

Table 4-3 NSI Quad Antenna Polarization Connector Pin Out

NEWSCASTER VT1 Connector Pin	Function	Recommended Wire Size (AWG)	NSI Antenna Connector Pin
A	V	#22 BROWN	A
B	H	#22 RED	B
C	2/7 GHz Band Select	#22 GREEN	L
D	CCW	#22 WHITE	D
E	Polarization Ground	#22 BLACK	E
	CW (Default)	N/C	C
		N/C	F
		N/C	H
		N/C	J
		N/C	K
		N/C	M

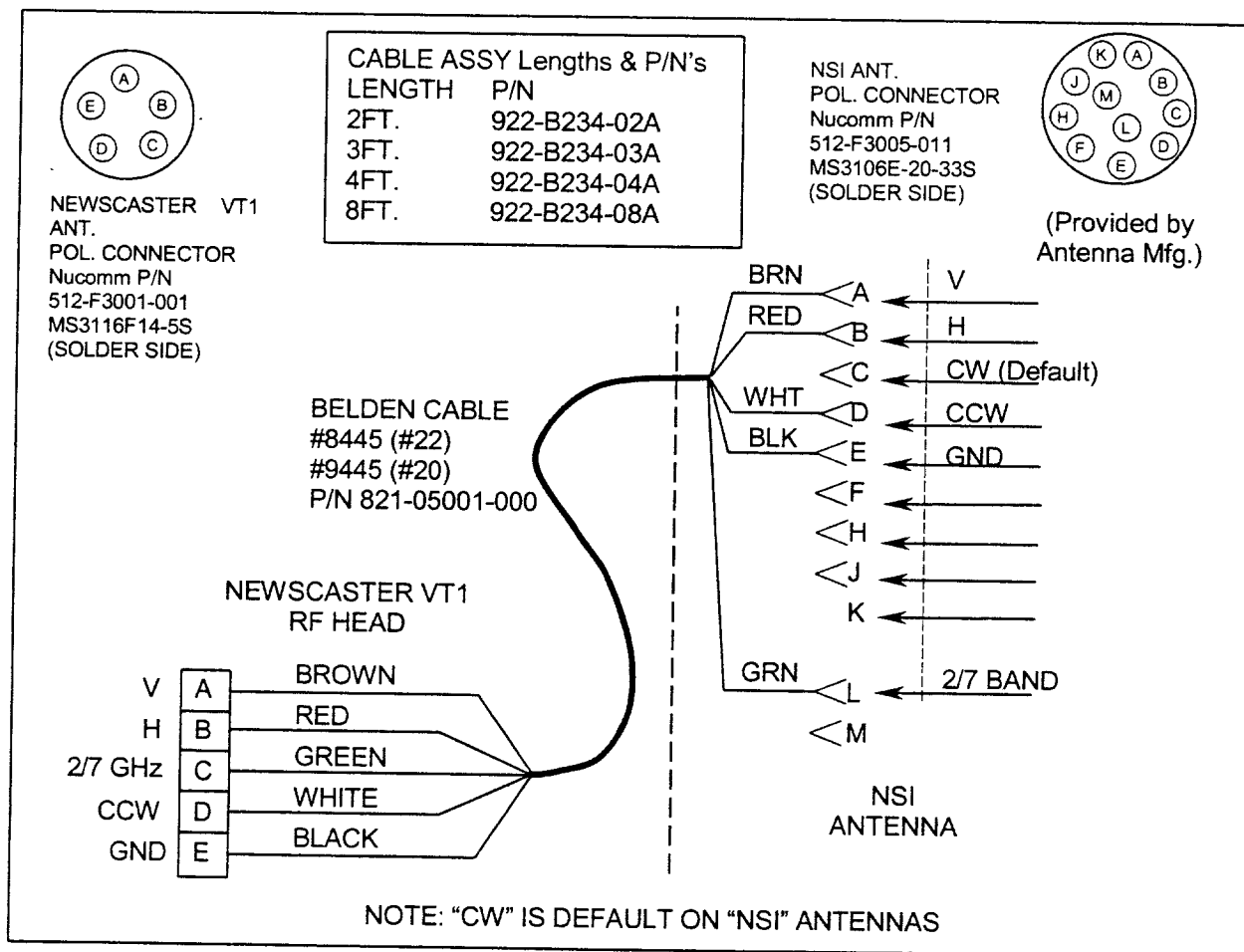


Figure 4-18 NSI Quad Antenna Polarization Connections

Table 4-4 Radio Waves Quad Antenna Polarization Connector Pin Out

NEWSCASTER VT1 Connector Pin	Function	Recommended Wire Size (AWG)	Radio Waves Antenna Connector Pin
A	V	#22 BROWN	F
B	H	#22 RED	B
C	2/7 GHz Band Select	#22 GREEN	G
D	CCW	#22 WHITE	C
E	Polarization +24V	#22 BLACK	K
	CW (Default))	N/C	
	Shield GND	N/C	L
	DC GND	N/C	M
		N/C	A
		N/C	D
		N/C	E
		N/C	H
		N/C	J

