GS-4000-RGM

Robust Globalstar Modem

Operating Manual

FTS

FCC Warning

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

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Revision 5   2-August-2007
700-GS-4000

REVISION HISTORY

| Revision #	Date	Description
1	Dec 23, 2003	Original issue.
2	July 02, 2004	Update from RGM-1620 to GS2 Control Board
3	Aug 04, 2005	Update Telemetry cable part numbers, control board description, and FTS address
4	Apr 04, 2006	Update with Remote Initiated Call and firmware version 2.0 details. Now refer to GS-4000 as a GS-4000-RGM.
5	Aug 02, 2007	FCC warning added.

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GS-4000-RGM OPERATION

GENERAL DESCRIPTION

The FTS GS-4000 Robust Globalstar Modem (GS-4000-RGM) is a general purpose data modem for the Globalstar satellite network. The GS-4000-RGM combines Qualcomm's Globalstar GSP-1620 Satellite Data Modem and antenna as well as a custom designed FTS Control Board in a rugged aluminum weatherproof housing making the GS-4000-RGM a good telemetry solution suitable for remote monitoring applications in harsh field conditions.

The GS-4000-RGM housing, shown below in Figure 1, is an 11 inch, clear anodized, 4 inch outer diameter aluminum tube with aluminum endcaps. The housing tube has two recessed grooves which provide a non-slip location for mounting hardware. The Globalstar antenna is integrated into the GS-4000-RGM housing on the top endcap. Military style bayonet connectors mounted on the bottom endcap provide electrical connections for the modem. O-ring seals on the bayonet connectors, Globalstar antenna and housing endcaps ensure a waterproof housing for the GS-4000-RGM electronics. A versatile mounting bracket allows the GS-4000-RGM to be mounted to masts of various diameters.

The GS-4000-RGM is equipped with two RS-232 serial ports - Programming and Telemetry. The Programming Port is used exclusively for configuring the GS-4000-RGM whereas the Telemetry Port provides power and remote device communications connections for the GS-4000-RGM.
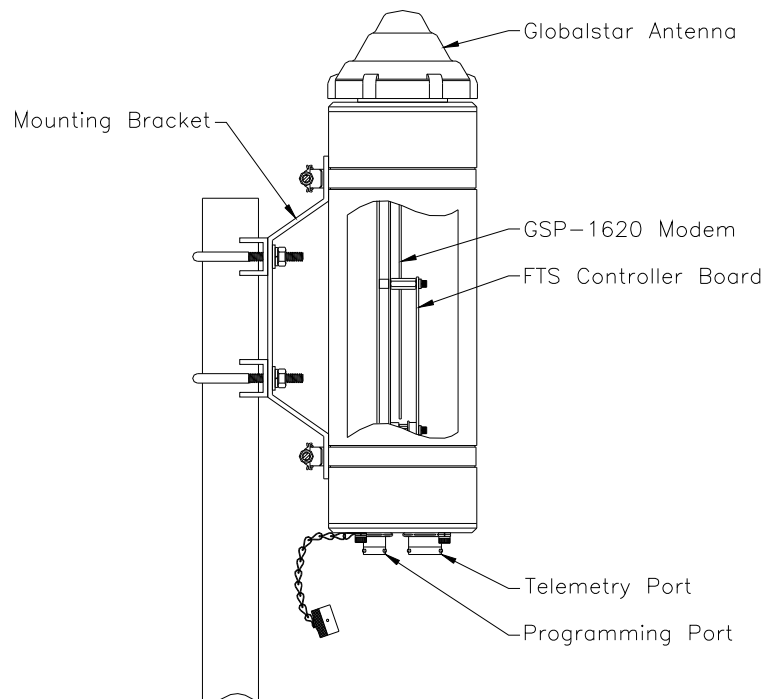
Figure 1. FTS GS-4000-RGM Robust Globalstar Modem

