



NEWSCASTER VT2

ENG/OB Microwave Transmitter



User Manual

M17-0002-00A (rev 1.0)
(software version D3.xx)

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- RA number.
- Model number.
- Serial number.
- Frequency operating range (*in the case of modules*).
- A detailed description of the problem.
- Name of an engineer or technician we may contact in regards to this problem.
- Include a “ship to” and “bill to” address.

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Nucomm, Inc.
101 Bilby Road
Hackettstown, New Jersey 07840

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Troubleshooting to the component level is often not cost-effective and frequently impossible. Often the practical method of effecting field repairs is to substitute known good spare modules for suspect units. Nucomm maintains an inventory of replacement modules for its complete line of products.

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Nucomm products are designed with easy access to components to facilitate service. When troubleshooting the VT2 Transmitter, the user is cautioned to read all module descriptions in this manual. Some Nucomm modules cannot be serviced in the field. Warnings are included in the circuit descriptions and on certain modules themselves, however the lack of a warning cannot be construed as a statement of safety. To prevent voiding of the Nucomm warranty that protects the equipment, please contact Nucomm before servicing or making any repairs.

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Do not return any Nucomm product to the factory until a return authorization (RA) number has been given, along with shipping instructions, as discussed previously.

Contact Information

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101 Bilby Road
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For 24-hour emergency service, our Customer Service Manager can be contacted by pager at (908) 515-3709.

CAUTION!

RISK OF ELECTRICAL SHOCK. DO NOT REMOVE COVERS.

- Do not remove any covers.
- Refer servicing to qualified technicians only.
- Disconnect all power before servicing.
- Read and perform all instructions carefully. Failure to follow suggested instructions and guidelines may void all warranties.



FCC STATEMENT

This equipment has been tested and found to comply with Part 74.637 (a) (2) of the FCC Rules and Regulations. Any unauthorized changes or modifications not expressly approved by Nucomm, Inc. could void the user's authority to operate the equipment, and invalidate the equipment's warranty.

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Document Revision

Date Modified	Revision	Modified by	Modification Detail
October 25, 2004	0.0	J Payne/M Hardy	Preliminary Release
March 11, 2005	0.1	M Hardy	Additional formatting.
June 3, 2005	0.2	R Risch	Additional text, graphics and formatting.
November 3, 2005	0.3	M Hardy	Additional Nycoil and related information, as well as figure numbering, references, Menu Tree, and Frequency Stability.
April 6, 2006	1.0	M Hardy	Additional text, graphics and formatting. Added Menu Tree, BAS instructions and drawings.



1. DESCRIPTION

Nucomm's *NewsCaster VT2* series is a two box Digital and Analog ENG/OB Microwave Transmitter System. The Mast Mounted Microwave Transmitter is designed to operate in any specified band in the 1.00 to 15.5 GHz frequency range. Each unit is field programmable and configurable to meet a wide range of customer requirements.

The *NewsCaster VT2* is a "split-box" transmitter system utilizing a rack-mounted Control Unit (19" x 1RU, sometimes referred to as the "IDU"), and a Mast Mounted transmitter RF Head (or "ODU"). The two are connected with a single IF cable (RG-6 coax, or optional Triax), which carries the 70 MHz IF, Control Data, and DC power. For cases where an existing IF cable in the Nycoil must be used, and cannot support the diplexing of the DC power, the *NewsCaster VT2* can be fitted with an AUX Power output to send the power via separate conductors. (Refer to Table 8.)

The *NewsCaster VT2* is fully integrated with an Analog FM modulator, compliant super-low delay MPEG 2 Encoder and Multimode Digital Modulator. Available modulations include FM (*NTSC / PAL*), COFDM, *optional* single carrier QAM, and *optional* VSB. As additional digital modulation formats become available, the VT2 can easily be software updated. This makes the VT2 extremely flexible while greatly reducing circuit complexity.

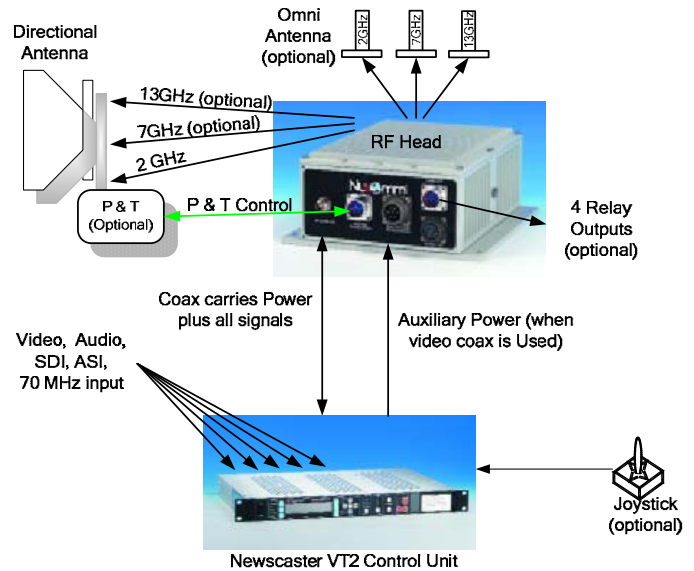


Figure 1: NewsCaster VT2 System Diagram

Highlighted features include six "Quick-Key" presets that allow single button operation, integrated dynamic color bars, and HD transport capability. Also, special menus have been included to ease the BAS relocation process.

Other available options for the *NewsCaster VT2* include Pan & Tilt control, a 10Watt Digital High Power Amplifier, remote control and monitoring functionality, multi-band operation, etc.

This manual is written in a general form to cover all configurations and options for the *NewsCaster VT2* within the 1.00 to 15.5 GHz frequency range.

The convention of this manual is to show non-standard configuration options with shaded text, as shown here.



2. FEATURES

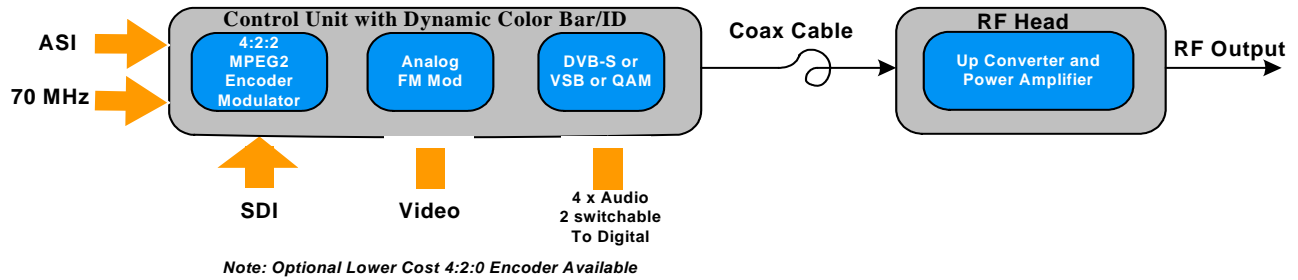


Figure 2: NewsCaster VT2, Simple Block Diagram

Nucomm's *NewsCaster VT2* Series Digital-Analog ENG/OB microwave transmitter was designed with the 2GHz BAS Relocation in mind, and is optimized for ENG/OB truck applications. Nucomm has led the way in creating the most comprehensive ENG/OB transmitter available, with many state-of-the-art features not found in any of the other competing models.

Control Unit Features:

Fully integrated features of the Control Unit (as shown in Figure 3) include:

- Smart LCD Display for system control
- Six Quick-Key presets that allow single button configuration.
- Integrated dynamic color bars.
- Super low delay MPEG-2 using a 4:2:2 or 4:2:0 encoder.
- Multi-Mode modulator that includes COFDM, Analog FM and optional VSB, DVB-S or QAM modulation
- High data rate HD transport.
- Special menus to ease the BAS relocation process.
- Antenna polarization selection, CW, CCW, H, V.
- Omni/Directional antenna selection (Optional).
- Control of four Form C relay closures in the RF Head (Optional).
- Integrated Pan / Tilt Control (Optional)
- Joystick for Pan / Tilt (Optional)

Digital & Analog Input Signals:

The NEWSCASTER VT2 Control Unit accepts multiple input formats. These include:

- Composite video (NTSC & PAL).
- Digital video as SDI, with audio de-embedding.
- ASI.
- Two analog audio (optionally four).
- One digital AES/EBU audio (optionally four).
- 70 MHz.

The audio's can be combined with the video via the MPEG-2 encoder or the FM sub-carriers. A key feature of the *NewsCaster VT2* is that the SDI video can be converted internally to composite video and transmitted as FM analog modulation. The Audio and Video signal flow is shown in Figure 3.

In Digital mode, the *NewsCaster VT2* accepts video as SDI, ASI, or Composite, along with LINE, Embedded, or AES audio(s), and digitally compresses the signals using 4:2:2 or 4:2:0 MPEG2 encoding. The encoded signal is then internally modulated with one of the user-selected formats: COFDM, or *optional* QAM or VSB. (Refer to Figure 3).

For additional flexibility, an ASI Out port is provided, enabling the *NewsCaster VT2* to be used as a standalone ASI Encoder

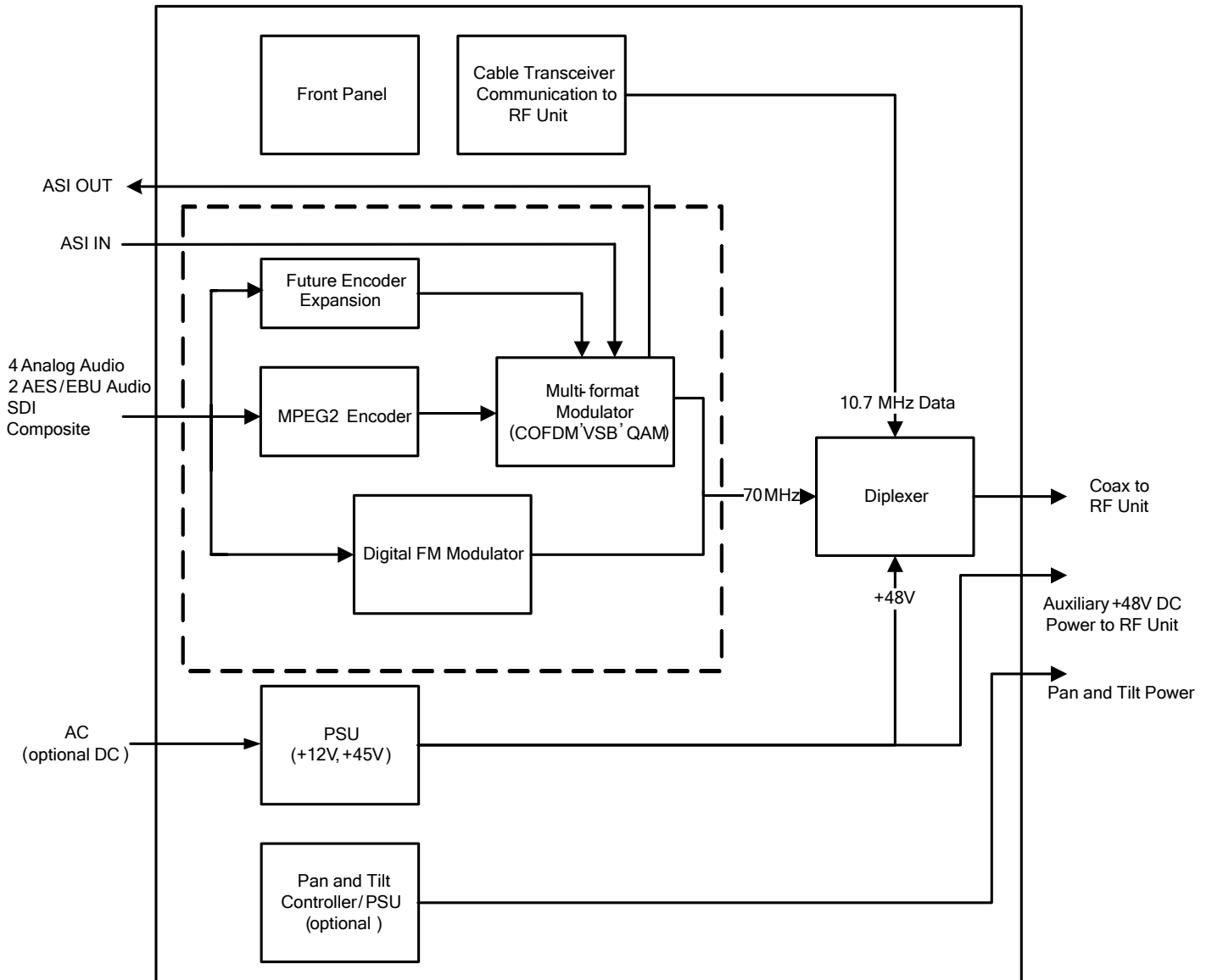


Figure 3: Control Unit Block Diagram

In Analog mode, the *NewsCaster VT2* accepts SDI or Composite video, and LINE, Embedded, or AES audio.

The *NewsCaster VT2* can also accept externally modulated signals via the 70 MHz Input Port.

Audio Sub-carriers:

The two standard, or *four optional*, synthesized audio sub-carriers are field programmable and feature individual source selection (OFF / LINE / TONE / AES) and gain control via the menu system or audio “Quick-Key”. The sub-carrier frequencies, mode, and additional gain are front panel adjustable using the menu system.

Prime Power:

The standard Control Unit input voltage is 90 to 240 volts AC (40 to 60 Hz). Optionally, the system can be configured for DC ranging from +11 to +32 VDC, or for both AC & DC operation in the ranges listed above. In all configurations, the system automatically adapts to the input voltage without requiring the user to change any jumpers, switches or settings. Appropriate line cords are provided.

Dynamic Color Bar Generator:

To activate the Dynamic Color Bar Generator, press the “TEST COL” button on the front panel of the Control Unit. The LED above the button will light. The color bar pattern is the SMPTE color bar standard. In the middle of the pattern is a 16 character ID that can be programmed through the LCD display. The first character in the ID will blink to indicate that the microwave link is active. In a digital system if the decoder stops decoding, the picture will freeze and the operator would have no way of knowing this. By causing one of the ID characters to blink, one can quickly tell that the link is operating properly. In addition to numbers and characters, several symbols are available for display in the ID. These symbols include a helicopter, a Van, a camera, etc.

When the Dynamic Color Bar Generator is activated, a 1 kHz test tone is inputted to the active audio channels. The left channel will be a CW tone. The right channel will be a pulsed tone.

Preset Keys:

Nucomm has designed six Preset Keys into the front panel of the NewsCaster VT2. These keys are used to instantly recall previously programmed configuration parameters such as frequency, modulation format, analog or digital, video and audio input type, etc. To program a Preset Key, first set the NewsCaster VT2 to the desired operating configuration. Then hold one of the six Preset Keys in until a confirmation message is displayed (roughly 10 seconds).

To recall the Preset, simply press appropriate key. The display will indicate the NewsCaster VT2 has been re-configured per the Preset.

Frequency Coverage:

Nucomm's *NewsCaster VT2* transmitters are available in single-, dual-, and tri-band configurations. This manual covers all the models in the NewsCaster VT2 series.

The *NewsCaster VT2* series radios provide full coverage of the 2, 7 & 13GHz US frequency bands, and/or other bands as required internationally, from 1 to 15.5 GHz. The US frequency bands are given in Table 1 through Table 5. Band and channel selections are made and clearly displayed via the front panel LCD interface.

Antenna Operation:

The NewsCaster VT2 can control a number of antenna functions, including:

- Polarization switching
- Directional-Omni antenna switching
- Selection between RWI or NSI Antennas

Coax Cable Requirements:

The NEWSCASTER VT2 Control Unit and RF Head are typically connected with a single Coax or Triax cable, which carries the 70MHz IF and the Control Data signals, and in a

typical system, the power to the RF Head, which is diplexed onto the center conductor of the cable for coax, or through the inner shield when Triax is used. The cable conductor must carry 2 to 3 amps of current at +48 volts. The center conductor of Belden 1694A/RG 6U coax (or equivalent), and the inner shield of the Belden 8232A/RG59U triax are large enough to carry this current with a minimum of voltage drop.

When using video cable such as RG 58, or Belden 1505/RG-59U, the voltage drop through the center conductor is too great to carry the diplexed +48volts. To support the use of these cables which may be existing in the Nycoil and must be used, Nucomm has provided an auxiliary power ("AUX Power") connector that routes the power to external wires. Refer to Section 4.7 for details.

