Communications Trailer Operations Manual

This version does not have PASSWORDS.

Version	Draft 0.1	Gordon Gibby /David Puscher	September 19, 2020
	Draft 0.2	Gordon Gibby/David Puscher	September 20, 2020
	Draft 0.3	Gordon Gibby/David Puscher	September 23, 2020
	Draft 0.4	Gordon Gibby/David Puscher (passwords removed for public display)	December 9, 2020
	Draft 0.5	December 2020 Updates including new frequency chart	December 15, 2020
	Draft 0.6	Jan 2021 Updates Newly granted frequencies; new Lake Yale antenna info	January 26, 2021
	Draft 0.7	Jan 2021 Updates Corrected error in repeater frequencies	January 26, 2021
	Draft 0.8	Added Lake Yale Antenna; Lake Yale Ground connection; Improved information on networking systems; Hurry Up Mast.	January 31, 2021

Table of Contents

l Printer
m. Television
n. Ethernet switches
o. Uninterruptible Power System (UPS)
p Hurry-Up Mast (HUM)

3.. Preparing for Travel

a. Gathering location dependent parameters

a. Secure inside objects
b. Disconnect networking cable
c. Secure antenna masts
d. AC power
e. Outside inspection

4. Setting up at Site
a. Outside inspection
b. Inside inspection
c. AC Power
d. Deploy antenna masts
e. Deploy Satellite system
f. HF antenna
g. HF station
h. VHF/UHF station
I. Repeater

APPENDIX: Volunteer Visit Trailer Management

NOTE:

Manuals for multiple devices utilized in the PCC will be stored on the primary radio computer in the directory c:\Ham

1. Introduction

CAPABILITIES: Passwords are stored in a separate document.

Communications Type	Item	Speed	Comment
Connection to pre-existing network	Cradle Point fail-over router: 192.168.0.3	Speed limited primarily by the available bandwidth of the source; may be unavailable in disaster areas.	Ethernet cabling from the CRADLEPOINT router. May possibly be wired through mesh or bridging microwave routers, to overcome large distances.
Verizon cell service data Verizon wireless Account 742030412 Device ID 99000929038 Modem Phone No. 904 239 6091 Support 1 800 922 0204 Account Manager: Lonnie D. Wright Jr. Technology Services Florida Baptist Convention 6850 Belfort Oaks Place Jacksonville FL 32216 FBC Phone: 904 396 2351 My phone: 904 596 3056		Speed limited by available cell service. Latencies typically n the 40-50 mSec range but throughput may be limited in disaster areas.	
Satellite tcp/ip networking LbiSatellite Communications 801.501.9990 Support NOC 24/7 365 at 1 801 501 9990 techsupport@lbisat.com	Enterprise Router **(passwords removed)** 192.168.1.1 Includes two plain analog telephone connections (and possibly 2 VOIP based telephones, not	Speed at nominal service appears to be approximately 1-2 M bits per second download (Mbps)	Requires clear sky to the W 116.8

Site ID 72064	connected as of this writing) Phone numbers: Line1 689 208 2781 Line2 689 208 3611		
Internal WIFI	TP Link Router/Wifi		SSID: PCC **PASSWORDS REMOVED** at the time of this writing
High Frequency SSB radio ICOM 7300 – 100 watts output SCS PTC-Iiusb pactor modem, upgraded to pactor 3. Internal soundcard MFJ993B Intellituner auto antenna tuner	Radio modified to operate not only on amateur frequencies but also on federally licensed frequencies under the SHARES license held by FBDR NND4DR	Data rate is in the range of 100-2000 bps on HF Winlink or similar connections. Far slower than satellite, but long distance and relatively infrastructure independent	Capable of tuning any type of coax-fed antenna within an SWR of 10:1, also capable of tuning long-wire window or open-wire fed antennas
VHF/UHF FT-7800R FM 50 Watts on 2 meters 40 watts on 70 cm Voice analog			We do not currently have digital capability (e.g. Packet AX.25) created for this radio. Primary usage is to connect to local repeater or SARNET.
WINLINK Authorization	N4RBC Password: **(removed)** (case sensitive) Recovery Email: fbcdrcom@gmail.com Password: **(Password removed)** Contact: David Puscher	Trustee: Luther Willis gives full permissions	

Table 1-1 Capabilities

RESOURCES

The following is an incomplete list of the additional resources we have found within the PCC trailer:

BAOFENG UV-82C Business Band Radios	FBDR 101, 102, 103 with chargers / earpieces
Box of Kenwood handi-talkies for the ERT crew	Typically gets picked up by the ERT group. Channel appears to be programmed for our repeater
Additional box of various handi-talkies	Not in the best of shape, scattered types
Multiple laptop Computers (7 at the time of this writing)	At time of this writing DELL laptops Intel i76820HQ @ 2.70 GHz 8 Gbyte RAM 64 bit operating system 227 Gbyte hard drive

HP Color Laser Jet Printer	
2 large screen televisions	
Microwave oven	
2 tool boxes	One from Michael Crisler Another “pull out tray” of tools
ADMIN large tote with multiple office supplies	
Office supplies	Clipboards, dry erasers
Electrical Cords	Various extension cords and triple-sockets
Phone charging cords	
ONAN 10-HDKCC Spec G 10kW generator	>800 hours per hour meter 240/120 VAC 50 Amps 10-40 Oil Liquid cooled 6 quarts oil

Table 1-2 Resources within Trailer

2. Systems

a. AC Power input

Figure 2-1 AC power connection.

50A service. 240VAC (two 120V lines). The diesel powered generator used in the September 2020 deployment was 65kW.

Note that the AC power connection does NOT accept a central "spike"; if one is present in the 50 Amp service cable, it may have to be removed. Strain relief the cable if possible (this was done after the photo was taken, to the stanchion to the right of the jack). *Be observant when plugging the cable in – it has three prongs plus a ground connection on the side; the ground connection must contact the finger from the trailer.*

GROUND: Michael Crisler has arranged for heavy duty grounding connections from the left front corner of the PCC trailer, see photo below for buried ground rod connection:

Wire to buried ground rod (courtesy of Mike Crisler). Note the network connection also in this photo.

b. Diesel Generator

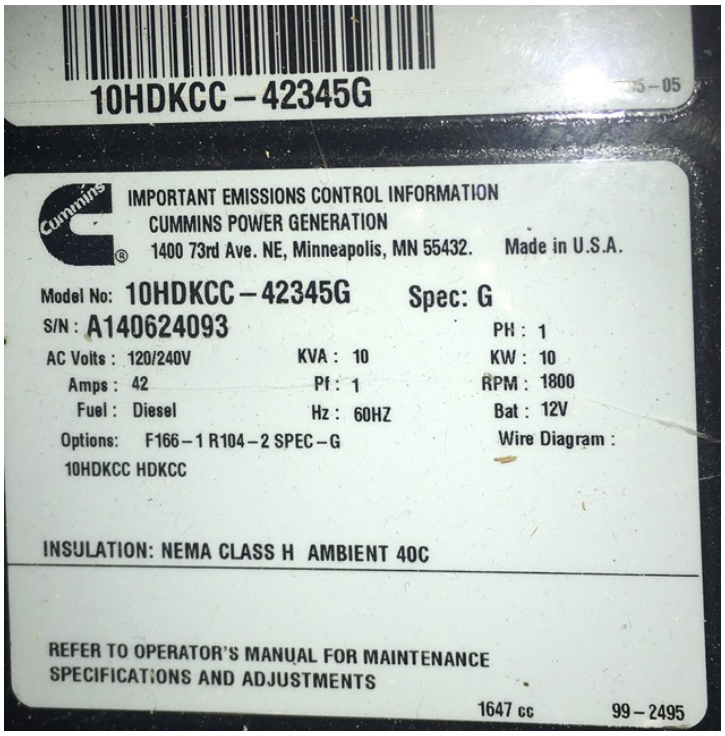


Figure 2-2 Onan Diesel Generator 10-HDKCC Spec G

1800 RPM
6 quarts Oil (note diesel oil is often different from gasoline oil) – 10W40 typical. Oil should be changed every 250 Hours, and fuel and air filter every 500 hours.

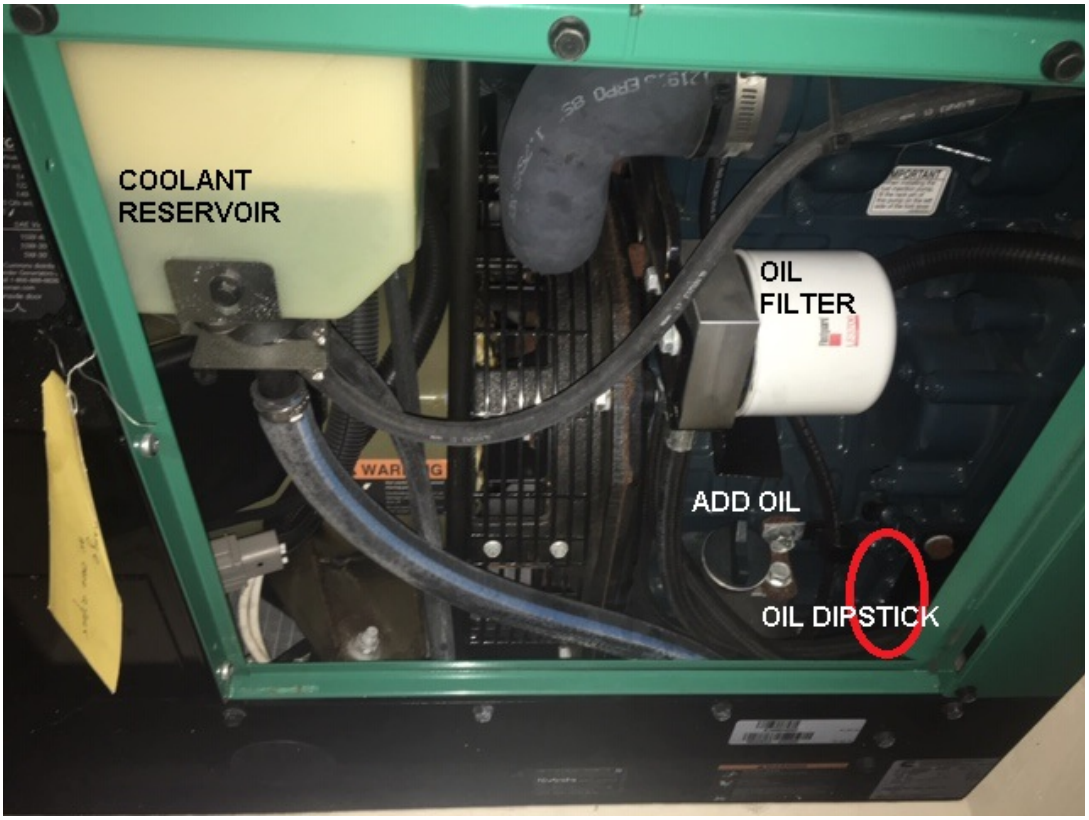


Figure 2-3: *Front of "ledge", open door and then remove the side access panel of the generator to get this view providing access to the oil dipstick, filter, and coolant reservoir..*

Note that Access to the Coolant reservoir is to the left of this photo, side of generator cabinet.

