

3. TTY Menu Control and Monitoring

The TTY menus cover two important features of the RCP8:

- **System configuration**- discussed in **Section 4**.
- **Local control and monitoring**- discussed in this section.

The initial test and configuration of the RCP8 is made using the TTY menus on the local keyboard, mouse and monitor. These menus can also be accessed remotely over the network.

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3.1 Starting the TTY Menus

There are different ways to start the TTY menus, depending on your hardware configuration.

```
$ rcp8 -int
```

To start the menus :

```
$ antx
```

This special mode is supported by the SIGMET IRIS software and uses spare bandwidth, on the existing host computer serial or network interface, to allow the user to converse with the RCP8 from an XTERM window. After the initial stabilization and setup, this is the preferred method of using the TTY menus since the “chat” mode can be started up remotely and does not require additional hardware or cabling.

In either case, hitting “Enter” will get you to the RCP8 TTY menu prompt:

```
RCP>
```

3.2 The TTY Main Menu

The Main menu represents the top level of communication between the RCP8 and the user in the TTY Setups. All setup, monitor, and control functions can be accessed through this menu.

The example on the following page represents the Main menu as it appears on the TTY screen:

```
RCP> help
Available Commands:
  Axis <AZ><EL>           General Axis Setup
  Control <Lines><Logic>   Control outputs
  Help <Support><Listall><View> Help text (also '?')
  INU                     Inertial Navigation Unit
  Monitor <Ang><INU><SIO><Sta><Con> Live TTY monitor
  Pservo <AZ><EL>         Position Servo Variables
  Reset <#Seconds>        Reset from Shutdown
  Restore <Factory><Saved><Undo> Restore settings
  Save                   Save settings
  Site <Disp><Host><Custom><Misc> Local Site setups
  Status                Status Input Lines
  Vservo <AZ><EL>         Velocity Servo Variables
```

To make a selection, type the appropriate command followed by any additional keywords or numerical values. Remember, many of the commands may require additional information.

The DELETE and BACKSPACE keys may be used to correct typographical errors however, all invalid selections will result in a diagnostic message followed by a beep. To simplify typing, all commands and keywords may be abbreviated to a short, unambiguous prefix.

Many of the commands relate to the setup and calibration of the RCP8, as described in **Section 4**. The remainder of this section describes the control and monitoring features, i.e., the following commands:

- Help <Support><Listall><View>
- Monitor <Ang><INU><SIO><Sta><Con>

These provide access to the monitoring and local control functions of the RCP8.

3.3 The TTY Help Menu

3.3.1 TTY "Help Support" Command

The following example demonstrates how the "HELP" command is invoked using "support" as the identifying keyword.

```
RCP> help support
  E-Mail: support@sigmet.com
  US-Mail: 2 Park Drive, Unit #1, Westford, MA 01886 USA
  Internet: www.sigmet.com, ftp.sigmet.com
  Phone: (978) 692-9234 (Monday-Friday, 9am-5pm EST)
  FAX: (978) 692-9575 (All hours)
```

3.3.2 TTY "Help View" Command

This version of "HELP" is used to view internal status and configuration that is not easily visible from other RCP8 commands.

```
RCP> help view
Rev.B board, ROM V09 from Tue Jun 23 16:00:07 1998
Values were last saved using ROM version V10
IP Module Inventory:
  IP-A : IP-Digital-48      IP-D : Empty Slot
  IP-B : IP-Digital-48      IP-E : IP-488
  IP-C : IP-Digital-48      IP-F : IP-Precision-ADC
Additive angle offsets  AZ: 0.00  EL: 0.00
```

The various sections of the listing include:

- The board and code revision levels, and the date and time that the code was compiled. The date is useful in distinguishing beta test versions that may be released from time to time.

The support for intermediate minor releases of RCP8 code includes a minor version number for intermediate "unofficial" releases. The minor number starts from zero at the time of each "official" release, and then increments until the next "official" release. The RCP8 front panel and TTY startup messages will show the minor release number (if it is not zero). Likewise, the minor release number of the code that last saved the nonvolatile RAM will be shown in the "Help View" command.