The standard coax cable required between the Control Unit and the RF Head must have an impedance of 75 Ohms. The NewsCaster will on occasion, be used to replace systems that use 50 Ohm RF or video type coax cable in an existing Nycoil. On special request, Nucomm can configure the NewsCaster VT2 system to operate using these 50 Ohm cables. Again, depending on the type of coax cable used in the pre-existing Nycoil, the power to the RF Head may require the use of the AUX Power option.

RF Head Features:

The rugged *NewsCaster VT2* RF Head, as shown in Figure 4, includes:

- IF to RF Up-Converter
- RF Power Amplifier
- Low Noise Frequency Synthesizer
- Diplexer that splits the +48 volts, the 70 MHz and the Control Data.
- DC to DC Converter
- Optional Pan & Tilt Controller
- Optional Omni/Directional Antenna switch.

- Optional Four Form C Relay contacts controlled from the Control Unit.

The RF Head components are housed in a weatherproof enclosure that mounts on the antenna pan and tilt housing, replacing the conventional power amplifier. This setup combines precise tuning of the transmitter frequency with exceptional output power. The RF unit is equipped with type “N” connectors for the directional and *optional* omni-directional antenna(s).

Other Standard Features:

- Digitally synthesized microwave oscillator tuning.

- RS232/RS485 Remote.
- RF Power Output Adjustments.
- Field Programmable RF and ASC settings.

Other Options:

- Remote Control Software allowing the *NewsCaster VT2* to be fully monitored and controlled from an IBM Compatible PC through a RS232C/RS485 port.
- High Power Amplifier (*20 Watt Analog, 10 Watt Digital*).
- Mounting Adapter Plates enabling mounting of the RF Head and High Power Amplifier to the Pan and Tilt.

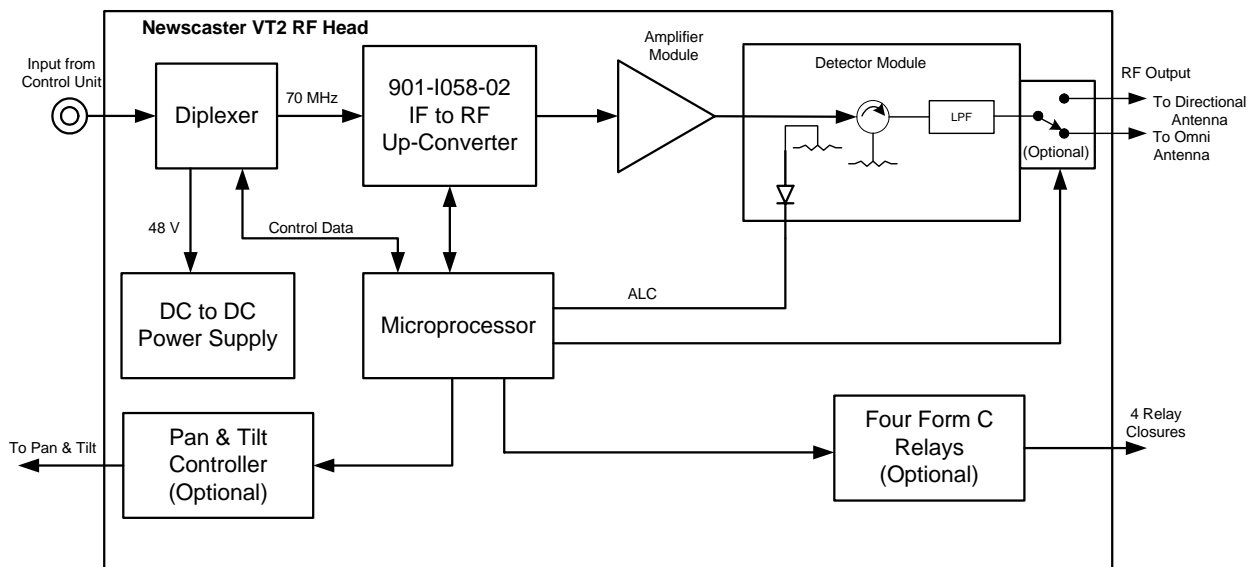


Figure 4: RF Head Block Diagram



3. SPECIFICATIONS AND FREQUENCY PLANS (USA)

RF PERFORMANCE

Frequency Bands (*Front panel selectable*)

Band 1:1.99 GHz – 2.50 GHz
 Band 1 (optional):2.30 GHz – 2.70 GHz
 Band 2:6.43 GHz – 7.12 GHz
 Band 3:12.706 GHz – 13.250 GHz
 (other plans available per user requirements)

Tuning step size:250 kHz (US), 100 kHz (International)
 70 MHz input:-10 to 0 dBm (*75 Ohms*)
 Frequency stability:+/- 5ppm (.0005%)

Power Output:

2 GHz band:

Standard:12W Analog; 4W Digital
 Optional:10W Digital**

6/7 GHz band:

Standard:5W Analog; 2W Digital
 Optional:10W Analog, 4 W Digital
 Optional:10W Digital**

Dual Band 2 + 7GHz:

Standard:2GHz: 12W Analog, 4W Digital
 Standard:7GHz: 5W Analog, 2.5W Digital
 Optional:10W Analog; 2.5W Digital;
 Optional:10W Digital**

13GHz Band

Standard:1W Analog, 0.25W Digital
 Optional:3W Analog, 1.75W Digital

**Analog adjustable to FCC maximum EIRP (*max amp power 25W*); A separate RF Head is required for the 10 Watt digital configuration.

Standby mode:

Standby:No RF output
 Normal:Instant on frequency transmission

NEWSCASTER VT2 Specifications (continued)**Modulation Modes*****COFDM***

Modulation Formats.....	COFDM; QPSK, 16QAM, 64 QAM
Code Rate:	1/2, 2/3 3/4, 5/6, 7/8
Guard Interval:	1/32, 1/16, 1/8, 1/4
Bandwidth:	6, 7 and 8 MHz

Analog

Analog FM:	2 field tunable sub-carriers (optional 4)
Modulation Deviation (field selectable):	3 MHz/volt or 4 MHz/volt

VSB

Modulation Formats.....	2VSB, 4VSB, 8VSB, 8TVSB
-------------------------	-------------------------

Video & Digital Input Performance:**Analog Video Mode:**

Video:.....	525/625 lines NTSC/PAL field selectable
1 V p-p for +/- 4 MHz deviation	
1 V p-p for +/- 3 MHz deviation	
<i>(Video input sensitivity switchable)</i>	
Pre-emphasis or Flat:	Field selectable
Pre-emphasis:	NTSC/PAL-B,G or M (field selectable)
Video Low-Pass-Filter (field selectable): ..	3.9, 4.5, 4.75, 5.0 and 6.0MHz
Frequency Response:	0.5 dB (10 Hz to video filter selected)
Base-Band Response:	1.0 dB (10 Hz to 10 MHz)
Signal-to-noise ratio:	69 dB typical (65 dB minimum)
Differential Phase:	+/- 1.0 degrees
Differential Gain:	+/- 1.0 %

Digital Video Mode:

Composite Video:	
1 V p-p Maximum input	
Frequency Response:	0.5 dB (10 Hz to 20 kHz)
Base-Band Response:	1.0 dB (10 Hz to 10 MHz)
Signal-to-noise ratio:.....	69 dB typical (65 dB minimum)
Differential Phase:	+/- 0.5 degrees
Differential Gain:	+/- 0.5 %
SDI and ASI.....	0.80 Volts p-p

Digital and Analog Modes:

Input impedance:	75 Ohms
Return loss:	-26 dB (10 Hz to 5 MHz)

NEWSCASTER VT2 Specifications (continued)**Audio Performance:****Analog Audio Mode**

Two channels:2 Analog, *or* 1 AES/EBU, SDI De-embedded
 Four optional4 Analog, *or* 2 AES/EBU, SDI De-embedded
 Sub-Carriers: selectable and field tunable from front panel; Tunable in 5 kHz steps 4.8 to 9.0 MHz

Digital Audio Mode

Two channels:2 Analog, *or* 1 AES/EBU, SDI De-embedded
 Four optional4 Analog, *or* 2 AES/EBU, SDI De-embedded
 Frequency Response:30 Hz to 20 kHz: 0.5 dB

Digital & Analog Audio Line Input:

US:+8 dBm, 600 Ohms for 75 kHz deviation
 International:+12 dBm, 600 Ohms for 100 kHz deviation
 Frequency Response:
 30 Hz to 10 kHz:0.5 dB
 10 kHz to 15 kHz:1.0 dB
 Signal-to-noise:
 Line audio:65 dB
 Deviation:75 kHz peak at 1 kHz (*100 kHz for PAL*)
 Pre-emphasis:75 μ s & 50 μ s LCD selectable

Harmonic distortion:

Line audio:0.5% maximum (*typically 0.2 %*)

Remote control:RS-232 / RS-485

Power Requirements:

Input range:100 to 260 VAC 50/60 Hz (*Optional DC: +11 to +32*)
 Power consumption:80 W typical (*12 watt version*)
 10 Watt all Digital.....120 Watts

Environmental:

Temperature range:
 Full specification (RF Head):-30° to +60°C
 Full specification (Control Unit):-10° to +50°C
 Storage:-40° to +80°C
 Humidity:0 to 95% non-condensing

Altitude:

Operating:20,000ft (*6,000 m*)
 Storage:50,000ft (*15,000 m*)

NEWSCASTER VT2 Specifications (continued)**Physical Characteristics:**

Size:

Control Unit:19" (48.26cm)W, 1.75" (4.45cm)H, 16" (40.64cm)D
 RF Head (Standard Power):9.5" (24.13cm)W, 5" (12.7cm)H, 15" (38.1cm)L
 RF Head (High Power):TBD

Weight:

Control Unit:6 lbs (2.72kg)
 RF Head (standard power):12 lbs (5.45kg)
 RF Head (High Power):TBD

Connectors:*Control Unit:*

Video / SDI / DVB-ASI / 70MHz:Type BNC-F
 Audio:Removable Screw Terminal Strip
 IF output to RF Head:TNC-F (*optional Triax*)
 Optional AUX Power out:Terminal Strip
 Remote Control (RS232 / RS485):9 Pin D, Female
 Remote Control (Ethernet):RJ-45
 Summary Alarm:.....Form C on Terminal Strip
 Pan / Tilt Power (to RF Head)8 Pin military style connector (see Sec 4 for cabling)

RF Head:

Optional AUX Power in:MIL-C-26482, 12 Pin
 RF Output:Type "N" female
 Polarization
 Pan / Tilt Power (from Control Unit).....12 Pin military style connector (see Sec 4 for cabling)
 Pan / Tilt Control (to Pan / Tilt).....17 Pin military style connector (see Sec 4 for cabling)

3.1 FREQUENCY PLANS (USA)

The standard US frequency plans apply to all units sold into markets covered by the FCC. Frequency plans for all systems sold into non-US markets are individualized to meet specific customer requirements and licensing restrictions, as specified at the time of purchase.

CHANNEL / FREQUENCY PLAN - CHART NO: 326		
2 GHz (17 MHz)		
(Frequency Range 1,994 MHz – 2,497 MHz)		
Channel	Offset	Receive Frequency MHz
1	–	1,994.75
1	0	1,999.00
1	+	2,003.75
2	–	2,012.25
2	0	2,016.50
2	+	2,020.75
3	–	2,029.25
3	0	2,033.50
3	+	2,037.75
4	–	2,046.25
4	0	2,050.50
4	+	2,054.75
5	–	2,063.25
5	0	2,067.50
5	+	2,071.75
6	–	2,080.25
6	0	2,084.50
6	+	2,088.75
7	–	2,097.25
7	0	2,101.50
7	+	2,105.75
8	–	2,454.25
8	0	2,458.50
8	+	2,462.75
9	–	2,471.25
9	0	2,475.50
9	+	2,479.75
10	–	2,488.25
10	0	2,492.50
10	+	2,496.75m

Table 1: Frequency Plan (US), 2GHz 17MHz

CHANNEL / FREQUENCY PLAN - CHART NO: 326		
2 GHz (12 MHz)		
(Frequency Range 2,025 MHz – 2,496 MHz)		
Channel	Offset	Receive Frequency MHz
1	-	2,028.50
1	0	2,031.50
1	+	2,034.50
2	-	2,040.50
2	0	2,043.50
2	+	2,046.50
3	-	2,052.50
3	0	2,055.50
3	+	2,058.50
4	-	2,064.50
4	0	2,067.50
4	+	2,070.50
5	-	2,076.50
5	0	2,079.50
5	+	2,082.50
6	-	2,088.50
6	0	2,091.50
6	+	2,094.50
7	-	2,100.50
7	0	2,103.50
7	+	2,106.50
8	-	2,454.25
8	0	2,458.50
8	+	2,462.75
9	-	2,471.25
9	0	2,475.50
9	+	2,479.75
10	-	2,488.25
10	0	2,492.50
10	+	2,496.75

Table 2: Frequency Plan (US), 2GHz 12MHz

CHANNEL / FREQUENCY PLAN - CHART NO: 326 (Frequency Range 6,431 MHz – 7,119 MHz)		
Channel	Offset	Receive Frequency MHz
1	–	6,881.25
1	0	6,887.50
1	+	6,893.75
2	–	6,906.25
2	0	6,912.50
2	+	6,918.75
3	–	6,931.25
3	0	6,937.50
3	+	6,943.75
4	–	6,956.25
4	0	6,962.50
4	+	6,993.75
5	–	6,981.25
5	0	6,987.50
5	+	6,993.75
6	–	7,006.25
6	0	7,012.50
6	+	7,018.75
7	–	7,031.25
7	0	7,037.50
7	+	7,043.75
8	–	7,056.25
8	0	7,062.50
8	+	7,068.75
9	–	7,081.25
9	0	7,087.50
9	+	7,093.75
10	–	7,106.25
10	0	7,112.50
10	+	7,118.75
11	–	6,431.25
11	0	6,437.50
11	+	6,443.75
12	–	6,456.25
12	0	6,462.50
12	+	6,468.75
13	–	6,481.25
13	0	6,487.50
13	+	6,493.75
14	–	6,506.25
14	0	6,512.50
14	+	6,518.75

Table 3: Frequency Plan (US), 7GHz

CHANNEL / FREQUENCY PLAN - CHART NO: 10 (Frequency Range 12,706MHz - 12,950MHz)		
Channel	Offset	Receive Frequency MHz
1	-	12,706.25
1	0	12,712.50
1	+	12,718.75
1	++	12,725.00
2	-	12,731.25
2	0	12,737.50
2	+	12,743.75
2	++	12,750.00
3	-	12,756.25
3	0	12,762.50
3	+	12,768.75
3	++	12,775.00
4	-	12,781.25
4	0	12,787.50
4	+	12,793.75
4	++	12,800.00
5	-	12,806.25
5	0	12,812.50
5	+	12,818.75
5	++	12,825.00
6	-	12,831.25
6	0	12,837.50
6	+	12,843.75
6	++	12,850.00
7	-	12,856.25
7	0	12,862.50
7	+	12,868.75
7	++	12,875.00
8	-	12,881.25
8	0	12,887.50
8	+	12,893.75
8	++	12,900.00
9	-	12,906.25
9	0	12,912.50
9	+	12,918.75
9	++	12,925.00
10	-	12,931.25
10	0	12,937.50
10	+	12,943.75
10	++	12,950.00

Table 4: Frequency Plan (US), 12GHz

CHANNEL / FREQUENCY PAN - CHART NO: 10 (Frequency Range 12,976MHz - 13,250MHz)		
Channel	Offset	Receive Frequency MHz
1	-	12,956.25
1	0	12,962.50
1	+	12,968.75
1	++	12,975.00
2	-	12,981.25
2	0	12,987.50
2	+	12,993.75
2	++	13,000.00
3	-	13,006.25
3	0	13,012.50
3	+	13,018.75
3	++	13,025.00
4	-	13,031.25
4	0	13,037.50
4	+	13,043.75
4	++	13,050.00
5	-	13,056.25
5	0	13,062.50
5	+	13,068.75
5	++	13,075.00
6	-	13,081.25
6	0	13,087.50
6	+	13,093.75
6	++	13,100.00
7	-	13,106.25
7	0	13,112.50
7	+	13,118.75
7	++	13,125.00
8	-	13,131.25
8	0	13,137.50
8	+	13,143.75
8	++	13,150.00
9	-	13,156.25
9	0	13,162.50
9	+	13,168.75
9	++	13,175.00
10	-	13,181.25
10	0	13,187.50
10	+	13,193.75
10	++	13,200.00
11	-	13,206.25
11	0	13,212.50
11	+	13,218.75
11	++	13,225.00
12	-	13,231.25
12	0	13,237.50
12	+	13,243.75
12	++	13,250.00

Table 5: Frequency Plan (US), 13GHz



4. INSTALLATION

4.1 UNPACKING & INSPECTION

Unpack the *NewsCaster VT2* and visually inspect for possible damage to the LCD, connectors, and surface areas. If damage is found, a claim should be filed with the transportation carrier. Save the shipping container and packing material for re-shipment, as needed.

