

APPENDIX B - MOUNT SPECIFIC DATA

For

Fixed Based Antenna with Pulse Sensors

1.0 INTRODUCTION

This appendix describes the unique characteristics of a RC3000 antenna controller customized to work with a fixed based antenna having azimuth and elevation axis pulse sensors and a potentiometer for the polarization axis.

This appendix highlights the functional differences between this customized version of the RC3000 and the operation described in the baseline RC3000 manual. The appendix is to be used in conjunction with the baseline manual as the baseline manual is referenced extensively.

The following paragraphs follow the baseline manual's outline. Referenced paragraphs highlight the operational differences between the customized version and the baseline.

1.2 Software Configuration

The software model designation for this version of the RC3000 is **H1**.

1.3.2 System Interface Requirements

The H1 version assumes the following antenna interfaces:

- DC motor drives for azimuth, elevation and polarization
- azimuth position feedback provided only by a single phase pulse sensor
- elevation position feedback provided only by a single phase pulse sensor
- polarization position feedback provided by a potentiometer
- no discreet azimuth, elevation or polarization limit switches available
- no GPS or fluxgate compass sensors utilized

1.3.3 Operational Overview

The H1 version utilizes a subset of the full RC3000 functionality described in the baseline manual. Since H1 is customized for fixed-based antenna use, RC3000 features required for mobile antenna operation are not provided. Functionality of H1 is also dictated by the absence of absolute angle position sensors for the azimuth and elevation axis.

H1 provides for manual jogging of the antenna in azimuth, elevation and polarization. After a satellite has been found, its azimuth, elevation and polarization positions may be stored and later recalled automatically.

Since no absolute angle sensors exist for azimuth or elevation, no automatic LOCATE function is provided. The satellite pointing angle calculations normally performed as part of LOCATE are made available as an aid to finding satellites.

2.0 INSTALLATION

2.1 Equipment Mounting

Only the RC3000 itself will need to be mounted as described in section 2.1.1. No GPS receiver, fluxgate compass or elevation inclinometer will be present.

2.2 Electrical Connections

2.2.2 Motor Drive

Wire the azimuth, elevation and polarization motors as described in this paragraph.

2.2.3 Drive Sense

Only the polarization potentiometer will need to be wired.

2.2.4 Limit Switches

No limit switch inputs will be used. Azimuth and elevation software limits will be implemented as described later in this appendix.

2.2.5 Signal Strength

The signal strength inputs may be used as described in the baseline manual.

2.2.6 Navigation Sensors

GPS and compass will not be used with H1.

2.2.7 Accessories

No interfaces mechanized via the J8 connector are applicable to H1.

2.2.8 RF Autopeak

The J11 connector may be utilized to provide a "RF" signal source as described in the baseline manual.

2.2.9 Hand Held Remote

The optional hand held remote unit will command antenna movement normally for H1. Since no hardware axis limits exist, the limit switch LEDs on the hand held remote will not be active.

2.2.10 Pulse Sensors

Pulse sensors will be the only feedback mechanism for azimuth and elevation. The interface requirements defined in 2.2.10 must be followed to ensure correct pulse counting.

2.2.11 PC Remote Control

H1 may be wired for remote control as described.

2.2.12 Waveguide Switch

The optional waveguide switch control module may be used with H1.

2.3 Initial Configuration

Configuration of the H1 version is quite different from that described in the baseline RC3000 manual. The user is encouraged to review unique H1 operations (section 3 of this appendix) prior to beginning configuration.

2.3.2 Elevation Calibration

2.3.3 Azimuth Calibration

The goal of the following steps is to configure the azimuth and elevation pulse counting system and to set the software limits that will define the allowable range of movement.

- 1) from the LIMITS MAINTENANCE mode (3.3.2.5) make the software limit logic inactive.

WARNING: during the time that the “ WARNING – LIMITS INACTIVE **” alarm message is flashing, there will be no automatic limiting of azimuth or elevation movement by the RC3000. Any movement of the antenna should be observed to ensure that no physical damage occurs.**

