

Appendix ASC

Integrated ASC Beacon Receiver Option

Revision: 5 December 2012, software version 1.60

This appendix describes the additional functions provided by the RC3000's integrated Atlantic Satellite Corporation (ASC) Beacon receiver option.

1.1 Appendix Organization

This appendix is provided as a supplement to the baseline RC3000 manual. The corresponding paragraphs in the baseline RC3000 manual are referred to when data specific to the Integrated ASC Beacon Receiver option is described.

1.2 Features

This option provides the ability to manually and automatically tune an integrated beacon receiver for use during LOCATE and TRACK modes.

Software Configuration

RC3000 software configuration is presented in the form RC3K-ab-wxyz where ab-wxyz represents: (Mount manufacturer/Model #)-(Nav Sensor Option)(Tracking Option)(Remote Option)(Receiver Option)

This feature is categorized as one of the RECEIVER options of the RC3000.

OPTION CATEGORY	DESIGNATOR	DESCRIPTION
Integrated Receiver	N	No integrated receiver supported
	B	Integrated Novella Beacon Receiver
	D	Integrated DVB-S Receiver
	C	Integrated DVB-S and Novella Receivers
	X	Integrated DVB-S2 Receiver
	Y	Integrated DVB-S2 and Novella Receivers
	E	Integrated ASC Beacon Receiver
	F	Integrated DVB-S2 and ASC Receivers
G	Integrated DVB-S and ASC Receivers	

Software supporting the integrated beacon receiver would therefore be designated as RC3K-ab-wxy**E**, RC3K-ab-wxy**F** or RC3K-ab-wxy**G**.

Hardware Configuration

The beacon receiver hardware may be purchased in two configurations:

- 1) Internal - designator "E"
- 2) External - designators "F" or "G"

When both a DVB receiver and the ASC receiver are purchased the ASC must be placed external (housed unit) to the ACU due to internal ACU space limitations.

1.3.10 Integrated Beacon Receiver Overview

For many tracking applications, it is desirable to monitor the satellite's beacon as an indication of received signal strength. Due to the relatively low power and narrow bandwidth of satellite beacons, specialized receiving equipment is required. This option allows the RC3000 ACU to internally house and control an L-band beacon tracking receiver manufactured by Atlantic Satellite Corporation (ASC).

The beacon receiver is designed to lock to and measure the level of conventional continuous wave beacons.

When housed internally, the L-band beacon signal is input to the beacon receiver from the backpanel of the RC3000. Via user programming, beacon frequency may be selected to a resolution of 10 kHz.

The beacon receiver tracks the beacon signal's frequency drifts and measures its power level. The receiver generates a DC voltage output which represents, in logarithmic scale, the beacon power at the receiver's input. The output voltage to input power log-conformity is better than 0.1 dB over a 40 dB measuring range. The RC3000 monitors this DC voltage during tracking operations in order to keep the antenna peaked on the satellite.

1.4 Beacon Receiver Specifications

	BEACON RECEIVER
Input Range	950 to 2,050 MHz
Input Impedance	50 ohm
Input Level	-35 dBm to -90 dBm
Signal Strength Output Range	0 - 10 VDC
Signal Strength Output Scale	Logarithmic
Signal Strength Output Slope	10 VDC for 20 dB input level change
Post-detection Time Constant	100 ms
Threshold	< 45 dBHz
System Level Range	55 dB
Frequency Tuning	10 kHz
Attenuation Control	0 - 60 dB
Demodulation	Continuous Wave only
Operating Temperature	0 - 50 deg. C.
Storage Temperature	-40 - 70 deg. C.

2.0 INSTALLATION

In order for this option to work properly, all other normal ACU calibration steps described in the baseline manual must be performed correctly.

2.1.5 Beacon Receiver mounting

When only the beacon receiver is present, the 8 inch x 5 inch beacon receiver card will be factory mounted internally above the RC3000's analog board.

When both the integrated DVB and beacon receiver are present, the beacon receiver card will be housed in a small enclosure and mounted externally to the RC3000.