4.2 PRE-INSTALLATION CHECKOUT

Connect the *NewsCaster VT2* IF output to the RF Head via an appropriate IF cable (refer to Table 7.) Connect the RF output of the RF Head through a 30-watt, 30-dB attenuator to a spectrum analyzer and observe the output frequency on the analyzer display. Note that the frequency and level correspond directly to the LCD display on the front panel of the VT2.

4.3 CABLES AND CONNECTORS

Detailed drawings and pinouts of the *NewsCaster VT2* cables and connectors are shown throughout this section. Please contact Nucomm Customer Service if additional detail is required.

4.4 CONTROL UNIT MECHANICAL INSTALLATION

The *NewsCaster VT2* Control Unit is shipped pre-assembled. Mount the Control Unit in a standard 1RU E.I.A. rack space, using all 4 rack screws.

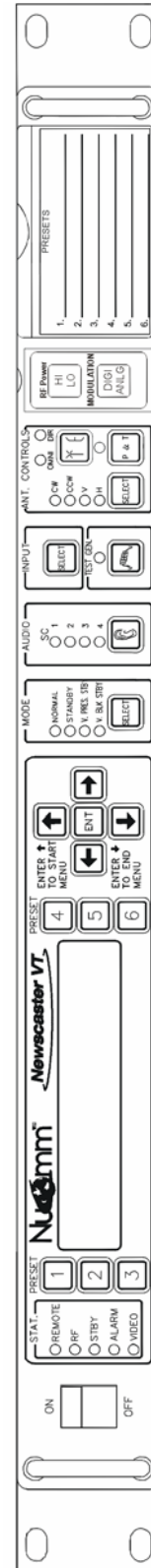
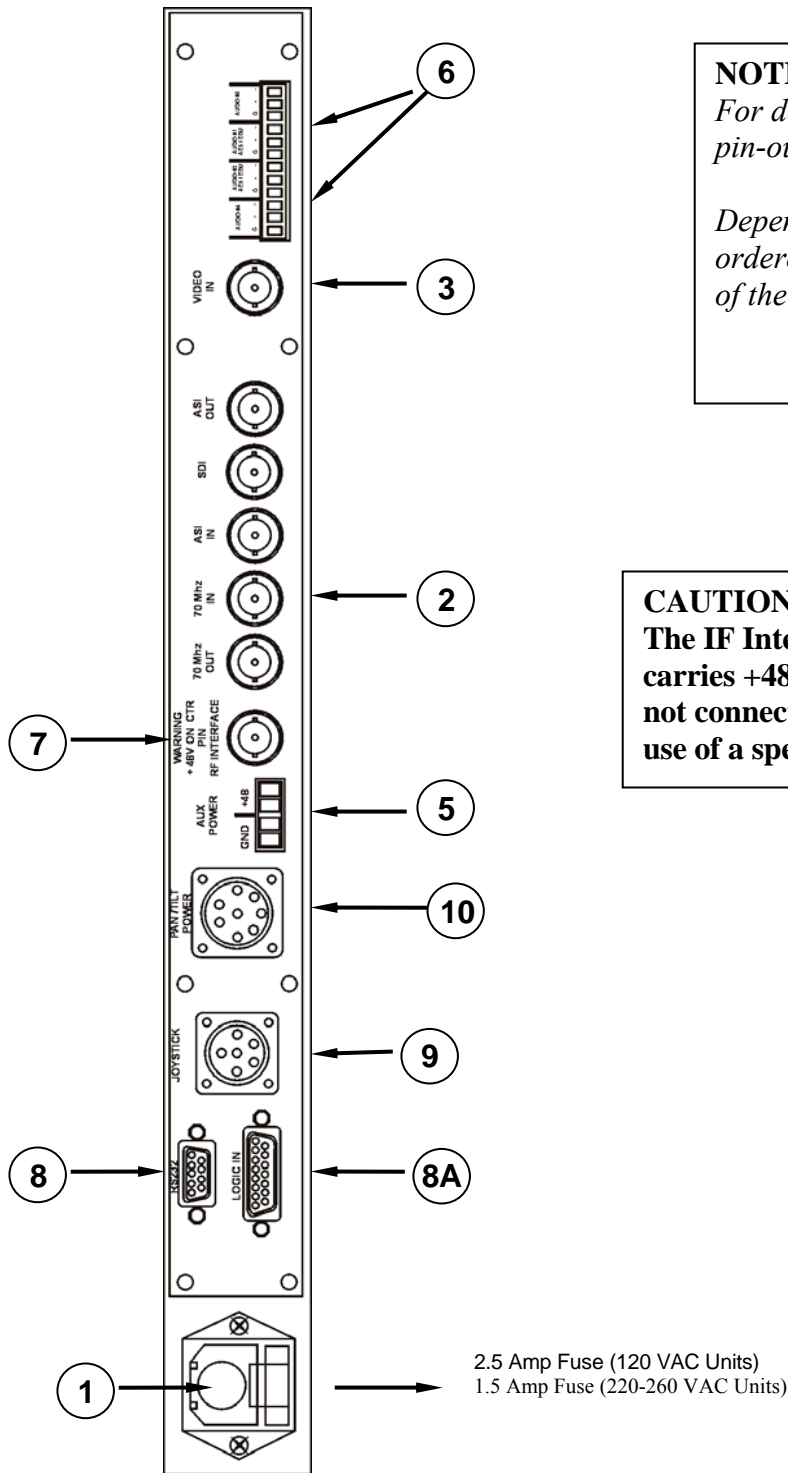


Figure 5: Control Unit Front Panel



NOTE:
 For detailed views of connectors and pin-outs, refer to Figures 10 thru 14.
 Depending on the configuration ordered, some units may not feature all of the connectors pictured here.

CAUTION – IF INTERFACE (7)
 The IF Interface center conductor carries +48V to power the RF Head. Do not connect any instruments without use of a special test cable.

Figure 6: Control Unit Rear Panel (AC model)

4.5 CONTROL UNIT ELECTRICAL INSTALLATION

Input Power

AC Power: The *NewsCaster VT2* is standard configured to operate on AC power ranging from 90 to 260 VAC at 40 to 60 Hz. Connect the provided AC line cord to an appropriate AC power source. (Refer to Figure 6, Detail 1.) Alternate line cord connector types are available from Nucomm if needed.

DC Power: When configured for DC, the system can operate on DC power ranging from +11 to +32 VDC. Connect the provided DC line cord between the lugs on the back of the unit to an appropriate DC power source. (-) for GND, and (+) for the +11 to +32VDC.

In all configurations, the system automatically adapts to the input voltage without requiring the user to change any jumpers, switches or settings.

Video

All video inputs/outputs are made via clearly marked 75 Ω BNC connectors. (Refer to Figure 6, Detail 3 and Detail 4.) Simply connect a 75 Ω coaxial cable between the source and target equipment, and select the appropriate input type via the front panel interface. Refer to Section 5 for details.

Available video inputs and outputs are:

- **SDI (input)**
- **ASI IN**
- **ASI OUT** (from the internal encoder)
- **Video (Input)** – For use with Composite and Baseband Video.

70 MHz Connectors

70 MHz input and output ports (75Ω BNC) are provided.

The 70 MHz input port allows an externally modulated signal to be inputted to the system for RF transmission. To utilize this feature, “External 70MHz” must be selected as an input via the front panel interface. Refer to Section 5 for details.

The 70 MHz output port can be connected to a spectrum analyzer for monitoring, or to an external transmitter. (see Figure 6, Detail 2).

Note: When “External 70 MHz” input is selected, the 70 MHz out is a loophrough only.

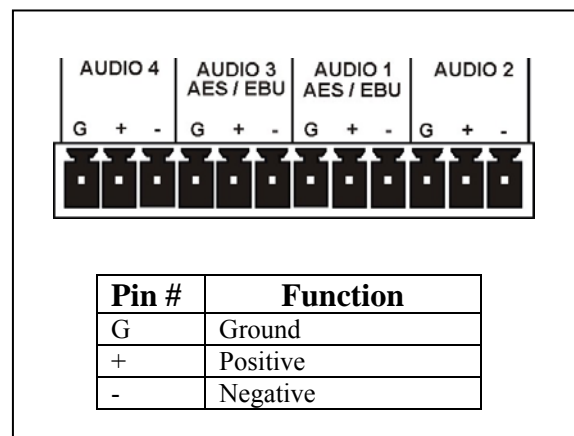


Figure 7: Control Unit, Audio Connector

Audio

The Analog and Digital audio inputs are made via a strip terminal on the rear panel. (Refer to Figure 6, Detail 6 for connector location.) The terminal marked "G" is for the ground lead, (-) is for the negative signal and (+) is for the positive. (Refer to Figure 7 for the connector detail.)

The Digital AES/EBU inputs are made via the Audio 1 & Audio 3 terminals. As such, only one Digital audio is available in the standard “two audio” configuration.

IF Interface and AUX Power

When the IF Cable is suitable, a single TNC (or optional Triax) connector (Figure 6, Detail 7) is used to output the three signals that must pass between the Control Unit and the RF Head:

- (a) the modulated 70 MHz signal
- (b) the inter-unit control data
- (c) the +48VDC for the RF Head.

For cases when an existing non-conforming IF cable that cannot handle +48VDC must be used, the AUX Power option must be fitted and will provide the +48V on a separate connector (Figure 6, Detail 5) for transport to the RF Head via dedicated conductors.

Table 7 lists conforming cables and details the various configurations possible with and without the AUX Power option.

NOTE: When AUX Power is configured, the +48v still remains available at the IF Interface port. This allows the user to upgrade to a conforming IF cable without requiring any changes to the unit.

Additional detailed information on the interconnection between the Control Unit and RF Head is found in Sections 4.7 through 4.9.

Remote

The remote control port (Figure 6, Detail 8) allows for full control and monitoring of the NewsCaster VT2. Both RS232 and RS485 are supported. Refer to Section 5.3.2 for settings. Refer to Figure 8 for pin-out.

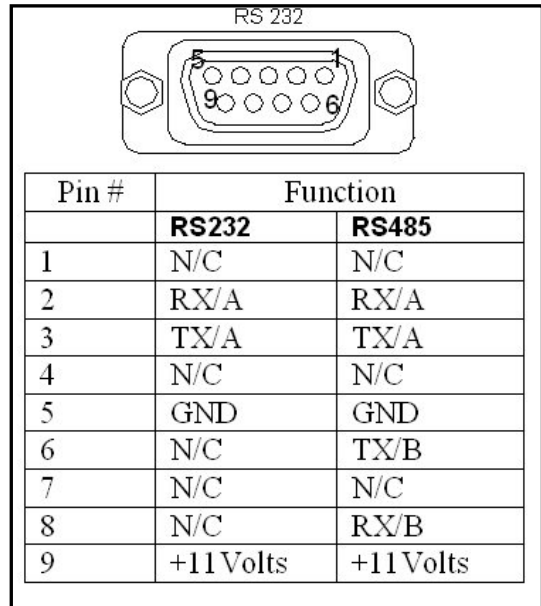


Figure 8: Control Unit, RS-232 Connector

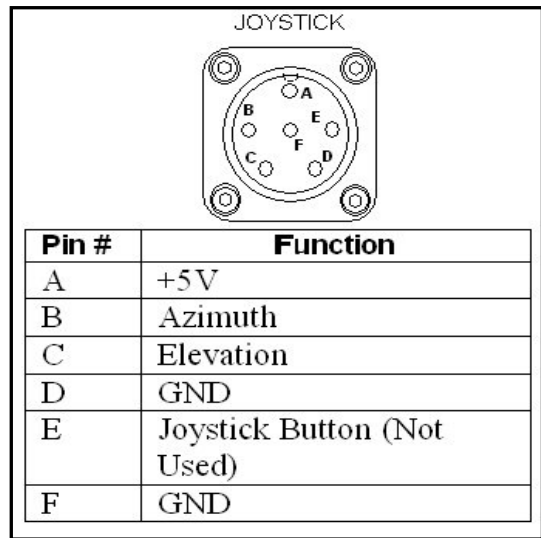


Figure 9: Control Unit, Joystick Connector

Joystick

This optional 6-pin connector (Figure 6, Detail 9) connects the optional joystick for Pan & Tilt Motor control. (Refer to Figure 9 for a detailed view and the pin-outs.)

Pan/Tilt Pwr

This *optional* connector is used to provide power to the Pan & Tilt Motor. See Figure 6, Detail 10 for connector location on the Control Unit. Detailed cabling info for 120VAC Pan & Tilt systems can be found in Table 10 and Figure 15. Detailed cabling info for 12VDC Pan & Tilt systems is found in Table 11 and Figure 16.

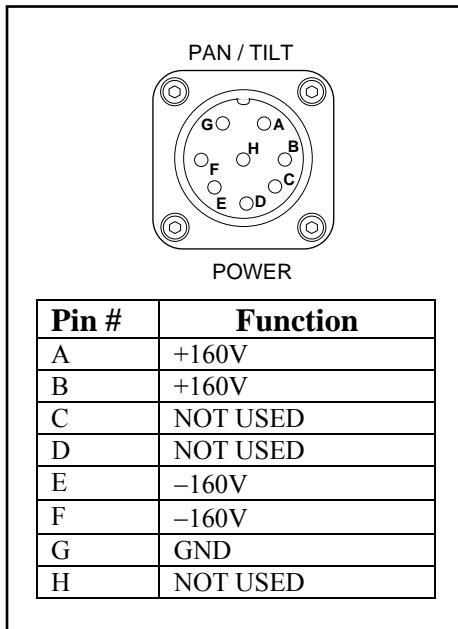


Figure 10: Control Unit, 160v Pan/Tilt Pwr Connector

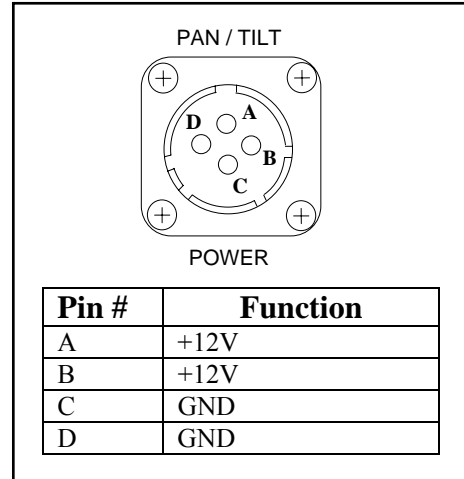


Figure 11: Control Unit, 12v Pan/Tilt Pwr Connector

4.6 RF HEAD MECHANICAL INSTALL

Nucomm’s mast mounted transmitter consists of a single RF head (*containing the up-converter, P&T, PSU, Antenna Controls, and amplifier*). There is also a legacy “extended power output” option which consisted of two mast mounted units, the RF Head (*containing the up-converter, P&T, PSU and Antenna Controls*) and the High Power Amplifier (or HPA). The legacy system is no longer manufactured.

In a typical installation of Nucomm's NewsCaster VT2, the RF Head (and HPA if configured) are mounted on the Pan & Tilt mechanism, which is attached to a pneumatic

mast atop an ENG/OB van. (See Figure 12 for a typical mounting setup.)

To ease the mounting of the RF Head (and legacy HPA if configured) to the Pan & Tilt, mounting adapter plates are available. The plate is first mounted to the Pan & Tilt with (4) 1/4-20x.750" flat head screws, then the RF Head (and legacy HPA if configured) are mounted to the adapter plate(s). For cases when the mounting adapter plate is not used, the hole pattern of the RF Head (and legacy HPA) base plate has been provided (See Figure 28).

Note: The RF Head(s) should be mounted so that the heat sink fins are vertical during operation.

