and Type 2 AIS AtoN Station alternatives.

A.2.1. Additional Controller Capability

In addition to Message 21, the controller composes optional output messages to the VDL, as described in Table 2.

Table 2. Summary of optional Type 3 AIS AtoN Station messages

Msg ID	Message name	Message description	Application examples
6	Binary addressed message	Binary data for addressed communication	Monitoring of AtoN equipment
8	Binary broadcast message	Binary data for broadcast communication	Meteorological and hydrological data
12	Addressed safety related message	Safety related data for broadcast communication	Warn AtoN malfunctioning
14	Broadcast safety related message	Safety related data for broadcast communication	Warn AtoN malfunctioning

THIS PAGE IS INTENTIONALLY LEFT BLANK.

APPENDIX B

PROTEC-D AtoN AIS

FIRMWARE UPDATE

THIS PAGE IS INTENTIONALLY LEFT BLANK.

Firmware Update

In order to update AtoN firmware, the following is required.

- Power Cable: Refer to the “Mounting and Connections” section of this manual for more details on the power requirements.
- Communications Cable: Refer to the “Mounting and Connections” section of this manual for more details on the pinout.
- Firmware Update Package

B.1. Normal ARM Code Update (ARM Standalone Image Already Installed)

If the unit has already been updated with a standalone binary ARM version, it can be subsequently updated with a different version of ARM code, using a simple procedure that does not require the unit to be opened. The following procedure describes the normal method used to update software.

The unit should be powered up with the Communications/Sensor port connected to the “HyperTerminal” at “115200 Baud.”

(1) While trace messages are displayed on the “HyperTerminal” console, hold the “Ctrl” key and type “FF.” As shown in Figure B–1, the following message appears.

*** Flash Update Request ***

Ready for Xmodem File Transfer

After this message appears, “C” characters are generated, and the ARM code update can begin.

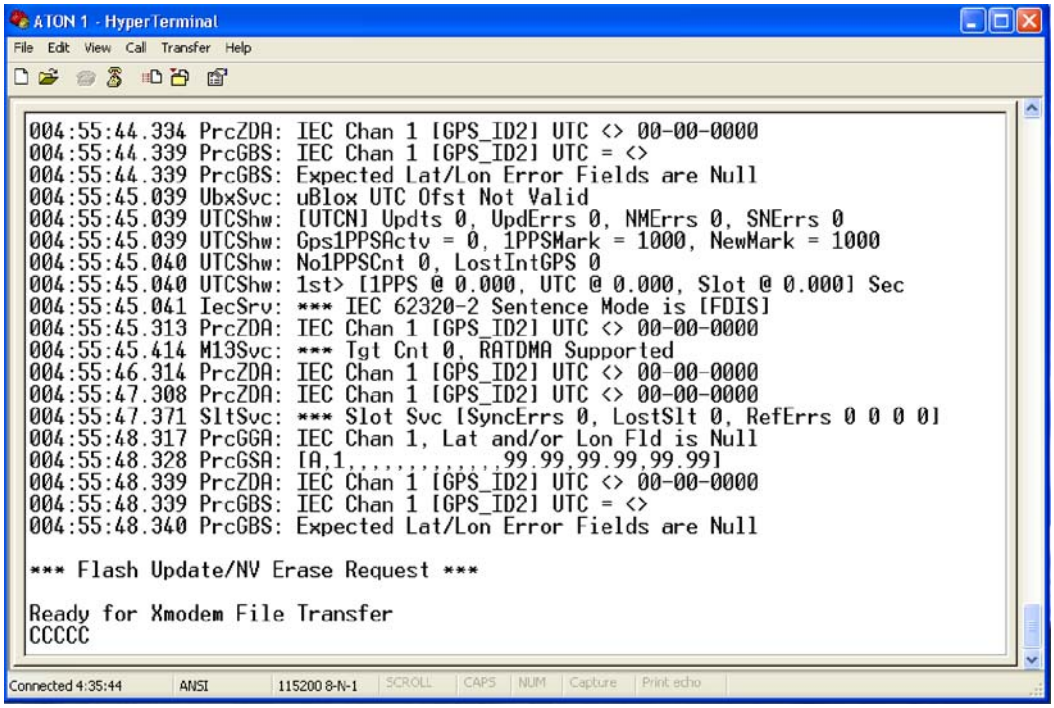


Figure B-1. Flash Update/NV Erase Request Screen

(2) In the “HyperTerminal” menu pull-down bar, click “Transfer” and “Send File.”