Generator is connected via an automatic transfer switch, with shore power to avoid both being connected simultaneously. Unclear which has priority. Auto transfer switch is accessed by the cabinets at the left side of the ledge area.

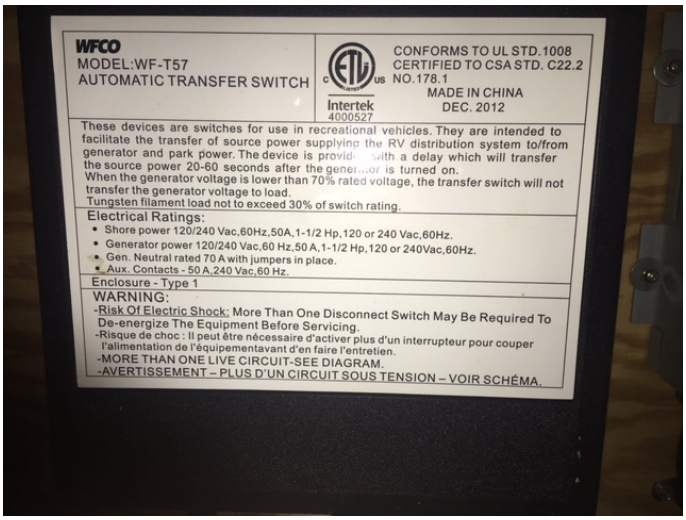


Figure 2-4. Explanatory Placard on the Automatic AC Transfer switch

Starting the Generator

1. Check for proper oil level and coolant level and to detect any leaks. Oil level should be between the lo and hi marks; on the far left side of the generator, cold and warm levels of coolant level are marked.
2. If the fuel filter has been replaced or after the generator et runs out of fuel, the fuel system should be primed; position the control switch to STOP/PRIME for 30 seconds The status indicator stays on while the pump is on.
3. Position and hold the control switch to START until the generator starts. The status indicator the switch flashes while cranking. It will stay on continuously when the generator set is running. Don't crank over 30 seconds. After 5 tries, give it a rest before continuing.

FAULT CODES: The diesel generator start switch can transmit 1 or 2 digital code by flashes. These are covered in Section 6 Troubleshooting of the Onan operating manual. Initially the system will present only 1 digit

1 = high engine coolant temperature
2 = low oil pressure fault
3 = service fault

Pressing stop/prime once on the control switch will cause the two digit codes to display for five minutes.

Two digit Code

1 2	Over voltage
1 3	Under voltage – system could not maintain rated voltage; consider reducing load
1 4	Over frequency

1 5	Under Frequency
1 9	Governor actuator ensed an open or shorted circuit
2 2	Governor actuator overload – reduce load
2 7	Voltage sense is unable to sense output voltage
2 9	Battery voltage is > 19 volts
3 2	Low cranking speed
3 5	Control Card failure
3 6	Engine stopped; most likely due to the inadequate fuel level
3 8	Over Current 9field overload) – indicates low power factor loads
4 1	Generator Rotor – control unable to sense field or output voltage
4 2	Processor – microprocessor ROM error occurred during self test
4 3	RAM failure
4 5	Speed Sense – control is unable to sense quadrature frequency
4 8	Generator field sense – unable to sense field voltage
5 7	Over prime (exceeded 3 minutes)

c. AC Circuit Breaker Panel / AC Power

The AC panel is located on a wall at the front of the trailer up on the ledge area, behind the satellite / networking racks. To access it, climb up steps carefully and crawl forward on hands and knees. All of the circuit breakers are 120VAC.

> December 2020: Michael Crisler has added some extremely helpful AC current & voltage readouts to the power panel to better delineate the power being used at any given moment.

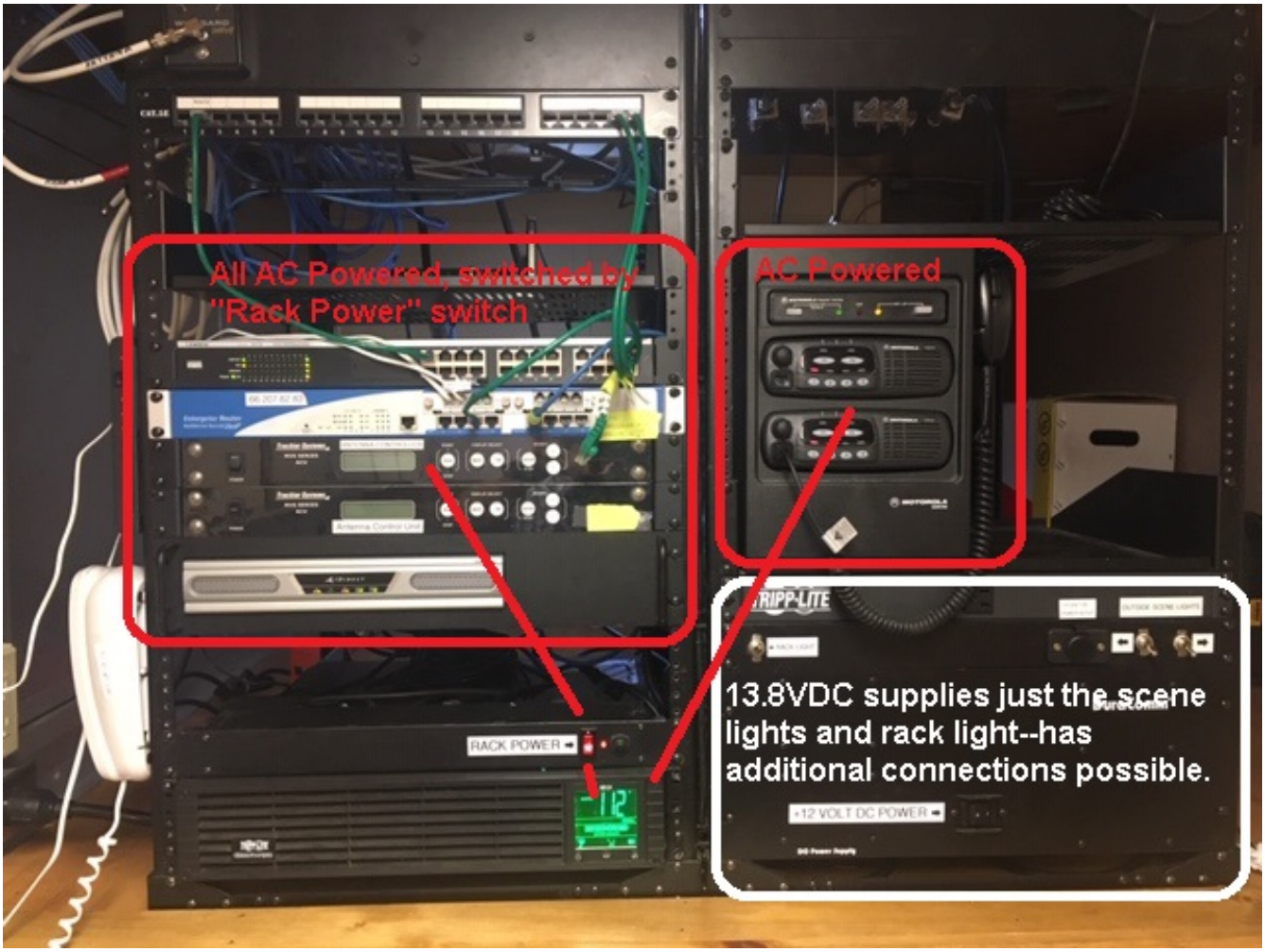


Figure 2-5. *Explanation of how power is provided to rack-mounted equipment The items in the left rack are AC powered by the UPS system, through an extension box which has a "Rack Power" On/Off switch. Additional items are directly wired to the UPS, such as the Motorola Repeater.. The 13.8VDC power supply in the right lower rack at this time powers ONLY the rack light (very small lamp) and the four large outside "Scene Lights."*

PLAN is to power our repeater also from the 13.8VDC power supply.

Ham Radio DC Power is provided by a single switching power supply in the beige cabinet, which is currently wired to the normal trailer AC wiring – but could be moved to the UPS system if necessary.

d. Overview of Internet Source Selection: Fail-over network routing

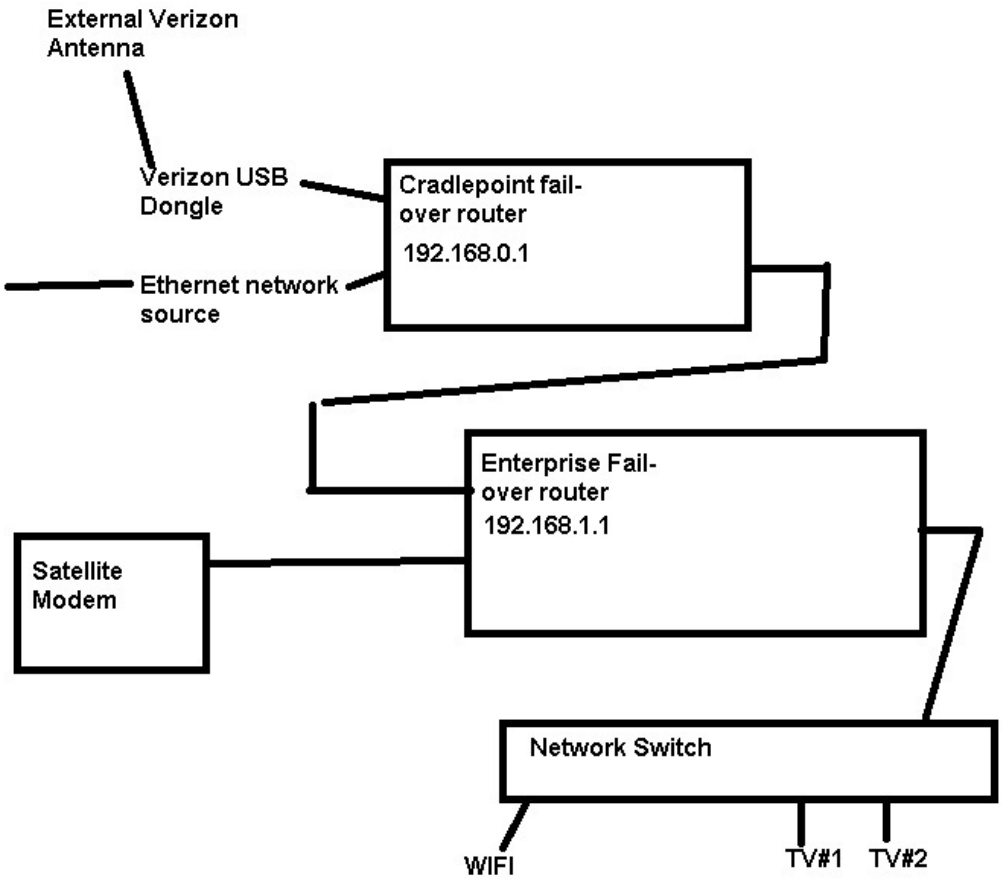


Figure 2-6 *Block diagram of networking*

Cradlepoint Mode: MBR1200B
Running firmware version 6.5 Compatible with USB730L data modem

The PCC has up to three different sources of tcp/ip internet available. A system of two sequential fail-over routers allows optimal selection of the three choices.