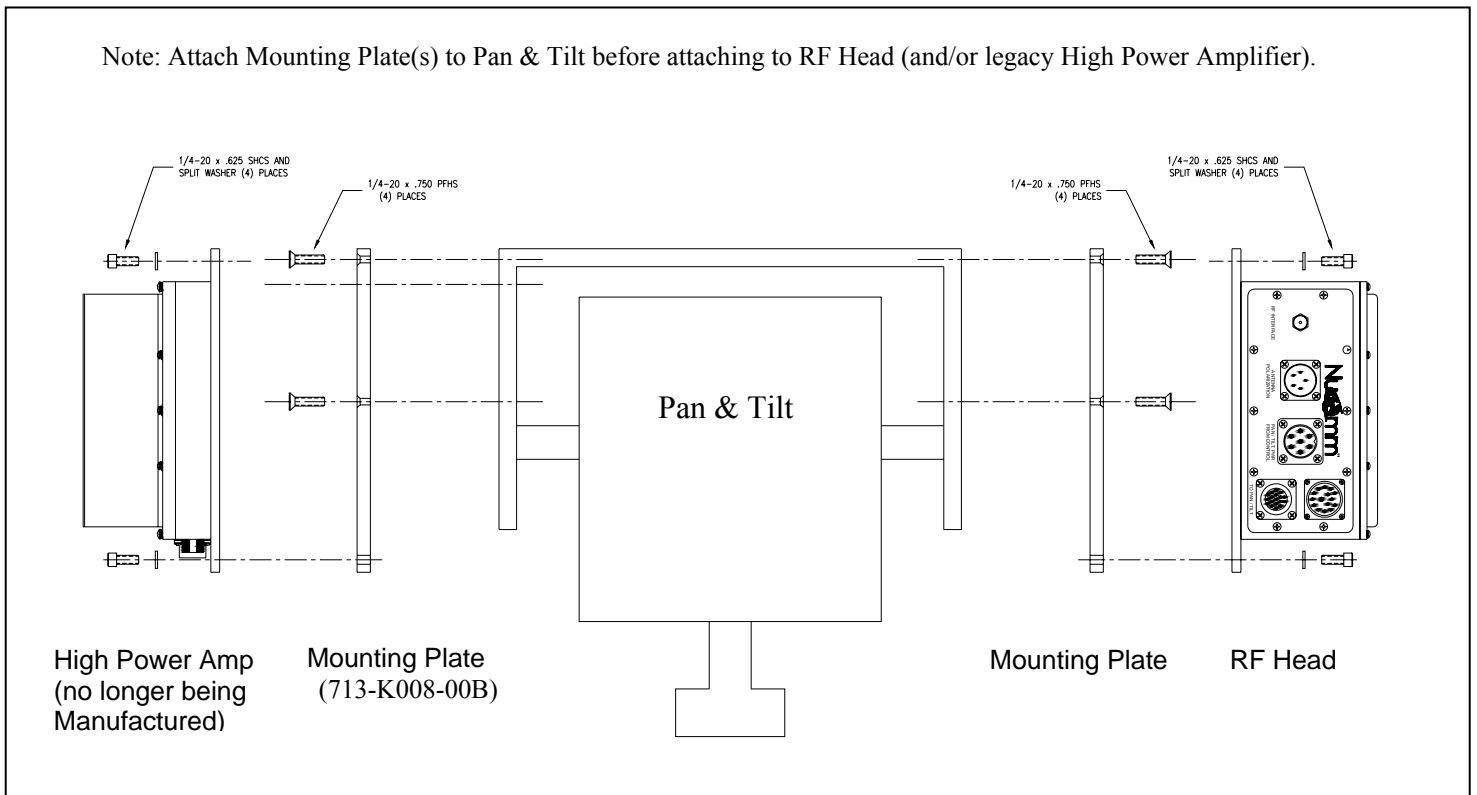


Figure 12: Mounting RF Head (and legacy HPA) using Mounting Plate

4.7 PREPARING THE INTERCONNECT CABLES (INCLUDING NYCOIL)

The NewsCaster VT2 is flexibly designed to use multiple IF cable types. The STANDARD cable types support diplexed +48VDC for transport to the RF Head. Belden 1694A (Coax) and Belden 8232A (Triax) are certified for this “one cable” configuration. Other common cables, such as Belden 1505, may require the use of the AUX Power option. Refer to Table 7 for more details on using the cables types mentioned. Table 9 details the AUX Power cable.

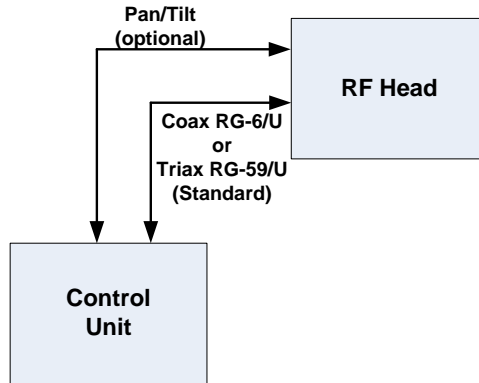


Figure 13: Nycoil Block Diagram – Standard Coax (or Triax) Configuration

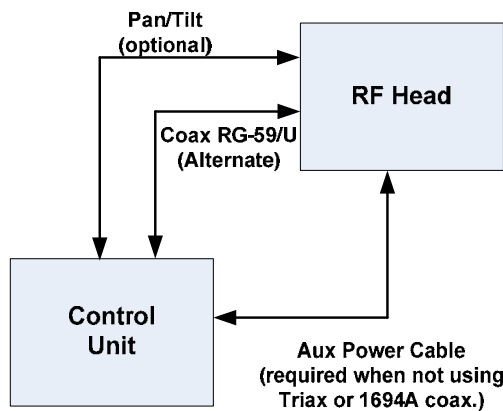


Figure 14: Nycoil Block Diagram – Alternate Coax Configuration

Most broadcasters use a Nycoil cable conduit between the truck and the mast top. The required length of the Nycoil cable is twice the difference between the extended and nested mast height.

MAST MODEL	NYCOIL LENGTH
5-20	30'
6-27	40'
7-30	50'
7-34	60'
7-42	70'
8.5-52	100'
9-58	100'

Table 6: Recommended Nycoil cable lengths

Config Type	Control Unit Connector	Cable Type	Cable Use	RF Head Connector
Standard Coax	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000	Belden 1694A RG-6U (recommended)	<ul style="list-style-type: none"> • 70MHz IF • Inter-Unit Data • +48VDC Power 	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000
Standard Triax	Triax Connector Trompeter PL375-13A Nucomm 511-F3002-000	Belden 8232A RG-59U (recommended)	<ul style="list-style-type: none"> • 70MHz IF • Inter-Unit Data • +48VDC Power 	Triax Connector Trompeter PL375-13A Nucomm 511-F3002-000
Alternate Coax (requires Aux Power Option)	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000	Belden 1505(e.g.) RG-59U	<ul style="list-style-type: none"> • 70MHz IF • Inter-Unit Data 	TNC Connector Trompeter UPL40-41 Nucomm 511-F3003-000
	Terminal Strip Nucomm 514-E0003-04A	#20AWG x 3	<ul style="list-style-type: none"> • +48VDC Power 	15-pin connector ITT Cannon: MS3116J14 Nucomm 512-F3012-015

Table 7: Typical IF cable configurations for the NewsCaster VT2

Table 8 is provided as a summary of the cables and conductors that are required for STANDARD and ALTERNATE configurations, with and without Pan and Tilt Control.

System Configuration	Cable Usage	Wire Type / Size	Number of Conductors
Standard Coax or Triax (no Pan & Tilt)	Control to RF Head Interconnect	Belden 1694A RG-6U (Coax) or Belden 8232A RG-59U (Triax)	n/a
	Aux Power Cable	#20 AWG	3
Standard Coax or Triax (with Pan & Tilt)	Control to RF Head Interconnect	Belden 1694A RG-6U (Coax) or Belden 8232A RG-59U (Triax)	n/a
	Pan & Tilt Control	#18 AWG	4
Alternate Coax (with Pan & Tilt)	Control to RF Head Interconnect	Belden 1505(e.g.) RG-59U (Coax)	n/a
	Aux Power Cable	#20 AWG	3
	Pan & Tilt Control	#18 AWG	4

Table 8: Summary of Nycoil cables and conductors needed

Control Unit “AUX Power”	Function	Recommended Wire Size	RF Head “AUX DC POWER”
1	+48VDC	#18 Violet	A
3	+48VDC	#18 Violet	B
2	Ground	#18 Black	G

Table 9: AUX Power cable pinout

The following Tables and Figures are provided to assist in preparing the interconnect cables for the optional Pan & Tilt control.

Control Unit “PAN/TILT POWER”	Function	Recommended Wire Size (AWG)	RF Head “PAN/TILT PWR FROM CONTROL”
A	+160VAC*	#18 White	A
B	+160VAC*	#18 Red	B
C	Not Used		C
D	Not Used		D
E	-160VAC*	#18 Brown	E
F	-160VAC*	#18 Black	F
G	Not Used		G
H	Not Used		

*The motor for the 120VAC Pan and Tilt actually requires 160VAC.

Table 10: Pan & Tilt Power (120 VAC) Connector Pin-outs

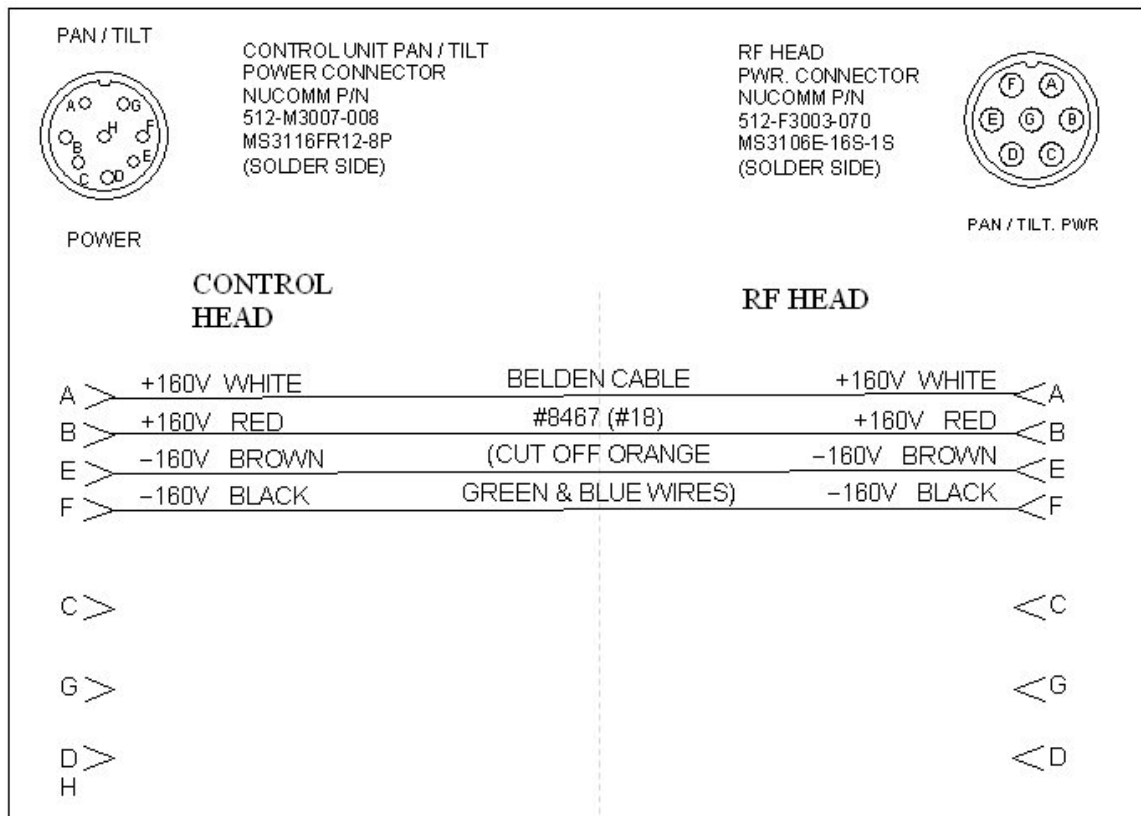


Figure 15: Pan & Tilt Power (120VAC) Interconnect Diagram

Control Unit "PAN/TILT POWER"	Function	Recommended Wire Size (AWG)	RF Head "PAN/TILT PWR FROM CONTROL"
A	+12VDC	#18 YELLOW	A
B	+12VDC	#18 YELLOW	B
C	GND	#18 BLACK	E
D	GND	#18 BLACK	F
No Connection	Not Used		C
No Connection	Not Used		D
No Connection	Not Used		G

Table 11: Pan & Tilt Power (12VDC) Connector Pin-outs

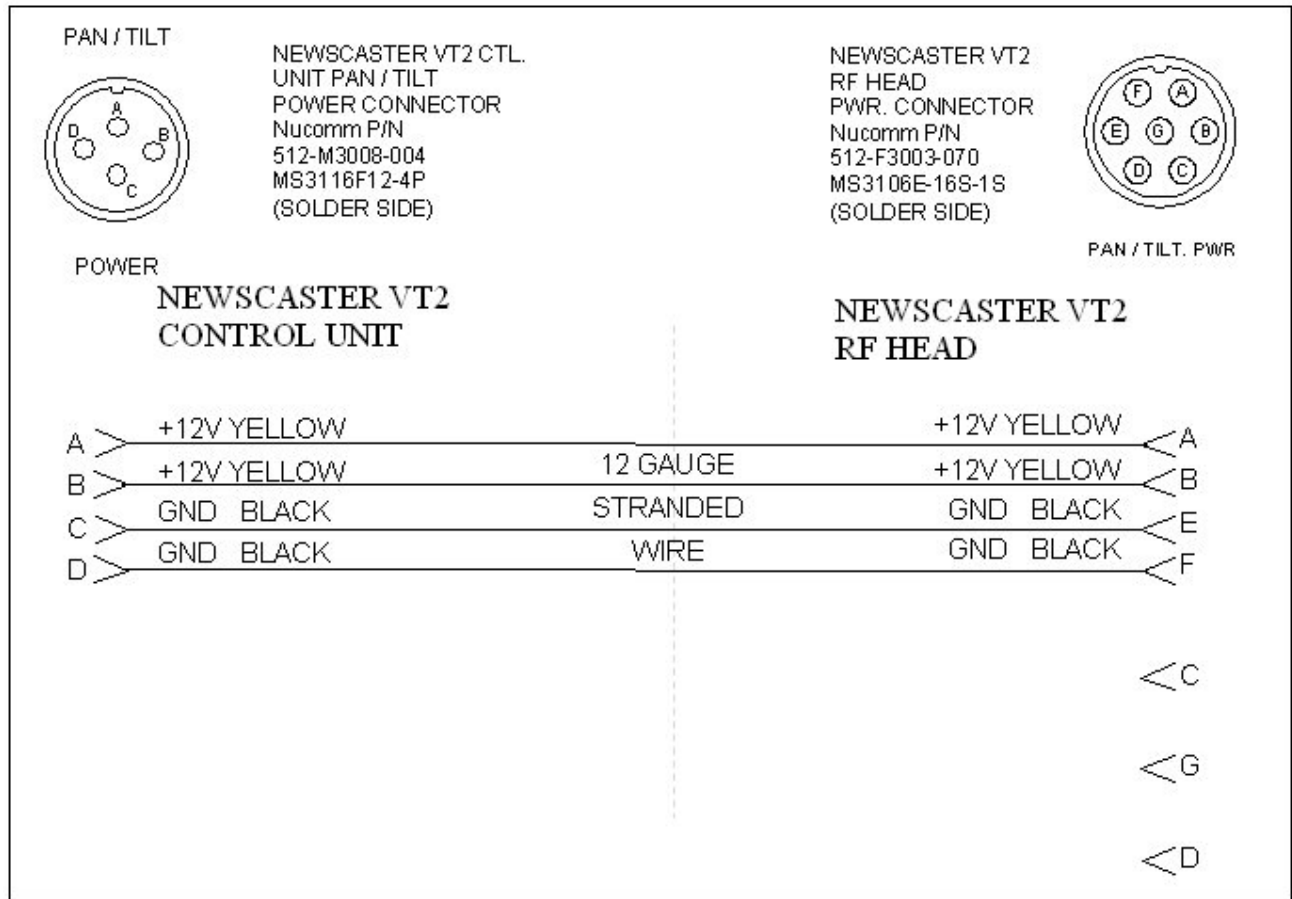


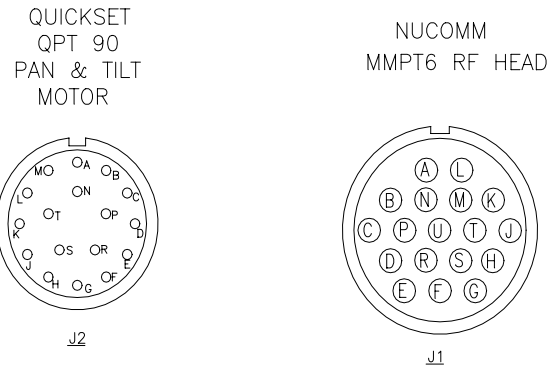
Figure 16: Pan & Tilt Power (12VDC) Interconnect Diagram