As previously mentioned, the GS-4000-RGM electronics consists of a Qualcomm Globalstar GSP-1620 Satellite Data Modem and a custom designed FTS Control Board.   Figure 2 illustrates the relationship between the FTS control board and the GSP-1620.   Note that the RS-232 equipped remote monitoring device communicates directly with the GSP-1620's data port and that the FTS Control Board is used exclusively for modem initialization functions and power distribution.   This arrangement allows the user full access to the GSP-1620 functionality without intervention from the FTS Control Board.
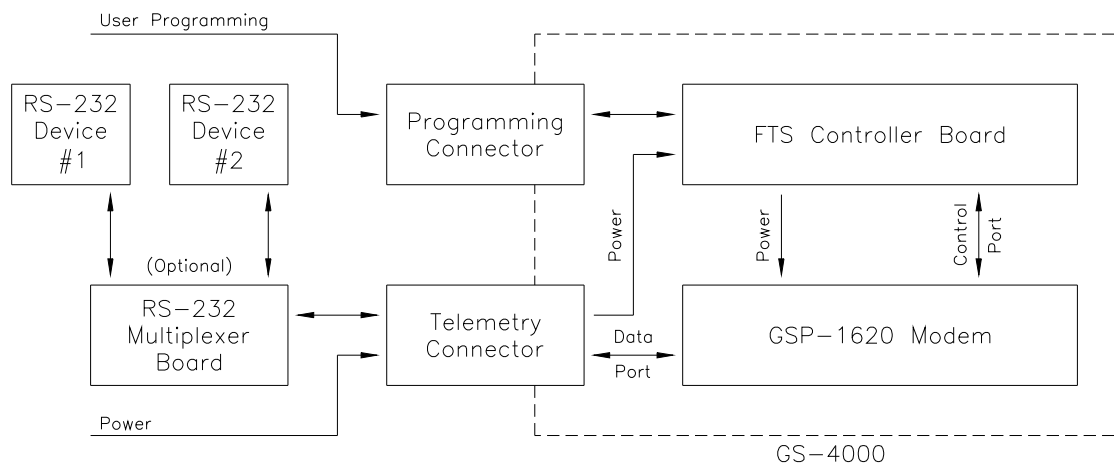
Figure 2. GS-4000-RGM Robust Globalstar Modem Topology

The GSP-1620 uses typical Hayes AT commands through a standard RS-232 interface. Full duplex, asynchronous data connections between the GSP-1620 and a host modem are made through the Globalstar Satellite Communication System and the public switched telephone network. The over-the-air data rate is fixed by the Globalstar network at 9600 bps; however, communication between the GSP-1620 and its associated RS-232 device is via the GSP-1620 data port and is programmable from 300 bps to 115.2 kbps. Communications can either be field initiated by the remote device or be user initiated from a host modem.

The FTS Control Board is used for modem initialization and control as well as power distribution. All control board parameters are configured through the GS-4000-RGM Programming Port. User programmable modem initialization strings and control board parameters are stored in the control board's non-volatile memory. Upon power-up, and at programmed intervals, the FTS Control Board initializes the GSP-1620 modem and then continually monitors the modem for proper operation. In the event of a modem reset or lock-up, the FTS Control Board will power cycle, reset and reinitialize the modem to the desired operating state. Communication between the control board and GSP-1620 are via the GSP-1620's control port and are completely independent of the GSP-1620's communications with its associated RS-232 device. The FTS Control Board also provides reverse voltage and over-voltage protection for the GSP-1620.

The optional RS-232 multiplexer board shown in Figure 2 is actually housed inside the GS-4000-RGM. The multiplexer board allows one of two RS-232 devices to communicate with the GSP-1620. When using the optional multiplexer board, only receive and transmit lines are switched, all other RS-232 signal lines are not used. RS-232 device selection is managed by the control board and is based on the time of day. For example, the control board can be programmed for RS-232 Device #1 to communicate in the am hours while Device #2 can communicate in the pm hours. Switching times are synchronized to the Globalstar system time which uses Universal Coordinated Time (UTC). When configuring the multiplexer board switching times, be sure to account for your local time offset from UTC (can use the Time Zone Offset command if desired).

UNPACKING

The following is what you should have received:

1. GS-4000-RGM Robust Globalstar Modem.   FTS Part Number: GS-4000-RGM

   or modem with optional multiplexer.   FTS Part Number: GS-4000-BCH

2. GS-4000-RGM Operating Manual.   FTS Part Number: 700-GS-4000

3. GS-4000-RGM Telemetry Cable (user specific)   FTS Part Number: CBL-GS4000-RGM

       For custom applications   FTS Part Number: TBD

4. GS-4000-RGM Programming Cable (optional)   FTS Part Number: CBL-FWS-LDS-PC

5. GS-4000-RGM Hardware Kit for Mast (optional)   FTS Part Number: GS-4000-MKIT

INSTALLATION

In most cases the best deployment for a GS-4000-RGM is at the top of a pole as shown in Figure 1. When mounted, the antenna at the top of the GS-4000-RGM must have a clear view of the sky so that there is a direct line of sight to the Globalstar satellites. The antenna's view of the sky should be unimpeded by tall obstacles such as buildings or trees that would cause signal degradation. It is important to note that the location of the Globalstar satellites cannot be predicted as the 48 low-earth-orbit Globalstar satellites follow different paths across the sky.

