



READY: (+UP -dwn)
IDLE SatA0 99.0

RUN
STOP



MVS Series Antennas Operating Instructions

March 2007

Version 3.5

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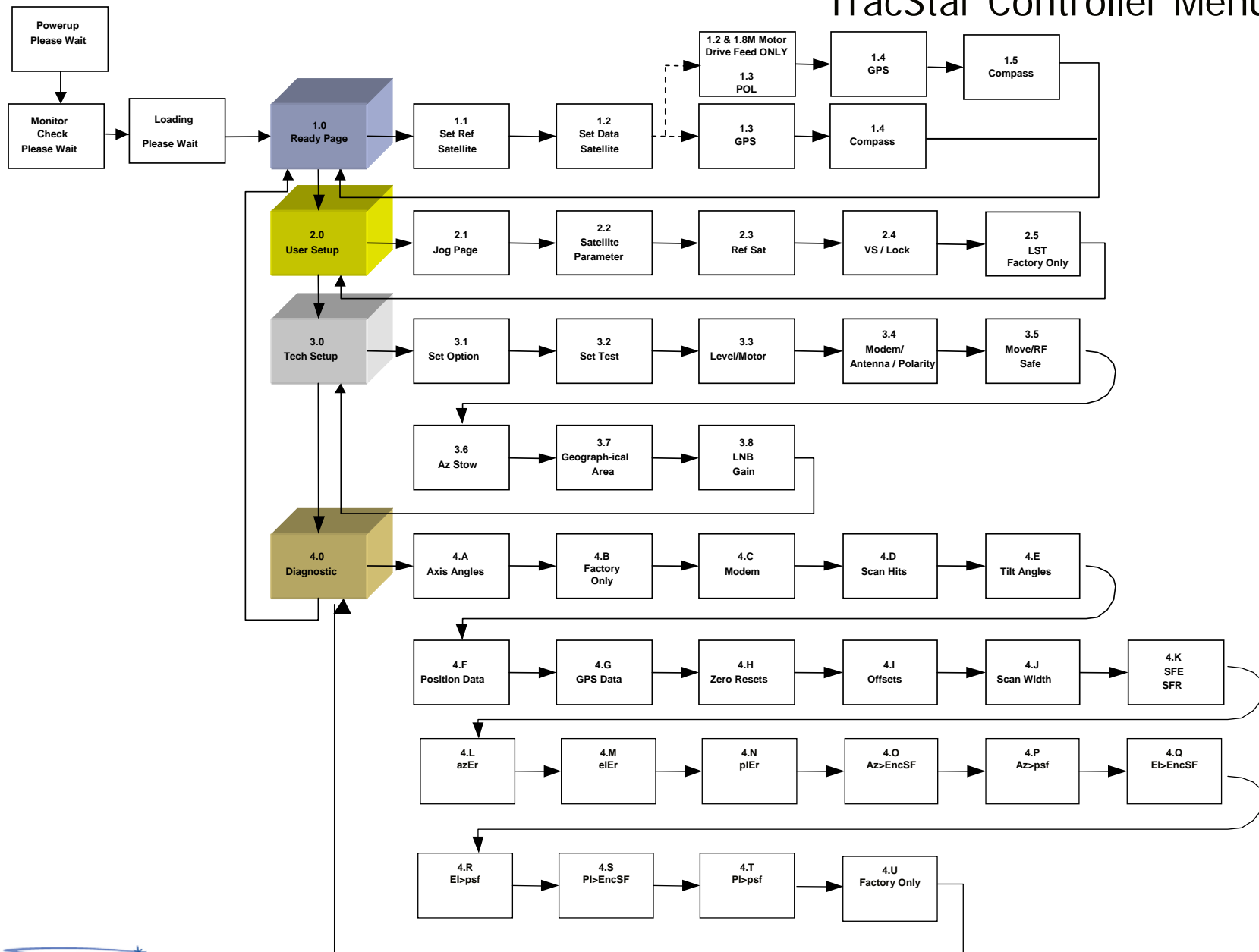
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!! CAUTION !!

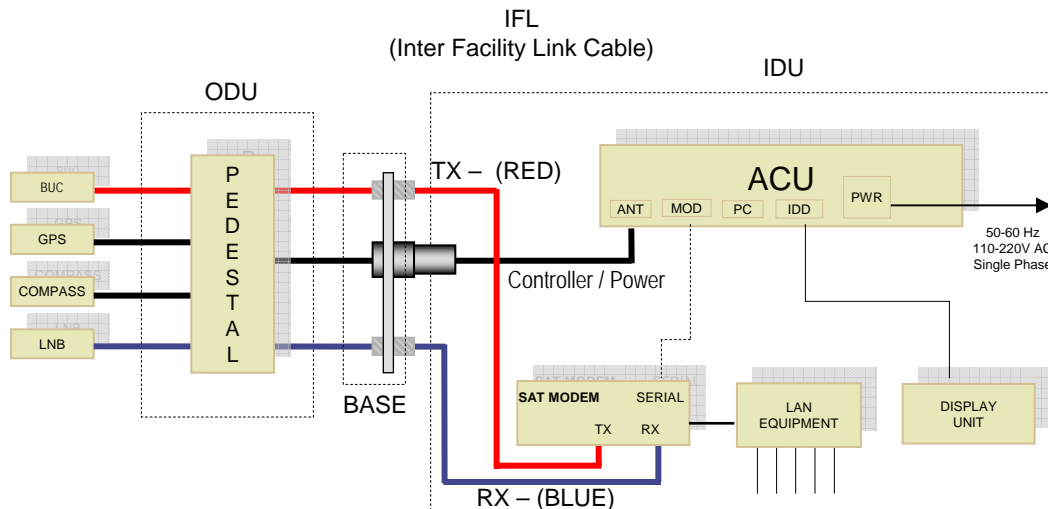
Antennas are typically shipped fully configured for a network. Changing data in the antenna controller may render the antenna inoperable. Change controller settings with caution.



TracStar Controller Menu Grid



QUICK START USERS GUIDE



NOTE THE FOLLOWING WARNING

- Do NOT connect or disconnect the RG6 Coaxial cables or antenna controller cable while power is applied to any connected equipment. Turn off all power before connecting or removing cables. Failure to do so may cause damage to the system.

TURN KEY OPERATION

- ON
 - Connect antenna as shown above – (the MOD-SERIAL cable is required for modems using GPS input. The cable may be a DB9-DB9 or a DB9-RJ45 w/a RJ45 jumper cable, depending on modem style.)
 - Apply power from the tabletop power supply or the 1U rack mount power supply, whichever applies.
 - Once the control panel interface displays “READY”, press “+” and hold for 2 seconds.
- OFF
 - Press the MAIN button until the display reads “READY”
 - Press the “-” button and hold for 2 seconds
 - Remove power from the antenna by turning off power to the power supply or the 1U rack mount panel, which ever applies.
 - Once power is removed, disconnect any cables necessary for transporting the antenna.

WHAT TO EXPECT

- The antenna has a self-calibration and startup routine. User intervention is not required after the initiation of this process. Under normal operating conditions the antenna will determine its absolute location, find its predetermined reference satellite, then find and lock onto the desired data satellite. Satellite LOCK can be determined by a message on the display unit showing LOCK XXX.X with XXX.X being the desired satellite.

PERFORMANCE TIPS

- If after a number of unsuccessful scans or several minutes have passed and no “LOCK” indication is present on the display:
 - Turn off power and check cable and power connections to all equipment, being careful to observe all warnings. Ensure the satellite modem is connected properly. Reapply Power.
 - Ensure there is a clear, unobstructed view towards the equator relative to the antenna's position.
 - Check leveling of antenna. Auto-correction software will accommodate up to $\pm 10^\circ$ of error in the mounting plane of the antenna. Begin the process again.
 - If the controller display shows “LOCK” and Voice is available and Internet access is not available, check IP addressing of your computer and set to “DHCP”.

Using the Antenna

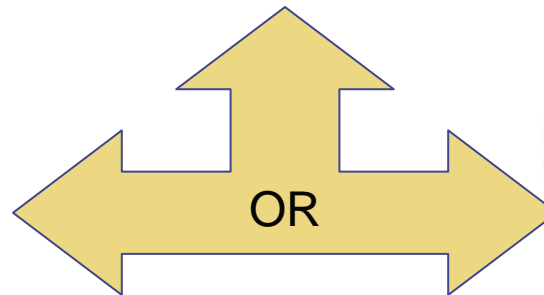
- The TracStar control system is resident on the antenna.
- No data is stored in the controller interface units.
- Either the IDD with the 'Blue Box' or the 1RU controller interface serve as I/O devices for the user and VSAT modem as required.



TracStar
Controller
System



The desktop controller's IDD and the 1RU rackmount controller serve as controller interface devices to the antenna based TracStar controller system.



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1. Theory of Operation
2. Antenna Setup Options
3. Antenna Operations and Display Unit Instructions



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Using the Manual



IMPORTANT



ARROW 1X
MAIN 2X

PgUP / PgDn

- Click on HOME / HOUSE symbol to return to INDEX page
- Denotes information TracStar feels is important for product operation.
- Number of times operator must touch respective keypad position to accomplish the direction(s) being given.
- PgUP / PgDn navigates the MVS Manual by decreasing or increasing the page number respectively.

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| | | | |

BASIC Operation

Antenna Description

- Three axis, polarization over elevation over azimuth
- Configurable for operation on most satellites
- Designed for simple operation, performs precise antenna to satellite alignment with the push of a button or a switch
- Pedestal Description:
 - High precision motors with optical encoders
 - Very low backlash drive system
- Each antenna is fully integrated with
 - GPS
 - Compass
 - DVB Receiver
 - Base level sensor
 - Antenna Control System with User Interface

The Standard Satellite Acquisition Process

- Upon power up and deployment, the following acquisition sequence takes place:
 - Compass aligns the antenna with south (if in the northern hemisphere, to the north if in the southern hemisphere)
 - Antenna acquires GPS for high precision geographic location information
 - Antenna precisely sets elevation angle and sweeps through a selected reference satellite, monitoring signal characteristics of the reference satellite
 - Antenna peaks on reference satellite until the center of the antenna beam is located as an alignment reference. Antenna then peaks on the satellite of interest and performs a high precision alignment to the satellite
 - Antenna sends GPS to satellite modem (if applicable)
 - Satellite modem initiates contact with network operations center

Antenna Description

- DirectPoint™ technology closely couples with the satellite modem thus enhancing the satellite acquisition accuracy and reducing the startup time. The antenna goes directly to the data satellite and using enhanced communications capability with intelligent modems is able to acquire, lock and peak on the specific satellite without the traditional pre-alignment (reference satellite) stage.



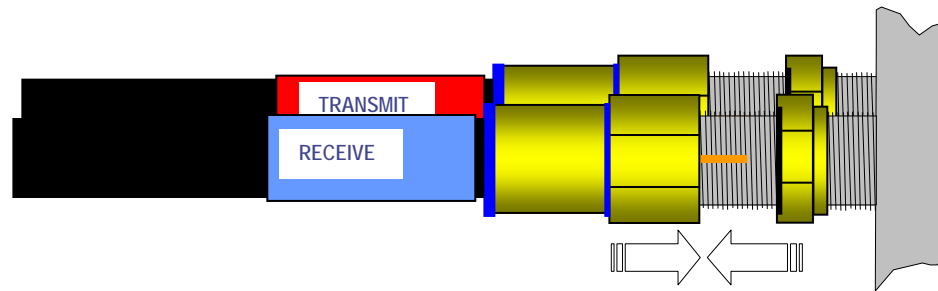
The DirectPoint mode is invoked by setting "10000" as the Lock Method Word in the User Setup Page 2.4 and "iDirect" (or other 2-way communication modems) as the "Modem" in Tech Setup Page 3.4.

DirectPoint Acquisition Description

- Upon power up and deployment, the following acquisition sequence takes place:
 - Compass aligns the antenna with south (if in the northern hemisphere, to the north if in the southern hemisphere)
 - Antenna acquires GPS data for high precision geographic location information
 - Using DirectPoint™ and bypassing the selected reference satellite, the antenna pointing algorithm precisely scans to the selected data satellite
 - Monitoring signal characteristics specific to this data satellite, the antenna peaks on the center of the satellite beam and performs a high precision alignment to this satellite
 - After completion of the peaking sequence GPS data is sent to the modem to enable transmit
 - The modem can then automatically initiate contact with the network operations center and be commissioned into the network

IFL CABLE CONNECTIONS

There are two different types of coaxial connectors on the IFL cables. The cable connecting to the antenna is shown below. The two-piece connection allows for the O-ring seal in the smaller nut to be placed on the F Type connector first. Once the cable is connected, the smaller nut is tightened against the cable end allowing the O-ring to provide a moisture proof seal.



Antenna Setup Options

1. Quick Setup

1. This setup is performed for an antenna system to be used in a geographical region for the first time.
2. The user has known Reference Satellite information.
3. The user does not have Reference Satellite frequencies.

2. Quick Setup Reference from Script

1. This setup is performed for an antenna system to be used in a geographical region for the first time.
2. The user has a script, i.e., orbital positions and frequencies exist for the Reference Satellites and therefore can be entered into the antenna controller.

3. Quick Setup Reference Using SkyScan

1. This setup is performed for an antenna system to be used in a geographical region for the first time.
2. There is no information for Reference Satellites.

4. After the Reference Satellites are input, the following criteria should be considered in selecting them.

1. There can be up to 12 Reference Satellites in the library. A general rule is to select 3-4.
2. The antenna "rated" the satellites during the ScanSky. Reference satellite positions ending with the letter "A" are the most desirable, then "B", then "C". "Z" indicates that sufficient carrier power was not found.
3. Try to select satellites that are low in the orbital ARC (east or west of the users longitude position), i.e., lower on the horizon is better.

1. Quick Setup Reference – Known Reference Satellites - CONUS



IMPORTANT

NOTE:

The factory default setting is for AUTO. The system will select a reference satellite that is optimum for your GPS position.

| Step | Function | Action | Display Page |
|------|---|--|---|
| 1. | Power up antenna | Turn on power at ACU | READY |
| 2. | Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP,[Code 0] Tech Setup [CODE 13] READY |
| 3. | (Input Reference Satellites Page 1.1) Select Ref 61.5 Satellite Select Ref 119.0 Satellite Factory Default is AUTO | From Ready page: Arrow 1x + or – through Ref Sat List ENTER + or – through Ref Sat List Enter Main | READY SetREF, 61.5 XXX.X SetREF, 119.0 XXX.X READY |
| 4. | (Input data satellite parameters Page 1.2) Toggle between SatA and SatB Input orbital position for SatA Input orbital position for SatB | From READY page: Arrow 2x + or – + or – Enter | READY SELECT DATA [SatA] or [SatB] XXX.X |

Locate the antenna so that it has an unobstructed view of the orbital arc.

Orient the antenna so that it comes up generally to the south (if located north of equator), north (if located south of equator).

2. Quick Setup Reference – Known Reference Satellites – NON CONUS



IMPORTANT

NOTE:

The factory default setting is for AUTO. The system will select a reference satellite that is optimum for your GPS position.

Locate the antenna so that it has an unobstructed view of the orbital arc.

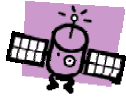
Orient the antenna so that it comes up generally to the south (if located north of equator), north (if located south of equator).

*If IDLE SAT shows 0.0, then Satellite Configuration has not been performed and system will err.



| Step | Function | Action | Display Page |
|------|--|---|---|
| 1. | Power up antenna | Turn on power at ACU | READY |
| 2. | Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP,[Code 0] Tech Setup [CODE 13] READY |
| 3. | Clear existing satellite data. (Page 3.2) | From READY page Main 2x Arrow 2x + or – to Enter + Enter | READY TECH SETUP [Code 13] SET TEST, [NONE] [CLEAR REF DATA] [CANCEL] [RUN NOW] READY |
| 4. | Input reference satellite parameters. (Page 2.3) Go to reference satellites entry page Leave both default frequencies 10799 Set scan type to Freq Repeat, up to 12 Ref satellites | From READY page Main 1x Arrow 3x Enter + or – to Ref Sat Long ENTER - to [10799] ENTER + TO [Freq] ENTER | READY USER SETUP [Rs 1] [XXX.X] [XXX.X] [XXX.X] [10799] [SS] [Freq] |
| 5. | Run Frequency Scan (Page 3.2 – Set Test/Freq Scan) | From READY page Main 2x Arrow 2x + or – to ENTER + Enter | READY TECH SETUP, [Code 13] SET TEST, [NONE] [SCAN FREQ] [cancel] [RUN NOW] READY |
| 6. | (Input Reference Satellites Page 1.1) Select RefX Satellite Select RefY Satellite | From Ready page: Arrow 1x + or – through Ref Sat List ENTER + or – through Ref Sat List Enter Main | READY SetREF, X XXX.X SetREF, Y XXX.X READY |
| 7. | (Input data satellite parameters Page 1.2) Toggle between SatA and SatB Input orbital position for SatA Input orbital position for SatB | From READY page: Arrow 2x + or – + or – Enter | READY SELECT DATA [SatA] or [SatB] XXX.X |

3. Setup Quick Reference: From A Script



IMPORTANT

NOTE:

Locate the antenna so that it has an unobstructed view of the orbital arc.

Orient the antenna so that it comes up generally to the south (if located north of equator), north (if located south of equator).

| Step | Function | Action | Display Page |
|------|---|---|---|
| 1. | Power up antenna | Turn on power at ACU | READY |
| 2. | Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, ENTER Main 2x | READY TECH SETUP [Code 0] Tech Setup [CODE 13] READY |
| 3. | Clear existing satellite data. (Page 3.2) | From READY page Main 2x Arrow 2x + or – to ENTER + ENTER | READY TECH SETUP [Code 13] SET TEST, [NONE] [CLEAR REF DATA] [cancel] [RUN NOW] READY |
| 4. | Input reference satellite parameters (Page 2.3) Select Reference Satellite 1 Input orbital position for Ref 1 Input primary frequency for Ref1 Input secondary freq. for Ref1 Repeat, up to 12 Ref satellites | From READY page Main 1x Arrow 3x ENTER + or – then ENTER + or – then ENTER + or – then ENTER + or – then ENTER | READY USER SETUP [Rs 1] [XXX.X] [XXXXX] [XXXXX] [Rs2] |
| 5. | (Input reference satellites Page 1.1) Select RefX satellite Select RefY satellite | From READY page: Arrow 1x + or – then ENTER + or – then ENTER | READY Set Ref XXX.X XXX..X |
| 6. | Input data satellite parameters. (Page 1.2) Toggle between SatA and SatB Input orbital position for SatA Input orbital position for SatB | From READY page Arrow 2x + or – then Enter + or – then Enter + or – then Enter | READY SELECT DATA [SatA] or [SatB] XXX.X XXX.X |

4. Setup Quick Reference Using SkyScan



IMPORTANT

NOTE:

Locate the antenna so that it has an unobstructed view of the orbital arc.

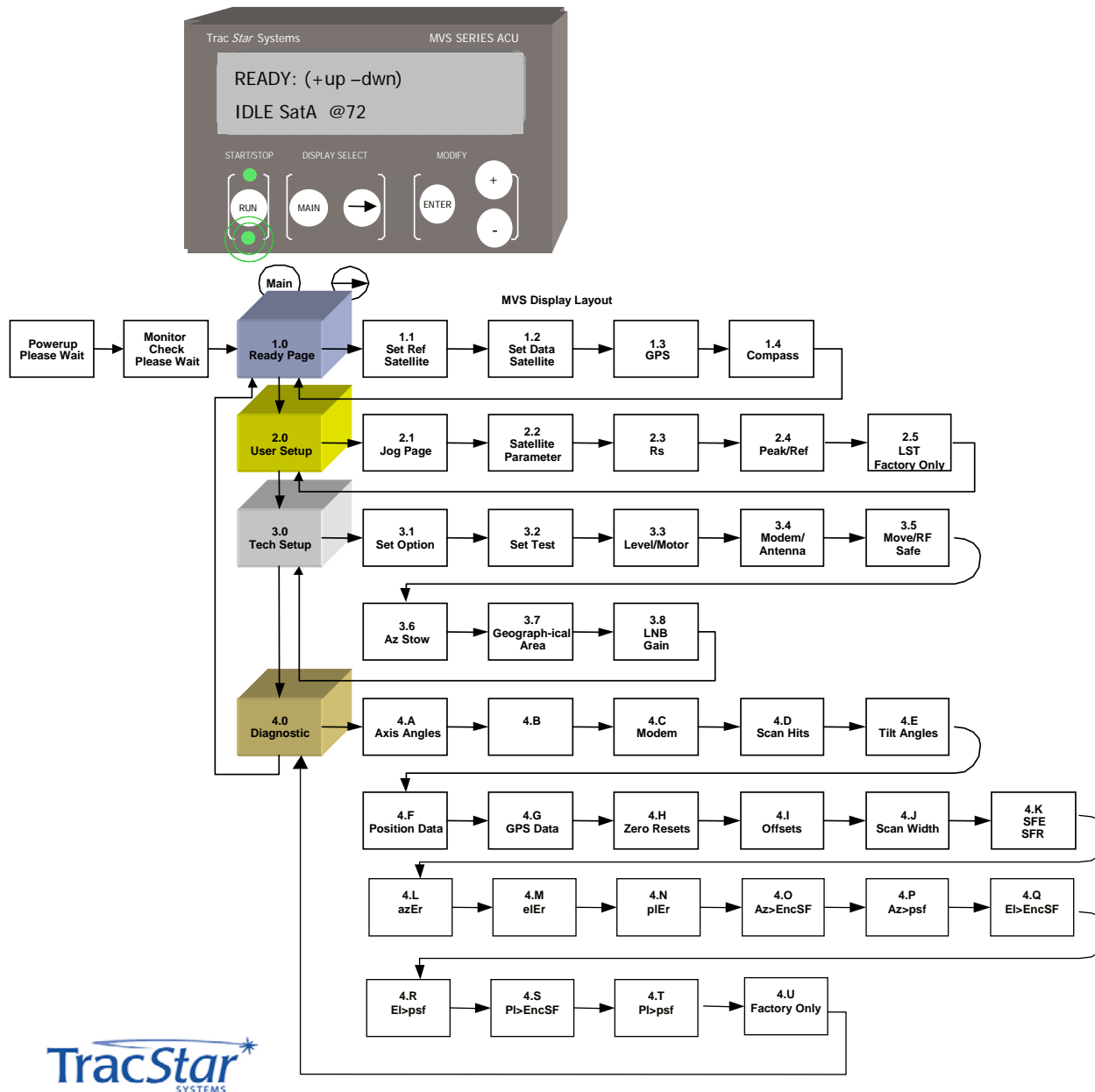
Orient the antenna so that it comes up generally to the south (if located north of equator), north (if located south of equator).

| Step | Function | Action | Display Page |
|------|--|--|--|
| 1. | Power up antenna | Turn on power at ACU | READY |
| 2. | Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP, [Code 0] Tech Setup, [CODE 13] |
| 3. | Clear existing satellite data. (Page 3.2) | From READY page Main 2x Arrow 2x + or – to ENTER + ENTER | READY TECH SETUP, [Code 13] SET TEST, [NONE] [CLEAR REF DATA] [cancel] [RUN NOW] READY |
| 4. | Initiate ScanSky function: | From SET TEST page + or – to ENTER + ENTER | SET TEST, [NONE] [SCAN Sky] [cancel] [RUN NOW] Initiates Sky Scan |
| 5. | Input reference satellites (Page 1.1) Select RefX satellite Select RefY satellite | From READY page: Arrow 1x + or – then ENTER + or – then ENTER | READY Set Ref XXX.X XXX.X |
| 6. | Input data satellite parameters. (Page 1.2) Toggle between SatA and SatB Input orbital position for SatA Input orbital position for SatB | From READY page Arrow 2x + or – then ENTER + or – then ENTER + or – then ENTER | READY SELECT DATA [SatA] or [SatB] XXX.X XXX.X |

Technical Manual DATA Presentation



IMPORTANT

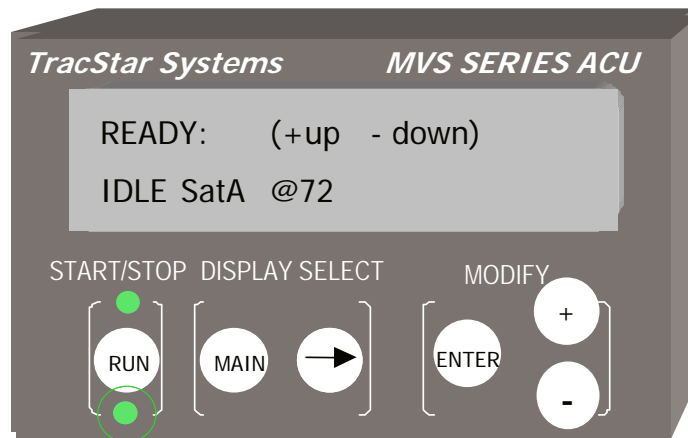


There are four distinct groupings of functions in the operation of the TracStar Auxiliary Control Unit (ACU). This manual will discuss each of these groups (Ready Page, User Setup, Tech Setup and Diagnostics) individually.

During actual ACU operation, the various sections are selected by pushing the MAIN button the appropriate number of times thus moving "vertically" to select the desired group function. Hereafter, the block diagram will be shown for each individual function without the other groups functions being represented.

Regardless of what operation is displayed in the ACU display panel, returning to the MAIN or MASTER menu may always be accomplished by continually pressing MAIN until "READY:" appears.

MVS ACU Unit Display and Layout



| | |
|-------------------|--|
| START/ STOP | Places the antenna in operational mode green LED on top) or idle (green LED on bottom) |
| DISPLAY SELECT | MAIN steps through the menu vertically → steps across the menu horizontally |
| MODIFY | ENTER to select or step through page options + or – to modify selection |

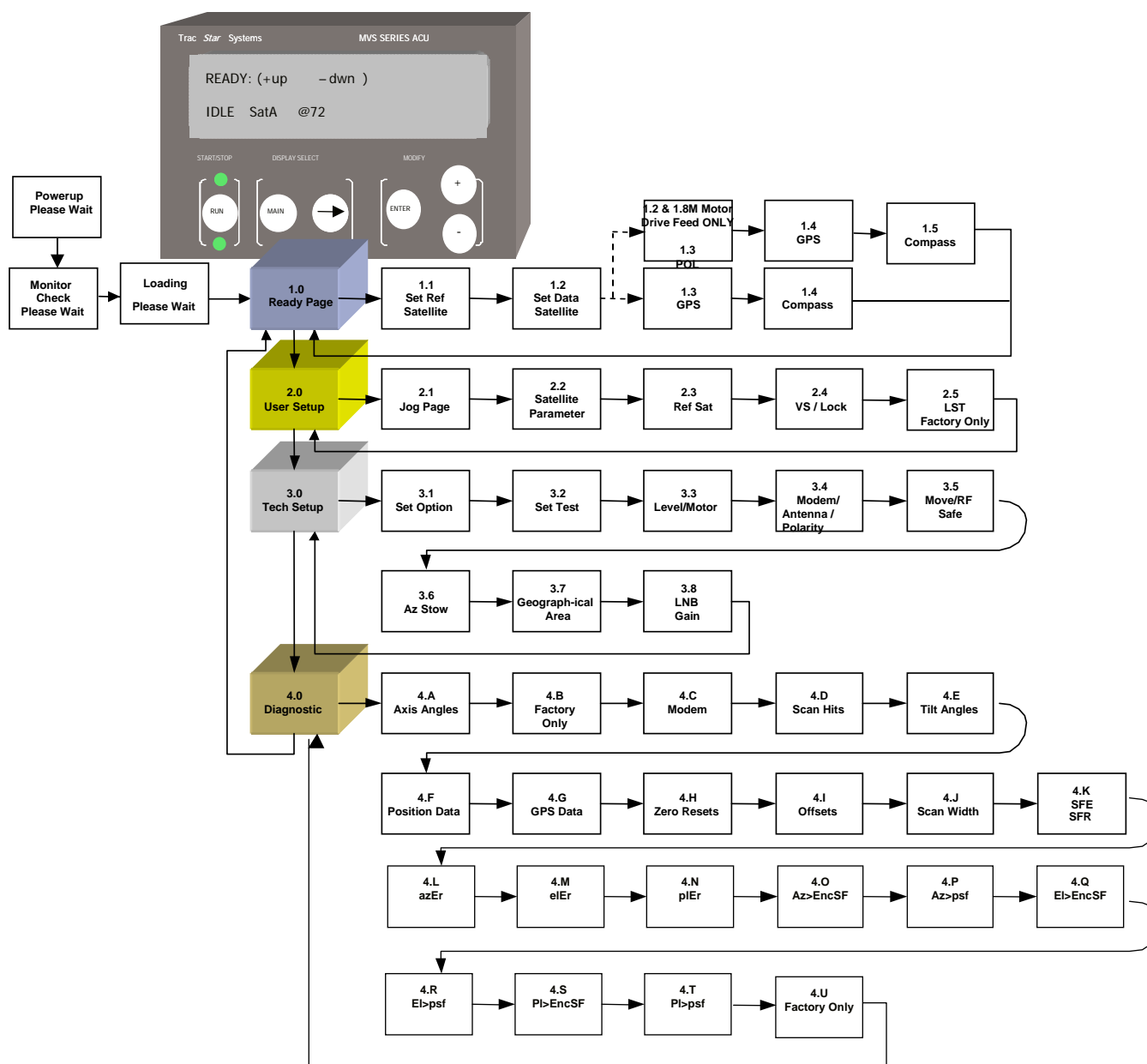
IMPORTANT



Note: A Flashing Question Mark [---?---] in the display indicates an item has not yet changed in the process. Select the desired item with [+/-] then press enter.



Flashing Blocks indicate something has changed but not been stored. ENTER must still be pressed to move to the next item.

1.0 READY



- READY is the main or default page and appears once the system is powered up. The selected satellite and orbital position in degrees longitude is displayed. Positive degrees indicates west longitude, "-" or negative degrees indicates east longitude.
- To activate the system:
- Turn on power to the TracStar Power Supply.
- To deploy: When the display shows "READY", press "+" and hold for 2 seconds to initiate a satellite acquisition. This can be done with the antenna in any position.
- Press the MAIN and  keys to navigate through the menu options and the ENTER key to select menu items/options.
- To stow: When the display shows "READY", press "-" and hold for 2 seconds to stow. This can be done with the antenna in any position. Lower LED should be on.
- From the READY page the user can:
 - Press  move to the Select Satellite page.
 - Press **MAIN** move to User Setup.

Note that when the system is in READY (standby) mode the bottom green LED is on. When the system is active the top LED is on.

1. Typical Acquisition Sequence

| Message Displayed | Description |
|-----------------------------------|---|
| POWER UP PLEASE WAIT | Power is being applied to the system |
| MONITOR CHECK PLEASE WAIT | The system is initiating its internal monitor software |
| LOADING PLEASE WAIT | The system is going through a momentary warm-up stage (3-5 seconds) |
| READY: (+ up – down) | The system is in standby mode waiting for instructions (green LED is on bottom): (a) Press + to initiate an acquisition (b) Press – to stow the antenna |
| RUN: (+/- stop) Startup @ XX | The system is active and has started an acquisition (green LED on top). NOTE: any time the system is active press + or – to place the system in standby. |
| RUN: (+/- stop) Compass XXX | The system is reading the compass and aligning. Shows relative compass sensor reading. |
| RUN: (+/- stop) Wait GPS 118 | The system is acquiring GPS signals Last digit shows number of GPS satellites acquired. |
| RUN: (+/- stop) SCAN XXX YYY | The system is scanning a reference satellite XXX is orbital position; YYY shows signal strength |
| RUN: (+/- stop) PEAK XXX YYY | The system is scanning the selected communications satellite |
| RUN: (+/- stop) Locked XXX YYY | The antenna is locked on the selected satellite |
| IDLE | To place the system in standby, press + or -, READY page will appear |

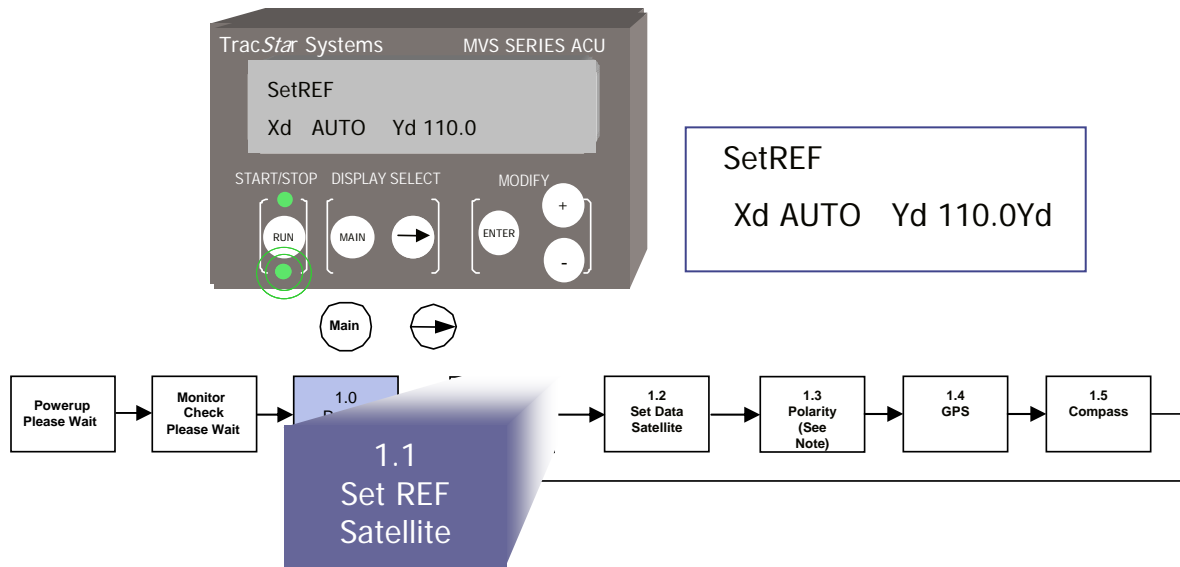
DirectPoint – Typical Acquisition Process

NOTE:

A reference satellite is not used with the DirectPoint acquisition process. To engage the DirectPoint mode, the modem must be capable of two-way communication with the TracStar controller and a console cable must be connected between the modem and the controller LOCK Word must be set to 10000. DirectPoint is typically preset at the factory if shipped with a DirectPoint capable modem. For field setting, follow LOCK Word setup procedures on page 39.

| Message Displayed | Description |
|--|---|
| POWER UP PLEASE WAIT | Power is being applied to the system |
| MONITOR CHECK PLEASE WAIT | The system is initiating its internal monitor software |
| LOADING PLEASE WAIT | The system is going through a momentary warm-up stage (3-5 seconds) |
| READY: (+ up – down) Idle Sat A @ xxx | The system is in standby mode waiting for instructions (green LED is on bottom): (a) Press + to initiate an acquisition (b) Press – to stow the antenna |
| RUN: (+/- stop) Startup @ XXX | The system is active and has started an acquisition (green LED on top). NOTE: any time the system is active press + or – to place the system in standby. |
| RUN: (+/- stop) Compass XXX | The system is reading the compass and aligning. Shows relative compass sensor reading. |
| RUN: (+/- stop) Wait GPS 118 | The system is acquiring GPS signals Last digit shows number of GPS satellites acquired, +100 if locked |
| RUN: (+/- stop) SCAN XXX YYYY | The system is scanning the data satellite XXX is the orbital position; YYY = tuner reading; YYYY = analog reading |
| RUN: (+/- stop) PEAK XXX YYY | The system is scanning the selected communications satellite PEAK XXX shows satellite coordinate PEAKS shows S/N Ratio & Signal Strength |
| RUN: (+/- stop) Locked XXX YYY | The antenna is locked on the selected satellite. Display loops - Locked @ XXX * PEAKS S/N * GPS Sent * Tx Enabled |
| | To place the system in standby, press + or -, READY page will appear |

1.1 Set Reference Satellite



- The antenna system uses a reference satellite as part of the acquisition process.
- The Set Reference Satellite page allows the user to select up to two pre-programmed reference satellites from a stored library.
- The RefX is the primary and the RefY is the secondary. The secondary reference satellite will be used in case the primary satellite cannot be found, for example, signal blockage.