Existing wired Ethernet (e.g., at home base) – connected by wired (blue) Ethernet cable, this is cheapest and first choice. The cable for this is coiled up and stored accessible by the generator fuel door. This cable (or suitable alternative[1]) connects to the WAN port of the Cradlepoint fail-over router. The WAN (Wide Area Network) port is the DEFAULT where the Cradlepoint expects to find an internet connection to use.

1 For connecting to an existing internet source that is more than 300 yards away, some microwave bridge or mesh system would be needed to make the transfer.

Figure 2-7A *PREVIOUS Storage of external wired Ethernet connections* ***December 2020: Note that a female RJ-45 jack has been added to the left front edge of the trailer to allow external wired Ethernet to be easily connected. The wiring of this connector is the more-common "B" version of the EIA standard.***

The Cradlepoint MBR 1200B fail-over router will use the existing wired Ethernet if available, but if not, will attempt to use Verizon based hotspot from a dongle connected to its USB port #1 or #2 Note that a tiny connector for the external antenna can be connected to the Verizon hotspot.

Our experience with this router is that you must be very patient for it takes a while for it to connect to the Internet through the USB730L—approximately 3 minutes. The bootup sequence includes sequentially lighting each of the 4 blue signal strength LEDS; following this the USB modem appears to spend more than a minute acquiring network access. Only at this point do you see a valid signal strength indication in terms of "bars" of signal. .

After full bootup: The Attention (Amber) light will be ON at the far right if your WAN connection is failed, but it will provide Internet access thru the USB730L if there is enough verizon signal and internet access through that

NOTE: The TP-Link older router with USB port does NOT accept the USB730L. The firmware in the TP-Link is too far out of date for this modem and we were NOT able to find the appropriate BIN file for it.

Note that if you reboot the Cradlepoint MBR1200B, the Enterprise router next downstream may not obtain a new IP DNS lease – you'll have to reboot the Enterprise router also. Easiest way to do this is to cycle the Rack Power off, then On.

December 2020: The front panel LED's on the Cradlepoint are actually very good at providing a lot of information about its operation:

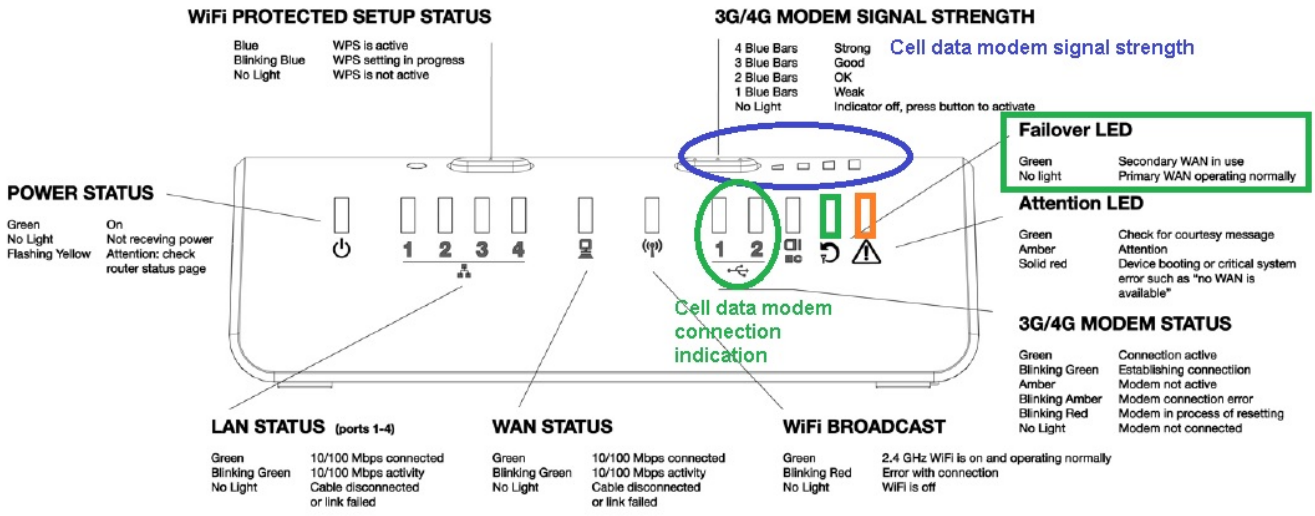


Figure 2-7B. *Explanation of the Cradlepoint router lights.* ***Suggest you pay particular attention to the 3G/4G Modem status lights, and the Failover LED in this diagram.***

Examples: If the Failover LED is Green --- the system is using the USB cell data modem, as hardwired Ethernet (from the "barn" or other wired source) has failed. If USB1 or USB2 is GREEN it indicates a cell data connection is working. The blue LED's above give the signal strength detected.

CONSOLE ACCESS

The control access to the Cradlepoint router is gained by pointing your web browser at its address, 192.168.0.1, and entering the user name and password from before in this text.

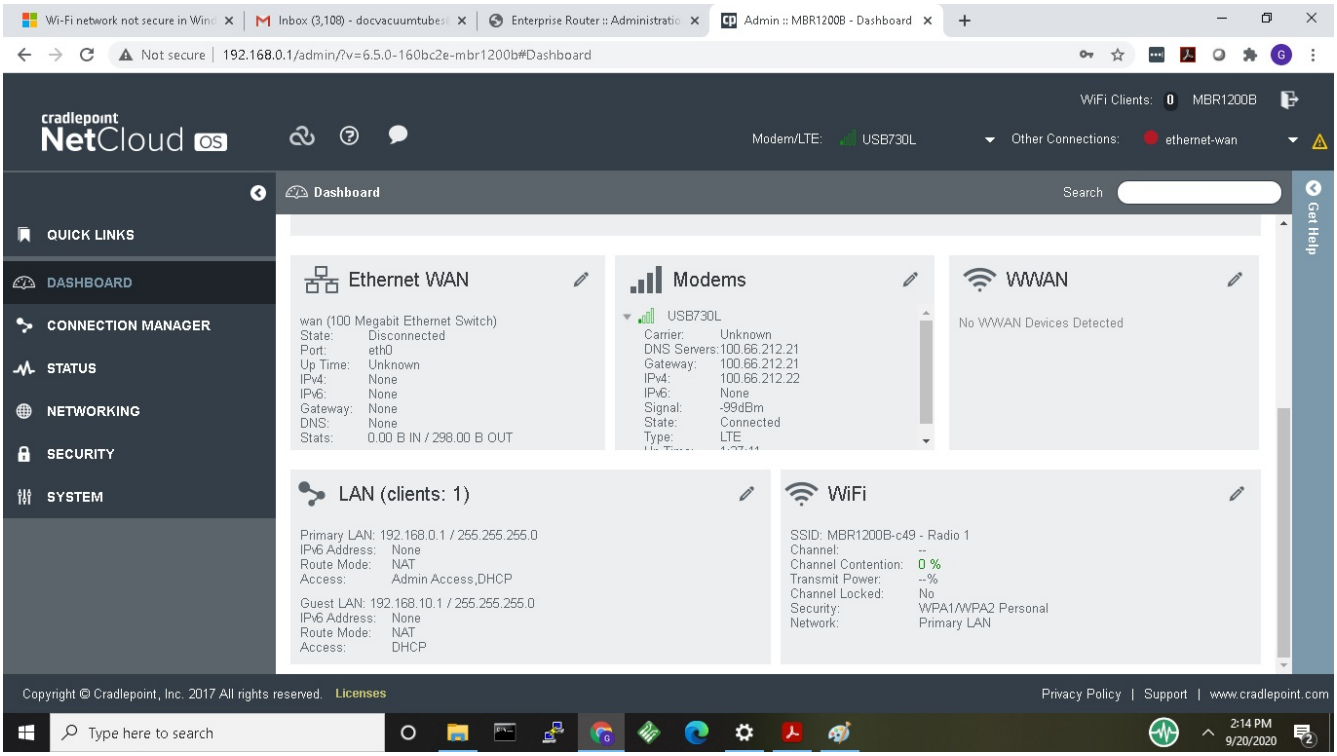


Figure 2-8A. *The web server on the Cradlepoint allows you to see which connections are up and running, as well as the signal strength found on the Verizon Modem USB730L. The manual for the 730L is stored on the main ham computer in the directory c:\Ham.*

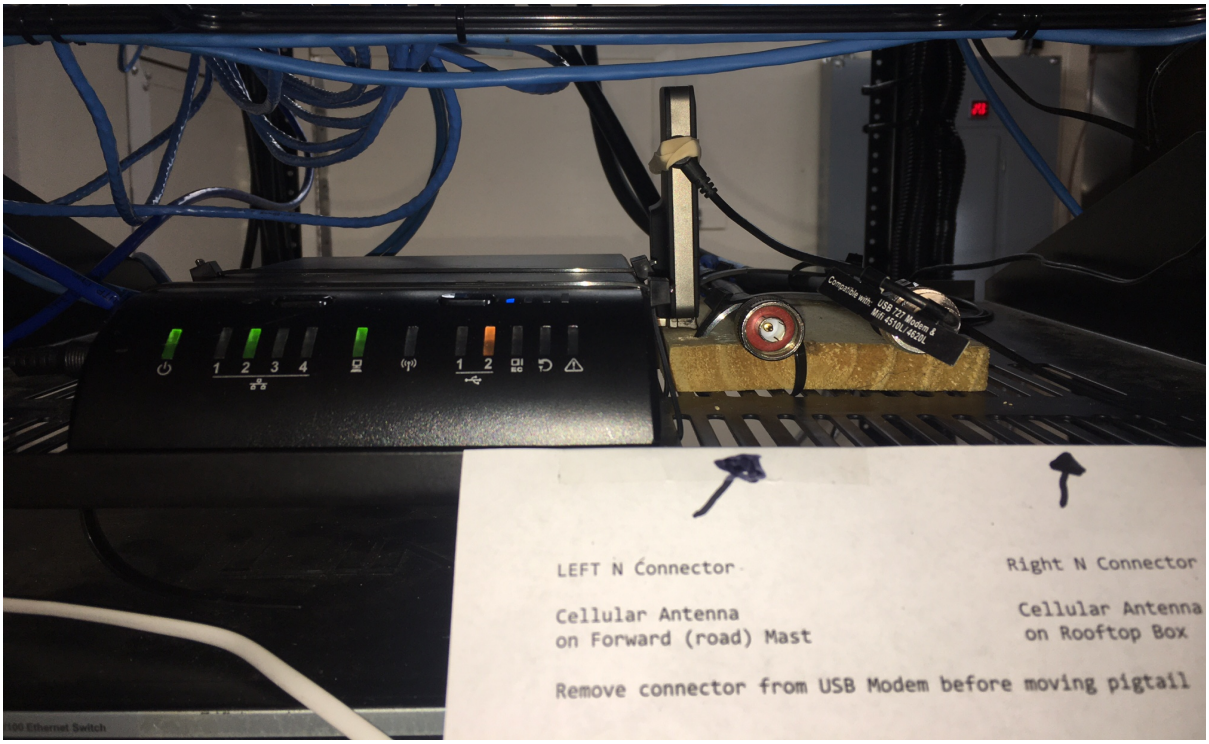


Figure 2-8B: *Mike Sprenger rigged up a rubberband system to keep the cellular antenna connected and made the system work far better!! This also tends to better physically support the USB connected 730L modem. Note which connector goes to which antenna. I'm not convinced that the "Cellular antenna on Rooftop Box" is useful…..*

Note that the signal strength in dBm is shown: in this case -99dBm (likely unusable). My measurements with the trailer sitting at Lake Yale were the following:

Antenna	Signal Strength dBm at Lake Yale, tests of 1/30/2021	Comment
Only internal	-99dBm	Likely unusable
"right" N connectors cellular antenna on rooftop box	-95 dBm	1-2 bars of signal
"left" N connector (forward road mast)	-85 dBm (mast laying DOWN)	3-4 bars of signal – very useable

VERIZON USB DATA MODEM USB730L

Novatel Wireless Global Modem USB730L (4G)

This is one of many data modems that connect to cellular carriers and provide internet to users. This device can literally be plugged into an available USB port of a Windows computer and will work. The computer finds the appropriate drivers and it will appear as one of the wired networks, giving you Internet access. When plugged into a USB port on the Cradlepoint, it does the same thing – provides Internet to the Cradlepoint fail-over router thru the USB port.