> **CAUTION: The Globalstar antenna must be installed in a configuration that ensures a minimum line-of-sight separation distance of 21 centimeters (8.5 inches) is maintained at all times between the antenna and any personnel.**

If installing the GS-4000-RGM in a snowy location, provisions must be made to prevent snow build-up on the antenna as Globalstar frequencies are attenuated by wet snow and ice. By physical design, the GS-4000-RGM is designed to minimize snow build-up on the antenna; however, to ensure proper system operation, wet snow or ice on the antenna must be restricted to a maximum thickness of 20 centimeters (8 inches).

To ensure compatibility between the Globalstar and GPS satellite systems, the Globalstar antenna must be mounted a minimum distance of 80 centimeters (30 inches) from a GPS antenna.

CONNECTION

Two connection ports are available on the GS-4000-RGM – the Programming Port and the Telemetry Port. The Programming Port is used only to configure the GS-4000-RGM while the Telemetry Port has power and communications connections for the GS-4000-RGM.

Programming Port

The Programming Port is used exclusively to configure the GS-4000-RGM. The Programming Port provides an RS-232 interface (9600 bps, no parity, 8 data bits, 1 stop bit and no flow control) to the Control Board through a 6 pin, female, military bayonet style connector. FTS cable CBL-FWS-LDS-PC can be used to connect the GS-4000-RGM to a standard pc COM port. GS-4000-RGM Commands are detailed later in this document. Programming Port connections are given in Figure 3.
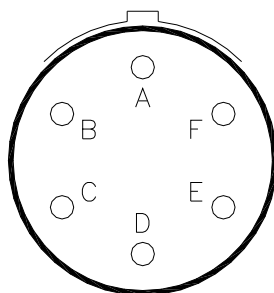
A	TxD from GS-4000-RGM
B	SIGNAL GROUND
C	SHIELD
D	not used
E	not used
F	RxD to GS-4000-RGM

Figure 3. GS-4000-RGM Programming Port Connections

Telemetry Port

The Telemetry Port is provides an RS-232 interface to the GSP-1620 and power for the GS-4000-RGM through an 18 pin, male, military bayonet style connector. On the Telemetry Port, the GS-4000-RGM is configured as the Data Communications Equipment (DCE) while the connecting device is assumed to be the Data Terminal Equipment (DTE). The default baud rate for the Telemetry Port is factory configurable (factory default is 9600 bps); however, the baud rate is user configurable through the Programming Port. Telemetry Port connections are given in Figure 4.
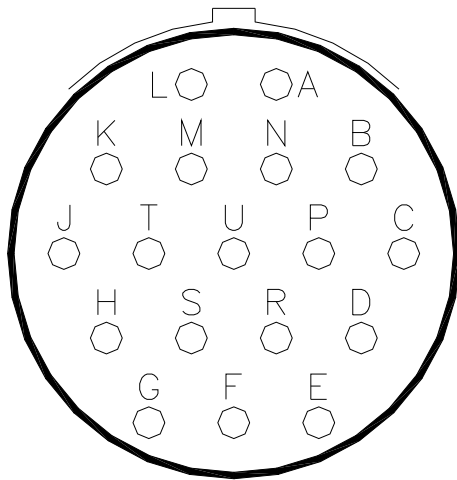
PIN	STANDARD	OPTIONAL [1]
A	SHIELD	SHIELD
B	TxD	TxD-A
C	RxD	RxD-A
D	RTS	TxD-B
E	CTS	RxD-B
F	DSR	no connect
G	GROUND	GROUND
H	DTR	DO NOT CONNECT
J	DCD	no connect
K	RI	no connect
L	POWER	POWER
M	*not used*	*not used*
N	GROUND	GROUND
P	*not used*	*not used*
U	*not used*	*not used*
T	no connect	GROUND
R	*not used*	*not used*
S	*not used*	*not used*