(3) When the “Send File” screen opens, click the arrow in the “Protocol” box and select “Xmodem.”

(4) Click the “Browse” button to locate the ARM binary images, usually located in the “Aton Images” folder. Find the ARM executable binary image file. An example is “AtoN_1_14K.bin.” This name corresponds to Rev 1.14K of the ARM code. Unless otherwise directed, select the file with the highest version number.

(5) Select the file by double-clicking on it in the file list. Click the “Send” button in the “Send File” window. As shown in Figure B-2, this begins the actual transfer.

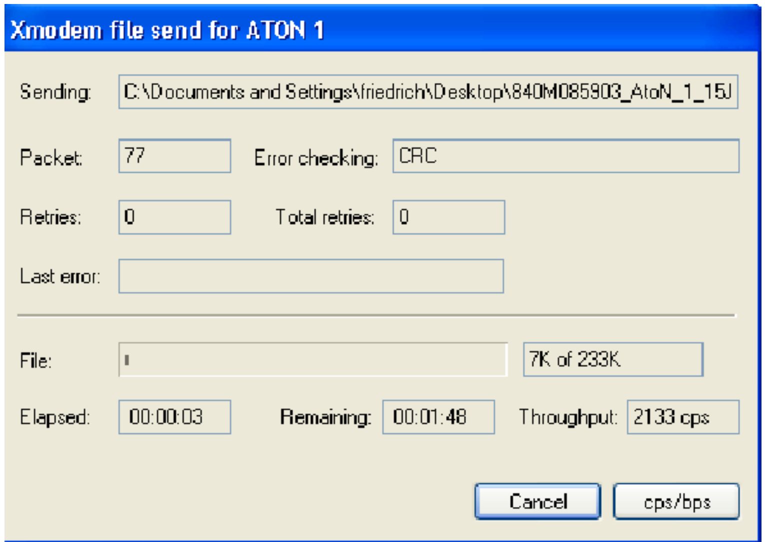


Figure B-2. ARM Firmware Update Transfer Screen

(6) When the binary file is completely transferred, Figure B-3 appears, displaying the image size and a message that the erase of the NV was successful. The message “Hit ESC to Reboot” also appears. Press Esc to reboot. Trace message should begin to be displayed on the screen.