- An inventory of all of the IP modules that are plugged in.
- Current angle offsets that are being added to the parallel or synchro angle inputs. This value generally comes from the "Axis" setup command; but in some cases it may be supplied by external equipment.

3.4 The TTY “MONITOR” Command

The “MONITOR” command provides a live display of changing parameters within the RCP8. Several different types of displays can be selected, but all consist of a line of information that is continually retyped on the same position of the TTY screen. For terminals operating at 2400 baud or faster, the effect is similar to that of a stationary format display where each value is kept up-to-date.

User commands may be input while the monitor display is running. The effect is as if the TTY cursor were located to the right of the text and the characters appeared in the usual manner. Since the entire status line is continually being retyped, the implementation of these echoed characters is somewhat more complicated. The DELETE and BACKSPACE keys can still be used to correct errors and the ENTER key terminates the input.

When a valid command is input, the screen will scroll up a line and the status display will continue to be printed on the following line. A history of the commands that have been typed is thereby preserved. With this in mind, a blank line is one of the more useful commands. This no-operation command allows the display to scroll in an upward motion. It also creates a sequential record of observations on the TTY screen, thus allowing the information to be written down at a later time. This is an important feature for calculating the initial measurements of the antenna dynamics as required for the position and velocity servos.

Invalid commands will erase all command characters; the TTY will beep, and no scrolling will occur.

After many commands are typed, the initial heading will eventually scroll off the top of the screen. Entering the “.” command will automatically retype the heading line, and the status display will continue under it as before. The “.” command can prevent the misinterpretation of an unlabeled line of numerical information.

To exit from the monitor command, use the ESC key or the “QUIT” command. Either one will cause an immediate return to the Main menu.

Alternate data displays are usually available within each monitor command. Use the “ALT” command to toggle through the different displays, and the “MAIN” command to quickly return to the default presentation. If you exit from a monitor while an alternate display was in use, you will automatically be returned to that display upon reentering.

3.4.1 TTY Antenna Monitor and Control

The RCP8 can display most of the important real-time antenna parameters on the local TTY screen and can request antenna motion through a simple command interface. This local control and monitoring capability is primarily intended for use during the initial installation and testing of the RCP8. The features, however, are so simple to use, it could also form the basis of a “front panel” for the manual antenna control.

The local antenna monitor is entered by typing “monitor angles” from the Main menu.



Note: The “MONITOR” command may be abbreviated to its unique first letter. The term “angles” is the default value of an optional keyword; typing a single letter “m” would also work.

An initial heading is printed, followed by repeated lines of numerical text in the following manner:

```
RCP> monitor angles
AZ-Pos  AzTach  Az-Vel  AzDrv      EL-Pos  ELTach  EL-Vel  ELDrv      Time
-----  -----  -----  -----  -----  -----  -----  -----  -----
141.21   34.81     8.37   32.7       12.01    0.00    0.00    0.0        3.42
```

The displayed values are interpreted as:

AZ-Pos / EL-Pos

The Azimuth (AZ) position is unsigned and displayed in a 0 to 360° range. The Elevation (EL) position is signed and operates from – 180 to +180°.

AZTach / ELTach

The AZ and EL tachometer levels represent 12-bit, A/D converter samples scaled to a range from – 100 to +100.

AZ-Vel / EL Vel

The AZ and EL velocity are computed as the end-product of the tachometer samples with a calibration slope for each axis. If there is no hardware tachometer then the position is differenced to obtain a virtual tachometer. Note that for the virtual tach, the internal dynamic antenna model is used for interpolation.

AZDrv / ELDrv

The AZ and EL motor drive represents 12-bit, D/A converter values scaled to a range from – 100 to +100.

Time

The seconds counter increments from zero to 10 with 0.01 second resolution. These values are included so the elapsed time, between displayed lines, can be easily measured. It is useful when manually calculating the antenna dynamic parameters.