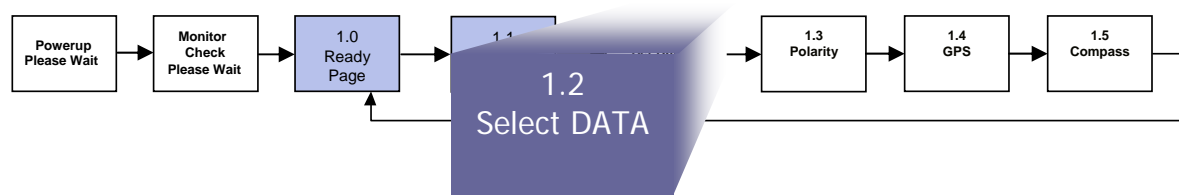
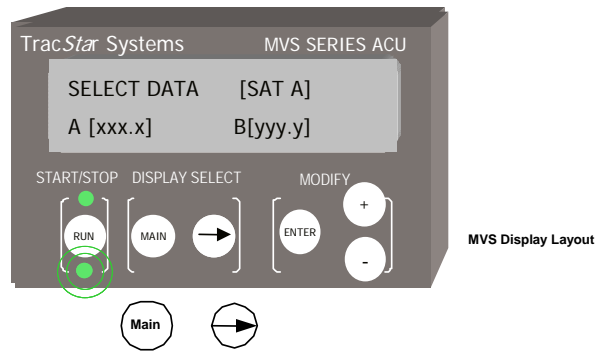
IMPORTANT

- **NOTE:** Satellites located west of 0° longitude are positive and those east of 0° are shown as a negative number.
- 1.3 Polarity is only viewable for the 1.2 and 1.8 Meter antennas.
- For best results, the REF satellite should be low to the horizon and not overhead.

1.1 Set Reference Satellite (con't)

| Description | Action | Display |
|--|--|---|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13 Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| Set Reference Page (Page 1.1) | From Ready Page: Arrow 1x | SetREF X[XXX.X] Y XXX.X |
| Reference X is the primary reference satellite. Select the appropriate reference satellite from the library. Factory default is AUTO for USAdvb only . | + or – then Enter (Press + to select known satellite or "auto", then Enter) | SetREF [XXX.X] Y [XXX.X] |
| Reference Y is the secondary satellite in case the primary satellite is not available, i.e., blockage. In some cases the RefY satellite will be used as a check during the acquisition. <i>If RefX is set as AUTO, then setting RefY to other than AUTO will cause the RefY location to be tried FIRST, followed by the AUTO list as needed.</i> | + or – then Enter (Press + to select known satellite or "auto", then Enter) | SetREF XXX.X Y [XXX.X] |

1.2 Select Data Satellite



SELECT DATA [SatA]
A [XXX.X] B [XXX.X]

- The Set Data Satellite page allows the user to select the communications satellite of interest.
- The user can select up to two pre-programmed data satellites, SatA and SatB.
- The user can program the desired satellite by entering the orbital position in degrees longitude.



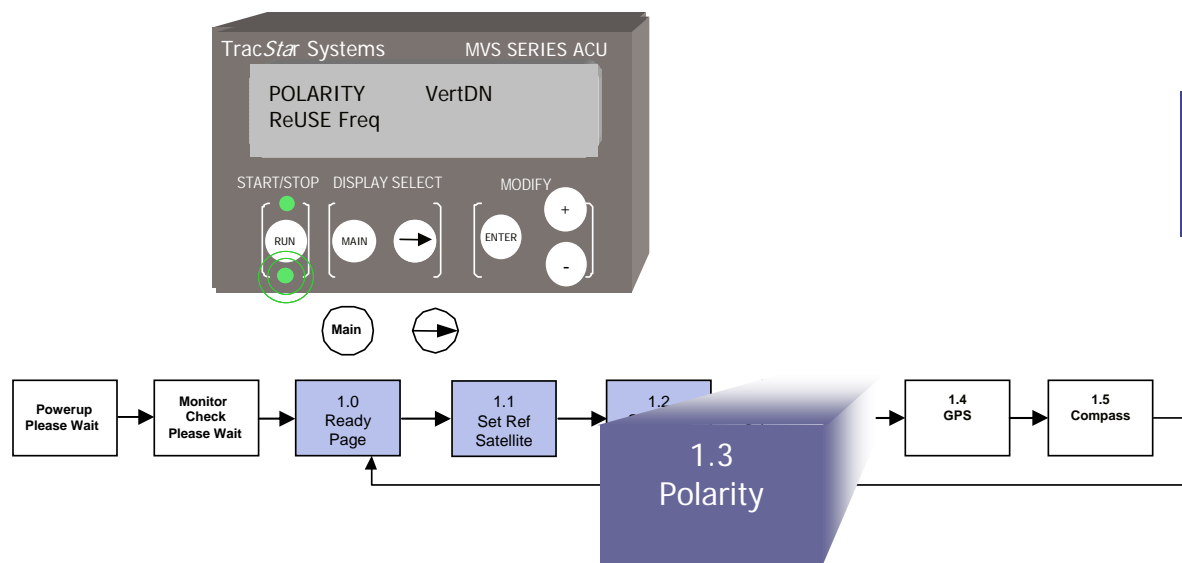
IMPORTANT

- NOTE: Satellites west of 0° longitude must be entered as positive values, satellites east of 0° longitude must be entered as negative values.

1.2 Select Data Satellite (con't)

| Description | Action | Display |
|---|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| Set Satellite Page (Page 1.2) | From Ready Page: Arrow 2x | SELECT DATA [SatA] A XXX.X B XXX.X |
| When SatA is flashing, the antenna will acquire SatA. The orbital position for SatA is shown on the bottom row as well as on the READY page. Press ENTER to select SatA, or press + to change to SatB , then press ENTER. | + or – to [SAT A] or [SAT B] ENTER | SELECT DATA [SatA] A XXX.X B XXX.X SELECT DATA [SAT A] [A XXX.X] B XXX.X |
| Now the orbital position for SatA is flashing and the user can input the desired orbital position in degrees longitude. Press + or - until the desired value is reached then ENTER. | + or – to Data Sat Long ENTER | SELECT DATA [SatA] A XXX.X B XXX.X SELECT DATA SAT A A XXX.X [B XXX.X] |
| Now the orbital position for SatB is flashing and the user can input the desired orbital position in degrees longitude. Press + or - until the desired value is reached then ENTER. | + or – then Enter Main | SELECT DATA SatA A XXX.X [B XXX.X] READY |
| NOTE: Satellites west of 0° longitude must be entered as positive values, satellites east of 0° longitude must be entered as negative values. | | |


1.3 Polarity



POLARITY VertDN
ReUSE Freq

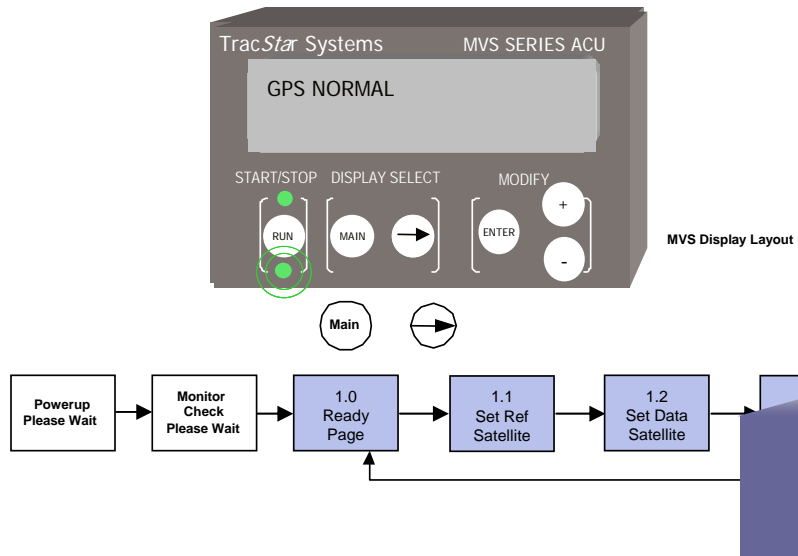
- **Applies to MVS1200 / MVS1800 with motorized feed assembly ONLY. Is not viewable with other antennas.**
- The user is allowed to change the polarization of the receive frequency
- Allows the user to ReSCAN the existing selection of Satellite A / Satellite B frequency after changing the receive polarity

1.3 POLARITY (con't)

| Description | Action | Display |
|--|--|-----------------------------------|
| Polarity Page (Page 1.3) FOR MVS1200 and 1800 ANTENNAS ONLY | From Ready Page: Arrow 3x | POLARITY [VertDN] |
| After the code is entered, the word VertDN is flashing. The user can now manually input the desired polarity, VertDN or HorzDN. | + or – then Enter | POLARITY [VertDN] |
| ReUSE Freq is now flashing. The user can now manually select the ReUSE or ReSCAN options. <i>NOTE: ReSCAN is not intended to replace the Satellite Parameters / Section 2.2 of the manual. If the proper frequencies are in place for SatA and SatB, a simple ReSCAN can be used after changing polarity. If problems are encountered, refer to Section 2.2, reset the SatA and SatB frequencies to 10799 and the antenna will scan for the best available frequency.</i> | + or – then Enter  | [ReUSE Freq] [ReSCAN Freq] |

IMPORTANT

1.4 Manual GPS Input



GPS NORMAL

- The antenna system has an integrated GPS to aid in satellite acquisition. The Manual GPS page allows the user to select between the built in GPS (default) or manually input GPS coordinates in case the GPS is unavailable. Power cycling the unit resets to default conditions.

1.4 Manual GPS Input (con't)

| Description | Action | Display |
|--|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| GPS Normal Page (Page 1.4) | From Ready Page: Arrow 4x | GPS [NORMAL] |
| After the code is entered, the word NORMAL is flashing. The user can now manually input the GPS coordinates. | + or – then Enter | GPS [NORMAL] |
| MAN is now flashing, press ENTER to step to the latitude input. | Enter | Gps[MAN] LATXXX.XX LONG XXX.XX |
| LAT is now flashing, press + or – until the desired coordinate is reached, then press ENTER. | + or – then Enter | GpsMAN [LAT 22.86] LONG XXX.XX |
| LONG is now flashing, press + or – until the desired coordinate is reached, then press ENTER. | + or – then Enter | GpsMAN LAT 22.86 LONG [81.23] |

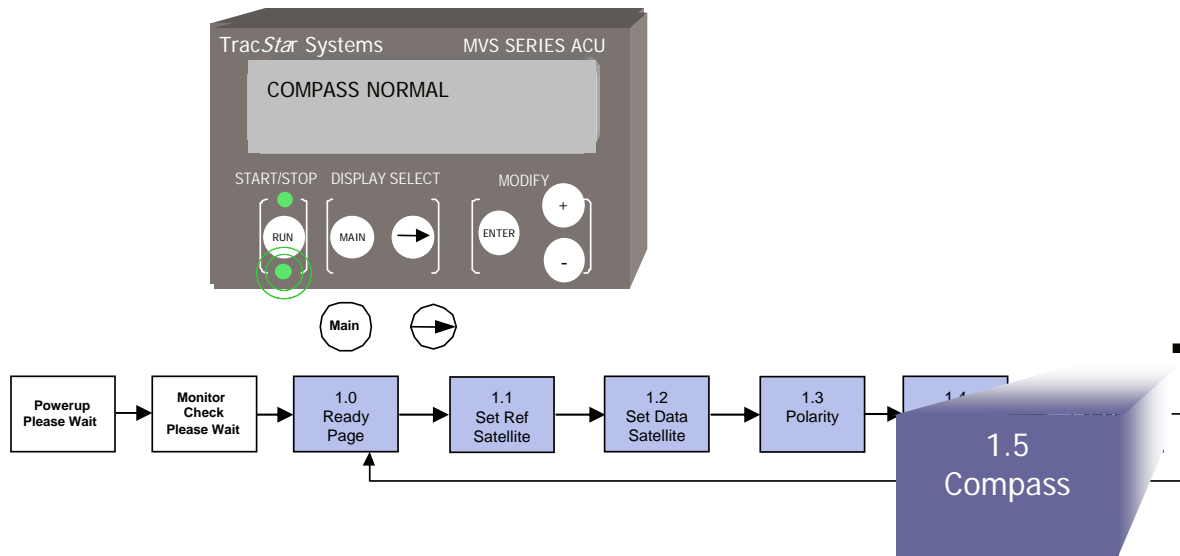


IMPORTANT

NOTES:

1. Coordinates are entered in degrees and decimals of degrees (vs. minutes and seconds)
2. Coordinates west of 0° longitude are positive, east of 0° are negative values.
3. Coordinates north of the equator (latitude) are positive, south of the equator are negative.

1.5 Manual Compass Input



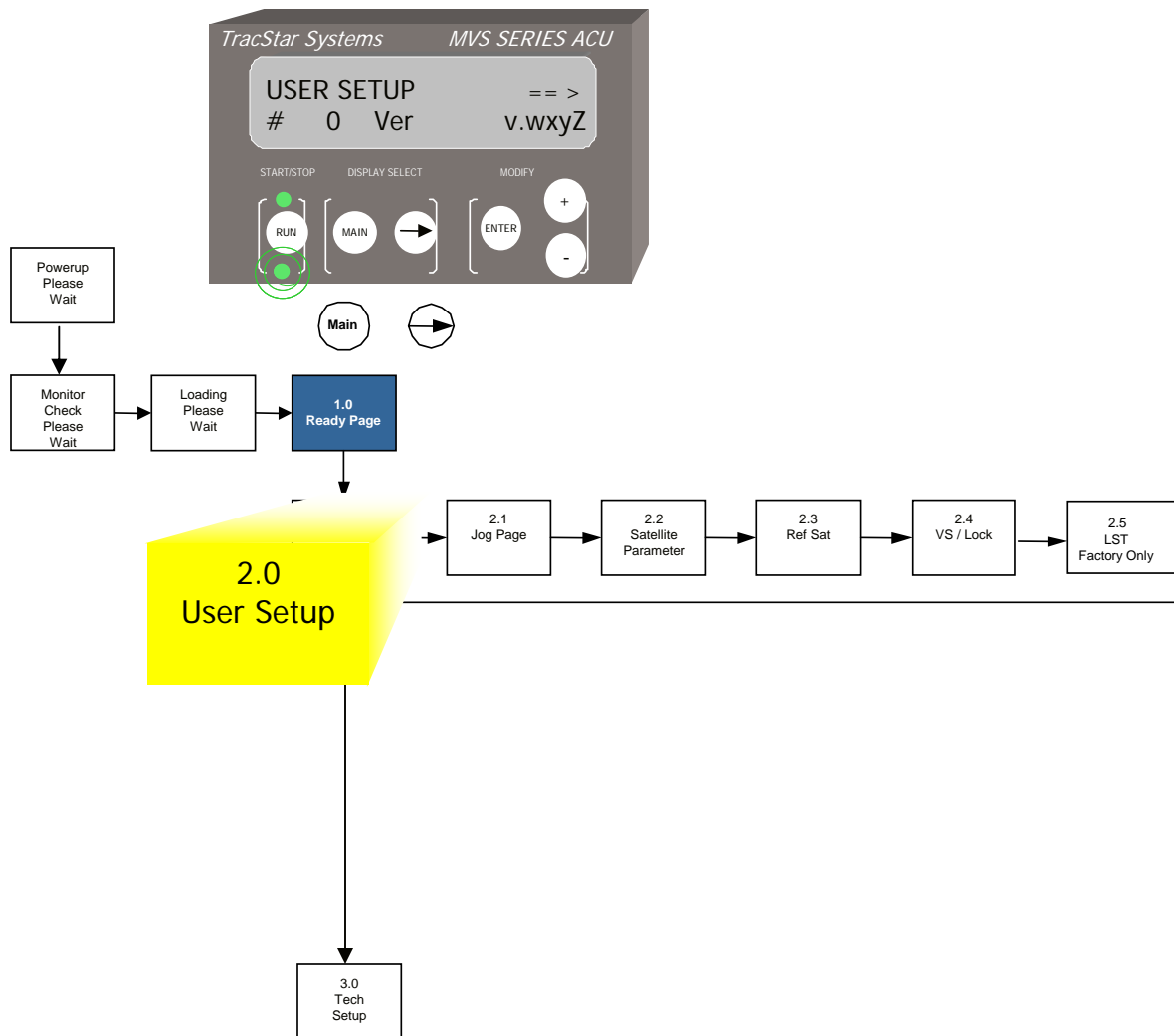
COMPASS NORMAL

- The antenna system has an integrated compass to aid in satellite acquisition. The Manual Compass page allows the user to provide the antenna with a north or south heading in case the compass is unavailable or heavily influenced by external magnetic fields.
- The Menu returns to the READY PAGE.
- NOTE: In normal operation, the antenna uses GPS readings and input from modems capable of 2-way communication with the antenna to establish a compass-less heading reference.


1.5 Manual Compass Input (con't)

| Description | Action | Display |
|---|--|---|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13 Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| COMPASS Page (Page 1.5) | From Ready Page: Arrow 5x | COMPASS [NORMAL] |
| After the code is entered, the word NORMAL is flashing. Press + or – to change to Manual input, then ENTER. | + or – then Enter | COMPASS [NORMAL] |
| The Display now prompts the user to jog the antenna to face or point south (north in southern hemisphere). The Jog function is described in section 2.1. | | COMPASS MANUAL JOG South, Start |
| Once the antenna is pointed south using the Jog function, press START and the system will initiate its scan from the manually input south position. * Ideally, the antenna should be pointed as close to south as manual positioning allows. | | |

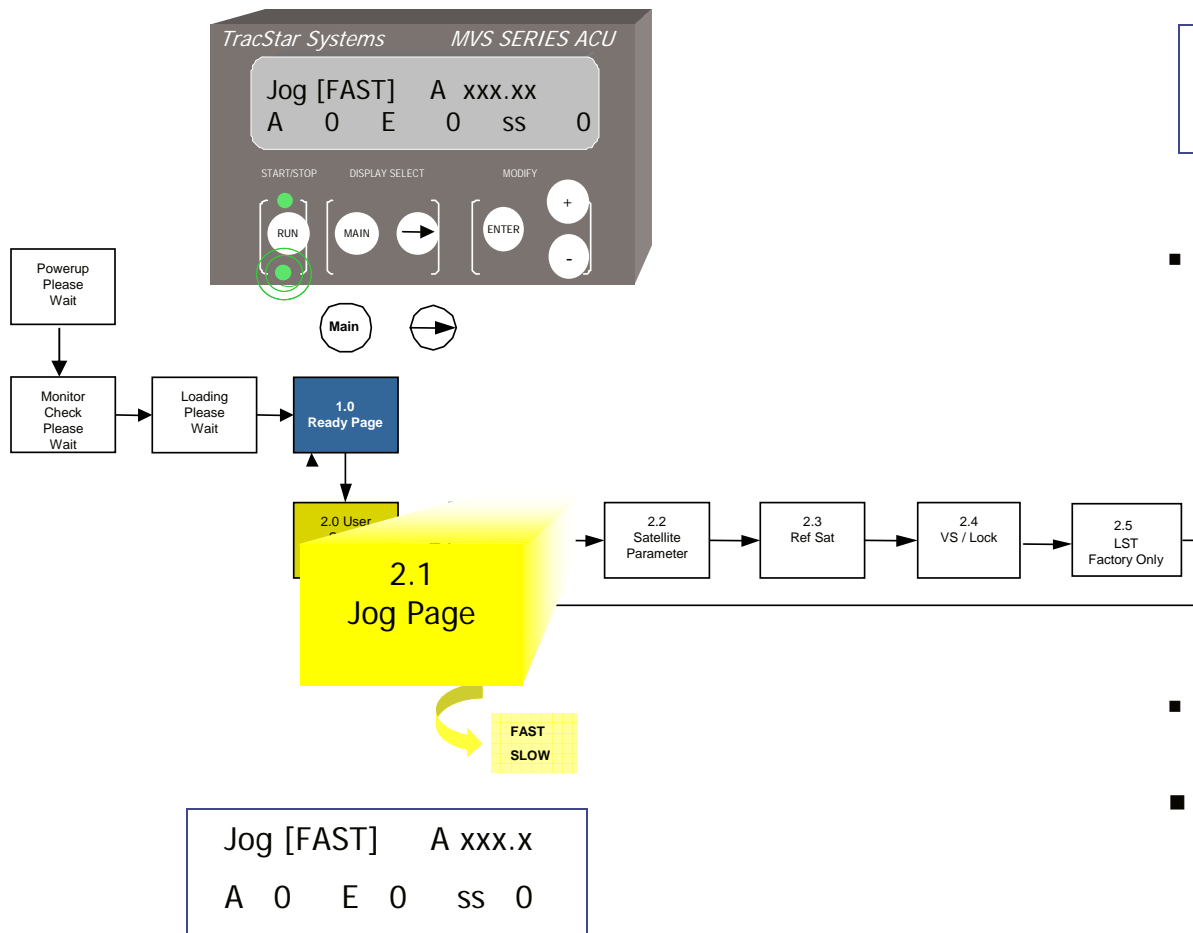
2.0 USER SETUP



USER SETUP == >
#XXXXX Ver 1.234Z

- USER SETUP contains several interactive and setup pages including antenna jog control and satellite parameter setup.
- The antenna serial number and the software version are shown on the bottom row.
- Press  to step to the Jog page or MAIN to step to the TECH SETUP page.


2.1 Jog



Top A – Denotes position of each respective axis by heading – Az, El, Pol
Based on selected axis below. Top A changes to E for Elevation and P for Polarity.

Bottom A, E, P (ss alternately) - # of button pushes

- Jog control enables the user to manually position the antenna in the azimuth, elevation and polarization axes. The jog step increment is flashing.

Press  to select FAST (1 Degree steps) or SLOW (0.1 Degree steps) jog increments.

- Press  to select.

CAUTION: IMPORTANT

DO NOT JOG THE ANTENNA IN AZIMUTH OR POLARIZATION WHILE IN STOW.

To avoid OVERTRAVEL errors, DO NOT DRIVE THE ANTENNA BEYOND ITS TRAVEL LIMITS IN ANY AXIS

2.1 Jog (con't)

| Description | Action | Display |
|--|--|---|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13 Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| Jog Page (Page 2.1) | From Ready Page: Main 1x Arrow 1x | Jog FAST A XXX.XX |
| Jog Position is now flashing. The user can select FAST or SLOW jog increments. Fast=1.0 degree/step Slow = 0.1 degree per step | + or – then Enter | Jog FAST A XXX.XX |
| The azimuth position is now flashing. The user can jog the antenna by pressing + for clockwise and – for counterclockwise. | + or – then Enter | Jog FAST 1.0 → ENT [A 0] E 0 P 0 |
| Now the elevation position is flashing. The user can jog the antenna by pressing + for up and – for down. | + or – then Enter | Jog FAST 1.0 → ENT A 0 [E 0] P 0 |
| Now the polarization position is flashing. When viewed from the rear of the dish, the user can jog the antenna by pressing + for clockwise and – for counterclockwise. | + or – then Enter | Jog FAST 1.0 → ENT A 0 E 0 [P 0] |

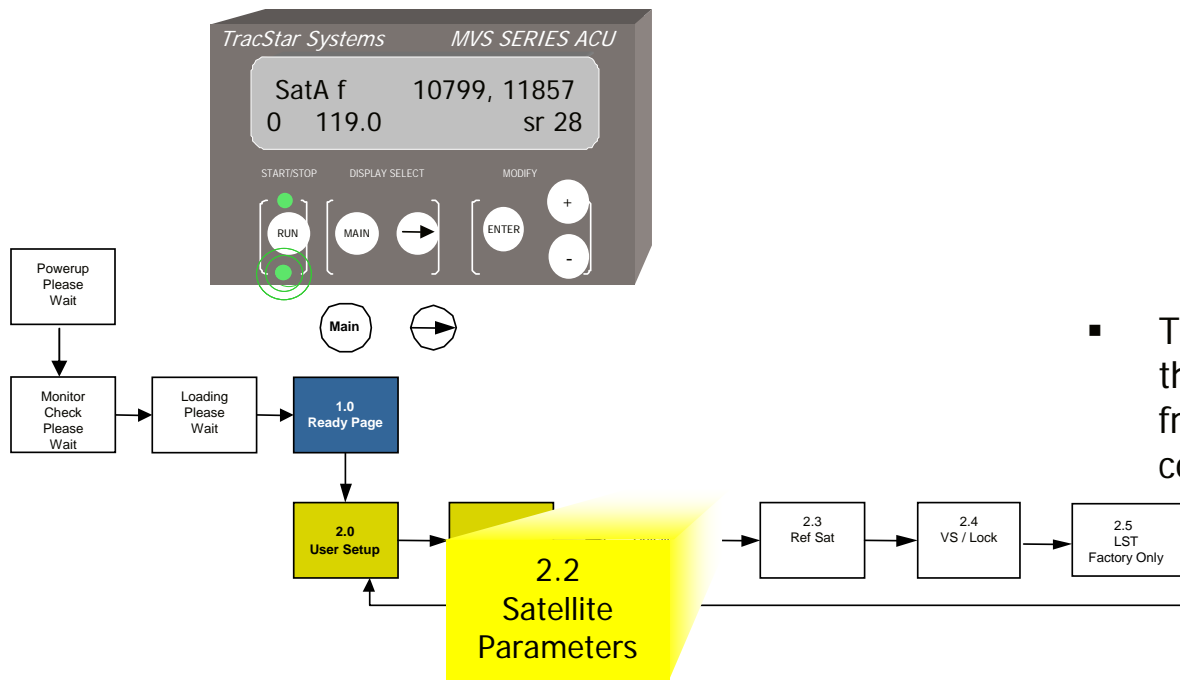
NOTES:

1. The user must press START/STOP to activate the antenna motors. The top green LED will flash when the motors are enabled.
2. DO NOT JOG THE ANTENNA IN AZIMUTH OR POLARIZATION WHILE IN STOW.
3. DO NOT DRIVE THE ANTENNA BEYOND ITS TRAVEL LIMITS IN ANY AXIS.



IMPORTANT

2.2 Satellite Parameters



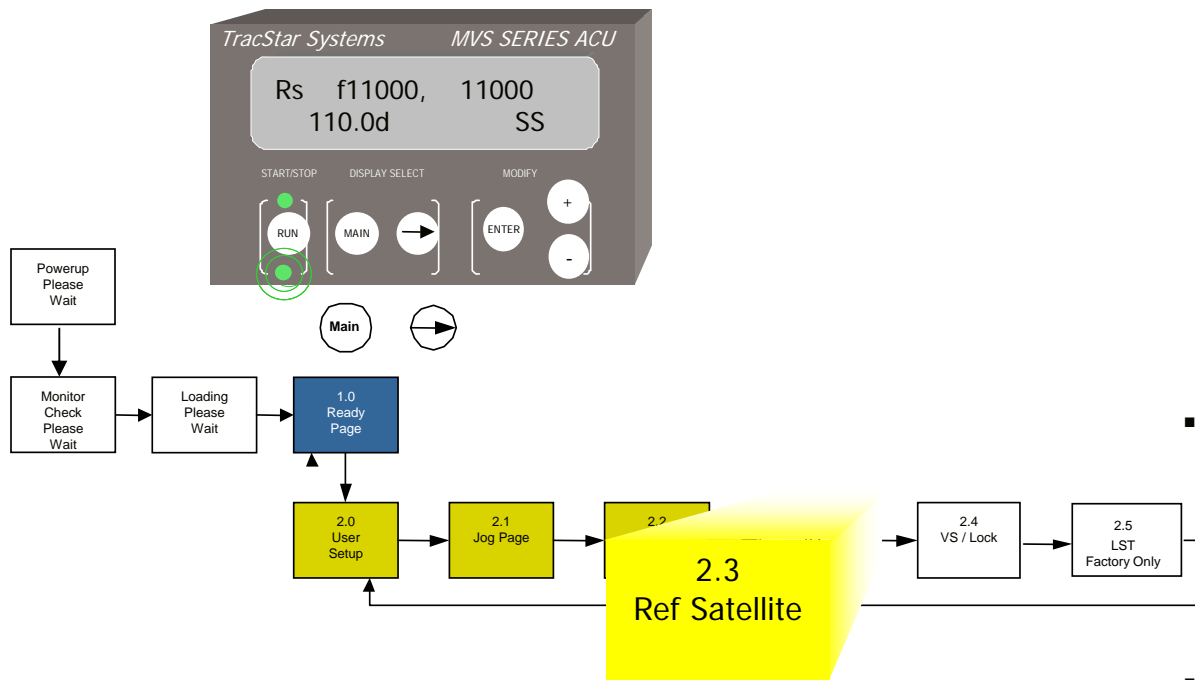
| | | |
|------------------|-------|------|
| SatAf10799,11857 | | |
| 0 | 119.0 | sr28 |

- The Satellite Parameters page allows the user to view or edit the frequencies used to acquire the communications satellite.

2.2 Satellite Parameters (con't)

| Description | Action | Display |
|--|---|-----------------------------------|
| Satellite Parameters Page (Page 2.2) | From Ready Page: Main 1x Arrow 2x | SatAf10799, 10799 [0] 119 sr28 |
| The user can toggle between SatA and SatB. To change to SatB, press + to switch to SatB. To change from SatB to SatA, press -. The orbital position of the selected satellite is displayed on the bottom row. | + or – then Enter | SatAf10799, 10799 [0] 119 sr28 |
| To input a new frequency for SatA press Enter then + or – to the desired frequency, then Enter. The default frequency is 10799. When the default is entered, the antenna will scan for the best frequency available. | + or – then Enter | SatA[f10799], 10799 0 119 sr28 |
| This is the secondary frequency and may be used by the antenna to verify lock or as a backup frequency, depending on the Lock Word (paragraph 2.4) | + or – then Enter | SatAf10799, [10799] 0 119 sr28 |
| sr is the symbol rate and should not be adjusted. | | |

2.3 Reference Satellite



[Rs] f10799, 10799
110.0 usd vb

- The Reference Satellite page provides access to the available reference satellites so the user can:
 - Enter Reference Satellites
 - Delete Reference Satellites
 - Edit parameters
- Up to 12 reference satellites can be stored

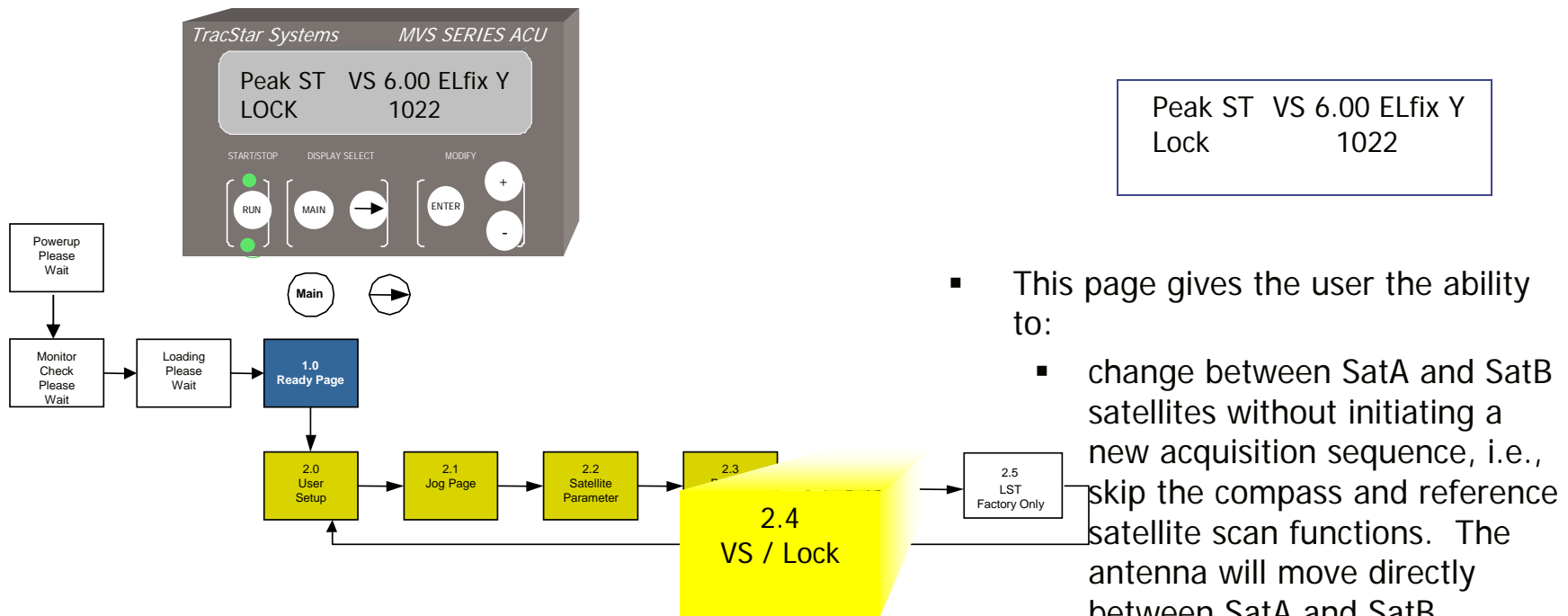
2.3 Reference Satellite (con't)

| Description | Action | Display |
|---|---|--|
| Reference Satellite Page (Page 2.3) | From Ready Page: Main 1x Arrow 3x | [Rs1] f10799,10799 XXX.X USDvB |
| The user can enter/edit the reference satellites from this page. When [RSX] is flashing the user can step to the next reference satellite with + or -. There can be up to 12 Reference Satellites stored. Select the desired Ref satellite number then Enter. | + or – then Enter | [RsX] f10799,10799 XXX.X USDvB |
| The orbital position is now flashing and can be edited. Press + or – to the desired value, then Enter | + or – then Enter | RsX f10799,10799 [XXX.X] USDvB |
| The primary frequency is now flashing. Use + or – to set the desired frequency or set to 10799 as default, then Enter. The default frequency will be automatically updated when the frequency scan is run (para. 3.2 Set Test). Over 6-8 weeks without power to the antenna, scanned frequencies may be lost unless a save to EEPROM is performed. | + or – then Enter | Rs2 [f10799],10799 XXX.X USDvB |
| Continued on Next Page | | |

2.3 Reference Satellite (con't)

| Description | Action | Display |
|---|-------------------|------------------------------------|
| The backup frequency is now flashing. Use + or – to set the desired frequency or set to 10799 as default, then Enter. The default will be automatically updated when the frequency scan is run (para. 3.2 Set Test) | + or – then Enter | Rs2 f10799,[10799] XXX.X USDvB |
| The user can select a scan method that uses signal strength (SS) or frequency (Freq) or USDvB to acquire the Reference Satellite. | + or – then Enter | Rs2 f10799, 10799 XXX.X [USDvB] |
| If more Reference Satellites are desired, change to RsX then input the orbital positions and frequencies. <i>Repeat until all the applicable Reference Satellites are input.</i> | + or – then Enter | [RsX] f10799, 10799 XXX.X USDvB |

2.4 VS/Lock Methods



- This page gives the user the ability to:
 - change between SatA and SatB satellites without initiating a new acquisition sequence, i.e., skip the compass and reference satellite scan functions. The antenna will move directly between SatA and SatB
 - Set the Lock Method Word
- Upon Power Up the antenna will default as follows:
 - Peak: ST: As previously set
 - VS 6.00 ELfix Y – DO NOT CHANGE
 - Lock Word: As previously set

2.4 Peak/Lock Method (con't)

| Description | Action | Display |
|---|---|---|
| The Lock Word sets the criteria by which the antenna identifies satellites. The choices are to use a transponder/carrier frequency or by signal strength. By modifying the Lock Word, certain conditions are set and must be met for the antenna to lock. | + or – then Enter | Peak ST ReRef Y [Lock 1022] |
| Note: The following are valid lock words. NORMAL w/compass SLOW w/compass NO COMPASS W/DirectPoint | 1233, 1133, 1036, 1022, 1032, 1023, 1222, 1233,1232,1223 and 10000 (DirectPoint Mode) 10010 10011 NEW LOCK WORDS | |

Peak ST VS 6.00 ELfix Y
Lock 1022

2.4 Peak/Lock Method (con't)

| 0 | 1 | 0 | 2 | 2 |
|----------------------------------|--------------------------|------------------------------------|---|------------------------------------|
| | Reference Satellite Scan | Reference Satellite Lock Condition | Reference Satellite Frequency Condition | Data Satellite Frequency Condition |
| | 0 = Signal Strength | 0 = AGC | 0 = Neither | 0 = Neither |
| 1 = DirectPoint Mode | 1 = Frequency | 1 = AGC & SNR | 1 = SLOW w/compass | 2 = F1 or F2 |
| All Other parameters must be "0" | | 2 = SNR Only | 2 = F1 or F2 | 3 = F1 and F2 |
| | | | 3 = F1 and F2 | 6 = Peak on B; Move to Sat A |

Example: 1022 is a decimal word and will set the following condition for acquisition of the Reference and Data Satellite:

1022 = When the antenna is scanning for the Reference satellite, it will use the frequency from the Reference Satellite Page (2.3). Alternatively, if the digit is set to 0, the antenna will scan for the Reference Satellite using signal strength.

