

Gen5 Panther Manpack

GCS-3105EKP-01T/W (Ku-Band)

GCS-3105EXP-01T/W (X-Band)

GCS-3105EAP-01T/W (Ka-Band)

User's Manual



Headquarters:

7640 Omnitel Place • Victor, NY 14564 USA

Voice: +1.585.742.9100 • Fax: +1.585.742.1914

Web site: <http://www.L-3com.com/gcs>

E-mail: GCS.Support@L-3com.com



communications

GCS

[This page is blank for double-sided printing.]



Table of contents

List of figures	ii
Revision history	iv
Copyright notice.....	iv
Trademark attribution.....	iv
Proprietary rights	iv
Export compliance	v
Warnings	v
L-3 GCS warranty services.....	vii
Technical support	viii
Overview	1
Front panel connections	2
Features	2
Site survey information	3
Panther setup procedure.....	3
Ku- and X-band RFE and feed connections	16
Ka-band RFE and feed connections.....	17
Internal and external NMEA GPS	19
Band polarization (<i>Ku-band only</i>)	24
Power connections	26
AC/DC power converter.....	27
Panther terminal deploy and display screens.....	28
The five Panther display screens	28
Panther graphical user interface (GUI).....	32
iDirect Panther GUI pages.....	34
External modem connections to Panther.....	46
Panther teardown and stow procedure	47
Panther terminal packout.....	48
Functional descriptions.....	50
Main chassis	50
RFE	52
Transmit section	52
Receive section	52
Antenna assembly	53
Ku-band articulation.....	54
AC/DC power connections	55
Battery assembly	56
Battery warnings.....	57
Appendix A: GCS-3104EXP-01T Panther system specifications	58
Appendix B: Packing list.....	59
Ku-band Panther terminal.....	59
X-band Panther terminal.....	61
Ka-band Panther terminal (0170-0000-03).....	63
Appendix C: Changing the Ka-band polarization	65
Appendix D: Panther terminal menu procedures	68



Gen5 Panther Tri-Band Manpack

User's Manual

Panther terminal main menu	68
Set transmit power.....	68
Place the Panther terminal online or offline.....	69
Select location source	70
Load an option file from the Panther terminal main menu	71
Loading an option file from the Panther Web GUI.....	72
Load a new option file.....	73
Add a new option file from a PC	73
Add from Modem	73
Remove an option file	73
View/Save an option file	73
Load an option file	73
Appendix E: Acronyms and definitions.....	74

List of figures

Figure 1 Deployed Gen5 Panther manpack (rear view)	1
Figure 2 Panther front panel connector detail	2
Figure 3 Panther side panel connector detail	2
Figure 4 Satellite guide.....	3
Figure 5 Compass/inclinometer.....	4
Figure 6 Antenna petals and stow pin	4
Figure 7 Petal stow pin removal	5
Figure 8 Modem chassis positioned on level surface	5
Figure 9 Panther outriggers.....	6
Figure 10 Panther outrigger installation.....	6
Figure 11 Panther outrigger secured.....	6
Figure 12 Panther bubble level showing a level surface	7
Figure 13 Panther leveling knob adjustment	7
Figure 14 RFE identification	7
Figure 15 RFE attachment to Panther terminal	8
Figure 16 RFE attached to modem chassis	8
Figure 17 RFE mounted and latched to modem chassis	9
Figure 18 Articulation assembly installation 1.....	9
Figure 19 Articulation assembly installation 2.....	10
Figure 20 Articulation assembly installation 3.....	10
Figure 21 Articulation arm rotation to 90° setting	10
Figure 22 Feed clamp assembly	11
Figure 23 Feed clamp assembly design	11
Figure 24 Feed clamp seated on articulation assembly	11
Figure 25 Ring clamp assembly secured to articulation assembly	12
Figure 26 X-, Ku-, and Ka-band feeds	12
Figure 27 Hub ring clamp in open position	12
Figure 28 Feed assembly installed in hub ring clamp.....	13
Figure 29 First parabolic antenna petal installed	13
Figure 30 Petal J-clip installation.....	14
Figure 31 Installation of last parabolic reflector petal	14
Figure 32 Panther terminal with dish vertically oriented	15
Figure 33 TX polarization configuration	15
Figure 34 Ku-/X-band: RX cable installation.....	16



Gen5 Panther Tri-Band Manpack

User's Manual

Figure 35 Ku-/X-band: TX cable installation	16
Figure 36 Ku-/X-band: Completed cabling between RFE and feed	17
Figure 37 Ka-band feed assembly installed	17
Figure 38 Ka-band: RX coax connection to LNA	18
Figure 39 Ka-band: RX connection to RFE	18
Figure 40 Ka-band: TX waveguide connection to transmit port	18
Figure 41 Ka-band: TX waveguide connection to RFE	19
Figure 42 Internal GPS	19
Figure 43 Panther AC/DC converter	20
Figure 44 Battery box	20
Figure 45 Battery box attached to the modem chassis	20
Figure 46 DC power cable connected to AC/DC converter	21
Figure 47 DC power cable connected to Panther	21
Figure 48 AC power cable connection	21
Figure 49 RFE Power and M&C cable connection	22
Figure 50 RFE transmit cable connection	22
Figure 51 RFE receive cable connection	23
Figure 52 Power switch	23
Figure 53 Ku-band: Polarization markings on Ku-band feed	24
Figure 54 Ku-band: Pol angle on the front panel display	25
Figure 55 Ku-band: Elevation adjustment	25
Figure 56 Ku-band: Azimuth angle on the front panel display	25
Figure 57 Panther terminal connected to AC/DC power converter	26
Figure 58 AC/DC converter and panther power connectors	27
Figure 59 Example of settings for static IP addressing	32
Figure 60 Network cable connectors	33
Figure 61 Laptop IP address in Web browser	33
Figure 62 System Web page	33
Figure 63 Panther Monitor page	34
Figure 64 Panther Monitor page	35
Figure 65 Panther GPS page	35
Figure 66 Panther Modem page	36
Figure 67 Panther RFE page	37
Figure 68 Panther Power page	38
Figure 69 Panther Point page	39
Figure 70 Panther Configuration page	41
Figure 71 Panther Troubleshoot page	43
Figure 72 Troubleshoot event log	45
Figure 73 Panther case (bottom layer)	48
Figure 74 Panther case (top layer)	48
Figure 75 Panther cable pouch contents	49
Figure 76 Ka-Band: RFE to antenna TX RF cable	49
Figure 77 Panther front panel display	51
Figure 78 Panther front panel	51
Figure 79 Panther side panel	51
Figure 80 Ku-band and X-band antenna assembly—front view	53
Figure 81 Panther antenna articulation	54
Figure 82 Panther AC and DC power connections view	55
Figure 83 DC power cable and AC power cable	55
Figure 84 BB-390 rechargeable battery	56
Figure 85 BB-390 batteries in battery box	56



Gen5 Panther Tri-Band Manpack

User's Manual

Figure 86 Battery box attached to modem chassis.....	56
Figure 87 Ku-band Panther terminal component layout	60
Figure 88 X-band Panther terminal component layout	62
Figure 89 Ka-band Panther terminal component layout	64
Figure 90 Ka-band: Polarization shown as RHCP TX	65
Figure 91 Ka-band: Moving transmit polarization to RHCP TX	65
Figure 92 Ka-band: Remove RX waveguide termination.....	66
Figure 93 Ka-band: Loosen LNA assembly	66
Figure 94 Ka-band: LNA moved to either front or back port.....	66
Figure 95 Ka-band: Mount RX waveguide termination	67
Figure 96 Ka-band: RX coax connected to LNA.....	67
Figure 97 Ka-band: TX waveguide installed on transmit port.....	67
Figure 98 Panther terminal screen and Up/Down buttons.....	68
Figure 99 Panther Configure page	72
Figure 100 Option file selection GUI.....	73

Revision history

Revision	Date	Description
A	10/11/2012	Initial release of document.

Copyright notice

The design and other information contained in this document are provided solely for the purpose of operating and maintaining L-3 GCS equipment. All such information is the exclusive property of L-3 GCS except for rights expressly granted by contract. The contents of this manual and any subsequent volumes, which may be or become a part thereof, may not be copied, reproduced, or duplicated by any means (photographically, manually, digitally, or by optical scanning) without the express written permission of:

L-3 GCS
7640 Omnitech Place
Victor, NY 14564-9782
Telephone: (585) 742-9100

Trademark attribution

Windows is a trademark of Microsoft Corporation.

Proprietary rights

The information contained in this document is proprietary to L-3 Global Communications Solutions, Inc. (L-3 GCS). As such, said information may be used by the recipient solely for the purpose for which it was supplied by L-3 GCS. The recipient may not, under any circumstances, duplicate, use or disclose in any manner whatsoever, in whole or in part, the contents of this document to any other party, without first securing the written permission of L-3 GCS.



Export compliance

This technical data is controlled under the U.S. International Traffic in Arms Regulations (ITAR) and may not be exported to a foreign person, either in the U.S. or abroad, without the proper authorization by the U.S. Department of State.

Warnings



RADIO FREQUENCY RADIATION HAZARD

Dangerous RF power levels exist on and around the antenna during operation. RF electromagnetic radiation can potentially cause serious burns and injury. The power levels in use in the Panther Manpack are relatively low in comparison to conventional focused aperture satellite systems, but good safety practices should be always followed regardless of the system in use.

- DO NOT stand in front of the antenna when the transmitter is operating.
Adhere to the following distances for each SATCOM band:
 - X-band: 18 feet
 - Ku-band: 54 feet
 - Ka-band: 15 feet
- DO NOT work on the waveguides while the power is on.

**HIGH VOLTAGE IS USED IN THE OPERATION OF THIS EQUIPMENT****DEATH ON CONTACT****MAY RESULT IF PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS**

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technicians are aided by operators, they must be warned about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections or 115 Volt AC input connections with installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through the body.

WARNING: Do not be misled by the term "low voltage." Potentials as low as 50 Volts may cause death under adverse conditions.

When working inside the equipment, do not wear rings, bracelets, or dangling items that could touch components or connectors and cause injury or death.

Before starting work on live circuits, remove all exposed metal objects on your body. This includes bracelets, watches, rings, dog tags, etc.



Gen5 Panther Tri-Band Manpack

User's Manual

L-3 GCS warranty services

Limited Warranty Statement for L-3 GCS-Manufactured or Supplied Products

The warranty obligations of L-3 GCS are limited to the terms set forth below.

Please note that L-3 GCS reserves the right to update, from time to time, the warranty terms provided for new purchases of L-3 GCS manufactured or supplied products, and to establish the effective date of those updated warranty terms.

L-3 GCS warrants to the original purchaser ("Customer") that, for a period of twelve (12) months, or for whatever other period of time as may be agreed between L-3 GCS and customer, ("Standard Warranty Period"), new L-3 GCS manufactured products ("Products") will be free from defects in material and workmanship. Other manufacturer's products supplied by L-3 GCS, if any, shall carry only such other manufacturer's standard warranty, except that, in all cases, a minimum twelve (12) month warranty period shall apply. The start of the warranty period is the documented date of Customer purchase of the Product from L-3 GCS or L-3 GCS' authorized reseller. In the absence of a documented purchase date, the start of the warranty period will be deemed the date of shipment of the Product from its point of manufacture or supply to L-3 GCS' customer.

All L-3 GCS Products are manufactured from parts and components that are new or equivalent to new in accordance with industry standards.

Should Customer discover a defect in material or workmanship during the warranty period, and should L-3 GCS agree that the defect exists, L-3 GCS will, at its sole discretion, repair or replace the Product at no charge to Customer, provided the Product is returned during the warranty period, with transportation charges prepaid, to the location designated by L-3 GCS. In order to obtain warranty service, the Product must be properly packaged to ensure safe arrival, with the Return Material Authorization clearly displayed on the outside of the packaging. L-3 GCS may require proper proof of purchase documentation prior to issuing a replacement Product. The warranty period on replacement Products is the remainder of the warranty on the original Product or ninety (90) days, whichever is longer.

L-3 GCS uses new and reconditioned parts in performing warranty repairs and building replacement products. Repair parts or replacement Products may, at L-3 GCS' option, include equal or better models or features. If L-3 GCS elects to repair a Product, L-3 GCS owns all parts removed from the repaired Product.

To request warranty service and before returning a Product to L-3 GCS, Customer should contact the L-3 GCS Service Center at (585) 742-9100. Once the L-3 GCS Service Center determines that repair is required, L-3 GCS will issue an RMA number. A copy of Customer's receipt or bill of sale bearing the name and location of L-3 GCS' authorized reseller, if any, and the L-3 GCS serial number and model number of the product in which the defect has been reported may be required as a proof of Customer purchase for warranty service. In the event that Customer imposes a requirement for on-site warranty repair at a remote location, Customer shall be liable for payment of travel, per diem and all other such non-standard expenses incurred by L-3 GCS in addressing and/or satisfying the warranty claim.

L-3 GCS has no responsibility whatsoever with regard to any content or data on returned Products. Customer is responsible for saving or backing up data contained in any Product returned to L-3 GCS for warranty repair, evaluation or any other services. L-3 GCS shall have no responsibility for such data whatsoever and shall have no liability arising out of any damage to, or loss or disclosure of such data. The allocation of risk under this limitation of liability is reflected in the purchase price of the Product.

This limited warranty applies only to L-3 GCS manufactured or supplied products that can be identified by the original, unaltered trademark, trade name or logo affixed to them. L-3 GCS does not warrant any product that is not manufactured or supplied by, for, or with permission from L-3 GCS.



This warranty does not cover any of the following conditions:

- Abuse, unreasonable use, mistreatment, or neglect.
- Damage caused by unusual physical or electrical stress or power fluctuations.
- Damage caused during installation of the Product (unless the Product is installed by L-3 GCS).
- Damage caused by the equipment or system in or with which the Product is used.
- Damage caused by modification or repair not made or authorized by L-3 GCS.
- Products whose L-3 GCS Serial Number and/or Material Number label have been removed, torn, or defaced.
- Damage caused by improper or improperly used packaging.
- Damage caused by lack of ESD protection.
- Products determined to be stolen or, otherwise, not the rightful property of the warranty claimant.
- Products on which the Product cover, or any label or seal is removed or damaged.

Should it be determined that a Customer warranty claim is invalid, Customer shall be liable for payment of a "Standard Test and Evaluation Fee", and for payment of any and all additional expenses incurred by GCS in addressing the invalid warranty claim.

FAILURE TO COMPLETE AND RETURN ANY GCS PRODUCT REGISTRATION FORM WILL NOT DIMINISH CUSTOMER'S WARRANTY RIGHTS. THIS WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHERS, WHETHER ORAL OR WRITTEN, EXPRESSED, IMPLIED OR STATUTORY. L-3 GCS SPECIFICALLY DISCLAIMS TO THE MAXIMUM EXTENT PERMITTED BY LAW, ANY AND ALL IMPLIED WARRANTIES OR CONDITIONS AS TO THE PRODUCTS OR ANY OTHER MATTER WHATSOEVER. IN PAR, BUT WITHOUT LIMITATION, L-3 GCS SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS OR ANY OTHER WARRANTY ARISING FROM A COURSE OF DEALING OR USAGE OF TRADE. THIS LIMITED WARRANTY DOES NOT APPLY TO, AND L-3 GCS MAKES NO WARRANTY TO CUSTOMER WITH REGARD TO, PRODUCTS ORIGINALLY SOLD AS AN INTEGRATED COMPONENT OF A SYSTEM NOT SUPPLIED BY L-3 GCS, OR PRODUCTS PROVIDED UNDER A THIRD PARTY LEASING OR SERVICE ARRANGEMENT. ANY MODIFICATION, EXTENSION OR ADDITION TO THIS WARRANTY MUST BE APPROVED IN WRITING BY L-3 GCS.

L-3 GCS IS NOT RESPONSIBLE OR LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, HOWEVER CAUSED, AND WHETHER OR NOT L-3 GCS WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INCLUDING BUT NOT LIMITED TO, COSTS OF PROCUREMENT OF SUBSTITUTE GOODS, LOSS OF DATA OR PROGRAMS, LOST PROFITS, DOWNTIME, GOODWILL, DAMAGE OR REPLACEMENT OF EQUIPMENT AND PROPERTY, AND ANY COSTS OF RECOVERING, PROGRAMMING OR REPRODUCING ANY PROGRAM OR DATA STORED IN OR USED WITH L-3 GCS PRODUCTS OR ANY OTHER DAMAGES ARISING OUT OF THE PURCHASE, USE OR PERFORMANCE OF THE PRODUCT.

This Statement of Limited Warranty shall be exclusively interpreted in accordance with the English language with the meaning of its terms. Should a translation of this Limited Warranty deviate from the English language version, only the English language version shall apply and be binding.

Technical support

GCS Technical support is available 24/7. For technical support, call GCS at 585-742-9145 or toll free at 877-247-1207.

Overview

This manual, in conjunction with the quick reference card, provides information to deploy, operate, and maintain the Panther manpack tri-band terminal.

The Panther provides high data rate communications for remote Internet/VPN connectivity, live videoconferencing, surveillance, reconnaissance, and other IP-based applications. It is the smallest and lightest terminal of its kind and can be deployed in minutes utilizing a built-in, deployable parabolic antenna, and internal iDirect modem.

The system is available in a compact transit case suitable for transportation shipment or checked airline baggage.



Figure 1 Deployed Gen5 Panther manpack (rear view)



Front panel connections

Figure 2 and Figure 3 show the Panther front panel and side Panther terminal connections.

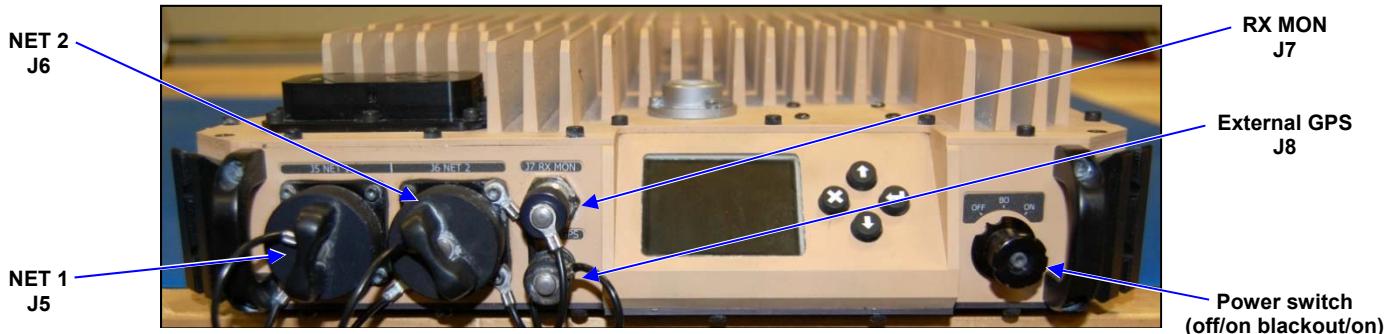


Figure 2 Panther front panel connector detail



Figure 3 Panther side panel connector detail

Features

The Panther terminal offers the following features:

- Rugged weather-resistant chassis, antenna, and ancillaries.
- High-efficiency, 24" parabolic antenna with a feed that provides vertical or horizontal linear cross-polarized operation.
- DC power operation via battery (two BB-390 or BB-2590) or external DC Power from either the AC/DC or through an external DC-to-DC source.
- Simple set up and tear down.
- Intuitive front panel indicators, signal strength, and modem condition.
- Slanted LCD display for ease of viewing.
- Internal iDirect DVB-S2 modem.
- External modem input/output L-band interface.
- Conventional RJ-45 network interface for message traffic device and/or M&C laptop.
- An internally-hosted, Web-based graphical user interface (GUI). No special application is needed other than a browser.
- As easy to use as a BGAN terminal without the high per-minute cost.
- Uses commercial or government satellites.
- Silent, fanless operation.



Site survey information

The following steps should be completed before the Panther terminal is set up.

1. Select an antenna operation site. The antenna requires a flat, level area with an unobstructed view in the direction of the satellite. An uncluttered foreground within either side of the look-angle allows for more reliable operation.
2. Use the compass (or inclinometer) to locate a suitable site for the system. Verify a clean look-angle with the inclinometer.
3. Ensure that there are no large steel objects in the immediate vicinity of the Panther that might disrupt or give a false reading to the compass.
4. Install outriggers for leveling and added stability.
5. Determine AC power availability. AC power requirements are 90-240 VAC, 47-63 Hz, with a power requirement of 240 watts.
 - If DC power is to be used to power the Panther, obtain a source that can provide 18-48 VDC at 20 Amperes maximum.
 - If DC backup power from batteries is required, ensure that there is an adequate supply of known-good batteries to operate over the expected time frame. The Panther requires a quantity of two BB-390 or BB-2590 batteries for every hour of operation anticipated, if they are the primary source of power. Note that they must be used in groups of two freshly charged batteries to power the Panther.
 - The iDirect modem has a power-saving feature called Keyline that extends battery life, depending on traffic usage.