(1) Port connections when optional multiplexer board is installed

Figure 4. GS-4000-RGM Telemetry Port Connections

HARDWARE CONFIGURATION

Jumper JMP6 on the GS-4000-RGM Control Board is used to determine the operation of the GSP-1620's data port DTR line. DTR is required to be constantly asserted to prevent the GSP-1620 modem from entering 'sleep' mode. If the modem enters 'sleep' mode, it will need to be reinitialized upon wake-up which means the connected device must be programmed with the appropriate initialization strings. For most applications jumper JMP6 should be configured to keep DTR constantly asserted (refer to Figure 5). Jumper JMP7 is used to determine the operation of the GSP-1620's control port DTR line. In most cases, this jumper should be left in the default position (refer to Figure 5).

JMP6	Data Port DTR Operation
pin 1 connected to pin 2	DTR controlled by connected device
pin 2 connected to pin 3	DTR constantly asserted <***default***>

JMP7	Control Port DTR Operation
pin 1 connected to pin 2	DTR controlled by FTS Control Board <***default***>
pin 2 connected to pin 3	DTR constantly asserted

Figure 5. GS-4000-RGM Control Board Jumper Settings

POWER-ON BEHAVIOR

When power is first applied to the GS-4000-RGM a power-up sequence is performed. Operation after the power-up sequence has completed is determined by the GS-4000-RGM configuration parameters. The GS-4000-RGM power-up sequence is given below in Figure 6.

STEP	RESULT
1	Simultaneously the control board processor and the GSP-1620 processor boot-up
2	Control board initializes the GSP-1620 with the user defined AT command strings after the specified control board 'Initialization Delay' parameter.
3	60 seconds after power-up, the Control board will attempt to synchronize to the Globalstar network time.
4	Control Board will periodically reinitialize the GSP-1620 with the user defined AT strings based programmed in the Control Board.
5	If the 'Switch Interval' parameter is greater than 00:00:00 and the multiplexer board is installed, the control board will switch RS-232 ports on the Multiplexer Board as specified by the Switch Offset and Switch Interval parameters.

Figure 6. GS-4000-RGM Power-Up Sequence

PARAMETER PROGRAMMING

Normally the GS-4000-RGM will be provided by FTS pre-configured to your specifications; however, if you wish, you can modify the GS-4000-RGM parameters. All GS-4000-RGM parameters, including the user programmable modem initialization strings are stored in non-volatile memory on the GS-4000-RGM Control Board. The parameters can be read or written using commands over the GS-4000-RGM Programming Port. See the GS-4000-RGM Commands section of this manual for command details.

AIRTIME ACTIVATION

All GS-4000-RGM Globalstar modems need to be activated with an appropriate satellite airtime price plan from Globalstar. While FTS facilitates processing the activation and can assist the user in choosing the most appropriate price plan, Globalstar will directly bill the user for the airtime charges. It is the user's responsibility to keep their account up to date.

Contact FTS for help in choosing the most appropriate Globalstar satellite airtime price plan.

OPERATION

Once the GS-4000-RGM has been properly activated and installed, the user can communicate with the remote device connected to the GS-4000-RGM modem over a connection routed through the Public Switched Telephone Network (PSTN). The user can either connect to the remote device from a host computer (a host initiated call) or have the remote device connect to the host computer (a remote initiated call). Once the call is answered and the modem-to-modem handshaking is complete, the user can communicate with the remote device. There are no timeouts or disconnect features in the GS-4000-RGM. The GS-4000-RGM **will not** terminate a data call. There are 3 ways in which a call is terminated: the host closes the connection; the remote closes the connection; or the Globalstar satellite signal is lost. If a call is terminated due to the satellite signal being lost, the GS-4000-RGM will not re-establish the connection.

Host Initiated Calls to the Remote

This is the normal mode of operation for the GS-4000-RGM. Host initiated calls are used to poll remote field devices for the required information. Calls that originate from a host computer can be automatically answered by the GS-4000-RGM. Once the call is answered, the user can "seamlessly' communicate with the remote device. The remote device does not need to know about the satellite link. Usually the call is terminated when the host closes the phone connection.