10**2**2 = 0 the AGC circuit of the internal receiver is used for a satellite lock indication. If the digit = 1, the lock indication is a combination of AGC and SNR (Signal Noise Ratio) readings. If the digit = 2, the lock indication is from SNR values only.

10**2**2 = This digit sets the condition that the antenna must find either the primary or the secondary frequency (F1 or F2) on the reference satellite in order to confirm lock. Alternatively, if the digit is set = 3, F1 AND F2 will be confirmed in order for the antenna to lock.

10**2**2 = This digit sets the condition that the antenna must find either the primary or the secondary frequency (F1 or F2) on the reference satellite in order to confirm lock. Alternatively, if the digit is set = 3, F1 AND F2 will be confirmed in order for the antenna to lock. *

If the last digit is set to = 6, the antenna will peak on Satellite B, then swing to Satellite A. Use this for extreme cases where there appears to be no transponder on the desired data satellite.

With DirectPoint™ the Lock Method Word can be set to 10000 to enable peaking on the desired satellite (Sat A or Sat B) without using a Reference satellite. In this mode the carrier data from the modem is use solely for acquiring and peaking on the satellite.

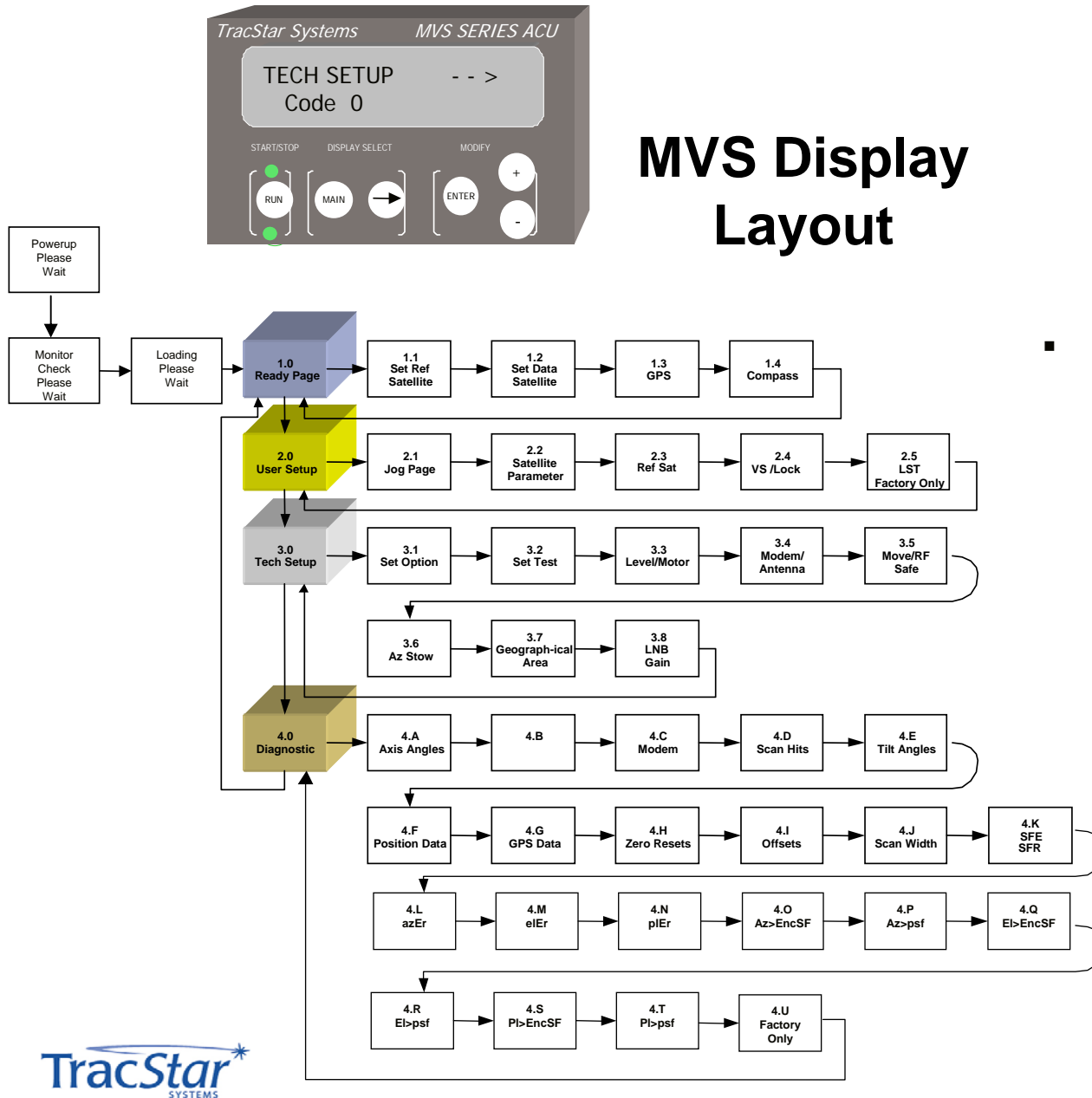
LOCK WORDS FOR COMPASS-LESS ACQUISITION & DIRECTPOINT COMBINATION

10000 – Normal scan w/compass
10010 – Slow scan w/compass
10011 – No compass / DirectPoint

The valid lock words are: 1022, 1033, 1023, 1032, 1222, 1233, 1232, 1223 and 1036. Use 10000 for DirectPoint acquisition.*

NEW LOCK WORDS

3.0 TECH SETUP



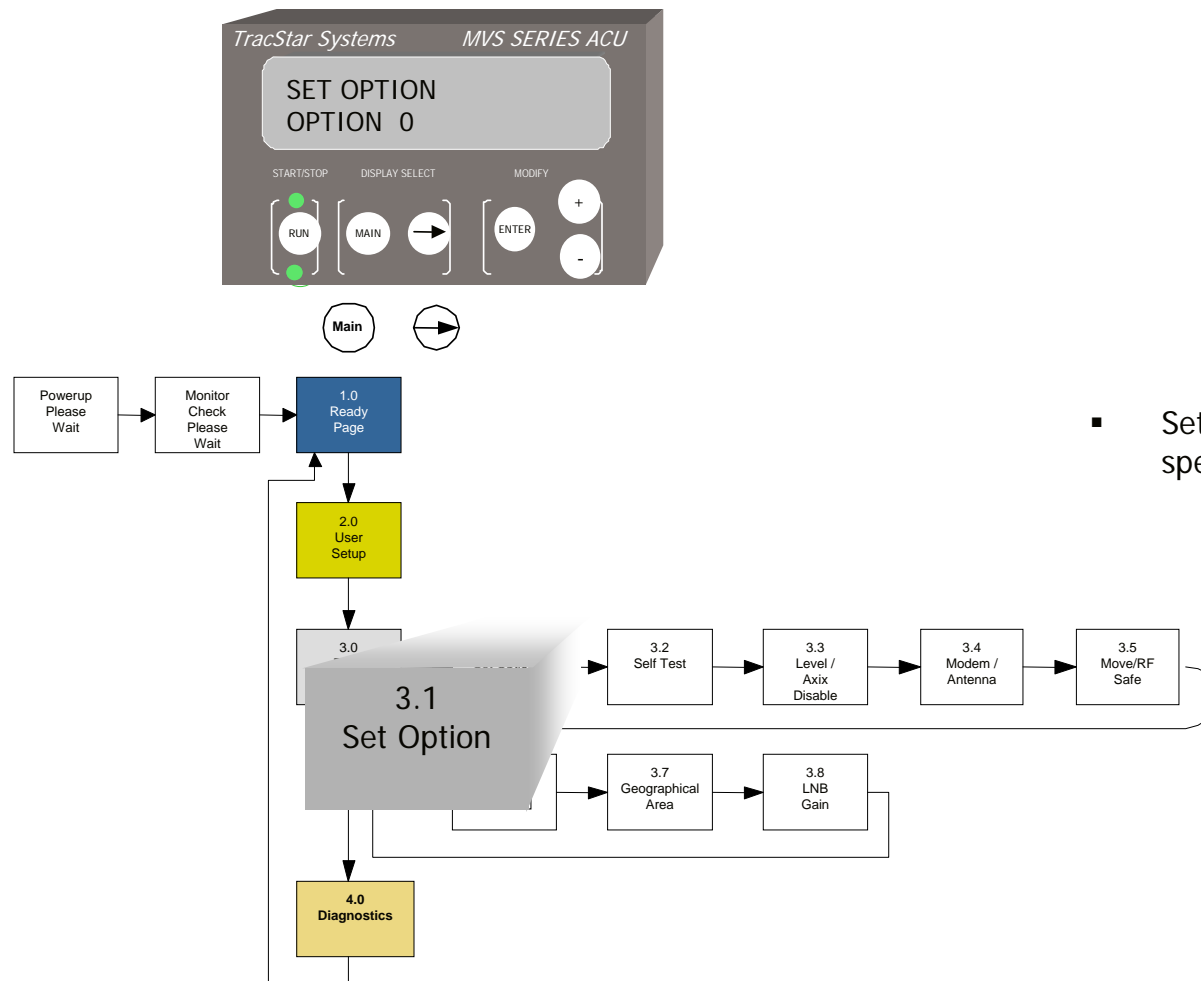
TECH SETUP -->
Code 0

- TECH SETUP contains several interactive setup pages and the ability to enable/disable various sensors and motor drives. This page is password protected to prevent inadvertent or undesirable changes. The user must press + to Code 13, then ENTER to edit these pages.

3.0 TECH SETUP (con't)

| Description | Action | Display |
|--|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 READY |

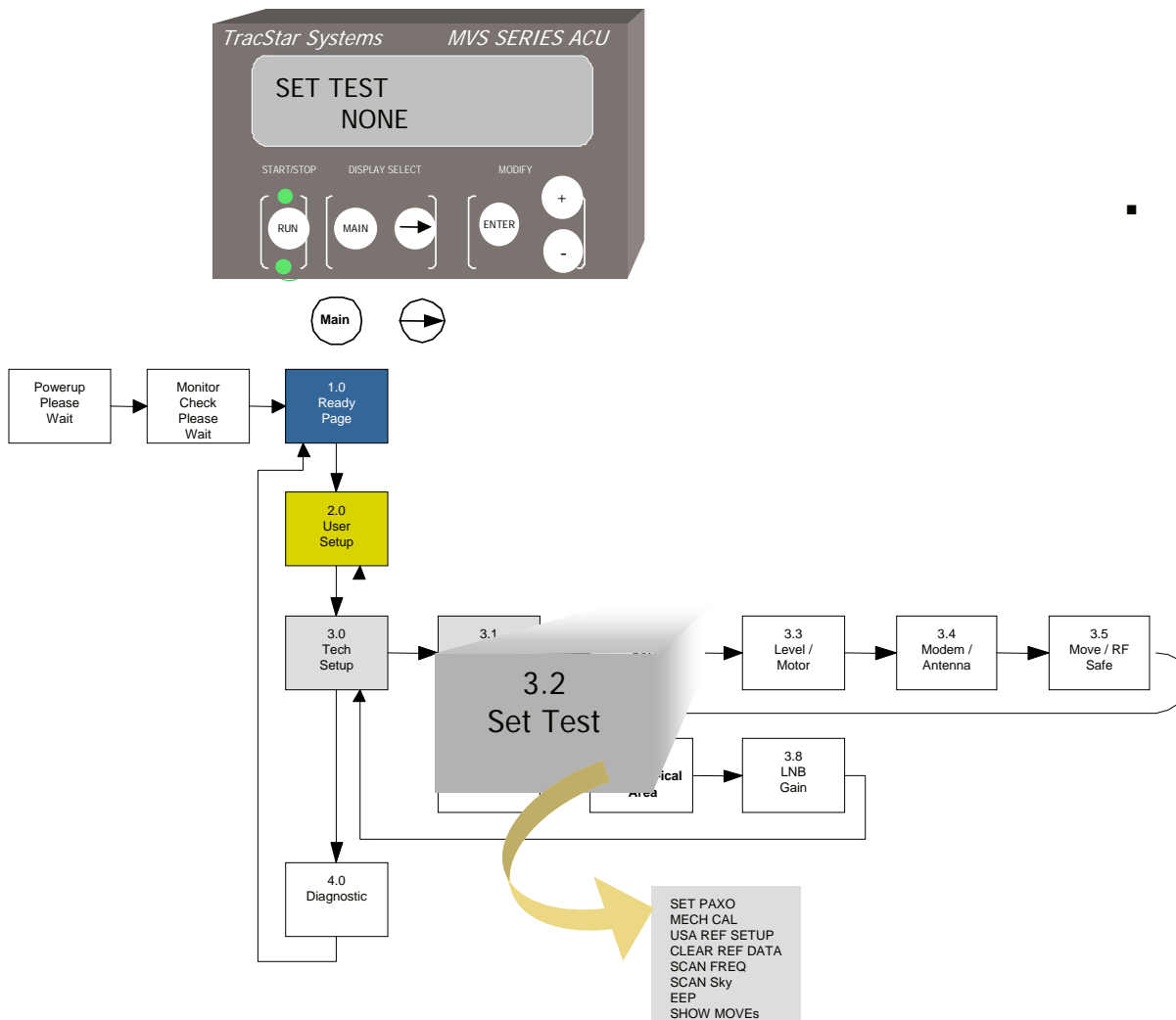
3.1 Set Option




SET OPTION
[OPTION 0]

- Set Option is occasionally used for special functions by factory personnel.

3.2 Set Test



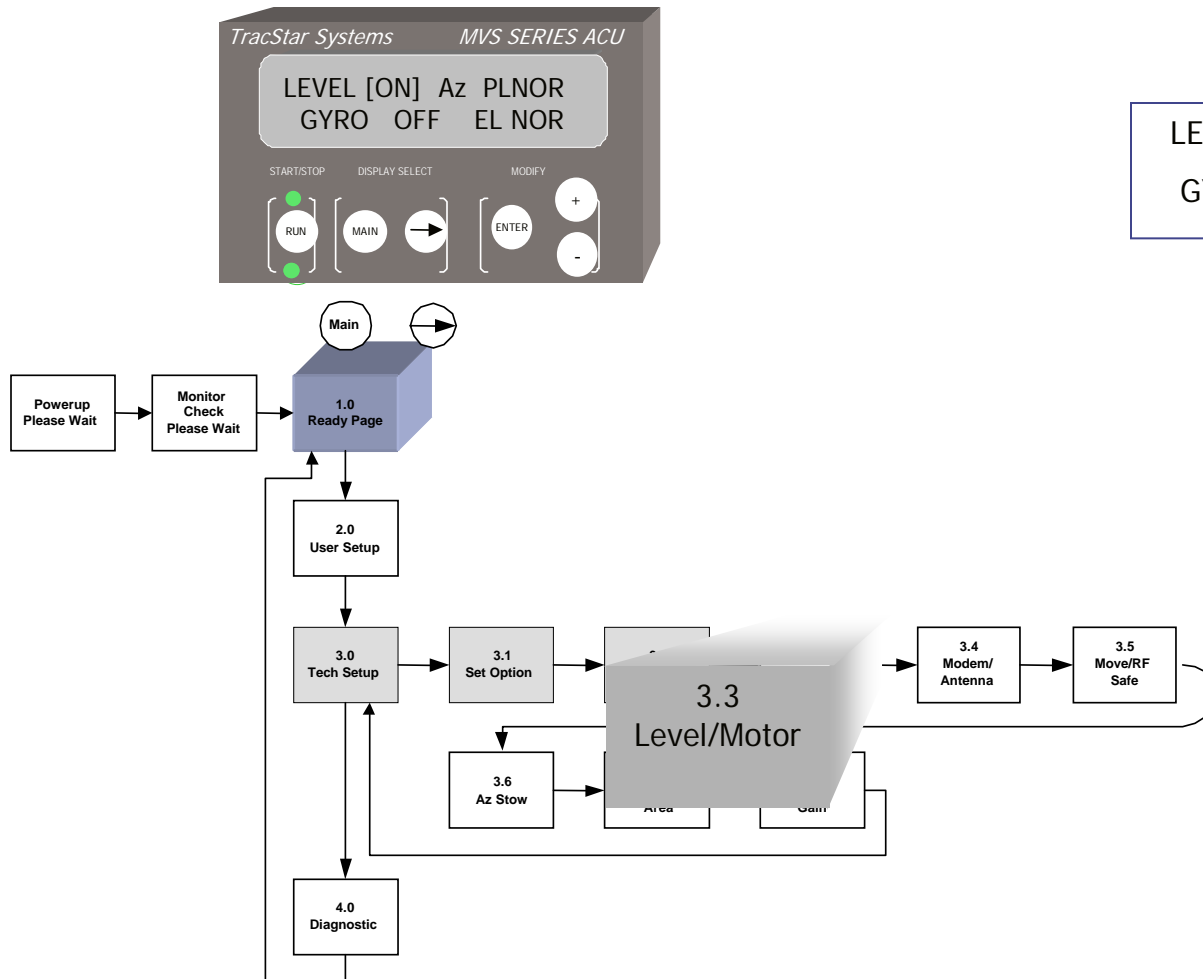
SET TEST
[NONE]

- There are several function available to the user in Set Test. Press the  key to select the desired function. NOTE: The following tests do not have input parameters. They are either RUN or NOT RUN as a standard factory setup, under the direction of factory personnel.
 - NONE:
 - SET PAZO: Sets pol axis azimuth offset – (use when changing from factory reflector)
 - MECH CAL: Mechanical self-calibration of antenna
 - USA REF SETUP – Clears out data and Ref Sat locations and defaults to USAadvb settings
 - CLEAR REF DATA – Clears out all SAT / Ref SAT data
 - SCAN FREQ: Scans selected Reference Satellites for transponder/carrier frequencies that will be used in subsequent acquisitions.
 - SCAN Sky: Scans the orbital arc for Reference Satellite positions, signal strength and frequency.
 - EEP Save: Saves memory to NVEProm.
 - SHOW MOVEs: Pre-programmed satellite acquisition simulation.

3.2 Set Test

| Description | Action | Display |
|--|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 READY |
| Set Test Page (Page 3.2) | From Ready Page: Main 2x Arrow 2x | SET TEST [NONE] |
| Press + or – until the desired function is shown: Set PAZO – Factory Direction Only MECH CAL – Factory Direction Only USA REF SETUP – Factory Direction Only CLEAR REF DATA – Factory Direction Only SCAN FREQ – Factory Direction Only SCAN Sky – Factory Direction Only EEP Save – Factory Direction Only SHOW MOVEs – simulates antenna acquisition process for indoor demonstrations | + or – then Enter | SET TEST [NONE] |
| | + or - | SET TEST [CANCEL] SCAN FREQ |
| | Enter | SET TEST [RUN NOW] SCAN FREQ |

3.3 Level/Motor Control Page



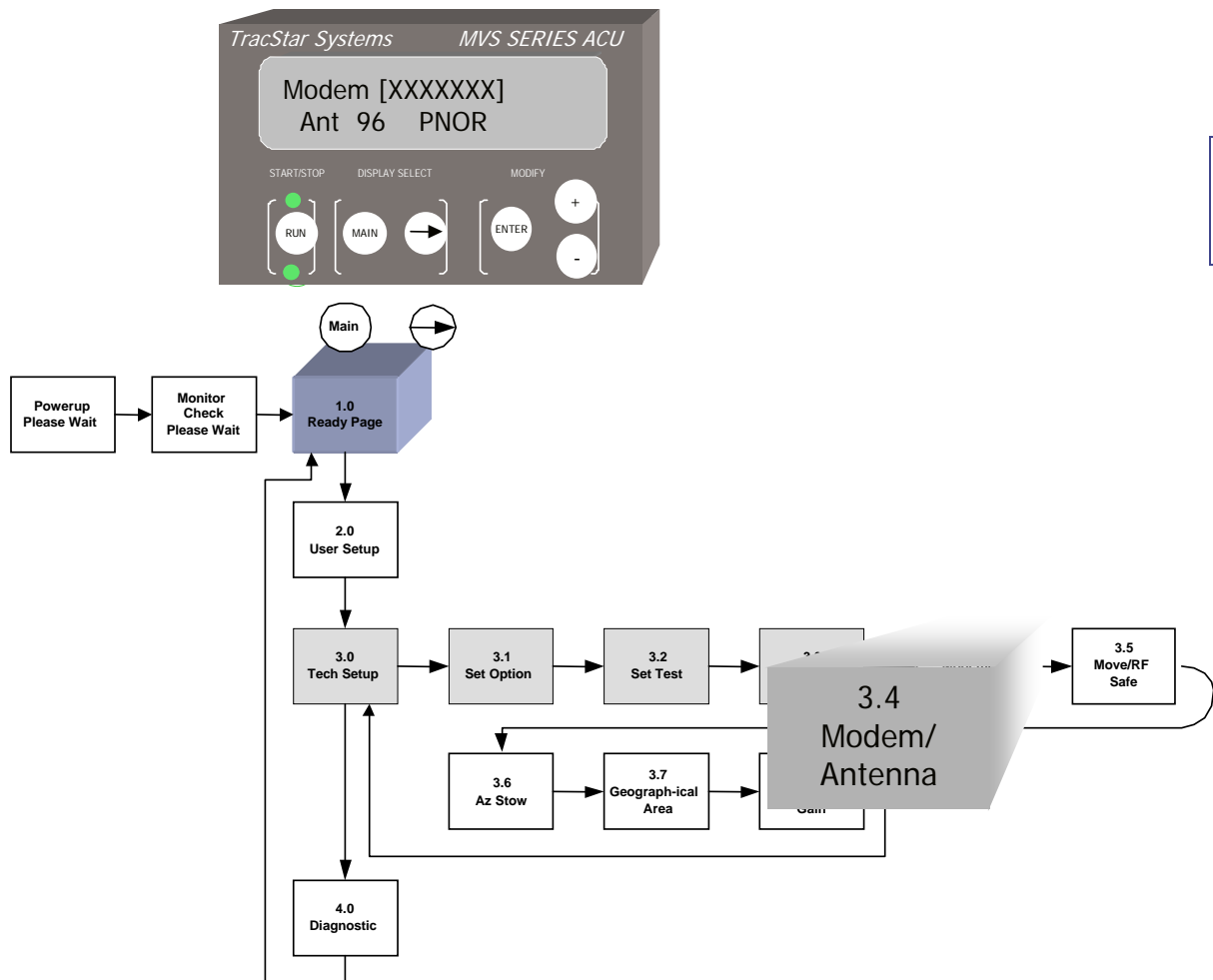
LEVEL [ON] Az PL NOR
GYRO OFF EI NOR

- This page gives the user the ability to turn off the base level sensor and the azimuth, elevation and polarization motors. This would normally only be performed in a troubleshooting application.
- The GYRO option is not applicable to this antenna. Default setting is OFF.

3.3 Level/Motor Control (con't)

| Description | Action | Display BLUE indicates default setting |
|---|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 READY |
| Level / Motor Control Page (Page 3.3) | From Ready Page: Main 2x Arrow 3x | LEVEL [ON /OFF] Az PLNOR GYRO OFF EL NOR |
| The user can turn the base level sensor off, this would only be done during a maintenance or troubleshooting activity. MAY CAUSE ANTENNA ACQUISITION FAILURE. | + or – then Enter | LEVEL [ON /OFF] Az PLNOR GYRO OFF EL NOR |
| The user can turn the azimuth and polarization motor off, normally only a troubleshooting function. | + or – then Enter | LEVEL ON Az PL [NOR /DIS] GYRO OFF EL NOR |
| The user can turn the elevation motor off, normally only a troubleshooting function. | + or – then Enter | LEVEL ON Az PL NOR GYRO OFF EL [NOR /DIS] |

3.4 Select Modem/Antenna/Pol



Modem [XXXXXXX]
Ant 1.2SE VertDN

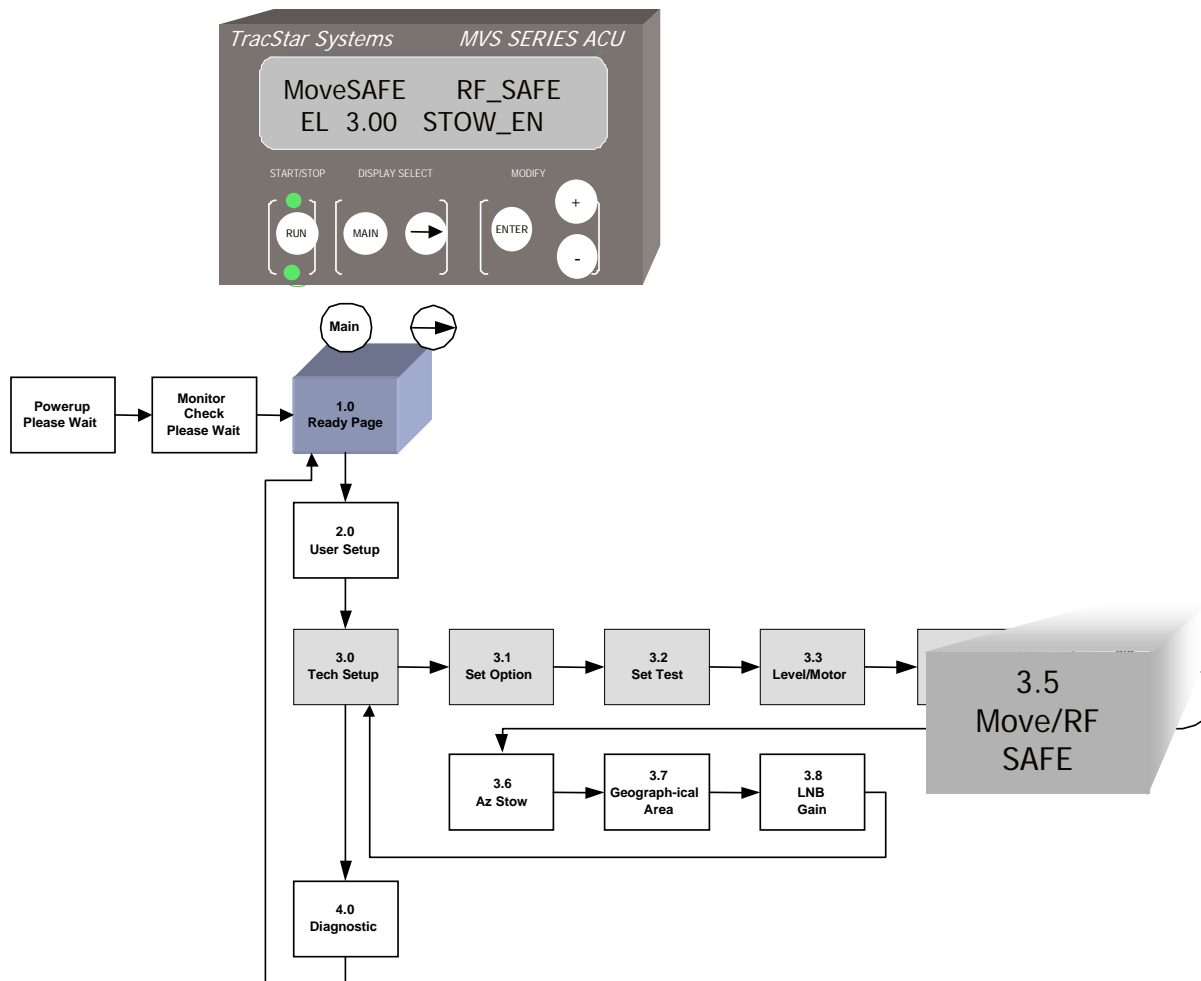
- The antenna has a serial interface for communications to selected modem types. The antenna can provide GPS information over this port.
- Press the + or – key to scroll through the pre-programmed modem models, make a selection and press ENTER.

On the MVS1200 (1.2 Meter) and MVS1800 Antennas with the Motorized Feed Assembly, Receive Polarization can be selected.

3.4 Select Modem/Antenna/Pol (con't)

| Description | Action | Display | MODEM TYPE | Supported Modems |
|--|---|--|---------------|---------------------------------|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 READY | NONE | Non GPS modems |
| Select Modem / Antenna Page (Page 3.4) | From Ready Page: Main 2x Arrow 4x | Modem [iDirect] Ant 96 Remove | iDirect * | Net Modem II Plus |
| The user can select from the following modem types for the GPS interface: None iDirect Linkstar Linkway AuxRemote | + or – then Enter | Modem [iDirect] Ant 96 Remove | Linkstar | Linkstar, EMS |
| The antenna type cannot be changed without factory direction. | Contact Factory | Modem iDirect Ant 96 Remove | Linkway | Linkway |
| MVS 1800, 1200 and 960SB Antenna ONLY | | | | |
| The user can select the Receive Polarization for the antenna. Choices are: HorzDN VertDN | + or – then Enter | [HorzDN] | Aux Remote | Factory |
| | | | Com Tech * | Com Tech SCPC |
| | | | Skylane96 * | Skylane @ 9600 baud |
| | | | Gilat * | SkyEdge |
| | | | iNfiniti * | 3000,5000, 7000 iDirect |
| | | | iNfiniti IP * | ALL Lantronics Adapter Req'd |
| * DirectPoint Capable Modems | | | | |

3.5 Move/RF_SAFE



Move[SAFE] RF_SAFE

EL 3.00 Stow EN

- There are several safety features built into the antenna:
- MOVE SAFE prevents any azimuth motion including jog commands below a pre-set elevation angle. This is to prevent jogging the antenna at too low of angles and possibility causing a mechanical interference.
- RF SAFE provides a Transmit Inhibit feature. If there is a motion command given to the antenna while it is locked onto a satellite, the transmitter will be inhibited prior to any motion of the antenna. The modem must have an optional DC block installed in the transmit line to be valid and for this feature to be used.
- STOW En will automatically stow the antenna IF:
 - Power is still present on the pedestal*
 - The GPS system detects movement of more than ten (10) feet*
- Requires approx 45 seconds to complete the STOW process – Power MUST be present on the pedestal.**

3.5 MOVE/RF_SAFE (con't)

| Description | Action | Display BLUE indicates default setting |
|---|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| Move/RF/Stow Safe Page (Page 3.5) | From Ready Page: Main 2x Arrow 5x | Move [SAFE /ANY!] RF SAFE EL 3.00 Stow EN |
| Move [SAFE] prevents azimuth axis motion including jog commands below this pre-set limit to prevent accidental mechanical interference. Move [ANY] will disable the SAFE mode. | + or – then Enter | Move [SAFE /ANY!] RF SAFE EL 3.00 Stow EN |
| RF [SAFE] will inhibit LNB power thereby inhibiting transmit if a motion command is given to the antenna via the controller. RF [ANY] will disable the SAFE mode. | + or – then Enter | Move SAFE RF [SAFE /ANY!] EL 3.00 Stow EN |
| EL [X.XX] sets the low elevation angle for Move SAFE. Adjust with + or – until the desired value is reached. | + or – then Enter | Move SAFE RF SAFE [EL 3.00 /x.xx] Stow EN |
| Stow [En] is the auto stow feature designed to stow the antenna in the event the GPS systems detects more than 10 feet of movement. This is a safety feature if the antenna is roof mounted and the vehicle begins to move with the antenna up. Stow [DIS] will disable the safe feature. | + or – then Enter | Move SAFE RF SAFE EL 3.00 Stow [EN /dis] |

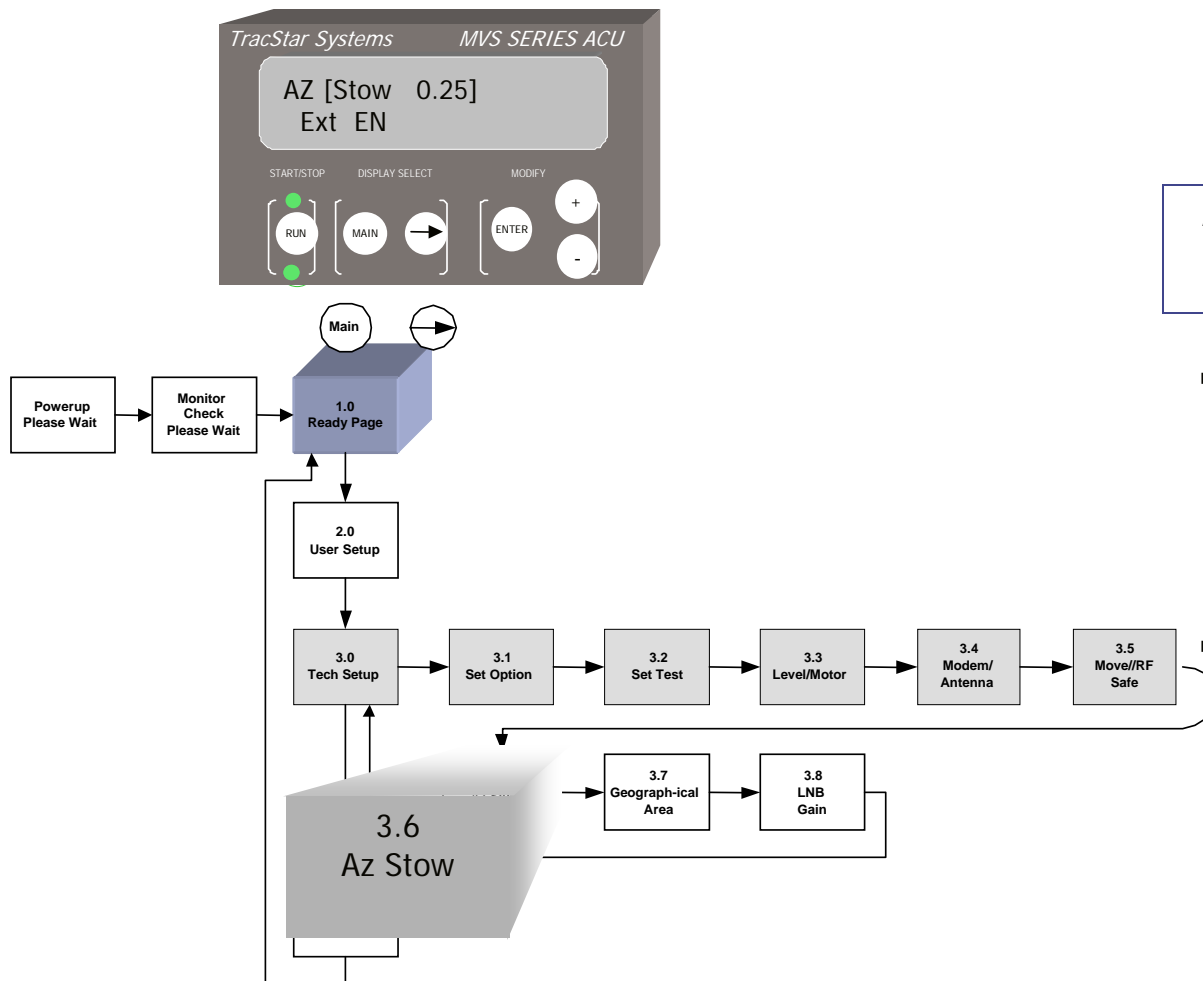
!! WARNING !!