For detailed information on the battery assembly, refer to "Battery assembly" on page 56.

Panther setup procedure

The following steps describe how to set up the Panther. The pictures shown depict a Ku-band Panther. The set up process is the same for each band with differences in the RFE wiring and Web screen configuration. Band-specific instructions are noted as necessary during the set up procedure.

1. Remove the satellite guide shown in Figure 4 from the transit case.

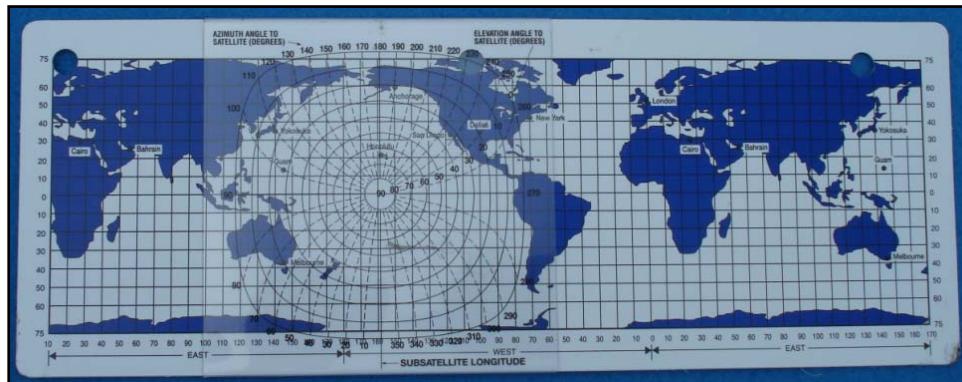


Figure 4 Satellite guide

2. Find the longitude of the satellite through which communication will be established. Slide the graticule over the satellite subpoint and inspect for the local satellite elevation and azimuth.



Gen5 Panther Tri-Band Manpack

User's Manual

3. Remove the compass/inclinometer shown in Figure 5 from the transit case. Use the local azimuth and elevation for the satellite to ensure there is clear sky in the direction of the satellite.



Figure 5 Compass/inclinometer

4. Remove the modem chassis from the Panther transit case.
5. Remove the articulation, RF cables, AC power cord, and GPS antenna from their stow locations in the transit case.
6. Remove the antenna petal storage bag from the transit case and remove the petal stow pin from each set of four petals. Refer to Figure 6 and Figure 7. Store the petal stow pins in the storage bag for later use during repack.

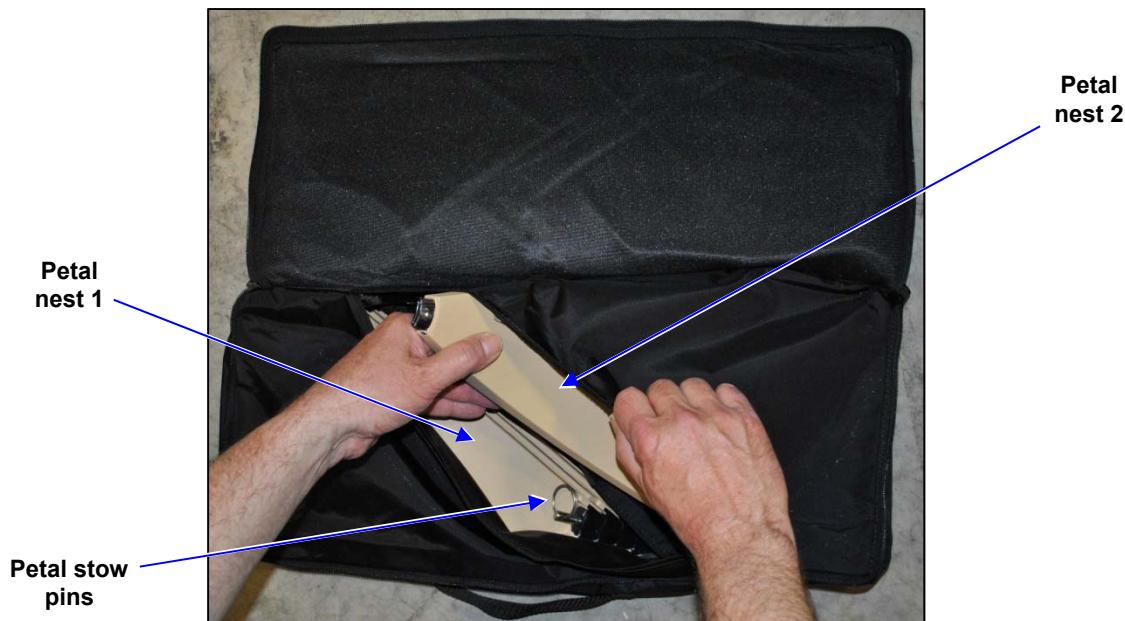


Figure 6 Antenna petals and stow pin

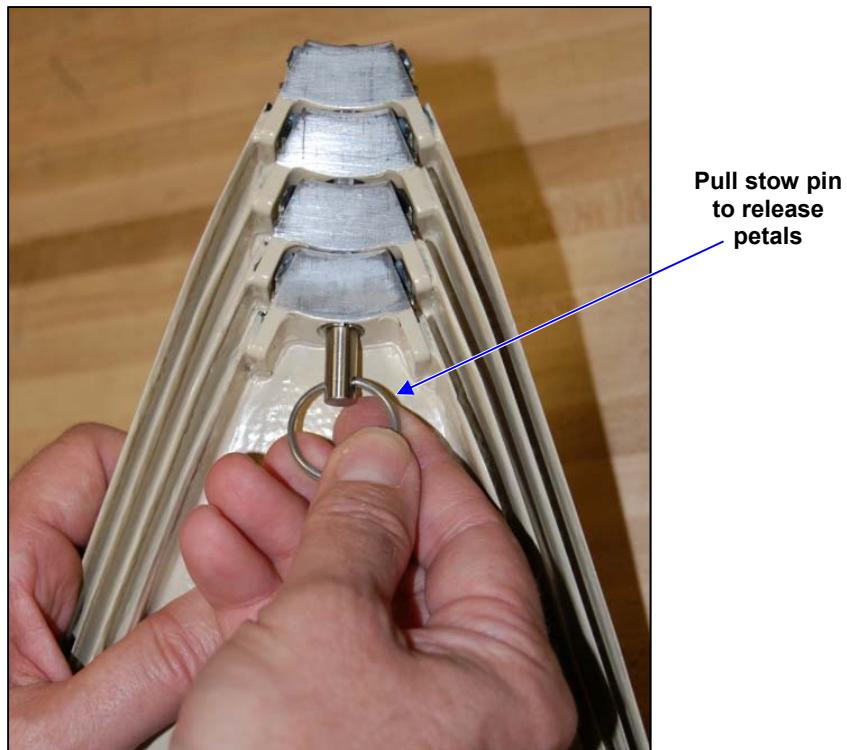


Figure 7 Petal stow pin removal

7. Remove the Panther terminal from the transit case and place it on a level surface, as shown in Figure 8



Figure 8 Modem chassis positioned on level surface



Gen5 Panther Tri-Band Manpack

User's Manual

-
8. Remove the outriggers from the Panther transit case. Refer to Figure 9.



Figure 9 Panther outriggers

9. Install each of four outriggers. The outriggers attach by first clasping the top spring-mounted latch into the top of the mounting base. Press down and connect the lower latch into the bottom of the mounting base. Refer to Figure 10.



Figure 10 Panther outrigger installation

10. Tighten the installation knob to secure the outrigger in place. Refer to Figure 11. Continue installation of all outriggers following this same process.



Figure 11 Panther outrigger secured



Gen5 Panther Tri-Band Manpack

User's Manual

-
11. Inspect the bubble level shown in Figure 12 for a level indication. Adjust the leveling knobs on each outrigger, to achieve a level indication. Once level, tighten the wing nut. Refer to Figure 13.



Figure 12 Panther bubble level showing a level surface



Figure 13 Panther leveling knob adjustment

12. Obtain the RFE from the transit case. Ensure the correct band has been obtained. The RFE band type is identified by a designation on the product label on the end of the unit. Refer to Figure 14. Figure 12 shows a Ku-band RFE.

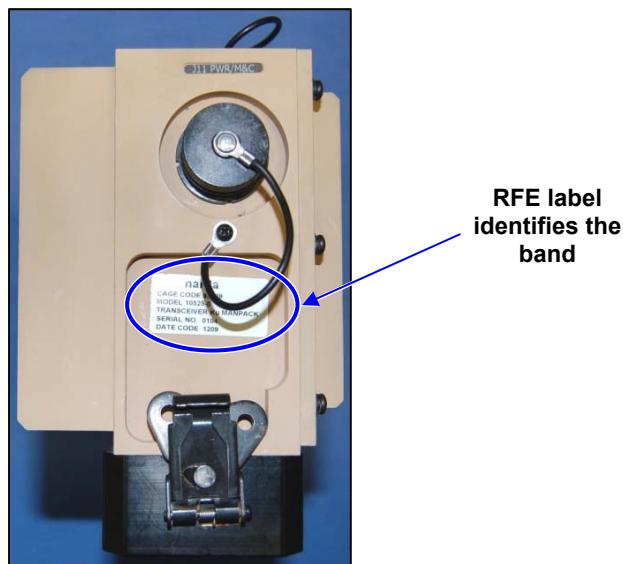


Figure 14 RFE identification

-
13. Attach the RFE to the modem chassis by orienting J11 on the same side as the modem chassis I/O panel. Refer to Figure 15 and Figure 16.

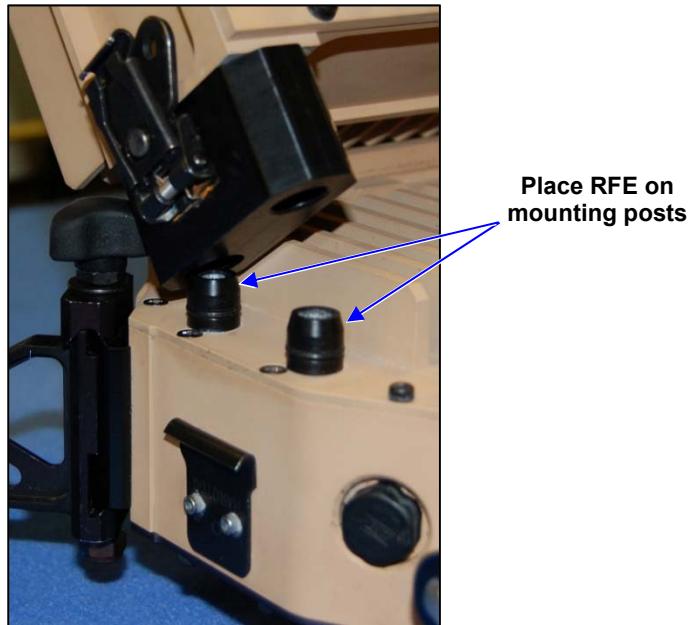


Figure 15 RFE attachment to Panther terminal



Figure 16 RFE attached to modem chassis

-
14. Secure the RFE to the modem chassis by connecting the mounting latch located on both ends of the RFE. Refer to Figure 17.

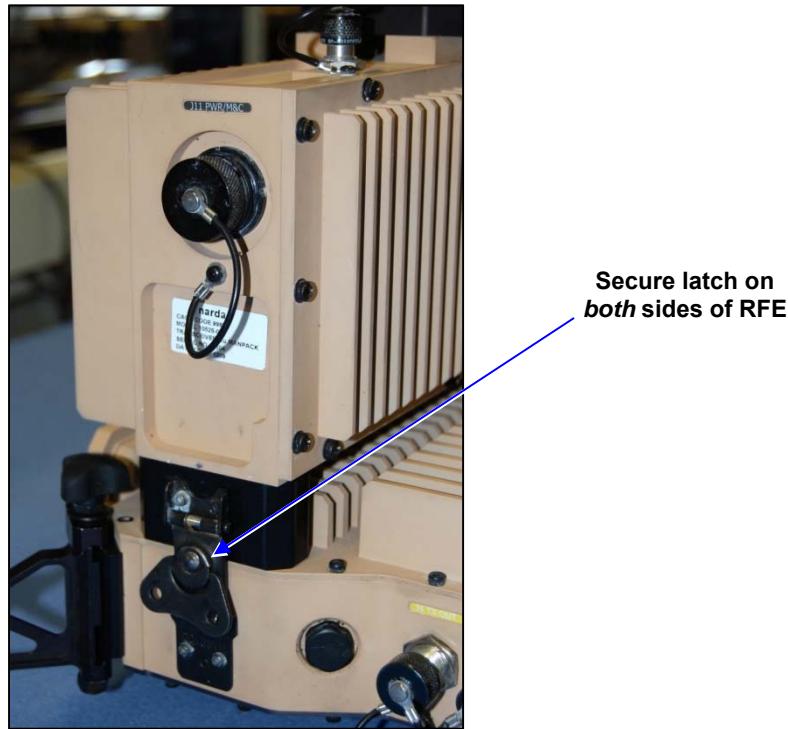


Figure 17 RFE mounted and latched to modem chassis

15. Obtain the articulation assembly from the transit case. The base of the assembly contains a spring-activated mechanism. Position the assembly so the knob faces towards the edge of the Panther and hook one end of the base clamp onto the base, as shown in Figure 18.



Figure 18 Articulation assembly installation 1

-
16. Pull the assembly forward so the spring compresses to the back of the base clamp against the knob, then lower the assembly onto the base. Refer to Figure 19. Release the assembly so it grips against the base.

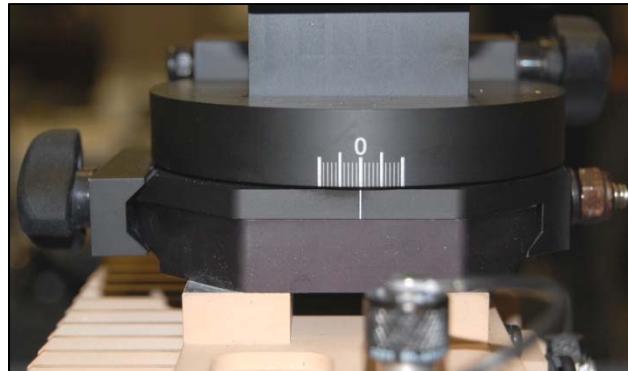


Figure 19 Articulation assembly installation 2

17. Secure the articulation assembly by tightening the knob, as shown in Figure 20.

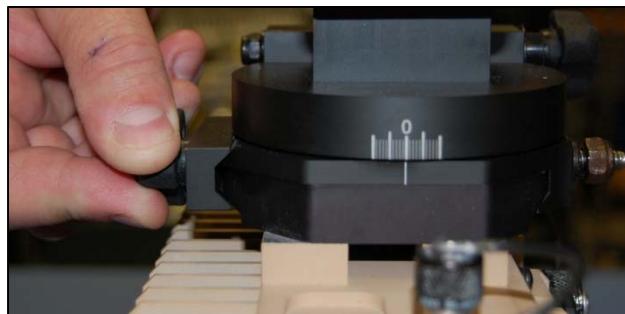


Figure 20 Articulation assembly installation 3

18. Adjust the articulation arm to a 90° setting, as shown in Figure 21.



Figure 21 Articulation arm rotation to 90° setting

19. Obtain the feed clamp assembly, shown in Figure 22, from the transit case.



Figure 22 Feed clamp assembly

20. Slide the feed clamp assembly onto the articulation assembly using the groove on the feed clamp arm. Refer to Figure 23. Ensure that it fully seats at the end of the articulation assembly mount, as shown in Figure 24.

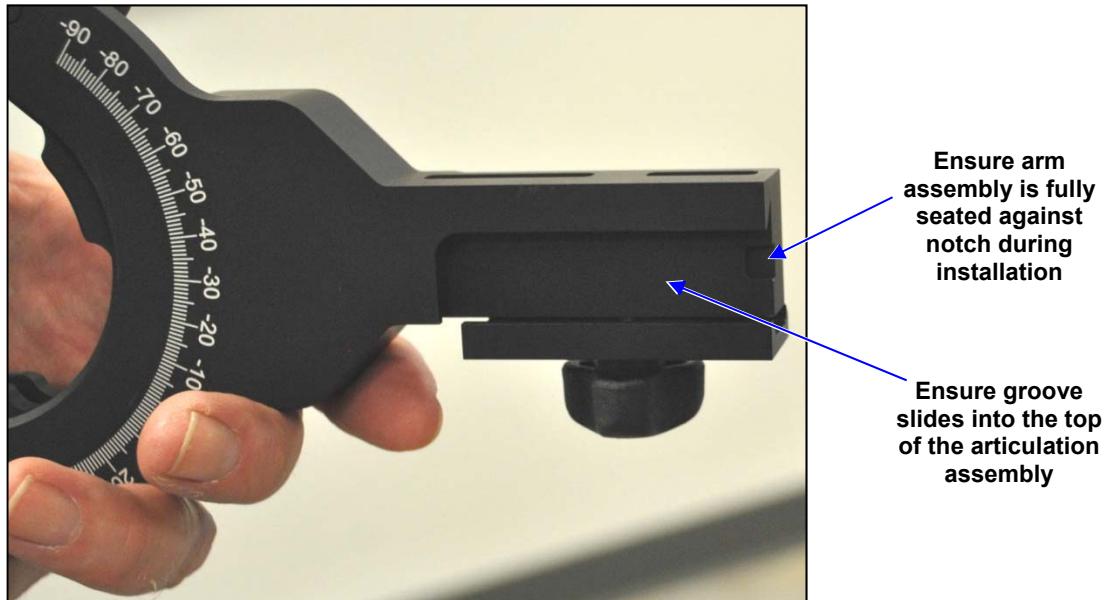


Figure 23 Feed clamp assembly design

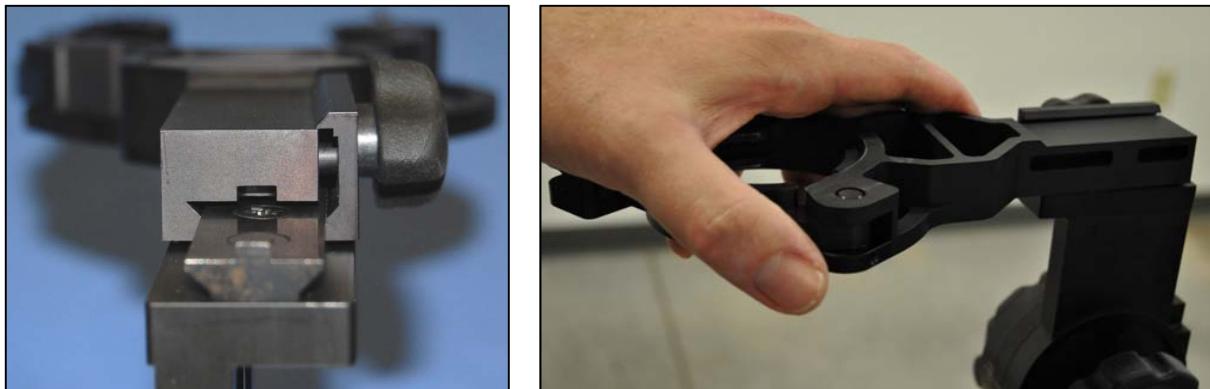


Figure 24 Feed clamp seated on articulation assembly.

21. Secure the feed clamp assembly onto the articulation assembly by tightening the knob, as shown in Figure 25.



Figure 25 Ring clamp assembly secured to articulation assembly

22. Obtain the appropriate feed assembly from the transit case. The three feeds supported by the Panther terminal are shown in Figure 26.

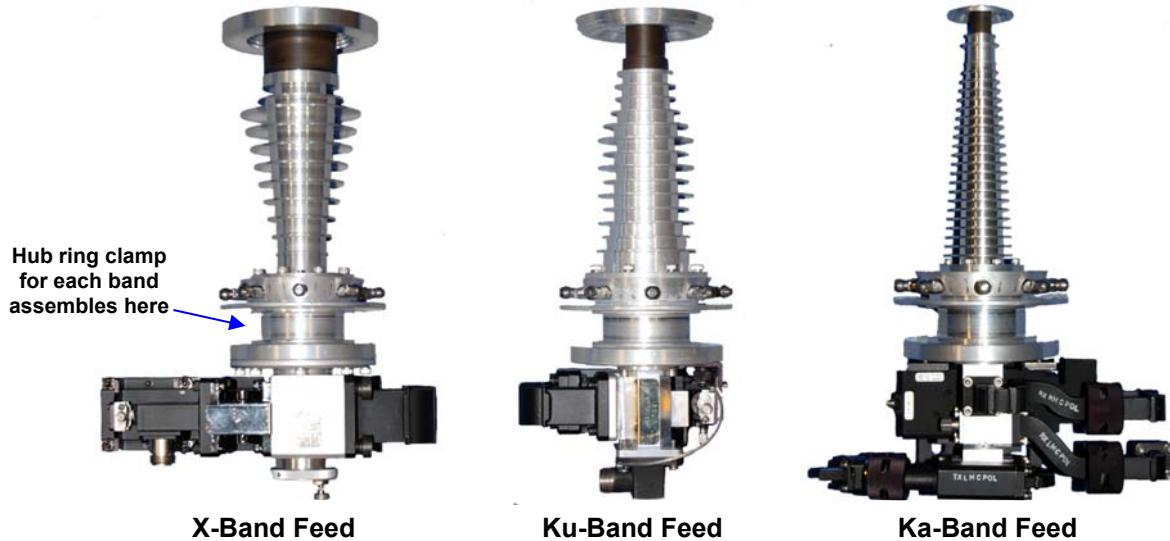


Figure 26 X-, Ku-, and Ka-band feeds

23. Open the hub ring on the ring clamp assembly, as shown in Figure 27.



Figure 27 Hub ring clamp in open position

-
24. Place the feed assembly into the hub ring and swing the hub ring clamp over to hold the ring. Figure 26 shows the feed assembly mounting location. Tighten the ring clamp to ensure the feed assembly does not turn in the hub ring. Refer to Figure 28.