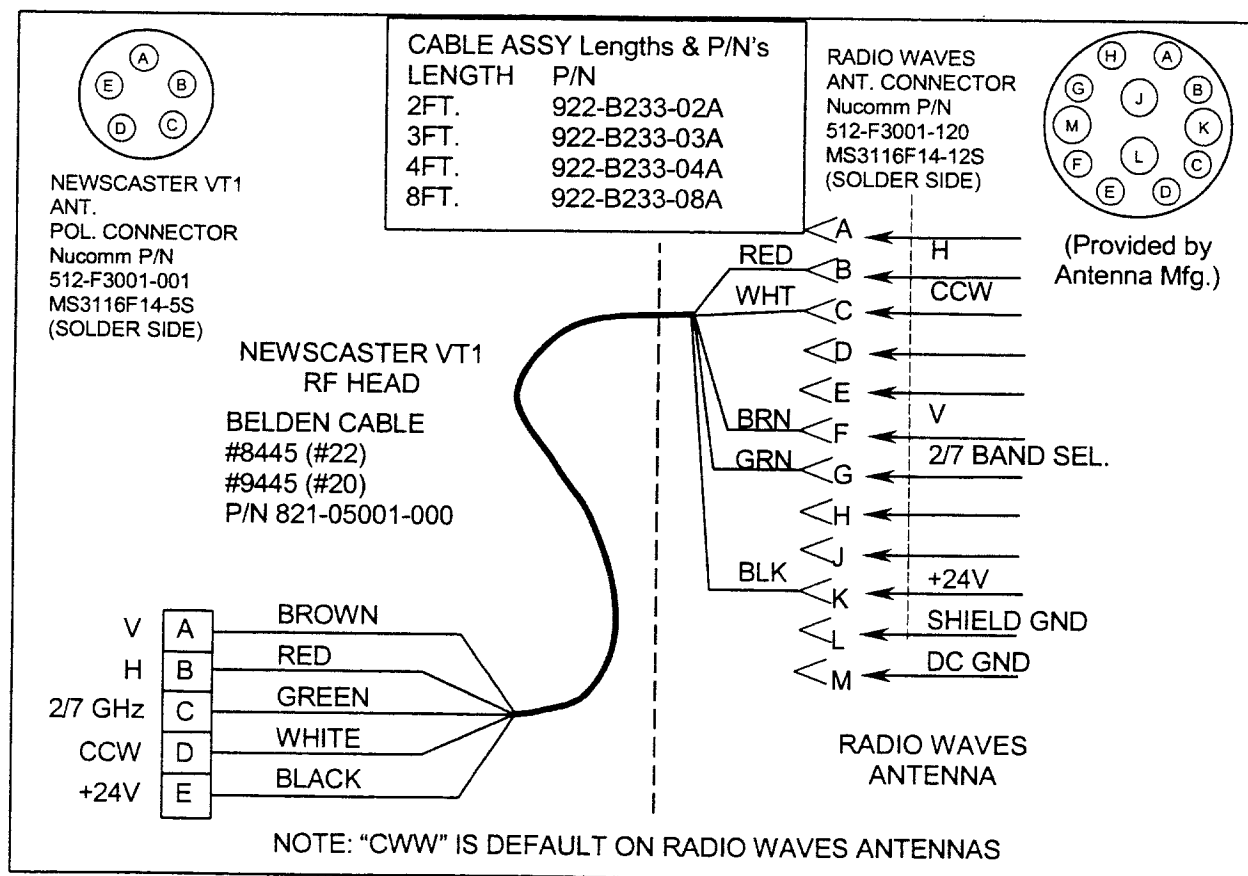
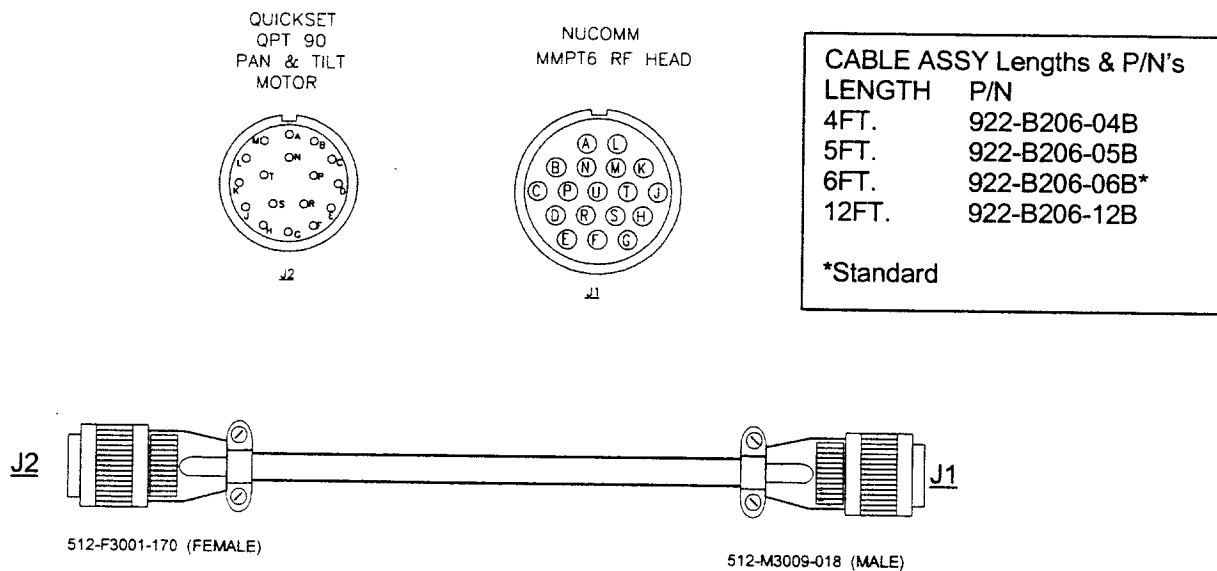
**Figure 4-19 Radio Waves Quad Antenna Polarization Connections**

Table 4-5 Quickset Model QPT90 12/120VDC Pan & Tilt Connector Pin-out**Pan & Tilt Motor Ass'y****RF Unit**

CONNECTOR 17 PIN	FUNCTION	RECOMMENDED WIRE SIZE AWG	CONNECTOR 18 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 "+" (120VDC 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 "-" (120VDC Units Only)	#20 Black	P
T	AZ Pot Wiper	#20 White	T
N/A	N/C	N/A	U