“Stow EN” is NOT a failsafe solution. Ultimate responsibility falls upon the user to ensure proper antenna positioning prior to movement of the vehicle. For ultimate safety, users should install an ignition lock-out prohibiting movement of the vehicle if the antenna is deployed. TracStar assumes no responsibility for damage to the vehicle or antenna for failure to stow the antenna.



IMPORTANT

3.6 Azimuth Stow/External Switch




AZ [Stow 0.25]

Ext EN

- The AZIMUTH STOW setting provides the offset for the angular distance from the azimuth reference switch to the desired azimuth stow position.
- The Enable/Disable setting enables or disables the optional start/stow switch that is located on the antenna.

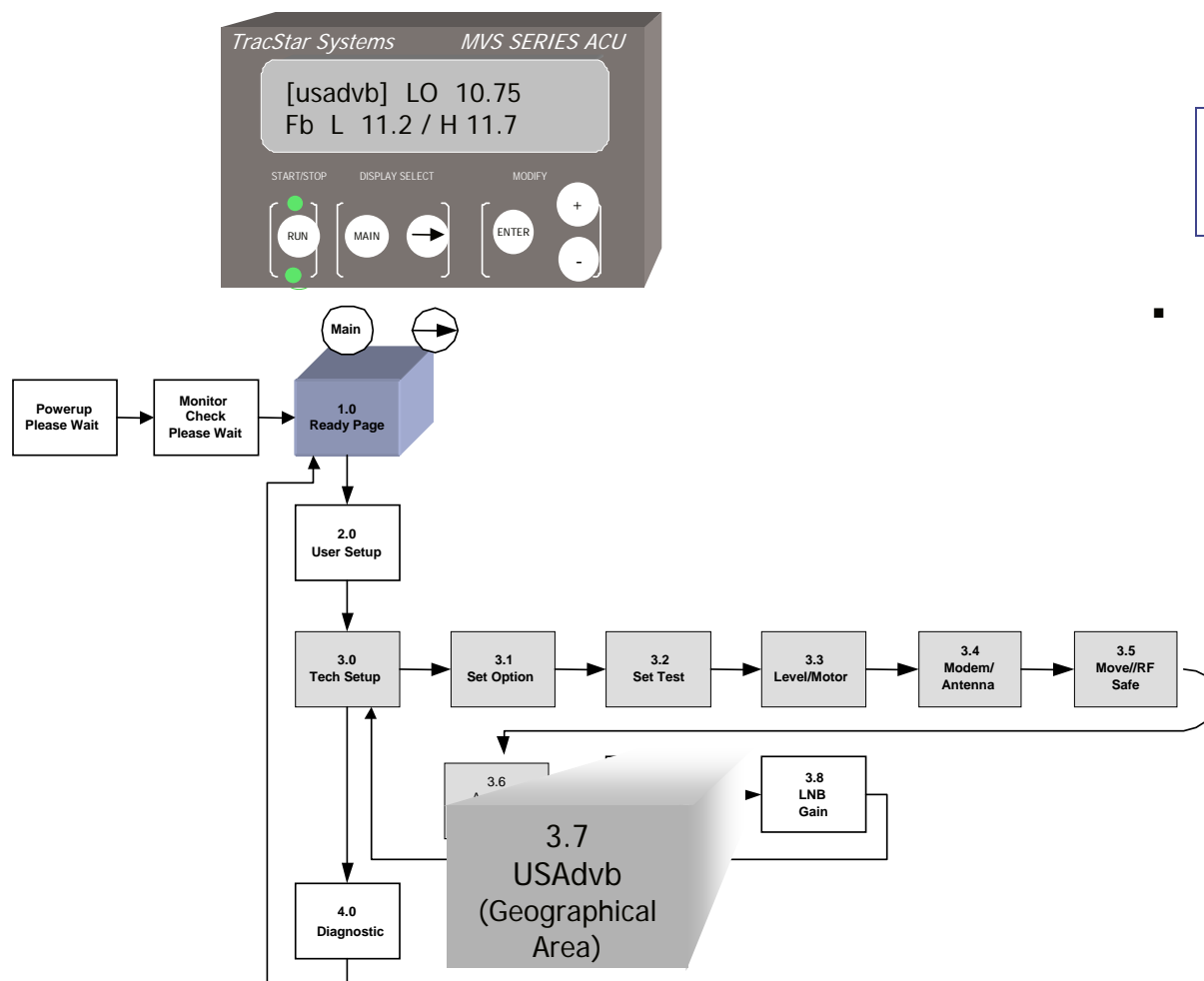
3.6 Azimuth Stow Setting

| Description | Action | Display BLUE indicates default setting |
|--|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 READY |
| Azimuth Stow / External Switch Page (Page 3.6) | From Ready Page: Main 2x Arrow 6x | AZ [Stow 0.25] Ext EN |
| The azimuth stow setting determines the offset for the angular distance from the azimuth axis reference switch to the desired azimuth stow position. + or – will change the angle. This is set in the factory. | + or – then Enter | AZ [Stow 0.25] Ext EN  |
| Ext EN indicates whether the pedestal start/stow switch is enabled or disabled. Press + or – to change the selection, then Enter. | + or – then Enter | AZ Stow 0.25 Ext [EN /dis] |

IMPORTANT

Az STOW is set at the factory and should not be adjusted except under guidance of factory personnel. Damage to the antenna may result from improper setting and may void warranty.


3.7 USAdvb



- The LNB Setup page allows the user to:
 - Select the region of the world that the antenna is located in
 - Input the local oscillator frequency of the LNB in use
 - Input the receive frequency band corresponding to the frequency band and LNB in use.
 - Note: these are the frequencies that are used during the antenna scan.

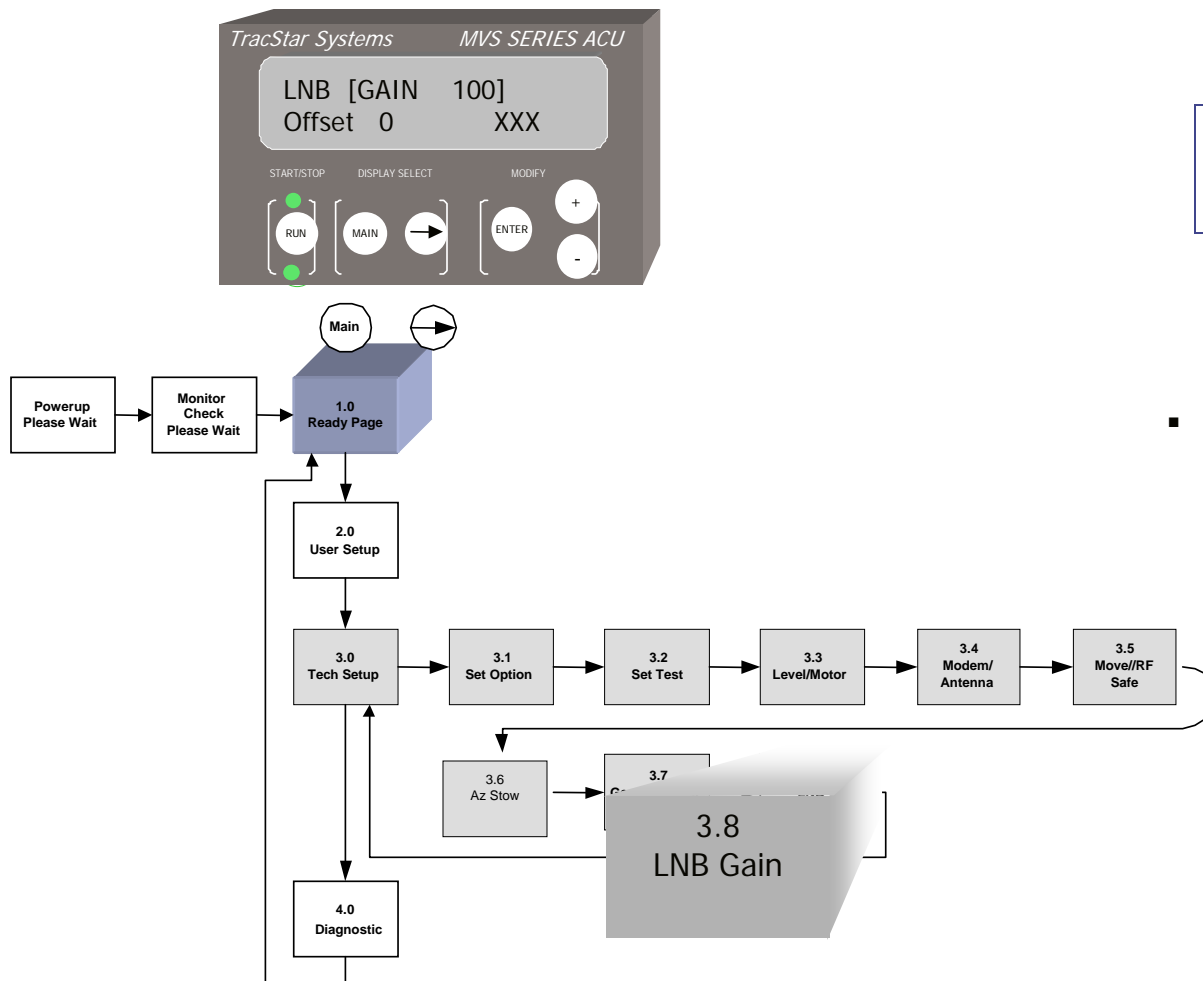
| LNB BANDS | |
|-----------|-------------|
| LO | 11.2 – 11.7 |
| MID | 11.7 – 12.2 |
| HIGH | 12.2 – 12.7 |

3.7 USAdvb

| Description | Action | Display BLUE indicates default setting |
|---|---|---|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| LNB Setup Page (Page 3.7) | From Ready Page: Main 2x Arrow 7x | [USAdvb] LO 10.75 Fb L 11.2/H 11.7 |
| The antenna must be set to USA, USAdvb, Mid East or Europe. Press + to edit then Enter. <i>USAdvb is the preferred setting in the USA, due to the type of satellite typically used as a reference. Mid EAST and EUROPE have the same internal software functions, either will work in either location.</i> | + or - then Enter | [USAdvb] LO 10.75 Fb L 11.2/H 11.7  |
| Set the LNB Local Oscillator frequency using + or -, then Enter | + or - then Enter | Mid East [LO 10.75] Fb L 11.2/H 11.7 |
| Set the low end of the frequency band in use with + or -, then Enter. | + or - then Enter | Mid East LO 10.75 Fb [L 11.2]/H 11.7 |
| Set the high end of the frequency band in use with + or -, then Enter | + or - then Enter | Mid East LO 10.75 Fb L 11.2/[H 11.7] |
| | | |

IMPORTANT

3.8 LNB GAIN

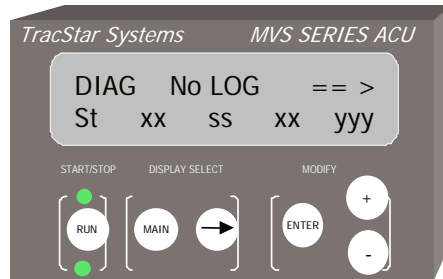


- The LNB Gain page allows the user to:
 - Adjust the gain of the LNB as seen by the antenna controller's built in signal strength measurement (SS).
 - Enter a LNB noise offset as seen by the antenna controllers built in signal strength measurement (SS).

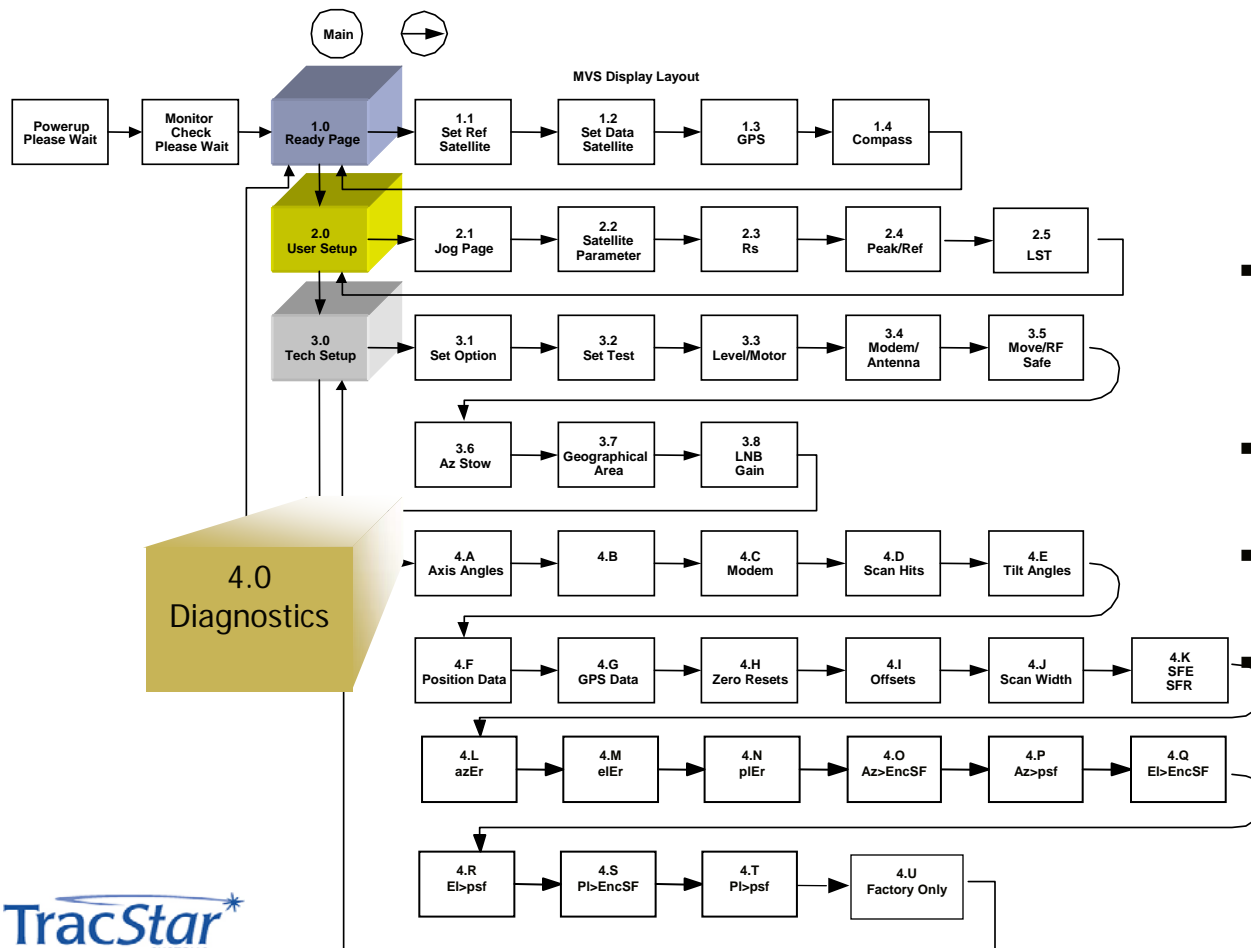
3.8 LNB GAIN

| Description | Action | Display BLUE indicates default setting |
|---|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| LNB GAIN Page (Page 3.8) | From Ready Page: Main 2x Arrow 8x | LNB [GAIN 100] Offset 0 XXX |
| The user may wish to adjust the LNB gain as measured by the built in tuner: Gain = 100, nominal setting Gain = 50, ½ of nominal gain Gain = 200, double the nominal gain When adjusting the gain, monitor the signal strength number in the lower right. Increasing the gain will increase the signal level. | + or – then Enter | LNB [GAIN 100] Offset 0 XXX |
| The user may wish to adjust the LNB offset as measured by the built in tuner. Adjust the offset when the antenna is pointed at a cold sky. Adjusting the offset should minimize the signal strength number when the antenna is looking at cold sky. | + or – then Enter | LNB GAIN 100 [Offset 0] XXX |

4.0 DIAGNOSTICS

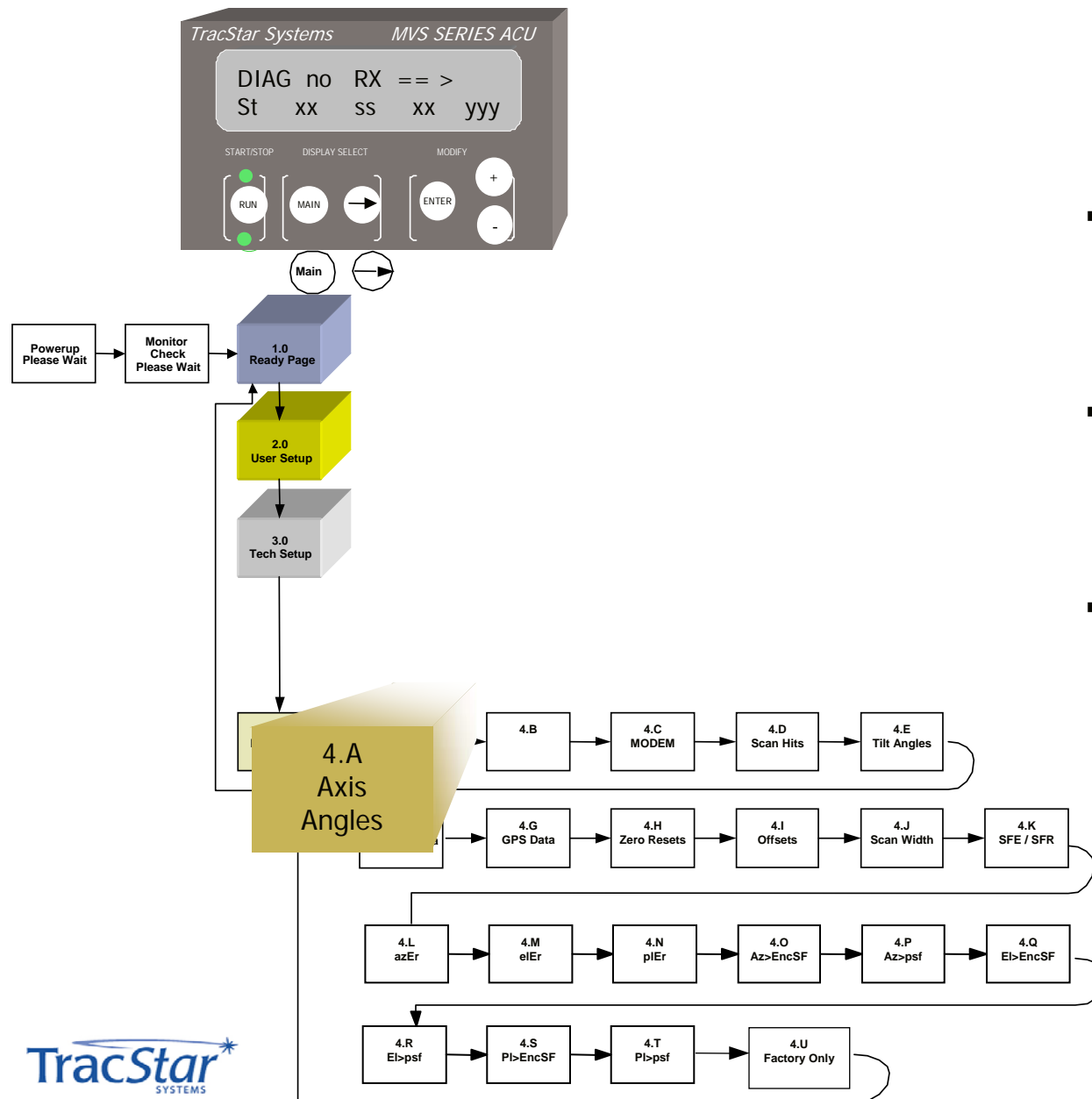


DIAG No LOG ==>
St XX ssXX YYY



- The Diagnostics section includes information on antenna pointing angles, level sensor readings, GPS data and the ability to set correction factors for the three axes.
- "No LOG" and "LOG try" are messages unique to Idirect Series Modems requiring a log-in process.
- St XX indicates the tracking state of the antenna.
- ssXX composite signal strength.
- YYY is tuned signal strength.

4.A Axis Angles

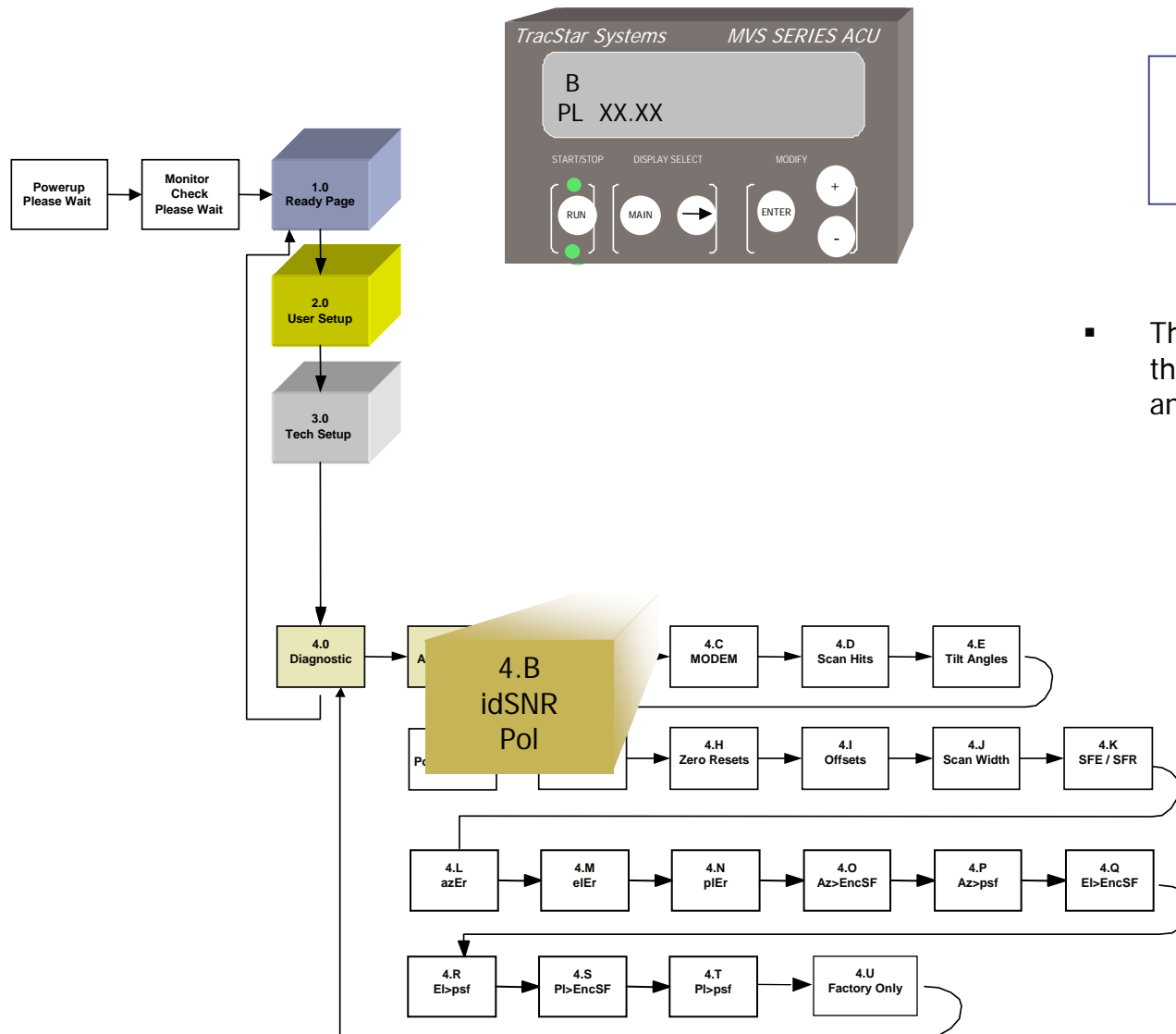


A 246.00 E 28.70

Ap 44.6 Ep 27.77

- The DIAGNOSTICS A page indicates the azimuth and elevation angles of the antenna.
- The top row shows the antenna Az and El angles relative to the earth (azimuth only valid after lock on)
- The second row Ap and Ep indicate the Az and El angle relative to the pedestal coordinates, i.e., the azimuth stow angle is zero degrees. El is only valid above -10 degrees.

4.B B Page



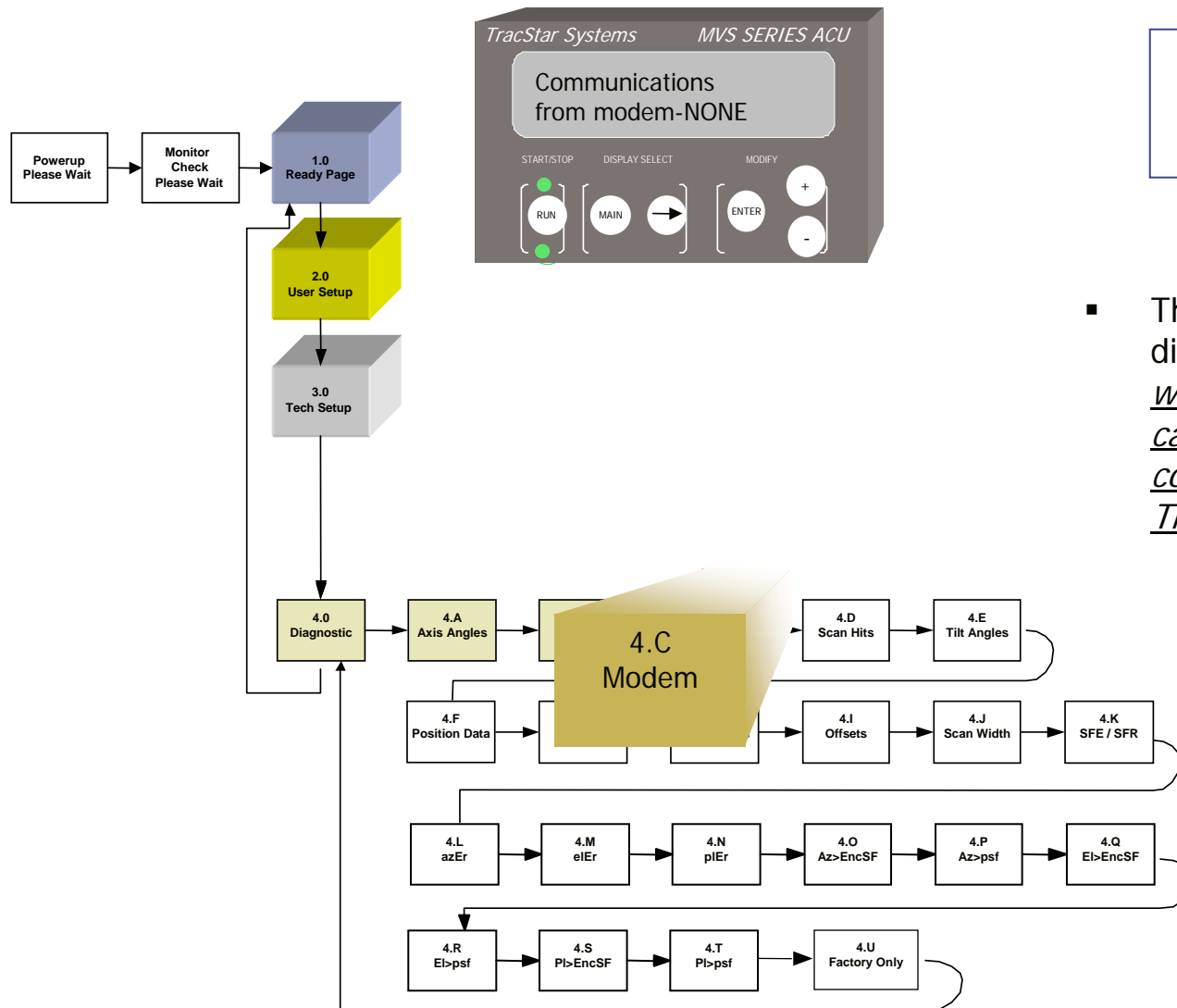
B
PL XX.XX

- The DIAGNOSTICS B page displays the polarization angle of the antenna.

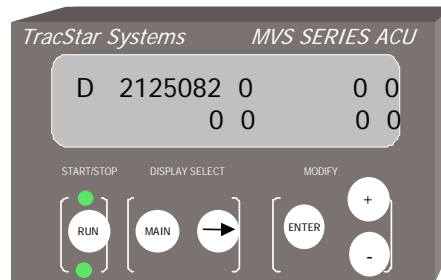
4.C C Page

Communications
from modem-NONE

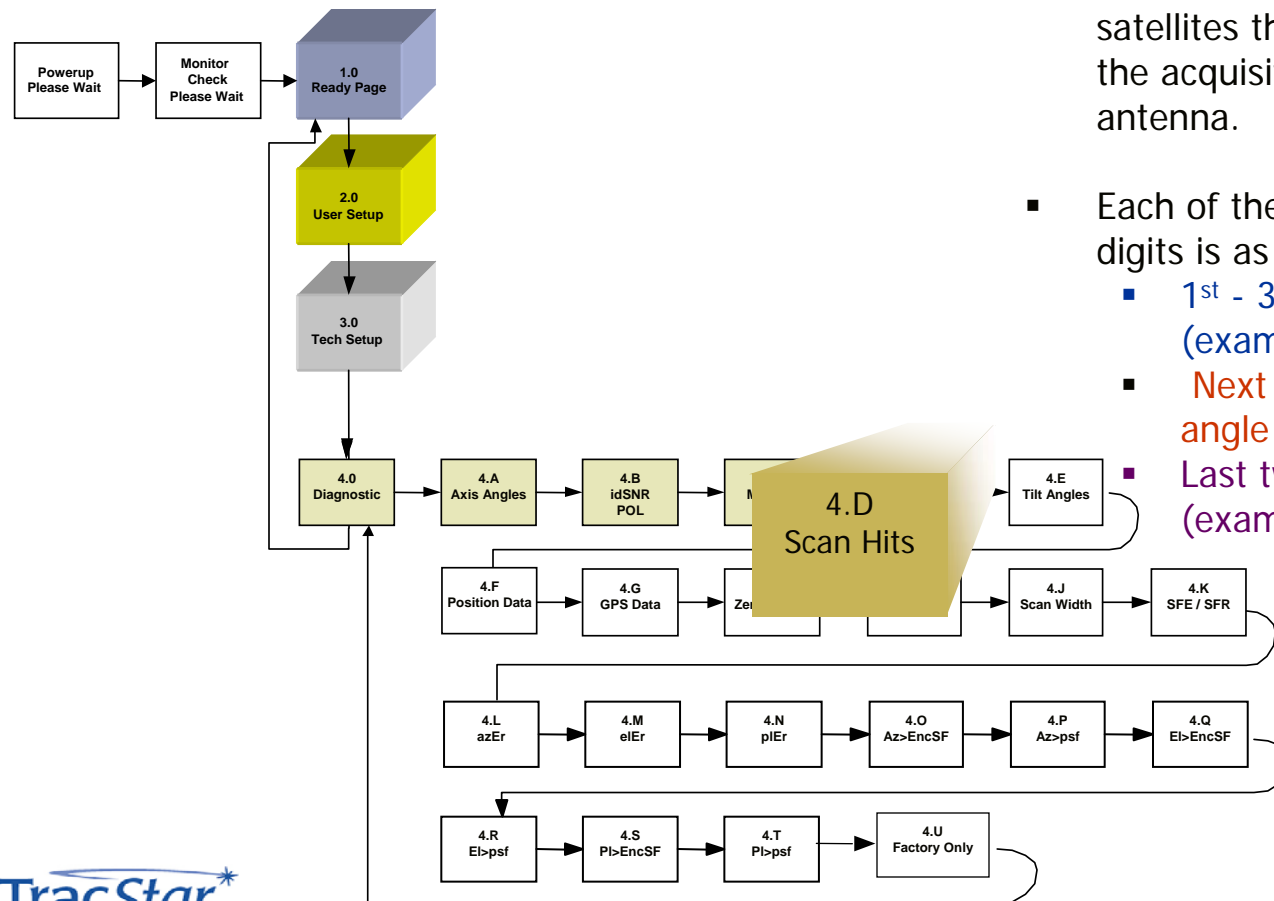
- The DIAGNOSTICS C page displays modem messages when connected to modems capable to two-way communication with the TracStar controller only.