Figure 28 Feed assembly installed in hub ring clamp

25. Ensure the pins on the feed assembly are clean and clear of dirt and debris. Wipe clean prior to installing the antenna petals.
26. Insert the first antenna petal onto the hub by feeding the petal base into the locating pins on the feed assembly and pressing the petal onto the pin. Gently push with the thumb of one hand while supporting the edge of the petal with the other hand. Refer to Figure 29. Ensure that the petal is inserted straight into the mounting pin.



Figure 29 First parabolic antenna petal installed

27. Insert the next antenna petal into the adjacent locating pin on the feed assembly. If necessary, loosen the hub ring clamp, rotate the feed assembly, and then retighten the hub ring clamp. Match the edge of the petal with the edge of the first petal and ensure the "J" clips interlock, as shown in Figure 30. A gentle push with the thumb at the base of the petal will insert it into the feed assembly while supporting the edge of the petal at the "J" clip.

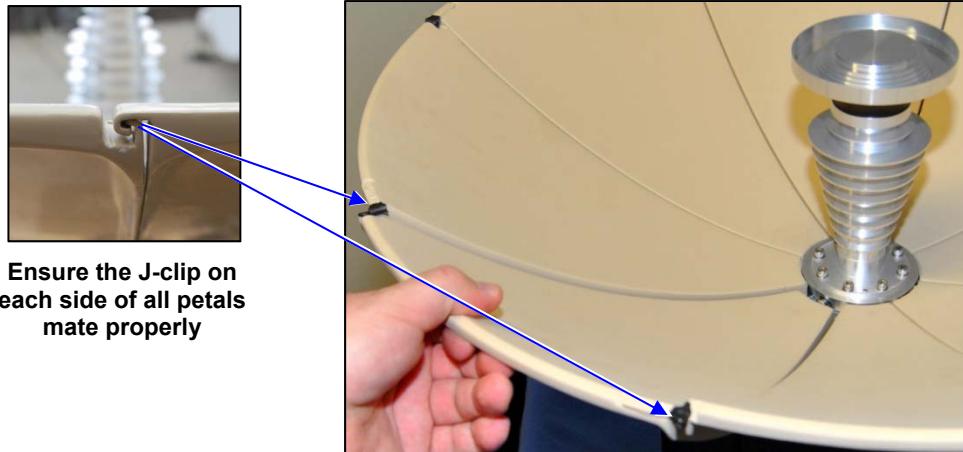


Figure 30 Petal J-clip installation

28. Insert the other petals as previously described. The last petal needs to be carefully supported at the petal edge and both "J" clips carefully aligned so the petal slides into position and the "J" clips interlock. Gentle pressure with the thumb of each hand at the petal edges will help to insert the petal. Refer to Figure 31.

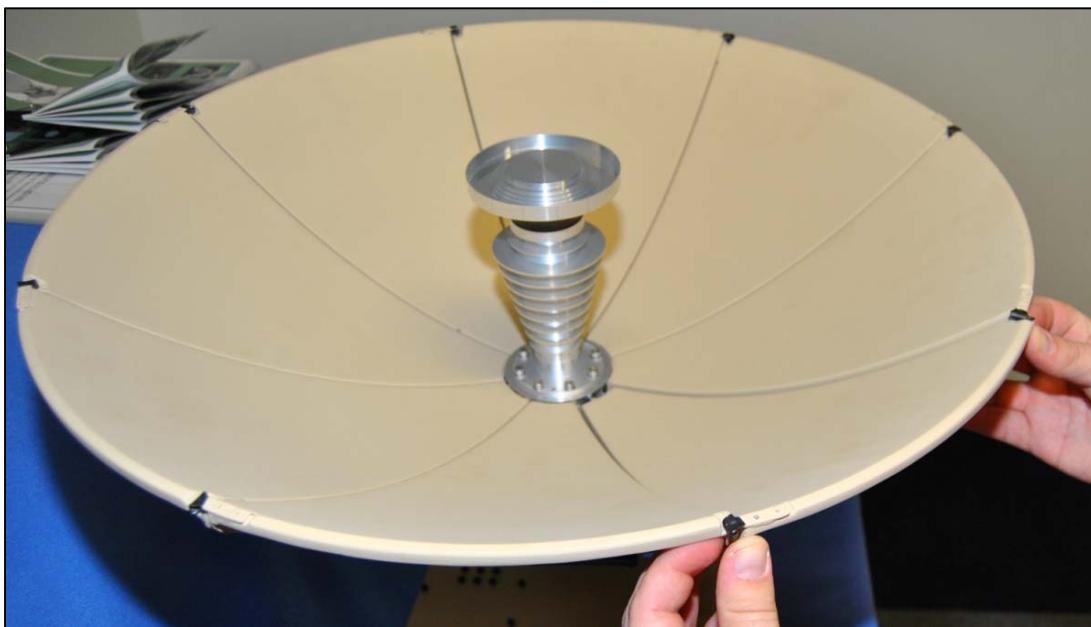


Figure 31 Installation of last parabolic reflector petal

-
29. Tilt the feed assembly so the dish is vertically oriented and pointed at the horizon. Accomplish this by grasping the hub with one hand and loosening the elevation clamp with the other hand. Refer to Figure 32.



Figure 32 Panther terminal with dish vertically oriented

30. *For X-band only*, set the TX polarization to the appropriate setting (**TX RHCP** or **TX LHCP**) by rotating the set wheel, as shown in Figure 33. The default setting is TX RHCP.

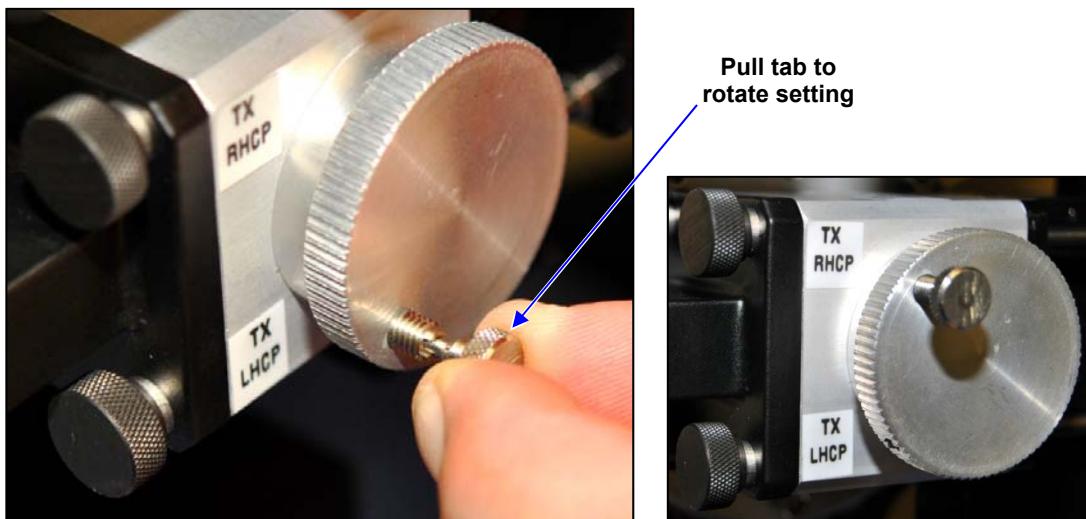


Figure 33 TX polarization configuration

Ku- and X-band RFE and feed connections

The following steps apply to Ku- and X-band terminals only. If you are assembling a Ka-band terminal, proceed to step 34.

31. Attach the receive coax to the blue **RX connection** on the feed and the **J14 RX ANT** connection on the RFE. Route the cable to the inside channel on the cable mounting clasp, as shown in Figure 34.

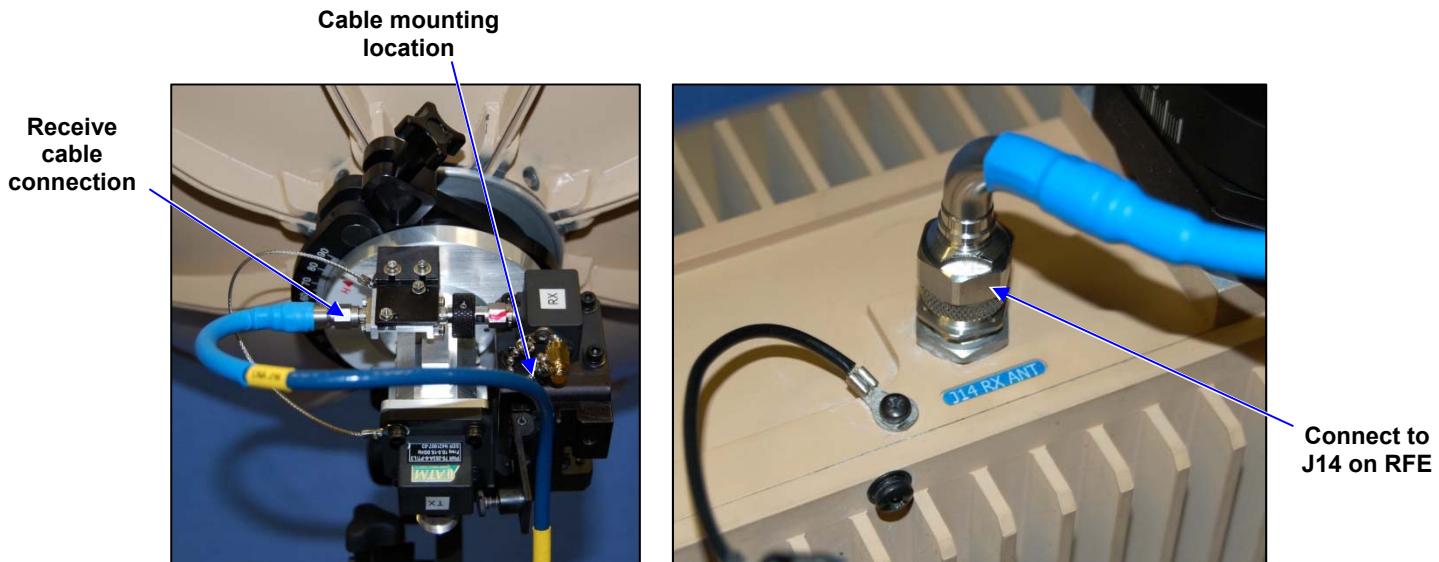


Figure 34 Ku-/X-band: RX cable installation

32. Attach the TX coax to the red **TX connection** on the feed and the **J15 TX ANT** connection on the RFE. Route the cable to the outside channel on the cable mounting clasp, as shown in Figure 35.

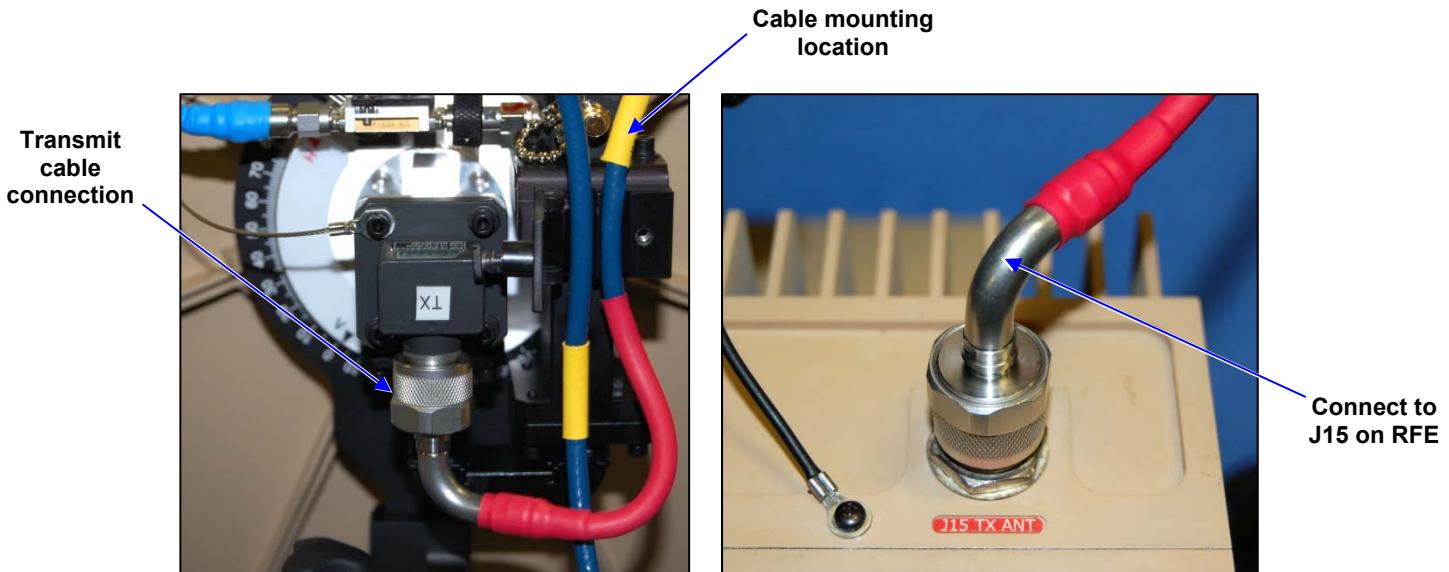


Figure 35 Ku-/X-band: TX cable installation

-
33. Close and secure the cable mounting clasp cover. The completed cabling is shown in Figure 36.

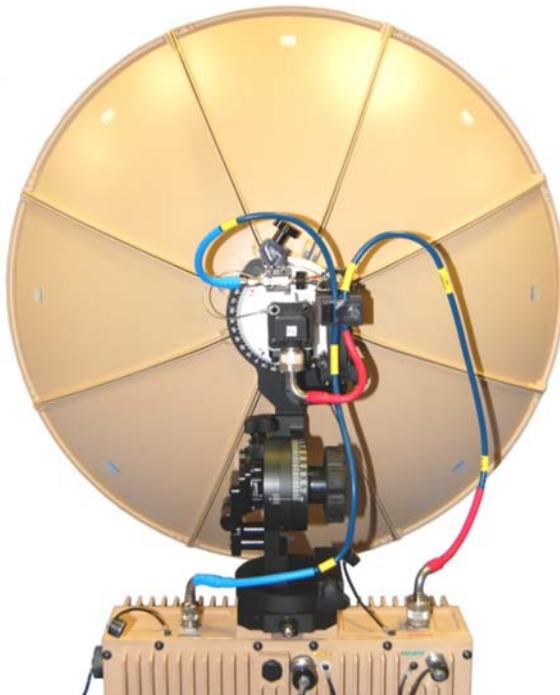


Figure 36 Ku-/X-band: Completed cabling between RFE and feed

Ka-band RFE and feed connections

Steps 34 through 37 describe the cabling between the Ka-band RFE and feed assembly. The installed Ka-band feed assembly is shown in Figure 37.



Figure 37 Ka-band feed assembly installed

-
34. Connect the RX coax to the **LNA**, as shown in Figure 38.



Figure 38 Ka-band: RX coax connection to LNA

35. Connect the other end of the RX coax to the **J14 RX ANT** connector on the RFE, as shown in Figure 39.

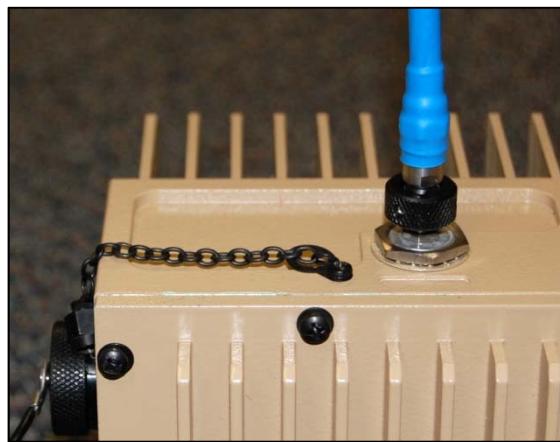


Figure 39 Ka-band: RX connection to RFE

36. Connect one end of the TX waveguide to the **transmit port** on the feed. Refer to Figure 40.

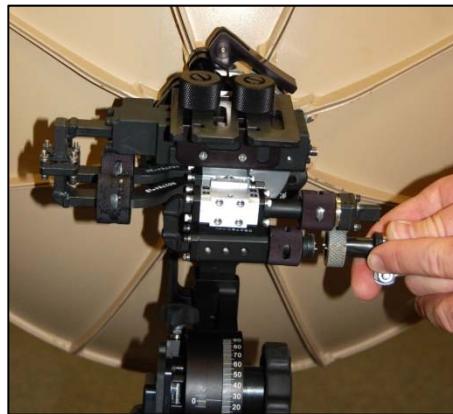


Figure 40 Ka-band: TX waveguide connection to transmit port



-
37. Connect other end of the TX waveguide to the **J15 TX ANT** connector on the RFE, as shown in Figure 41.



Figure 41 Ka-band: TX waveguide connection to RFE

Internal and external NMEA GPS

The Panther terminal comes equipped with an internal GPS that is selectable through the Panther Web GUI or the front panel. The terminal is configured to use the internal GPS by default. The internal GPS is located on the top of the Panther terminal, as shown in Figure 42.

In addition, an external NMEA GPS, such as the DAGR GPS (customer supplied, not included with the system) can be connected to the J8 connector on the Panther front panel. An externally installed GPS can be selected from the Web GUI or front panel.

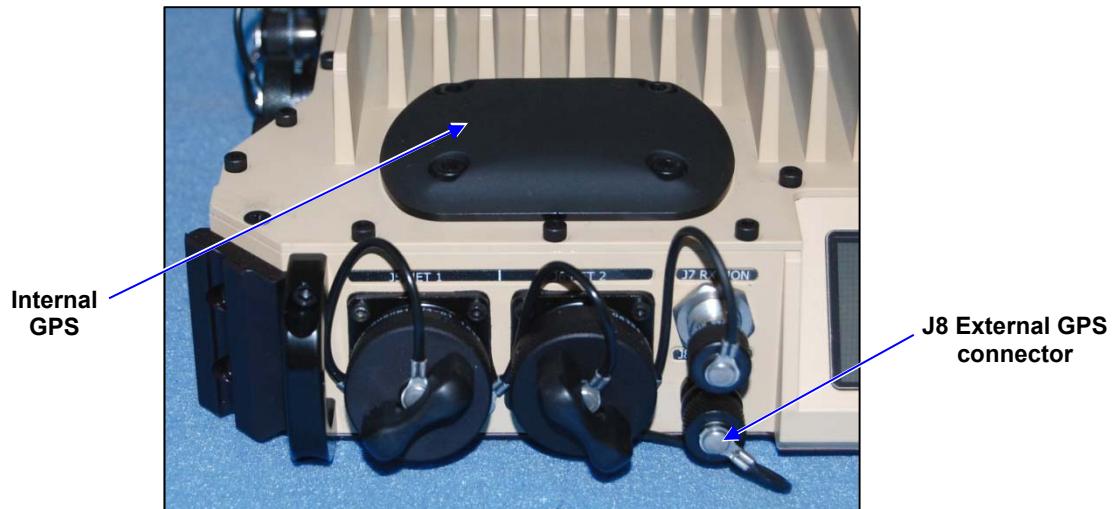


Figure 42 Internal GPS

38. Position the Panther so the antenna faces the appropriate satellite azimuth as determined by the previous survey.



Gen5 Panther Tri-Band Manpack User's Manual

-
39. Obtain the AC/DC converter from the transit case. The AC/DC converter is shown in Figure 43.



Figure 43 Panther AC/DC converter

40. *If two charged BB-390 or BB-2590 batteries are available, insert them into the battery box and attach the battery box to the back of the Panther terminal. Do not use different battery types concurrently. The battery box is shown in Figure 44. When installing the battery box, position the batteries so the battery terminals connect to the matching terminals on the modem chassis. Figure 45 shows the battery box connecting to the modem chassis.*



Figure 44 Battery box



Figure 45 Battery box attached to the modem chassis

-
41. Connect the DC power cable (0170-6450-01) to **J19 DC OUT** on the end of the AC/DC converter. Refer to Figure 46.