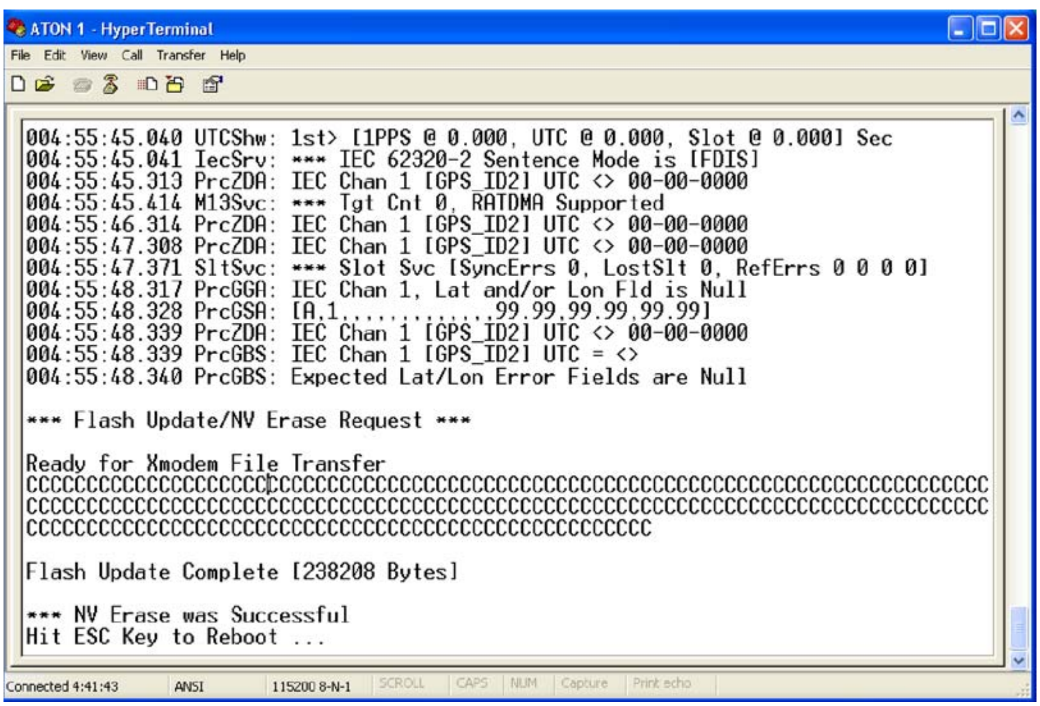


Figure B-3. Firmware Update Successful Message

B.2. Recovery Mode of ARM Code Update

Occasionally, the ARM code image in flash memory can be corrupted by an interrupted download or improper programming of the flash during production. If the flash is corrupted, a two-step process is required to load a flash image.

> **NOTE: This method of updating the ARM code works whether there is an image in Flash or not. However, it is the only method that loads an ARM image if the Flash image is not present or is corrupt.**

(1) Install a jumper on the AtoN Baseband board. Connect the Utility #1 port to "HyperTerminal" at "115200 Baud." The BMS jumper must be installed on the Baseband Board at PL10, between pins 13 and 14. PL10 is the 14-pin header located at the board edge near the Atmel AT91RM9200 processor device. Pins 13 and 14 are the end pins of both rows of PL10 at the end nearest the slot cutout in the PC board that allows the RF connector to be accessed.

(2) Power up the AtoN. The "HyperTerminal" console displays "C" characters at around one per second.

(3) When the "C" characters are displayed, the ARM code update can begin. On the "HyperTerminal" menu pull-down bar, click "Transfer" and "Send File."

(4) When the "Send File" screen opens, click the arrow in the "Protocol" box and select "Xmodem."

(5) Click the "Browse" button and find the ARM binary images in the window, usually located in the "Aton Images" folder. Double-click on "SerBoot.bin" file.

(6) In the "Send File" window, click the "Send" button. This begins the actual transfer, as shown in Figure B-2.

(7) When the transfer ends, "C" characters are automatically generated.

(8) Click the "Browse" button and find the ARM binary images in the window, usually located in the "Aton Images" folder. A sample file is "AtoN_1_14K.bin." The name corresponds to Rev 1.14K of the ARM code. Unless otherwise directed, select the file with the highest version number.

(9) Double-click on the binary file. Click the "Send" button in the "Send File" window. This begins the transfer of the binary image.

(10) When the binary file is completely transferred, "C" characters are automatically generated on the screen.

(11) Remove the BMS jumper and power the board up again. The unit should boot normally and trace messages should appear in the "HyperTerminal" window.

THIS PAGE IS INTENTIONALLY LEFT BLANK.

APPENDIX C

PROTEC-D AtoN AIS

WARRANTY

Return Material Policy

The maintenance philosophy for the AIS AtoN is replacement of failed assemblies. In the unlikely case of a failure, the entire unit should be sent back to the factory.

Attempts by anyone but an authorized L-3 representative to repair the AIS AtoN will void the warranty.

Components and spare parts purchased from L-3 that are discrepant for any of the following reasons may be returned immediately, provided the extended value of the parts is in excess of $100.00.

1. **Overshipments**

   Quantity of parts received in excess of quantity specified on purchase order.