4.D Scan Hits

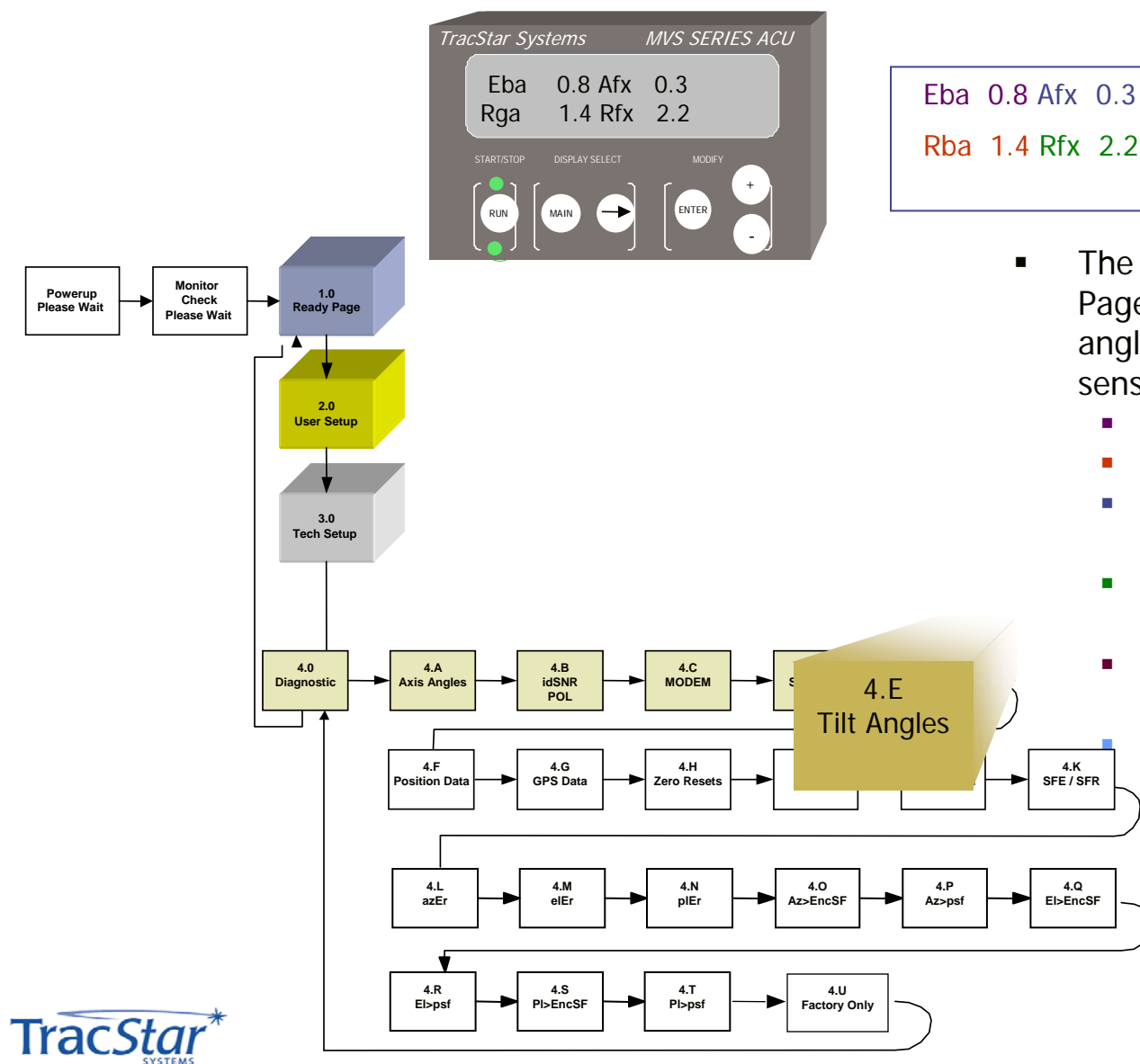


2125082 0000000
0000000 0000000



- The DIAGNOSTICS D page indicates satellites that were “seen” during the acquisition and alignment of the antenna.
- Each of the four groups of seven digits is as follows:
 - 1st - 3 digits - azimuth angle (example 212)
 - Next two digits - elevation angle (example 50)
 - Last two digits signal – strength (example 82)

4.E Tilt Angles

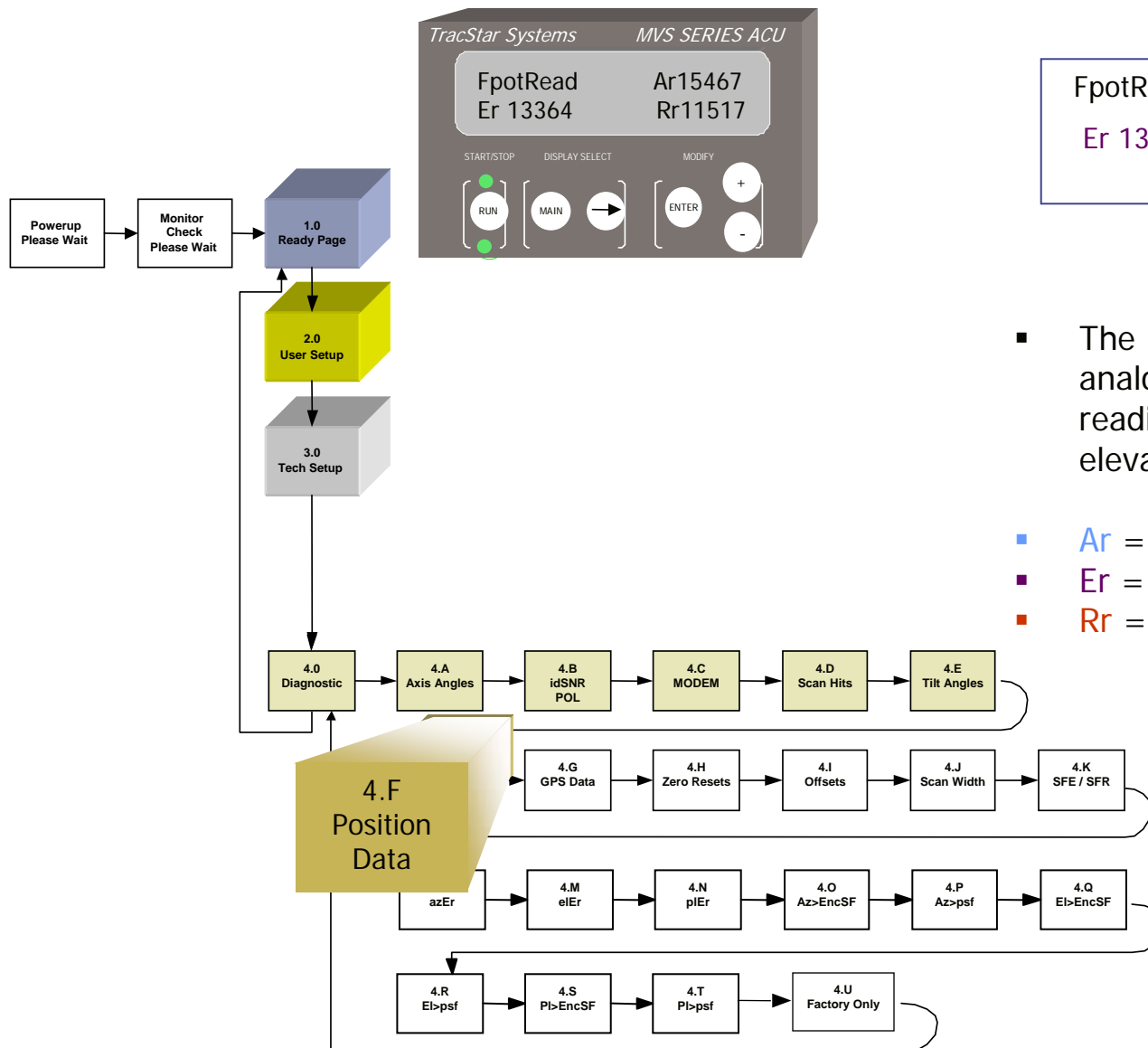


Eba 0.8 Afx 0.3
Rba 1.4 Rfx 2.2

Elv 4.0 Afx1.7
Rlv 1.5 Rfx 1.4

- The values on the DIAGNOTICS E Page are the pedestal base tilt angles as measured by the tilt sensor.
 - Eba = elevation base angle
 - Rba = roll base angle
 - Afx = azimuth adjustment due to base tilt
 - Rfx = pol adjustment due to base tile
 - Elv = raw (unfiltered) el base angle reading
 - Rlv = raw (unfiltered) roll level reading

4.F Axis Position Transducer Readout

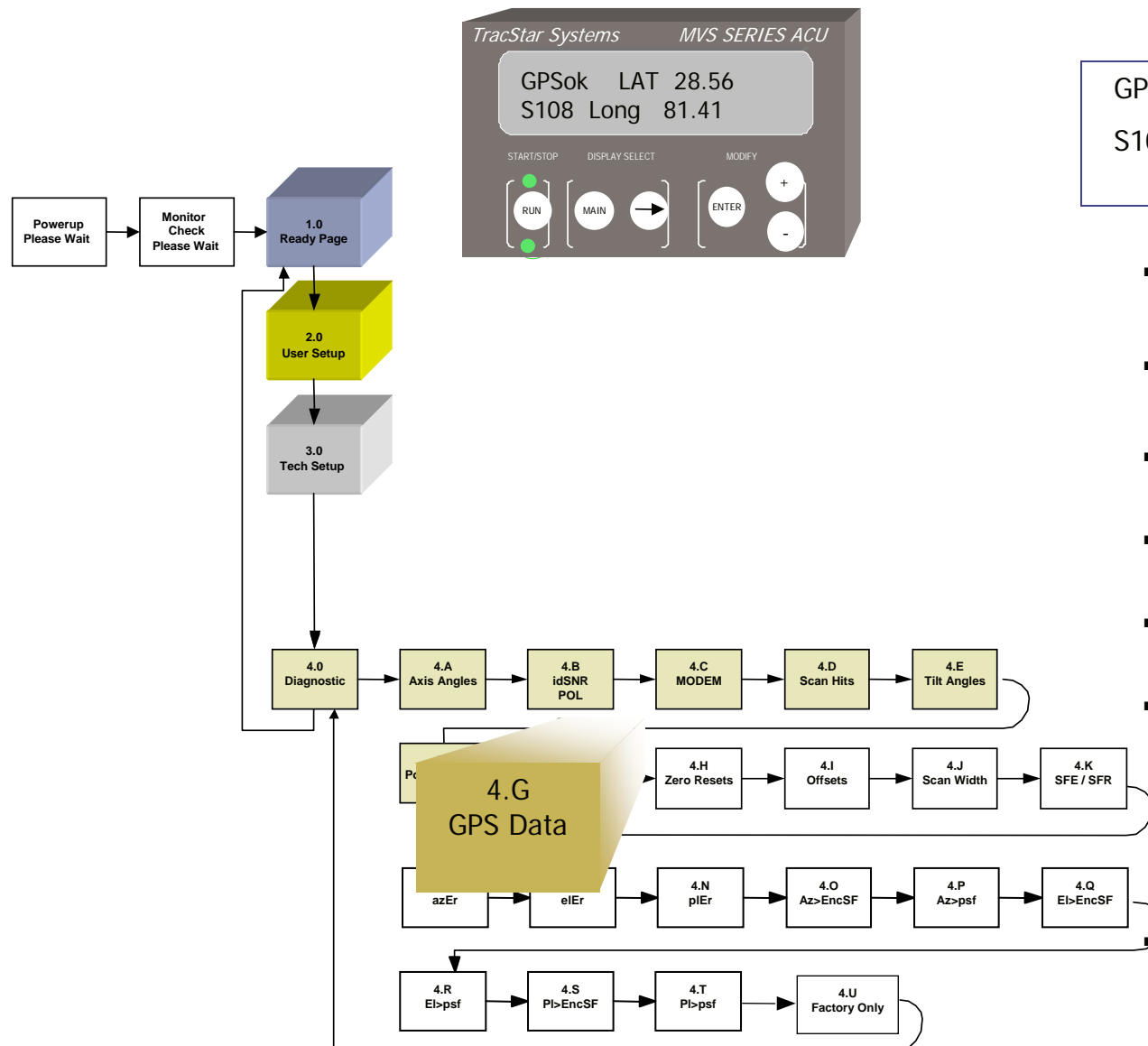


FpotRead Ar15467
Er 13364 Rr11517

- The DIAGNOSTICS F page is the analog position transducer reading from the azimuth and elevation axis.

- Ar = azimuth reading
- Er = elevation reading
- Rr = (not used)

4.G GPS Data

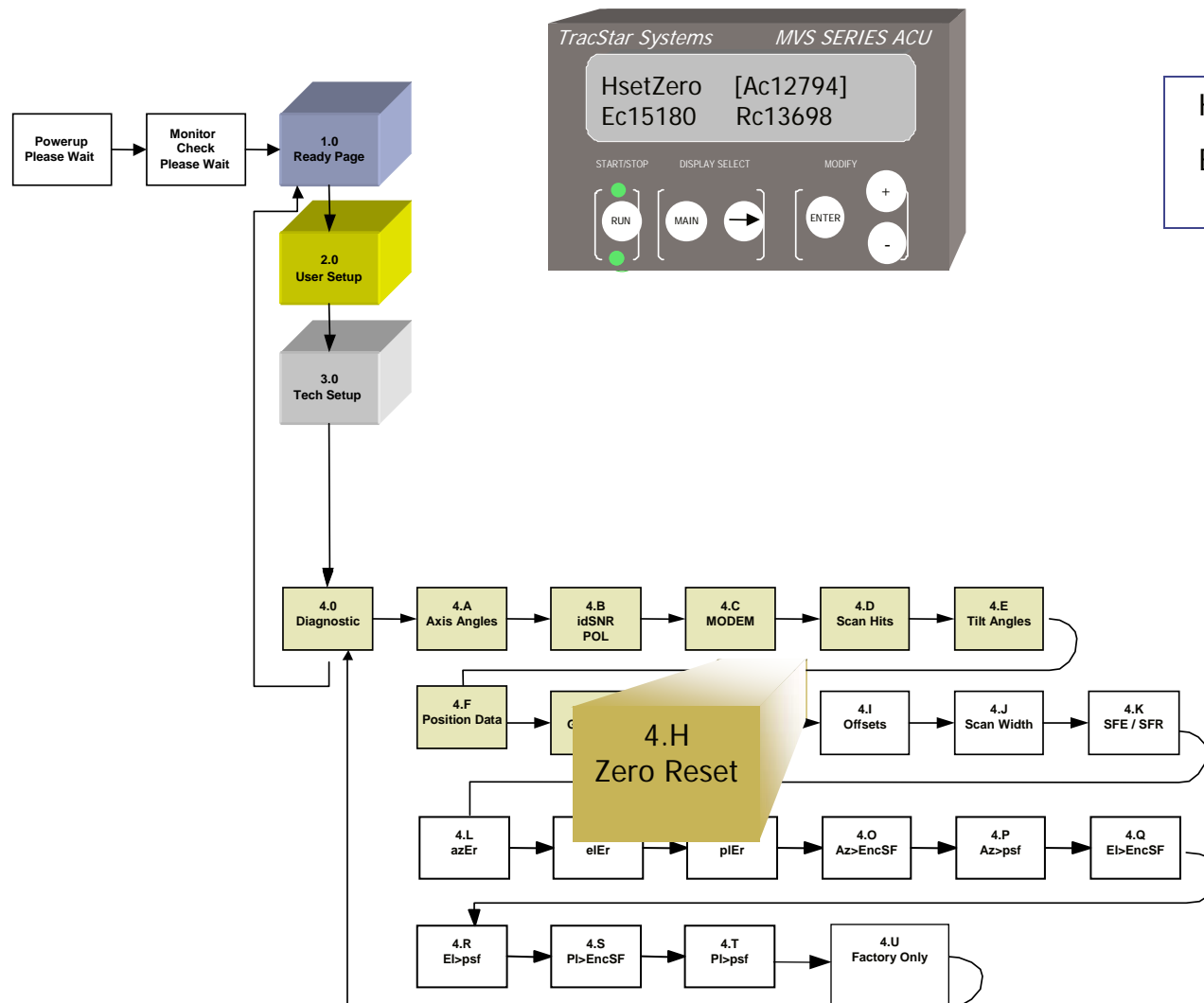


GPSok LAT 28.56
S108 Long 81.41

- The DIAGNOTICS G page provides the GPS data as follows:
- GPSok indicates the GPS signal is acquired
- LAT 28.56 indicates the current latitude of the antenna.
- GVelocity indicates a change of antenna movement/location
- MagD 5.10 indicates the magnetic deviation
- S108 - Digit (placeholders shown)
 - 1 - indicates if the unit has ever received GPS lock
 - 0 - indicates the unit has not received GPS on this power up
 - 1 - indicates the unit has received GPS on this power up
 - 8 - number of GPS satellites currently being received

Long 81.41 gives the longitude position of the antenna.

4.H Axis Zero Offsets



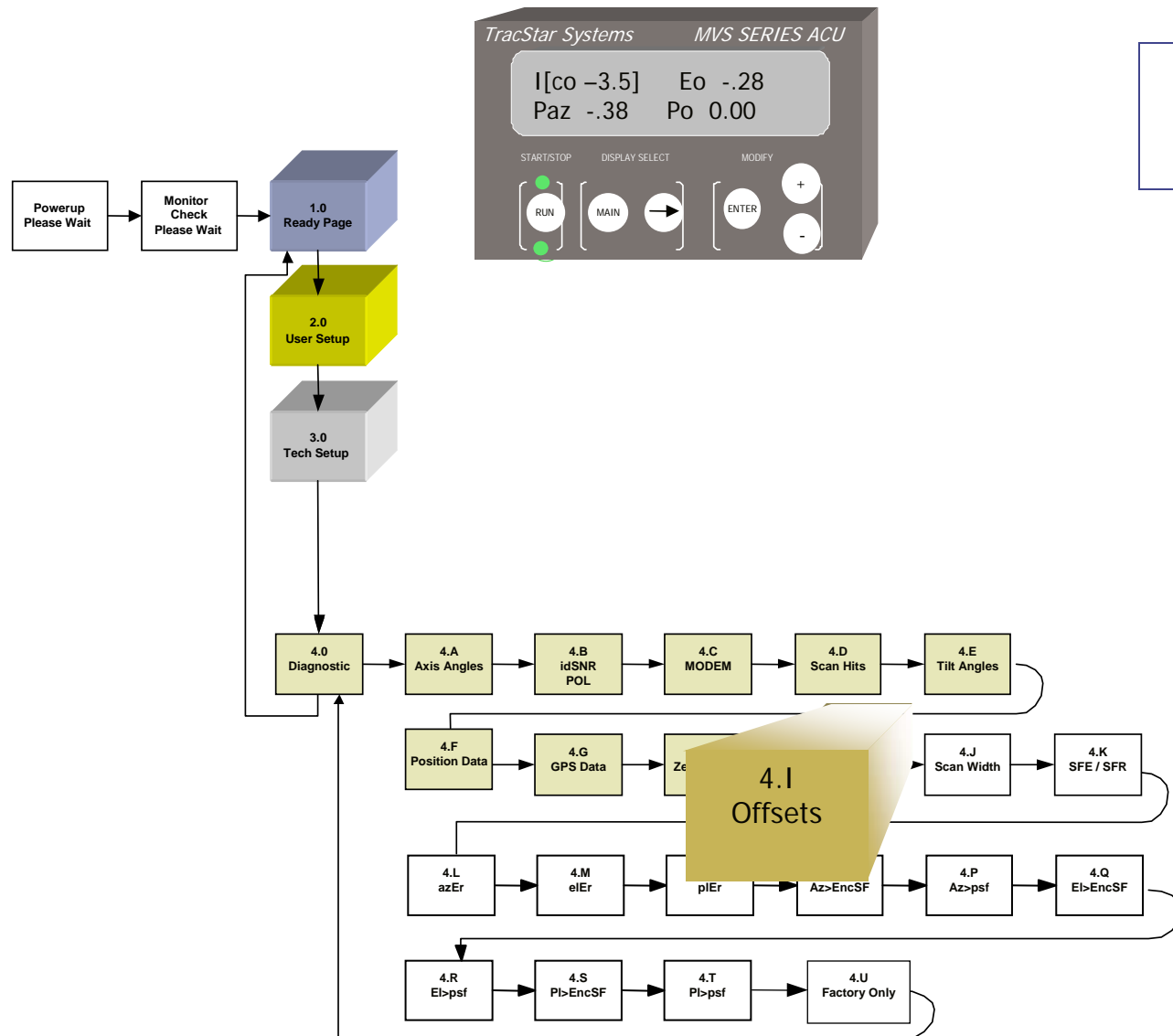
HsetZero [Ac12794]
Ec15180 Rc13698

- DO NOT CHANGE without assistance from factory personnel
- The DIAGNOSTICS H page allows the user to set the center value for each of the transducers as seen on the F page.
- Ac is the azimuth center value used to set azimuth 0 degree angle (stow position).
- Ec is the elevation center value used to set elevation 45 degree angle.
- Rc (not used)

4.H Axis Zero Offsets (con't)

| Description | Action | Display |
|--|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 READY |
| Axis Zero Offsets Page (Page 4.8) | From Ready Page: Main 3x Arrow 8x | HsetZero [Ac12794] Ec15180 Rc 13698 |
| When Ac (azimuth center) is flashing, the user can press + or – to change the azimuth value, then Enter. | + or – then Enter | HsetZero [Ac12794] Ec15180 Rc 13698 |
| When Ec (elevation center) is flashing, the user can press + or – to change the azimuth value, then Enter. | + or – then Enter | HsetZero Ac12794 [Ec15180] Rc 13698 |
| Rc = Not Used | + or – then Enter | HsetZero Ac12794 Ec15180 [Rc 13698] |

4.I Axis Offsets



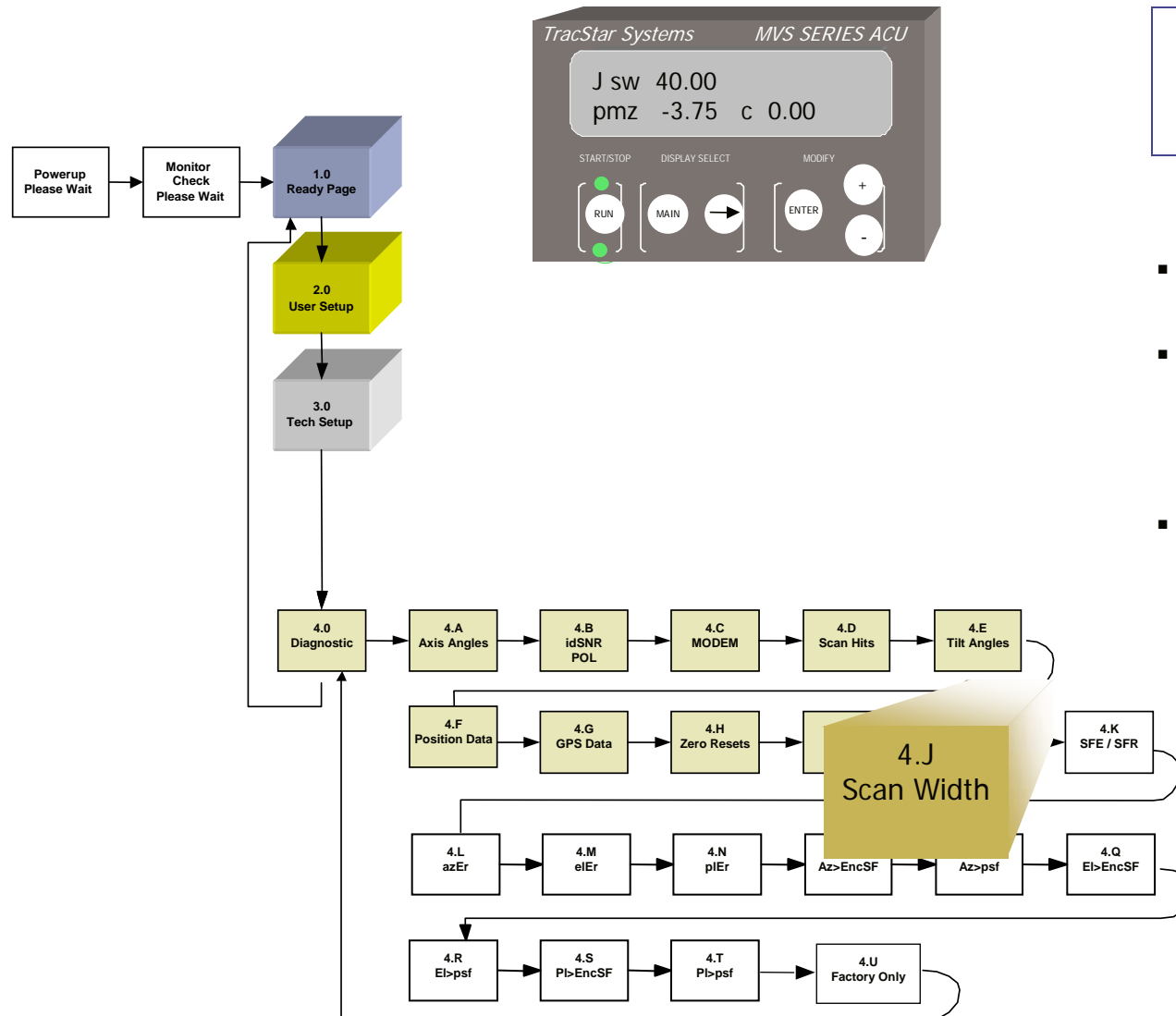
I[co -3.5] Eo -.28
Paz -.38 Po 0.00

- The DIAGNOTICS I page allows the user to view and set offsets in degrees for each axis.
- Co is the compass offset, this correction is self learning and updates itself on each acquisition.
- Eo is the elevation offset after each acquisition.
- Paz is the boresight offset for the RF beam.
- Pl is the polarization adjustment for peaking co/x pol adjustments

4.I Axis Offsets (con't)

| Description | Action | Display |
|--|---|--|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| Axis Zero Offsets Page (Page 4.9) | From Ready Page: Main 3x Arrow 9x | I [co -3.5] Eo -.28 Paz -.30 Po 0.00 |
| Co is the compass offset and updates automatically after each acquisition. The user should not change this value. | Enter | I [co -3.5] Eo -.28 Paz -.30 Po 0.00 |
| Paz is the boresite offset for the RF beam. This value is set in test and should not be changed by the user. | Enter | I co -3.5 Eo -.28 [Paz -.30] Po 0.00 |
| Po is an offset for the polarization axis. An offset can be permanently input by the user if necessary. Code 13 allows for up to 8 degrees of offset. Code 53 allows for up to 45 degrees of offset. | + or – then Enter | I co -3.5 Eo -.28 Paz -.30 [Po 0.00] |

4.J Azimuth Scan Width



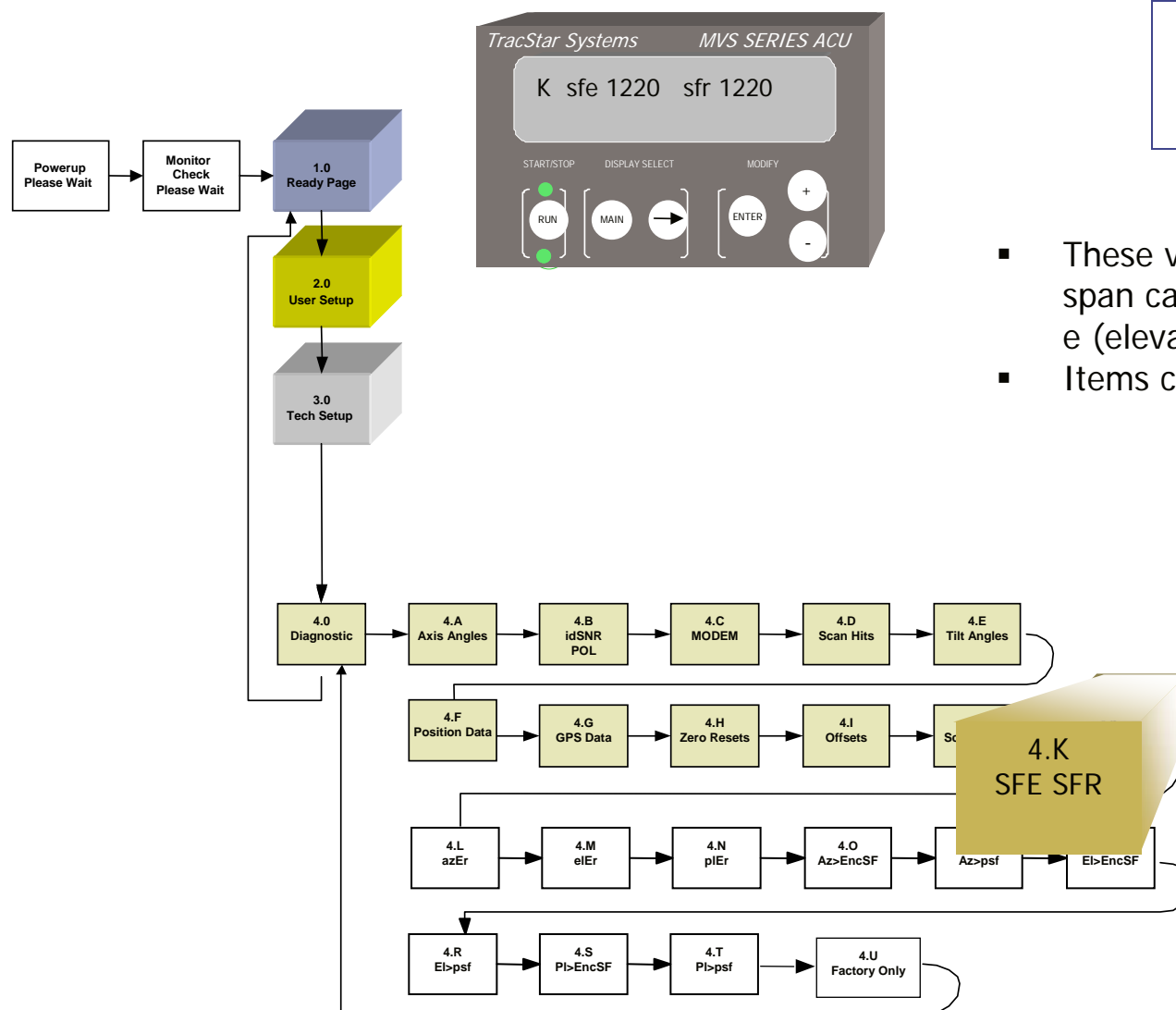
J sw 40.00
pmz -3.75 c 0.00

- DO NOT CHANGE without assistance from factory personnel
- The Diagnostics J page allows the user to set the width of the azimuth scan during the initial reference satellite acquisition.
- The default value is 40.0 degrees.
 - The max value is 100 degrees
 - The min value is 10 degrees.

4.J Azimuth Scan Width (con't)

| Description | Action | Display |
|--|---|---|
| Set Code (enables editing) (Page 3.0) | From READY page Main 2x + to code 13, Enter Main 2x | READY TECH SETUP Tech Setup CODE 13 |
| Azimuth Scan Width Page (Page 4.10) | From Ready Page: Main 3x Arrow 10x | [Sw 40.00] pmz -3.75 |
| The user can adjust the azimuth scan width from 10 to 100 degrees. 40 is the default. | + or – then Enter | [Sw 40.00] pmz -3.75 |

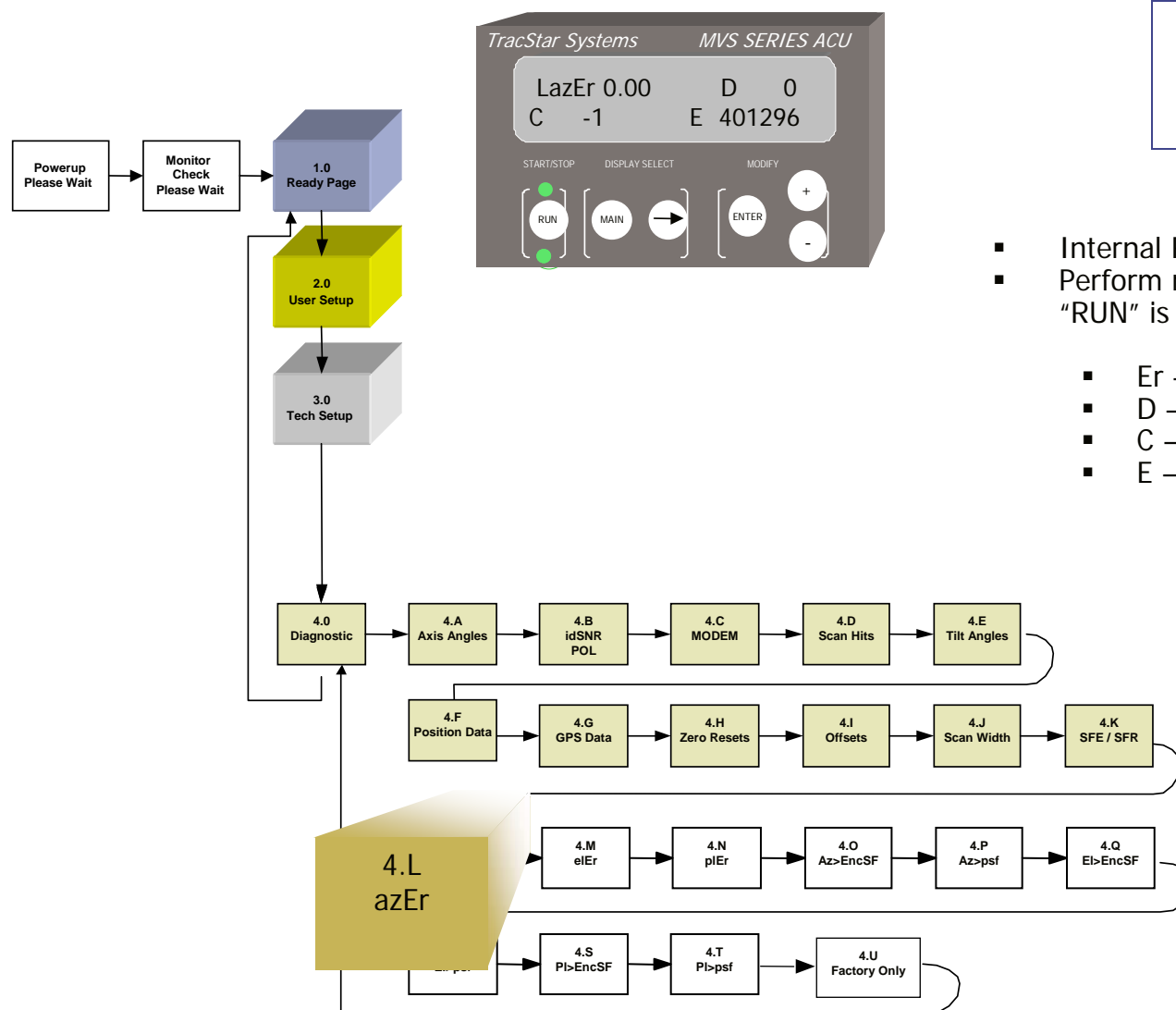
4.K SFE SFR



K sfe1220 sfr1220

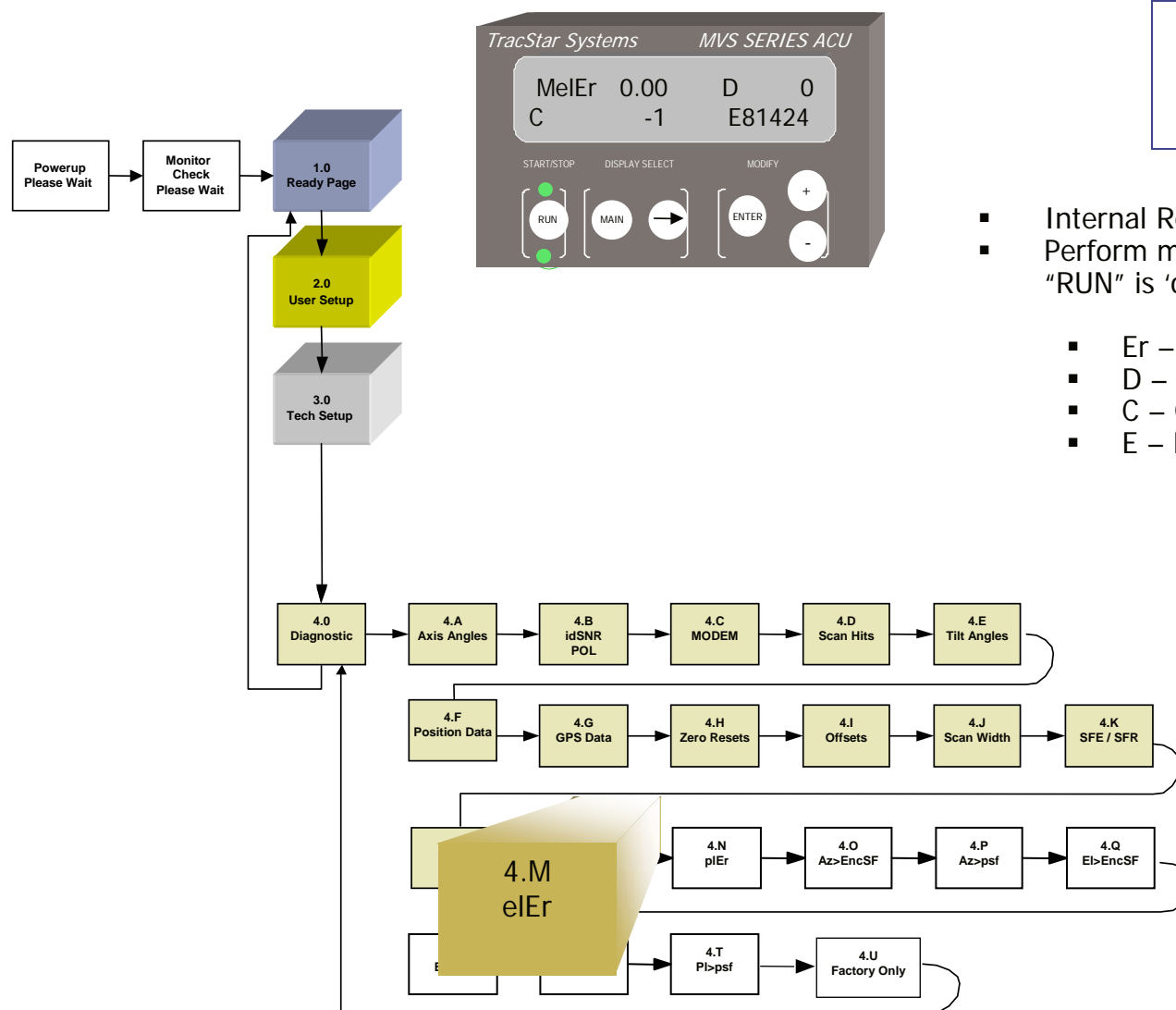
- These values are the base angle level span calibrations for the e (elevation) and r (roll) tilt.
- Items can NOT be edited from the ACU