RF HEAD "TO PAN/TILT" (18 PIN)	FUNCTION	RECOMMENDED WIRE SIZE (AWG)	PAN & TILT MOTOR (17 PIN)
A	N/C	#20 Green/Black	A
B	Position Pot-Ref B	#20 Orange/Black	B
C	N/C	#20 Blue/Black	C
D	Position Pot-Ref A	#20 Black/White	D
E	AZ Left	#20 Red/White	E
F	Elev. Pot Wiper	#20 Green/White	F
G	Chassis Ground	#20 Blue/White	G
H	Field "+" (120VAC Units Only)	#20 Orange	H
J	Elev. Up	#20 Blue	J
K	Elev. Down	#20 White/Black	K
L	AZ Right	#20 Red/Black	L
M	Stow SW Up	#20 Red	M
N	Stow SW Down	#20 Green	N
P	Field "-" (120VAC Units Only)	#20 Black	P
T	AZ Pot Wiper	#20 White	T
U	N/C	N/A	N/A

Table 12: Quickset QPT90 12VDC/120VAC Pan & Tilt Connector Pin-out

CONNECTORS: J2 AMPHENOL MS3116F14-18S Provided with Quickset Unit
 J1 AMPHENOL MS3106F20-29S

Cable: Belden # 9458, 15 Cond. #20



CABLE ASSY LENGTH	P/N
4FT.	922-B206-04B
5FT.	922-B206-05B
6FT.	922-B206-06B*
12FT.	922-B206-12B

*Standard

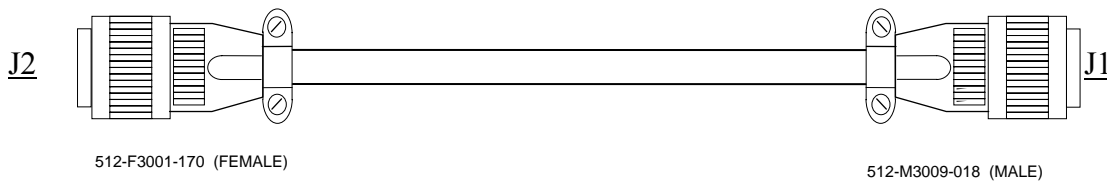


Figure 17: Pan & Tilt Motor Interconnect Cable

NCVT2 - RF HEAD	Function	Recommended Wire Size (AWG)	NSI Antenna
N/C	CW (Default)	N/C	N/C
E	V	#22 BROWN	A
C	H	#22 RED	B
D	2/7 GHz Band Select	#22 GREEN	L
F	CCW	#22 WHITE	D
G	Common Ground	#22 BLACK	E
K	Earth Ground	N/C	N/C
N/C	N/C	N/C	F
N/C	N/C	N/C	H
N/C	N/C	N/C	J
N/C	N/C	N/C	K
N/C	N/C	N/C	M

Table 13: NSI Quad Antenna Polarization Connector Pin Out

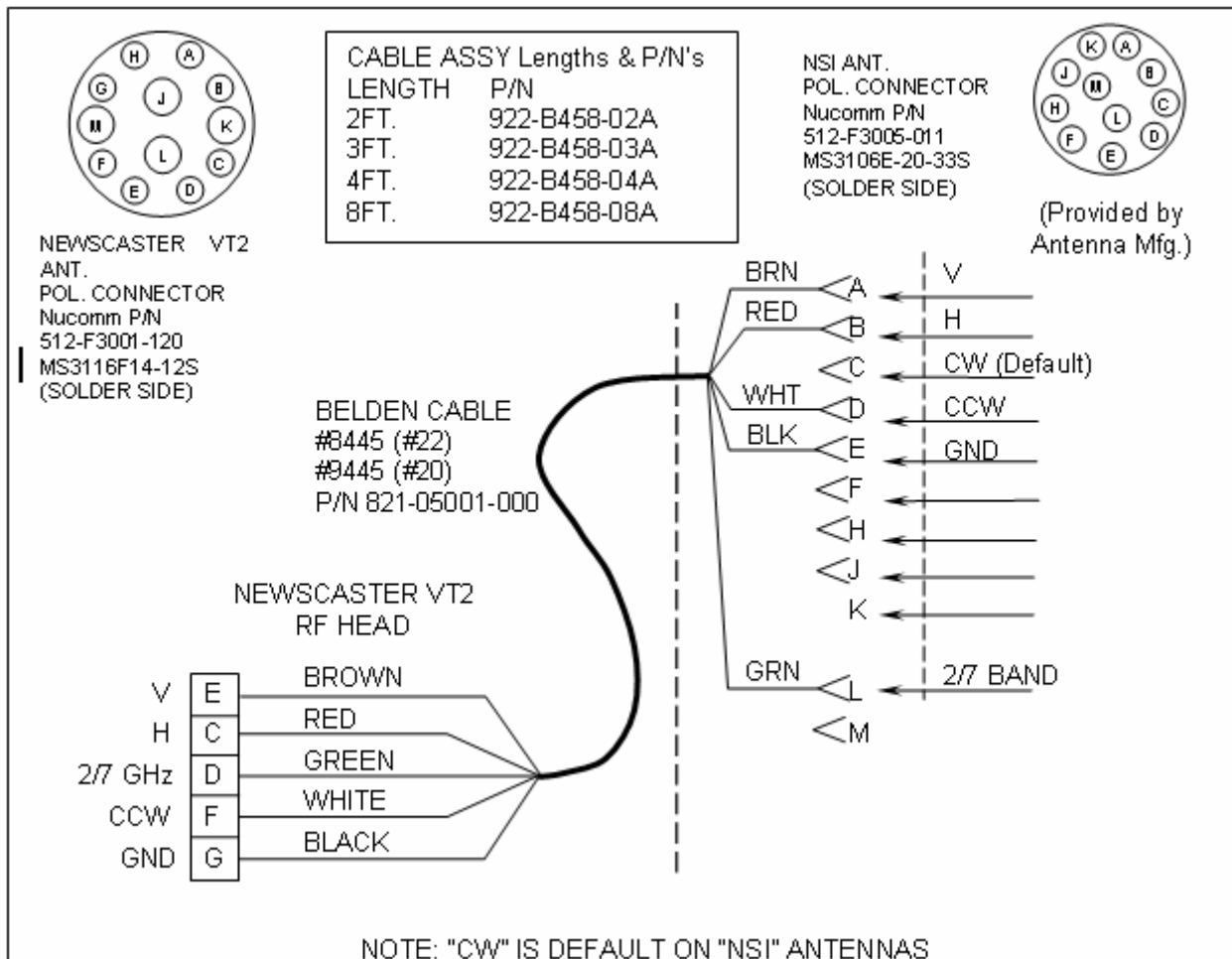


Figure 18: NSI Quad Antenna Polarization Connections

NCVT2 - RF HEAD	Function	Recommended Wire Size (AWG)	Radio Waves Antenna
N/C	CW (Default)	N/C	N/C
E	V	#22 BROWN	F
C	H	#22 RED	B
D	2/7 GHz Band Select	#22 GREEN	G
F	CCW	#22 WHITE	C
G	Common +24V	#22 BLACK	K
N/C	Shield GND	N/C	L
K	DC GND	#22 BLUE	M
N/C	N/C	N/C	A
N/C	N/C	N/C	D
N/C	N/C	N/C	E
N/C	N/C	N/C	H
N/C	N/C	N/C	J

Table 14: Radio Waves Quad Antenna Polarization Connector Pin Out

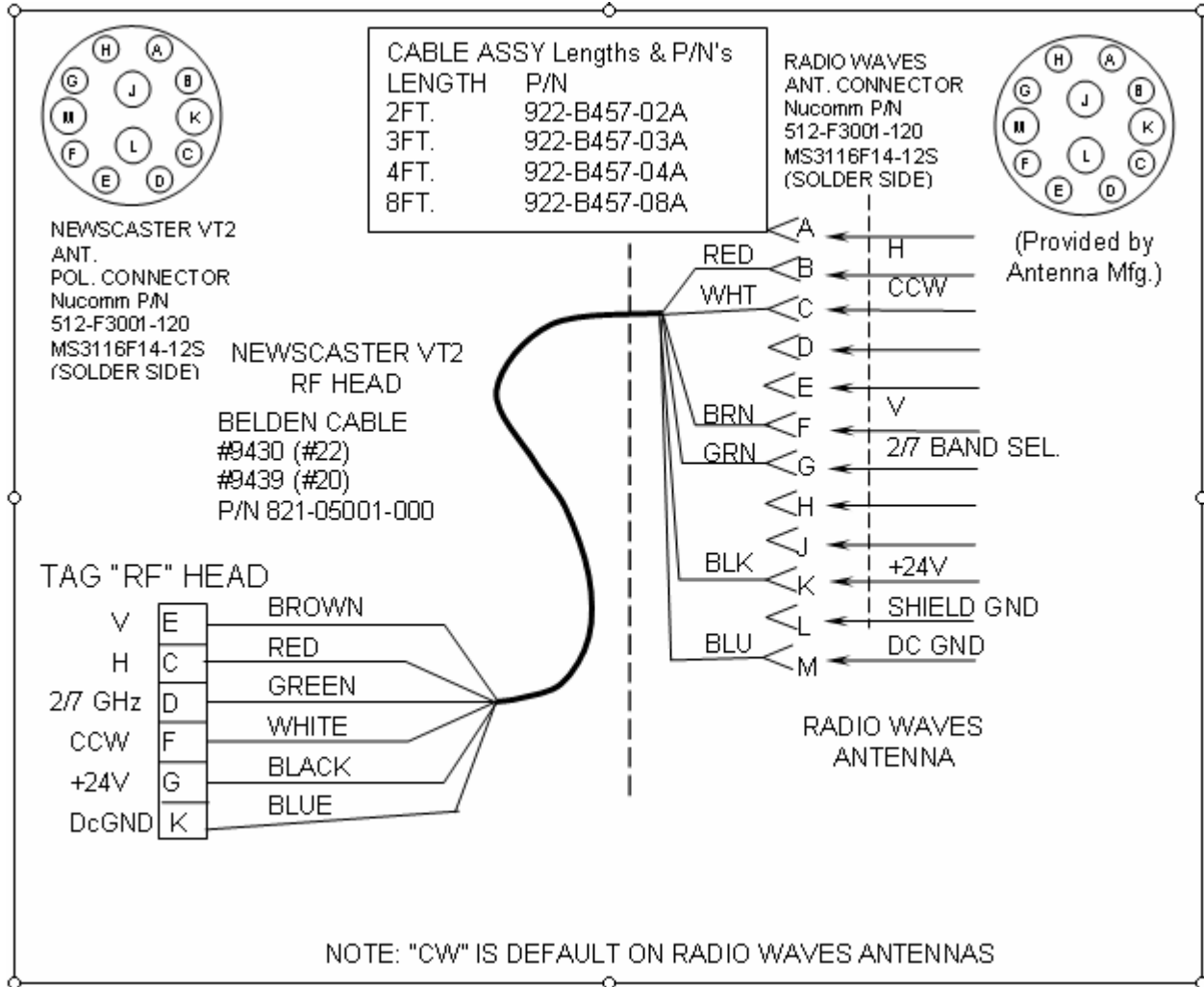


Figure 19: Radio Waves Quad Antenna Polarization Connections

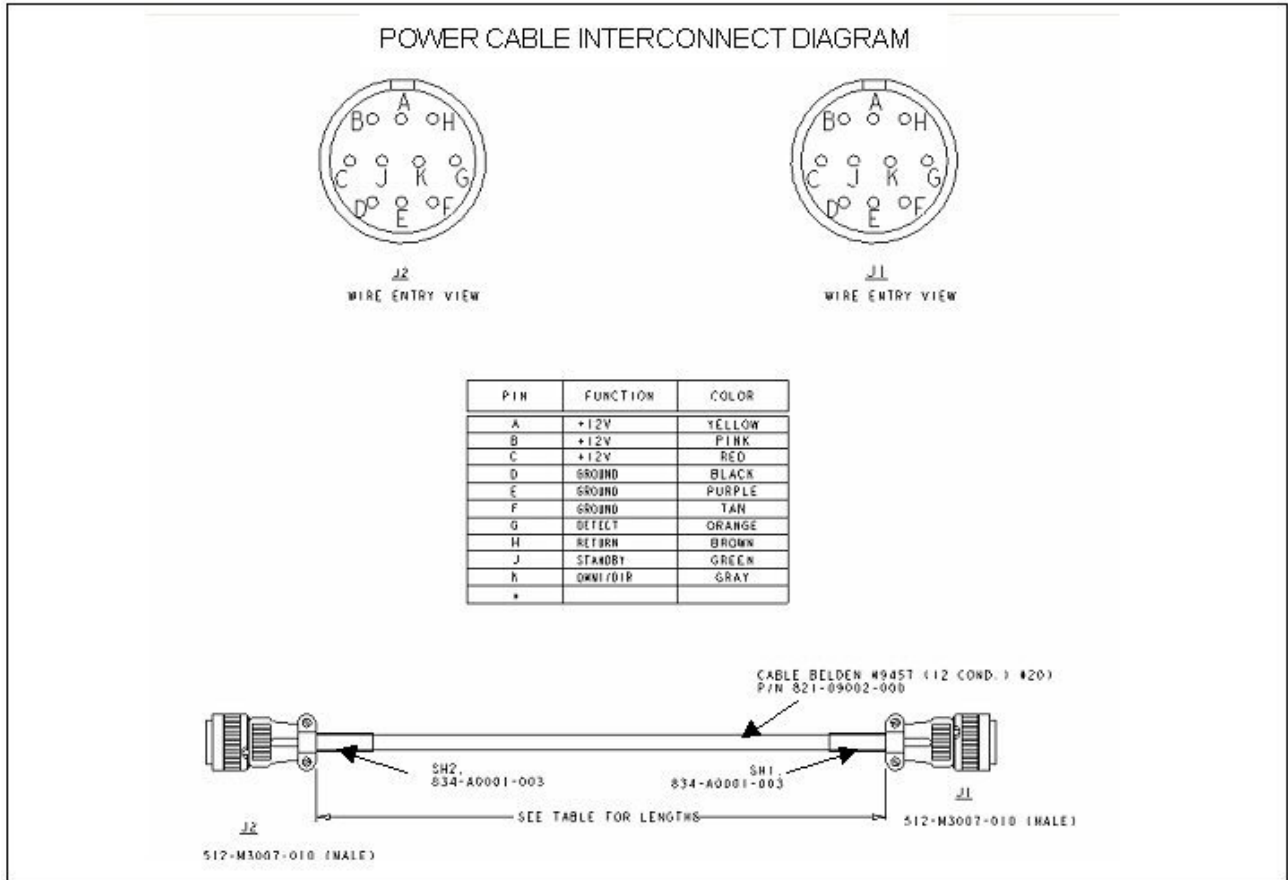


Figure 20: Cable, RF Head to optional High Power Amplifier

4.8 RF HEAD CONNECTORS

IF Interface and AUX Power

The TNC, or Triax, IF connector inputs the diplexed 70 MHz, inter-unit control data, and DC power for the RF Head when Belden 1694, or Triax, cable is used. If RG-59 is used, then DC is input from the Aux Power cable via the Aux DC Power input. (Refer also to Figure 21, Detail 11.)

Antenna Polarization

This connector (if configured) receives the antenna polarity control signals from the Control Unit. Both NSI and Radio Waves antennas are compatible, as well as others. See Table 13 & Figure 18 for NSI details. See Table 14 & Figure 19 for RWI details. (Refer also to Figure 21, Detail 12.)

Pan / Tilt Power (from Control)

This connector (if configured) inputs power from the Control Unit, which is then passed on to the RF Head.

See Table 10 and Figure 15 for 120VAC P&T. See Table 11 and Figure 16 for 12VDC P&T. (Refer also to Figure 21, Detail 14.)

To Pan / Tilt

This connector (if configured) outputs signals and power for the Pan & Tilt unit. Refer to Table 12 and Figure 17 for cabling and pin-outs. (Refer also to Figure 21, Detail 13.)