3.4.1.1 Commands Recognized by the Angle Monitor

The following commands are available within the angle monitor:

Angle Monitor Commands:

```
azd / eld <#>  Set AZ/EL drive (D-Units)
azp / elp #     Set AZ/EL position (degrees)
azt / elt <#>  Set AZ/EL velocity (Tach-Units)
azv / elv <#>  Set AZ/EL velocity (deg/sec)
    Alt        Switch among alternate presentations
    Main       Back to primary presentation
    Reset <#>  Reset from Shutdown (Unsafe sec)
    .          Reprint header labels
```

The following commands are used to set up particular drive levels, or alternatively to start up one of the internal servos, for both the azimuth and the elevation axes. The range of -100 to $+100$ represent the digital value that is applied to the output D/A converters.

- Use the “ad” or “ed” commands, followed by a number in the range of -100 to $+100$, to output a given motor drive.
- Use the “ap” or “ep” commands, followed by the desired angle in degrees ($^{\circ}$), to move the antenna to a fixed position.

The host computer serial interface will continue to control the RCP8 until a command that moves the antenna is typed on the TTY screen. The RCP8 will remain under the terminal's control until the local monitor mode has been exited.



Important: The terminal may be used as a monitor however, do not input those commands that will seize control from the host computer.

If commands are used to move the antenna, checks are usually performed that restrict the antenna's travel to ensure the soft limits (lower and upper) are not exceeded. The checks are done by executing the position servo “silently” in the background using the two soft limits as target points. If the present motor drive does not rest in between the calculated drives, then the drive is automatically overridden by either one of those values. This is a safety measure designed to prevent the antenna from running into its stops.

3.4.1.2 Alternate Display for Shipboard Platforms

The following alternate format is useful when moving platform stabilization is performed. This allows the user to compare the Pedestal and the Earth angles as the orientation of the platform changes.

Ped	AZ/EL	Earth	AZ/EL	Earth	Vel	Roll	Pitch	Head
294.70	-0.98	359.72	9.43	-0.01	4.00	-7.99	-7.76	65.88

The displayed values are interpreted as:

Ped AZ/EL

This represents the Pedestal position angles in degrees ($^{\circ}$).

Earth AZ/EL

This represents the Earth position angles in degrees ($^{\circ}$).

Earth Vel

This represents the Earth AZ and EL angular velocities in degrees/seconds ($^{\circ}/\text{sec}$).

Roll/Pitch/Head

This represents the Roll, Pitch, and Heading angles of the moving platform in degrees ($^{\circ}$).

3.4.1.3 Alternate Display of Antenna Dynamics

The following alternate format prints several derived parameters pertaining to the dynamic properties of each antenna axis. Only one axis is displayed at a time. The azimuth axis printout is shown below, but the alternate display for the elevation axis is identical.

AZ-Pos	AzTach	AzDrv	T-Cal/Vel/Ratio			T-Dot	T-Err	I-Mom	Time
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
359.95	-11.67	-2.3	-13.72	-3.25	1.013	2.86	-1.0	2.81	5.29

The displayed values are interpreted as:

AZ-Pos

The represents the Pedestal position angle in degrees ($^{\circ}$).

AzTach

The represents the Pedestal tachometer levels, scaled to -100 to $+100$ T-Units

AzDrv

The represents the Pedestal drive signals, scaled to -100 to $+100$ D-Units.

T-Cal / Vel / Ratio

The tachometer calibration values consist of a one-second averaged tachometer calibration level (T-units) and a computed actual velocity based on various positions ($^{\circ}/\text{sec}$). Both of these numbers define the map from the tachometer T-units to velocities ($^{\circ}/\text{sec}$). The slope ratio, implied by the current values to the stored slope from the axis menu, is displayed. This ratio should be very close to 1.000 for all rates of rotation. The antenna must be in motion for these values to be valid.

T-Dot / T-Err / I-Mom

The time derivative of the tachometer (i.e. the acceleration) is displayed in T-units/sec followed by the extrapolated tachometer error in T-units, based on a 2.5-second integration of an internal antenna model. This tachometer error is the basis of an unresponsive antenna check that is continually executed in the background. The antenna's instantaneous moment of inertia is displayed in D-units and T-units/sec. The antenna must be accelerating for these values to be valid.