4.L Axis Diagnostics



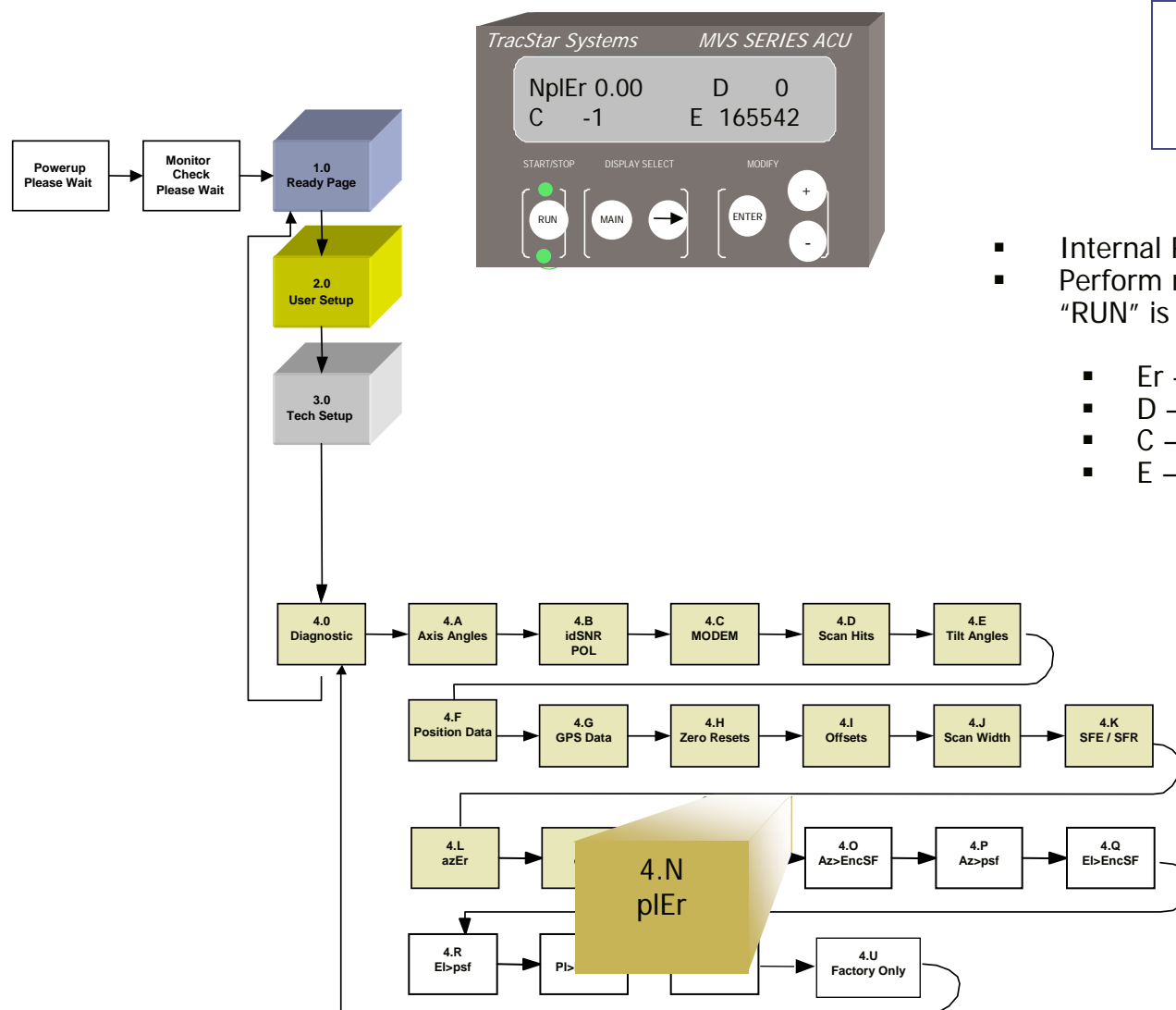
- Internal Readings from azimuth axis.
- Perform manual jog of the azimuth axis when "RUN" is 'on' and +/- buttons are depressed.
 - Er – Servo Position Error
 - D – DAC Value +/- 120
 - C – Current Value +/- 100
 - E – Encoder Counts

4.M Axis Diagnostics



- Internal Readings from elevation axis.
- Perform manual jog of the azimuth axis when "RUN" is 'on' and +/- buttons are depressed.
 - Er – Servo Position Error
 - D – DAC Value +/- 120
 - C – Current Value +/- 100
 - E – Encoder Counts

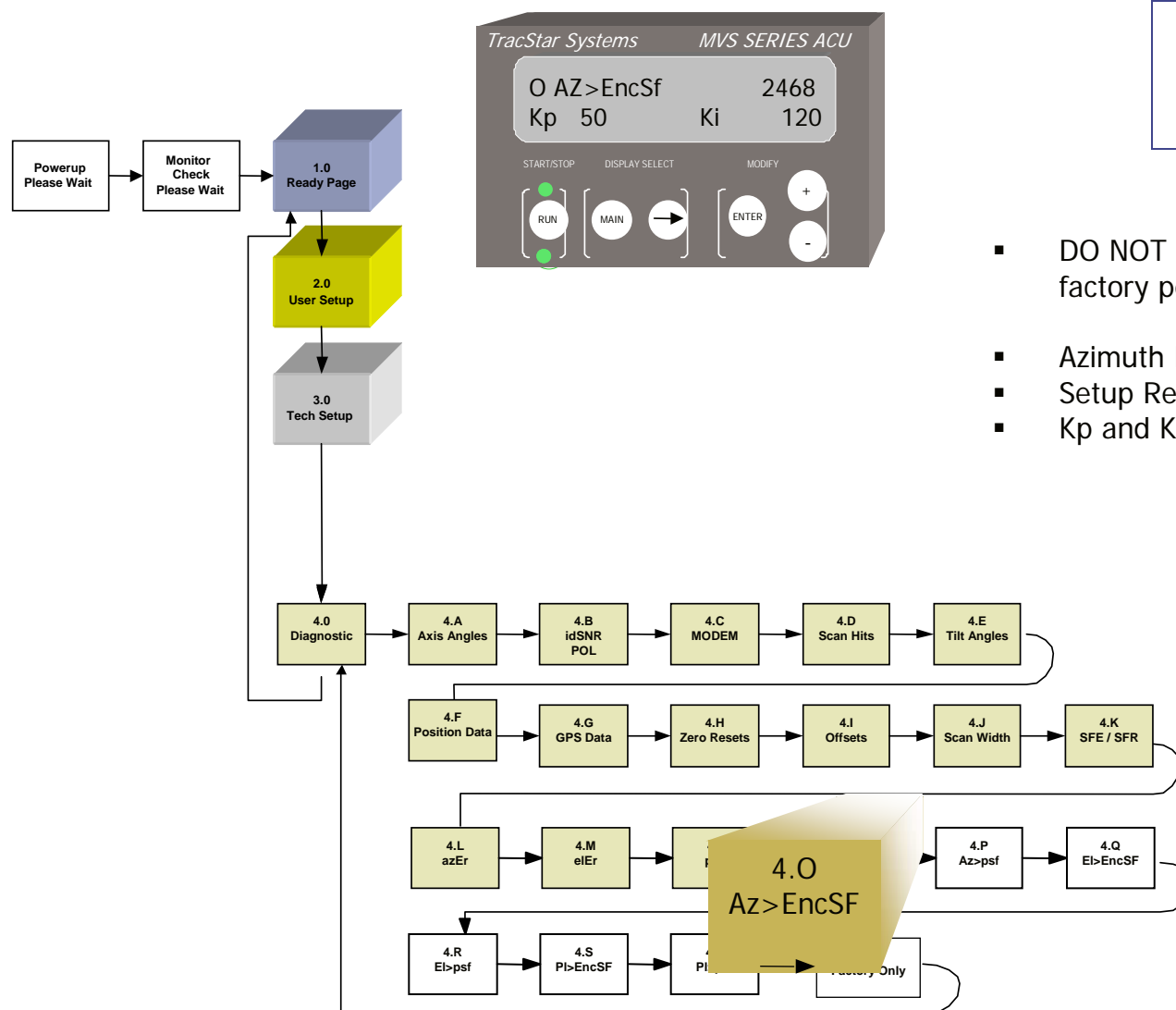
4.N Axis Diagnostics



| | | | |
|-------|------|---|--------|
| NplEr | 0.00 | D | 0 |
| C | -1 | E | 165542 |

- Internal Readings from pole axis.
- Perform manual jog of the azimuth axis when "RUN" is 'on' and +/- buttons are depressed.
 - Er – Servo Position Error
 - D – DAC Value +/- 120
 - C – Current Value +/- 100
 - E – Encoder Counts

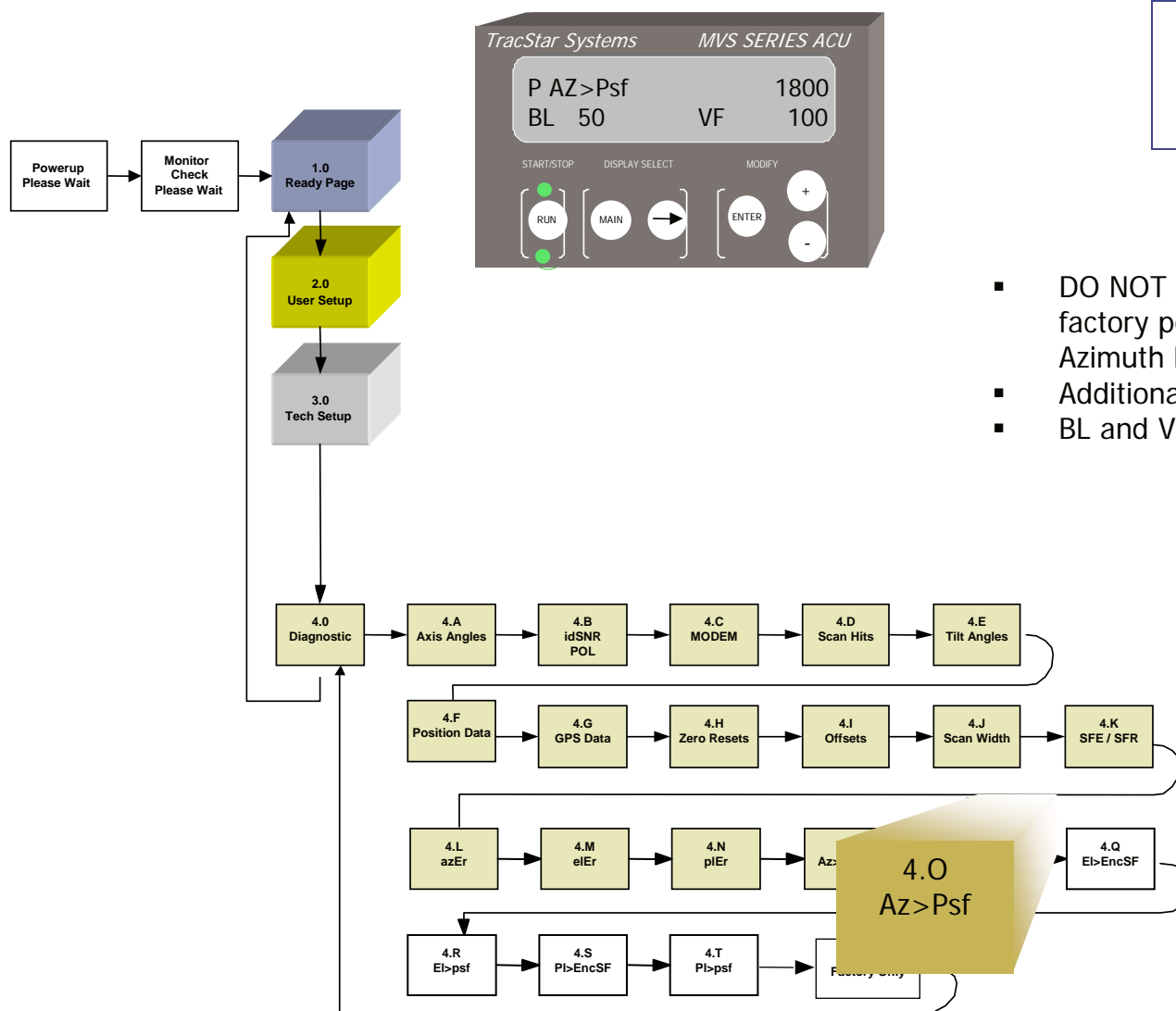
4.0 Axis Diagnostics



| | |
|------------|--------|
| O AZ>EncSf | 2468 |
| Kp 50 | Ki 120 |

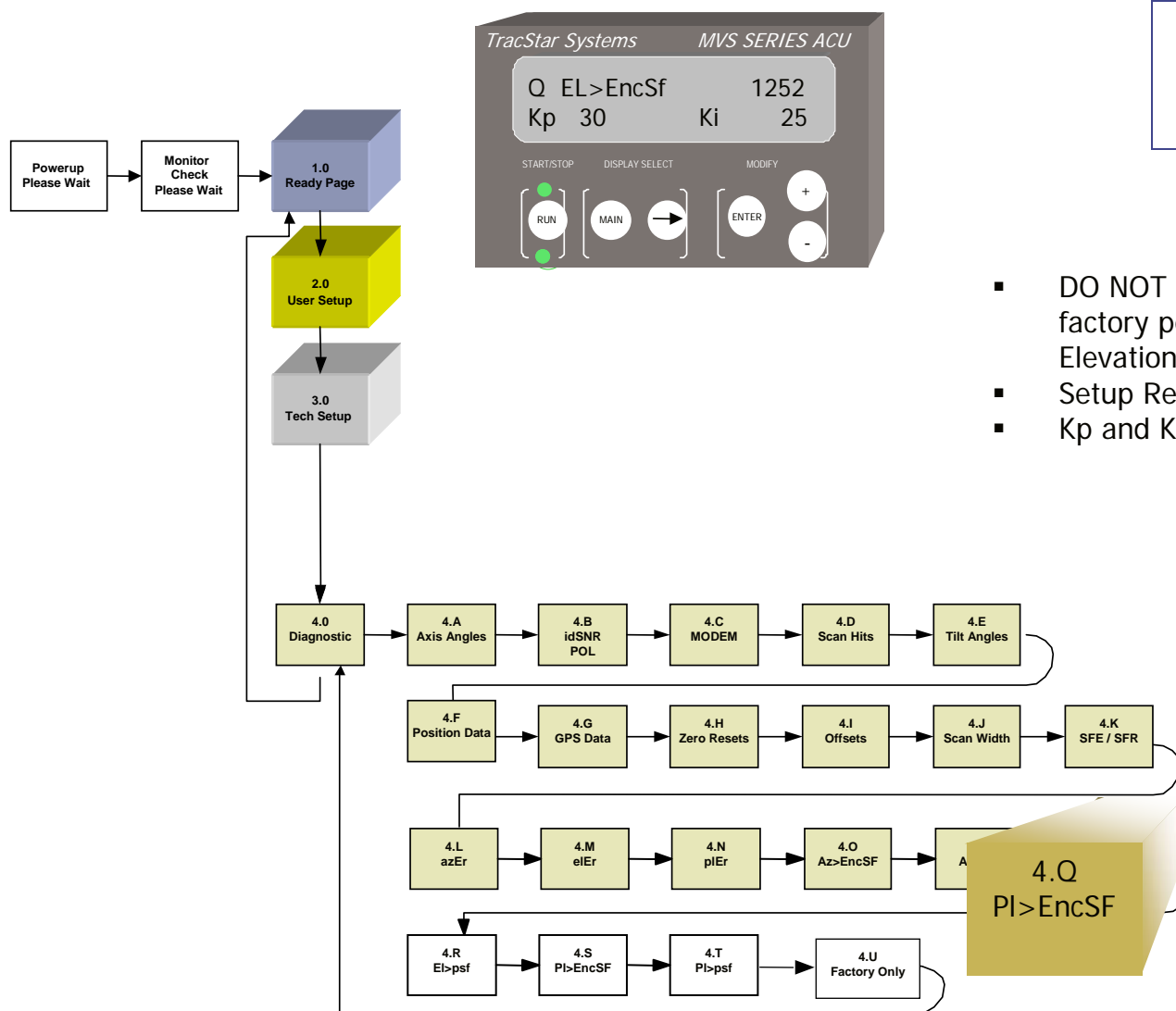
- DO NOT CHANGE without assistance from factory personnel
- Azimuth Encode Scale Factor
- Setup Readings for Azimuth Axis
- Kp and Ki are servo loop data

4.P Axis Diagnostics



- DO NOT CHANGE without assistance from factory personnel
Azimuth Pot Scale Factor
- Additional Setup Readings for Azimuth Axis
- BL and VF are servo parameters

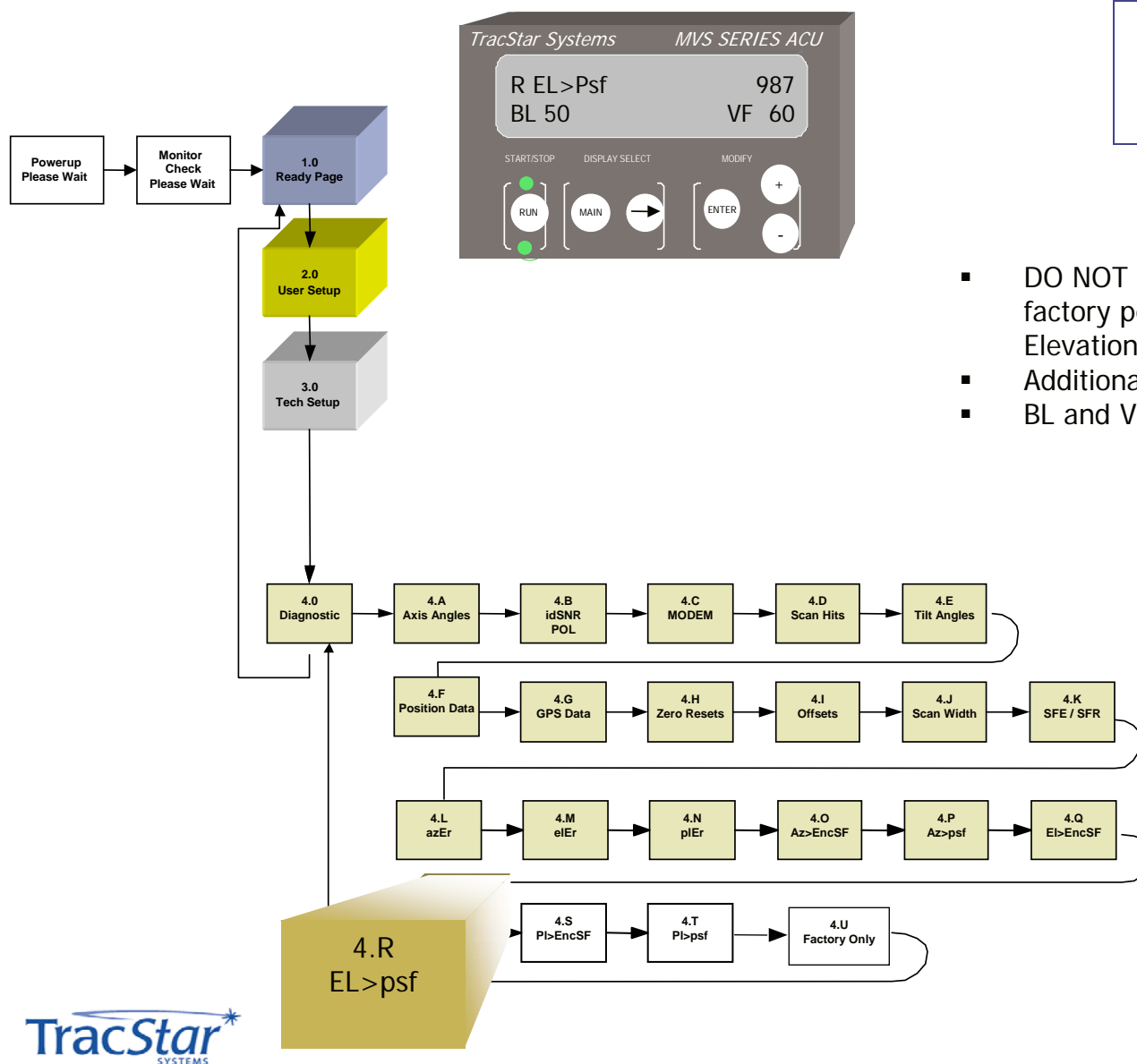
4.Q Axis Diagnostics



| | |
|------------|-------|
| Q EL>EncSf | 1252 |
| Kp 30 | Ki 25 |

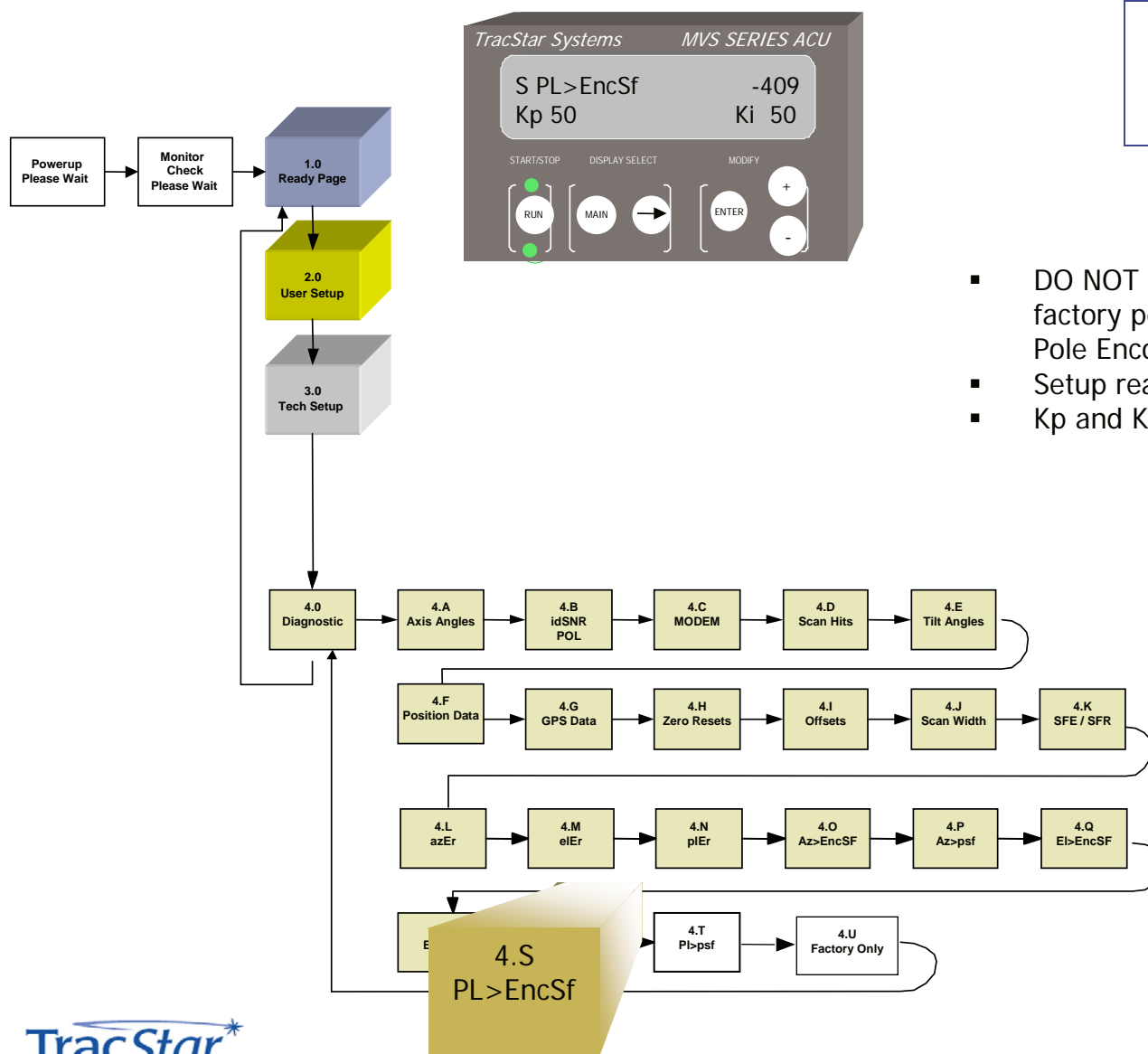
- DO NOT CHANGE without assistance from factory personnel
- Elevation Encode Scale Factor
- Setup Readings for Elevation Axis
- Kp and Ki are servo loop data

4.R Axis Diagnostics



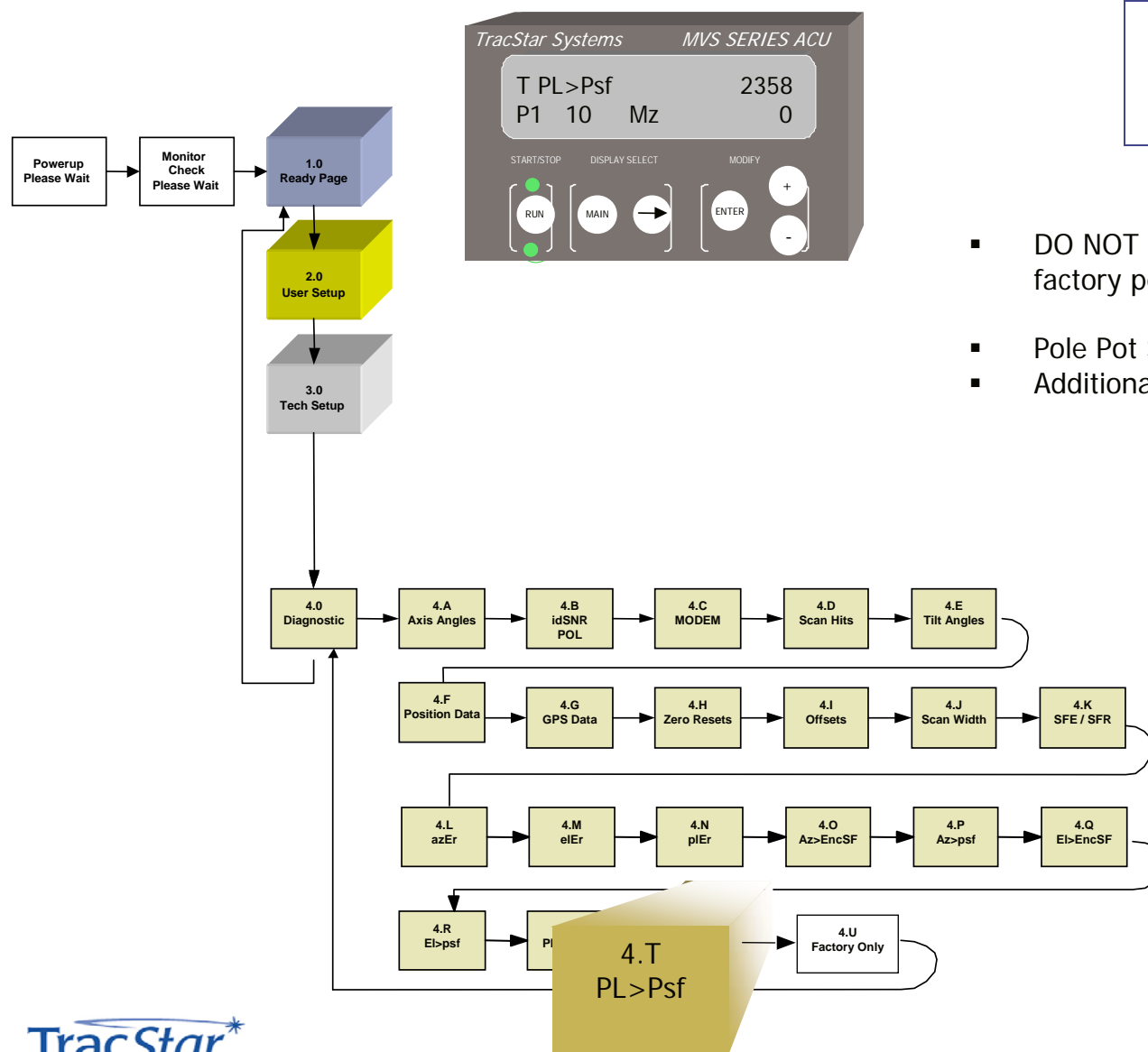
- DO NOT CHANGE without assistance from factory personnel
- Elevation Pot Scale Factor
- Additional Setup Readings for elevation axis
- BL and VF are servo parameters

4.S Axis Diagnostics



- DO NOT CHANGE without assistance from factory personnel
Pole Encode Scale Factor
- Setup readings for Pole axis
- Kp and Ki are servo loop data

4.T Axis Diagnostics



- DO NOT CHANGE without assistance from factory personnel
- Pole Pot Scale Factor
- Additional setup readings for pole axis

TROUBLESHOOTING

- Antenna has no power.

Turn off Power. Check the power cord on the ACU and or the rack mount control panel. The antenna receives its power from one of these two respective locations. Check the antenna end of the grey cable with the black connectors as well. Reapply Power. Restore Power.

- OBSTRUCTIONS

Ensure there is a clear unobstructed view towards the equator relative to the antenna's position.

- Antenna Not Responding

When using the handheld controller, ensure the RJ11 (phone cord) connection is properly seated in the ACU and the handheld device.

- REF SAT NOT FOUND

Select an alternate reference satellite (refer to page 20) and begin the acquisition process again. Should the message still occur, move the antenna base in a 90° arc and check the leveling of the antenna. Auto-correction features in the software will accommodate up to $\pm 10^{\circ}$ of error in the mounting plane of the antenna.

- Skyscan

Skyscan can be engaged to find all available satellites in the sky. Refer to the operating manual for instruction on using Skyscan.

- Waiting Log On (iDirect - NetModem or Infiniti Series)

The TracStar controller 'logs' into the iDirect modem, when iDirect modem is selected. Make sure the DB9-RJ45 cable is in place between the controller and the modem, as this serves as the communication link. If communication still fails, set modem to NONE to allow antenna to lock onto satellite.

ERROR MESSAGES & RECOVERY

MINOR ERROR MESSAGES – FIELD REPAIRABLE

- COMPASS ERROR – Not seeing the compass, follow the manual compass procedure
- Stuck on GPS – Not detecting any GPS satellite – Follow the manual GPS procedure
- POWER UP PLEASE WAIT – No communications between the ACU and antenna. Check Interconnection cable from modem to antenna controller
- NO REF SAT FOUND – Antenna can't find a reference satellite. Verify the antenna has clear exposure to the southern sky
- NO XPONDER SIGNAL – Antenna can't find the data satellite. Verify the antenna has clear exposure to the southern sky
- BASE ANGLE LIMIT – Antenna base angle exceeds 8°. Level the antenna.
- BASE TILT ERROR – Antenna has moved after being deployed. Start a reacquisition
- SAT ERROR – No satellite information is programmed into the antenna. Reprogram satellite data.

MAJOR ERROR MESSAGES – POTENTIAL RECOVERY

- AZ MAJOR OT – Antenna has been driven beyond the azimuth electrical limit. Error may be recoverable by stowing several times.
- AZ OVER TRAVEL – Antenna has reached the electrical limit. Error may be recoverable by stowing several times.
- PL MAJOR OT – Antenna has been driven beyond the polarization electrical limit. Error may be recoverable by stowing several times.
- PL OVER TRAVEL – Antenna has reached the electrical limit. Error may be recoverable by stowing several times.
- EL OVER TRAVEL – Antenna has reached the electrical limit. Error may be recoverable by stowing several times.

MAJOR ERROR MESSAGES – FATAL ERRORS

Check antenna for movement blockage from trees, wifi masts, etc.

- POWER UP PLEASE WAIT – No communications between the ACU and the antenna.

- AZ FAULT – Not detecting any azimuth motor movement
- PL FAULT – Not detecting any polarization motor movement
- EL LOW LIMIT – Antenna is reporting low elevation fault
- EL FAULT – Not detecting any elevation motor movement

Possible Causes

- a) circuit board failure b) control cable failure
- a) Motor Failure b) circuit board failure
- a) Motor Failure b) circuit board failure
- a) bad sensor b) improper jogging
- a) Motor Failure b) circuit board failure

5: Description of System

TracStar MVS750 / AvL Model 750 iMoVSAT three-axis positioner

TracStar Controller

The complete system weighs approximately 95 lb. depending upon the options selected.

General

The Model MVS750 / iMoVSAT antenna system is an elevation over azimuth positioner featuring the simple, rugged Roto-Lok® drive system that produces very low backlash, high stiffness, and high reliability. It is driven by a low backlash gearbox with DC motors and all drive components are high-strength steel encased in lubricated-for-life housings, resulting in the most reliable, no-maintenance system with the minimum of weight. The reflector is a 75 cm equivalent Channel Master illuminated by a corrugated horn. The options for the placement of the transmitter vary depending upon the size: A 1 - 4 watt BUC can be installed on the feed boom.

RF System

The offset reflector/feed system produces co-polarization patterns that easily meet the FCC Section 25.209 requirements beyond 1.72 degrees in the transmit band and 1.95 degrees in the receive band. It is also fully compliant with the ITU Recommendation for international use.

Roto-Lok Drive System

The patented Roto-Lok drive system utilizes highly reliable aircraft control cables in a redundant configuration to achieve a lightweight, very stiff drive system with zero backlash. This high-tech performance is achieved using low-tech components - by simply wrapping the cable around the drive capstan several times before wrapping the larger drive drum. This method results in a minimum free-length of cable. The load cable on the main drum is exponentially reduced as it is wrapped around the drum. Therefore, the total elongation of the cable under load is minimized. The Roto-Lok system has up to 10 times less backlash than that of comparable gear systems. The cables are pre-tensioned and spring-loaded at the main drum attachment point, which eliminates backlash at installation and from any unexpected cable stretch in the future.