There is an external antenna port using a tiny connector on the USB730L. Signal strengths in our experience were best by using a USB-port extender cable and mounting the actual USB modem in the fan casing area to obtain some aperture to the outside sky.

See above: Mike Sprenger has potentially made the external antenna connection work.

ALTERNATIVE: If you have problems with the external antennas, a possible solution is to use USB-extender cables to get the modem OUTSIDE the metal shielding of the PCC trailer, and to use a simple parabolic or corner reflector with the modem at the focal point, to dramatically increase its gain.

December 2020: Tests were performed in a limited amount of time with a commercial WEBOOST AT&T cell phone booster. Turns out that Verizon and AT&T use same frequencies so this may provide

a solution for the antenna issues of the PCC Cell Novatel Wireless Global Modem USB730L. The WEBOOST provides for an external antenna (which can be directional if desired) via common RG6 (cable TV) F- connectors. Roughly 40-60 dB of gain is provided by the WEBOOST system and a small internal antenna The WEBOOST is basically a bidirectional repeater; cell phones work by receiving in one band of frequencies….and sending in another (very similar to a ham radio duplex repeater). The WEBOOST simply receives signals from tower and repeats them inside the trailer, and vice versa. In order for it to work, must have significant isolation between internal and external antennas (to prevent feedback). The "Faraday cage" effect of the PCC works nicely for this.

This has not yet been tested with the Verizon cell data modem (due to lack of time) but worked perfectly with both an ATT cell phone and a Verizon cell phone so it is likely to solve the PCC cell data modem signal levelproblem.

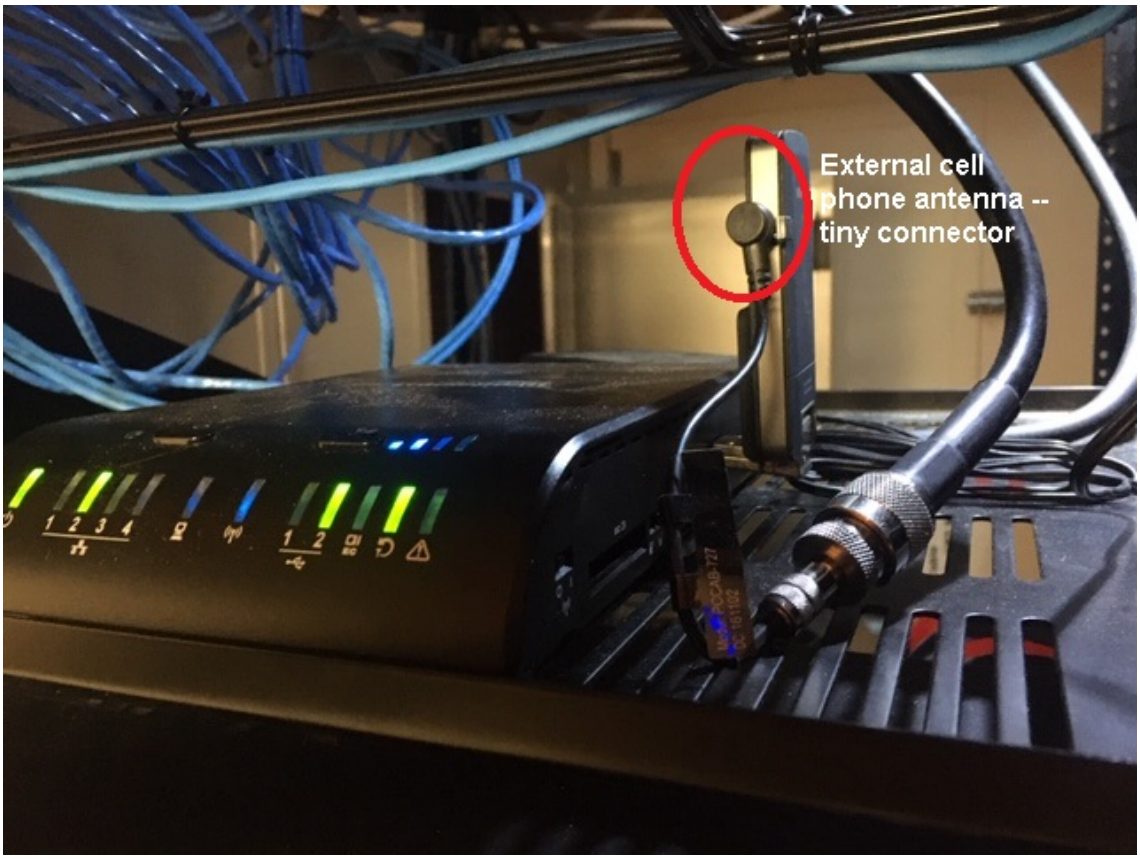


Figure 2-9. *Red Circle shows the fragile connection of the external antenna to the Verizon hotspot, a USB input to the Cradlepoint fail over router. As shown in previous photo, Mike Sprenger has jury-rigged this with a rubberband, much more successful. In this example, the wired Ethernet has failed, and the system is preferentially routing Verizon data connection (from USB slot #2, note green light) onward to the Enterprise fail-over router.*

The best choice for data from the Cradlepoint (whatever that might be at any given time) is then connected to the Enterprise Fail-over router on WAN Port #1. The satellite modem data is connected on WAN Port #2. The Enterprise router will select preferentially the output of the Cradlepoint, but if failed, it will utilize the Satellite. One can force that choice simply by removing the Ethernet cable from the Cradlepoint to the P1 WAN input to the router.

The control screens of the Enterprise router can be accessed by pointing an Internet browser to the IP number of the Enterprise router: 192.168.1.1

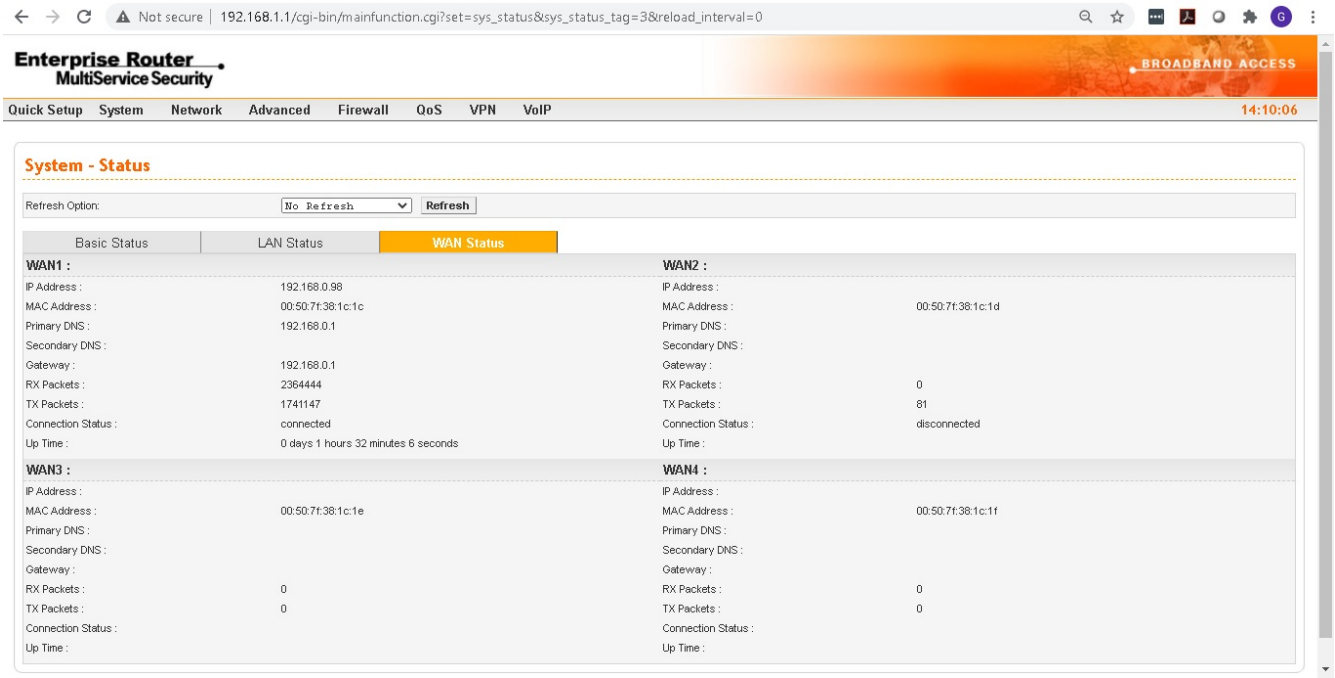


Figure 2-10: *System status screen from Enterprise Router showing one working WAN connection; for this screen shot, the satellite signal was removed, so the screen displays only ONE working WAN connection.*

ENTERPRISE ROUTER NETWORK ACTIVITY LIGHTS:

As currently wired, here are the lights you can expect to see illuminated:

	LAN (outputs from the router)				WAN / DMZ (sources of Internet)			
VPN			blink		Blink if in use	Blink if in use		
Firewall			green		Green	green		
QoS			green		Green	green		
	P1	P2	P3	P4	P1	P2	P3	P4

Comment			This is the output to the Ethernet switch.		From the Cradlepoint fail-over router	From the satellite modem		

Router Reliability

It is unlikely that you would want to try to reprogram either of the routers. They are fairly complicated. However, being able to understand their various displays and lights will be very helpful to you. We have seen instances where the Enterprise Router refused to accept a good signal from the Cradlepoint and was not making proper connections. **This is likely because it needs to request a new lease on an IP number from the Cradlepoint router. In that case, power-recycling the Enterprise router solved the problem**. The Satellite system can be depowered while connected without harm. We power cycled by turning off RACK POWER, waiting a few moments, and turning back on, after which the Enterprise router functioned perfectly

tracert and ping

These are two command line programs that are extremely useful in diagnosing issues with the routers. For example:

`ping foxnews.com` Should show a response with a latency of about 50 milliseconds over cell connection and about 600 milliseconds over satellite connection.

```
C:\Users\Gordon>ping fox.net

Pinging fox.net [64.99.80.121] with 32 bytes of data:
Reply from 64.99.80.121: bytes=32 time=108ms TTL=238
Reply from 64.99.80.121: bytes=32 time=120ms TTL=238
Reply from 64.99.80.121: bytes=32 time=229ms TTL=238
Reply from 64.99.80.121: bytes=32 time=118ms TTL=238

Ping statistics for 64.99.80.121:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 108ms, Maximum = 229ms, Average = 143ms
```

Example of a ping from my computer to "fox.net" through my cell phone. Replies arrived in roughly 120 milliseconds each. 4 packets were sent, and all four were received. The fact that the fox.net was converted into an IP number (64.99.80.121) indicates that my DNS (domain name server) connection is working well. If your internet is all fouled up...you may not be able to get conversion from names to numbers. That will be your first clue that things aren't right….when it tells you it can't find "fox.net."