Remote Initiated Calls to the Host

If the remote device is capable of dialing a modem, then it is possible for the remote device to establish a connection to a host computer. Remote initiated calls are used when it is necessary for the field device to send data back to a host computer. Usually the call is terminated when the remote device closes the phone connection.

There are two issues to be aware of when having the remote device initiate the connection to the host computer:

1) GSP-1620 modem AT Dial command:
   Only the ATD command is supported by the GSP-1620. The ATDT and ATDP commands will be ignored by the GSP-1620 modem.

2) GSP-1620 modem Hang-up sequence:
   When the remote device wishes to terminate the PSTN connection, the remote device must change the GSP-1620 from Online to Online-Command Mode by using the in-band control data escape sequence (+++) and then issue the AT hang-up command (ATH). See the example below:

ACTION	COMMAND	RESPONSE
Check if modem ready		
	at	OK
Check Globalstar status		
	at$qcstatus	SERVICE AVAILABLE: YES
		SERVICE MODE: GLOBALSTAR
		PROVIDER: GSTAR CA
		GATEWAY: 11
		RSSI: 4
		REGISTRATION: YES
		ROAMING: NO
		CALL STATE: IDLE
		CALL TYPE:
		CALL DURATION:
		NUMBER:
		OK
Dial the number	atd 12504785906	
Wait for the connection		CONNECT
> transmit	hello out there.	
< receive		HELLO TO YOU
> transmit	I',m going to hang-up now.	
< receive		ALRIGHT THEN, BYE.
> transmit	bye.	
Change to Online-Command Mode		
	+++	
		OK
Hang-up the phone		
	ath	
		OK
		NO CARRIER

Refer to the QUALCOMM Globalstar GSP-1620 Satellite Data Modem Product Specification for full details on the GSP-1620 AT Command set (FTS document # 701-GSP1620 Product Spec).

Internet Communications

It is possible to use the GS-4000-RGM to communicate using Globalstar's Direct Internet service (#777); however, the GS-4000-RGM will not automatically establish this connection or process any Globalstar SMS messages. In order to use the Direct Internet service, the attached remote device must establish the internet connection and be able to communicate using the appropriate protocols with the host device.

Refer to the QUALCOMM Globalstar GSP-1620 Satellite Data Modem Product Specification for full details on the GSP-1620 Direct Internet operation (FTS document # 701-GSP1620 Product Spec).

MAINTENANCE

The only field maintenance required by the GS-4000-RGM is a periodic check of the telemetry port cable for deterioration and excess snow removal from the antenna.

Please contact FTS technical support if the unit fails to operate properly.

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GENERAL DESCRIPTION

Commands for configuring the GS-4000-RGM are issued on the Programming Port with communications software such as HyperTerminal. RS-232 COM port settings of 9600 bps, no parity, 8 data bits, 1 stop bit with no flow control are required.

Configuration data is entered on a simple command line basis with basic editing (backspace only). The maximum line length is 40 characters, all characters beyond that will be ignored and all lines must end in <CR>.

Normally the ">" prompt will be displayed; however, if the Switching Interval parameter is not 00:00:00 and the optional Multiplexer Board is installed, then the prompt will display "A>" or "B>" depending on which RS-232 port is currently selected.

A command without anything following will display the current value of that parameter on the next line.
>Example:
>>>1<enter>
>>>ATZ
>>>>

A command with an equals sign following will set the value of that parameter.
>Example:
>>>ID=10<enter>
>>>>

IMPORTANT: Changed values are not permanently saved in the Control Board's eeprom until the 'save' command is issued. When a value is changed, the current working value is updated, but the eeprom copy is not. This allows multiple changes without the delays involved in updating the eeprom each time. Current working values can be viewed with the 'everything' command.

Timekeeping
The GS-4000-RGM sets its time from the UTC referenced Globalstar system time. Users may account for their local time zone by correctly setting the Time Zone Offset parameter.

Interval and Offset Parameters

This paragraph applies for the following parameter pairs: Initialization Interval & Initialization Offset; Reset Interval & Reset Offset; Power Cycle Interval & Power Cycle Offset; and Switch Interval & Switch Offset. When the Interval parameter of the parameter pair is set to 00:00:00, the function of the parameter pair is disabled (i.e. If Reset Interval is set to 00:00:00, the modem will not be periodically reset). Intervals and offsets are performed on a daily basis with the cycle always starting at 00:00:00 (midnight).