RF Output

The RF output is via a Type-N connector located at the center rear of the *NewsCaster VT2* RF Head and carried, via a 50 Ω low-loss coaxial cable, to the antenna. Turn the cable connector clockwise while keeping it in line with the transmitter connector. To avoid unnecessary connector wear, do not allow the cable to rotate while you connect it to the transmitter. (Refer also to Figure 21, Detail 15.)

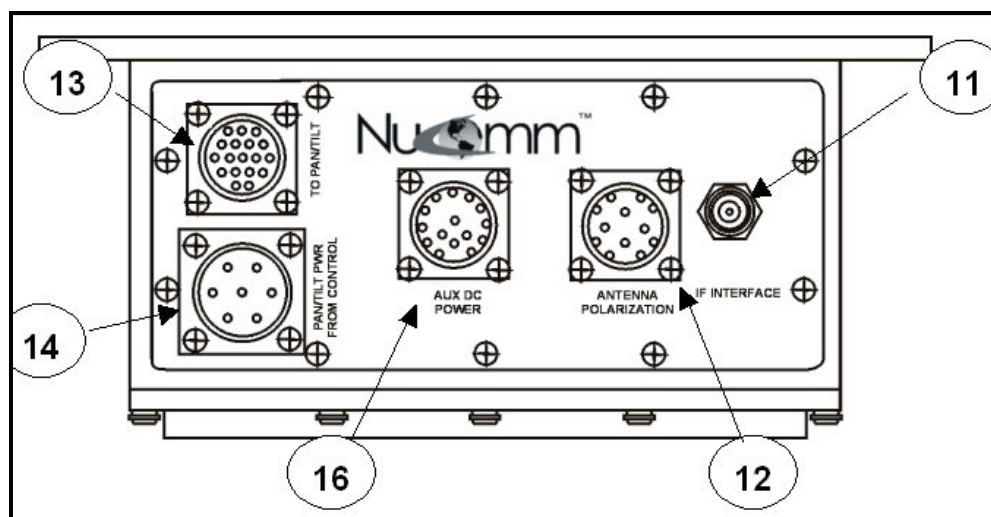


Figure 21: RF Head, Front-Panel (shown w/Pan & Tilt option)

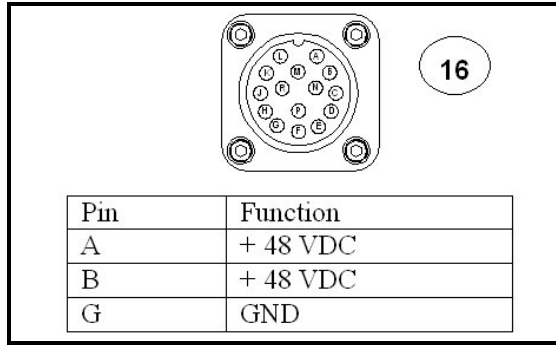


Figure 22: RF Head AUX Power Connector

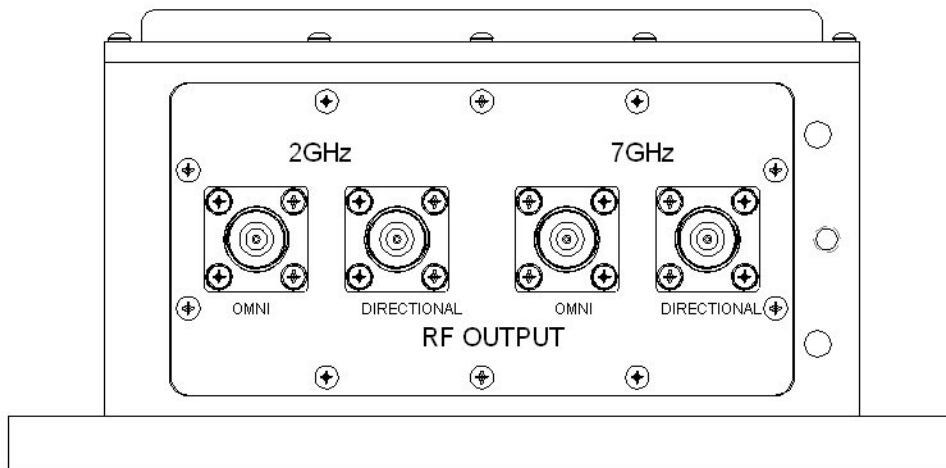


Figure 23: RF Head, Rear Panel
(Dual Band shown, with optional Omni ports)

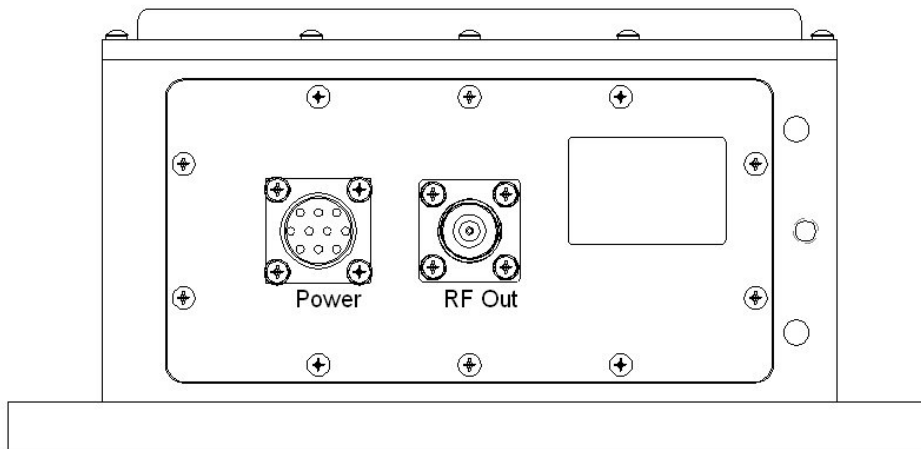


Figure 24: RF Head, Rear Panel (legacy extended power)

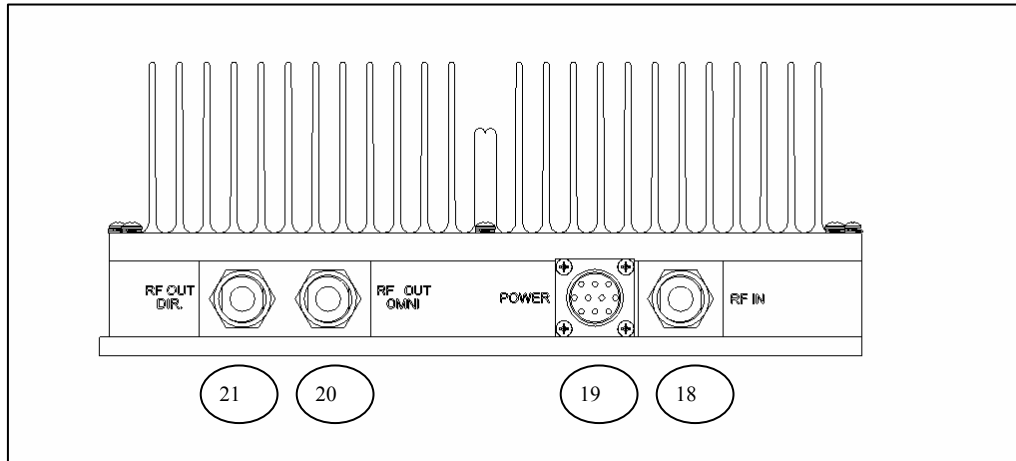


Figure 25: High Power Amp, or “HPA” (no longer produced)

4.9 CONTROL UNIT / RF HEAD INTERCONNECT

Figure 26 and Figure 27 show the interconnects between the *NewsCaster VT2* Control Unit and the mast mounted RF Unit (and the legacy High Power Amplifier which is no longer produced). To assist in preparing the Control and Monitor cable, connector pin assignments and recommended wire sizes are provided. When Triax or Belden 1694 are used, the only conductors required to pass through the Nycoil for standard operation are the coax (or Triax) cable (for power, data, and 70 MHz IF) and optional power conductors if configured for Pan & Tilt. An auxiliary power cable is required if using 75 Ω RG-59 (or optional 50 Ω RG-58).

RF Head Connections

Perform the following for BOTH the Standard and legacy Extended Power Output configurations:

- Connect the RF cable to the RF Interface jack. (Figure 21, Detail 11.)
- Connect the antenna polarization cable. (Figure 21, Detail 12.)

If the Pan/Tilt option is configured:

- Connect the Pan/Tilt Power cable to the RF Head (7-pin). (Refer to Figure 21, Detail 14.)
- Connect P1 (18 pin, male) of the Pan & Tilt Power/Control cable to J1 “TO PAN/TILT” on the RF Head. Connect P2 (17 pin, female) of the Pan & Tilt Power/control cable to the Pan & Tilt motor assembly. Refer to Table 12 and Figure 17 for cable pin-outs. (Refer also to Figure 21, Detail 13.)

If the AUX Power option is configured:

- Connect the AUX Power cable to the AUX DC POWER jack on the RF Head.

In addition to the above connections, the following are specific to the power output option chosen.

For Standard Power Output Only

Connect the antenna cable between your antenna and the appropriate “RF OUTPUT” port: 2GHz Omni; 2GHz Directional; 7GHz Omni; or 7 GHz Directional. (Refer to Figure 23)

For (legacy) Extended Power Output Only

Connect the 10-pin Power/Control cable, and the RF interconnect cable between the RF Head and the High Power Amp. (Refer to Figure 24 & Figure 25)

Connect the antenna cable between your antenna and the appropriate “RF OUTPUT” port on the High Power Amp: 2GHz Omni; 2GHz Directional; 7GHz Omni; or 7 GHz Directional. (Refer to Figure 25)

NSI & Radio Waves Quad Antenna Polarization Interconnection

Wiring diagrams are provided to assist in preparing the polarization cable, including connector pin assignments and recommended wire sizes.

See Table 13 & Figure 18 for NSI details.
See Table 14 & Figure 19 for RWI details.

A software setting via the LCD interface is used to select between the two antenna types, and will be factory configured per the type specified when the order is placed.

Quickset QPT90 Pan & Tilt Interconnection

The Pan & Tilt platform will handle a maximum load of 90 lbs, with 0-355° of rotation and +/- 90° of tilt. The unit features adjustable "limit" switches for rotation and tilt. The Pan & Tilt is controlled by an optional joystick, which is connected to the *NEWSCASTER VT2* Control Unit. The operator is able to set the platform position to within 1 degree of the desired position. The Control Unit displays the azimuth and degree of rotation, as well as the tilt above and below the horizon.

Nucomm supports two input voltage versions of the Quickset QPT90, a 12v version and a 120v version. Table 12 and Figure 17 show the interconnection between both QPT90 versions and the RF Head. The interconnection between the Control Unit and the RF head is different for each version.

QPT90 - 120VDC

See Table 10 and Figure 16 for details of the interconnection between the Control Unit and the RF Head for this Pan/Tilt Motor version.

QPT90 - 12VDC

See Table 11 and Figure 15 for details of the interconnection between the Control Unit and the RF Head for this Pan/Tilt Motor version.

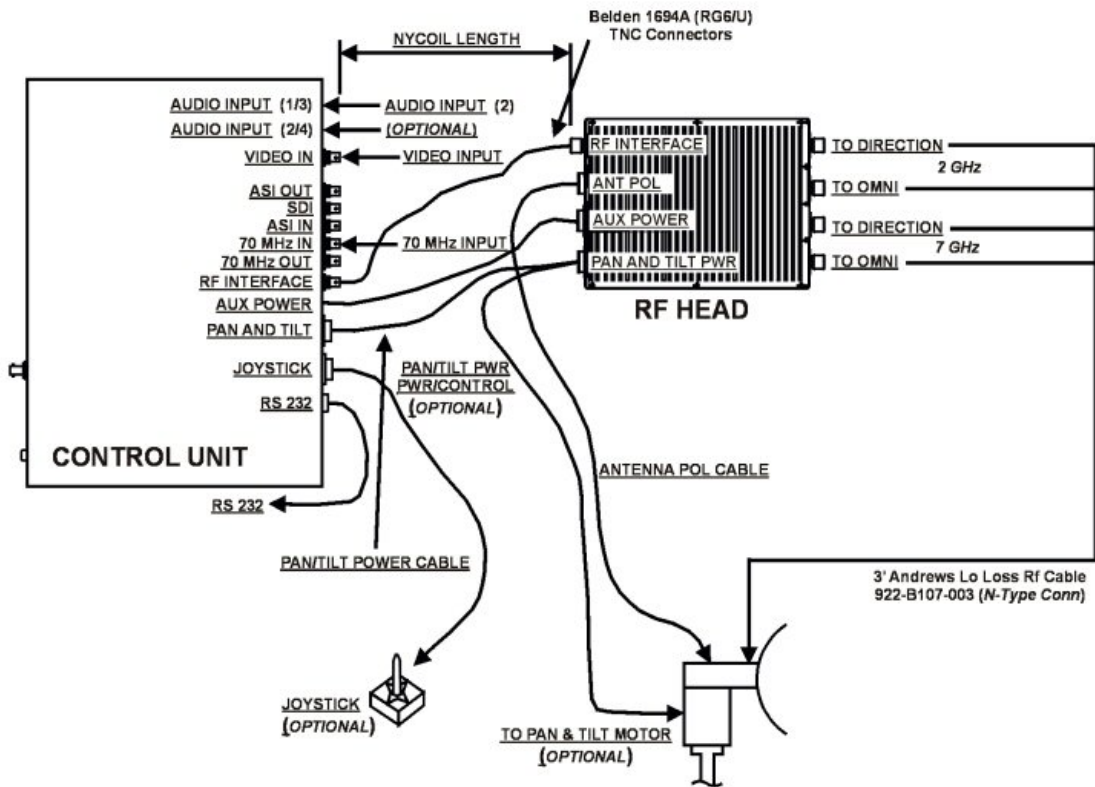


Figure 26: NCVT2 Interconnects, Standard Power

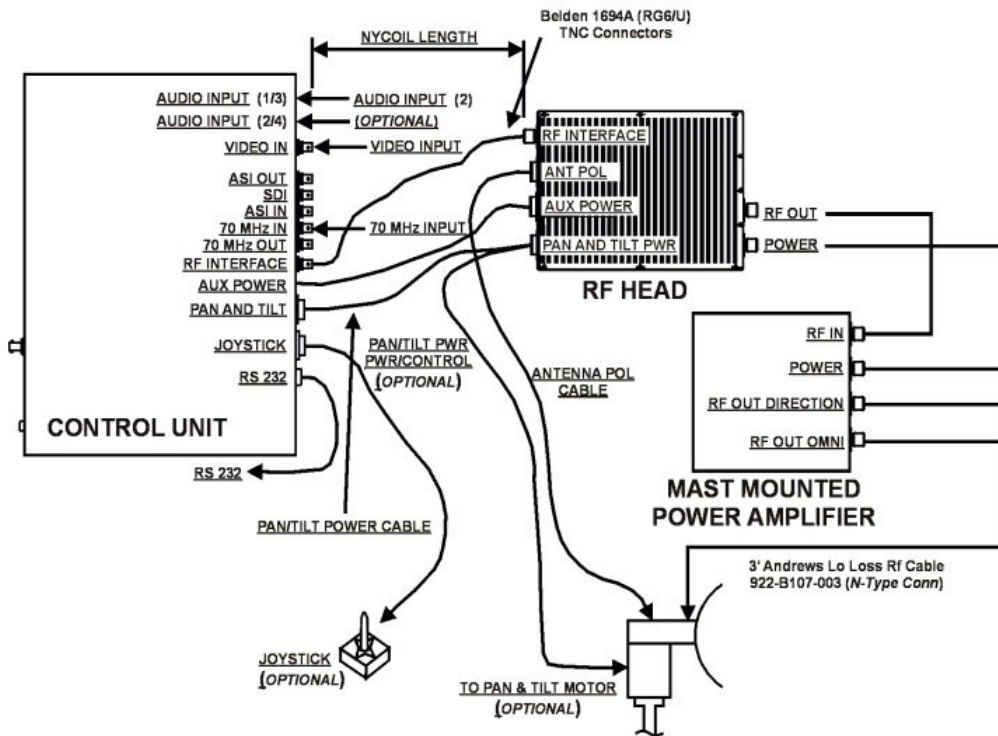


Figure 27: NCVT2 Interconnects, Extended Power Option (legacy)

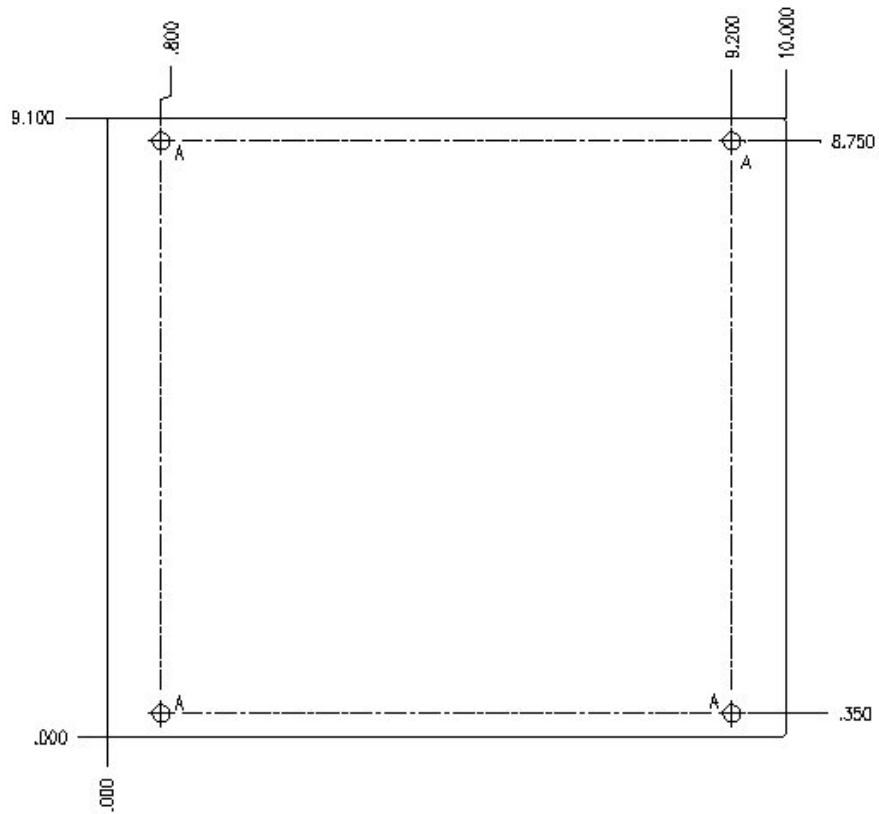


Figure 28: Hole Pattern of RF Head (and legacy HPA) Base Plate

Drill holes (A) are .250 Dia. (through drilled)

Material is ALUM 6061, 1/4" thick.