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

Cable: Belden # 9458, 15 Cond. #20

**Figure 4-20 Pan & Tilt Motor Interconnect Cable**

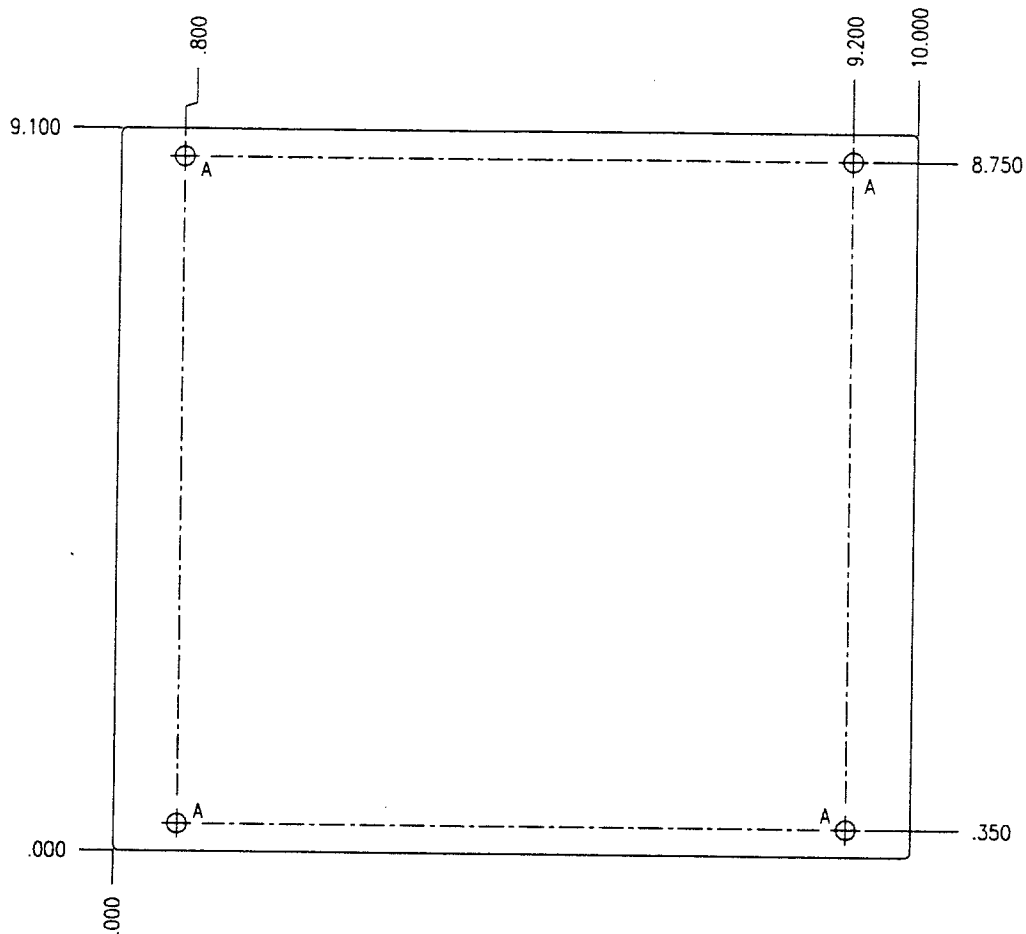


Figure 4-21 NEWSCASTER VT1 RF Unit Mast Mounting Plate

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 plate.

Table 4-6 Nycoil – Recommended Coiling Cable Lengths

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'

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5.0 OPERATION

5.1. Basic Front Panel Operations

On each screen, a selection cursor appears as an underscore character. This cursor is moved left (←) or right (→) using the respective arrow key. When the desired item has been identified with the cursor, the item is selected by pressing the Enter (ENT) key. Once selected a cursor (underscore) will begin to flash as a solid box. Use the up (↑) or down (↓) arrows to scroll through the settings. Once the desired setting has been made, the ENT key is used to confirm the entry. Only after the ENT key is pressed, does the change take effect. If the ENT key is not pressed and the keypad is left idle for 15 seconds the current selection will be discarded, and the previous one will remain. In the case of a multi digit selection, as in subcarrier frequency, the bold cursor can be moved left or right to select other digits. When the entire frequency has been entered, press the ENT to confirm the setting. Refer to Figure 5-2 for the Flow Chart.

Standard Screen:

The *Standard Screen* is the main screen that appears at power up. This screen displays the current channel, band, frequency, and output power. Note the cursor under the channel number.

6,887.500 MHz	5.0 W
CH= <u>1</u> BAND=6	

Channel Selection:

From the *Standard Screen* the channel can be changed by underscoring the channel number, then pressing ENT to

select the channel for editing. Using the up or down arrows the desired channel may be selected. To have the new channel take affect, press the ENT key. Once pressed the unit will likely enter standby as the synthesizer changes frequency. When the new frequency has been reached the unit will release the standby condition and transmission will resume.

Power Adjustment:

There are two power levels on the NEWSCASTER VT1:

- Analog
- Digital

These modes are automatically selected based on the *Input* signal selected from the front panel. Additionally HI and LOW power settings are available from the Front Panel. The output level can be changed 3 to 6 dB down for LOW power. The cursor is moved to underline the current power on the *Standard Screen* (shown below). The ENT key is pressed to select the item for edit. The up or down arrow is used to move the power up or down, the power will change the moment the arrow button has been released. The new value displayed is the current power. To end Power Editing, press the ENT key.

6,887.500 MHz	5.0 W
CH=1 BAND=6	

Frequency Direct:

This is an optional mode of operation. This allows the frequency to be changed without limitation to channels. To use, move the cursor to underline the frequency, and press the ENT key.

Using the left and right arrows selects the digit to edit and the up and down arrows to change the digit value. Continue this procedure until the entire frequency has been set. When complete press the ENT key to have the new frequency take effect. If a frequency is entered that is outside of the band of operation an error message will be displayed. The error message will contain the valid region of operation. The invalid frequency entered will be ignored. When operating in this mode the channel number will be 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 VT1 operating controls and indicators are shown in Figure 5-1. Location numbers provide for cross-reference between the Figure and description.

ON/OFF (1):

Power On/Off control.

STAT. (2):

The following Status Indicators indicate the status of the unit:

Remote:

When lit the unit is under control of the remote interface.

RF (Green):

Indicates RF power is present at the output connector.

STBY (Yellow):

Indicates the output is muted in the Standby Mode.

Alarm (Red):

Indicates one of the following:

- Synthesizer is out of phase lock (Places the unit in Standby).

- Audio subcarrier is out of phase lock (Does not place the unit in Standby).
- There has been a module failure (Does not place the unit in Standby unless the failed module is the synthesizer).

The exact reason for the alarm can be determined from the Alarm section of the Main Menu.

PRESET (3):

Three programmable preset keys are provided to save and recall system configurations. Input type, output power, channel number, and audio settings are saved. To program one of the Presets, *Press* and *Hold* the desired Preset key for *four* seconds to save the current settings.

LCD Interface (4):

The LCD is the main interface to the unit. The display shown in Figure 5-1 is *the Standard Screen*.

Entry Keypad (5):

This keypad is used to navigate through the LCD menus and to change menu options. The *ENT* key is used to enter and exit an edit mode, and to select within the menus. See Section 5-2 for specific operations.

MODE (6):

The MODE key is used to select the four operating modes. The selections are:

NORMAL:

The NEWSCASTER VT1 Transmitter is active, whether or not a video (or composite) input signal is applied.