Time

The seconds counter increments from 0 to 10 with 0.01 second resolution. These values are included in order to easily measure the elapsed time between display lines.

3.4.2 TTY Serial I/O Monitor

This display is provided as an aid to debug the serial interface with the host computer. The TTY screen displays the I/O activity and the interpretation of the commands being sent to the RCP8. The serial I/O monitor is entered by typing "monitor sio" from the Main menu.

```
RCP> monitor sio
  Ch/Rec In  Time Err  Ch/Rec Out  AZ-Pos  AZ-Vel  EL-Pos  EL-Vel
-----
154867 11002  0.2   3 698660 11342   0.00 P  0.00   0.00 P  0.00
```

The displayed values are interpreted as:

Ch/Rec In

The character input count represents the total number of characters received. The valid record count represents the number of properly formatted packets received.

Time

The time represents the time since the last valid record was received (sec).

Err

The error count represents the total number of improperly formatted packets received.

Ch/Rec Out

The character output count represents the total number of characters and packets transmitted.

AZ-Pos/AZ-Vel

This represents the requested azimuth position and azimuth velocity and are always displayed regardless of the servo type. The letter "P," in the center of the two values, represents the position servo.

Other letters that may appear include:

- “V” — velocity servo,
- “D” — direct motor drive, and
- “X” — disabled.

EL-Pos/EL-Vel

This represents the requested elevation position and velocity and has the same format as for azimuth.

3.4.2.1 Commands Recognized by the Serial I/O Monitor

If command characters are typed by the user while the TTY screen displays the status text, these characters will be echoed at the right side of the screen. The commands that are available within the Serial I/O Monitor are:

SIO Monitor Commands:

Alt	Switch among alternate presentations
Ri/Ro	Host computer record In/Out monitor
Main	Back to primary presentation
Zero	Clear SIO counters
.	Reprint header labels

3.4.2.2 Alternate Displays of Raw SIO Records

The “Ri” and “Ro” subcommands may be used to view the incoming and outgoing raw serial traffic with the host computer. This can be very helpful when debugging interface problems at either end. The data are shown in hexadecimal format, one (variable length) record per line. Note that the only data shown are character sequences that 1) begin with a byte with MSB set but not equal to 0xFF, 2) end with 0xFF, and 3) have MSBs clear in all intermediate bytes. Examples are shown below.

Incoming Records from Host Computer

```
-----  
80 00 00 00 00 00 0A 00 0F 00 00 00 00 FF  
80 00 00 00 00 00 0A 00 0F 00 00 00 00 FF  
C0 01 00 00 02 00 00 00 00 00 00 00 00 FF  
80 00 00 00 00 00 0A 00 0F 00 00 00 00 FF  
C0 4D FF  
80 00 00 00 00 00 0A 00 0F 00 00 00 00 FF
```

Outgoing Records to Host Computer

```
-----  
80 00 00 00 00 00 00 00 00 10 00 00 00 24 30 FF  
80 00 00 00 00 7F 7F 00 00 10 00 00 00 34 33 FF  
C0 00 00 00 00 00 00 00 00 10 00 00 00 FF  
C0 01 7F 7F 7F 7F 7F 3F 00 00 00 00 FF  
80 00 00 00 00 00 00 00 00 10 00 00 00 4B 36 FF  
C0 4D FF  
80 00 00 00 00 00 00 00 00 10 00 00 00 34 65 FF
```

3.4.3 TTY Inertial Navigation Unit Monitor

This display provides a view of the data stream arriving from an optional Inertial Navigation Unit (INU). The INU monitor is entered by typing "monitor inu" from the Main menu.

```
RCP> monitor inu
Roll    Pitch  Head    R.Dot  P.Dot  H.Dot    Time    Date
-----
-1.04   4.74  345.96    0.6    3.1    8.3   00:27:58  1-Jan-1998
```

The displayed values are interpreted as:

Roll / Pitch / Head

These represent the attitude angles in degrees ($^{\circ}$).

R.Dot / P.Dot / H.Dot

These represent the rates of change of attitude angles in degrees ($^{\circ}$) / second.

Time / Date

The time and date, using whatever time zone has been set for the INU.