Use four (4) size 1/4-20 x .750" screws to mount the unit.

5. OPERATION

5.1 FRONT PANEL OPERATIONS

On each screen, a cursor appears as an underscore character, and is moved (←) or (→) by the arrow keys. When the cursor is under a desired item, select it by pressing ENT and the underscore becomes a solid box. Use (↑) or (↓) to scroll the available screens. When the desired setting has been made, press ENT to save the entry and put any change(s) into effect. If ENT is not pressed, and the keypad is left idle for 15 seconds, the changes are discarded. In a multi-digit selection, as in sub-carrier frequency, the boxed "Enter" cursor can be moved left or right to select other digits. Refer to Figure 30 and Figure 31 for graphics showing the Menu Tree's.

Standard Screen:

The *Standard Screen* appears at power up, and displays channel, band, frequency, and output power. Note the cursor under the channel number.

CH=1	6,887.500MHz			
BAND=6-7G	HIGH	0.0dBm		D

Channel Selection:

Change channels on the *Standard Screen* by underscoring the channel and pressing ENT to select it. Use the up or down arrows to select the new channel, then Press ENT to have the new channel take affect. The unit will go to standby as the synthesizer changes frequency. Transmission will resume when the new frequency is reached.

Power Adjustment:

The power *mode* of the NewsCaster VT2 is set automatically to ANALOG or DIGITAL, based on the **Modulation (13)** selected on the

front panel. This should not be confused with the power *output*.

The user can select HI or LOW power output (*changes the output level 3 to 6dBm*) by pressing the HI/LO button (**13**). The power will change when the arrow button is released. The new value displayed is the current power.

CH=1	6,887.500MHz			
BAND=6-7G	LOW	0.0dBm		D

Frequency Direct:

This is an optional operating mode allowing the frequency to be changed without limitation to channels. To use, move the cursor to underline the frequency, and press the ENT key. Use the left and right arrows to select the digit(s) to edit, and the up and down arrows to change the value(s). Continue this procedure until the entire frequency has been set. When complete, press ENT to have the new frequency take effect. If the frequency entered is outside the band of operation, the entry will be discarded, and an error message showing the valid region of operation will be displayed. In this mode the channel number is replaced with asterisks "*****". To return to channel mode, select the channel with the cursor and change it to the desired channel number.

5.2 CONTROLS AND INDICATORS

The NewsCaster VT2 operating controls and indicators are shown in Figure 29. Location numbers provide for cross-reference between the figure and description.

ON/OFF (1) Power On/Off control

STAT. (2) The following show the unit's status:

Remote: Unit is under remote control.

RF (Green): RF present at output port.

STBY (Yellow): Indicates muted output

Alarm (Red): Indicates that there has been a module failure. The exact reason for the alarm can be determined from the Alarm section of the Main Menu. (See Section 5.3)

Preset (3)

Six programmable preset keys are provided to save and recall system configurations. To store the current settings to a Preset, *Hold* the desired Preset key until the confirmation screen is displayed (about *four* seconds). The following settings will be saved:

- Modulation Type.
- Input Type.
- Output Power.
- Channel Number.
- Audio Settings.

LCD Interface (4)

The LCD is the main interface to the unit. The display shown in Figure 29 is *the Standard Screen*.

Entry Keypad (5)

This keypad is used to navigate the LCD menus. The *ENT* key is used to enter and exit from edit mode, and to make menu selections.

Mode (6)

The MODE key is used to select from the following four operating modes:

NORMAL

Transmitter is active, with or without a video (*or composite*) input signal.

STANDBY

Transmitter is in STANDBY until switched to another mode. Frequency synthesizer is locked on frequency.

AUDIO (7)

The *AUDIO* quick key is used for basic audio sub-carrier mode (LINE/AES) selection and gain changes.

SC1 Off/ <u>Line</u> /AES 6.200MHz +2dB
SC2 Off/ <u>Line</u> /AES 6.800MHz +2dB

Note: You can NOT change Audio Sub-Carrier frequencies via this interface. Please refer to section 5.3.2 “Audio Sub-Carrier Frequency” in the “Nextel BAS Relocation Settings” section.

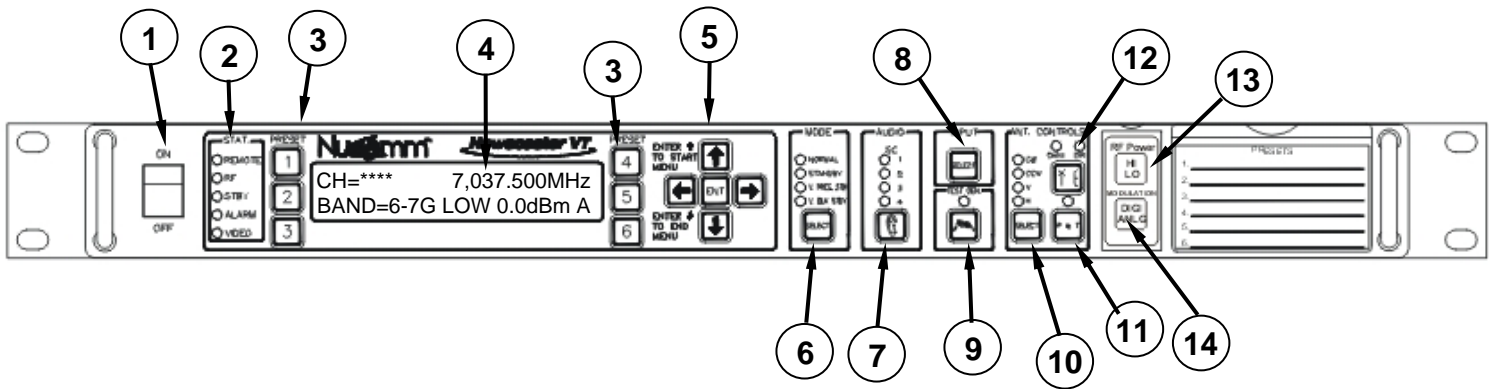


Figure 29: NEWSCASTER VT2 Front Panel Controls and Indicators

The gain or mode selection is made using the left or right arrow keys and edited using the standard editing procedure. Additional audio sub-carriers are selected with the up and down arrows. To edit sub-carrier frequency, refer to *Settings* in Section 5.4.

The gain adjustment allows for ±6 dB of gain, and can be used to compensate for variance in line levels. Audio levels will be expressed in dBm when using analog modulation, and in dBu when in digital, per the following:

$$P_{dBm} + \text{Gain} - 18 = P_{dBu}$$

$$0.0 \text{ dBm} = -18 \text{ dBu}$$

If LINE is selected, the unit accepts balanced 600-Ohm inputs at +8 dBm Analog (-10 dBu Digital). At 1 KHz input, headroom is +18 dBm Analog (0.0 dBu Digital).

If AES is selected, the unit accepts data from the backplane AES port(s) and decodes the Group 1 audio from the SDI stream. If only two audio channels are configured, they will be the first channel in Group 1.

Four LED's indicate the status of the audio channel:

- GREEN:** On and working - OK.
- GREEN Flashing:** Over modulation.
- RED:** Trouble indication.
- OFF:** Off, or not configured.

INPUT (8)

The *INPUT* key brings up the *Input Screen* to select the mode of the input BNC connector. Press *ENT*, then use the up and down arrows to select the desired format. Press *ENT* to confirm entry. To return to the *Standard Screen*, press the *Input* key or wait 15 seconds.



When analog modulation is selected, the input selections will be:

Composite - The signal applied at the INPUT connector is routed through the internal low pass filter to modulate the output. Typically, this filter has a bandwidth of about 4.0 MHz for NTSC and 5.6 MHz for PAL. The NTSC filter selectivity ensures the higher frequency video components do not interfere with the 4.83 MHz audio subcarrier.

SDI - SDI is converted to Composite via an internal circuit and then processed as a Composite signal.

External 70 MHz FM - The input bypasses the modulator, and is routed directly to the heterodyne up-converter.

When digital modulation is selected, the input selections will be:

Composite - In this mode the input signal is passed through the MPEG Encoder and converted to digital.

SDI - The Input is routed through the MPEG Encoder.

External 70 MHz Digital - The input bypasses the modulator, and routes to the heterodyne up-converter.

ASI - Input bypasses the Encoder and goes to the digital modulator. The ASI rate must be at or below the maximum digital modulation rate.

TEST GEN (9)

This key allows editing of the 16 character ID, and selection of the waveform display. This is only selected when the input type is set to "VIDEO".

When TEST GEN is enabled, the green LED is lit and the LCD displays the current pattern and ID. The menu will time-out after 2 seconds. Pressing TEST GEN a second time disable TEST GEN.

ANTENNA CONTROL (10)

The SELECT key is used to change the antenna polarization.

PAN & TILT (11)

When Pan & Tilt is pressed, the Red indicator LED is lit to indicate P/T power is enabled. Any joystick movement will move the antenna in that direction. A display for P/T elevation and aximuth is available. When operating the Pan & Tilt, the antenna movement MUST also be physically monitored to reduce the danger of hitting power lines, etc. When the desired position is reached, press Pan & Tilt again to disable power to the motor and reduce the possibility of unintentional antenna movement.

ANTENNA SELECTION (12)

This key toggles between Omni or Directional for antenna selection. If no Omni is connected this function should be disabled. (See Options in Section 5.4.)

HI/LOW RF POWER (13)

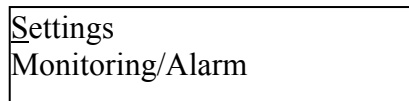
This key selects whether the unit will operate in HI or LOW power mode.

MODULATION MODE (14)

This key selects whether the unit will operate in Analog or Digital mode.

5.3 MENU SYSTEM

5.3.1 Main Menu



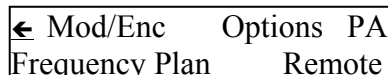
Refer to Figure 30 and Figure 31 for tree diagrams of the menu system. To enter the Main menu, hold (↑) and press ENT. To select a sub-menu, move the cursor to the desired item, and press ENT. To move back up a level, select (←) at the upper left of the screen and press ENT.

The Main Menu contains settings not ordinarily required during standard operation, such as the following:

- Modify the frequency plan.
- View trouble-shooting information.
- Changing sub-carrier frequencies.
- Changing video configurations.
- Setting up the remote interface.
- Configuring special unit options.

5.3.2 Settings

Selecting "Settings" accesses the system settings menu.



Mod/Enc (Modulator/Encoder)

Selecting Mod/Enc provides access to parameters for video, audio, the MPEG-2 encoder and the digital/analog modulator. First you must select whether you want to modify Analog or Digital parameters.

• ANALOG
DIGITAL

Analog Video and Audio

• Video
Audio

Video Setup (FM modulation)

• Video Level: 0
Video Emphasis:
NTSC/PAL/Flat

Video invert and emphasis are edited from here. If the NewsCaster is used with existing gear that inverts the video, it can be pre-inverted at the transmitter to compensate. The pre-emphasis network may be bypassed, if desired.

Pressing the UP or DOWN arrow selects the Video Standby screen where Video Black Standby and Video Standby are set. STBY can be changed to TEST GEN if that option is installed.

← Vid-Blk Stby: Standby
Video Standby: Standby
Video Inverse: Invert/Normal

Audio Setup (FM modulation)

← SC1 Freq:7.500MHz EMP
Mode:LINE Level:+2

This screen allows viewing and editing of the analog audio configuration. Input mode, emphasis or flat, sub-carrier frequency and level may be selected. Pressing the UP or DOWN arrows toggles between the audio inputs.

Video Setup (Digital modulation)

ANALOG
• DIGITAL

When Digital is selected, you will see a screen allowing access to Modulator and Encoder settings.

← Modulator
Encoder

Modulator Setup

← Power: On Mod: QPSK
CR: 1/2 GI:1/32 BW:8MHz

You can view and/or edit the following:

- Power: On/Off.
- Modulation: QPSK, 64QAM, 16QAM.
- Code Rate: 1/2, 7/8, 5/6, 3/4, 2/3.
- Guard Interval: 1/32, 1/4, 1/8, 1/10.
- Bandwidth.

Encoder Screen:

← Audio Video
Table GOP Rate

By selecting "Audio" you can view the sample rate.

By selecting "Video" you can view and/or edit the following:

- Standard: PAL, NTSC.
- Profile: 4:2:2, 4:2:0.
- Aspect Ratio.

By selecting "Table" you can view and/or edit the following:

- Service Name.
- Service Provider.
- PCR PID.

- Video PID.
- Audio 1 PID.
- Audio 2 PID.

By selecting "GOP" you can set the GOP level from 0 (Super Low Delay) to 5 (Highest Quality Encoding).

By selecting "Rate" you can view the "MPEG Only Rate".

Options:

← Start in Standby: NO
DIR Antenna Only: NO
← Antenna Type: Nucomm
P+T Position Pot: YES
← Elevation Thd: 70
←

Start in Standby: The unit can be forced to startup in Standby regardless of the last mode used. Caution: if the power to the unit is interrupted for any reason the unit will not return to transmit without user intervention.

Dir Antenna Only should be set to YES if an Omni antenna is not connected to the RF Head. This locks the Antenna Selection Switch in DIR and prevents accidental switching to the Omni circuit.

Antenna Type is selectable between Nucomm and NSI. This will be factory set per the configuration ordered.

Pan + Tilt Position Pot If the Pan and Tilt control potentiometers are installed, then this option should be set to YES.

Elevation Threshold can be used to halt the Pan function when the selected elevation has been exceeded, to avoid equipment damage.

PA

This is a Factory access point to the power amplifier bias points, and should only be used with factory consultation.

Frequency Plan

← Frequency Band
2GHz 7GHz 12/13GHz

This menu allows viewing and editing of the frequency plan.

Remote:

← Remote Cfg
Download Data

This menu allows remote configuration through a PC. The type of interface (RS232 or RS485), BAUD rate, and address (1-255) are selectable.

The Download Data function is for use by factory personnel only.

5.3.3 Monitoring/Alarms (Trouble Shooting)

(See Table 15 for Alarms and their Cause)

Selecting Monitoring/Alarm allows status to be obtained on the Control and RF Units. Notice the internal temperature of the units may be monitored.

← Control: OK	25°C
RF Module: OK	63°C

Visibility to the full range of alarms is provided, with an indicator of which module is failing.