- 2) from the MANUAL mode, jog the antenna to its midway point in azimuth travel and almost to the down limit in elevation travel. This position will be where the azimuth and elevation pulse counts will be initialized.
- 3) Reset the pulse count from the DRIVE ERROR RESETS mode (3.3.2.2). This action will set the azimuth pulse count to 32768 (middle of count range) and the elevation pulse count to 100 (at low end of count range).
- 4) From MANUAL, jog the antenna up for a few seconds and note the elevation pulse count. Enter this value in the DOWN: field of the ELEVATION PULSE DRIVE configuration screen (3.3.1.3.6). Software will generate the DOWN elevation limit when the pulse count is below this value.
- 5) From MANUAL, jog the antenna up close to the physical up limit of the antenna. Note the elevation pulse count. Enter this value in the UP: field of the ELEVATION PULSE DRIVE configuration screen (3.3.1.3.6). Software will generate the UP elevation limit when the pulse count is above this value.
- 6) From MANUAL, jog the antenna close to the physical azimuth counterclockwise limit of the antenna. Note the azimuth pulse count. Enter this value in the CCW: field of the AZIMUTH PULSE DRIVE configuration screen (3.3.1.3.3). Software will generate the CCW azimuth limit when the pulse count is below this value.
- 7) From MANUAL, jog the antenna close to the physical azimuth clockwise limit of the antenna. Note the azimuth pulse count. Enter this value in the CW: field of the AZIMUTH PULSE DRIVE configuration screen (3.3.1.3.3). Software will generate the CW azimuth limit when the pulse count is above this value.
- 8) Reactivate the software limit logic from the LIMITS MAINTENANCE mode (3.3.2.5).
- 9) Move the antenna through the UP/DOWN and CCW/CW range of movement to verify that the antenna halts at the software limits previously defined.

WARNING: continue to monitor the antenna movement during step 9. If there is a problem in the pulse counting system (wiring , etc.), the mount could physically move beyond intended limits.

2.3.4 Polarization Calibration

The steps described in the baseline manual will be applicable for calibrating the polarization axis.

NOTE: The H1 default polarization scale factor is set to a common value. The scale factor for any particular mount will need to be characterized.

2.3.5 Fast/Slow Motor Speed

Set the motor speed as described.

2.3.6 Pulse Sensor Checkout

Normally pulse sensors are an optional secondary source of azimuth and elevation position sensing. The actions described in this paragraph were essentially done during the azimuth and elevation configuration steps above.

2.3.8 Navigation Sensor Communication

This step is not applicable to the H1 version.

2.4 Final Calibration

2.4.1 Compass Calibration

This step is not applicable to the H1 version.

2.4.2 Azimuth and Elevation Alignment

This step is not applicable to the H1 version.

2.4.3 Signal Strength Adjustment

Configure signal strength inputs as described in this paragraph.

2.4.4 Pulse Scale Factor

Characterize the mount's azimuth and elevation pulse scale factors as described in this paragraph.

2.5 Operational Presets

Preset truck locations are not applicable for a fixed based antenna. Preset satellite data may be entered for use in the SATELLITE mode described later.

For fixed based operation, the antenna's latitude, longitude and heading will only be entered once. The POSITION mode described in 3.2.2.7 of the baseline manual has been moved from the Operating Group's MENU to the MAINTENANCE MENU of the Programming Group.

At this time enter the antenna's latitude and longitude.

Enter the antenna's true heading as 0.0. A true heading of 0.0 will allow the SATELLITE mode to display true azimuth bearing to a selected satellite.

2.6 Miscellaneous Adjustments

Set the LCD contrast and date/time/timezone as required.

3.0 DETAILED OPERATION

3.1 Operation Overview

3.1.1 Modes

The H1 version of software implements a subset of the functions available from the baseline RC3000 mobile antenna controller. Several of the H1 modes will operate only slightly different from that described in the baseline manual. Differences in modes between that described in the baseline manual and H1 will be detailed in the following paragraphs.

3.2 Operating Group

Since H1 is configured for fixed based antenna operation, it is assumed that antenna position (latitude, longitude and heading) will only need to be entered once. Upon power up, the SAVED MOUNT POSITION screen will not appear to confirm the antenna's position.

3.2.1 Manual Mode.

MANUAL mode will function as described in the baseline manual. The only change for H1 is that AZIM and ELEV will only display pulse counts as no angular position information is available.

3.2.2 Menu Mode

The H1 MENU mode allows the user to choose from a set of functions applicable to this type of antenna system.

SATELLITE mode is a modification of the LOCATE mode described in the baseline manual. AZEL is a mode that is normally made available via the MAINTENANCE MENU in baseline RC3000s. PEAK is a simple new mode provided for H1. See 3.2.2.11 below for description of PEAK. STORE, RECALL and DELETE modes function the same as in the baseline RC3000.

1-SATELLITE	2-AZEL	3-PEAK	MENU
4-STORE	5-RECALL	6-DELETE	
			CST
<0-6>SELECT	<MODE>MANUAL		14:37:23

3.2.2.1 Deploy

3.2.2.2 Stow

No Deploy or Stow modes will be provided with H1. If certain antenna positions are desired to be saved for maintenance reasons, STORE them with fake satellite names such as DEPLOY, PARK, etc.