2.2.5 Signal Strength

The RC3000 monitors the input power level signal and lock status from the beacon receiver via the AGC2 circuitry.

When mounted internally, these connections are made inside the RC3000. The AGC2 and LOCK2 inputs via the J2 backpanel connector will therefore be inactive.

NOTE: any other receiving equipment must therefore be connected via the J2 AGC1 inputs.

2.2.8 RF connection

When mounted internally, the J11 L-Band RF input will be split internally to the beacon receiver and the RC3000's L-Band power detector.

3.0 DETAILED OPERATION

3.2.2.3.7 Unique LOCATE mode steps using the Integrated Beacon Receiver

When the beacon receiver option is present, additional steps will be added to the normal LOCATE sequence. Initiate the LOCATE mode as usual and select the satellite that you want to locate. As always lat/lon from the GPS and a heading "estimate" from the compass will be obtained and the estimated pointing angles to the selected satellite will be displayed. Press <ENTER> to proceed and then select the desired polarization as usual.

If the selected satellite is from the user preset list and a beacon frequency has been programmed for the selected polarization, the beacon receiver will be automatically tuned before any LOCATE movements begin. The input power level and lock status from the beacon receiver will then be available as the SS2 inputs. Normal locate and autopeak operations will then proceed using the SS2 inputs as their source.

CAUTION: Many satellites utilize the same frequencies for beacons. If the beacon frequency for the satellite of interest is not unique, the Autopeak scan function could lock onto the wrong satellite.

TRACK MODE

The inclusion of the integrated beacon receiver is basically transparent to the functionality of TRACK mode. TRACKing as described in appendix TRK will proceed as if an external receiver is providing signal strength to the SS2 input.

Prior to entering Track mode, the beacon should either be manually tuned via the beacon receiver maintenance screen or automatically tuned as part of prior LOCATE.

Within the TRACK FACTORS configuration screen, the signal source should be programmed to SS2.

When the beacon receiver loses lock, its AGC output also drops to a minimum value. Therefore, loss of lock will manifest itself as a "loss of signal" situation.

3.3.1.1.3 Preset Satellites

In addition to the normal preset satellite data (see baseline manual), this option allows programming of two beacon frequencies (H and V) per satellite. The formatting of the preset satellite list screen has been modified slightly to accommodate the unique beacon receiver data items.

```
SAT#: 1   NAME:TELSTAR 12   CONFIG-SATS
LON:121.0W PO:-26.0       H:12198.90
INCL: 3 BAND:1 EPH:0     V:11701.03
<SCR> THRU LIST, <ENTER> TO MODIFY DATA
```

H: HORIZONTAL BEACON <xxxxx.yy>MHz
V: VERTICAL BEACON <xxxxx.yy>MHz

The H: and V: fields allow the user to program the beacon frequency for both polarizations.

NOTE: program the actual beacon frequency (RF), not the IF frequency beyond the LNB. The RC3000 will automatically adjust according to the local oscillator frequency (LO) of the LNB.

If you do not want the RC3000 to automatically tune and use a beacon for a particular satellite, program 0.00 into H and V for that satellite.

If the system has a circularly polarized feed, describe the one beacon frequency in the H: field.

The following table shows an example list of North American Ku-band satellites and their published beacon frequencies.

SAT NAME	LON	Horizontal Frequency	Vertical Frequency
Nahuel 1	71.8 W	11700.00	11701.00
AMC-6	72.0 W	11702.00	12198.00
AMC-5	79.0 W	11701.00 11702.00	
AMC-9	83.0 W	11702.00	12198.00
IA-6	93.0 W	11702.00	12198.00
IA-5	97.0 W	11702.00	12198.00
AMC-4	101.0 W	11702.00	12198.00
AMC-1	103.0 W	12198.00	
AMC-15	105.0 W	11702.00	12198.00

3.3.2.11 Beacon Receiver Maintenance

When the integrated beacon receiver option is present, the MAINTENANCE menu allows the user to select Beacon Receiver maintenance by pressing the ENTER key (symbolized by <>).