Control Unit:

← PSU:OK	Audio:OK
Mod/Enc:OK	Enc:N/A

This first screen under "Control" provides an overview of the Control Unit. To obtain specific module status, move the cursor and press *ENT*.

Power Supply Screen:

← PSU:+12 Voltage OK +12= +11.9V -12 = -12.0V
--

This screen displays the units PSU voltages. The first display line toggles between the two voltages present.

Modulator/Encoder:

← Encoder: WORKING OK Ver: *.*.*
← Encoder: WORKING OK Current Rate: *.*.*mbps
← Encoder: WORKING OK Max Rate: *.*.*mbps

This screen displays modulator/encoder status. Version, Current Rate, and Maximum Rate are displayed.

RF Unit:

← P&T:N/A Synth:OK Controller:OK

This first screen under "RF Module" provides an overview of the RF Unit. To obtain specific module status, move the cursor and press *ENT*.

P&T Screen:

← P&T:WORKING OK

Under this screen, the status of the pan and tilt motor is displayed.

Synthesizer Screen:

← Synth:WORKING OK Loop=+2.9V

← Synth:WORKING OK 15.0= +14.5V 22.0= +23.2V

Under this screen, the locked status and loop voltage of synthesizer is displayed.

Controller Screen:

← RF Router:WORKING OK Ver:D2
← RF Router:WORKING OK +48v= +41 +11v= 10.7V
← RF Router:WORKING OK +5= +4.8V -5 = -4.7V
← RF Router:WORKING OK +24= 22V Var = -8.9V

These screens provide status on the power supply voltages, plus the firmware version of the control board in the RF Head.

5.4 NEXTEL BAS RELOCATION SETTINGS

For our US clients, the *ChannelMaster* is designed so that, when properly configured per the following guidelines, **you will only need to change one setting, on one screen** when it's time to switch over to the "post-Nextel" 2GHz band plan

To preset the unit to allow a "one setting" switchover, there are two groups of settings that must be made in advance: "AUDIO SUB-CARRIER FREQUENCY" and "CHANNEL BANDWIDTH & BAND PLAN". These are described below.

5.4.1 Audio Sub-Carrier Frequency

In this section you set your "pre-Nextel" and "post-Nextel" Audio Sub-Carrier (ASC) frequencies, so that when you make the switchover they will be ready to go.

Start the ASC set-up procedure by making the following menu selections:
 SETTINGS>MODULATOR/ENCODER>ANALOG>AUDIO

This brings up a screen similar to the one at right, with the settings and selections as described below:

← SC1 Insertion: (-20 to -40dBc) 2(17)/7/13: 4.83 MHz 2(12) 1-7: 4.83 MHz 2(12) 8-10: 4.83 MHz

NOTE: Press "Up" & "Down" to scroll through the ASC's, and press "Left" & "Right" to scroll through the available settings. The settings for all ASC's are modified in the same fashion. ASC#1 is used as the example.

2(17)/7/13 This setting controls the frequency for the selected Sub-Carrier when operating in the "pre-Nextel" 2GHz band (USA), and also for all the other frequency bands (i.e. 7GHz or 13GHz). The possible range for this setting is 4.83MHz to 8.5MHz.

2(12) 1-7 This setting controls the frequency for the selected Sub-Carrier when operating in the "post-Nextel" 2GHz band (USA) on channels 1 through 7. The possible range for this setting is 4.83MHz to 5.8MHz

2(12) 8-10 This setting controls the frequency for the selected Sub-Carrier when operating in the "post-Nextel" 2GHz band (USA) on channels 8 through 10. The possible range for this setting is 4.83MHz to 8.5MHz

Nucomm's default Audio Sub-carrier Frequencies				
Bandplan	ASC1	ASC2	ASC3*	ASC4*
2(17)/7/13	4.83MHz	6.20MHz	6.80MHz	7.50MHz
2(12) 1-7	4.83MHz	5.80MHz	6.80MHz	7.50MHz
2(12) 8-10	4.83MHz	6.20MHz	6.80MHz	7.50MHz

**NOTE: Due to bandwidth limitations, only two ASC's can be active on the "post-Nextel" 2GHz bandplan (US), regardless of how the unit is hardware configured.*

5.4.2 Channel Bandwidth and Band Plan

In this section you can set your “pre-Nextel” and “post-Nextel” Video Bandwidth Deviation, so that when you make the switchover they will be ready to go.

Start this set-up procedure by making the following menu selections:

MENU>Settings>Options>Nextel

This brings up the screen at right, with the settings and selections as described below:

2GHz Freq Plan: 2G(17), 2G(12)
BW(2G(17)/7/13): 4MHz, 3MHz
BW(2G(12)8-10): 4MHz, 3MHz

2GHz Freq Plan

This setting controls the 2GHz Frequency Plan which will be used by the radio. Select the 17MHz “pre-Nextel” bandplan by choosing “2G(17)”, or the 12MHz “post-Nextel” bandplan by choosing “2G(12)”.

BW(2G(17)(7/13)

This setting controls your Video Deviation bandwidth when operating in the “pre-Nextel” 2GHz band (USA), and also for all the other frequency bands (i.e. 7GHz or 13GHz). The possible selections are 3MHz or 4MHz.

BW(2G(12) 8-10)

This setting controls the Video Deviation bandwidth when operating in the “post-Nextel” 2GHz band (USA) on channels 8 through 10. The possible selections are 3MHz or 4MHz.

NOTE: Due to bandwidth limitations of the “post-Nextel” 2GHz bandplan, in “2G(12)” mode, the Video Deviation bandwidth of 2GHz channels 1 through 7 is locked at 3MHz..

5.4.3 SWITCHOVER TO “POST-NEXTEL” SETTINGS

For our US clients, when your DMA switchover date arrives, assuming you have already set the unit per the preceding guidelines, you will only need to take the following steps to put the radio on the new “post-Nextel” settings:

Step #1: *Navigate* to the following menu: *Settings>Options>Nextel*

Step #2: *Change* your “2GHz Freq Plan” setting from “2G(17)” to “2G(12)”

Step #3: *Done!*

NewsCaster VT2 Alarms		
Alarm Message	Problem	Probable Cause
“+11V Error”	+11 VDC is out of tolerance.	Problem in power supply or +11 VDC line being loaded down.
“+5V Error”	+5 VDC is out of tolerance.	Problem in power supply or +5 VDC line being loaded down.
“IFLO Unlock”	IF Local Oscillator (Reference) cannot frequency lock.	Reference Oscillator signal wrong or bad.
“RFLO Unlock”	RF Local Oscillator (Reference) cannot frequency lock.	Reference Oscillator signal wrong or bad.
“MOD: FPGA FAIL”	FPGA failed software loading from PROM.	Bad PROM.
“MOD: LOADING ERR”	MOD microprocessor failed loading data EPROM or EPROM data not recognizable.	Bad EPROM or EPROM data corrupted.
“MOD: VIDEO ERROR”	MPEG Video FIFO Read/Write Error.	Bad MPEG Encoder Module.
“MOD: AUDIO ERROR”	MPEG Audio FIFO Read/Write Error.	Bad MPEG Encoder Module.
“MOD: ASI OVERFLOW”	External ASI Data Rate Error	Check devices for proper data rate setting. Check external ASI signal for problems. Possibly U1 (<i>SDI Receiver</i>) of COFDM MPEG 2 Encoder Board, its PLL circuit, or its clock is bad.
“MOD: ASI UNLOCKED”	External ASI Signal Lock Error	Check external ASI signal for problems. Possibly U1 (<i>SDI Receiver</i>) of COFDM MPEG 2 Encoder Board, its PLL circuit, or its clock is bad.
“MOD: NO VIDEO INPUT”	Video signal missing.	Bad cable, bad connector, or COFDM MPEG 2 Encoder Board bad.
“MOD: NO AES AUDIO 1”	No AES Audio 1 signal.	Possibly U24 or U11 of COFDM MPEG 2 Encoder Board bad.
“MOD: NO EMD AUDIO 1”	No Embedded Audio 1 signal.	Possibly U1 (<i>SDI Receiver</i>) or U17 (<i>Microprocessor</i>) of COFDM MPEG 2 Encoder Board bad.
“MOD: EMB RATE 1”	Embedded Audio 1 Data Rate Error.	Check devices for proper data rate setting. Check external SDI signal for problems. Possibly COFDM MPEG 2 Encoder Board bad.
“MOD: NO AES AUDIO 2”	No AES Audio 2 signal.	Possibly U22 or U7 of COFDM MPEG 2 Encoder Board bad.
“MOD: NO EMD AUDIO 2”	No Embedded Audio 2 signal.	Possibly U1 (<i>SDI Receiver</i>) or U17 (<i>Microprocessor</i>) of COFDM MPEG 2 Encoder Board bad.
“MOD: EMB RATE 2”	Embedded Audio 2 Data Rate Error.	Check devices for proper data rate setting. Check external SDI signal for problems. Possibly COFDM MPEG 2 Encoder Board bad.

Table 15: NewsCaster VT2 Alarms

Monitoring/Alarm

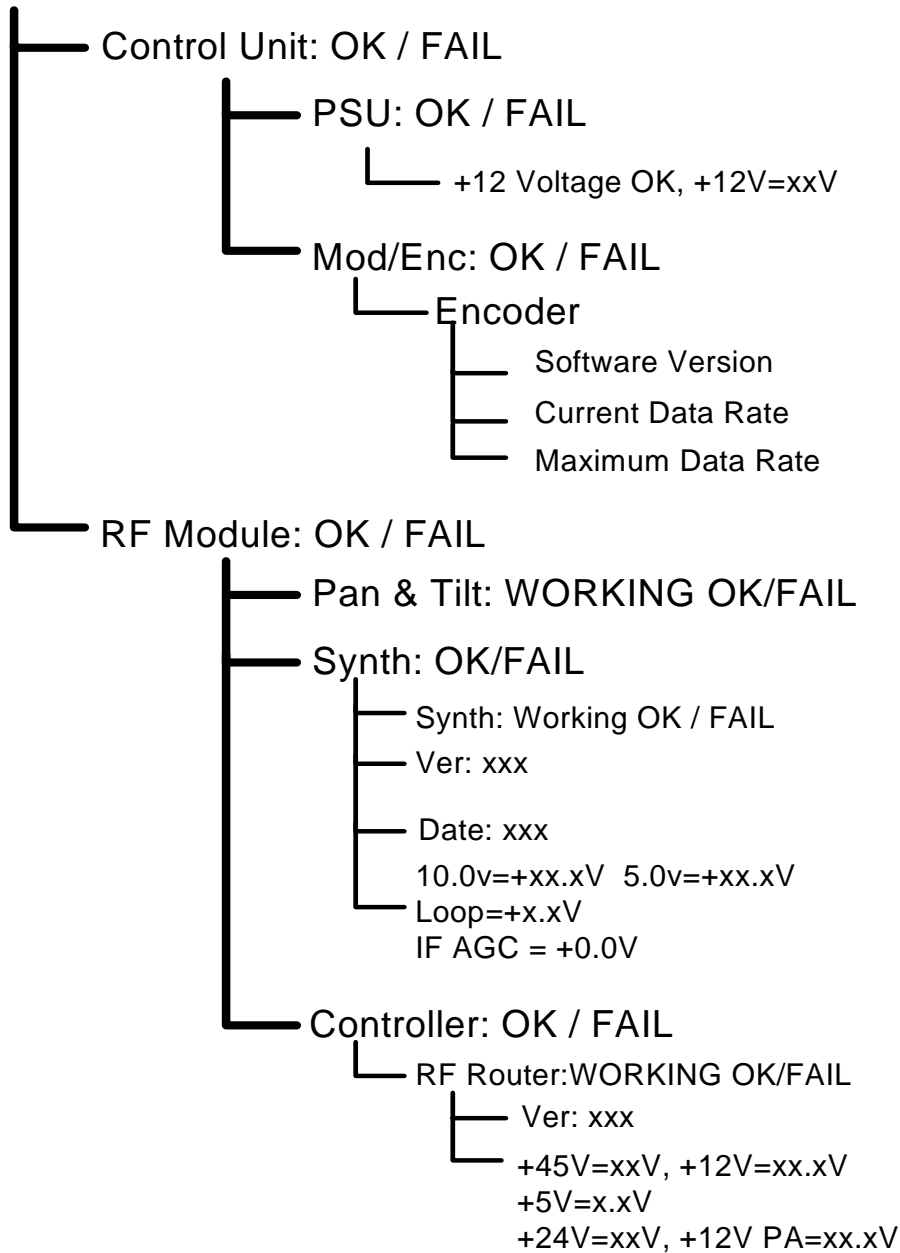


Figure 30: Menu Tree: “Monitoring & Alarms”

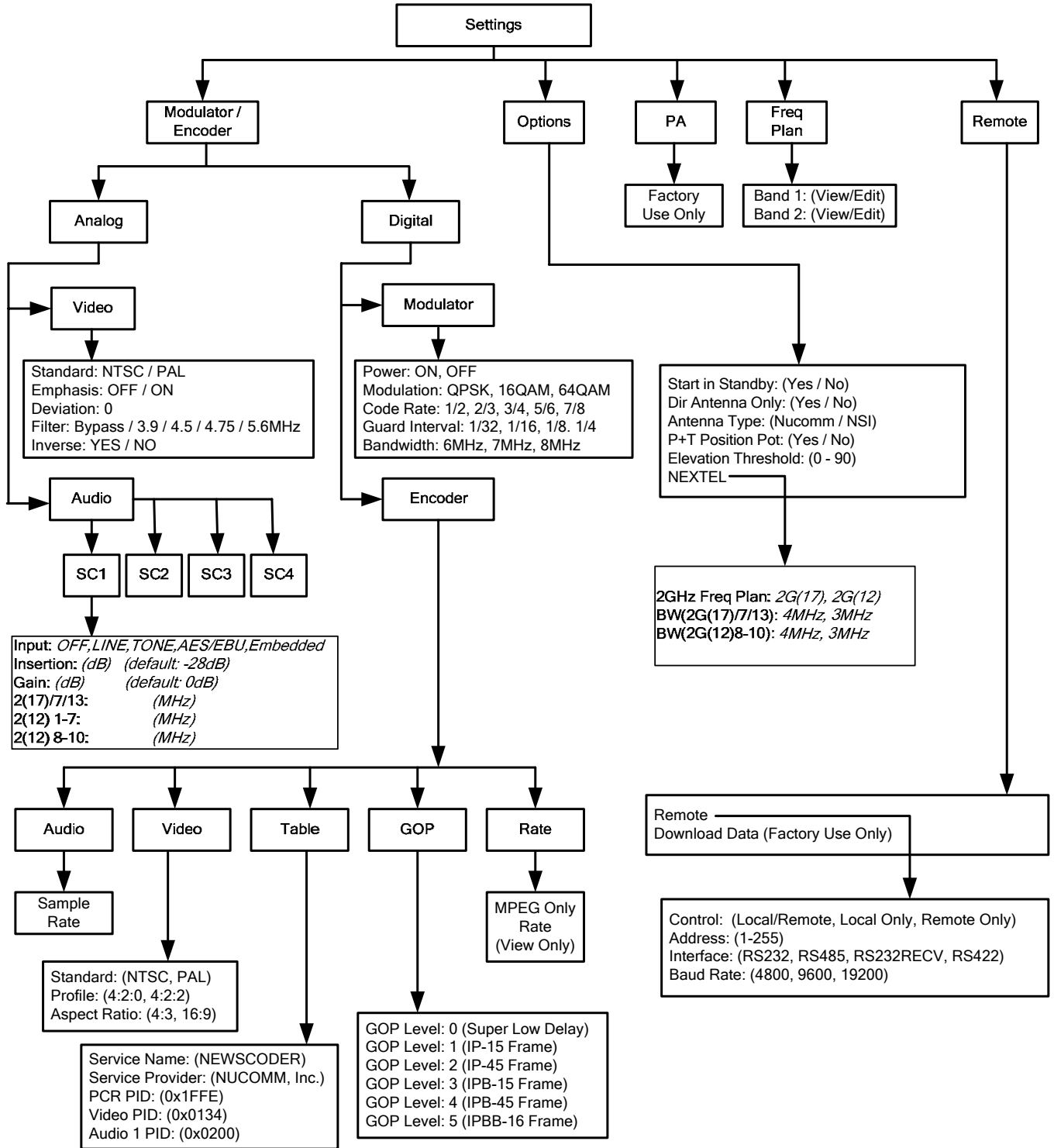


Figure 31: Menu Tree: “Settings”