3.2.2.3 Satellite

Since absolute angle sensors are not available, the H1 version will not attempt to perform an automatic LOCATE function. A modified version of LOCATE is provided as SATELLITE mode.

POS:	38°56N	94°44W	0.0	SATELLITE
SAT:GE-2		85.0W		AZ:164.7
1-MANUAL	2-PRESET	3-SATLIST		EL: 43.8
<1-3>SELECT	SAT	SOURCE	H: 78.2	V: -11.8

The main function of SATELLITE mode is to provide a mechanism for the user to select the name of a satellite for subsequent STOREing. The user may select a satellite's name (plus longitude, inclination and RF band information) by three ways (manual, preset or satlist) as described in 3.2.2.3 of the baseline manual.

In section 2.5, the user was requested to enter the antenna's latitude and longitude and to enter a true heading of 0.0. Having described the antenna's position the SATELLITE mode will calculate a pointing angle to the selected satellite. The AZ field will show the true heading to the satellite. Theoretical values for horizontal and vertical polarization will also be displayed.

After selecting a satellite name, go to MANUAL mode to locate and peak up on the satellite.

3.2.2.4 Store

After manually locating the selected satellite, STORE its azimuth, elevation and polarization positions via the STORE mode as described in the baseline manual.

3.2.2.5 Recall

3.2.2.6 Delete

RECALL and DELETE will perform as described in the baseline manual.

3.2.2.7 Position

As noted previously, antenna position should only have to be entered once for fixed-based operation. POSITION mode will function as described in the baseline manual but it's selection has been moved to the MAINTENANCE MENU.

3.2.2.8 Settings Mode

No SETTINGS mode is made available for H1. If an antenna (azimuth, elevation or polarization) jam or runaway error occurs go to DRIVE RESET (3.3.2.2) to reset the error.

3.2.2.9 Track

If the optional tracking software is purchased, TRACK mode will work as described in the baseline manual.

3.2.2.10 Remote

If the optional remote control software is purchased, REMOTE mode will work as described in the baseline manual.

3.2.2.11 Peak

Peak will perform a simple operation to move to the local peak in azimuth and elevation. The PEAK movement is similar to the STEP TRACK operation described in 3.2.2.9.1 of the baseline manual.

AZIM: 27546	SS1 : 470	PEAK
ELEV: 3487		
PERFORMING PEAK UP		

PEAK will use the Autopeak SIGNAL SOURCE and SCAN THRESHOLD values entered in the AUTOPEAK configuration screen (3.3.1.2.6) to recognize that a satellite is present and to peakup on the signal.

3.3. Programming Group

3.3.1 Configuration Mode

The configuration mode will be as described in the baseline manual. Many individual configuration items are not applicable to the H1 version. The table in paragraph 3.3.1.2 will highlight the items that may need to be changed by the user.

All applicable configuration items will function as described in the baseline manual.

3.3.1.2 Reset Defaults

The following table supplies the default configuration item values for H1.

Space has also been provided to record installation specific changes to the configuration items. Note: recording of installation specific changes to defaults may prove valuable when trying to restore system configuration.

Configuration items not applicable to the H1 version are commented as N/A. Items that the H1 user may need to customize are marked in bold.

CONFIGURATION ITEM	H1	INSTALL VALUE	COMMENTS
SYSTEM DEFINITION			
GPS_present	0		N/A
Compass_present	0		N/A
Mode	2		Set to user preference
antenna_size_cm	244		Set to antenna size
Waveguide_Switch_Present	0		N/A
AZIMUTH CALIBRATION			
Reference Voltage	2.50		N/A
Azim_offset	0.0		N/A
ccw_azim_limit	0		0 – 360 allows display of
Cw_azim_limit	360		True antenna bearing
Scale Factor	10.0		N/A
ELEVATION CALIBRATION			
Reference Voltage	1.69		N/A
Elev_offset	0.0		N/A
Up_elev_limit	90		N/A
Down_elev_limit	0		N/A
Elevation_Scale_Factor	50.00		N/A
Elevation_look_configuration	1		N/A
POLARIZATION CAL			
Reference Voltage	2.50		Set per installation directions
Scale Factor	10.0		
Polarization_Offset	0.0		
CW Polarization Limit	90.0		
CCW Polarization Limit	90.0		
Polarization_type	2		
H/V_Reference	1		
Default Horizontal Position	-45.0		
Default Vertical Position	45.0		
Pol_Automove_Enable	1		
SIGNAL PARAMETERS			
Channel 1 Polarity	1		Set according to receiver characteristics
Channel 1 Threshold	100		
Channel 1 Delay	0.1		
Channel 1 Lock Type	0		
Channel 2 Polarity	1		
Channel 2 Threshold	100		
Channel 2 Delay	0.1		
Channel 2 Lock Type	0		
AUTOPEAK			
Autopeak Enabled	0		
Signal Source	1		For use by PEAK
RF Band	1		For use by PEAK
Spiral Search AZ Limit	3		
Spiral Search EL Limit	3		
Spiral Signal Threshold	200		
Scan Range Limit	8		
Scan Signal Threshold	200		For use by PEAK