To get more detailed information, you turn to the tcp/ip command TRACEROUTE. On Windows computers, constricted by the original DOS command-line interface, this command had to be shortened to

tracert

Here is a useful example of a tracert while working over a heavily loaded cellular data network:

```
C:\Users\Gordon>tracert foxnews.com

Tracing route to foxnews.com [23.193.21.81]
over a maximum of 30 hops:

  1     2 ms     1 ms     1 ms  my.usb [192.168.1.1]
  2     2 ms     2 ms     2 ms  cp.local.tld [192.168.0.1]
  3     *        *        *     Request timed out.
  4   532 ms   439 ms   540 ms  107.sub-66-174-110.myvzw.com [66.174.110.107]
  5     *        *        *     Request timed out.
  6     *        *        *     Request timed out.
  7   693 ms   567 ms   649 ms  19.sub-69-83-102.myvzw.com [69.83.102.19]
  8     *        *        *     Request timed out.
  9   578 ms   758 ms   709 ms  106.sub-69-83-97.myvzw.com [69.83.97.106]
 10   653 ms   669 ms   599 ms  106.sub-69-83-97.myvzw.com [69.83.97.106]
 11   750 ms   606 ms   523 ms  105.sub-69-83-98.myvzw.com [69.83.98.105]
 12   659 ms   648 ms   710 ms  0.ae0.GW13.HOU7.ALTER.NET [157.130.150.189]
 13   642 ms   749 ms   635 ms  0.ae15.GW7.DFW13.ALTER.NET [140.222.234.67]
 14   734 ms   558 ms   784 ms  verizon.com.customer.alter.net [204.148.197.30]
 15   753 ms   801 ms  1001 ms  ae3.ntt-dfw3.netarch.akamai.com [23.203.147.221]
 16   547 ms   806 ms   666 ms  a23-193-21-81.deploy.static.akamaitechnologies.com
[23.193.21.81]

Trace complete.
```

Explanation

tracert foxnews.com will show every router traversed in the process of reaching the desired URL. This will include the routers in the PCC so you can see which ones were traversed. In the example above, it traveled to the Enterprise router (192.168.1.1) and from there to the Cradlepoint router (192.168.0.1) which has the Verizon cellular data modem, and from there it had a hiccup on the next router and then hit a router that has myvzw as part of its name (Verizon-based) and went through several of those until hitting what appears to be a proxy for fox news, akamaitechnologies.com

Yesterday these times were more in the 50 millisecond range. Today they are in the 500+ millisecond range – indicating the network is more heavily utilized (probably due to our computers downloading Microsoft operating system updates).

Had we been using the satellite –

a) It would have proceeded from 192.168.1.1 (Enterprise router) directly through satellite to a ground station,
b) never seeing 192.168.0.1
c) and experiencing about 600 mSec delays from that point onward, due to the satellite traversal times.

The P3 output of the Enterprise router feeds the PCC wifi system by way of the Ethernet switch and can also be used by both televisions.

ALTERNATE CONNECTIONS:
You can always plug your computer, by using a wired Ethernet cable, directly into one of the LAN outputs of the Cradlepoint router (access to hardwired or cellular data) or the Enterprise Router or the Ethernet switch (access to all three sources), and avoid the need for the WIFI connections if you so desire.

ALTERNATE ROUTERS

In the material in the back room, an alternate fail-over router was discovered that chooses between wired Ethernet and USB-socket provided cellular data modem. This appears to be the older system that was replaced by the Cradlepoint.

Figure 2-11 TPLink fail-over cellular/wired/wifi router

This router has as of Jan 2021 replaced the previous WIFI router in the PCC trailer because it offered more recent security options.

e. Satellite Systems

For OPERATION, see the excellent material by Dave Puscher later in the SETUP section.

From Wikipedia:

> **Eutelsat 117 West A**, formerly **Satmex 8**, is a geostationary communications satellite operated by Eutelsat. Previously operated by Satmex, it was launched by a Proton-M/Briz-M rocket in March 2013 to replace Satmex 5, and is being used to provide communication services to North, Central and South America,[5] with broadband, voice and data transmission, and video broadcasting services. The satellite was transferred from Satmex to Eutelsat when the companies merged in 2014, being renamed as part of the Eutelsat fleet in May 2014.[7]

Specifications

The satellite is model SSL 1300E and carries twenty four C band transponders operating with 36 MHz and forty transponders in the Ku band operating with 36 MHz.[2]

Longitude 116.78 degrees W
Period: 23.93 hours

Satellite Dish is automatically controlled and aimed by the TracStar Systems MVS Series ACU (Antenna Control Unit) – the bottom of the two control units in the rack. Acquisition and aiming depends on the iDirect satellite modem beneath it to decode and analyze the signals.

Once working, the digital (IP) signal goes to the Enterprise (fail-over) router into WAN port #2

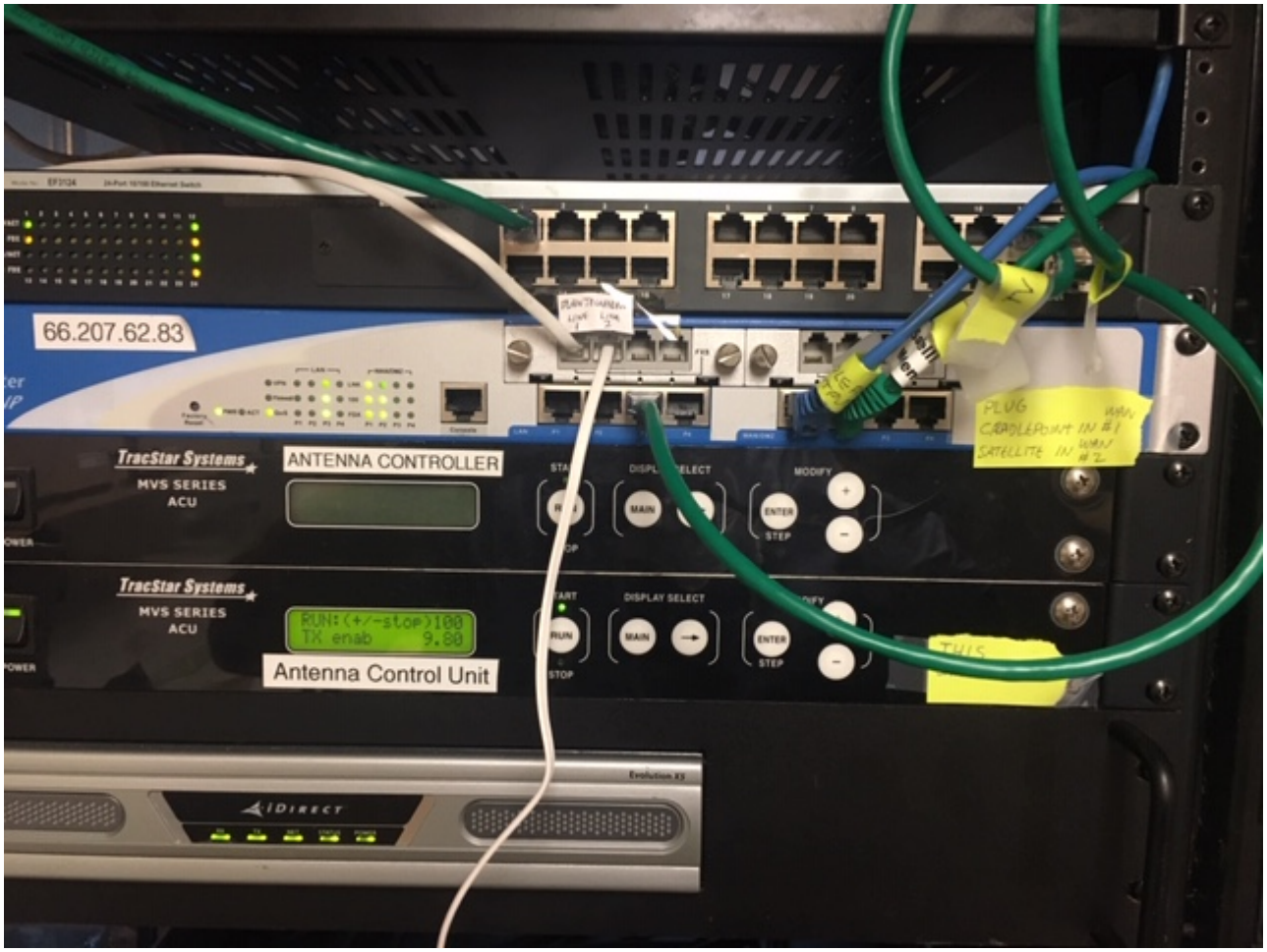


Figure 2-12. Enterprise router configuration

Enterprise Router Configuration as of September 2020

Port	Connection	Comment
WAN (Inputs to the Router)		
WAN Port 1	Cradlepoint	Best of wired Ethernet versus Verizon hotspot
WAN Port 2	Satellite Modem signal	
LAN (outputs from the router)		
LAN port 3	To the network switch, port 24	
Telephone Ports		
FXS Port 1	Plain old telephone line 1	
FXS Port 2	Plain old telephone line 2	

f. Antenna Masts / Coax

Figure 2-13 Roof mounted mast

The antenna masts are stowed with a retention pin at half their length when folded down to prevent movement. In order to raise the mast, one must be ON the roof. Remove the retention pin, remove the pin from above the hinge, move the mast to vertical, and replace the pin and secure with the clip.

The color coding of the coax cables to the masts is as follows;

MAST	Position	Color
Front / Driver's side	TOP – Verizon cell antenna	White Blue
	2nd – VHF/UHF mobile antenna	Yellow Blue
	3rd – backup 440-470 UHF antenna (can be used for repeater if necessary)	Orange Blue
	Bottom – unused	Purple Blue
Rear / Passenger side	TOP – Repeater antenna	White Red
	2nd – unused	Yellow Red
	3rd – unused	Orange Red
	Bottom – unused	Purpose Red

Figure 2-14 Mast Antenna Coax connector terminations on Rack

The coax cables are terminated in bulkhead connectors on the back of the passenger side rack.

Figure 2-14 *Lightning Arrestor protections at rack. Since this photo, additional lightning arresters have been added.*

On the inside of the rack, Polyphemus or similar lightning arr esters should be installed and then connections made to the appropriate radio.

g. HF Antenna Port

Figure 2-16A Location of the HF antenna connection.