STANDBY:

The NEWSCASTER VT1 Transmitter is in STANDBY and will not transmit until switched to another mode. In this

mode, the frequency synthesizer is locked on frequency.

V. PRES. STBY:

This mode is only selectable if the input is set to *VIDEO*. If no video is present, the transmitter automatically switches to *STANDBY* after a two-second delay (minimum). This mode

is used to remotely place the transmitter into *STBY* when a video signal is removed. If the Test Generator is installed, the user may select Color Bars to be activated rather than having the unit go into *STBY*. See Section 5.3.1.

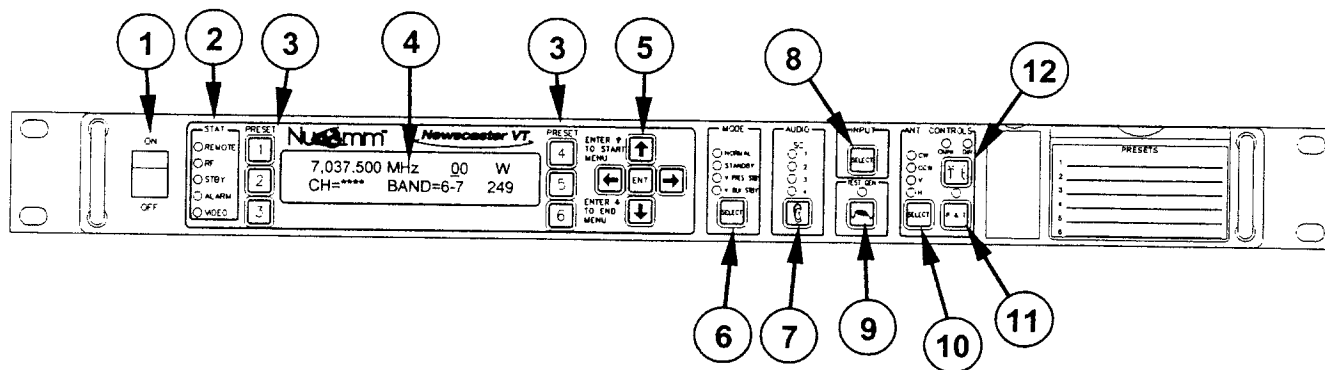


Figure 5-1 NEWSCASTER VT1 Front Panel Controls and Indicators

V-BLK STB:

This mode is only selectable if the input is set to *VIDEO*. If the camera is capped, or black video is present at the video input (no vertical interval signals present) the NEWSCASTER VT1 will be switched into Standby within 30 seconds. If the black video or black burst is removed, the NEWSCASTER VT1 will switch to Standby in 2 seconds. When the video signal is reapplied, the unit will return to the Normal mode within 2 seconds. If the TEST GEN is installed, the user may select Color Bars to be activated rather than having the unit go into *STBY*.

AUDIO (7):

The *AUDIO* quick key is used for basic mode (Line/MIC/Tone/Off) and gain changes to the audio subcarriers independently. When pressed the *Standard Screen* is replaced with the

AUDIO Quick Key Screen as shown below. The gain or mode selection is made using the left or right arrow keys and edited using the standard editing procedure (Section 5.2.). Additional subcarriers are selected using the up and down arrows. To edit the frequency, see the *NEWSCASTER VT1 Settings* (Section 5.3.1.).

SC1	6.200MHz	MIC	+2 dB
■		■	28kHz

The gain adjustment allows for ± 9 dB of gain. This can be used to compensate for variance in line or mike levels. 0 dB has been set using a 1kHz, +8 dBm input to produce a subcarrier deviation of 75 kHz peak (100 kHz peak for PAL).

When *LINE* is selected, the unit will accept a balanced 600-Ohm input at +8 dBm. At 1 kHz input, the unit has headroom up to +18 dBm.

When MIC is selected, the unit will accept a balanced 1k-Ohm input from -50 to -30 dBm. An internal AGC maintains the average subcarrier deviation at 50 kHz. (67 kHz for PAL).

Four LED's (1 through 4) indicate the current status of the audio channels as follows:

GREEN – Channel is ON and functioning properly.

GREEN (Flashing) – Indicates over modulation.

RED – Trouble indication.

OFF – Channel is "OFF" or not provided.

INPUT (8):

The *INPUT* quick key is used to select the mode of the input BNC connector. When pressed the *Standard Screen* is replaced with the *Input Screen*. To change the mode of the input BNC press the *ENT* key to enter edit mode. Use the up and down arrows to select the desired input. To confirm entry, press the *ENT* key. To return to the *Standard Screen*, press the *Input* key or wait 15 seconds.

Input
Video

When any of the analog selections are made the power amplifier is placed into the analog mode (Class-C). The analog selections from the *Input* quick key include:

Video

In this mode, the program video signal applied at the *INPUT* connector is routed through the internal low pass filter to modulate the *NEWSCASTER* VT1 output. Typically, this filter has a bandwidth of about 4.0 MHz for NTSC and 5.6 MHz for PAL. The NTSC filter

selectivity is such that the higher frequency components of the video will not interfere with the 4.83 MHz audio subcarrier.

Tone

In this mode a 761.5 kHz (1512 kHz PAL) test tone is routed to the modulator to produce a Bessel Null of 8 MHz/Volt.

Baseband/FSK

This mode bypasses the video low pass filter. In this mode, the input bandwidth (about 10 MHz) is sufficient to pass a complete composite video plus audio subcarriers (Including a T1/E1 subcarrier with FSK or QPSK modulation). If the audio subcarriers are "ON" they will appear summed into the baseband signal.

When any of the 70MHz selections are made, the input connector is routed directly to the heterodyne up-converter. The 70 MHz selection from the *Input* quick key includes:

External 70 MHz FM

This selection switches the power amplifier into the analog mode (Class-C).

External 70 MHz Digital

This selection switches the power amplifier into digital mode (Class-A).

TEST GEN (9) Optional:

The *TEST GEN* key allows for editing of the 16 character ID and selection of the waveform displayed. When activated the green LED above the key is illuminated. This is only selected when the input type is set to "VIDEO".