Example: If the Switch Offset is 06:15:00 and the Switch Interval is 8 hours (08:00:00), then the following are the switch times:
- Channel A from 00:00:00 to 06:15:00
- Channel B from 06:15:00 to 14:15:00
- Channel A from 14:15:00 to 22:15:00
- Channel B from 22:15:00 to midnight

The default values for the Interval and Offset (Initialization, Reset and Power Cycle) parameters mean that the GSP-1620 modem is: power cycled daily at midnight; reset daily at 11:30 am; and also reinitialized daily at 5:30 am and 5:30 pm. Power cycle events take precedence over reset events which take precedence over initialization events. If an initialization event and a power cycle event are scheduled for the same time, only the power cycle event will occur as the modem is reinitialized as part of the power cycle event. In addition to these parameters, the GS-4000-RGM software periodically (Negotiation Interval of 15 minutes) queries the GSP-1620 modem with an AT command for an appropriate response. If no response or an incorrect response is observed, then the GS-4000-RGM will reset the GSP-1620 modem independent of the reset parameters. Also the control board continually monitors the modem DSR line for a reset condition and if a modem reset is detected, the control board will reinitialize the modem.

Switch Interval and Switch Offset parameters only become relevant (as indicated by the A> or B> prompt) when an optional multiplexer board is installed. Switch Interval and Offset operate independently from the Initialization, Reset and Power Cycle parameters.

COMMAND DETAILS

A description for the each GS-4000-RGM command is given below. Commands are not case sensitive. The shortest acceptable form of each command is listed for each parameter.

TIME ZONE OFFSET
Command:	**zo**
Default Value:	**00:00:00**
Range:	**-24:00:00 to +24:00:00**

This offset is added to the Globalstar system time (UTC) to set the GS-4000-RGM time.

TIME
Command:	**t**
Default Value:	**n/a**
Range:	**2000/01/01 00:00:00 to 2135/12/12 23:59:59**

Set/get the time. When the unit is first powered-up, the GS-4000-RGM time is set to 2000/01/01 00:00:00. In order to set the time, all time fields must be present in the correct format (example: 2003/08/21 10:45:00). When the Globalstar system time (UTC based) becomes available, the GS-4000-RGM will override its existing time setting with the Globalstar system time modified by the Time Zone Offset parameter. After power-up or a Power Cycle command the GS-4000-RGM will resynchronize its time to that of the Globalstar system.

NUMBER
Command:	**n**
Default Value:	**n/a**
Range:	**n/a**

Returns the phone number of the GS-4000-RGM. This command does not allow the phone number to be changed.

VERSION
Command:	**v**
Default Value:	**n/a**
Range:	**n/a**

Show the firmware version and serial number of the unit.

STATUS
> **Command:**   **st**
> **Default Value:** **n/a**
> **Range:**   **n/a**

Issues an AT$QCSTATUS command to the Globalstar and reports the response directly without interpretation. This command allows the user to verify that a satellite connection is available.

AT
> **Command:**   **AT…**
> **Default Value:** **n/a**
> **Range:**   **n/a**

Any command starting with "AT" is immediately passed directly to the GSP-1620 modem and the modem response is returned on the Program Port. If the GSP-1620 is in low power mode, there may be a significant delay before a response occurs.

> **Example 1**:   AT$QCTOD=1 will return the Globalstar system time and date (UTC). This time may be different from the GS-4000-RGM time.

>> > AT$QCTOD=1<enter>

>> 02 01 2004 18:12:57

> **Example 2**:   AT+GSN will return the GSP-1620 modem's hexadecimal ESN.

>> > AT+GSN<enter>
>> +GSN: 74024136

> **Example 3**:   AT+IFC=0,0 will disable flow control on the GSP-1620 data port.

>> > AT+IFC=0,0 <enter>
>> OK

> **Example 4**:   AT+IPR=9600 will set the GSP-1620 data port baud rate to 9600 bps.

>> > AT+IPR=9600 <enter>
>> OK

Refer to the QUALCOMM Globalstar GSP-1620 Satellite Data Modem Product Specification for full details on the GSP-1620 AT Command set (FTS document # 701-GSP1620 Product Spec).

HELP
> **Command:**   **h or ?**
> **Default Value:** **n/a**
> **Range:**   **n/a**

Display list of user commands.