Figure 46 DC power cable connected to AC/DC converter

42. Connect the other end of the DC cable to **J1 DC PWR IN** on the side of the Panther terminal. Refer to Figure 47.



Figure 47 DC power cable connected to Panther

43. Connect the AC power cable (0164-1250-01 or 0170-1250-01) to **J18 AC IN** on the other side of the AC/DC converter. Refer to Figure 48.



Figure 48 AC power cable connection



Gen5 Panther Tri-Band Manpack

User's Manual

44. Connect the RFE Power and M&C cable (0170-4150-01) from **J11 PWR/M&C** on the side of the RFE to **J2 RFE PWR/M&C** on the side of the Panther. Refer to Figure 49.



Figure 49 RFE Power and M&C cable connection

45. Connect the RFE transmit cable (0170-4160-01) between **J12 TX IN** on the RFE and **J4 TX OUT** on the side of the Panther. Refer to Figure 50.

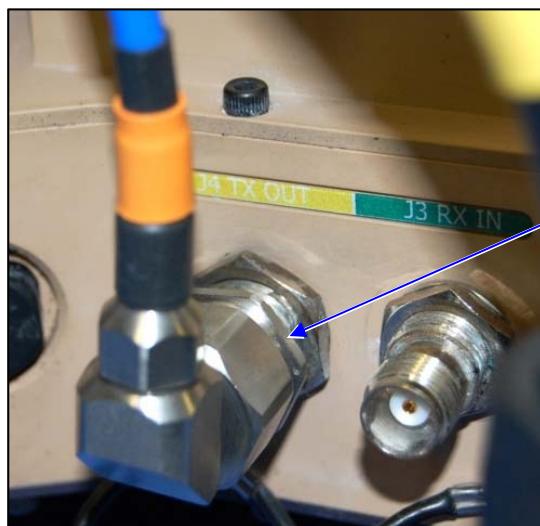


Figure 50 RFE transmit cable connection



Gen5 Panther Tri-Band Manpack

User's Manual

46. Connect the RFE receive cable (0170-4170-01) between **J13 RX OUT** on the RFE and **J3 RX IN** on the side of the Panther. Refer to Figure 51.

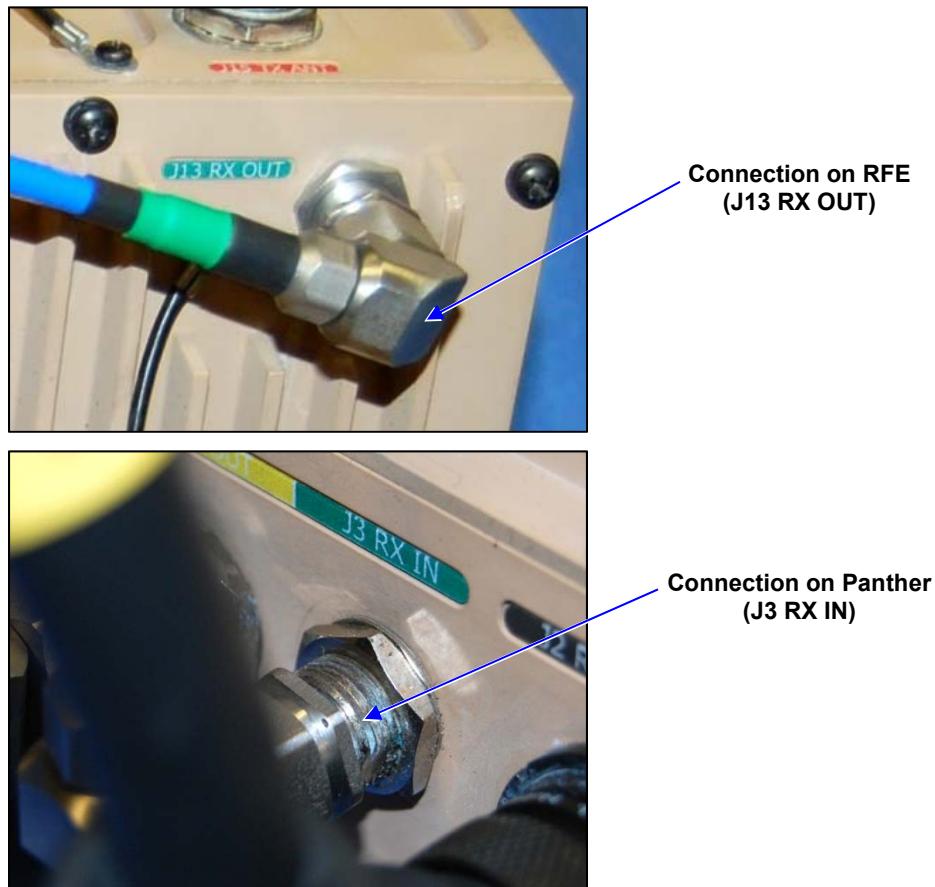


Figure 51 RFE receive cable connection

47. Attach a suitable source of AC to the AC/DC converter using the cables provided.
48. Turn on the power to the Panther manpack by pulling and rotating the power switch on the front panel. Refer to Figure 52. Rotate fully clockwise and observe that the unit goes through a self test of the display. A progress bar indicates for approximately ten seconds that the start up sequence has been initiated.

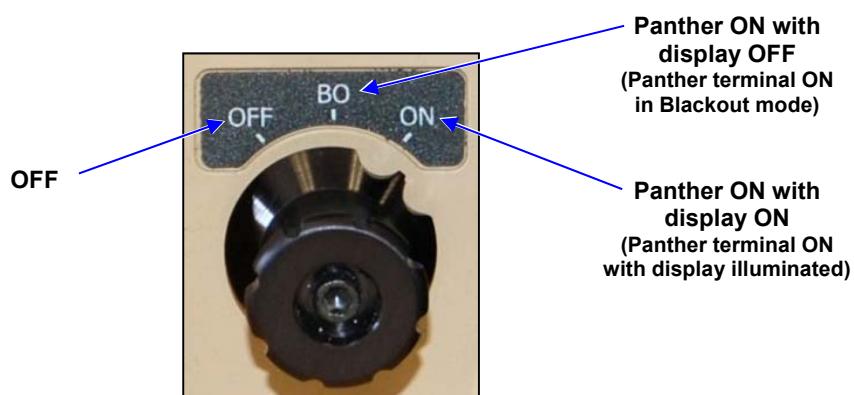


Figure 52 Power switch

Within approximately two minutes after the Panther has been powered, the modem will provide a pointing solution to the operator. The display will indicate the latitude and longitude of the terminal based on the GPS. The designated satellite will be indicated on the display. The display will also indicate an appropriate look angle to the designated satellite in the form of an azimuth angle (adjusted for magnetic deviation), elevation angle, and polarization angle. The display will indicate the appropriate polarization angle, which is either right-hand circular polarization (RH-T) or left-hand circular polarization (LH-T). The polarization indication on the front panel of the panther does not indicate the appropriate angle. It defaults to whatever was last set by the operator. This value is set using the panther GUI and must be set by the operator. The setting is provided by the NOC for whatever satellite provider is being used. This is true for any band, Ku, X or Ka.

For detailed description of the five Panther display screens, consult "The five Panther display screens" on page 28.

Special consideration for blackout operations: If the operation requires the use of the Panther with no visible light emissions, set the power ON/OFF switch to the middle BO (blackout mode) position. No indicators will be illuminated with the power switch in the Panther terminal BO position.

Band polarization (*Ku-band only*)

The Ku-band feed assembly must be preset for the appropriate transmit linear polarization. The feed assembly can be set to horizontal (H-T) polarization or vertical (V-T) polarization. Refer to Figure 54 for polarization designators on the Panther terminal front panel display. The adjustment to the feed assembly is made by loosening the knob on the feed collar and rotating the feed. Refer to Figure 53 for polarization markings on the Ku-band feed.

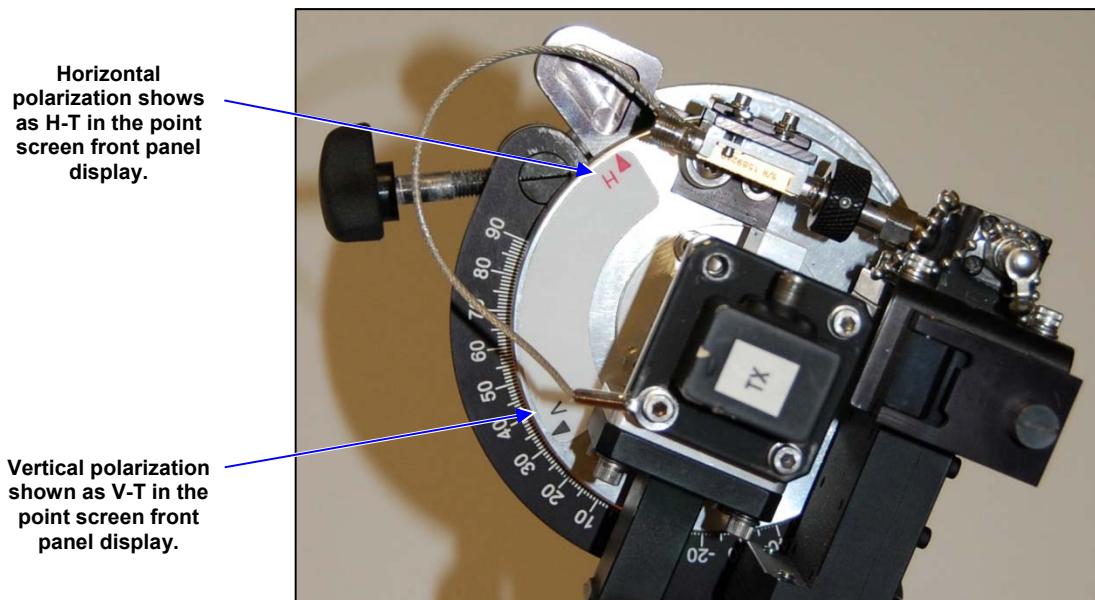


Figure 53 Ku-band: Polarization markings on Ku-band feed

The following steps will rotate the polarization adjustment clockwise or counter clockwise to the detent limit to set the feed for H-T or V-T, as needed for the satellite in use.

49. Adjust the antenna polarization to match the indications on the front panel display. Refer to Figure 54. Note that there is no angle given for circular polarity. It is simply LH-T or RH-T.

Match the antenna pol to the value shown on the point screen front panel display

H-T or V-T polarization is shown for Ku-band.

LH-T or RH-T polarization is shown for X-band or Ka-Band.

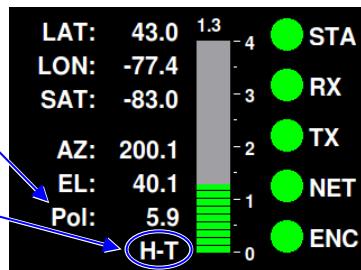


Figure 54 Ku-band: Pol angle on the front panel display

50. Adjust the antenna elevation by securely holding onto the hub with one hand and adjusting the elevation clamp with the other hand, as shown in Figure 55. Set the elevation to the value shown on the front panel display, as shown below.

Match the antenna elevation to the value shown on the point screen front panel display

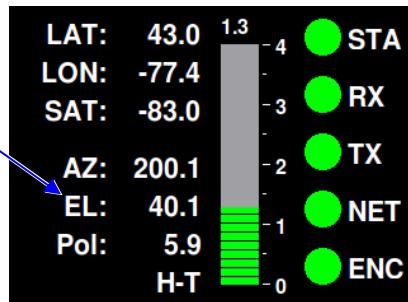


Figure 55 Ku-band: Elevation adjustment

NOTE: The above picture shows a Ku-band feed assembly.

51. Adjust the antenna azimuth angle by slowly moving the front of the terminal side-to-side in small increments from the original position determined with the magnetic compass. Observe the bar graph on the front panel display while making adjustments (refer to Figure 56). If an appropriately set up iDirect hub is present on the satellite, an indication of signal strength should be quickly observed on the vertical bar graph located on the front panel display. The operator should use the fine tune knob to carefully peak the azimuth angle on this signal making small step adjustments and waiting approximately one second between changes.

Peak the azimuth angle while observing the bar graph on the front panel display

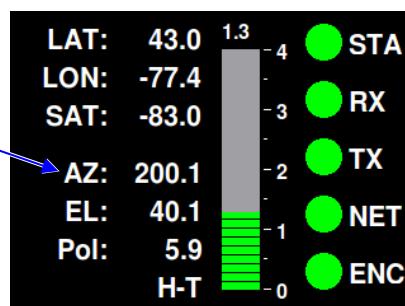


Figure 56 Ku-band: Azimuth angle on the front panel display



NOTE: If the bar graph signal strength indicator is fully illuminated, it can be adjusted for a higher maximum signal level by using a procedure listed in the Panther Graphical User Interface (GUI) section of this manual. Refer to the “Panther graphical user interface (GUI)” on page 32 where it discusses the Terminal portion of the screen. The desired maximum dB level of the Modem RSSI Max field can be entered and saved in this screen.

52. Use the fine tune knobs to adjust the azimuth and elevation until the maximum signal strength is displayed.

At this point the iDirect modem should progress through transmit bursting indications, from yellow to green color, and finally indicate a green condition on the TX and NET status indicator. This indicates the distant end hub and the terminal modem are ready for network traffic.

The setup procedure is complete.

Power connections

When in normal operation, the Panther receives power from its AC/DC power supply. The battery box attaches to the front of the modem chassis.

The Panther terminal is powered from any of the following:

- The external AC/DC power supply.
- The external DC/DC power converter (optional).
- Battery box with two BB-390 or two BB-2590 batteries.
- 18V to 48V DC from another DC source.

The batteries provide power to the Panther terminal when the power source is removed or not present. Refer to Figure 57.

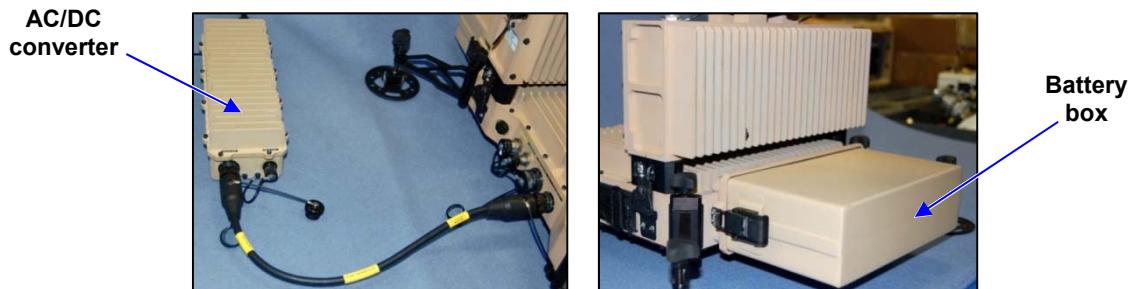


Figure 57 Panther terminal connected to AC/DC power converter

The AC/DC power converter connects to the modem chassis in the following manner:

1. *If the battery box is used, insert two charged BB-390 or BB-2590 batteries into the battery box and attach the battery box to the front of the modem chassis.*
2. Connect the DC power cable (0170-6450-01) to **J19 DC OUT** on the end of the AC/DC converter.
3. Connect the other end of the DC cable to **J1 DC PWR IN** on the side of the modem chassis.
4. Connect the AC power cable (0164-1250-01 or 0170-1250-01) to **J18 AC IN** on the other side of the AC/DC converter.



AC/DC power converter

The AC/DC power converter provides DC power for operation of the Panther terminal from a nominal 120V AC power source. The AC/DC converter will power the Panther from any source that provides 90V to 240V, 40Hz to 60Hz. Figure 58 shows the AC/DC connectors available on the AC/DC converter (left side of picture) and modem chassis (right side of picture).



AC/DC Converter



Panther terminal

Figure 58 AC/DC converter and panther power connectors

Two BB-390 or two BB-2590 batteries can be attached to the front of the modem chassis to provide primary power to the Panther terminal. The batteries also provide backup DC power to the terminal in the event that external power is disrupted or unavailable.

Table 1 describes the pin out of the AC IN (J18) connector on the AC/DC converter:

J18 pin	Function
Pin A	AC (L)
Pin B	Ground
Pin C	AC (N)

Table 1 AC INPUT (J18) pin-out

Table 2 describes the pin out of the DC OUT (J19) connector on the AC/DC converter:

J19 pin	Function
Pin 1	RX data +
Pin 2	RX data -
Pin 3	TX data -
Pin 4	TX data +
Pin 5	DC On
Pin 6	18V to 48V DC
Pin 7	Ground
Pin 8	Ground
Pin 9	Ground
Pin 10	KG power input
Pin 11	Ground
Pin 12	Ground

Table 2 DC OUTPUT (J19) pin-out



Table 3 describes the pin out of the DC PWR IN (J1) connector on the modem chassis:

J1 pin	Function
Pin 1	RX data +
Pin 2	RX data -
Pin 3	TX data -
Pin 4	TX data +
Pin 5	DC On
Pin 6	18V to 48V DC
Pin 7	Ground
Pin 8	Ground
Pin 9	Ground
Pin 10	KG power output
Pin 11	Ground
Pin 12	Ground

Table 3 DC INPUT (J19) pin-out

Panther terminal deploy and display screens

This section describes the five screens available from the Panther display.

When the Panther is first powered on, the display will show a blank white test screen followed by the L-3 logo with a progress bar. This indicates the modem is initializing.

If the Panther is pointed at a suitable satellite, an indication of signal strength will be observed. If no signal strength is indicated, move the Panther slowly to either side of the estimated pointing direction, and inspect the signal. The azimuth and elevation fine tune knobs can be used to make small adjustments needed to peak on the downlink signal.

The five Panther display screens

The Panther displays the following five display screens:

- Monitor screen
- Point screen
- Alarms screen
- Voltage alarms screen
- Voltage source alarms screen

Depress the Up/Down buttons on the front panel to select the appropriate display screen. Each screen displays four possible light color conditions:

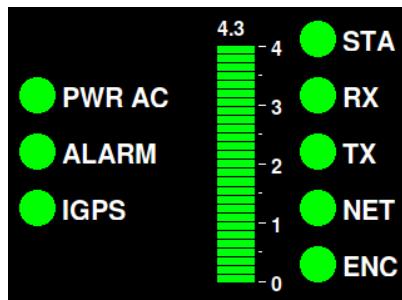
- Indicates a normal condition.
- Indicates an interim state condition.
- Indicates a fault condition.
- Indicates an inactive condition.

The following sections describe each screen.



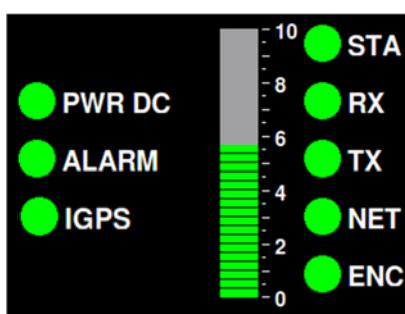
Monitor screen

The monitor screen displays the following iDirect modem light states:

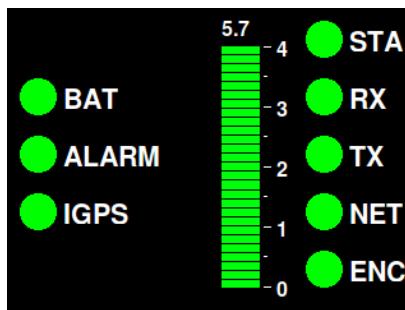


Monitor screen under AC power

- **PWR AC** displays PWR AC when the Panther terminal is under AC power. Possible states are red and green.
- **PWR DC** displays PWR DC when the Panther terminal is under DC power. Possible states are red and green.
- **BAT** displays BAT when DC (battery) power is used. Possible states are red and green.
- **ALARM** displays red, when an alarm condition occurs with BUC Lock, DRO Lock, GPS or PA Com, Modem Com, Modem OT, Modem Pwr, or any voltage state. Possible states are green or red.
- **GPS** indicates the status of the internal or external global positioning system (screen) receiver. Possible states are green or gray.
- **STA** indicates the modem has power and has initialized. Possible states are green or gray.
- **RX** indicates the modem has received lock on an active iDirect-based hub. Possible states are green, yellow, or gray.
- **TX** indicates when the modem transmitting return bursts to the hub. Possible states are green, yellow, or gray.
- **NET** indicates a full-duplex link has been established between the terminal and the hub. Possible states are green, yellow, or gray.
- **ENC** indicates the Panther is operating in an encrypted mode. Possible states are green or gray.
- The **vertical bar** indicates the receive signal strength. There is also a numeric value indicated on the top of the scale that indicates signal strength.



Monitor screen under DC power



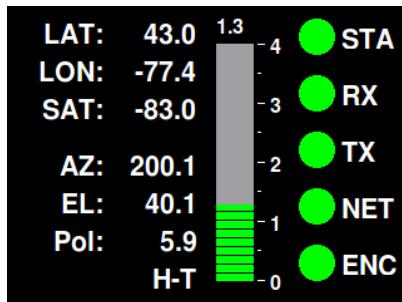
Monitor screen under battery power



Point screen

This screen indicates the parameters of the Panther terminal for a specific satellite. All indicators have a possible light state of green, red, or gray. The signal strength meter is always green.