By pressing the *TEST GEN* button the *TEST GEN* is enabled and the LCD

displays the current pattern and ID. The menu will time-out after 2 seconds. Pressing the TEST GEN button a second time will disable the TEST GEN. If PROG W/VID is selected the TEST GEN will gen-lock to the incoming video and place the ID into the Vertical Interval. The following options are available for NTSC:

- Colorbars with ID
- Multiburst with ID
- Linear Ramp with ID
- Program with VID

The following options are available for PAL:

- Colorbars with ID
- Multiburst with ID
- Program with VID

ANTENNA CONTROL (10):

The SELECT key is used to change the antenna polarization.

PAN & TILT (11):

This key is used to enable the Pan & Tilt. When first pressed, the Red indicator LED is turned "ON" indicating that the power to the Pan & Tilt is enabled. Any movement detected on the joystick will cause the Pan & Tilt to move in that direction. There is a display for the operator to view the movement of the antenna. When operating the Pan & Tilt, the operator MUST view the antenna's movement to reduce the danger of hitting power lines. When the desired position has been reached, press the Pan & Tilt button to disable power to the Pan & Tilt motor. This will reduce the possibility of unintentional movement of the antenna.

ANTENNA SELECTION (12):

This key is used to select which antenna is used. The antenna selection toggles

between using the Omni or Directional antenna as the antenna in use.

5.3. Main Menu

The Main Menu contains settings that will ordinarily not be required during standard operation. The Main Menu is used to set the following:

- Modify the frequency plan
- View trouble-shooting information
- Changing subcarrier frequencies
- Changing video configurations
- Setting up the remote interface

Refer to Figure 5-2 for a tree diagram of the menu. To enter the Main menu, hold the up (↑) arrow and press the ENT key. To select a sub menu from the Main Menu use the cursor to underscore the menu desired. Press the ENT key to select the menu. To back up a level in the menu use the arrow in the upper left side (←) of the menu.

Settings
Monitoring/Alarm

Selecting NEWSCASTER VT1 Settings accesses the system settings. Under this submenu, video and audio settings are set, frequency plan is selected, and Remote Configuration and Factory Download are enabled.

← Modulator/Encoder	PA
Frequency Plan	Remote

Selecting Monitoring/Alarm, status can be obtained on the Control Unit and the RF Unit.

← Control: OK
RF Module: OK

5.3.1. NEWSCASTER VT1 Settings

Video Configuration:

Video invert and emphasis are edited from this menu. If the NEWSCASTER VT1 is used with existing equipment that causes the video to be inverted, the video can be pre-inverted at the transmitter to compensate for the receiver. If desired, the pre emphasis network may be bypassed.

← Video Level: 0
Video Emphasis: ON

Pressing the UP or DOWN arrow selects the Video Standby screen. Video Black Standby and Video Standby are selected from this menu. STBY can be changed to TEST GEN when this option is installed.

← Vid-Blk Stby: Standby
Video Standby: Standby

← Vid-Blk Stby: TEST GEN
Video Standby: TEST GEN

← Video Inverse: NO

Audio Configuration:

This menu allows for viewing and editing of the audio configuration. The audio input mode, emphasis or flat, subcarrier frequency and level are selected from this menu. Pressing the UP or DOWN arrow toggles between the audio inputs.

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

Frequency Plan:

This menu allows for viewing and editing of the frequency plan.

← Frequency Band
2GHz

Remote:

This menu allows for remote configuration through a PC. The type of interface (RS232, RS485 or RS422), BAUD, and address (RS485 or RS422) is selectable from here. The Download Data is provided for use by factory personnel the only.

← Remote Cfg
Download Data

5.3.2. Monitoring/Alarm (Trouble Shooting)

This screen provides a full listing of alarms with a description of what module has a problem and a description of the problem. In addition to trouble shooting, various monitoring information is available. To obtain additional information, select the module with the cursor, and press *ENT*.

← Control: OK
RF Module: OK

Control Unit:

The first screen under Control Module provides an overview of the Control Unit. To obtain more information on a specific module, move the cursor under the desired module's status, and press the *ENT* key.

← PSU:OK Audio:OK
Mod:OK Enc:N/A

Power Supply Screen:

Under this screen, the status of the voltages are displayed. The first line toggles between the two voltages.

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

Audio Subcarrier Screen:

Under this screen, the status of the audio subcarriers is displayed, toggling between all of the subcarriers. The subcarrier #, description, subcarrier deviation, and carrier lock are displayed.

← SC1:1 No Des
SC1 Dev. = 28kHz Lock: YES

Modulator Screen:

Under this screen, the status of the FM modulator is shown.

← Modulator:
FM Modulator Locked:

Router Screen:

This feature is not available at this time.

RF Unit:

The first screen under RF Module provides an overview of the RF Unit. To obtain more information on a specific module, move the cursor under the desired module's status, and press the *ENT* key.

← P&T:N/A Synth:OK
Controller:OK

P&T Screen:

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

← P&T:WORKING OK

Synthesizer Screen:

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

← Synth:OK
Loop=+2.9V

← Synth:OK
15.0= +14.5V 22.0= +23.2V

Controller Screen:

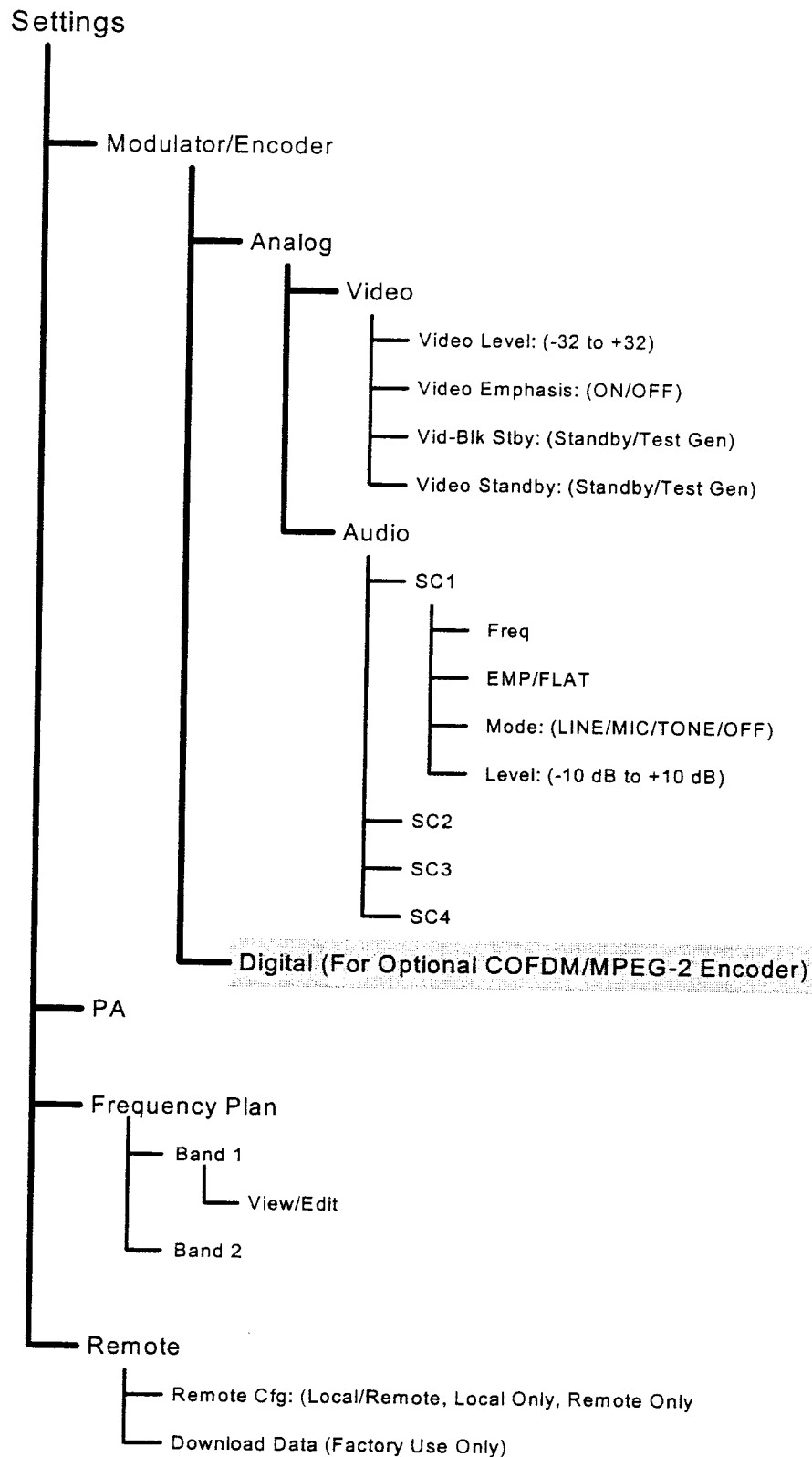
Three screens provide status on the voltages of the power supply, plus the firmware version of the control board in the RF Head. Pressing the UP or DOWN arrow shifts between the various screens.

← 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

**Figure 5-2 Main Menu Flow**

Monitoring/Alarm

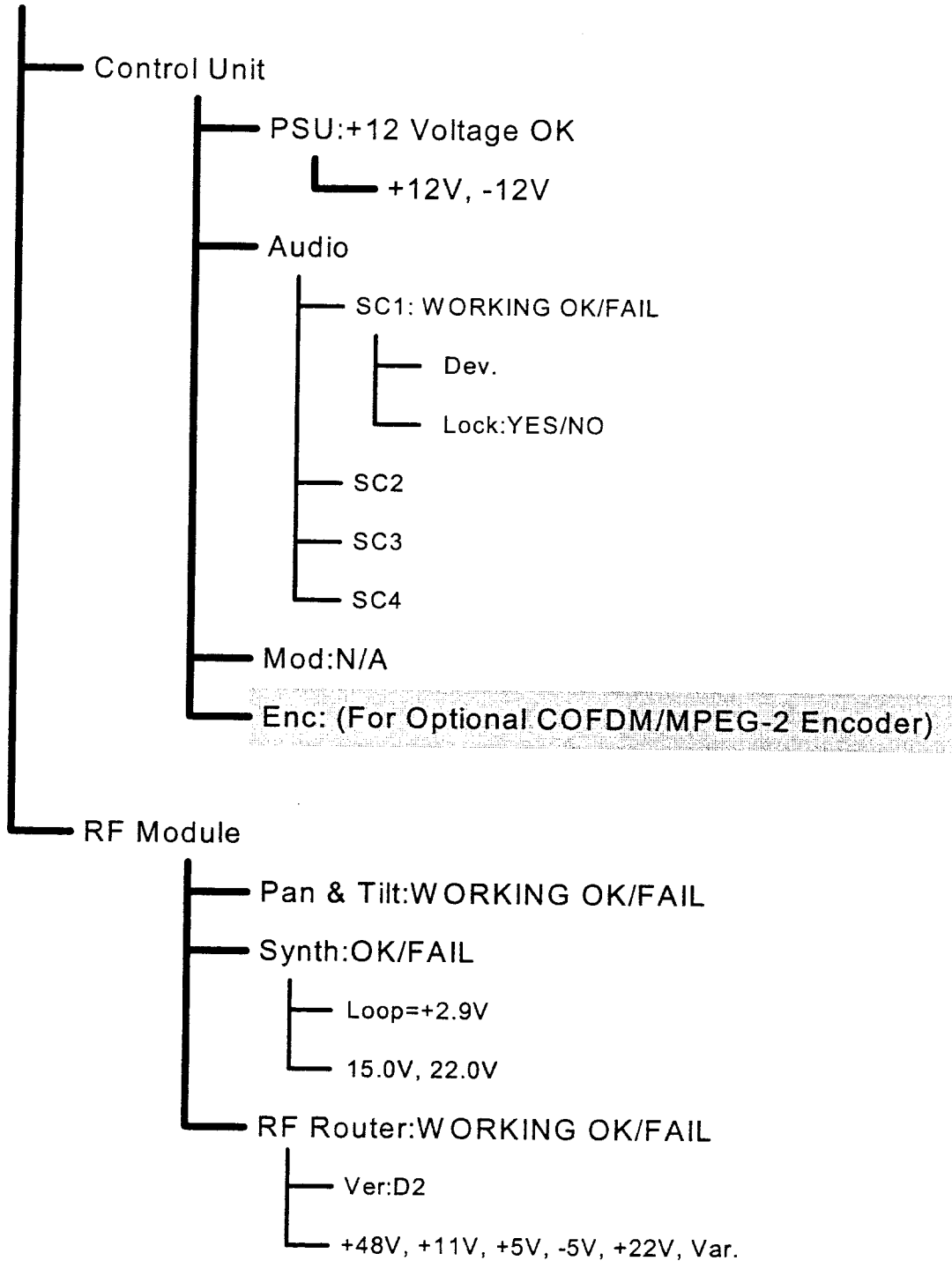


Figure 5-3 Monitoring/Alarm menu Flow

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6.0 Theory of Operation

6.1. General Theory of Operation

The following sections describe the overall transmitter system. Section 6.2 provides a general module description. See Figures 6-1 and 6-2 for the block diagrams.