The HF antenna cable and lighting arrester are accessible through the diesel fueling door at the front driver's side of the trailer. The SO-239 connector is low in the opening.

h. Business Band Repeater

Business band repeater is Motorola CDR700. Flat pack duplexer within the cabinet. Important for it to see a good 50 ohm antenna system. Press the white repeater enable switch at the upper left to enable repeating. Top radio is receiver; bottom radio is transmitter; there is a discrete microphone on the transmitter to allow transmission over the system.

New frequencies were granted January 2021 for our license WNUV645

Frequencies / Usages GRANTED January 2021					
	USER RADIO		REPEATER		
User Channel	Receive	Transmit	Receives	Transmit	Notes
1	464.5000 Tone Sqlch 123.0	469.5000 Tone 123.0	("P1") 469.5000 Tone Sqlch 123.0	("P1") 464.5000 Tone 123.0	Both Baofeng UV-82C and Kenwood walkietalkies can do this frequency.
2	464.5000 Tone Sqlch 123.0	464.5000 Tone 123.0	"Talkaround" Frequency for missing repeater (everyone works on the output frequency of the missing repeater)		(Talkaround on repeater output frequency) Both Baofeng UV-82C and Kenwood walkietalkies can do this frequency.
3	464.5500 Tone Sqlch 203.5	469.5500 Tone 203.5	("P2") 469.5500 Tone Sqlch 203.5	("P2") 464.5500 Tone 203.5	Both Baofeng UV-82C and Kenwood walkietalkies can do this frequency.
4	464.5500 Tone Sqlch 203.5	464.5500 Tone 203.5	"Talkaround" Frequency for missing repeater (everyone works on the output frequency of the		(Talkaround on repeater output frequency.) Suggest squelch tone settings of 203.5 Hz

			missing repeater)	
5	151.7000 Tone Sqlch 123.0	151.7000 Tone 123.0	*No repeater authorized on this frequency.*	VHF simplex Baofeng UV-82C can do this channel, but the existing Kenwood handi-talkies cannot.
6	151.7600 Tone Sqlch 203.5	151.7600 Tone 203.5	*No repeater authorized on this frequency.*	VHF simplex Baofeng UV-82C can do this channel, but the existing Kenwood handi-talkies cannot.
7	154.5275 No Tone Sqlch	154.5275 No Tone	*No repeater authorized on this frequency.*	VHF simplex Baofeng UV-82C can do this channel, but the existing Kenwood handi-talkies cannot.

LICENSED AMATEUR RADIO OPERATORS MAY PROGRAM ADDITIONAL CHANNELS ABOVE THESE INTO THEIR PERSONALLY OWNED UV-82C.

i. HF station

The HF station includes a 100-watt output CW/SSB Icom 7300 SDR-based radio with internal sound card and CAT control over USB port; an upgraded SCS PTC-Iiusb Pactor modem capable of P3, and an MFJ 993B Intellituner antenna tuner.

Bluetooth connection to the SCS modem:

PIN: 174A502D

The external antenna port from the trailer is connected to ANT 1 of the MFJ Intellituner and should be selected to avoid damage. The typical operation of the tuner at present time is automatic tuning based on RF output from the transceiver whenever the SWR rises above a preset threshold The base position of all pushbuttons (other than the POWER) is OUT, not in.

LAKE YALE EXTERNAL ANTENNA:
130-foot end-fed antenna wire is rolled up and hanging on the wall near the feed point at the east end of the Warehouse structure, where a new substantial ground rod has also been driven.

To use this antenna: Lay it out across the parking lot. Connect the line (rope) from the pole to it and pull it up and make it fast. (A new permanent post is expected in the future to be installed by Marvin Corbin.)

Figure 2-16B: *Staged End-Fed Antenna and balun at end of Warehouse. Antenna can be deployed by laying out toward the palm tree, connecting to cord there, and pulling tight. Coax runs to the typical parking position of the PCC Trailer.*

Figure 2-16C: *Pulley and cord system on palm tree for far end of HF antenna.*

j. VHF/UHF FT 7800R mobile transceiver

This radio is minimally programmed at the current time. Refer to its operating manual for further information.

https://www.manualslib.com/manual/339744/Yaesu-Ft-7800r.html

The antenna is 2nd from the top on the driver side, and has been checked to have good SWR throughout the 2 meter band. It works also on the 70 cm band, but I don't have the equipment with me to check 70 cm. Programming cable is being ordered, and all SARNET frequencies will be programmed.

k. Handi-talkies

Florida Baptist Disaster Relief has multiple kinds of handi-talkies.

Kenwood TK-3300
ERT security team uses Kenwood TK-3300 4-channel hand held radios.

Channel 1 – properly connects to the Repeater as programmed
Channel 2 – may be a simplex channel (not verified)

NOTE: THESE FREQUENCIES ARE UNFORTUNATELY NOT LICENSED FOR USE BY FLORIDA BAPTIST. New frequencies have been granted and these radios are in the process of being reprogrammed.

Although the connector for programming appears to be the same as for a Baofeng, I read that special registration key / software is required to program these radios.

l. Printer

The MFP M44u HP printer offers both direct and through-the-network printing. Our experience was better with the connection through the network, which appeared to have better buffering of data.

Using Windows 10, select SETUP from the Start menu, go to DEVICES, PRINTERS, and allow it to search for printers, then allow it to install and print a test page to verify.

m. Television

The Winegard device appears to be a preamplifier with two outputs. We have routed both the "front" and "rear" televisions from the outputs of the Winegard. Using the "search" feature (push button) appeared to "find" the televisions. Cables were marked appropriately, "Antenna" "Front" and "Rear" televisions.

The televisions also receive networking input over wired Ethernet cable.

The televisions also both receive HDMI input ("HDMI #3") and the HDMI selector on the left side of the rack system allows HDMI to be piped to the televisions.

n. Ethernet switch

The Ethernet switch appears to be conventional and connects traffic from any port to any other port.

o. Uninterruptible Power

The UPS system provides 110VAC for the rack system. **It is important to turn the rack power OFF for storage, so as not to drain the batteries of the UPS. T**here is a 48VDC connector on the back of the UPS, which for safety, has been taped over.

Figure 2-17 UPS and Rack Power ON/OFF Switch

p. Hurry Up Mast

Figure 2-18. *Hurry Up Mast can be transported attached to the trailer and ready for deployment. Be certain that it is fully collapsed before travel however. It should be LOWER than the height of the AC systems.*

December 2020

For background information on this innovative mast for the front of the PCC trailer, you can review sales information here: https://www.willburt.com/products/telescopic-masts/hurry-up/

Michael Crisler has the base and support bracket for this mast mounted on the front of the PCC trailer. Our measurements indicate that it can travel installed (as long as the mast is in the "down" retracted position) as it is at or below the air conditioner heights. It may be simpler to have this mast installed inposition before departing for a deployment.

This mast offers multiple possibilities and easy to extend:

a) An aluminum top-mast provides a possible attachment point for a cross bar or other attachment for UHF or cell phone antennas

b) Using a simple ring or other rope mechanism, this mast offers a suitably "high point" for an end fed, inverted Vee or other HF antenna. It can avoid the need for sandbag or slingshot efforts and give a good high mount in just a minute of extending the sections.

Figure 2-18. *Deploying the Hurry Up Mast.*

3. Preparing for Travel

NOTE: If preparing for an OUTBOUND DEPLOYMENT be certain to accomplish these tasks prior to deployment:

- ❑ Determine the maidenhead locator for the planned base of operations and enter it into the WINLINK software for all callsigns contemplated.
- ❑ Determine the manual dish pointing parameters for the Satellite for the planned deployment location (see following instructions for satellite deployment) at dishpointer.com
- ❑ Update operating system software in the deployment HF radio computer (and possibly other laptops stored on the comms trailer)
- ❑ Update WINLINK application software (this happens automatically if you callup the software)
- ❑ Update WINLNK forms (this happens automatically if you call up the software)
- ❑ If possible, create an ICS-205 frequency table for the deployment
- ❑ If possible, create an ICS-205A giving contact information for the principal participants
- ❑ Send ICS-205 and ICS-205A to the Florida ARES® Section Emergency Coordinators (Jan 2021 this is Karl Martin: kg4hbn@gmail.com phone 386 756 9861) and ask that it be provided to the State of Florida Div. Emergency Management (or send it directly to them); if possible locate the COML for the county to which you are deploying so the material can be provided to that COML

GENERAL TRAVEL PREP CHECKLIST

❑ Be certain that the pactor modem and antenna tuner are secured from falling out of their metal shelf, with a strong tie.

❑ Check behind the satellite racks for loose items and stow.

❑ Move the operating radio computer to the floor area and secure in a box or protective covering.

❑ Remove all loose items from counter tops and ledge.

❑ Secure all items in the back portion of the trailer.

❑ Secure the table in the stowed position securely to the wall.

❑ Check every cabinet door for secure closure and lock.

❑ Disconnect the wired Ethernet networking cable and secure in the diesel filler recess.

❑ Check that both roof-mounted antenna masts are secured in the down position with the mid-mast retention pins inserted and the vertical pins secured as well.

- ❑ Turn off the RACK POWER switch.
- ❑ Turn off the UPS (small on-off button) (hold down for > 10 sec)
- ❑ Remove the AC power cable from the trailer.
- ❑ Be certain all radios are turned OFF.
- ❑ Complete a thorough “walk-around” inspection of the outside of the trailer looking for any loose items, any tire damage, or any foreign objects that would damage the tires when the trailer is moved.
- ❑ Be certain the Hurry Up Mast is fully collapsed and therefore lower than the height of the AC systems on the roof.

4. Setting up at Site

Considerations for the positioning of the PCC Trailer:
1. Must have clear sky view of the correct direction for the desired Satellite at the necessary elevation.
2. With connection distance of the generator.
3. With possible HF antenna positioning
4. Not in the way of food movement around a feeding station.

❑ Outside walk-around inspection: Carefully inspect the outside of the trailer for damage to tires, hanging or loose objects, obvious damage to the antenna masts or other damage.

❑ Inside inspection: Check both front and rear rooms for objects that have come loose or become damaged during transit and document:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

❑ After disconnection from the tow-vehicle and secure footing for the front jacks, use the up down buttons at the driver side front of the trailer to approximately level the trailer. (After the satellite system has locked on the satellite, you will not want to further adjust this.)

❑ Provide AC power for the trailer, either from an external source through the 50 Amp external connector or from the internal generator.

❑ Using a safe and sturdy ladder, gain access to the roof and deploy the masts with the desired antennas in the NMO connectors for the missions. Consider having backup antennas in place.

❑ Depending on the urgency of communications and the known possibilities, choose whether to deploy the amateur radio or satellite or wired Ethernet networking connections.

> Note that after the satellite system is deployed, no one should be on the roof forward of the plane of the dish for radiation safety reasons.

The following excellent tutorial is courtesy of David Puscher KK4RXT.