1-VOLTS	2-DRIVE	3-TIME	4-SIG MAINT
5-LIMITS	6-GPS COM	7-FG COM	8-MOVETO
9-FG CAL	0-SHAKE		.-CI RECORD
		<>-BCN	Z1-GTRE1.59

This mode allows the user to manually tune and test the Beacon Receiver's ability to lock onto a satellite's beacon. When the mode is entered the current IF frequency that the receiver is tuned to is displayed. Also displayed is the current attenuation (AN:) setting from the receiver.

-208.3	CCW	SS:623	BCN
43.7		LK:LOCK	.-AN:32
-14.5		SP:SLOW	9-IF: 1448.90
TUNE	BEACON	RECEIVER	7-LO:10750.00

Manual Antenna Control

Azimuth, elevation and polarization angles and limit status are shown in the two left columns of the display. The antenna may be jogged as it is in the MANUAL mode. The azimuth may be manually jogged via the 4 and 6 keys, elevation via the 2 and 8 keys, and polarization via the 1 and 3 keys. Speed (SP:) may be toggled via the 0 key.

Other keys will be used to tune the beacon receiver.

7- LO: LO FREQ<0-30000>MHz

The LO frequency of the LNB must be programmed here in order for the actual frequency of beacons to be described in the satellite preset list. NOTE: in most cases the LO frequency will default to the correct value (ex. 10750.00 for a Ku LNB) and not need to be changed.

9- IF: I FREQ<950.0 - 2150.0>MHz

The intermediate frequency to program the beacon receiver to may be entered via this field.

After entering the IF frequency, a tuning command will be sent to the beacon receiver. The success of the programming is then confirmed by a status check of the receiver. During the time of tuning and status checking the IF field will show "TUNING". If the status check shows that the receiver is now tuned to the entered IF frequency then the IF value will be displayed in the field. If the status check does not confirm the programming then the field will be filled with "*****.***".

NOTE: as described above (5-RF:), the IF field may also be derived by entering a RF value. After entering the RF value, the IF field will display "TUNING" just as if the IF value had been entered directly.

.-AN: ATTENUATION <0-60>dB

This field allows the user to change the input attenuation of the beacon receiver. Press the STOP (.) key to enter this field.

LK:----, LOCK

This field indicates the current lock status from the beacon receiver. "----" indicates that the beacon receiver currently has not established a lock on the tuned frequency. "LOCK" indicates that a lock has been established.

RF: / SS:

The signal level seen by the L-band (RF) power detector or the beacon receiver's AGC (SS) is shown in this field. The Scroll Down key will scroll between "RF" and "SS".

Upon entering this screen the beacon receiver's AGC (SS) value will be displayed. The SS value will probably be of most use for determining the functionality of the beacon receiver.

The RF value is an indication of total L-band power. This may be useful for finding a satellite while jogging the antenna from this screen.

Attenuation Optimization - "WAIT - TUNING AN VALUE"

An automatic attenuation optimization function will be triggered by pushing the SCROLL UP key. This function will automatically adjust attenuation up to five times in the attempt to achieve a signal strength value around 650. During these iterations the AN: value will change.

This function is normally performed during LOCATE and TRACK operations. It is intended as a debugging function only (consult RCI). NOTE: triggering this function will leave the beacon receiver's attenuation changed.

4.0 TROUBLESHOOTING

If the functionality of the beacon receiver is in question, first go to the maintenance screen and confirm communication with the receiver. If the receiver cannot be tuned, check the cabling between the beacon receiver and the rest of the RC3000.

If a LOCATE to a satellite does not work, manually position onto the satellite and confirm (via the maintenance screen) that a lock can be obtained at that frequency.

The inability to obtain lock may be due to low signal level reaching the beacon receiver. From the maintenance screen, set the attenuation to 0 to make the receiver as sensitive as possible.

5.0 DRAWINGS & SCHEMATICS