6.1.1. Internal Communications and Control

The NEWSCASTER VT1 includes the latest in technology. Each module within the NEWSCASTER VT1 Transmitter contains a local microprocessor responsible for control and monitoring of the specific module. Each microprocessor is programmed only with the information needed to perform its specific task. The microprocessors talk back and forth using I²C, a two-wire network. When the system is started, each module performs a self-test to ensure quality performance.

The front panel microprocessor then polls each module for configuration information. The reason for this polling is if a new module is installed the front panel will re-configure itself with the appropriate menus and selections. This allows for a Plug and Play type of unit. While in operation the front panel continuously monitors all the microprocessors and peripherals to insure performance.

The Control Drawer and RF Head contain an I²C modem that allows the two units to communicate.

6.1.2. Signal Routing Discription

Analog Mode:

When Analog video is connected to the *Input* connector, it is routed to the

Baseband processor. The baseband processor formats the analog video and audio into a baseband composite video signal. The baseband signal is routed to the super-heterodyne up-converting module to 70MHz through the coax (or Optional triax) cable to the RF Head. This module mixes the 70MHz signal with the IFLO to produce a first IF of 1500MHz¹. The 1500MHz signal is then mixed with the RFLO output of the synthesizer to produce the final RF output frequency. This signal is then amplified to the final output power and directed to the RF output connector (See Figure 6-1).

Digital Mode:

When a digital modem is used, the 70MHz is connected to the *Ext. 70 MHz Input* connector and routed to the super-heterodyne up-converting module through the coax (or Optional triax) cable. This module mixes the 70MHz signal with the IFLO to produce a first IF of 1500MHz. The 1500MHz signal is then mixed with the RFLO output of the synthesizer to produce the final RF output frequency. This signal is then amplified to the final output power and directed to the RF output connector (See Figure 6-1).

The 1500MHz the standard IF. Other IF frequencies are used for special frequencies as specified on the front cover of this manual.

¹ For discussion purposes 1500MHz will be used throughout the manual as the IF frequency. The actual frequency will vary depending upon the actual RF frequency band. Refer to Tables 6-1 through 6-2 for the actual IF used.