2. **Wrong Part Numbers**

   Receipt of parts numbered other than those identified on a customer order where L-3 has not advised the customer by purchase order acknowledgment, by telex, or by notification on the shipping document that the received part is a replacement for the ordered part.

3. **Parts Nonconforming to Specifications**

   If the extended value of the items is less than $100.00, the items are to be scrapped instead of returned. When this occurs, notification must be sent to L-3 advising: (1) the reason for the rejection; (2) the items are less than $100.00 in extended value and have been scrapped, and; (3) whether credit or replacement is desired.

If you wish to return material to L-3 for reasons other than warranty returns or those specified above, please contact an L-3 Account Administrator for authorization before proceeding. A Return Authorization Number will be assigned at this time. Your request should specify the relevant Return Authorization Number, purchase order number, part number, quantity, and the reason you wish the part returned.

To assist us in processing these items more efficiently, we ask that all returned goods be accompanied by paperwork that clearly indicates the following:

1. Reason for return
2. Purchase Order Numbers
3. Correspondence Reference Number
4. Return Authorization Number

4. **Copies of returned goods paperwork should be mailed to:**

   L-3 COMMUNICATIONS CORPORATION
   AVIATION RECORDERS DIVISION
   P. O. Box 3041
   Sarasota, FL 34230-3041
   Attn: Tom Meloche / Marine Systems Product Support Department

5. **Parts returned under the above conditions should be addressed to:**

   L-3 COMMUNICATIONS CORPORATION
   AVIATION RECORDERS DIVISION
   100 Cattlemen Road
   Sarasota, FL 34232
   Attn: SERVICE DEPARTMENT

Component and spare parts purchased from L-3 that have been on the customer's shelf for more than 10 weeks from date of receipt or have been installed in a component or on a vessel, are not covered by this procedure. Such parts may be covered by warranty in which case they should be returned through normal warranty channels.

For repair service, call or email to obtain a Repair Form:
L-3 Communications, Aviation Recorders
100 Cattlemen Road
Sarasota, FL 34232 USA
Attn: Repair Department
Tel: (941) 377-5558
Fax #: (941) 377-5585

RETURN OF MATERIAL UNDER WARRANTY

1. **Material should be returned to the following address:**

   L-3 COMMUNICATIONS CORPORATION
   AVIATION RECORDERS DIVISION
   100 Cattlemen Road
   Sarasota, FL 34232
   Attn: WARRANTY RETURNS

2. **For returning overseas shipments, the following customs broker must be used:**

   L-3 COMMUNICATIONS CORPORATION
   AVIATION RECORDERS DIVISION
   c/o A.J. Arango
   Air Cargo Bldg.
   4700 N. Hoover Blvd.
   Tampa International Airport
   Tampa, Florida 33634
   Tel: (813) 248-9220
   Fax: (813) 248-6013

   To ensure prompt handling of material returned under warranty, your return order and shipment should clearly identify the item as a warranty return, and a copy of such return order should accompany the shipment. Status of warranty in process will be provided by the Warranty Administrator.

3. **Warranty claims and warranty return orders pertaining to components and spare parts returned should be mailed to the following address:**

   L-3 COMMUNICATIONS CORPORATION
   AVIATION RECORDERS DIVISION
   P. O. Box 3041
   Sarasota, FL 34230-3041

   Attn: Marine Systems Warranty Administrator
   Tel: (941) 377-5574
   Fax: (941) 377-5591

RETURNED GOODS

Goods returned to stock for credit, at the request of the Buyer, and authorized by the Seller, will be subject to a restocking charge of 10% of the purchase price if notified within 30 days of the order, and 25% of the purchase price if notified after 30 days of the order.

CANCELLATION CHARGE

Any order wishing to be canceled must be approved by the pertinent Account Administrator and may be accountable for a cancellation fee of 15%. This cancellation fee shall take into account expenses already incurred and commitments made by L-3.

THIS PAGE IS INTENTIONALLY LEFT BLANK.