Secondary Drive System

The Az and El Roto-Loks are driven by a low backlash worm gear set with a 15:1 and 30:1 ratio respectively. The low backlash of the worm gear drive is reduced further by the Roto-Lok drive ratio. This results in a lash equivalent of only .1° in azimuth and .2° in elevation as seen by the reflector system. The gear sets are encased in a sealed housing allowing for continuous lubrication in synthetic oil, maximizing gear efficiency and minimizing wear.

Motor Drives

Lightweight, reliable, servo-quality DC motors with integral gearbox are used for Az, El, and Pol drives. The motors are also equipped with optical encoders that provide precise speed and positioning control, ensuring smooth operation when peaking the antenna. The 24V DC design provides current-limiting torque control and will allow for vehicle battery operation if necessary.

Controls

The antenna control system is produced by TracStar Systems and is integrated exclusively with the Roto-Lok pedestal assembly. The controller includes a tunable receiver, GPS system, and flux-gate compass. The main portion of the controller is located on the antenna positioner, placing it close to the optical encoders. The power supply and hand-held controller are separate and can be placed up to 25 feet away without special hardware. Special control cables can be obtained to place the power supply and hand-held up to 150 feet away from the antenna.

The TracStar controller was developed to achieve one-button, auto-acquisition of the satellite signal 100% of the time using a proprietary method. The controller peaks the antenna on the data satellite with greater accuracy than a human can achieve, thus assuring that there is no chance of adjacent satellite interference. Primary and secondary reference satellite menus and data satellite menus are available for an untrained operator. Any data satellite can be selected or pre-programmed by a trained operator. Semi-automatic modes are available in case of failure of GPS or a flux-gate to provide acceptable manual input of case heading and/or latitude and longitude. An *Auto-Select* mode is available for reference satellite selection in the TracStar software (domestic CONUS use only). The TracStar control system will work on any Ku Band satellite.

Construction

Except for the drive components and bearings, all components are aluminum, stainless steel or plastic to prevent rusting.

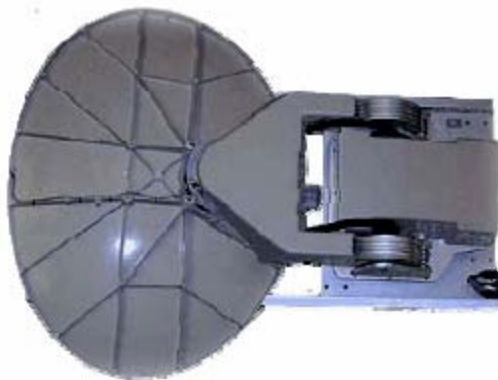
¹ Roto-Lok is a registered trademark of Sagebrush Technologies, Inc. All Rights Reserved.

6: General Deploy and Assembly Instructions

The TracStar MVS750 / AvL Model 750 positioner has been fully tested with the TracStar controller prior to shipment. All position feedback, limit sensing, limit switches, and motor speeds have been calibrated or set. The positioner needs only to be deployed and the coax and control cables connected to the controller.

1. Model 750 shown in stowed position (Figure 1)

Figure 1



2. Connecting the coax cable first, make the appropriate electrical connections. (Figure 2.)

Figure 2



3. Press "+" on TracStar hand-held controller (Figure 4) and hold for 3 seconds until unit begins deploying.
4. Figure 3 shows the unit fully deployed.

Figure 3



Controller Operating Instructions

1. To activate system, turn on power to the TracStar Indoor Unit (IDU). The display should read "Ready".
2. Press the "+" key to begin satellite acquisition.
3. To stow the antenna, press and hold the "-" key for 3 seconds. To insure that transmit is disabled, there is a 3-second delay before the antenna begins to stow.
4. The user may stop the motion by pressing the Start/Stop, + or - key at any time, either during an acquisition (Display reads "Run") while locked or during a stowing operation (Display reads "Stow").



Complete operating instructions can be found in the TracStar Controller Operating Instructions included in this manuals Index.

7: Azimuth Positioning System

Azimuth Bearing

The azimuth platform sits on top of a ball bearing platform with a dynamic and static moment capacity of over four times the worst-case wind-load specification. The assembly is surrounded by a double seal to protect the bearing platform, which is permanently lubricated. This rests on the azimuth drum and the azimuth cables wrap around the drum and capstan. Because of the excess capacity, low rpm and low number of cycles compared to the bearings B10 design life, no wear is expected. No maintenance should be required over the life of the positioner.

Azimuth Gearbox

The azimuth gearbox is a low backlash worm gearbox. The worm gear drive isolates any backlash in the motor drive from the system. In addition, since it is a 15:1 ratio, it will not back drive, thus eliminating any need for a brake on the drive train. The motor drives the input worm via a quill/female hole and square key. The azimuth capstan is secured to the bore of the output shaft with a square key. The gearbox contains synthetic oil. Because of the design capacity of the gearbox, low rpm and comparative limited cycles experienced by the system, no wear or maintenance is expected.

Azimuth Motor

The azimuth drive motor is a servo quality 24DC motor with an integral 19.7:1 spur gear train. The motor armature rotates at up to 4000 rpm causing a high-frequency noise that will vary, depending on the loading condition of the motor. An optical encoder is mounted to the other end of the motor output shaft to provide real-time positional information to the TracStar controller. The maximum gearbox output speed is 253 rpm. The output shaft is "D" shaped with a special adapter with a slot for a square key. Since the low backlash worm gear drive isolates the backlash from the motor, any backlash between the shaft adapter, square key, or motor gear train will never be seen by the reflector boresight. Any backlash at any of these points is of no consequence to the system performance. No maintenance or wear of the elevation motor is expected.

Azimuth Roto-Lok Cable Drive

The patented azimuth Roto-Lok drive produces a drive system with zero backlash, high stiffness, no wear, no lubrication, and maximum reliability. The system consists of three 1/16 9x17 stainless steel aircraft control cables, reverse-wrapped twice around the capstan with solid connections on one end and high force, Belleville springs on the other end occurring at the azimuth spring block. One cable has the capacity to withstand an 80 mph wind load. The additional cables are used to

provide increased stiffness and drive redundancy. ***If a cable becomes damaged during usage, merely cut off the cable and continue to use the positioner. You can replace the cable at your maintenance facility whenever time permits.***

The cables are sized to last the life of the positioner. No replacement from wear is expected. The spring package at one end will automatically compensate for any elongation of the cable. At installation, the Belleville springs are collapsed until no "air" is seen between the springs. You should check this condition yearly to account for the slow settling of the cable strands. Use a 3/8 box-end wrench to tighten the nut. ***Be sure not to over tighten.***

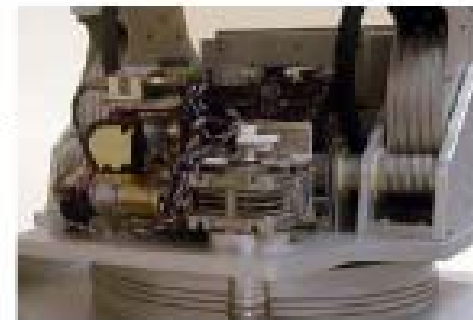
Azimuth Position Feedback

The azimuth position feedback is produced by a 10-turn, 1K-ohm potentiometer driven by the output shaft of the worm gearbox. In addition, an optical encoder is mounted to the output shaft on the motor and provides redundant feedback on azimuth position. The encoder also provides precise redundant feedback on unit's position relative to zero degrees starting position. The potentiometer is mounted on an angle plate that is mounted to the azimuth gearbox. A gear mounted to the potentiometer is driven by a pinion on the output shaft of the gearbox. The potentiometer is mechanically set at the one-half travel position when the azimuth cable position is at zero degrees. The azimuth stow switch is a magnetic proximity switch mounted in the az platform. The limits are controlled by using inputs from the potentiometer and optical encoder together and are set in and controlled by the TracStar controller. The azimuth drive has the mechanical capability of $\pm 400^\circ$ or $\pm 200^\circ$ from stow position.

8: Elevation Positioning System

Elevation Pivot Assembly

The elevation pivot assembly consists of two elevation drum assemblies pivoting between two clevis blades that house the high-tech, no-lubrication required, plastic bushings. No wear or maintenance is expected.



Elevation Gearbox

The elevation gearbox is a low backlash worm gearbox. The worm gear drive isolates any backlash in the motor drive from the system. In addition, since it is a 30:1 ratio, it will not back drive eliminating any need for a brake on the drive train. The motor drives the input worm via a quill/female hole and square key. The dual elevation drive shafts are driven with a square key. The elevation capstan is secured to the dual output shafts with a cap screw that clamps to the output shaft. The gearbox contains synthetic oil. Because of the design capacity of the gearbox, low rpm and comparative limited cycles experienced by the system, no wear or maintenance is expected.

Elevation Motor

The elevation drive motor is a 24V DC motor with integral spur gear train. The motor armature rotates at up to 4000 rpm causing a high frequency noise that will vary depending on the loading condition of the motor. An optical encoder is mounted to the other end of the motor output shaft to provide real time positional information to the TracStar controller. The maximum output speed is 133 rpm. The output shaft is a standard keyed shaft. The output torque capacity of the motor is rated for the operational wind load. Since the low backlash worm gear drive isolates the backlash from the motor, any backlash between the square key and motor gear train will never be seen by the reflector boresight. Any backlash at any of these points is of no consequence to the system performance. No maintenance or wear of the elevation motor is expected.

Elevation Roto-Lok Cable Drive

The patented azimuth Roto-Lok drive produces a drive system with zero backlash, high stiffness, no wear, no lubrication, and maximum reliability. The system consists of eight 1/16 9x17 stainless steel aircraft control cables, reverse-wrapped three times around the capstan with solid connections on one end and high force, Belleville springs on the other end occurring at the elevation cable termination block.

Four cables have the capacity to withstand an 80 mph wind load. The additional cables are used to provide increased stiffness and drive redundancy. ***If a cable becomes damaged during usage, merely cut off the cable and continue to use the positioner. You can replace the cable at your maintenance facility whenever time permits.***

The cables are sized to last the life of the positioner. No replacement from wear is expected. The springs package at one end will automatically compensate for any elongation of the cable. At installation, the Belleville springs are collapsed until no "air" is seen between the springs. You should check this condition yearly to monitor the slow settling of the cable strands.

Elevation Position Feedback

The elevation position feedback is produced by an electronic clinometer and encoder mounted on the output shaft of the motor. The clinometer has a resolution of 0.1 degrees with the accuracy/linearity of 1% of the 0-45° range and monotonic in the 45-90° range. The clinometer is rated for an outdoor environment. The encoder also provides precise feedback on the unit's position during operation. The limits are controlled by using inputs from the clinometer and optical encoder together and are set in and controlled by the TracStar controller. The clinometer is mounted on a bracket under the pol gear cover. The clinometer is covered with an aluminum cover to protect it from the mechanical damage and provide additional weather protection.

9: Polarization Feed and Drive Assembly

General

The feed assembly consists of the feed boom, feed housing, RF components and polarization drive. The feed boom is pivoted at the bottom of the reflector. The feed assembly is mounted to the feed boom.

Polarization Drive

The polarization drive motor is a 24DC gear motor. It is attached to the polarization gearbox. Polarization setting is accomplished by rotation of the reflector.

Polarization Gearbox

The azimuth gearbox is a worm gearbox. The worm gear drive isolates any backlash in the motor drive from the system. In addition, since it is a 30:1 ratio, it will not back drive, thus eliminating any need for a brake on the drive train. The gearbox contains synthetic oil. Because of the design capacity of the gearbox, low rpm, and comparative limited cycles experienced by the system, no wear or maintenance is expected.

Polarization Roto-Lok Cable Drive

The patented azimuth Roto-Lok drive produces a drive system with zero backlash, high stiffness, no wear, no lubrication, and maximum reliability. The system consists of two 1/16 9x17 stainless steel aircraft control cables, reverse-wrapped twice around the capstan with solid connections on one end and high force, Belleville springs on the other end occurring at the polarization spring block. One cable has the capacity to withstand an 80 mph wind load.

The additional cables are used to provide increased stiffness and drive redundancy. ***If a cable becomes damaged during usage, merely cut off the cable and continue to use the positioner. You can replace the cable at your maintenance facility whenever time permits.***

The cables are sized to last the life of the positioner. No replacement from wear is expected. The springs package at one end will automatically compensate for any elongation of the cable. At installation, the Belleville springs are collapsed until no "air" is seen between the springs. You should check this condition yearly to monitor the slow settling of the cable strands.

Polarization Position Feedback

The polarization position feedback is produced by the optical encoder mounted on the output shaft on the motor. The polarization stow and limit switch is mounted under the polarization platform and is accessible under the pol cover. The switch is fixed to a plate and is actuated by a rotation cam. The limits are controlled by using inputs from switches and optical encoder together and are set in and controlled by the TracStar controller. Pol stow is achieved by activating the stow switch mounted on the polarization cam. The polarization drive has the mechanical capability of $\pm 75^\circ$ or $\pm 95^\circ$.



10: Preventative Maintenance

General

The TracStar MVS750 / AvL Model 750 iMoVSAT is constructed to require a minimum amount of regular maintenance.

The following 21-Point Check List should be undertaken on a regular basis and can be rectified in the field:

21 Point Check List

1. Any small chips on the reflector front surface should be cleaned, filled with aluminum-loaded car body filler, rubbed down, primed and touched in with two-pack polyurethane paint.
2. The feed horn should be checked for cracks or damage.

Azimuth:

3. Check for unusual noise in the azimuth bearing, azimuth gearbox, and azimuth motor
4. Run in azimuth and check for unusual noise in azimuth motor
5. Check position of azimuth drive cables on capstan at 0°# Az
6. Check drive cables for damage
7. Run both Az limits and observe cable tracking
8. Check for excessive backlash in gearbox
9. Inspect cable terminations
10. Inspect Az potentiometer

Elevation:

11. Check for unusual noise in elevation pivot bushings and elevation gearbox
12. Run in elevation and check for unusual noise in elevation motor
13. Run up to limit
14. Check tracking of elevation drive cables
15. Check drive cables for damage
16. Check for excessive backlash in gearbox

Polarization:

17. Check for unusual noise in polarization pivot bearings and polarization gearbox
18. Run in polarization and check for unusual noise in polarization motor

- 19. Check tracking of polarization drive cables
- 20. Check drive cables for damage
- 21. Check for excessive backlash in gearbox

Spare/Replacement Parts

Since no wear or maintenance is expected, only electrical parts are recommended as spares. These parts will not fail from activity, but may fail from environmental exposure.

Optional:

| Description | Manufacturer | Manufacturer's Part # |
|------------------------|---------------------|------------------------------|
| Limit Switch Omron | | D2VW-5L2A-1HS |
| Potentiometer, 1k, 10T | | Spectrol 01F8239 |
| Proximity Switch | | CDI PS811 |
| Clinometer | | Spectron 02110002-000 |
| Spare Drive Cable Kit | | AvL Technologies |
| Elevation Motor | | Pittman GM9234E521 |
| Azimuth Motor | | Pittman GM9236E522 |
| Polarization Motor | | Pittman GM8724J199-R1 |

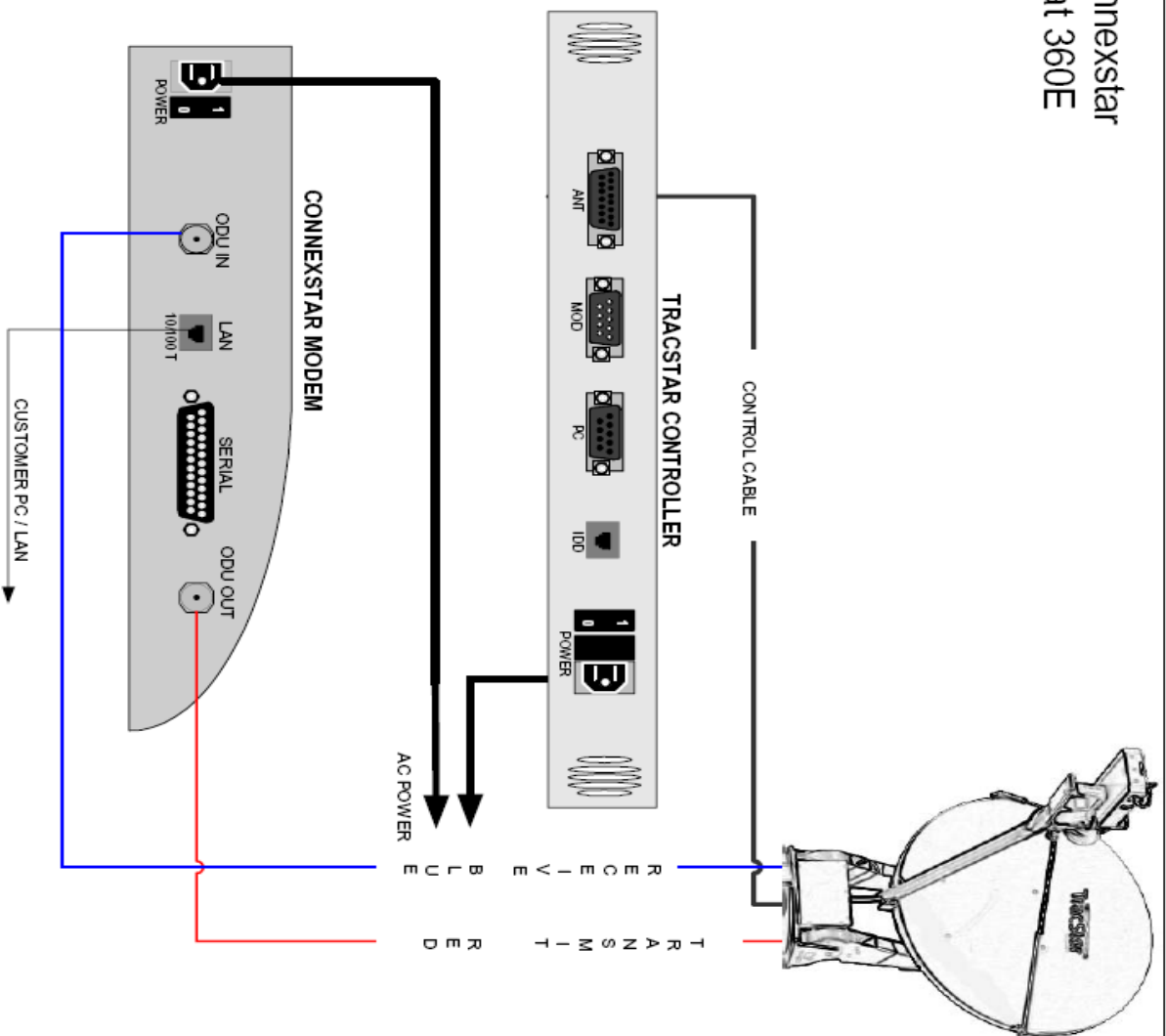
Appendix B – Connection Directions

Modem and Voice Equipment Connection / Wiring Diagrams

NOTE: For VoIP follow EMS w/EdgeAccess connection information for the EdgeAccess Equipment

Gilat 360E Connection

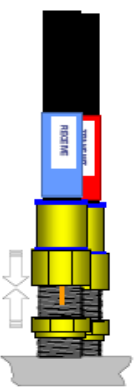
Connexstar
Gilat 360E



BASIC SYSTEM CONFIGURATION
CONNEXSTAR MODEM (DESK TOP)

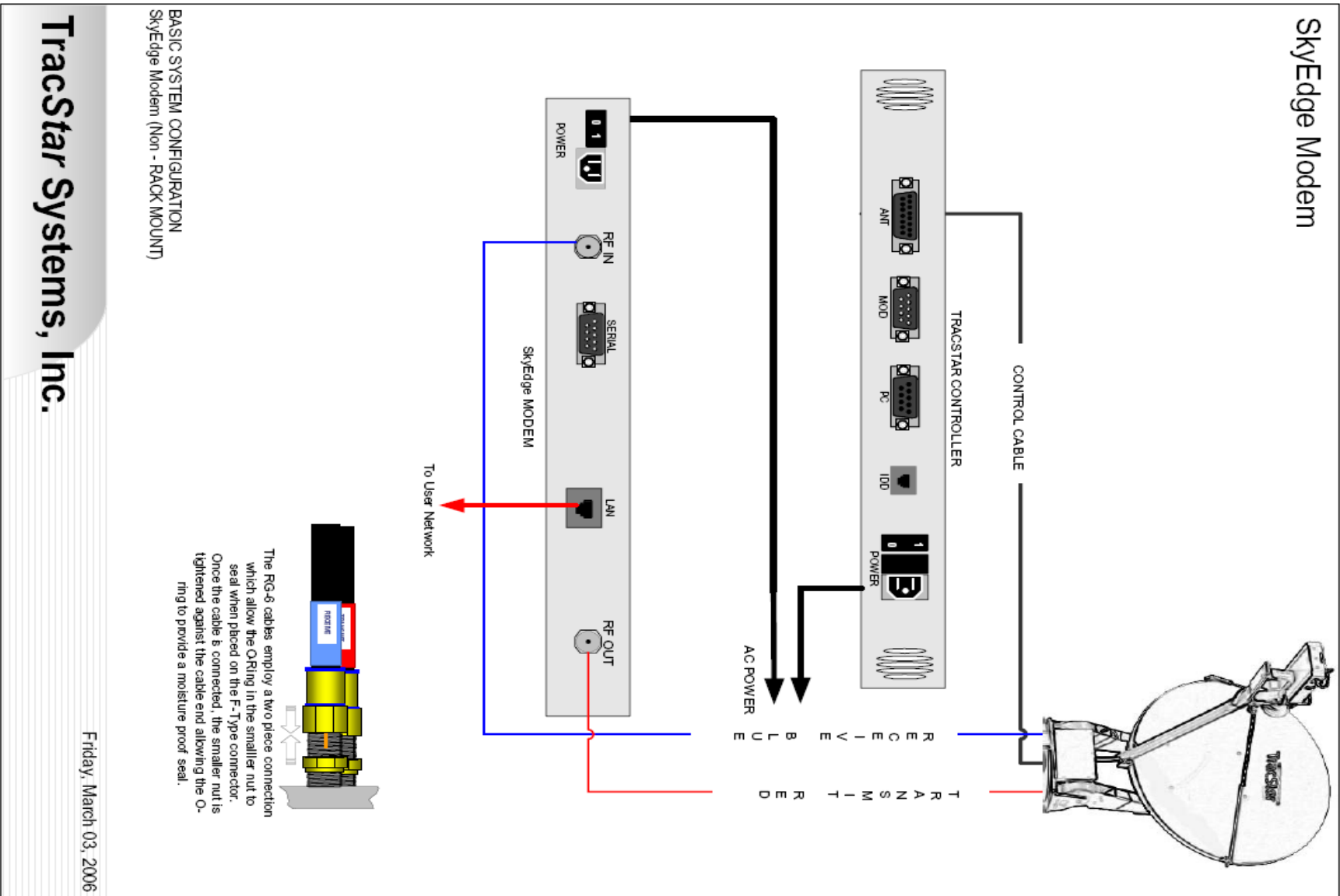
TracStar Systems, Inc.

Friday, March 03, 2006



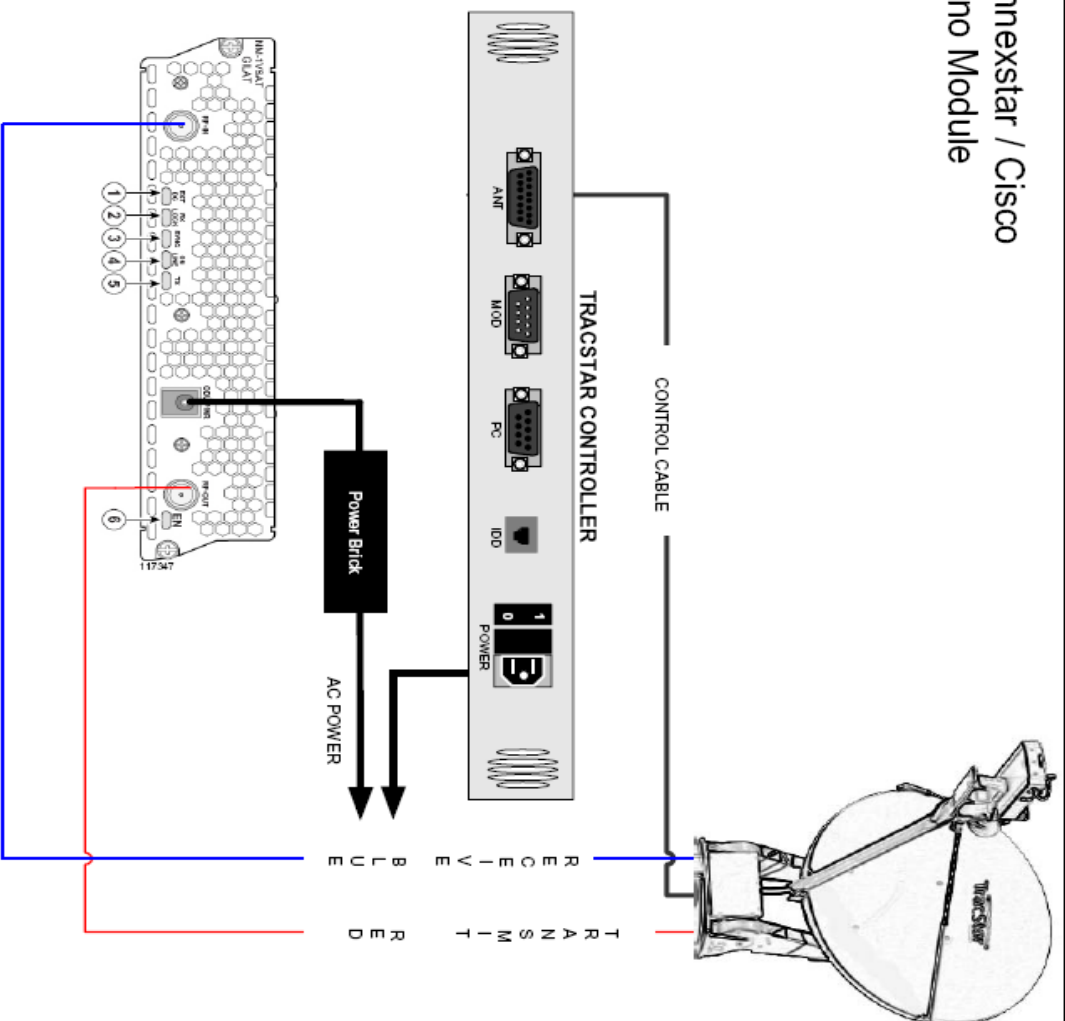
The RG-6 cables employ a two piece connection which allow the O-Ring in the smaller nut to seal when placed on the F-T-type connector. Once the cable is connected, the smaller nut is tightened against the cable end allowing the O-ring to provide a moisture proof seal.

SkyEdge Connection

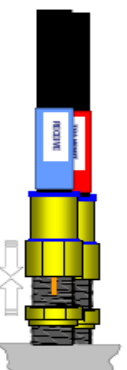


Connexstar Cisco Bruno (Gilat)

Connexstar / Cisco Bruno Module



The RG-6 cables employ a two piece connection which allow the O-Ring in the smaller nut to seal when placed on the F-T type connector. Once the cable is connected, the smaller nut is tightened against the cable and the O-ring to provide an airtight proof seal.

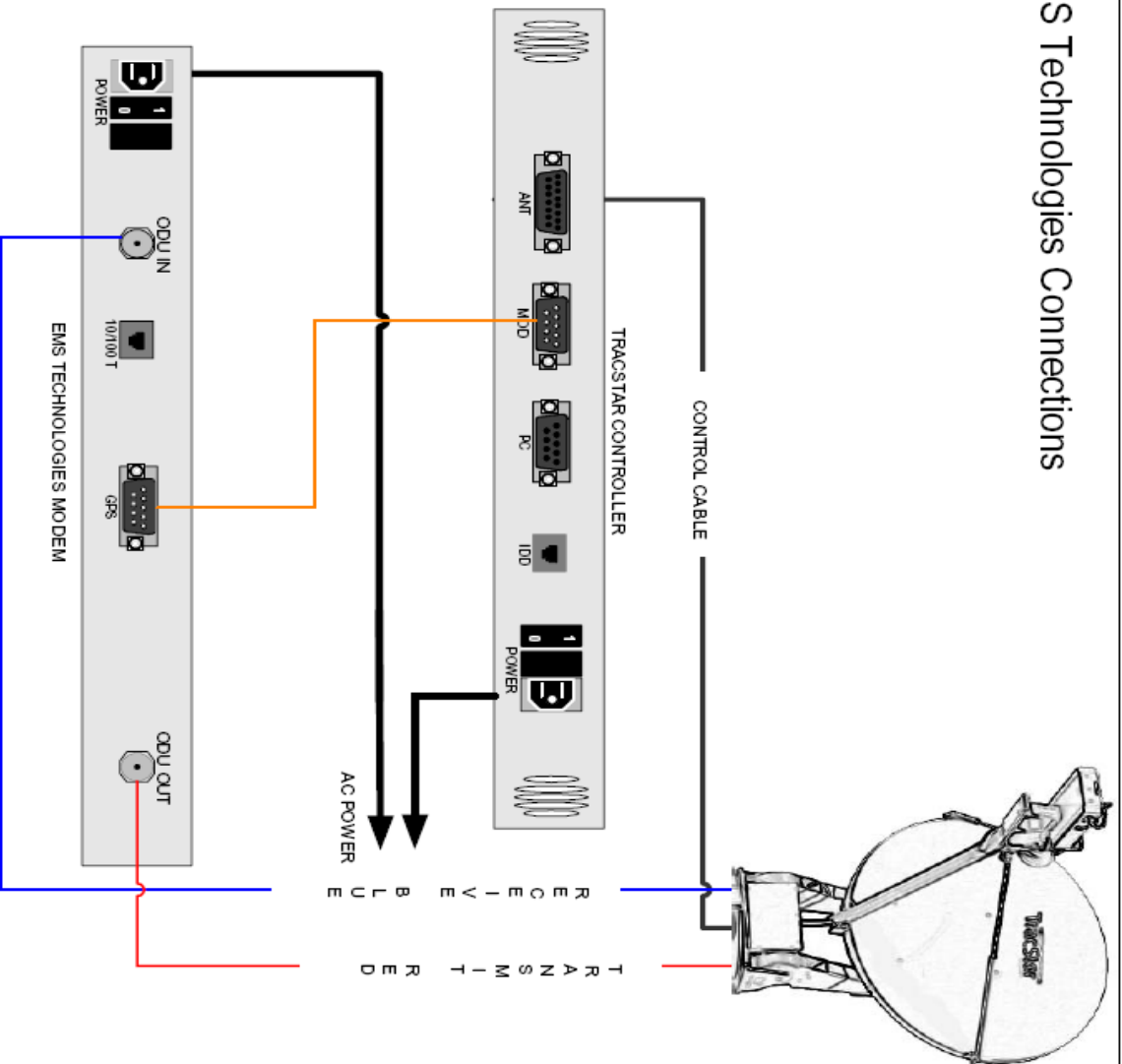


BASIC SYSTEM CONFIGURATION
CONNEXSTAR MODEM (DESK TOP)

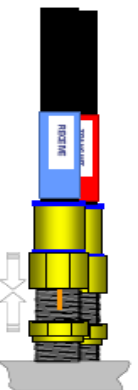
TracStar Systems, Inc.

Tuesday, March 07, 2006

EMS Technologies Connections



BASIC SYSTEM CONFIGURATION
EMS TECHNOLOGIES MODEM (RACK MOUNT)

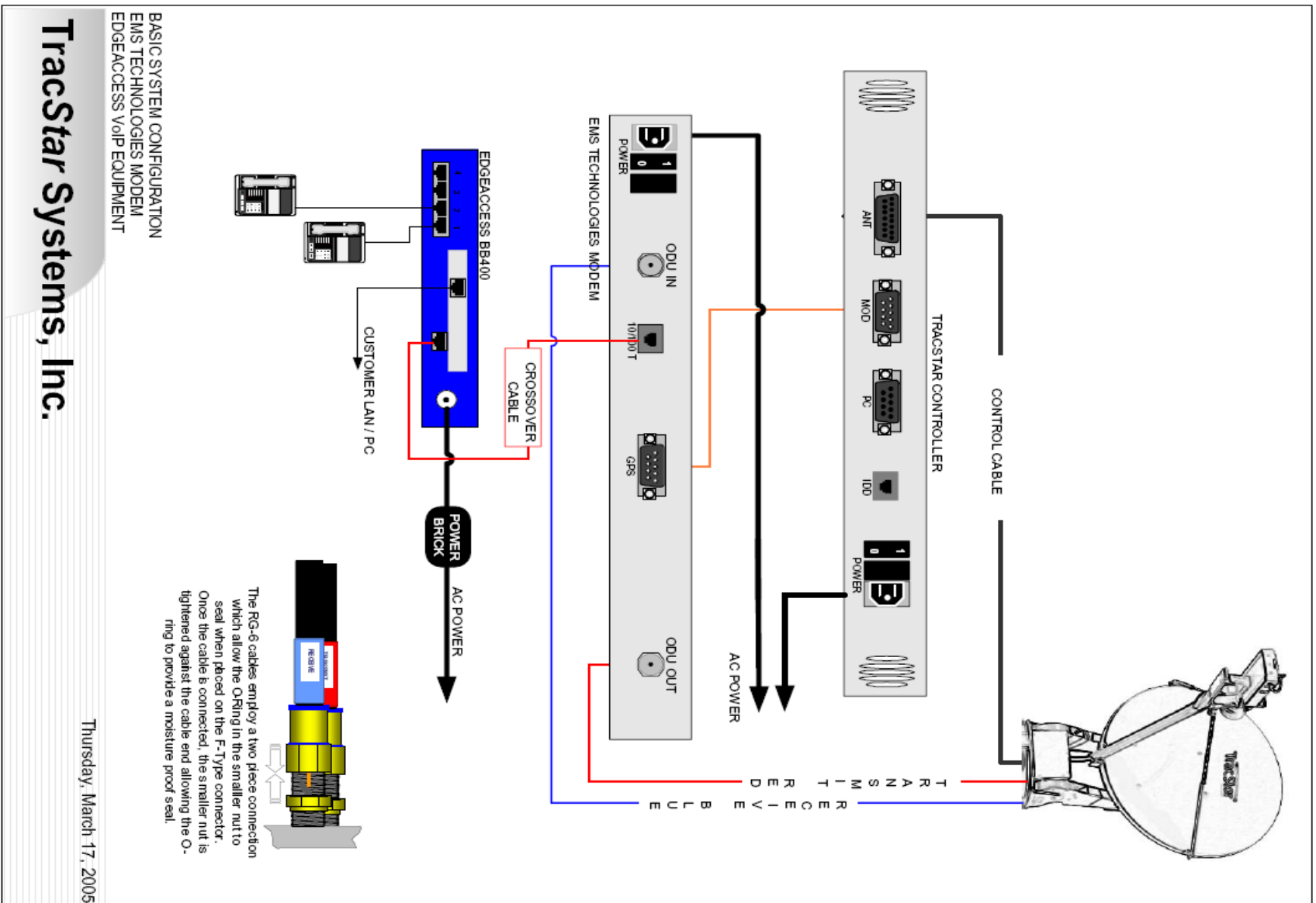


The RG-6 cables employ a two piece connection which allow the O-Ring in the smaller nut to seal when placed on the F-1 Type connector. Once the cable is connected, the smaller nut is tightened against the cable end allowing the O-Ring to provide a moisture proof seal.