The light state definitions are as follows:

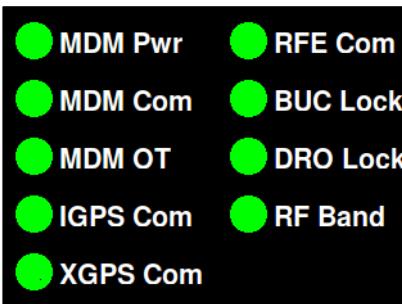


- **LAT** indicates the present latitude of the Panther terminal based on terminal location or from manual settings on the Panther GUI.
- **LON** indicates the present longitude of the Panther terminal based on GPS information or from manual settings on the Panther GUI.
- **SAT** indicates the longitude of the desired satellite.
- **AZ** is the azimuth (magnetic) for the Panther to align to a specific satellite.
- **EL** is the desired elevation for the Panther antenna to align to a specific satellite.
- **POL** indicates the required polarization necessary for the Panther parabolic antenna.
- The **vertical bar** indicates the receive signal strength.

Alarms screen

This screen indicates the state of internal regulated voltages. All indicators display green or red except MDM OT. MDM OT may display green (OK), yellow (caution), or red (overtemp). The XGPS may also display in gray if it is not the selected location source and it is disconnected from the terminal.

The light state definitions are as follows:



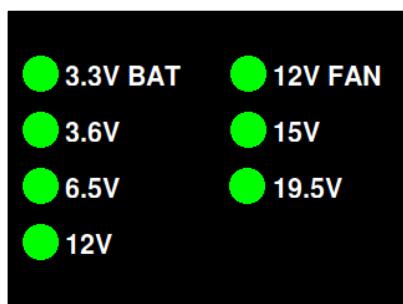
- **MDM Pwr** indicates power has been applied to the modem.
- **MDM Com** indicates communications have been established between the iDirect modem and the user interface (front panel display or Web interface).
- **MDM OT** indicates the modem is operating within normal operating temperature ranges. MDM OT may display green (OK), yellow (caution), or red (overtemp).
- **IGPS Com** indicates communications have been established with the internal global positioning system (GPS) receiver.
- **XGPS Com** indicates communications have been established with the external global positioning system (GPS) receiver.
- **RFE Com** indicates communications have been established with the Panther RF equipment subassembly.
- **BUC Lock** indicates the block-up converter is locked to the frequency standard of the modem.
- **DRO Lock** indicates the receiver local oscillator (LO) is locked to an internal frequency standard in the RFE subassembly.
- **RF Band** indicates whether a mismatch exists between the RFE and the modem configuration. If a mismatch exists, the status indicator will display red. In this case, the RFE will need to be changed or the correct option file will need to be uploaded to the modem.



Gen5 Panther Tri-Band Manpack

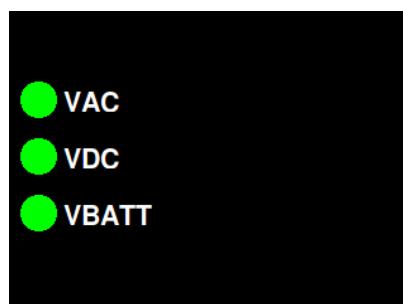
User's Manual

Voltage alarms screen



The Panther terminal provides various voltages to different portions of the internal electronics. The voltage alarms screen indicates the state of each of these internal voltage levels. If a level falls out of range, it will indicate an error condition. Possible light states are green and red.

Voltage source alarms screen



The voltage source alarms screen displays the state of each voltage source: AC voltage, DC voltage, and battery voltage. Possible states are green, red, and gray. Green means voltage is present on that source. Red means voltage is not in range. Gray means no source is present.



Panther graphical user interface (GUI)

This section describes how to use the Panther graphical user interface (GUI). The Panther GUI is available when a computer is properly attached and configured to the Panther LAN port.

NOTE: IP addresses shown in the images below are provided only as an example and should not be used in your configuration.

1. Connect a suitable laptop to the Panther LAN port and configure the internal network connection settings for static IP addressing. An address needs to be established in the 192.168.0.0 network with a submask of 255.255.255.0. An example utilizing a Microsoft Windows-based PC is shown in Figure 59.

NOTE: The settings of the static IP addresses will vary from unit to unit, as well as the traffic addresses. The settings shown are representative.

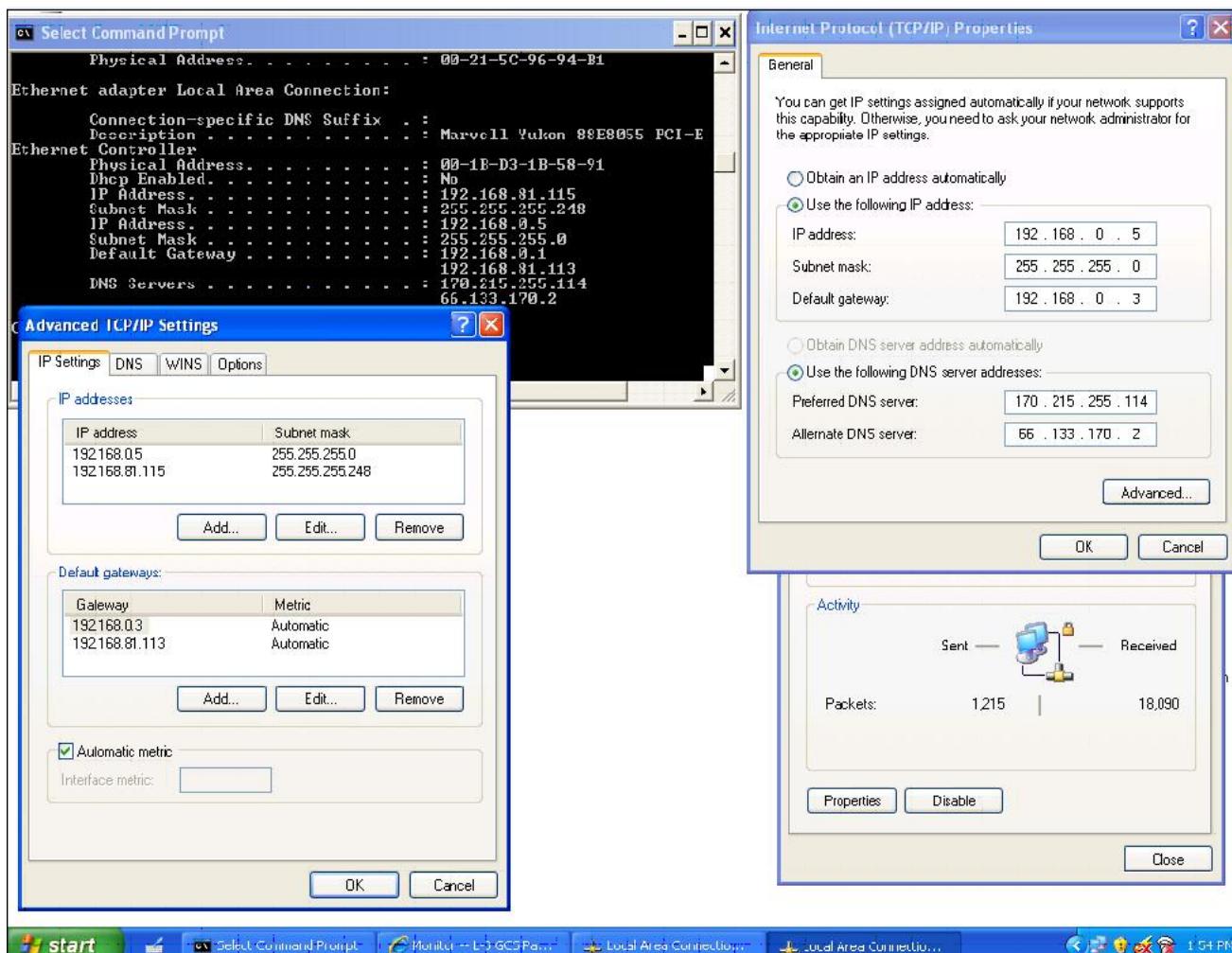


Figure 59 Example of settings for static IP addressing



Gen5 Panther Tri-Band Manpack

User's Manual

2. Cable the Panther to one of the network connectors, **J5** or **J6**, shown in Figure 60. There is no distinction between the connectors as they are ports on an internal unmanaged network switch.

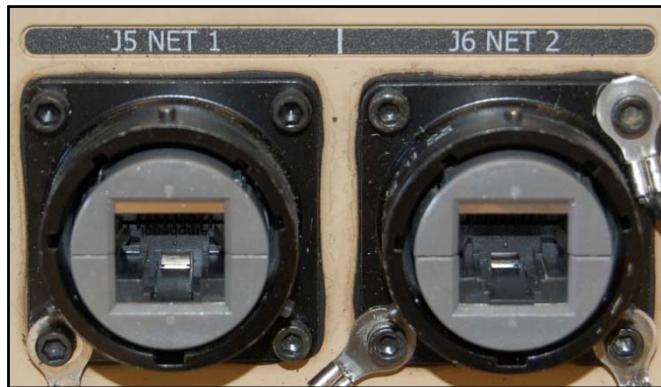


Figure 60 Network cable connectors

3. Enter a Web browser and go to IP address: **192.168.0.3** to activate the laptop Web browser with static addressing. Refer to Figure 61. When the Web address is accessed, the System page displays, as shown in Figure 62.



Figure 61 Laptop IP address in Web browser

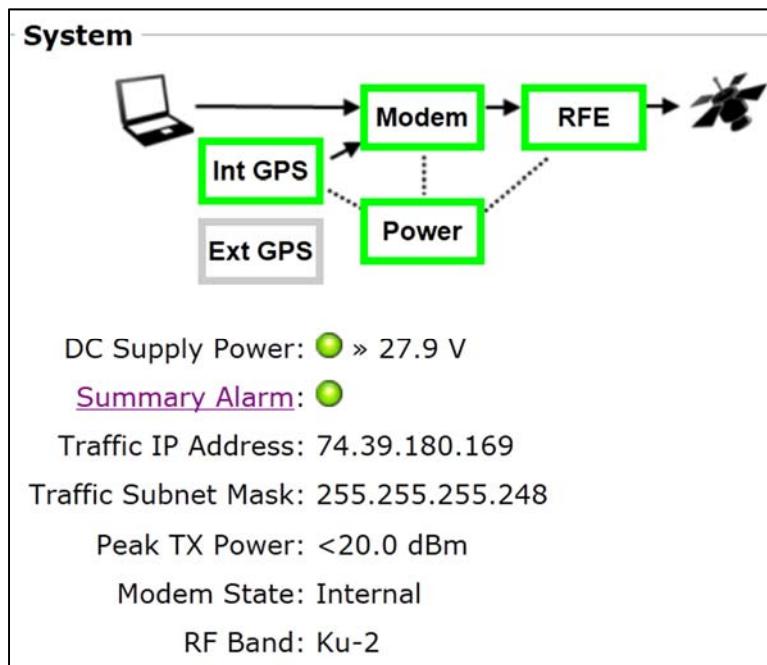


Figure 62 System Web page

4. The Panther hosts a series of screens identified as the Monitor screen, the Point screen, the Configuration screen, and the Troubleshoot screen.

The following section, “iDirect Panther GUI pages”, describes each of these Web-based screens.



Gen5 Panther Tri-Band Manpack

User's Manual

iDirect Panther GUI pages

Monitor page

The Monitor page is shown in Figure 63.

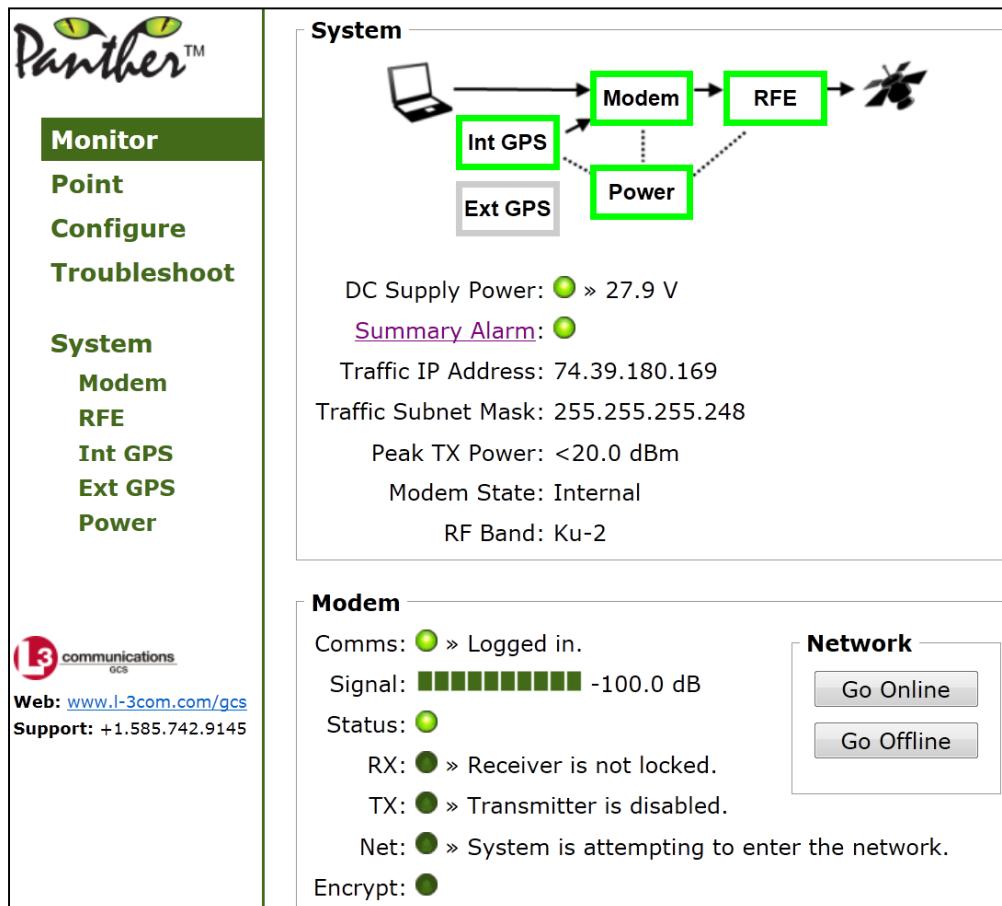


Figure 63 Panther Monitor page

The monitor page contains data associated with the terminal and internal modem.

System displays the current status of the GPS, modem, RFE, and power. The RF Band shown will reflect the terminal and RFE band installed.

Modem displays the internal iDirect modem status. The default condition is internal modem. External modem capability is selected by manual selection on the Configure page.

NOTE: Do not change any settings unless instructed by the HUB operator.



System region

The System region of the Monitor page, shown in Figure 64, displays the status of five different aspects of overall connectivity with various components integral to satellite acquisition.

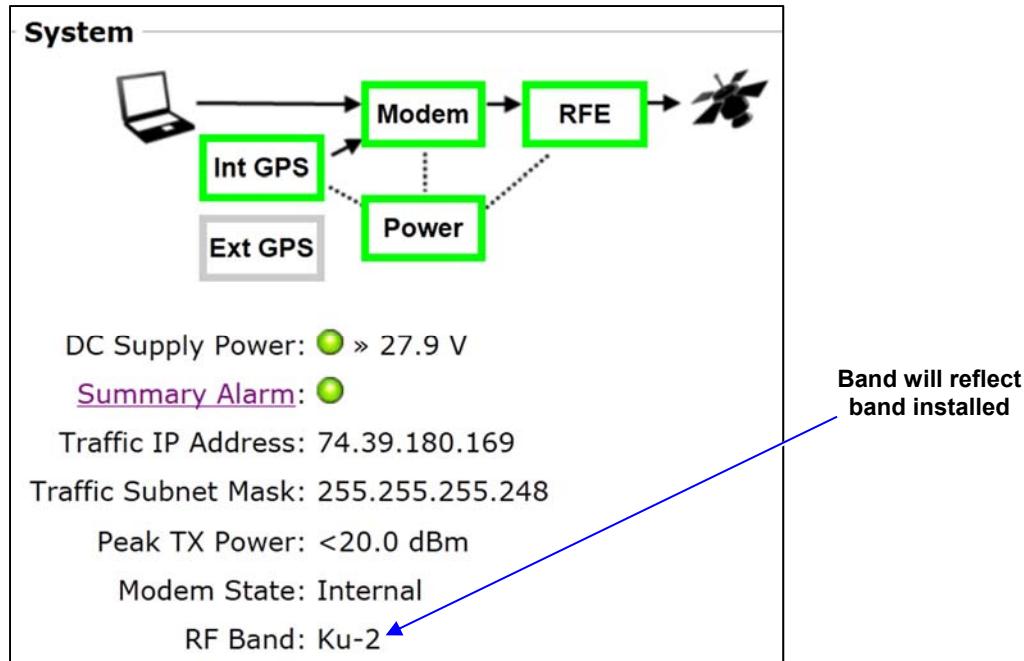


Figure 64 Panther Monitor page

Satellite acquisition requires proper connectivity of the internal or external GPS, modem, and RFE, and adequate power applied to each of these components. The System region of the monitor page displays a block diagram to shows the status of each component. Possible states of each component are green, yellow, red, and gray. Green indicates that a component is functioning properly. Yellow indicates a warning. Red indicates a problem (overtemp or out of range). Gray indicates nonexistent or not configured.

The Panther GUI is capable of displaying the status of the internal modem. The menu displays Int GPS and Ext GPS, which provides GPS status. If the external GPS (optional) is not connected and the terminal is not configured to use it, the Ext GPS block will appear grayed out. Click the relevant GPS block to view the GPS information. Figure 65 shows the information on these pages.



Figure 65 Panther GPS page



Gen5 Panther Tri-Band Manpack

User's Manual

The System region also displays modem information. Click the Modem block on the System region of the Monitor page to open the Modem information page shown in Figure 66.

Info

Power: ●	S/N: 49223
Over Temp: ● » 45.8° C	Version: 11.1.1.2
IP Address: 74.39.180.169	

Status

Comms: ● » Logged in.	Network
Signal: -100.0 dB	<input type="button" value="Go Online"/>
Status: ●	<input type="button" value="Go Offline"/>
RX: ● » Receiver is not locked.	
TX: ● » Transmitter is disabled.	
Net: ● » System is attempting to enter the network.	
Encrypt: ●	

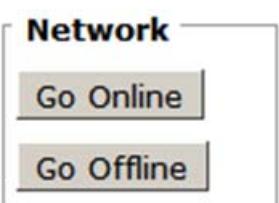
RF

RX Freq: 11934.050 MHz	Modem TX Power
TX Freq: 13800.000 MHz	Actual: -22.0 dBm
RX Power: -44.8 dBm	Desired: <input type="text" value="-22.0"/> dBm

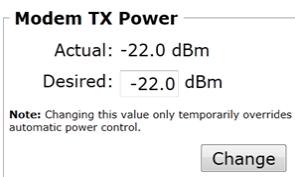
Note: Changing this value only temporarily overrides automatic power control.

Figure 66 Panther Modem page

The Modem page displays modem status information, including serial number, modem version, IP address, RF receive, and transmit information. Two additional screen regions are also shown: Network and Modem TX Power.



The Network segment is used to manually place the Panther internal modem online or offline.



The Modem TX Power segment Actual value shows the present power output setting of the internal modem. The Desired field allows the operator to temporarily set the modem TX power to a given value. Under closed-loop conditions, the hub normally will reset the Actual value to the dynamically established best value.



Gen5 Panther Tri-Band Manpack

User's Manual

Click the RFE block on the System region of the Monitor page to open the RFE page shown in Figure 67.

Panther™

Monitor

Point

Configure

Troubleshoot

System

Modem

RFE

Int GPS

Ext GPS

Power

L3 communications GCS

Web: www.l-3com.com/gcs

Support: +1.585.742.9145

Info

Comms: ●

S/N: 000104

P/N: 990295

Version: 1.03

Transmitter

BUC Lock: ●

Peak TX Power: <20.0 dBm

SSPA Temp: 65.50°C

TX Temp: 54.00°C

TX

State: ● » Enabled

Enable

Disable

Note: May show red when modem keyline control is enabled.

Receiver

DRO Lock: ●

RF Band: Ku-2

RX Temp: 59.00°C

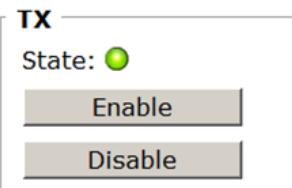
Miscellaneous

Micro Temp: 55.50°C

Band will reflect band installed

Figure 67 Panther RFE page

The Power page displays radio frequency equipment (RFE) information, including the data from both the transmitter and receiver. The temperature of the microcontroller is displayed under Miscellaneous. Temperature measurements are also displayed for the receiver and transmitter in both their respective areas.