3.4.3.1 Alternate INU Monitor Presentations

You may switch to the following alternate presentation by typing "alt":

```
Latitude Longitude Height  N.Vel  E.Vel  Z.Vel  Char/Err  Rec/Err
-----
42 31.0N  71  2.4W   40.9   10.0    3.0    0    0   161    0
```

The displayed values are interpreted as:

Latitude / Longitude / Height

These represent the physical location. Latitude and Longitude are in degrees and minutes, with N/S and E/W indicating the sign. Height is in meters relative to sea level.

N.Vel / E.Vel / Z.Vel

These represent the linear velocities in meters/second the North, East, and Up directions.

Char/Err and Rec/Err

These are the counts of the number of characters and records received, and the number of character and record errors that have been detected. A character error is a framing or parity error, whereas a record error results from an invalid CRC checksum

in a record of data. The record count should increase at a rate of approximately 100 records/second when INU data are being received correctly. You may use the “zero” subcommand to clear these counters so that changes are easier to spot.

3.4.4 TTY Status Line Monitor

This display provides a concise view of all of the status input lines that are sensed by the RCP8. The status line monitor is entered by typing “monitor status” from the Main menu.

```
RCP> monitor status
Hardware Electrical Inputs
Locl Pw1 Pw0 Rad Srv T/R Stby Intr Mag Air WGp Res ElLO ElHI IRIS
-----
--  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
                                On  --  --  --  --  --
```

The characters “—” will be printed under each status input that is not being used. For the used inputs, the word “ON” will be printed if the line is asserted, and blank space will appear if the line is not asserted.

You may switch to the following alternate presentation by typing “alt”. Now, the internal status of each condition is displayed. This is different from the condition of the hardware input line in that the status may be coming from another source, or may be spoofed from the requested control.

```
RCP Internal Status
Locl Pw1 Pw0 Rad Srv T/R Stby Intr Mag Air WGp Res ElLO ElHI IRIS
-----
                                ON                                000
```

Lastly, if auxiliary status lines have been enabled, then you may switch to the following bit presentation by typing “alt”. In the following example, four bytes of optional status have been selected via the “site custom” menu. High inputs are shown as a “1”, and low inputs are shown as a “.” (rather than as “0”, to make the string more readable at a glance).

```
Auxiliary Status Inputs
S[31:24] S[23:16] S[15:08] S[07:00]
-----
11111111 11111111 11111111 1111111.
```

The “Monitor Status” command uses the “/” subcommand to toggle between the requested and qualified versions of the primary and auxiliary status bits, as well as the direct hardware inputs themselves. The distinction between requested and qualified status bits exists because the status bits can appear on the left side of logic equations (See Section 4.8.2).

3.4.5 TTY Control Request Monitor

This display provides a concise view of all of the control functions that might be handled by the RCP8. The control request monitor is entered by typing “monitor control” from the Main menu.

The primary control functions that have been externally requested (usually from the host computer) are shown in the following display:

```
Requested Primary Control Bits
Pw1 Pw0 Rad Srv T/R Res IRIS
-----
                ON          000
```

The qualified state of each control function can be viewed by the “/” subcommand. The display now shows the actual control state, which may be different from the requested state if any internal logic equations are overriding the request (See Section 4.8.2).

```
Qualified Primary Control Bits
Pw1 Pw0 Rad Srv T/R Res IRIS
-----
                ON  ON      000
```

Note that “/” works as a toggle between the requested and qualified states of whatever control variables are being shown. This makes it easy to compare the bits, and to verify that custom logic equations are implemented correctly. The “alt” subcommand may be used to switch to the following display of requested auxiliary control bits:

```
Requested Auxiliary Control Bits
C[63:56] C[55:48] C[47:40] C[39:32] C[31:24] C[23:16] C[15:08] C[07:00]
-----
..... 11..... 1.....
```

from which the “/” subcommand can switch to the qualified states:

```
Qualified Auxiliary Control Bits
C[63:56] C[55:48] C[47:40] C[39:32] C[31:24] C[23:16] C[15:08] C[07:00]
-----
..... 1.....
```