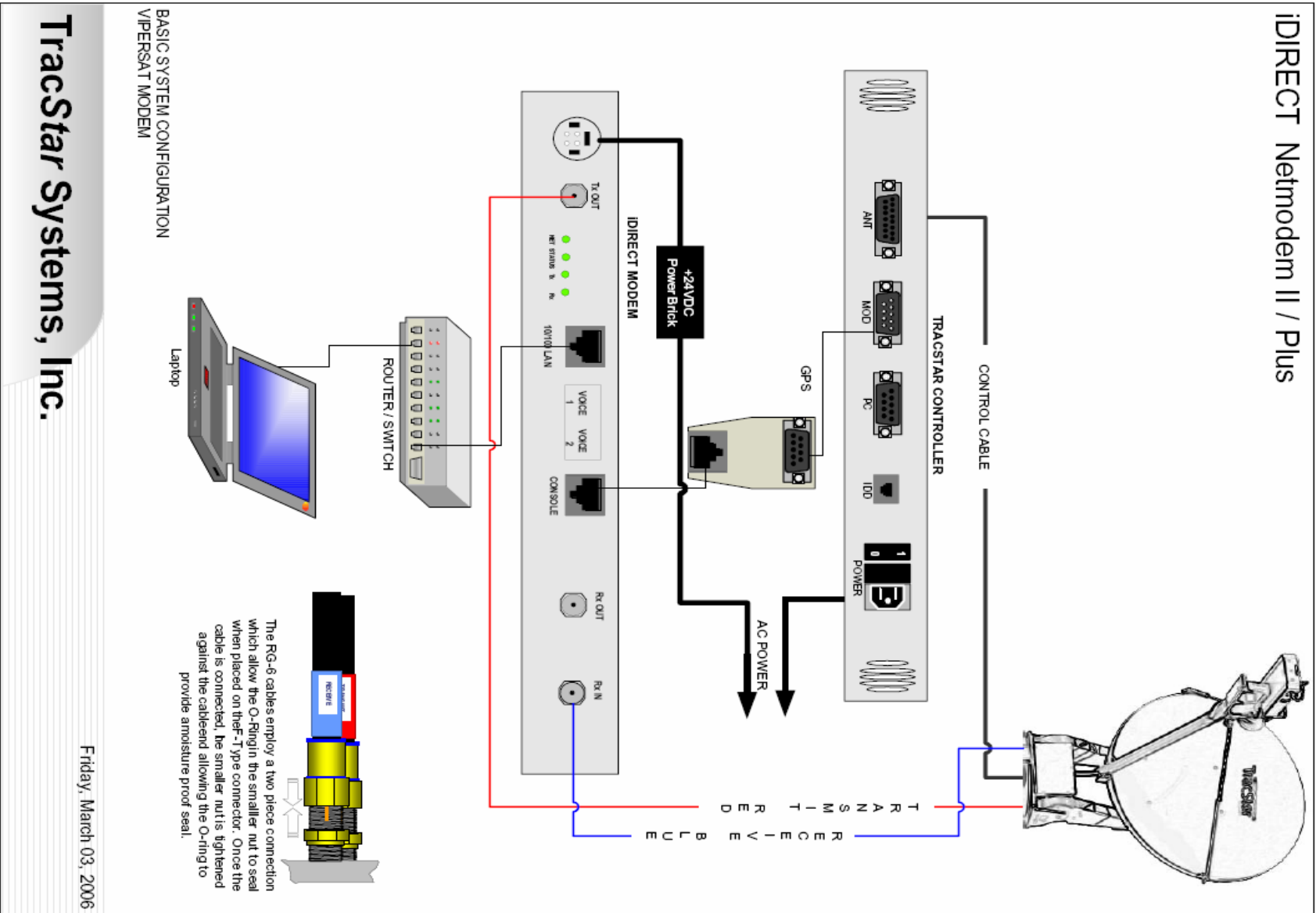
TracStar Systems, Inc.

Thursday, March 17, 2005

EMS with EdgeAccess Connection



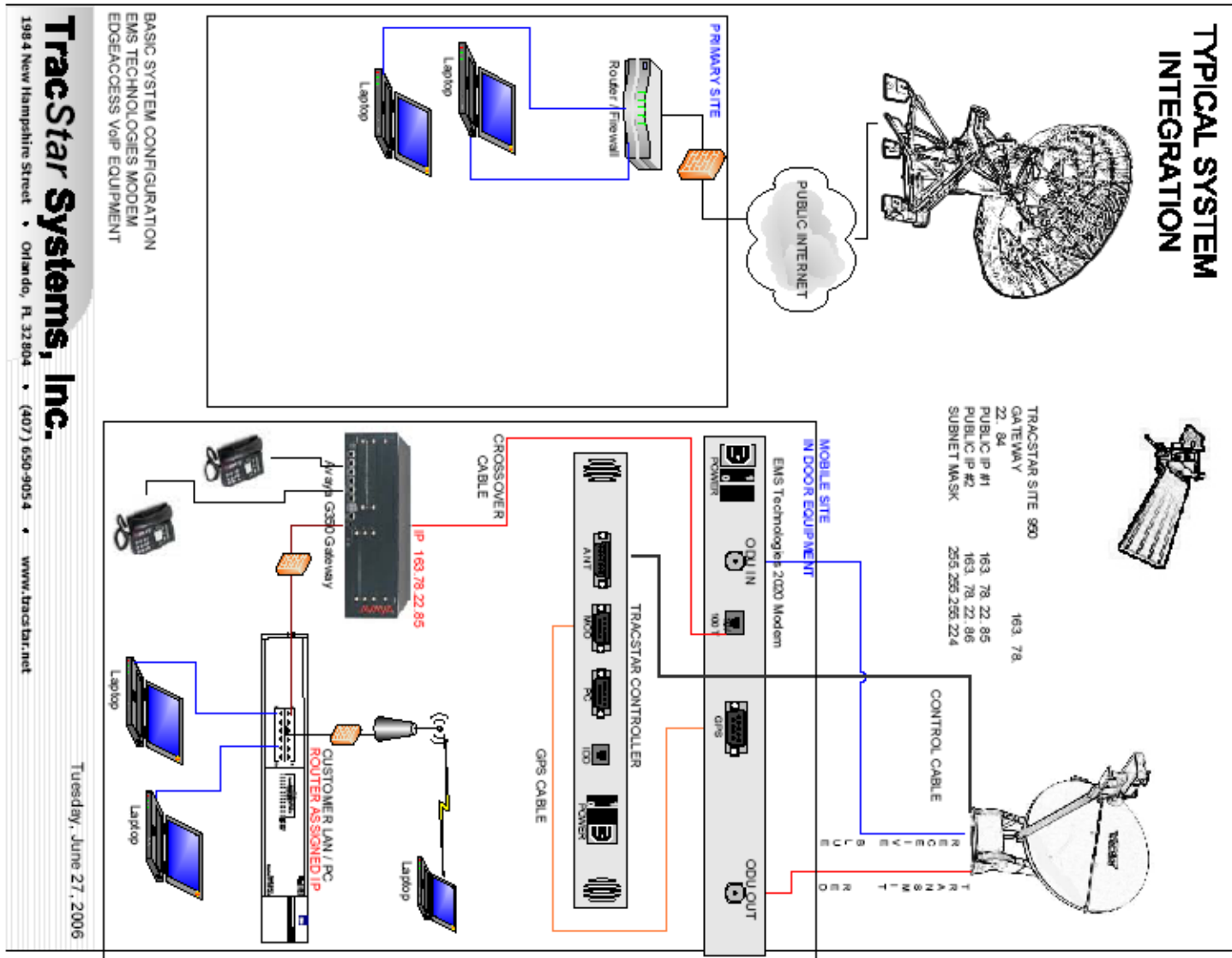
iDirect Netmodem II Connection



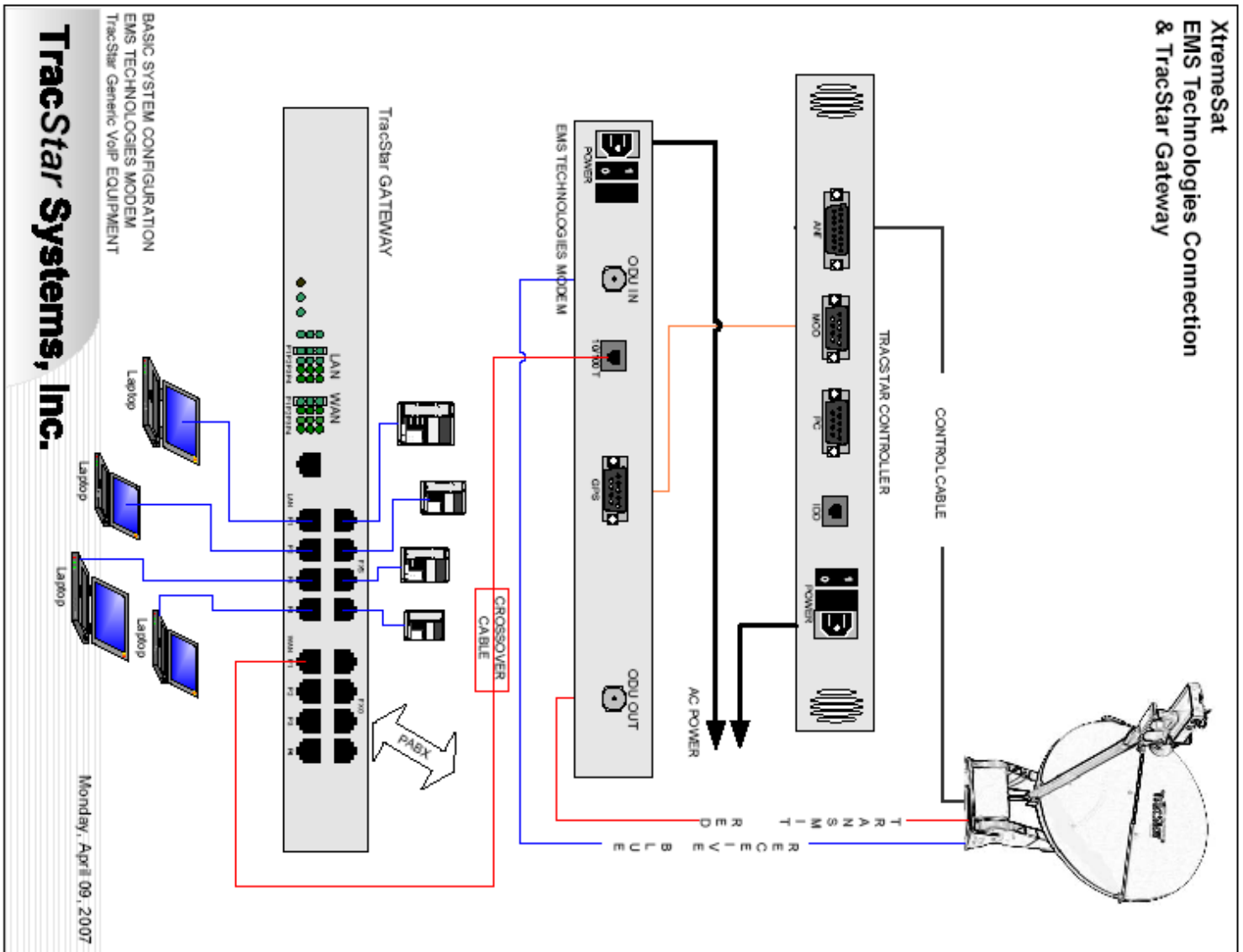
TracStar Systems, Inc.

Friday, March 03, 2006

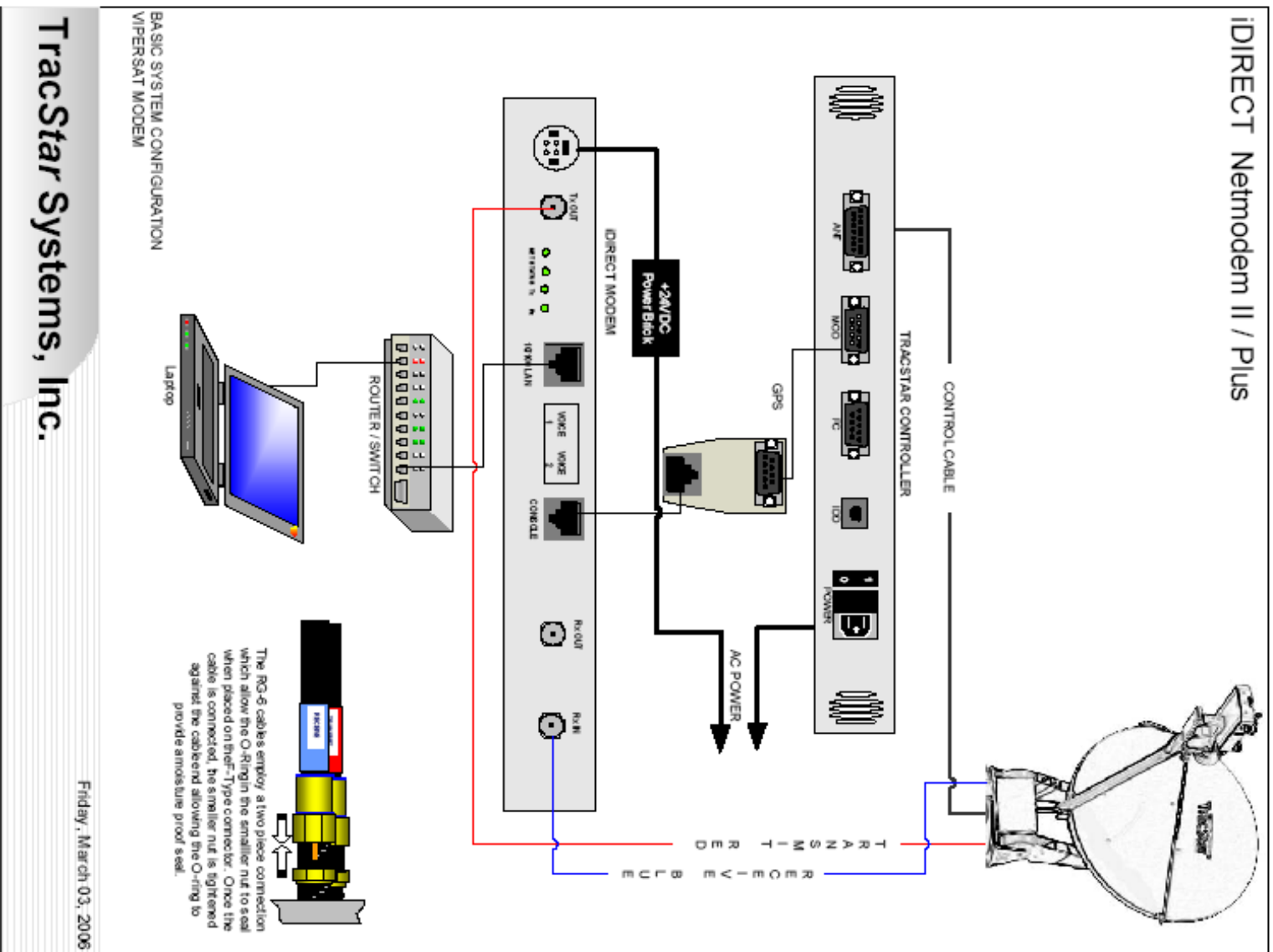
Avaya G350 Switch Connection



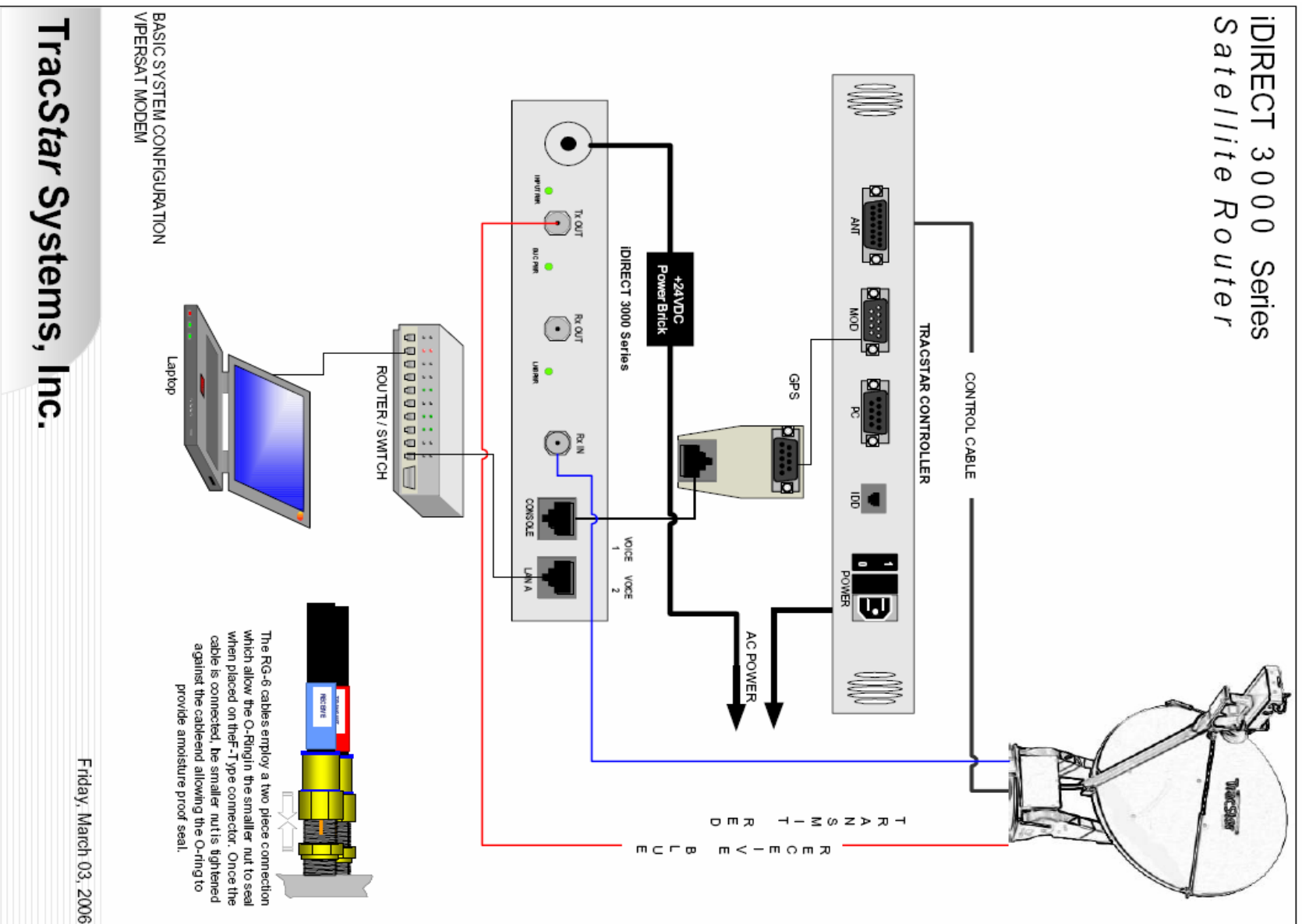
EMS & TracStar Gateway



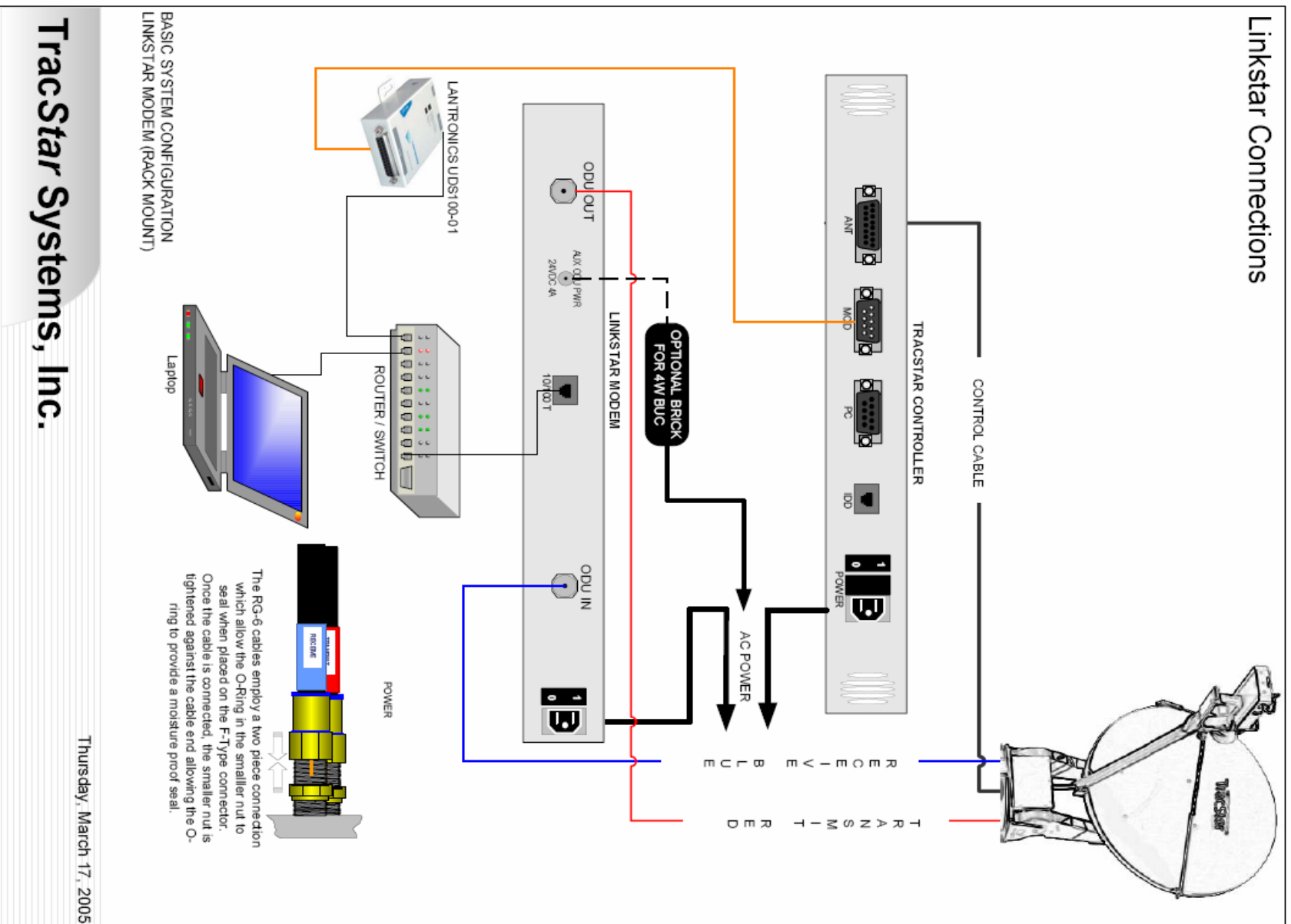
iDirect NetModem II



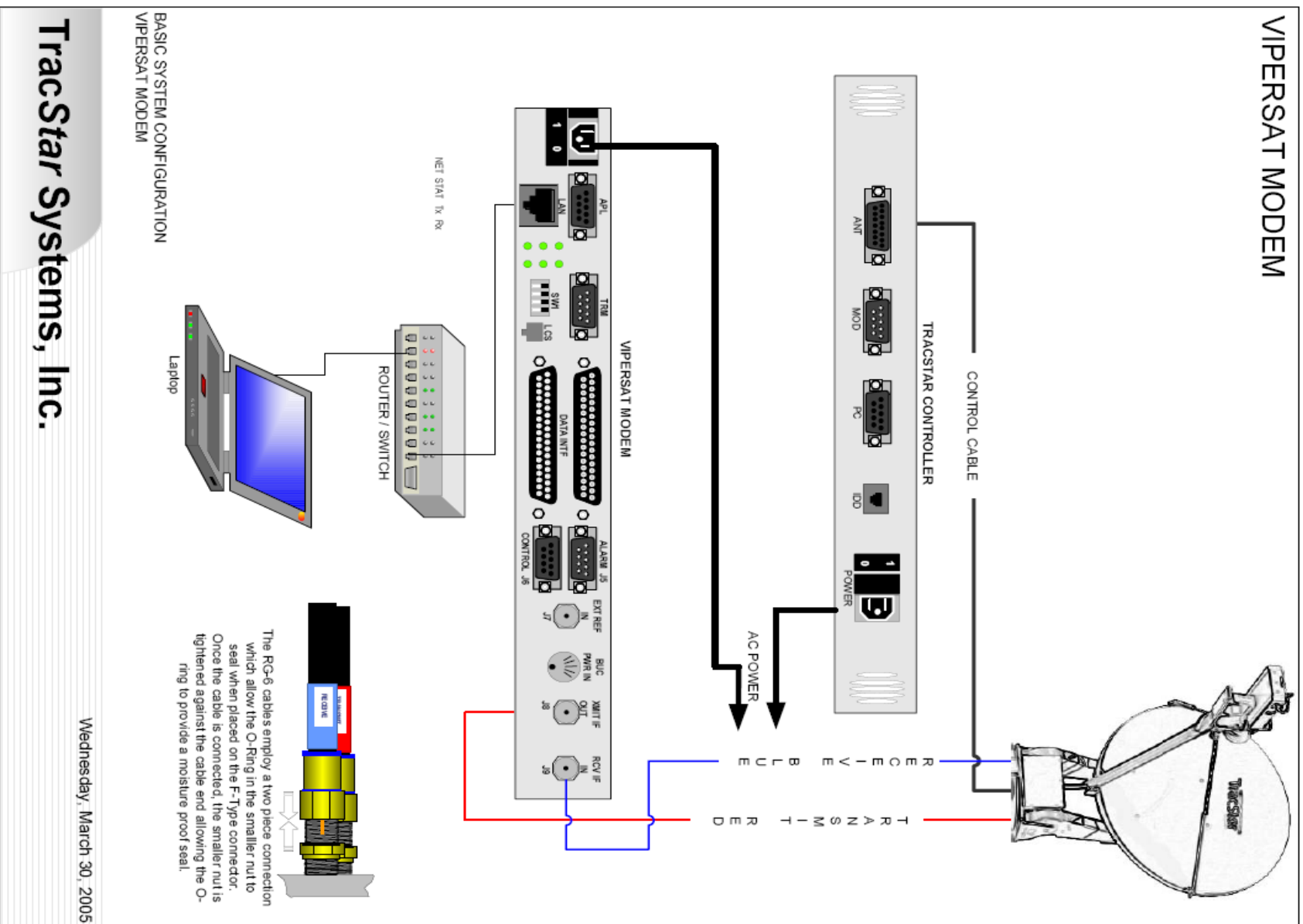
iDirect 3000 Series Connection



Linkstar Connection



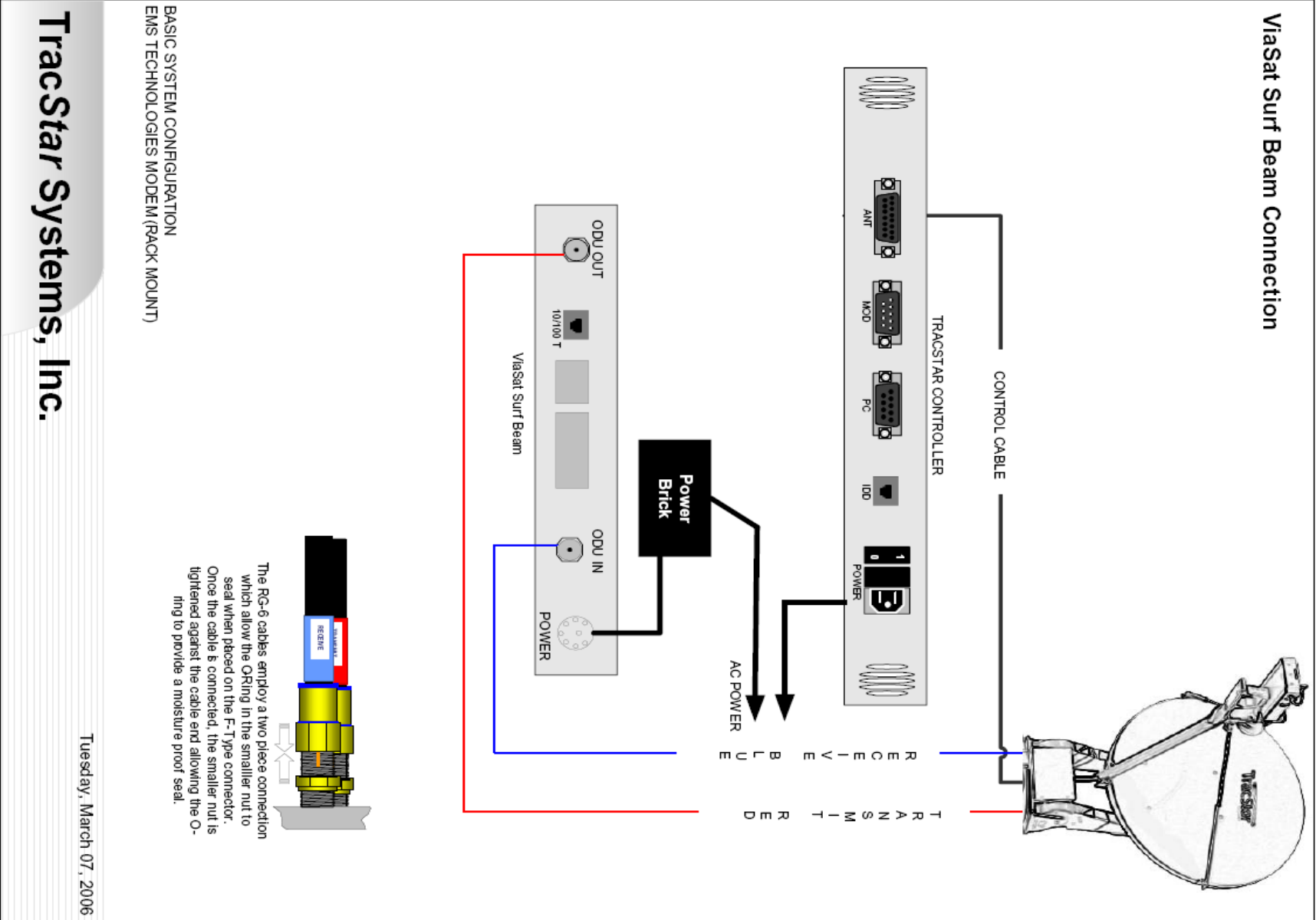
Vipersat Connection



TracStar Systems, Inc.

Wednesday, March 30, 2005

ViaSat Surf Beam Connection

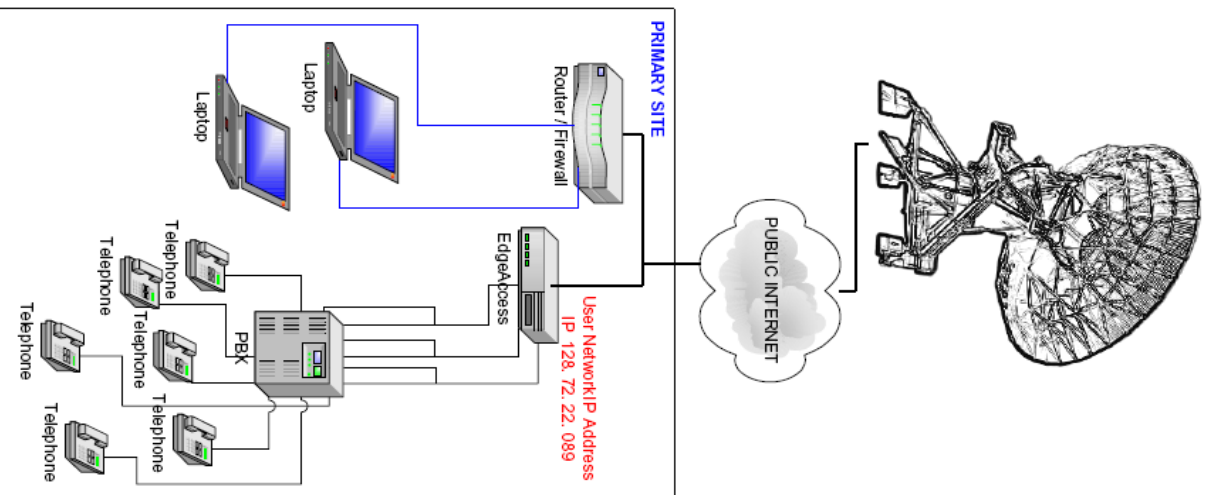


TracStar Systems, Inc.

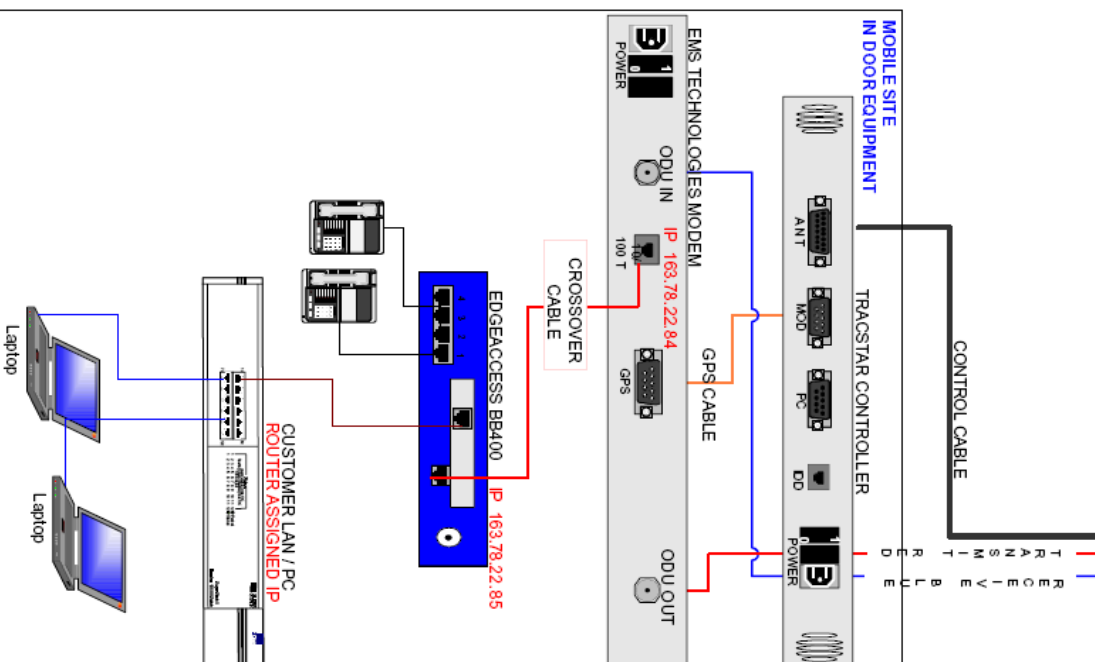
Tuesday, March 07, 2006

System Integration Example

TYPICAL SYSTEM INTEGRATION



```
TRACSTAR SITE 950
GATEWAY 163.78.22.84
PUBLIC IP #1 163.78.22.85
PUBLIC IP #2 163.78.22.86
SUBNET MASK 255.255.255.224
```



**BASIC SYSTEM CONFIGURATION
EMS TECHNOLOGIES MODEM
EDGEACCESS VOIP EQUIPMENT**

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Tuesday, February 21, 2006

TracStar Controller Menu Grid