The TX segment displays the current state of the Panther transmitter and provides a means to manually enable and disable the transmitter. In Keyline mode, this status alternates between red and green as the transmitter is enabled or disabled by the modem. This is a power and temperature savings feature.



Gen5 Panther Tri-Band Manpack

User's Manual

Click the Power block on the System region of the Monitor page to open the Power page shown in Figure 68.

Power Alarms	
3.3 V Battery:	● » 3.9 V
3.6 V Line:	● » 3.6 V
5 V Line:	● » 4.9 V
6.5 V Line:	● » 6.4 V
12 V Line:	● » 12.1 V
12 V Aux Line:	● » 12.0 V
15 V Line:	● » 15.0 V
19.5 V Line:	● » 19.6 V
VAC/VDC Line:	● » 27.9 V
Battery 1:	● » N/A
Battery 2:	● » N/A

Figure 68 Panther Power page

The Power page displays power and battery information. Power information includes a variety of different line voltages, including AC, DC, and battery power. The possible LED states are on/green (good), on/red (bad), or off (not installed).



Point page

The Point page is shown in Figure 69.

Location

Source: Manual
Latitude: 42.30°
Longitude: -85.20°
Mag Var: 12.1°
Comms:
Lock:

Satellite

Longitude: -61.0°

Angles

Azimuth (Mag): 134.2°
(True): 146.3°
Elevation: 35.3°
Polarization: -24.3°
TX Polarization: Vert

Modem

Comms: » Logged in.
Signal: -100.0 dB
Status:
RX: » Receiver is not locked.
TX: » Transmitter is disabled.
Net: » System is attempting to enter the network.
Encrypt:

Network

Modem TX Power

Actual: -22.0 dBm
Desired: dBm

Note: Changing this value only temporarily overrides automatic power control.

communications GCS
Web: www.l-3com.com/gcs
Support: +1.585.742.9145

Figure 69 Panther Point page

The Point page contains data that monitors and controls GPS, satellite longitude, and modem. Each segment of the Point screen is described below.

Location

Source: Manual
Latitude: 42.30°
Longitude: -85.20°
Mag Var: 12.1°
Comms:
Lock:

The Location segment indicates the data source for the terminal location. This can either be from GPS or by manual setting on the Configure page. Both the terminal latitude and longitude are shown. If the terminal is receiving data from the internal GPS receiver, the magnetic variation (Mag Var) for that location is displayed. If the Location Mode on the Configure page is set to manual, the indicated Mag Var value is set to the values in the Manual segment. See the Configuration page for additional detail.



Gen5 Panther Tri-Band Manpack

User's Manual

Satellite

Longitude: -61.0°

The Satellite segment indicates the satellite longitude. The longitude shown originates from the internal modem when the internal modem is used. If an external modem is used, the longitude shown originates from the Configuration page. A negative sign on the longitude denotes west longitudes; a positive sign on the longitude denotes an east longitude.

Angles

Azimuth (Mag): 134.2°

(True): 146.3°

Elevation: 35.3°

Polarization: -24.3°

TX Polarization: Vert

The Angles segment indicates the terminal pointing solution calculated for the terminal position. Azimuth (magnetic) corresponds to the compass heading/angle to the satellite from the current location. Elevation corresponds to the elevation to the satellite. The polarization angle is the value the antenna should be set to achieve the intended polarization.

Modem

Comms: Logged in.

Signal: -100.0 dB

Status:

RX: Receiver is not locked.

TX: Transmitter is disabled.

Net: System is attempting to enter the network.

Encrypt:

Network

Go Online

Go Offline

The Modem segment reports communication with the internal iDirect modem. The Signal indicator is a bar-graph showing the received signal strength indication (RSSI). The numeric value that follows the bar is the signal-to-noise ratio expressed in decibels (dB). The Status indicator denotes the internal modem condition. The RX indicator denotes an iDirect carrier is detected by the internal modem. The TX indicator denotes the internal modem is attempting to enter transmit mode. The Net indicator denotes that the internal modem has achieved a closed-loop condition with the distant end-hub line card. The Encrypt indicator denotes if transmission security is enabled.

Network

Go Online

Go Offline

The Network segment allows the operator to select Online or Offline operation with the internal modem.

Modem TX Power

Actual: -22.0 dBm

Desired: dBm

Note: Changing this value only temporarily overrides automatic power control.

Change

The Modem TX Power segment Actual value shows the present power output setting of the internal modem. The Desired field allows the operator to temporarily set the modem TX power to a given value. Under closed-loop conditions, the hub normally will reset the Actual value to the dynamically established best value.



Gen5 Panther Tri-Band Manpack

User's Manual

Configure page

The Configure page is shown in Figure 70.

The screenshot shows the configuration interface for the L3 Gen5 Panther Tri-Band Manpack. The left sidebar lists navigation options: Monitor, Point, **Configure**, Troubleshoot, System, Modem, RFE, Int GPS, Ext GPS, and Power. The main area is divided into four sections:

- Terminal:** Includes fields for Modem Password (redacted), Note (modem password used by the terminal), and Modem RSSI Max (10.0 dB). A TX Polarization section offers Horizontal and Vertical options, with Vertical selected. A Save button is present.
- Location:** Features Source (Int GPS, Ext GPS, Manual) and Manual (Latitude: 42.30°, Longitude: -85.20°, Mag Var: 12.1°) settings. A Save button is present.
- Modem:** Shows Option Files (modem_1.opt, 2.3KU_R49223.opt, R49223.opt, Panther_R49223.opt) with Panther_R49223.opt selected. Buttons include Browse..., Add from PC (highlighted in blue), Add from Modem, Remove, View/Save, and Load.
- External Modem:** Includes Modem State (Internal selected, External), Ku Band (1, 2, 3 selected), and Manual Sat Lon (-83.0°). A Save button is present.

At the bottom left, there is a smaller view of the Terminal section.

Figure 70 Panther Configuration page

The Configure page establishes configuration settings for the internal modem. Through this page, the modem password, polarization, and GPS mode settings can be configured, and option files can be managed.

This is a zoomed-in view of the Terminal section of the configuration page. It includes fields for Modem Password (redacted), Note (modem password used by the terminal), and Modem RSSI Max (10.0 dB).

The Terminal segment allows the iDirect modem password to be set. The Modem RSSI Max field sets the upper scale limit of the Panther receive signal strength indicator front panel display and in the corresponding signal indicators on the GUI Monitor and Point pages. This makes it easier for the operator to visualize the peaking of the antenna on a received signal when using the front panel meter.



Gen5 Panther Tri-Band Manpack

User's Manual

TX Polarization

- Horizontal
- Vertical

The TX Polarization segment sets the software to indicate the appropriate transmit polarization. The correct receive polarization is assumed to be cross polarized from the transmit polarization. Check the box associated with the designated TX polarization from the satellite provider. The front panel and GUI will report the selected polarization value.

The Save button will set the changes into memory.

Source

- Int GPS
- Ext GPS
- Manual

The Source segment in the Location region allows the operator to set GPS or Manual mode. Selecting GPS will utilize the internal or external GPS engine to send the position data to the microprocessor, which will calculate and present the pointing solution data to the display. If the operator selects Manual and enters a latitude and longitude into the Manual fields, the microprocessor will compute the pointing solution for the manually entered terminal location. This feature is useful for planning purposes and when GPS lock is not present.

Manual

Latitude: 42.30 °

Longitude: -85.20 °

Mag Var: 12.1 °

The Manual segment of the Location region displays the current latitude, longitude, and magnetic variation values.

Modem

Option Files:	<input type="button" value="Browse..."/>
modem_1.opt	<input type="button" value="Add from PC"/>
23KU_R49223.opt	<input type="button" value="Add from Modem"/>
R49223.opt	<input type="button" value="Remove"/>
Panther_R49223.opt	<input type="button" value="View/Save"/>
	<input type="button" value="Load"/>

The Modem segment allows the operator to browse for and load an option file from an attached drive on a local computer. An option file can also be retrieved from the modem. Available option files are listed in the Option Files segment of the screen and files can be saved, removed, viewed, and loaded. For details on how to load and manage option files from the front panel, refer to "Load an option file from the Panther terminal main menu" on page 71.

External Modem

- Internal
- External

The External Modem segment allows the operator to select the Modem State as Internal or External. This allows an external modem to be connected to the Panther terminal. Selecting the Internal field returns the Panther to the mode that will allow the internal modem to be used.

Ku Band

- 1
- 2
- 3

The Ku-band region only appears when using a Ku-band terminal. This region provides the ability to select the Ku-band region. This field is only active when the operator has selected External under the External Modem segment. 1=European, 2=CONUS, and 3=Intelsat.

Manual Sat Lon:

The Manual Sat Lon field manually selects a satellite longitude in order to display a potential pointing solution. This field is only active when the operator has selected External under the External Modem segment. In normal operation with the internal iDirect modem, the satellite longitude is read from the loaded option file.

The Save button allows the operator to save the changes entered into memory.



Troubleshoot page

The Troubleshoot page is shown in Figure 71.

The screenshot shows the 'Troubleshoot' page of the Panther interface. On the left, a sidebar lists navigation options: Monitor, Point, Configure, Troubleshoot (which is selected), System, Modem, RFE, Int GPS, Ext GPS, and Power. Below this is the L3 communications GCS logo and contact information: Web: www.l-3com.com/gcs and Support: +1.585.742.9145.

The main content area is divided into several sections:

- Modem Alarms:** Comms: ●, Power: ●, Over Temp: ●
- RFE Alarms:** Comms: ●, BUC Lock: ●, DRO Lock: ●
- Int GPS Alarms:** Comms: ●
- Ext GPS Alarms:** Comms: ●
- TX:** State: Network. Buttons: Disable, Enable Network, Enable CW, Enable PN. Note: The modem may need to be reset to re-enter the network after using these commands.
- Power Alarms:** 3.3 V Battery: ● > 3.9 V, 3.6 V Line: ● > 3.6 V, 5 V Line: ● > 4.9 V, 6.5 V Line: ● > 6.4 V, 12 V Line: ● > 12.1 V, 12 V Aux Line: ● > 12.0 V, 15 V Line: ● > 15.0 V, 19.5 V Line: ● > 19.6 V, VAC/VDC Line: ● > 27.9 V, Battery 1: ● > N/A, Battery 2: ● > N/A
- CW/PN:** Frequency: 950.000 MHz, Power: -40.0 dBm, Save button
- Miscellaneous:** Host Temp: 41° C, RF Band Match: ●, Event Log link

Figure 71 Panther Troubleshoot page

The Troubleshoot page indicates alarm conditions and internal voltage status. Green indicators show that the proper data or voltage is present.

Modem Alarms

Comms: ●
Power: ●
Over Temp: ●

Modem Comms indicates that there is serial data communications to/from the modem to the internal microprocessor. Power indicates the power status of the modem. Over Temp indicates the status of the modem temperature.



Gen5 Panther Tri-Band Manpack

User's Manual

RFE Alarms

Comms:

BUC Lock:

DRO Lock:

The RF Alarms segment indicates the synthesizer lock conditions in the block up converter (BUC) and the dielectric resonator oscillator (DRO), which provides the receive local oscillator. Comms indicates that there is serial data communications to/from the modem to the internal microprocessor.

Int GPS Alarms

Comms:

The Int and Ext GPS alarm segments indicate that NMEA data is provided by the internal GPS receiver to the internal microprocessor.

Ext GPS Alarms

Comms:

TX

State: Network

Note: The modem may need to be reset to re-enter the network after using these commands.

The TX segment allows the internal modem's network mode to be enabled or disabled, CW carrier to be enabled, or PN (a pseudo-random data stream at the internally set data rate) to be enabled.

Power Alarms

3.3 V Battery: » 3.9 V

3.6 V Line: » 3.6 V

5 V Line: » 4.9 V

6.5 V Line: » 6.4 V

12 V Line: » 12.1 V

12 V Aux Line: » 12.0 V

15 V Line: » 15.0 V

19.5 V Line: » 19.6 V

VAC/VDC Line: » 27.9 V

Battery 1: » N/A

Battery 2: » N/A

The Power Alarms segment shows whether various internal regulated voltages are within tolerance. It also shows which voltages are active: VAC/VDC or battery.

CW/PN

Frequency: 950.000 MHz

Power: -40.0 dBm

The transmit frequency can be entered in the CW/PN segment and the power toggled from saturated power (setting the power to "0") or a reduced carrier condition in dBm.

Miscellaneous

Host Temp: 41° C

RF Band Match:

[Event Log](#)

The Miscellaneous segment displays the host temperature, whether RF band match has been accomplished, and a link to the Event log. RF band match is accomplished when the Panther terminal has validated that the iDirect option file matches the RFE band.



Gen5 Panther Tri-Band Manpack

User's Manual

Event log

The Event Log link on the Troubleshoot page displays a list of event entries categorized by time and source. Table 4 lists the different source types and the various events related to each source. Figure 72 shows an example event log. An event is any loggable occurrence that is initiated from a predetermined system source. System sources and loggable events include:

Source	Event relates to
GPS	Global positioning system hardware or connectivity
Modem	Internal or external modem connectivity
Power	AC or DC voltage conditions
RFE	Radio frequency equipment hardware or communications
System	Power on and off

Table 4 Ku-band: Event log source descriptions

Event logs can be cleared. To clear an event log, check the box labeled "Check to enable clearing of event log" at the bottom of the event log screen (refer to Figure 72), then select the **Clear** button. The event log is cleared of all entries.

Panther™		
	<input type="checkbox"/> Clear	<input type="checkbox"/> Check to enable clearing of event log
		Current Time: 2012-09-27, 14:42:08
Monitor		
Point		
Configure		
Troubleshoot		
System		
Modem		
RFE		
Int GPS		
Ext GPS		
Power		
L3 communications Web: www.l-3com.com/gcs Support: +1.585.742.9145		
Time	Source	Description
2012-09-27, 14:13:49	RFE	Established comms.
2012-09-27, 14:13:48	Power	5V Line in range.
2012-09-27, 14:13:48	Power	3.3V Battery in range.
2012-09-27, 14:13:48	Power	3.6V Line in range.
2012-09-27, 14:13:48	Power	12V Aux Line in range.
2012-09-27, 14:13:48	Power	15V Line in range.
2012-09-27, 14:13:48	Power	19.5V Line in range.
2012-09-27, 14:13:48	Power	DC Line in range.
2012-09-27, 14:13:48	Power	24V Line in range.
2012-09-27, 14:13:48	Power	Battery 2 Line in range.
2012-09-27, 14:13:48	Power	Battery 1 Line in range.
2012-09-27, 14:13:48	System	Powered on.
2012-09-20, 21:59:08	RFE	Established comms.
2012-09-20, 21:30:11	Power	5V Line in range.
2012-09-20, 21:30:11	Power	3.3V Battery in range.
2012-09-20, 21:30:11	Power	3.6V Line in range.
2012-09-20, 21:30:11	Power	12V Aux Line in range.
2012-09-20, 21:30:11	Power	15V Line in range.
2012-09-20, 21:30:11	Power	19.5V Line in range.
2012-09-20, 21:30:11	Power	DC Line in range.
2012-09-20, 21:30:11	Power	24V Line in range.
2012-09-20, 21:30:11	Power	Battery 2 Line in range.
2012-09-20, 21:30:11	Power	Battery 1 Line in range.
2012-09-20, 21:30:10	System	Powered on.
2012-09-20, 21:29:00	XGPS	Lost comms.
2012-09-20, 21:29:00	XGPS	Lock Lost.
2012-09-20, 20:59:47	System	Real Time Clock set succeeded.
2012-09-20, 20:59:47	XGPS	Lock established.

Figure 72 Troubleshoot event log



External modem connections to Panther

In order to utilize an external L-band modem with the Panther terminal, the Configuration page segment for Modem State must be set to External. There must also be the presence of a 10 MHz frequency standard at a nominal 0 dBm with a tolerance of +3/-0 dB. This signal is normally available from commercial L-band modems as a configuration item. When the External Modem function is selected, the external modem connects directly to the RFE.

The Panther receive path is down converted to L-band and provided directly to the external modem from the RFE (J13).



Panther teardown and stow procedure

The following section describes how to tear down and pack the Panther system. Refer to "Panther terminal packout" on page 48 for proper storage locations.

1. Turn off power to the Panther manpack. Detach the AC power cord and stow in the cable pouch.
2. Remove the DC cable from the Panther and the AC/DC converter assembly and place in the cable pouch.
3. Remove the AC/DC converter and place it in the case.
4. Detach all remaining cables from the RFE, modem chassis, and the feed assembly. Coil neatly and stow in the cable pouch.
5. Re-attach all covers to all the connectors.
6. Grasp the hub with one hand and loosen the articulation assembly with the other hand. Tilt up the articulation assembly so the dish is horizontally oriented and pointed at 90°.
7. Extract the first petal from the hub assembly and slide the "J" clips apart by carefully applying pressure with the thumb of each hand at the petal edges. Ease the petal out of the alignment pin.
8. Remove all other petals by carefully extracting them from the hub assembly.
9. Make two sets of four petals. Stow four of the petals in a nest and pin each nest in place using the supplied stow pin.
10. Release the hub ring clamp assembly and extract the feed assembly. Place the feed assembly into the transit case.
11. Loosen the support arm clamp.
12. Detach the hub ring clamp assembly from the support arm. Place the hub ring clamp assembly into the transit case.
13. Unlatch the articulation assembly from the Panther terminal. Ensure that the assembly is secured in the horizontal, stow position.
14. Remove the RFE from the modem chassis and place it in the transit case.
15. Remove the battery box from the modem chassis and any batteries and place them into the transit case. Batteries are generally not acceptable to be in the case for shipping aboard aircraft.
16. Remove the outriggers from the Panther terminal and place them in the transit case.
17. Place the Panther modem chassis into the transit case.
18. Place the antenna petal nests 1 and 2 into the dish storage bag and place the bag in the transit case.
19. Place the cable pouch in the transit case.
20. Ensure there are no obstructions and carefully close and latch the transit case lid.

The teardown procedure is complete.

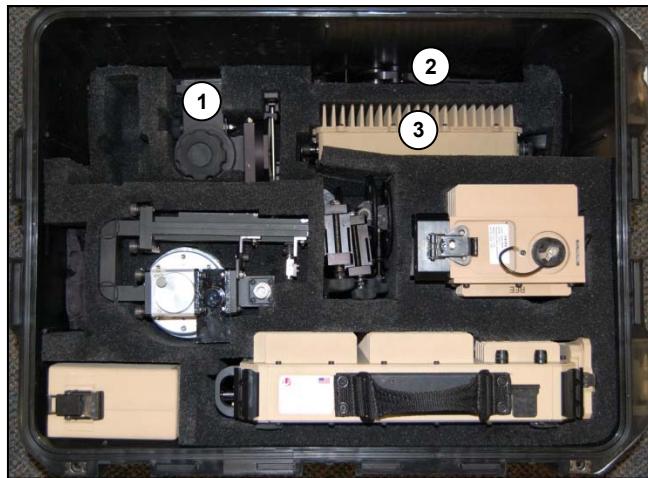
Panther terminal packout


Figure 73 Panther case (bottom layer)

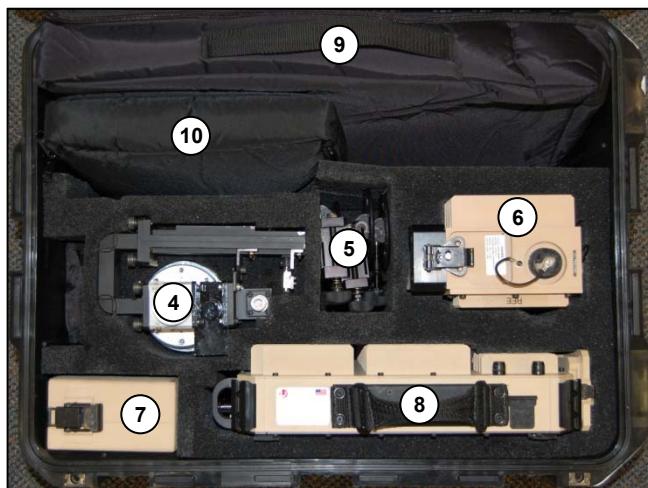


Figure 74 Panther case (top layer)

Panther Terminal Case		
	Description	Qty
1	Articulation assembly	1
2	Feed clamp	1
3	AC/DC converter	1
4	Feed assembly	1
5	Outriggers	4
6	RFE	1
7	Battery box	1
8	Modem chassis	1
9	Reflector pouch with eight petals	1
10	Cable pouch	1



Gen5 Panther Tri-Band Manpack

User's Manual



Figure 75 Panther cable pouch contents



Figure 76 Ka-Band: RFE to antenna TX RF cable

Panther Terminal Cable Pouch		
	Description	Qty
1	Modem to RFE cable, TX L-band (0170-4160-01)	1
2	Modem to RFE cable, RX L-Band (0170-4170-01)	1
3	RFE to antenna cable, RX RF (0170-4180-01)	1
4	RFE to antenna cable, TX RF (0170-4190-01)	1
5	Cable pouch	1
6	Garmin GPS (optional)	1
7	Satellite reference card	1
8	Suunto compass/inclinometer	1
9	Modem to RFE Power and M&C cable (0170-4150-01)	1
10	AC power cable, Panther (0164-1250-01)or (0170-1250-01)	1
11	DC power in cable (0170-6450-01)	1
12	2m terminal to TCP data cable (0149-4002-02)	2
13	Ka-band RFE to antenna TX RF cable (<i>Ka-band only</i>)	1



Functional descriptions

Main chassis

The main chassis contains the following internal subassemblies. These subassemblies are accessible only by trained personnel.