DOWNLOAD PARAMETERS
> **Command:**   **do**
> **Default Value:** **n/a**
> **Range:**   **n/a**

Block read of the GS-4000-RGM parameters.

NEGOTIATION INTERVAL
    Command: **ni**
    Default Value: **00:15:00**
    Range: **00:00:00 to 24:00:00**

This parameter is the time between GSP-1620 modem interrogations by the Control Board. If the modem response is incorrect, the modem will be reinitialized. Use 00:00:00 for no negotiation events.

INITIALIZATION INTERVAL
    Command: **ii**
    Default Value: **12:00:00**
    Range: **00:00:00 to 24:00:00**

This parameter is the time between GSP-1620 modem initialization attempts by the Control Board. Use 00:00:00 for no re-initializations after power-up.

INITIALIZATION OFFSET
    Command: **io**
    Default Value: **05:30:00**
    Range: **00:00:00 to 24:00:00**

This parameter offsets the first modem initialization event from midnight.

RESET INTERVAL
    Command: **ri**
    Default Value: **24:00:00**
    Range: **00:00:00 to 24:00:00**

This parameter is the time between modem reset events. Use 00:00:00 for no reset events.

RESET OFFSET
    Command: **ro**
    Default Value: **11:30:00**
    Range: **00:00:00 to 24:00:00**

This parameter offsets the first modem reset event from midnight.

POWER CYCLE INTERVAL
    Command: **pi**
    Default Value: **24:00:00**
    Range: **00:00:00 to 24:00:00**

This parameter is the time between modem power cycle events. Use 00:00:00 for no events.

POWER CYCLE OFFSET
    Command: **po**
    Default Value: **00:00:00**
    Range: **00:00:00 to 24:00:00**

This parameter offsets the first modem power cycle event from midnight.

SAVE
    Command: **s**
    Default Value: **n/a**
    Range: **n/a**

Write all the current parameter settings to eeprom. This also re-initializes the GSP-1620 modem. Any empty lines in the list of AT commands are removed.

GET AUDIT LOG
    Command: **al**
    Default Value: **n/a**
    Range: **n/a**

Retrieve all Audit log entries from the GS-4000-RGM Control Board. All Audit Log messages are date and time stamped. Audit log messages and their meaning are shown below.
- Failed to send AT command: Incorrect modem response to GS-4000-RGM AT command.
- Self reset: GS-4000-RGM detected that the GSP-1620 reset itself.

CLEAR AUDIT LOG
    Command: **ac**
    Default Value: **n/a**
    Range: **n/a**

Clear all Audit log entries from the GS-4000-RGM Control Board.

GET CALL LOG
    Command: **cl**
    Default Value: **n/a**
    Range: **n/a**

Retrieve all Call log entries from the GS-4000-RGM Control Board. The call log only records calls that were received (inbound calls). The call log does not record calls that were dialed from the GS-4000-RGM (outbound calls).

CLEAR CALL LOG
    Command: **cc**
    Default Value: **n/a**
    Range: **n/a**

Clear all Call log entries from the GS-4000-RGM Control Board.

EVERYTHING
    Command: **e**
    Default Value: **n/a**
    Range: **n/a**

Show all the current settings of the Control Board parameters. These values may not be the same as the values in the Control Board's eeprom if the user has edited the parameters without issuing the SAVE command.

RESET GSP-1620
    Command: **re**
    Default Value: **n/a**
    Range: **n/a**

The Control Board resets the GSP-1620 modem using the modem reset line, and then sends the initialization strings to the modem.

POWER CYCLE GSP-1620
    Command: **pc**
    Default Value: **n/a**
    Range: **n/a**

The Control Board cycles the power to the GSP-1620 (power turned off for about 8 seconds and then turned on again), and then sends the initialization strings to the modem.

INITIALIZATION DELAY
     Command: **id**
     Default Value: **10**
     Range: **0 to 255**

The number of seconds that must elapse after a power-up before the Control Board tries to first initialize the GSP-1620 modem.

SWITCH INTERVAL
     Command: **si**
     Default Value: **12:00:00**
     Range: **00:00:00 to 23:59:59**

Used when the optional multiplexer board is installed. This parameter is the time between port switches from RS-232 port A to port B then port B to port A. If set to a value of 0:00:00, then no switching will occur and unit stays connected to channel A.