Satellite Prep and Start-up
(David Puscher)

Once Power on in Comm trailer..
Turn Satellite power switch on

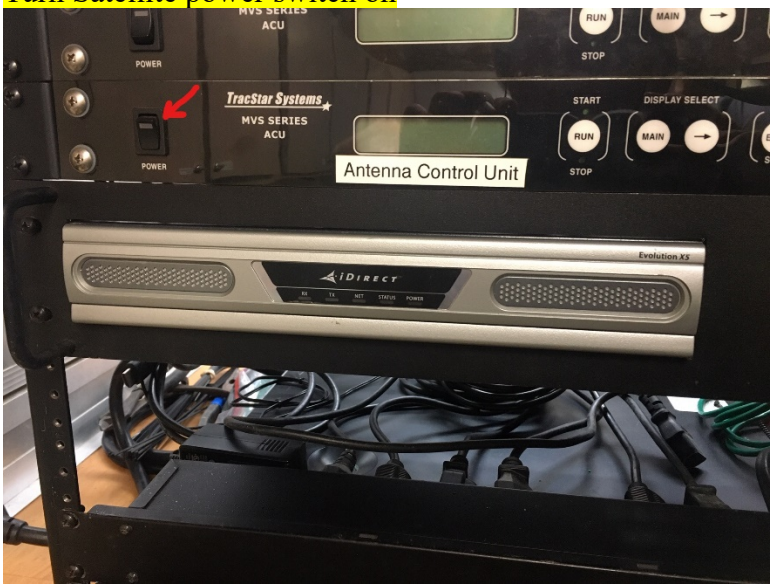


Figure 4-1 Antenna control Unit.

watch screen ..should see Monitor check, Loading please wait
*If please wait stays on loading, it is having problems talking to modem
Next you should see stowed then ready
Now press the run button

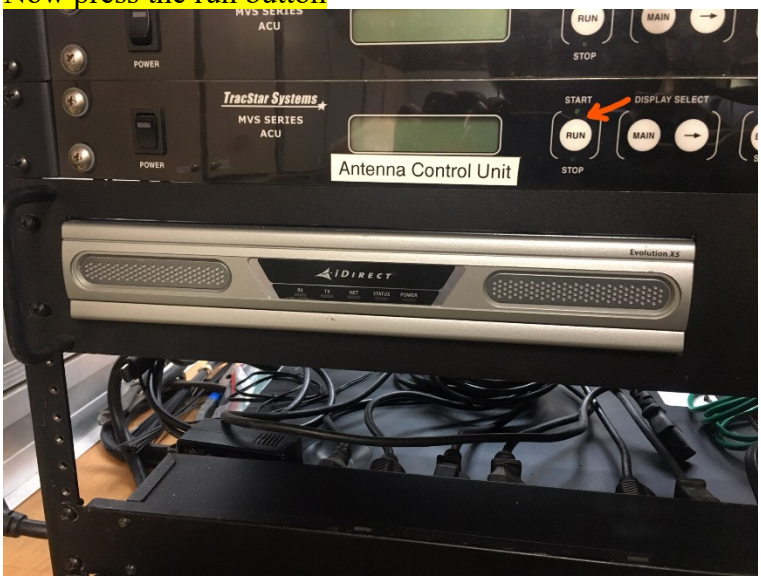


Figure 4-2 Antenna control Unit

Now the screen should read Start up @116.8

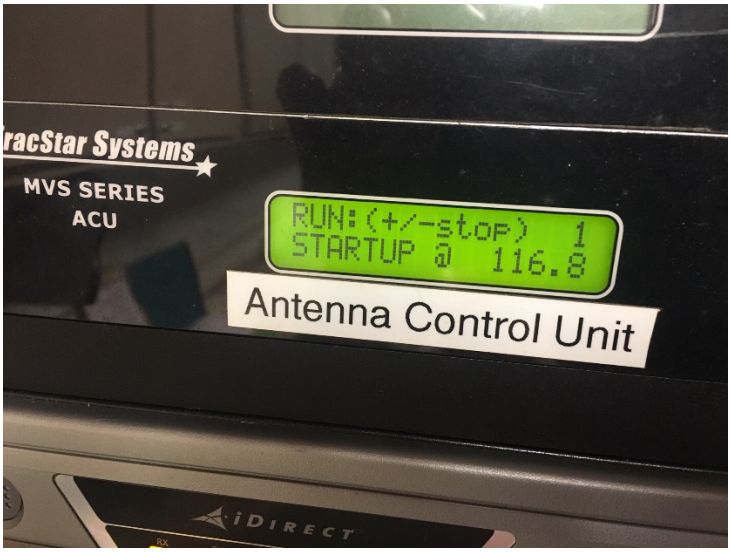


Figure 4-3 STARTUP

*Modem will not have a receive light at this time
Screen will display compass as antenna is deploying Will read Run and alternate between other information

*It will start and stop a few times. It needs 3 GPS signals for lock

Lower right corner of screen will display an arbitrary number that will go up and down. This is signal strength and it should go into the hundreds as the antenna locks into place.

The lower line center number is the SNR number. When Sat is locked in that should be at least 8 or 9. Modem receive light may be green and transmit will be red or yellow until lock
Satellite modem is the silver box below Satellite control with 5 lights

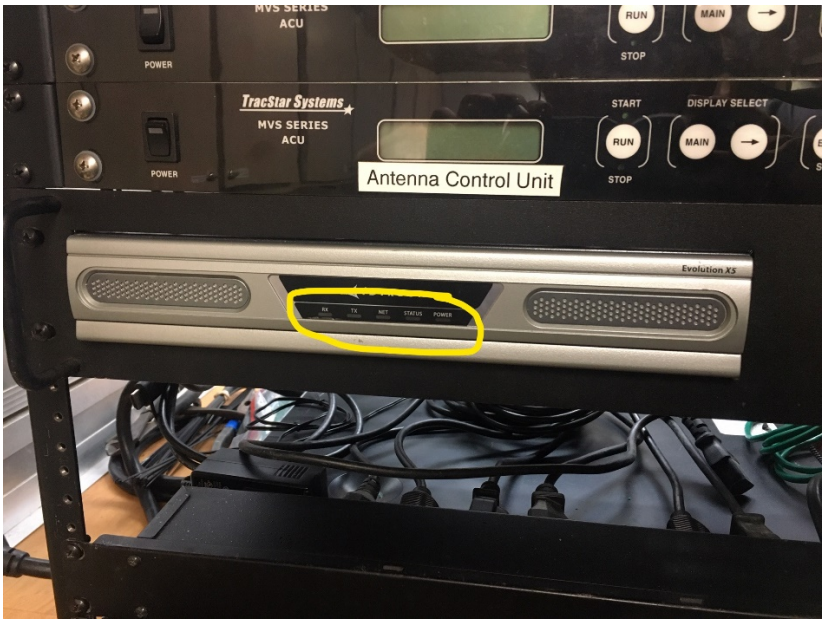


Figure 4-4: Status lights on Modem

** No persons should be on roof around satellite while the modem transmit light is green.

NOTE**
All com operators should download the satellite information for deployment location prior to departing.
Operators need to go to “dishpointer.com”

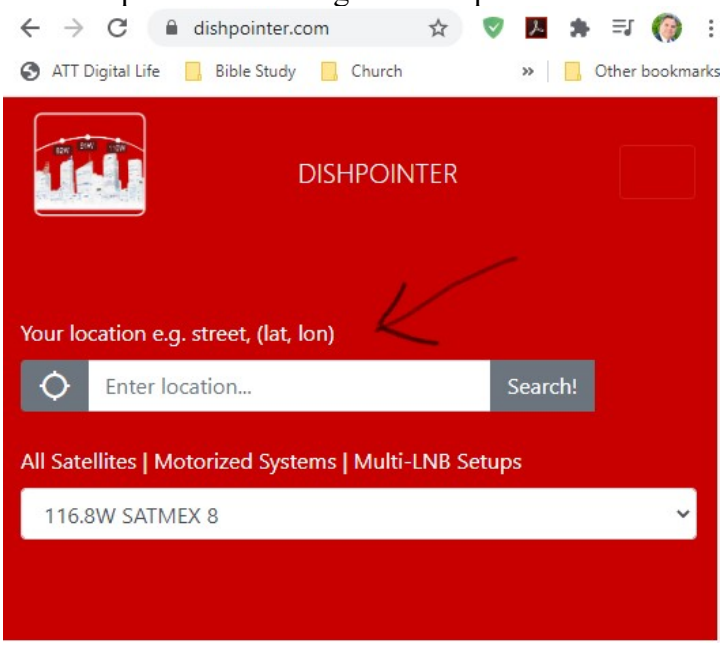


Figure 4-5 dishpointer.com selection of location

Enter Deployment address in search box

Now scroll down to select 116.8W SATMEX 8 [BE SURE TO SCROLL ALL THE WAY To “WEST”]
Now click search
You will get something like this

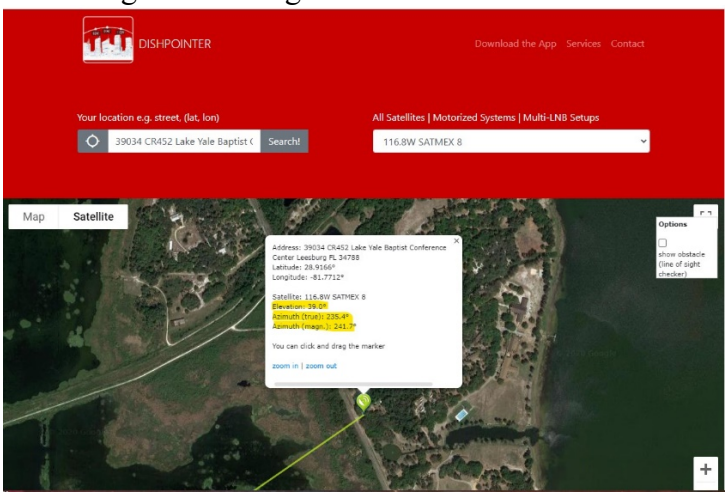


Figure 4-6 dishpointer.com delivery of aiming data

The information that is highlighted in yellow is the info you need to manually point the dish antenna

Shut down Satellite system

To stow antenna, first press the RUN button to get STOP illuminated, and then push and hold the minus button in lower right corner. Verify the antenna is stowing and visually look at antenna for stowing.

Figure 4-7 – the minus button used to begin the stowing process.

f. HF antenna
g. HF station
h. VHF/UHF station
I. Repeater

f. HF Amateur Radio Antenna Deployment.

Multiple types of antennas can be utilized for the HF amateur station, including but not limited to:

MPAS vertical antenna (easy to set up quickly, but significantly lower signal levels typically than the horizontal antenna options)
Horizontal or sloping end-fed resonant wire (typically 135-145 feet long) fed with 49:1 Balun. There are two of these systems on the trailer, one commercial with easy-to-handle wire; the other homebrew with standard white household wire and a Balun in a blue electrical box. The commercial antenna will

usually be easier to work with. A high perch for the far end of the antenna can be arranged by either a supported pole, or a line placed in a tree with any number of slingshot/tossing systems.
Horizontal, vertical or sloping non-resonant antenna fed with high impedance low loss window line (not currently provided in the trailer)

Caveats:

- Be certain that connections are good; we have had difficulties with loose PL-259'.
- Be certain that you understand whether the HF antenna is positioned in ANT 1 or ANT2 output of the MFJ antenna tuner.
- The MFJ currently is not set to utilize direct control from the 7300. Therefore providing a solid signal with which to auto-tune is useful. This may be done any of several ways.