- **Internal modem:** Provides the translation to and from baseband network data to L-band IF frequencies in the range of 950 MHz to 1700 MHz. The iDirect e850mp internal modem is incorporated into the design of the main chassis.
- **Power supply regulator assembly:** Provides the subregulated voltages necessary to power the internal modem, interface board, and RF electronics (RFE).
- **Host processor board:** Integrates the following items into a sub-assembly:
 - ❖ **Host processor microprocessor:** The host processor microprocessor is programmed with code that defines the product version and interacts with the provided internal modem. Communication with the host processor microprocessor is accomplished through the front panel network connections. The host processor utilizes a port on the internal network switch. Programming code is uploaded to the host processor through the network connection.
 - ❖ **Network switch:** A five-port unmanaged switch integrated into the interface board. Connections are made through subminiature connectors to RJ-45 interfaces. The fifth port of the network switch is unused.
 - ❖ **Receive IF splitter:** The receive path from the receive RF down conversion is split and passed to the internal modem and to the front panel. This provides the ability to connect a spectrum analyzer to monitor downlink spectra at L-band. The signal level available at the front panel is approximately -55dBm in the range of 950 MHz to 1700 MHz. The RX monitor (RX Mon) port of the modem chassis is only operable when using the internal iDirect modem.
 - ❖ **GPS receive engine:** The GPS is mounted to the modem chassis for normal operation.
 - ❖ **Display board:** Indicates the presence of terminal power, status of the internal modem, signal strength of the desired signal, and any fault indications.



Gen5 Panther Tri-Band Manpack

User's Manual



Figure 77 Panther front panel display

- **Front and side panels:** The terminal front and side panels, shown in Figure 78 and Figure 79, contains the following controls:
 - ❖ DC power input (J1)
 - ❖ RFE power/monitor and control (J2)
 - ❖ RX input (J3)
 - ❖ TX output (J4)
 - ❖ LAN port (J5, J6)
 - ❖ RX monitor (J7)
 - ❖ GPS antenna BNC (J8)
 - ❖ Power switch (Off/On blackout/On display)



Figure 78 Panther front panel

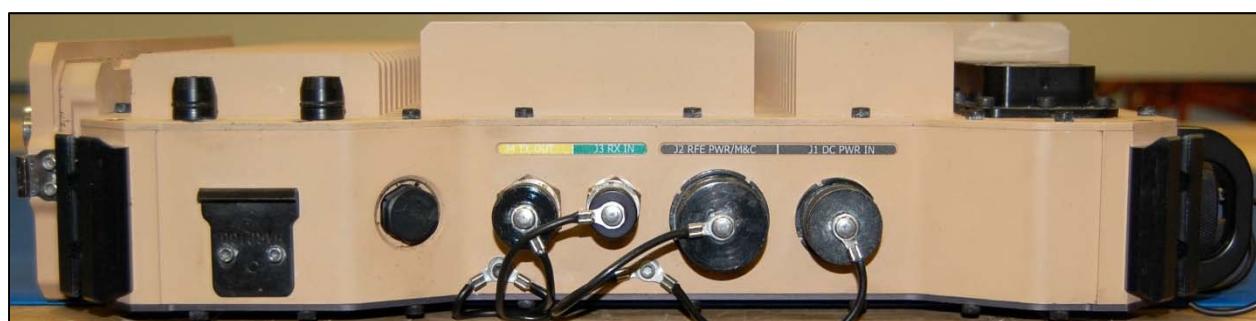


Figure 79 Panther side panel



RFE

The following sections describe the primary components of the radio frequency equipment (RFE): the receive and transmit sections and airflow.

Transmit section

The RFE transmit section comprises an up-conversion from the internal modem L-band output, through a filter, a block up-converter (BUC) and a solid state power amplifier (SSPA) to the 13 Watt level.

Transmit system local oscillator (LO) is 12.800 GHz. This yields a Panther TX frequency range of 13.750 GHz to 14.500 GHz.

Receive section

The RFE receive section comprises a down-conversion from Ku-band to L-band for presentation to the input of the internal modem. The RFE provides +15 VDC on the center conductor of the input TNC connector (J15) to power an LNA located on the feed.

The Panther receive range is determined by the setting on the Configuration page of the Web-based GUI. Refer to "Appendix A: GCS-3104EXP-01T Panther system specifications" on page 58 for additional details.

Antenna assembly

Figure 80 shows the rear and front view of the Ku-band, X-band, and Ka-band Panther antenna assemblies.

Transmit: Viewed from the rear, the transmit Type-N connector is located on the end of the Ku-band feed assembly, as shown in Figure 81. A 24" cable is provided with a Type-N male on the antenna end and a Type-N male connector on the RFE end.

Receive: Viewed from the rear, the SMA connector attaches to the output side of the LNA, which is attached to a waveguide-to-coax adapter. The waveguide adapter is attached to a filter on the feed assembly. A 24" cable is provided with an SMA male on the antenna end and a TNC male connector on the RFE end.

LNA: +15 VDC power for the LNA is provided on the center conductor of the coax that feeds the antenna receive output port.



Figure 80 Ku-band and X-band antenna assembly—front view

Ku-band articulation

Although the Panther Ku-band antenna can rotate about the central axis, the polarization is set to the polarization value by means of rotation of the feed. Set the feed orientation as shown in Figure 81. Tighten the clamp assembly with the feed in the indicated position. Refer to "Band polarization (Ku-band only)" on page 24 for specific details.

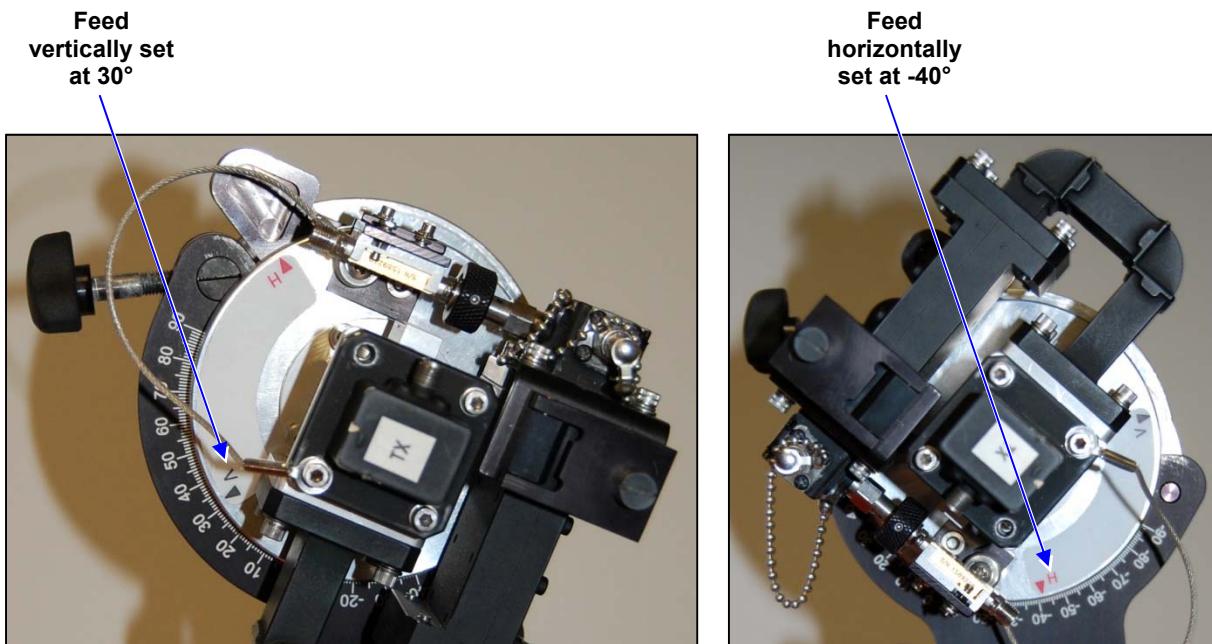


Figure 81 Panther antenna articulation

AC/DC power connections

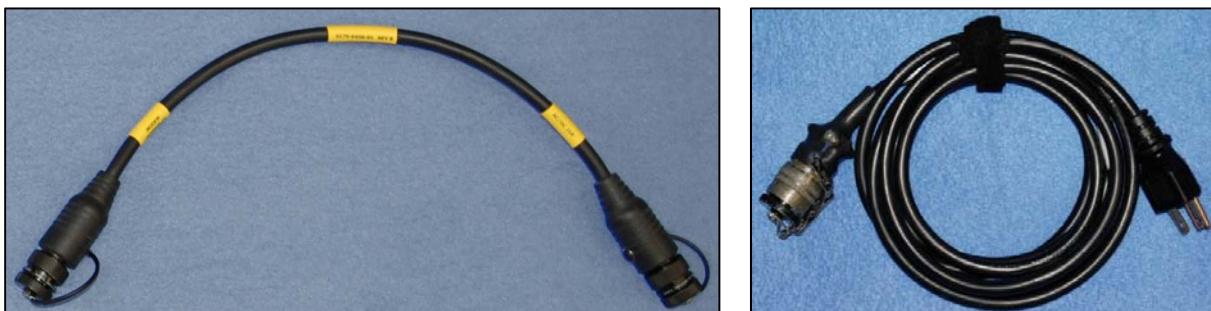
AC and DC power connections are available from the rear of the AC/DC converter assembly. Power connections can be made using the supplied cables.

- Attach the AC cable to **J18 AC IN** as shown in Figure 82.
- Attach the DC power cable from **J19 DC OUTPUT** on the AC/DC converter to **J16 DC PWR IN** on the Panther, as shown in Figure 82.

Figure 83 shows the DC power cable and AC power cable.



Figure 82 Panther AC and DC power connections view



DC power cable

AC power cable

Figure 83 DC power cable and AC power cable



Gen5 Panther Tri-Band Manpack

User's Manual

Battery assembly

The Panther battery assembly allows the Panther to be operated from DC battery power, provided from either two BB-390 or BB-2590 batteries. The BB-390 battery is a Nickel-Metal Hydride (NiMH) cell set that provides high-energy density.

The BB-390 battery is a rechargeable battery. Indicators are provided on the BB-390 battery to determine the battery's state-of-charge. Figure 84 shows the battery.



Figure 84 BB-390 rechargeable battery

The Panther can use two BB-390 batteries in normal operation. The batteries are placed in the battery case and attached to the front of the modem chassis. Figure 85 shows the battery pair installed in the battery box. Figure 86 shows the battery box with batteries attached to the Panther modem chassis.



Figure 85 BB-390 batteries in battery box



Figure 86 Battery box attached to modem chassis



Gen5 Panther Tri-Band Manpack

User's Manual

Battery warnings

The following warnings should be taken into consideration to ensure safe operation and battery health.

Battery use

It is important the following warnings are observed when using the battery.

- Rechargeable battery packs may get hot, explode, or ignite and cause serious injury if exposed to abusive conditions. To avoid this, follow each of these safety warnings:
 - Do not place the battery in a fire or heat the battery.
 - Do not connect the positive and negative terminal to each other with a metal object.
 - Do not carry or store the battery with other loose metal objects.
 - Do not pierce, strike, step on the battery, or subject the battery to strong impacts or shocks.
 - Do not solder directly onto the battery.
- Do not disassemble or modify the battery. The battery contains safety and protection devices that, if damaged, may cause the battery to generate heat, explode, or ignite.
- Do not place the battery in or near fire, on stoves, or other high temperature locations.
- Immediately discontinue using the battery if, while using it, or storing it, the battery emits an unusual smell, feels hot, changes color or shape, or appears abnormal in any other way. Contact the battery manufacturer if any of these problems are observed.
- Do not place the battery in a microwave oven, high-pressure container, or on induction cookware.
- If the battery leaks and fluid gets into an individual's eye, do not rub the eye. Rinse well with water and immediately seek medical care. If left untreated, the battery fluid could damage the eye.



Appendix A: GCS-3104EXP-01T Panther system specifications

Dimensions (L x W x H): 25.5" x 19.5" x 15.75"

Weight: 76 lbs

Packaging: All components integrated or stowed. Handle for single hand carry.

Operating temperature: -32° C (basic cold) to +50° C

Storage temperature: -32° C (basic cold) to +72° C

Non-operational vibration: MIL-STD-810G, Method 514.5, Procedure I, Restrained Cargo, Category 4.

Non-operational shock: MIL-STD-810G, Method 516.5, Procedure II and IV.

Moisture: Designed to meet MIL-STD-810G, Method 506.4, Procedure I.

Sand and dust: Designed to meet MIL-STD-810G, Method 510.4.

Wind rating: 20MPH operational, 40 MPH survivor gusting with anchor weights.

AC power input: Auto-sensing worldwide 90-240VAC, 47-63 Hz.

DC power input: 18-48 VDC source, regardless of source.

Frequency ranges: Ku-band RX: 10.95–12.75 GHz, TX: 13.750–14.500 GHz

X-band RX: 7.25–7.75 GHz, TX: 7.90–8.40 GHz

Ka-band RX: 20.2–21.2 GHz, TX: 30.0–31.0 GHz

Power output: Ku-band 13 Watts (41.14 dBm) P1dB

X-band 10 Watts (40.0 dBm) PLin

Ka-band 4 Watts (36 dBm) PLin

Antenna: 24" parabolic

Modem interface: TCP/IP

Polarization: Vertical or horizontal linear or LHCP/RHCP, configurable.

LAN interface: 10/100 BaseT Ethernet on RJ-45

Reliability: Continuous duty in desert to Arctic temperatures; operable in rain, dust, or fog.



Appendix B: Packing list

Table 5 contains all items associated with the Ku-band Panther terminal. Figure 87 shows a component layout of the entire system.

NOTE: All parts are available from L3-GCS by contacting the service department at 585-742-9145 or toll free at 877-247-1207.

Ku-band Panther terminal

Figure item #	Part #	Qty	Description
1	0170-7000-01B	1	Foamed case assy, hardshell, Panther, G5 Ku-band
2	0170-5110-01	1	Articulation assembly main, Gen5 Panther
3	0170-5150-01	1	Gen5 arm assembly
4	0170-2500-01	1	RFE assembly, Gen5 Panther Ku-band
5	0170-1000-01	1	Assembly, modem chassis, Gen5 Panther
6	0170-2050-01	4	Assembly, outrigger, Gen5 Panther
7	0170-8000-01	1	AC/DC battery box converter assembly
8	0170-4500-01	1	Feed Assembly
9	0170-6000-01	1	Assembly, AC/DC converter, Gen5 Panther
10	64-00005	8	24" parabolic dish
11	0164-4122-01	2	Pin, petal storage
12	0164-4121-01	1	Bag, dish storage
13	0170-4150-01	1	Cable assembly, modem to RFE power and M&C
14	0170-4160-01	1	Cable assembly, modem to RFE, TX L-band
15	0170-4170-01	1	Cable assembly, modem to RFE, RX L-band
16	0170-4180-01	1	Cable assembly, RFE to antenna RX RF
17	0170-4190-01	1	Cable assembly, RFE to antenna TX RF
18	0170-6450-01	1	Cable assembly, DC power in
19	0164-1250-01	1	Cable assembly, AC power, SDN-L Panther (0170-1250-01 alternate)
20	0149-4002-02	2	Data cable, 2m terminal to TCP
21	0100-0081-01	1	Cable pouch
22	86-25583	1	Reference card, satellite pointing
23	0170-0170-01	1	Inventory card, tri-band Gen5 Panther, Ku-band
24	0170-0150-02	1	User's manual, tri-band Gen5 Panther
25	65-80011	1	Tandem Compass/Clinometer, Suunto

Table 5 Ku-band Panther terminal packing list

**Figure 87** Ku-band Panther terminal component layout



Gen5 Panther Tri-Band Manpack

User's Manual

X-band Panther terminal

Table 6 contains all items associated with the X-band Panther terminal. Figure 88 shows a component layout of the entire system.

NOTE: All parts are available from L3-GCS by contacting the service department at 585-742-9145 or toll free at 877-247-1207.

Figure item #	Part #	Qty	Description
1	0170-7000-01B	1	Foamed case assy, hardshell, Panther, G5 Ku-band
2	0170-5110-01	1	Articulation assembly, Gen5 Panther
3	0170-5150-01	1	Gen5 arm assembly
4	0170-2600-01	1	RFE assembly, Gen5 Panther X-band
5	0170-1000-01	1	Assembly, modem chassis, Gen5 Panther
6	0170-2050-01	4	Assembly, outrigger, Gen5 Panther
7	0170-8000-01	1	AC/DC battery box converter assembly
8	0170-4600-01	1	Feed Assembly
9	0170-6000-01	1	Assembly, AC/DC converter, Gen5 Panther
10	64-00005	8	24" parabolic dish
11	0164-4122-01	2	Pin, petal storage
12	0164-4121-01	1	Bag, dish storage
13	0170-4150-01	1	Cable assembly, modem to RFE power and M&C
14	0170-4160-01	1	Cable assembly, modem to RFE, TX L-band
15	0170-4170-01	1	Cable assembly, modem to RFE, RX L-band
16	0170-4180-01	1	Cable assembly, RFE to antenna RX RF
17	0170-4190-01	1	Cable assembly, RFE to antenna TX RF
18	0170-6450-01	1	Cable assembly, DC power in
19	0164-1250-01	1	Cable assembly, AC power, SDN-L Panther (0170-1250-01 alternate)
20	0149-4002-02	2	Data cable, 2m terminal to TCP
21	0100-0081-01	1	Cable pouch
22	86-25583	1	Reference card, satellite pointing
23	0170-0170-02	1	Inventory card, tri-band Gen5 Panther, X-band
24	0170-0150-02	1	User's manual, tri-band Gen5 Panther
25	65-80011	1	Tandem Compass/Clinometer, Suunto

Table 6 X-band Panther terminal packing list



Figure 88 X-band Panther terminal component layout



Gen5 Panther Tri-Band Manpack

User's Manual

Ka-band Panther terminal (0170-0000-03)

Table 7 contains all items associated with the Ka-band Panther terminal. Figure 89 shows a component layout of the entire system.

NOTE: All parts are available from L3-GCS by contacting the service department at 585-742-9145 or toll free at 877-247-1207.

Figure item #	Part #	Qty	Description
1	0170-7000-01B	1	Foamed case assy, hardshell, Panther, G5 Ku-band
2	0170-5110-01	1	Articulation assembly, Gen5 Panther
3	0170-5150-01	1	Gen5 arm assembly
4	0170-2700-01	1	RFE assembly, Gen5 Panther Ka-band
5	0170-1000-01	1	Assembly, modem chassis, Gen5 Panther
6	0170-2050-01	4	Assembly, outrigger, Gen5 Panther
7	0170-6448-01	1	AC/DC battery box converter assembly
8	0170-4700-01	1	Feed assembly
9	0170-6000-01	1	Assembly, AC/DC converter, Gen5 Panther
10	64-00005	1	24" parabolic dish
11	0164-4122-01	2	Pin, petal storage
12	0164-4121-01	1	Bag, dish storage
13	0170-4150-01	1	Cable assembly, modem to RFE power and M&C
14	0170-4160-01	1	Cable assembly, modem to RFE, TX L-band
15	0170-4170-01	1	Cable assembly, modem to RFE, RX L-band
16	0170-4180-01	1	Cable assembly, RFE to antenna RX RF
17	0170-4195-01	1	Cable assembly, Ka-band RFE to antenna TX RF
18	0170-6450-01	1	Cable assembly, DC power in
19	0164-1250-01	1	Cable assembly, AC power, SDN-L Panther (0170-1250-01 alternate)
20	0149-4002-02	2	Data cable, 2m terminal to TCP
21	0100-0081-01	1	Cable pouch
22	86-25583	1	Reference card, satellite pointing
23	0170-0170-03	1	Inventory card, tri-band Gen5 Panther, Ka-band
24	0170-0150-02	1	User's manual, tri-band Gen5 Panther
25	65-80011	1	Tandem Compass/Clinometer, Suunto

Table 7 Ka-band Panther terminal packing list



Figure 89 Ka-band Panther terminal component layout

Appendix C: Changing the Ka-band polarization

The following steps will change the polarization sense of the feed as needed for the satellite in use.

1. Determine which polarization sense is required. Figure 90 shows the feed set for right-hand circular polarization transmit (RHCP TX) and left-hand circular polarization receive (LHCP RX). Figure 91 shows RHCP TX/LHCP RX.

The feed assembly must be set for the appropriate transmit circular polarization and receive circular polarization sense. The adjustment to the feed assembly is made by moving the transmit waveguide segments from one position to the adjacent position and by moving the receive LNA from one position to the adjacent position.