SWITCH OFFSET
     Command: **so**
     Default Value: **12:00:00**
     Range: **00:00:00 to 23:59:59**
Used when the optional multiplexer board is installed. This parameter offsets the first RS-232 port A to port B switch interval from midnight.

FORCE PORT A
     Command: **fa**
     Default Value: **n/a**
     Range: **n/a**

Force the multiplexer to channel A.

FORCE PORT B
     Command: **fb**
     Default Value: **n/a**
     Range: **n/a**

Force the multiplexer to channel B.

QUIT
     Command: **q**
     Default Value: **n/a**
     Range: **n/a**

Place the GS-4000-RGM Control Board into low power mode. The GS-4000-RGM will automatically wake-up when a call is received or when a carriage return is received on the programming port.

AT COMMAND STRINGS

	DEFAULT VALUES
1	ATZ
2	ATE0
3	ATS0=1
4	ATX0
5	AT+IFC=0,0
6	*<blank>*
7	*<blank>*
8	*<blank>*
9	*<blank>*

(for line 5): only firmware v2.0 or greater

Lines 1-9 are AT command string entry commands.

CLEAR AT COMMAND STRINGS
Command: **iclear**
Default Value: **n/a**
Range: **n/a**

Clear all AT settings so nothing is sent to the GSP-1620 (deletes fields 1-9).

ALL
Command: **a**
Default Value: **n/a**
Range: **n/a**

Show all the current AT strings that will be sent to the GSP-1620 modem on initialization.

DEFAULT
Command: **default**
Default Value: **n/a**
Range: **n/a**

Set all GS-4000-RGM parameters to their default value.

CHECK SIGNAL INTERVAL
    Command: **ci**
    Default Value: **00:00:00**
    Range: **00:00:00 to 23:59:59**

This parameter is the time between Globalstar RSSI signal level checks. If set to a value of 0:00:00, then no signal level check will occur..

CHECK SIGNAL OFFSET
    Command: **co**
    Default Value: **00:00:00**
    Range: **00:00:00 to 23:59:59**

This parameter offsets the first Globalstar RSSI signal level check from midnight.

CHECK SIGNAL THRESHOLD
    Command: **ct**
    Default Value: **2**
    Range: **0 to 4**

When the Globalstar RSSI signal level falls below the 'check signal threshold' value an entry will be places in the GS-4000-RGM's audit log. Then when the RSSI signal level rises above the threshold level a second entry will be made in the audit log.

The example below shows:

1/   On April 7th, 2006 at 18:44 UTC, the Globalstar signal level fell below the threshold value of RSSI=2 and that the status of the Globalstar signal was:

      RSSI: 0   : no signal
      SERVICE AVAILABLE: NO   : no service available
      PROVIDER: GSTAR CA   : Globalstar Canada
      GATEWAY: -1   : no gateway

2/   On April 7th, 2006 at 18:46 UTC, the Globalstar signal level rose above the threshold value of RSSI=2 and that the status of the Globalstar signal was:

      RSSI: 4   : best signal level possible
      SERVICE AVAILABLE: YES   : service available
      PROVIDER: GSTAR CA   : Globalstar Canada
      GATEWAY: 11   : Alberta gateway

Audit Log Sample:

      2006/04/07 18:42:04 Audit log cleared by user
      2006/04/07 18:44:00 R=0; S=NO; P=GSTAR CA   ; G=-1
      2006/04/07 18:46:00 R=4; S=YES; P=GSTAR CA   ; G=11

GS-4000-RGM SPECIFICATIONS

GS-4000-RGM ROBUST GLOBALSTAR MODEM

Operating Voltage Range	8 Vdc to 20 Vdc
Current Consumption (typical) Standby Transmit	40mA @ 12 Vdc input 500mA @ 12 Vdc input
Data Rate	9600 bps via Globalstar satellite constellation 300 bps to 115.2 kbps via RS-232 Telemetry Port 9600 bps via RS-232 Programming Port
Operating Frequencies	Transmit: 1610-1625 MHz Receive: 2484-2499 MHz
Maximum Transmit Power	+26 dBm EIRP (0.4 W)
Operating Temperature	-30 to +60 °C
Storage Temperature	-40 to +85 °C
Dimensions	36 cm (14") cylinder length (including antenna) 10 cm (4") outer diameter
Weight	2.7 kg (6 lb)