    - Morse code key held down for the appropriate time
    - Pactor: FSK level test will generally allow the tuner to tune
    - VARA – in the soundcard "setup" there is a TUNE button The level test in WINLINK does not work on this mode
    - ARDOP – Level Test within Winlink
    - JS8/FT8 – "tune" option
    - FLDGI – "tune option"

g. ICOM 7300 Amateur Radio Station

ICOM 7300 WINLINK SETTINGS

The ICOM 7300 is an exciting new transceiver that brings fully digital transceivers to the general amateur radio market. Packed with capabilities, getting it configured for disaster ministry communications, including both voice and data can take a bit of work. This Appendix discusses the settings that seemed to work well for the ICOM 7300 in the Florida Baptist Disaster Relief Comms Trailer.

Best to understand the different ways the ICOM 7300 can accept signals to be transmitted:

Input	**Signal Type / Examples**
Front panel microphone connector	Voice over the microphone -- electret mic element generates low-level (millivolt) analog audio frequency electrical signals from speech. Be aware of a DC bias here to power the microphone. (If necessary, analog signals from a TNC or external sound card could be injected here)
Rear Panel accessory connector	"Line Level" (100 mV) analog audio frequency electrical signals frm a TNC or external sound card can

	be injected here -- and here is where we inject the signal from the Pactor Modem
USB (Universal Serial Bus)	The USB connection on the ICOM 7300 accepts digital data (1's and 0's) to give the 7300's **internal soundcard** the information needed to synthesize the proper audio signals for the digital mode desired. (The USB connection also allow setting the band and frequency and other settings.) This is how WINMOR, ARDOP & VARA are utilized by WINLINK -- and also how one can make PSK31, FT8, or any other "soundcard" type signal.

Just to be clear, this table shows how each type signal for transmission is connected:

TECHNIQUE	**PHYSICAL INPUT**
Single Sideband Voice Transmissions	Microphone, connected to front panel mic input -- with transceiver in "SSB" mode (using whichever sideband is desired for the band)
PACTOR digital transmissions	**Rear Panel Accessory socket** -- with transceiver in "SSB" mode (using upper sideband)
All "soundcard" modes including both connected modes (ARDOP, WINMOR) and broadcast modes (PSK31, FT8, MT63, Olivia, etc)	**USB (Universal Serial Bus) digital signals from the computer** -- with transceiver in "SSB - Digital" mode

Because both the PACTOR digital and normal voice single sideband transmissions use the same ("SSB") mode -- the ICOM 7300 is configured to automatically accept analog input from either the front panel mic caonnector OR the rear panel accessory connector -- so if you are sending PACTOR and have talking noise in the room, it may be picked up by the microphone and go out along with the PACTOR transmissions (in the CW/DATA section of the band!) -- so an important suggestion:

PHYSICALLY REMOVE THE MICROPHONE TEMPORARILY WHILE CONDUCTING PACTOR DIGITAL COMMUNICATIONS WITH THE FLORIDA BAPTIST DISASTER RELIEF ICOM 7300 TO AVOID ACCIDENTAL MICROPHONE TRANSMISSIONS

Getting the right gain/volume and other settings for the incredibly-configurable ICOM 7300 external inputs, turns out to be rather important! Before these adjustments, I was unable to get things to work out well at all for PACTOR. The solutions were found in a helpful post by Demetre Valaris SV1UY

here: https://groups.io/g/pactor/topic/scs_pactor_config_with/14354355?p=,,,20,0,0,0::recentpostdate%2Fsticky,,,20,2,0,14354355.

Settings entered into the ICOM 7300 via its "MENU" and "SET" configuration menus:

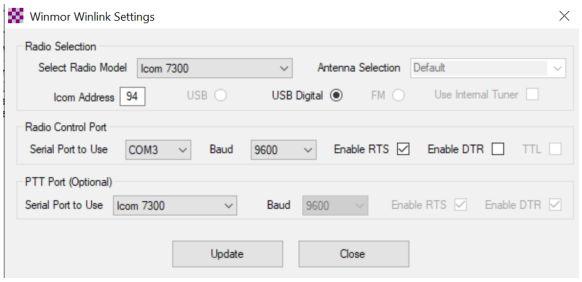
ACC/USB AF Output Level	50%
ACC MOD Level	15%
USB MOD Level	50%
DATA OFF MOD	MIC, ACC
DATA MOD	Set to **USB** for all techniques[2] other than PACTOR: **ACC**.

It is important to have adequate filter bandwidth for both the PACTOR (using SSB) and for the soundcard modes (which are set to use USB-D) -- do not change FIL1 (FILTER ONE) to anything narrower than 2400 Hz. Adjusting that filter setting takes a bit of getting used to, and recommendation is not to adjust further if it is set properly.

WINLINK WINMOR / ARDOP / VARA "**RADIO SETUP**"

Note: Radio control port baud 19200 may also work.

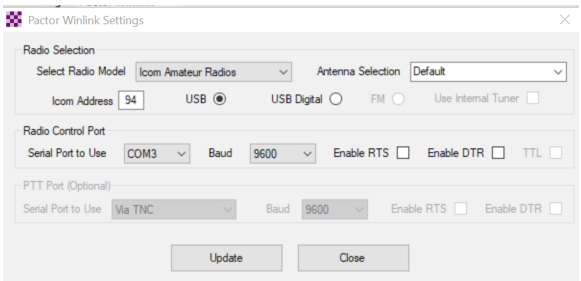
(ARDOP is similar) **Note that USB Digital is selected**. This allows the computer to control to send and receive via the USB (universal serial bus) connection.



WINLINK PACTOR "**RADIO SETUP**"

Two different Radio setups appear to work.
The first is Radio Model: "Icom Amateur Radios" with Icom address 94, and USB or USB-D selected;

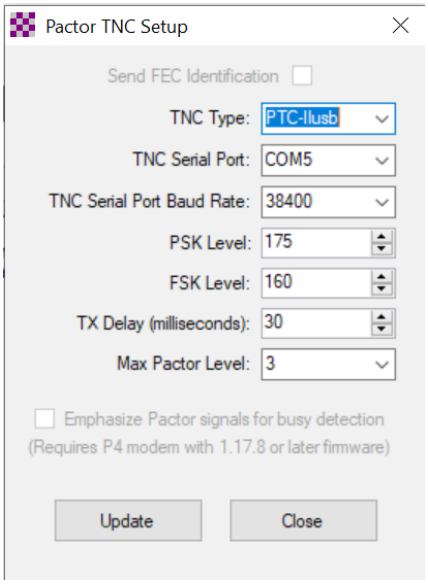
The second is Radio Model: "Icom 7300" with USB-D selected.



2 Tested for FT8 (set FT8 attenuator mid-scale) JS8, ARDOP, VARA. For JS8 File |Settings | Radio: PTT CAT; Data/Pkt; "Fake It" Split.

For proper linear (non-distorted) operation of the transmitter, the gain settings for the audio signals to be transmitted should be adjusted so that the signals don't cross into the "red" portion of the Power Output scale (or little to no ALC action if this is monitored). This has been preset for the WINMOR/ARDOP USB-Digital. For the PACTOR, the transmission levels of the individual Pactor modem are set as shown in the following figure:

WINLINK PACTOR TNC SETTINGS:



Note: The PSK Level / FSK Level may need to adjust; at Alachua County EOC 200 gives the correct output signal. This depends somewhat on the physical makeup of a mixer network in the cabling if so installed. Current settings in the PCC trailer are PSK level 200 and FSK level 200.

BLUETOOTH comms to the PACTOR

Computer must Bluetooth "PAIR" with the PACTOR modem. Bluetooth is used to control the PACTOR modem. Windows "SETTINGS" and Bluetooth dialog boxes will allow the pairing – the PIN for the FBDR pactor modem is

174A502D

and this is written on the top of the modem.

The proper com port for the Bluetooth connection from the PACTOR modem could possibly change and requires a bit of experimentation and examination of the WINDOWS SETTINGS "Device Manager" Com-Ports displays to figure out. Bluetooth connections from Pactor Modems always TWO sequential com ports. The one to select in the WINLINK tnc setup is the higher, or ODD number. Leave the TX Delay at 30 milliseconds, and for USA operation, the max pactor level is 3. The Serial port Baud Rate must be set to 38400 (the rate the Pactor Modem prefers)

h. VHF/UHF Transceiver

The FT7800R is a standard FM dual-band radio; at present it is connected to an antenna on the driver side mast.

I. Business Band Repeater

- Verify that the repeater is connected to a suitable antenna. Currently it is connected to a 440-470 MHz 4.5 dBd gain antenna at the top of the passenger side mast.
- turn on the power supply, bottom right of the passenger-side rack.

- Depress the ENABLE button to turn on the green repeater enabled light..
- Test operation of the repeater with a hand held transceiver

Radio	**Receives On**	**Transmits**	**PL tone**
USER	464.975 MHz	+ 5 MHz	Must transmit 203.5 tone to be repeated
REPEATER	469.975 MHz	464.975 MHz	

APPENDIX

Trailer Volunteer Maintenance Check Off List

Date	Equipment Checks / Activities
_____	❑ Diesel Generator checked _____ ❑ Satellite System Actvated/Tested:_____ _____ ❑ VHF/UHF Radio Checked Comment _____ ❑ Computer #1 Checked Comment _____ Software updated: ❑Windows ❑WINLINK ❑Prop. Tables ❑ Computer #2 Checked Comment _____ Software updated: ❑Windows ❑WINLINK ❑Propagation Tables ❑ HF Radio 7300 Checked Comment _____ ❑ HF Antenna Tested (cite type) _____ _____ ❑ WINLINK Connections made:_____ ❑ Voice nets _____ ❑ UHF Repeater tested _____ ❑ UHF business band radios charged/tested _____ _____ ❑ Driver side 12V Battery resting voltage: _____ ❑ charged ❑ Pass. side 12V Battery resting voltage: _____ ❑ charged ❑ Other _____ _____ Total Time _____ Hours (List all participants) Signature / Date: _____ _____
_____	❑ Diesel Generator checked _____ ❑ Satellite System Actvated/Tested:_____ _____ ❑ VHF/UHF Radio Checked Comment _____ ❑ Computer #1 Checked Comment _____ Software updated: ❑Windows ❑WINLINK ❑Prop. Tables ❑ Computer #2 Checked Comment _____ Software updated: ❑Windows ❑WINLINK ❑Propagation Tables ❑ HF Radio 7300 Checked Comment _____ ❑ HF Antenna Tested (cite type) _____ _____ ❑ WINLINK Connections made:_____ ❑ Voice nets _____ ❑ UHF Repeater tested _____ ❑ UHF business band radios charged/tested _____ _____ ❑ Other _____ ❑ Driver side 12V Battery resting voltage: _____ ❑ charged ❑ Pass. side 12V Battery resting voltage: _____ ❑ charged _____ Total Time _____ Hours (List all participants) Signature / Date: _____ _____