NOTE: If the transmit polarization is set to RHCP, the corresponding receive polarization must be set to LHCP. Likewise, if the transmit polarization is set to LHCP, the receive polarization must be set to RHCP. The Panther display shows a shorthand indication of the polarization RH-T or LH-T.

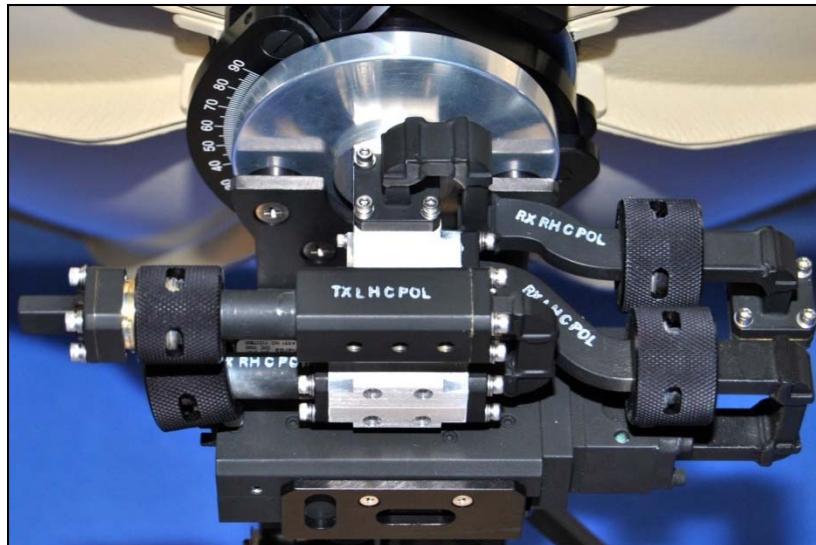


Figure 90 Ka-band: Polarization shown as RHCP TX

2. Prepare the feed for LHCP TX/RHCP RX by switching the waveguide terminations to the appropriate unused ports. Figure 91 shows how to move the waveguide termination from one port to the other.



Figure 91 Ka-band: Moving transmit polarization to RHCP TX

-
3. Temporarily remove the RX waveguide termination, as shown in Figure 92.

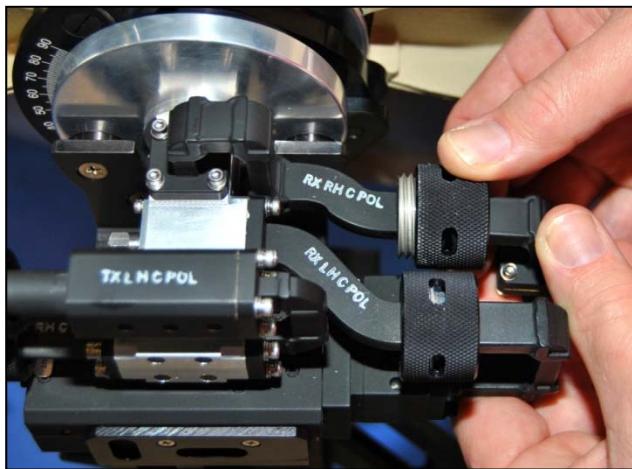


Figure 92 Ka-band: Remove RX waveguide termination

4. Loosen the knurled thumb screws to adjust the position of the LNA to the appropriate waveguide port. Refer to Figure 93.

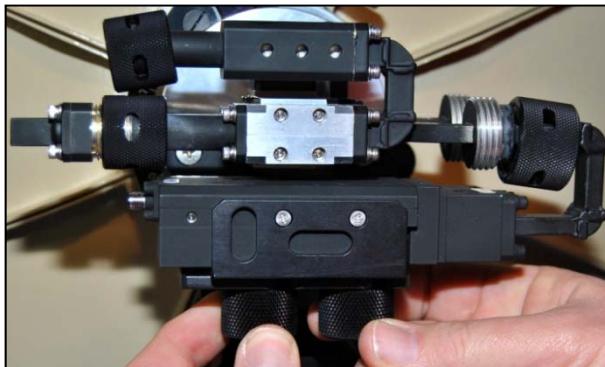


Figure 93 Ka-band: Loosen LNA assembly

5. Move the LNA to the proper waveguide port by sliding the assembly forward to the proper position. Refer to Figure 94.

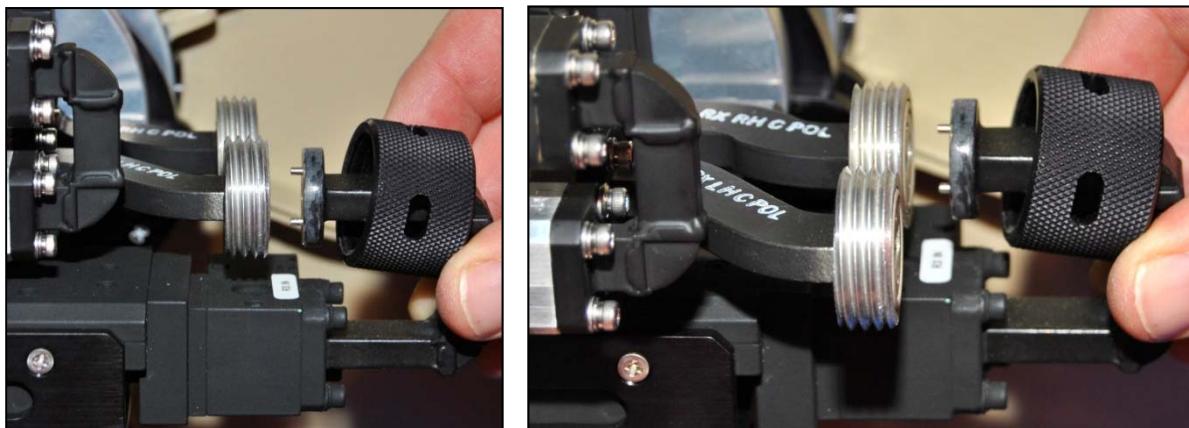


Figure 94 Ka-band: LNA moved to either front or back port

6. Place the RX waveguide termination on the unused port. Ensure the termination is oriented so the mounting posts are positioned properly, as shown in Figure 95.



Figure 95 Ka-band: Mount RX waveguide termination

7. Connect the RX coax to the LNA. Refer to Figure 96.



Figure 96 Ka-band: RX coax connected to LNA

8. Connect the TX waveguide to the transmit port. Refer to Figure 97.

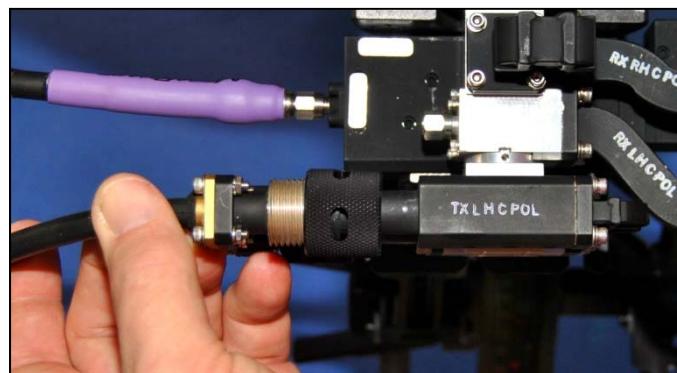


Figure 97 Ka-band: TX waveguide installed on transmit port



Appendix D: Panther terminal menu procedures

This appendix describes the features available through the Panther terminal main menu. These features include:

- Setting the modem transmit power
- Placing the terminal online or offline
- Selecting a GPS location source (internal, external, or manual)
- Loading and managing option files

Panther terminal main menu

The Panther main menu provides simple user-accessible menus that set the transmit power, place the Panther online or offline, define the GPS location source, and load option files. The main menu is operated using the Panther up/down buttons located to the right of the main screen. Refer to Figure 98.

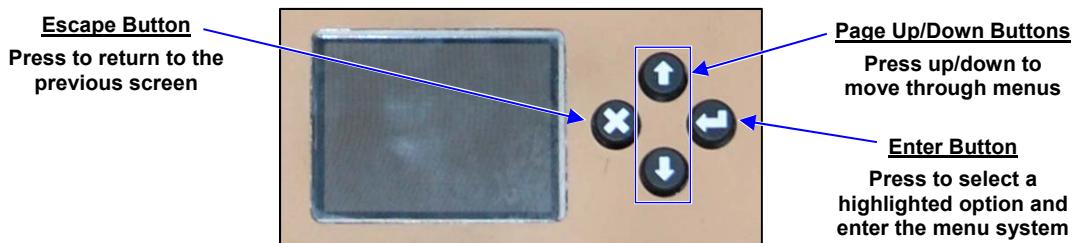
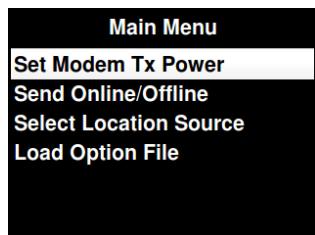


Figure 98 Panther terminal screen and Up/Down buttons

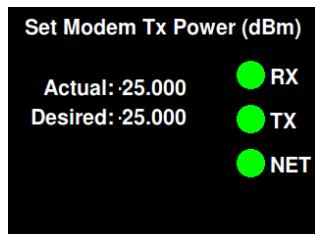
To move up or down, press the up arrow or down arrow. To select a highlighted option, press the Enter button. To access the Panther main menu, press the Escape button until the main menu has been accessed.

Set transmit power

The following steps describe how to set the Panther terminal transmit power from the Panther terminal main menu. The transmit power range is -40 dBm to 5 dBm. The settings in this section can also be configured in the Modem TX Power segment of the Panther terminal Point Web screen. Refer to the "Point page" on page 39 for details.



1. Highlight **Set Modem Tx Power** from the Panther main menu.



2. Press the Enter button to select the option. The **Set Modem Tx Power (dBm)** screen displays.
3. Press the up/down arrows to change the TX power setting. The new value is automatically sent to the modem and will be displayed in a few seconds.

The set transmit power process is complete.

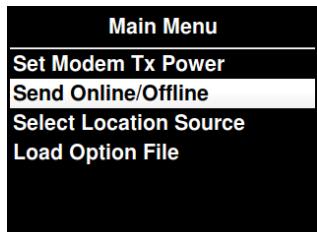


Gen5 Panther Tri-Band Manpack

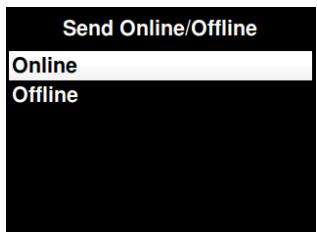
User's Manual

Place the Panther terminal online or offline

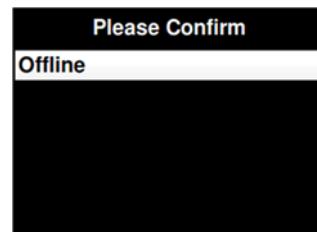
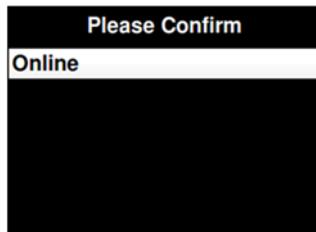
The following steps describe how to place the Panther terminal online or offline from the Panther terminal main menu.



1. Highlight **Send Online/Offline** from the Panther Main Menu and press the Enter button. The “Send Online/Offline” screen displays.

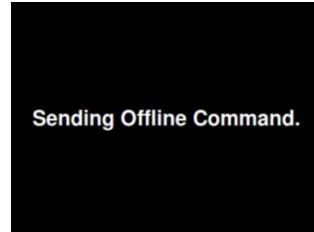


2. Highlight **Online** or **Offline** and press the Enter button to select the highlighted option. The “Please Confirm” screen displays.



3. Press the Enter button to confirm the highlighted option. If the highlighted option is incorrect, press the **Escape** button to return to the previous screen.

If the modem was placed online or offline successfully, one of the following screens displays:





Gen5 Panther Tri-Band Manpack

User's Manual

If the modem was placed online or offline unsuccessfully, one of the following screens reports the failure:

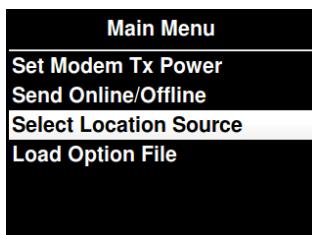


If the online or offline process failed, press the Escape button to exit the failure screen and return to the Panther main menu.

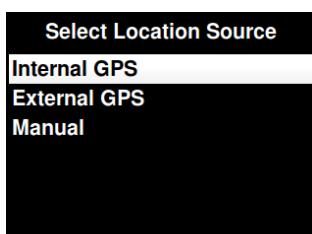
The online/offline process is complete.

Select location source

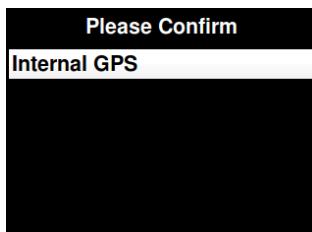
The following steps describe how to select a location source from the Panther terminal main menu. The source location can be set to internal, external, or manual. Manual relies on manual configuration from the Configure screen, which is accessible from the Panther Web screen. Refer to “Configure page” on page 41 for Web configuration details.



1. Highlight **Select Location Source** from the Panther Main Menu and simultaneously press the Enter button. The “Select Location Source” screen displays a list of GPS location sources.



2. Use the Up/Down buttons to highlight the appropriate setting. Press the Enter button to select the highlighted selection. The Please Confirm screen displays.



3. Confirm the selected location source setting by pressing the Enter button. Cancel the selection by pressing the Escape button. Once the setting is confirmed, a success screen indicates confirmation of the new setting.

The location source selection process is complete.

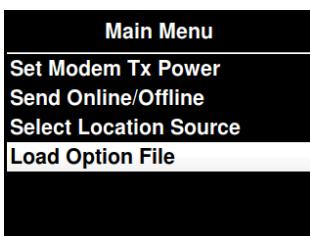


Gen5 Panther Tri-Band Manpack

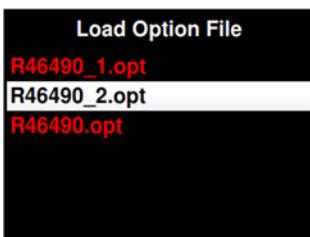
User's Manual

Load an option file from the Panther terminal main menu

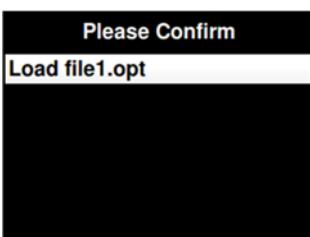
The following steps describe how to load an option file from the Panther terminal main menu.



1. Highlight **Load Option Files** and press the Enter button. The “Load Option File” screen displays a list of available option files.

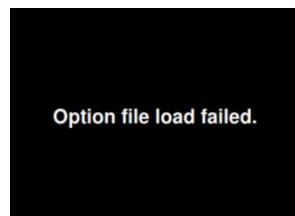
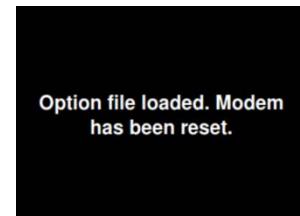


2. Press the Up/Down buttons to highlight the appropriate option file from the list. Press the Enter button to select the option file. The “Please Confirm” screen displays.



3. Confirm the option file selection by pressing the Enter button. If the selection is incorrect, press the Escape button to revert back to the previous step. If it is correct, the Panther will attempt to load the chosen option file.

4. Verify the option file loaded successfully. The Panther terminal reports success or failure, as shown in the screens below.



This completes the option file loading process.



Loading an option file from the Panther Web GUI

An option file can be changed by selection of a new file on the Configure page of the Panther GUI. For further discussion the Configuration Web page, refer to "Configure page" on page 41.

Figure 99 shows the option file section of a Panther terminal Web page.

Modem segment where option files are managed

Only displays with Ku-band terminals

The screenshot shows the 'Configure' tab selected in the left navigation menu. In the 'Modem' section, there is a list of 'Option Files' containing 'modem_1.opt', '2.3KU_R49223.opt', 'R49223.opt', and 'Panther_R49223.opt'. The 'Panther_R49223.opt' file is highlighted with a blue selection bar. To the right of the file list are five buttons: 'Browse...', 'Add from PC', 'Add from Modem', 'Remove', 'View/Save', and 'Load'. A blue arrow points from the text 'Modem segment where option files are managed' to the 'Modem' section. Another blue arrow points from the text 'Only displays with Ku-band terminals' to the 'Ku Band' section.

Figure 99 Panther Configure page



Load a new option file

To select and load a new option file previously stored, highlight the file viewed in the selection window and click **Load**. Refer to Figure 100.

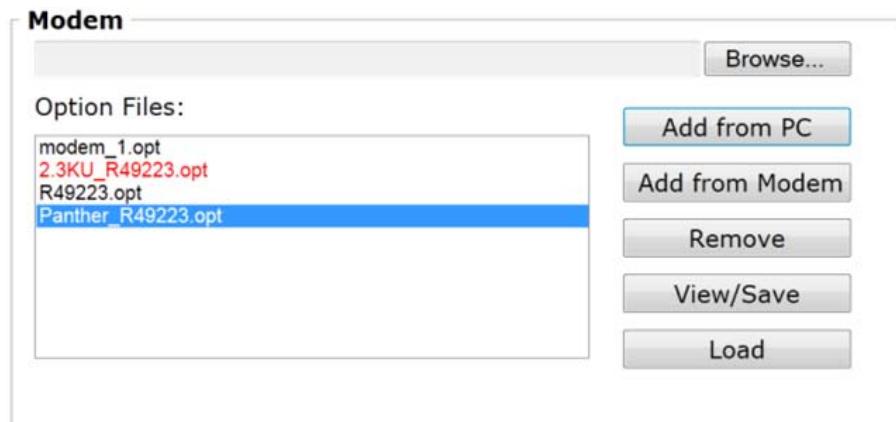


Figure 100 Option file selection GUI

Loading an option file is usually accomplished within about two minutes. When a new option file is loaded, the terminal will go through a restart and the terminal will temporarily lose communication with the terminal modem. All critical display parameters will be refreshed.

Add a new option file from a PC

To add a new option file from an attached PC into the available option file space:

1. Click **Browse** and look for the file in the appropriate subdirectory.
2. Click on **Add from PC**. The file will appear on the list, as shown in Figure 100.
3. Follow the load instructions, as described previously.

Add from Modem

The **Add from Modem** button retrieves a default option file stored in the modem. The retrieved option file is saved in the Option File list shown in Figure 100. It can then be viewed or edited using the **View/Save** button described below.

Remove an option file

To remove a file, highlight the desired file from the option file list and click **Remove**. The file will be removed from the displayed option file list.

View/Save an option file

To view or save an option file shown in the Option File list, highlight the file name in the list and click the **View/Save** button. The file will open. It can then be viewed/edited and can be saved by clicking **File** and then **Save**. The file is saved in the Option File list shown in Figure 100. The file name is saved as *modem.opt*. If this file is already used, a number will be appended to the end of the file name. For example, *modem1.opt*, *modem2.opt*, etc.

Load an option file

The **Load** file button loads a highlighted option file.



Appendix E: Acronyms and definitions

ACU	Antenna Control Unit
dB	Decibels
dBm	Decibels above/below 1 mW in 50 Ohms
CW/PN	Continuous wave/pseudo random data
Down-Link (Inbound)	Traffic from the Hub (NOC) to the Remote VSAT
Eb/No	Energy per bit over Noise density per Hz of bandwidth
EIRP	Effective Isotropically Radiated Power
FDMA	Frequency Division Multiple Access
FEC	Forward Error Correction Code
GEO	Geostationary Earth Orbit
GPS	Global Positioning System
IF	Intermediate Frequency
IFL	Inter Facility Link
I/O	Input/Output
LAN	Local Area Network
LNA	Low Noise Amplifier
LNB	Low Noise Block Down Converter
LO	Local oscillator
NOC	Network Operations Center
OMT	Ortho Mode Transducer
RF	Radio Frequency
RFE	Radio Frequency Electronics module
ROLL	Rotation angle for flat panel antenna
RSSI	Receive signal strength indicator
RX	Receive
SCPC	Single Channel Per Carrier
SNR	Signal-to-Noise Ratio
SSPA	Solid State Power Amplifier
TDMA	Time Division Multiple Access
TWIST	Setting the flat panel antenna polarization to position A to B
TX	Transmit
Up-Link (Outbound)	Traffic from Remote VSAT to the Hub (NOC)
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminal



Gen5 Panther Tri-Band Manpack

User's Manual

[This page blank for double-sided printing.]

Headquarters:

7640 Omnitel Place • Victor, NY 14564 USA

Voice: +1.585.742.9100 • Fax: +1.585.742.1914

Web site: <http://www.L-3com.com/gcs>

E-mail: GCS.Support@L-3com.com



communications

GCS