CONFIGURATION ITEM	H1	INSTALL VALUE	COMMENTS
AZIMUTH POT DRIVE			
Fast/Slow Threshold	0.3		N/A
Maximum Position Error	0.1		N/A
Coast Threshold	0.1		N/A
Maximum Retry Count	3		N/A
AZIMUTH PULSE DRIVE			
Pulse Scale Factor	2406		Characterize per mount
CW Pulse Limit	64000		Will determine AZ CW limit
CCW Pulse Limit	100		Will determine AZ CCW limit
Fast/Slow Threshold	50		Characterize per mount
Maximum Position Error	0		
Coast Threshold	3		
Maximum Retry Count	3		
AZIM DRIVE MONITORING			
Jam Slop	1		Characterize per mount
Runaway Slop	200		
Fast Deadband	1000		
Slow Deadband	500		
ELEV POT DRIVE			
Fast/Slow Threshold	0.8		N/A
Maximum Position Error	0.2		N/A
Coast Threshold	0.4		N/A
Maximum Retry Count	3		N/A
ELEV PULSE DRIVE			
Pulse Scale Factor	10431		Characterize per mount
UP Pulse Limit	39000		Will determine EL UP limit
Down Pulse Limit	21000		Will determine EL DOWN limit
Fast/Slow Threshold	100		Characterize per mount
Maximum Position Error	0		
Coast Threshold	3		
Maximum Retry Count	3		
ELEV DRIVE MONITORING			
Jam Slop	1		Characterize per mount
Runaway Slop	200		
Fast Deadband	1000		
Slow Deadband	500		
POL POT DRIVE			
Fast/Slow Threshold	2.0		Characterize per mount
Maximum Position Error	0.5		
Coast Threshold	0.3		
Maximum Retry Count	3		
POL DRIVE MONITORING			
Jam Slop	1		Characterize per mount
Runaway Slop	200		
Fast Deadband	1000		
Slow Deadband	500		

CONFIGURATION ITEM	H1	INSTALL VALUE	COMMENTS
TRACK			
Search Enable	0		Program as required
Max Track Error	3		
Search Width	4		
Peakup Holdoff Time	120		
Track Signal Source	2		
Signal Sample Time	2		
REMOTE CONTROL			
Remote Enabled	1		Program as required
Bus Address	50		
Baud Rate	6		
STOW / DEPLOY			
AZ STOW	0.0		N/A
EL STOW	95.0		N/A
PL STOW	0.0		N/A
AZ DEPLOY	0.0		N/A
EL DEPLOY	60.0		N/A
PL DEPLOY	0.0		N/A
PL ENABLED	0		N/A

3.3.2 Maintenance

The MAINTENANCE menu is as described in the baseline manual with the exception that the POSITION mode has replaced the SHAKE mode. Three modes associated with GPS and Fluxgate are not applicable to H1.

3.3.2.1 Analog to Digital Voltage

Azimuth and Elevation voltages are not applicable to H1.

Polarization and signal strength voltage per baseline manual.

3.3.2.2 Drive Reset

As described in baseline manual.

3.3.2.3 Time Maintenance

As described in baseline manual. Time synchronization from GPS receiver will not be available.

3.3.2.4 Signal Strength Offset Calculator

As described in baseline manual.

3.3.2.5 Limits Maintenance

As described in baseline manual.

WARNING: since only software limits are available for H1, care must be taken when the limits are made inactive.

3.3.2.6 GPS Serial Diagnostics

3.3.2.7 Fluxgate Serial Diagnostics

3.3.2.9 Fluxgate Calibration Procedure

Not Applicable to H1.

3.3.2.8 AZEL

As described in baseline manual. AZEL is also made available via MENU mode.

3.3.2.10 Shake

Selection 0 is now POSITION rather than SHAKE.