Lastly, the sixteen local logic variables are shown in the following “alt” display.

```
Local Variables
V[15:08] V[07:00]
-----
.....
```

3.4.6 TTY Internal LOG Monitor

This display allows you to view the RCP8’s internal log of data and events. The control request monitor is entered by typing “monitor control” from the Main menu. If log entries already exist when the command is typed, you will see a message resembling:

```
RCP8 System and Event LOG
-----
There are 27 saved entries - DELETE ?
```

You may type “Yes” to delete the old entries if they have already been seen, or if they are known to be unimportant. But beware — deleted entries can not be recovered and will never be seen again. In general, you should simply type <Enter> to view and preserve the saved entries. If you want a permanent record of the log, be sure

that you can archive the printed lines from the X-Terminal that is running, for example, “antcheck -chat”. After printing these old log entries you will see the message:

```
Flush this saved LOG and enter live update mode? n
```

Typing “Yes” will delete the entries that were just printed, and the monitor will enter its live update mode in which new log entries are printed (and discarded) immediately. Typing any key during live update mode will return to the top level “RCP>” prompt.

The depth of the log is eighty entries; when the log fills up, additional entries can not be added and are discarded. If this has happened, you will see an initial message such as:

```
WARNING: There have been 58 missed LOG entries
```

Each entry of the printed log begins with a banner such as:

```
----- # 27    Time: 4626.554 sec ----- (Angle Glitch)
```

This indicates that we have the twenty-seventh log entry, the time of the entry (in seconds since the RCP8 was booted), and the type of entry. One or more additional lines will follow with the specific data for this type of log entry.

3.4.7 TTY Analog Voltage Input Monitor

The command “Monitor ADC” may be used to view the sampled voltage on each of the eight analog input lines. An internal loop-back measurement of the AZ and EL drive output voltages is also included. A sample printout is shown below; all values are displayed in Volts.

```
RCP> monitor adc
Analog Input Lines (Volts relative to GND)
  0      1      2      3      4      5      6      7  AzRef ElRef
-----
 0.92  4.04 -3.12  0.00  0.00  0.00  0.00  0.00  1.22  0.00
```

3.5 TTY “RESET” Command

The RCP8 continually performs antenna consistency checks to guard against faults that might damage the mechanical system. Whenever such conditions are detected, the RCP8 will immediately enter a shutdown state and a flashing error message will appear on the front panel display.

The following list represents the three ways a shutdown state can be exited:

- Turn the power on and off
- use a suitable command from the host computer (e.g., “reset” in the antenna utility, or

- type the local TTY command “reset.”

The “RESET” command provides a restore capability that is more graceful than cycling the power. This can also be executed remotely using antcheck –chat.



Warning: The cause of the shutdown must be determined and corrected before attempting to restore system operation.

The local “RESET” command may be followed by an optional numerical value between zero and 10. This value represents the number of seconds that a shutdown will be inhibited following the reset, with a default value of one second. This brief lockout period is designed to assist with the antenna’s reposition so the shutdown condition can be remedied—rather than a repeat of the shutdown—immediately following the reset. For example, if the antenna has contacted a limit switch, the user can issue brief drive commands and attempt to move the antenna away from its limit.

The RCP8 will only shut down when it has control of the antenna. When the external LOCAL status input forces the RCP8 into local mode, it will not shutdown even if the velocity limits are exceeded or if the tachometer signals are inconsistent with angular positions. Once control is returned to the RCP8, the operator must ensure that no shutdown criteria is pending prior to the switch-over.

The “RESET” command always places the controller into its momentary “unsafe” condition regardless of whether the RCP8 is shutdown at the time the command is received. This allows the command to be used when attempting to exit from stuck conditions; including those times when the RCP8 has not actually shutdown.



Note: The “local” status places no restrictions on exiting from the shutdown state — only on entering it. Therefore, the “reset” command is always effective.

The “RESET” command causes a soft internal reset, i.e., the shutdown state is cleared and the RCP8 continues running smoothly. In some cases, however, the RCP8 may require a more drastic restart in this case, SIGMET recommends that you reboot the system. Alternatively the following commands can be used: