InternetVSAT.com

StarPro1 Installation Manual

28 – May – 04

Installing and commissioning an RCST

This document is intended for providing instructions on installing, operating, and field servicing of the StarPro1 ™ terminal system.

A typical StarPro1 ™ remote terminal system consists of the following components

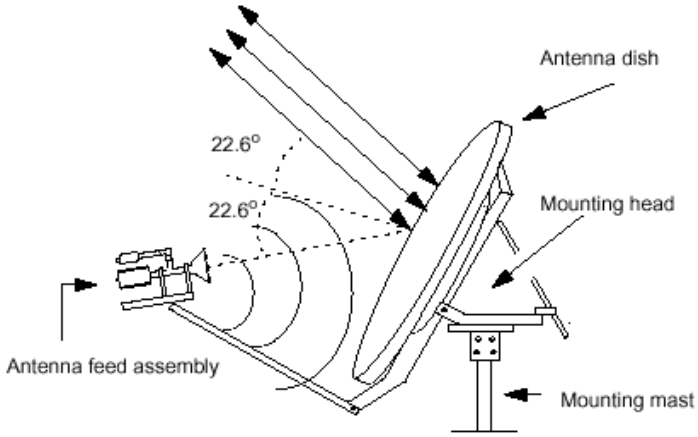
Component	Part No.	Qty[1]
1. Antenna Location dependant must be approved by InternetVSAT		1
2. Non-penetrating Mount TBC 1.2 m Channel Master	611652302	1
3. RCST	StarPro1 ™ terminal	1
4. BUC 2 W	JRC NJT5024F or 5016	1
5. LNB: W 3 & W1 DRO 10.95 – 11.7 Ghz L.O. 10 Ghz	NJR C21545A NJR 2184 Norsat 4708 C	1
6. IFL Cables:RG11 75 Ohm low loss	TBD	2
7. IFL Cable Installation Kit: RG11 75 Ohm low loss	TBD	2
8. Adapter(s) RG8 cable run F male to N female		1
9. Tape, self-fusing 6” (not supplied)	TBD	1[2]
10. Grounding wire 8 AWG		1[2]
11. Installation Kit, Indoor Unit, for rack mount (optional)		1[3]
12. DC power supply (optional)		1[3]

[1] Quantity is per line item.

[2] Installer supplied

[3] Optional requirements.

Below illustrates a StarPro1 ™ remote system



Ku-band Antenna and Antenna Feed Assembly

Important note at any timework is carried out on the TX or RX unit the power to the indoor unit must be turned OFF

Antenna and Feed Assembly

Incoming signals from the satellite are intercepted by the antenna reflector ("dish") and focused into the feed assembly. The feed assembly collects receive signals and passes them to the LNB.

The antenna geometry is termed an Offset Feed Parabola, with the beam (satellite direction) typically oriented 22.6^{o} above a line perpendicular to the antenna face, as shown above. The antenna mount allows the antenna to be pointed toward the satellite by pivoting around the mounting mast (azimuth) and by tilting about the mounting head (elevation). The entire Antenna Assembly can be rotated about the feed axis to set polarization.

Note that it is not a rule that an antenna offset is 22.6^{o}. Refer to the documentation that accompanies the antenna for the actual offset specification.

LNB

The LNB provides the low noise amplification and down conversion from Ku-band or C-band to L-Band. The down converted signals are then routed to the RCST via coaxial cable. Based on the satellite downlink frequency bands, the LNB is available to receive the frequencies as specified below.

Atlantic Bird	12649 Ku
	1349 L-Band
W 3 & AB1	11554.41 Ku
	1155.4 L-Band

BUC

The BUC (Block up converter) accepts transmit signals from the RCST and provides up conversion to the satellite uplink frequency and transmits them to the satellite.

For the StarPro1 ™ ODU, the BUC includes a Solid State Power Amplifier available as Ku-Band transceivers for .5-, 1-, 2-, or 4-Watt operation and as C-Band transceivers for 2- and 5-Watt operation. The RCST provides a 24VDC source to power these units. For the 4-Watt Ku-band and 5-Watt C-band units, the RCST is equipped with an external power supply adapter to satisfy the additional power requirement.

IFL Length	Cable	Connector	External Power Supply
0 - 30m	RG-6 type	F Type	No
30-50m	RG-11 type	F Type	No

Table 1: Cabling Specifications for 2W C-band or 1W/2W KU-band BUC

IFL Length	Cable	Connector	External Power Supply
100m	RG-11 type	F-type	Yes

Table 1: Cabling Specifications for 5W C-band or 4W KU-band BUC

Return Channel Satellite Terminal (RCST)

The StarPro1 RCST combines a DVB receiver, a burst MF-TDMA modulator, and a terrestrial traffic interface on a single integrated circuit board.

The RCST terrestrial interface is a standard 10/100BaseT. The TCP Acceleration processing engine is built into the RCST software. The maximum aggregate TCP data transmission rate for each RCST is 10Mbps.

The RCST comes with L-Band IF interfaces and can be rack-mounted. Depending upon the satellite link requirements, the StarPro1 RCST is deployable in VSATs ranging from sub-meter 0.96m/1-Watt Ku-band units to 2.4m/. 5-Watt C-

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Recommended Tools and Test Equipment

Below lists all recommended tools and test equipment for completing a StarPro1 ™ terminal system installation.

Description
□ Electronic Installer's Tool Kit Multi meter
□ Cable Termination Tool Kit Crimp tool for RG11 connectors Cable stripper
□ Magnetic Compass
□ Inclinometer
□ Socket Set, 3/8" drive, to 3/4", with 3" extension
□ Set, Allen Keys
□ Test Equipment: Satellite meter maximizing BER & 10Mhz span Adapters Type F female to N male GPS for LAT/LONG
□ Laptop PC for use in terminal configuration or troubleshooting, running telnet sessions. Minimum PC requirements: 10/100 Ethernet Card Win98 or higher Pentium processor
□ Standard LAN crossover cable
Standard straight LAN cable

A rack mounted RCST must occupy 3U space where the top 2U space is left empty as to ensure adequate cooling. Less space can cause overheating and failure of the terminal.

Similarly, a tabletop mounted RCST requires the placement to be cool and well ventilated. No other items may be resting on top of the unit to ensure adequate cooling.

IFL installation.

Cautions: 1. Ensure installation meets all applicable cable codes, including National Electrical Code (NEC) and local requirements. 2. Do not pull IFL cables using center conductor of the coax. Cable insulation is foam; pulling by center conductor will damage electrical performance. Use full grip only.

(1) Pull the IFL cables, using good installation practices. Leave 3 meters (10 feet) of cable beyond the antenna post for adequate service loops. At the indoor end, allow adequate service loop for easy access and service of the RCST.

(2) At the outdoor end, dress the IFL cables to the antenna mounting post using one of the tie wraps (included in the installation kit) positioned 30 cm (12 inches) from the bottom of the post.

(3) Terminate cable ends with connectors to mating connectors on antenna feed assembly and RCST. Dress cable to the support arm, using tie wraps.

(4) Use standard self-fusing tape on all outdoor connections as to ensure a watertight system. Approximately 3" of tape is required per connection.

Antenna Pointing

Record the following site parameters as determined with GPS:

Parameter	Value
Latitude	
Longitude	
Satellite Longitude	
Elevation	
Azimuth	
Polarization	

Perform standard antenna pointing procedure based on the above look angles.

www.Lyngsat.com has a complete frequency plan, which can help in identifying satellites

Pointing hints

Please use a universal LNB to make satellites easier to identify before fixing the correct LNB to the OMT for polarization

Star Pro IDU Installation

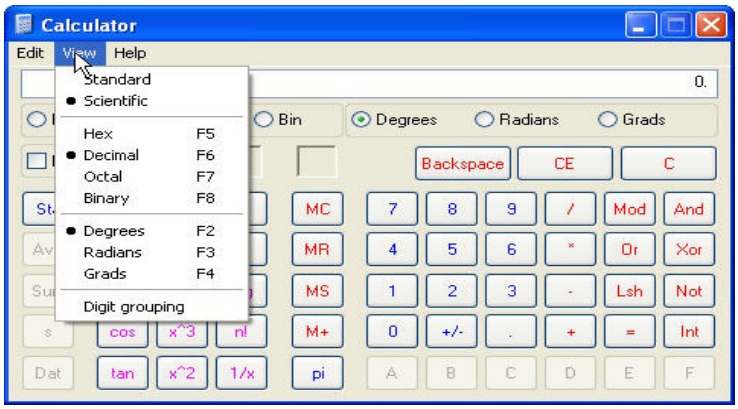
Before a terminal can be operational InternetVSAT must be informed of certain parameters and your GPS position then INTERNETVSAT can enable your terminal. You must email INTERNETVSAT with the correct activation form 2 working days before installation of terminal to enable INTERNETVSAT to program your system and respond with your Network IP address. Please note that PAS1R activations make take slightly longer.

Computer specification and telnet window operation

300MHz & above should be good for video etc.
Network card essential

1) IP Address Calculation

To calculate the IP address from the Ethernet address use the Microsoft default calculator. Select view/scientific.



Convert the last two octets of the MAC address (labelled Eth Addr) on the reverse of the unit and convert from HEX to DEC. For example 9C.D0 converts to 10.0.156.208. 10.0 will always complete the first 2 parts of the default IP address.

2) PC Configuration

Windows NT

From desktop right click on“Network Neighborhood”
Left click on Properties
Left click on Protocol flag
Highlight TCP/IP protocol
Left click on Properties
Left click on Specify an IP address for pc
Then enter the IP address you converted in step 1) as your gateway, and the pc ip address will be one up from that address. So for the 9C.D0, we have:-

IP – 10.0.156.209
Subnet Mask -255.255.255.0
Gateway – 10.0.156.208

Left click on Advanced to check gateway is installed and exit plus reboot

Windows 95/98

From desktop right click on Network Neighborhood
Left click on Properties

Scroll down to TCP/IP for network card installed in computer and highlight
Left click on Properties
Left click on Specify IP Address
Then enter the IP address you converted in step 1) as your gateway, and the pc ip address will be one up from that address. So for 9C.D0, we have:-

IP – 10.0.156.209
Subnet Mask -255.255.255.0
Gateway – 10.0.156.208

Left click on OK for reboot
No use of proxy within Internet Explorer or Netscape.

3) StarPro1 Network Test

Connect PC to the Star Pro with cross over Ethernet cable, or with straight cable through hub, router, etc.
Test connection by going to Command line and typing
Ping 10.0.xx.xx (Where xx is your converted IP from step 1)
If you are connected you should have a roundtrip time of around 10ms to StarPro1 & back.

Troubleshooting:-
If you are unable to ping your box, then check that the default IP address you converted is correct, and that you have configured your network card correctly.

4) Star Pro Configuration

Telnet to terminal via LAN cable

To telnet go to Start
Go to Run
Type cmd or command
Type telnet 10.0.xx.xx (Where xx is your converted IP from step 1)
Press enter, and you will be prompted for a password. This is blank, so only press enter.
A telnet window should come up with a title Telnet 10.0.xx.xx (Where xx is your converted IP from step 1)
Enter following parameters

For the W1 Network

savebootparms -pop 0x01310060 -pcr 0x365 -c 0x1ffc -s 27500000 -f 1606630 -o 1 -t -28

FOR the W3 Network
savebootparms –pop 0x11e0001 –c 0x530 –pcr 0x365 –f 1554410 –s 27500000 –o 1 –t -20

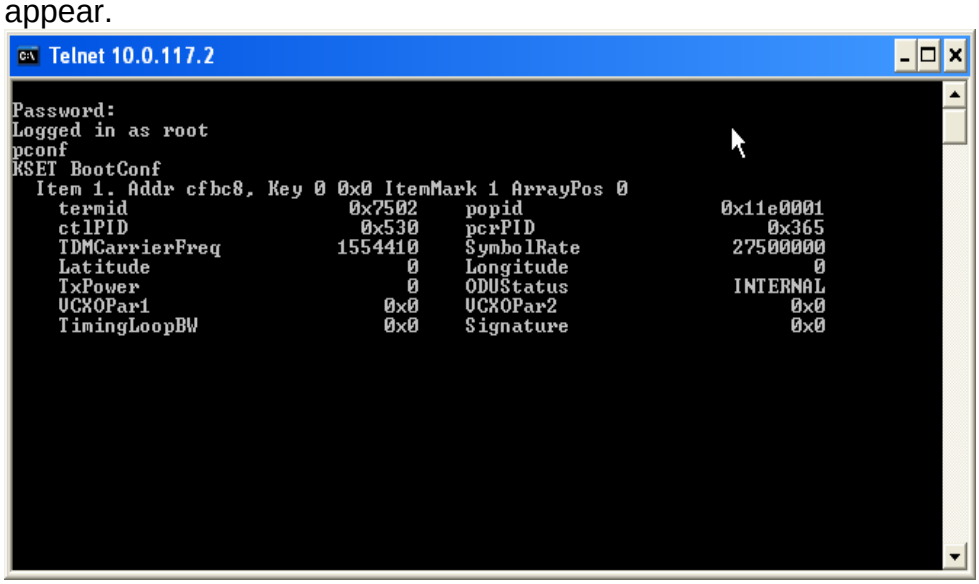
For The PAS1R Network
savebootparms -pop 0x011e0001 -c 0x1029 -pcr 0x365 -f 1510000 -s 26693600 -o 1 -t -26

Parameter	Value	Description
-t		Transmit Power Level (Power)
-f		Outbound TDM Carrier to tune to (Freq)
-pop		Population ID (POP)
-s		Symbol rate of TDM Carrier (SymRate)
-o		ODU status (0-none, 1-internal, 2-external power)

One you have typed these in, press enter. Then follow this with an hw command to reset the terminal.

5) Parameter Confirmation

To confirm the parameters, re-telnet into the box and type pconf. A display as follows should appear.



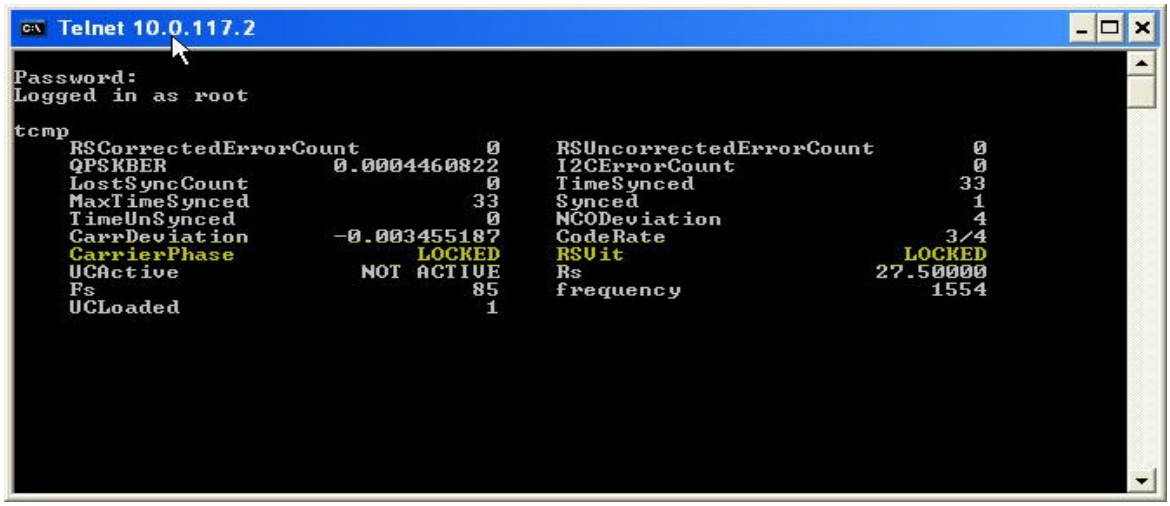
N.B. You do not have to enter Lat & Long coordinates but the NMS must know them to within 2Km to ensure network efficiency and in decimal after degree not minutes and seconds.

Troubleshooting:

If any of the parameters in the pconf command do not match up to what you have entered into the box, then re-enter the boot parameters.

6) Alignment Confirmation

To check the receiver has locked to the correct carrier type in tcmp and confirm the following. Also ensure that you have a minimum of 0.0001 QPSKBER reading. If not, please adjust your dish until you reach at least this figure. Note that the more zeros after the decimal point, the better your rx and tx signals will be.



Troubleshooting:

If the CarrierPhase is reading (!) LOCKED and the RSVIT is (!) LOCKED, then check your dish pointing, and also your boot parameter configuration using the pconf command mentioned above. Ensure also you have the correct polarity set, which is Horizontal RX.
If you are sure that the dish is pointed correctly, then check your cables are securely connected at both ends, and no water etc has got into the cables.

7. CW Test

This procedure is for enabling the RCST to transmit a CW carrier from the remote site.

Before starting this test, the PWR and ODU lights should be on, and the SAT light should be flashing. If not, then consult the troubleshooting steps above.

1. The CW carrier is measured in the InternetVSAT / Hub office.
For this measurement, the RCST must transmit a CW signal over the satellite. The Transmit frequency is specified on the CW commands.

DO NOT TRANSMIT A CW CARRIER UNLESS TRANSMIT AUTHORIZATION IS GIVEN BY INTERNETVSAT / HUB!

2. Before transmitting the CW signal, the RCST must establish receive Synchronization. After receive synchronization is established:

On The W1 Network please enter the following commands and ensure correct reply from box do not enter final command until authorized to do so by InternetVSAT.

Password:
Logged in as root
[type] do 31 [enter]

[reply from box] dbadd sssparms regionid 0xa0 sar2segsize 52
OK
setdbready sssparms
OK
dbadd rfportinfo PortId 1 AdminStatus 1 txrfcenterfreq 14250000 TxIFCenterFreq
1300000000 TxBandwidth 575000000
The following fields must be specified - PopId
Usage: dbadd dbname {fieldname value} ...
setdbready rfportinfo
OK
dbadd tdmacarrier carrierid 100 TxRFFreq 14010500 CarrierControl 5
OK
setdbready tdmacarrier
OK

[type] m -path on -output on -patt i0q0 -proc on -freq 1251 -sym 1.25 -power -28
[enter]

[reply from box] CACSetModConf
Address of txcb->SavedConfiguration = 0xDFD00
output ON pathmode ON dcpower ON procmode ON modulation QPSK pattern I0Q0 symbol
rate 1.25 analatt 28 idig 7.750000 qdig 7.750000 frequency 1247000 qdigitaloffs
et 0 band 2 kp 1 phsjump OFF

[type]cacsetcw -freq 1251 -power -28 -time 120 [enter]
[reply from box] CACSetModConf
Address of txcb->SavedConfiguration = 0xDFD00
CW at freq 1247 (MHz) power -13.99999 (dBm) during 120 (s)

For the W3 network please enter the following. Do not enter until given authorisation to do so by InternetVSAT:-
cacsetcw -power 0 -freq 989.6 -time 1000

For the PAS1R peak and pole test, please enter the following. Do not enter until given authorization to do so by the PanAmSat hub:-
cacsetcw -power -26 -freq 974.2 -time 12000

4. The transmission of the CW carrier will terminate after the Time has expired. To immediately stop transmission of the CW signal, enter **hw**. This will reboot the RCST.
5. The RCST will restart acquisition and synchronization after entering the hardware reset command, **hw**.
6. You may be required to re-send these commands again at a higher or lower power level if the CW test is not at an acceptable level. InternetVSAT will instruct you to do this if required.
7. Once an adequate power level has been achieved, you will be asked to enter save –t –xx (where -xx is the power level to be set on your box), then enter the hw command to reset the box.

Troubleshooting:
If InternetVSAT / Hub are unable to see the carrier, please check that the CW commands you have entered are correct for the network you are on, and if not enter the hw command and re-enter the commands. Also verify that all of the installation and configuration steps above have been checked and completed.

The SAT light in the terminal should start blinking after approximately 20 seconds. Leave the terminal running in this state for 5 minutes.

After reboot all the lights in the front of the terminal will become solid for a second and the satellite light will start blinking afterwards.

After a short while, the sat light on the terminal should lock solid, and you will acquire the network IP address and subnet mask which you will have received from InternetVSAT prior to installation.

> Note:
> The default address is only effective until the RCST becomes Transmit Acquired. Once the RCST is TX Synced, it receives its Network IP Address from the NMS and the default address is no longer valid. To re-establish the default address, remove the TX/Rx cables from the back of the terminal, and it will automatically reset to default.

Quick reference guide

Satellite	W3 Transponder D5
Frequency	L Band frequency (After LNB) W3 – 1155.4
Rx Polarization	W3 & W1- Horizontal
TX Polarization	W3 & W1 - Vertical
LO of LNB	W3 & W1- 10
Symbol Rate	27500000
C over N	Minimum 10dB
BER	min 10-4

Cables connectors

All coax to be RG11 75 Ohm low loss

Connectors F Type

Adapter F to N male for BUC

IP Configuration

Appendix B Unit Details and Alarms

RCST Specifications

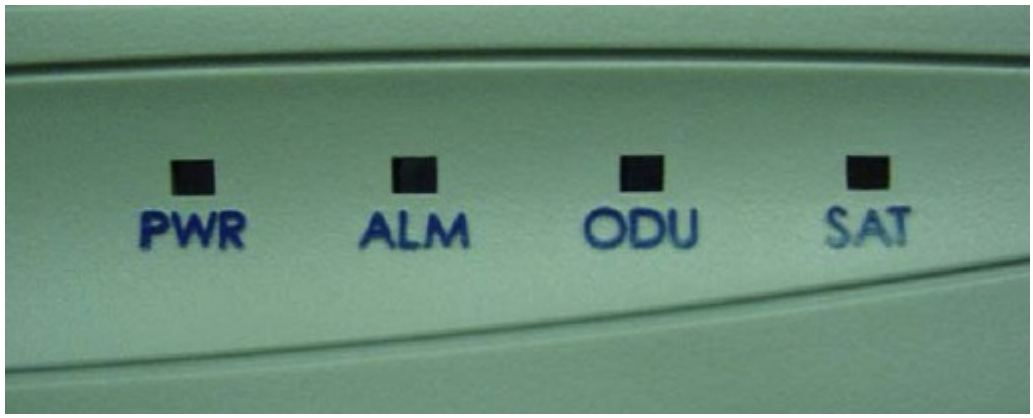
RCST Specifications Table

Dimensions	1U High, 13.08” Width, 7.53” Depth
Power	110/220 VAC Auto-sensing, Auto-ranging
Temperature	0° to 40°C Operating; -20° to 70°C Storage
Humidity	95% relative humidity non-condensing at 0° to 40° operating; 90% relative humidity non-condensing at 65°C
Susceptibility	EN50082-1; 1997
EMI	FCC Part 15, EN50022, CE
Safety	UL/cUL 1950; EN60950; TUV; VDE

Power Consumptio	125 VA

RCST Rear Panel Functions

Function	Rear Panel Label	Specification
Power supply	100-240V~ 60Hz/50Hz . 56A/.28A	• 50/60 Hz • Auto-range—100 VAC to 240 VAC, IEC 320
ODU IF connections	TX OUT Rx IN	• TX—950-1750 MHz (L band), 75 Ohm, Type F female • Rx—950-1750 MHz (L band), 75 Ohm, Type F female
LAN Interface	10/100BaseT	• 8-Pin RJ-45 Jack—IEEE 802.3 compatible. 10/100 BaseT physical interface
Auxiliary ODU Power (future)	AUX. ODU PWR	• +24 VDC, 4A Max., Barrel Pin Jack (Switchcraft 712RA)



RCST Front Display

PWR – ON indicates the AC power switch is turned on. The AC power switch is located on the back of the RCST. The AC voltage should be 100 to 240 VAC, 60/50 Hz, 2.0/1.0 Amps.

ALM – ON indicates the RAM used by the firmware to implement the two extra PIDs has failed a critical test for software version 1.0.8. The unit must be returned to the factory for repair before it will operate with 1.0.8.

ODU – ON indicates the RCST is supplying voltage to ODU, and is locked to the satellite.
.
SAT – OFF indicates no receive synchronization.
BLINKING indicates receive synchronization.
ON indicates receive and transmit synchronization.

StarPro1 Modulator and Demodulator Table

	Modulator Output	Demodulator Input
GCU	N/A	–35 to –75 dBm
RCST	–18 to –30 dBm in .125 dBm steps	–30 to –70 dBm