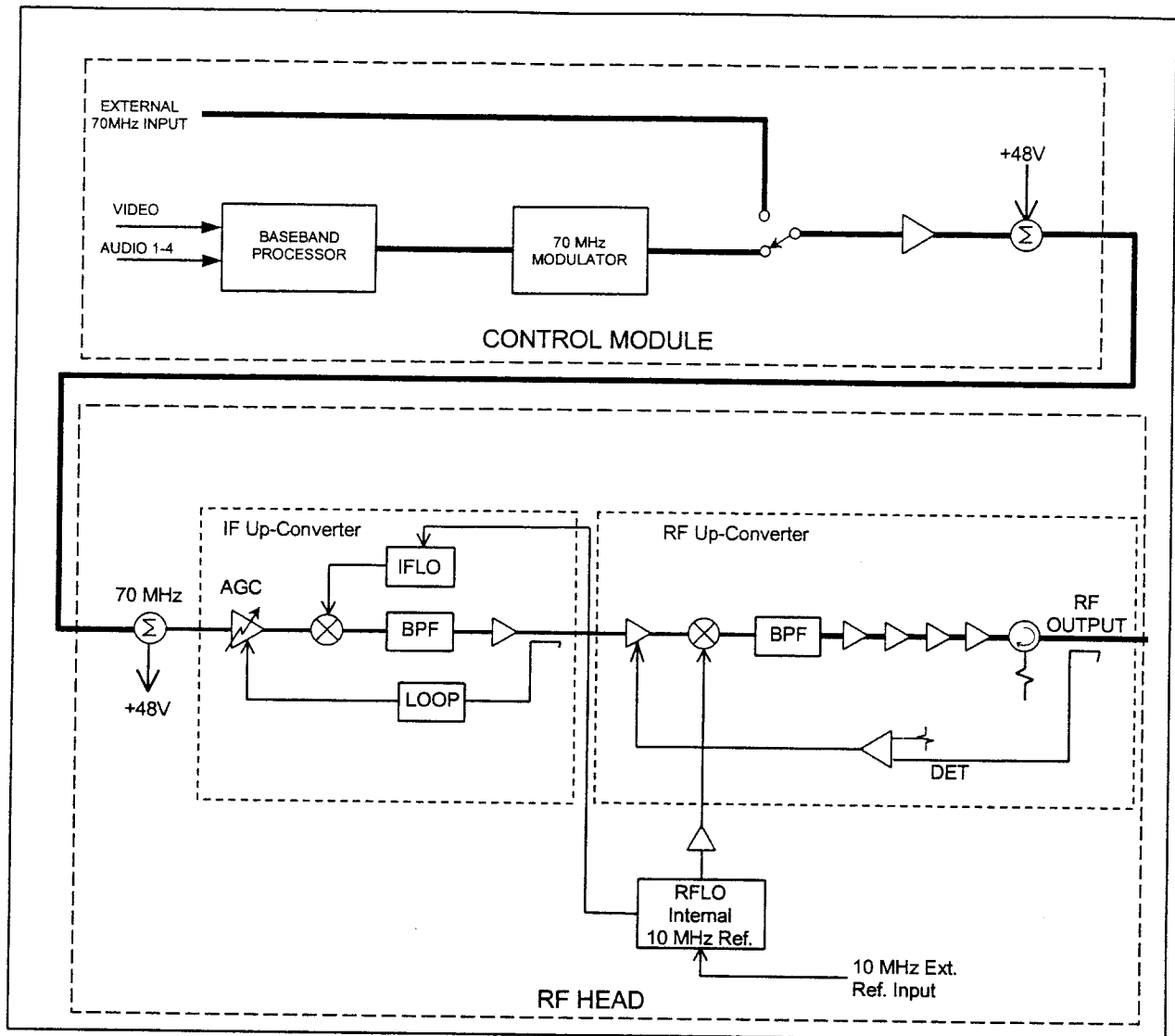


Figure 6-1 Single Band Transmitter Functional Block Diagram

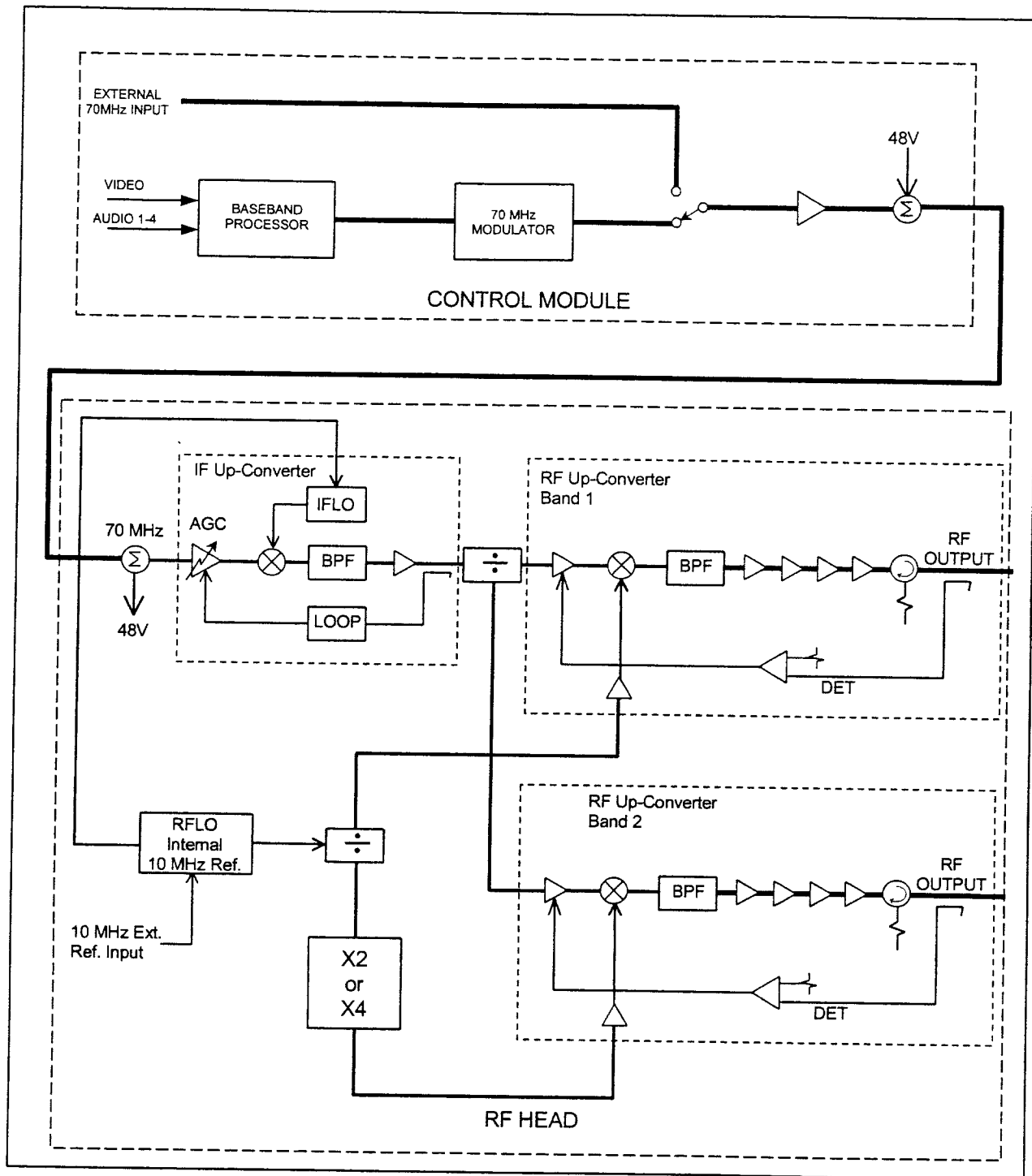


Figure 6-2 Dual Band Transmitter Functional Block Diagram

6.2. General Module Description

6.2.1. Control Unit *Smart Display* Board

The control board is the heart of the *Smart Display*. All unit controls originate from this control board. The *Smart Display* contains a microprocessor and a variety of peripheral interfaces. Control and monitoring commands originate from the microprocessor to other modules. The other modules reply with status signals that are displayed on either the LCD or various LED's on the front panel.

6.2.2. Baseband Processor Board

See Figures 6-3 and 6-4 for the Audio, and Video Block Diagrams. The baseband processor is located in the Control Unit. The baseband processor accepts composite video, or 1 video, 2 audio (4 Optional) baseband signals and a port to accept additional subcarriers. In addition to accepting these inputs, the baseband processor internally contains both Video and Audio test tones that are individual selected. It processes these inputs to produce a single composite baseband output signal. The baseband processor contains a microprocessor that handles all local board monitoring and control. The microprocessor accepts commands from the *Smart Display* to make all adjustments required.

At the input to the baseband processor there is a video switch used to route video, video test tones, ~~or the test generator~~ (Optional) to the baseband processor.

When video and audio signals are applied separately to the baseband processor, they are processed in

individual video and audio channels in the Video Processor. Video signals are filtered, to avoid interfering with the audio subcarrier, and emphasized according to the NTSC or PAL video emphasis curves.

Audio input signals are received from either a microphone or an interconnecting line from an audio mixer or similar device. In the MIC mode, an AGC circuit maintains a near-constant modulation level. The audio signals are emphasized and supplied to FM subcarrier modulators. The audio modulating waveform is monitored by a level detector, which raises an over-modulation alarm if the subcarrier deviation exceeds the preset limit. The output of the FM subcarrier modulators is combined with the video signal and with the external subcarrier port. The composite baseband signal is then routed to the 70 MHz modulator.

When a Composite signal is applied to the Input connector, it is routed to the baseband processor, amplified to a 1-Volt peak-to-peak level, emphasized and routed to the Frequency Synthesizer module for transmission. If the NEWSCASTER VT1's subcarriers are left "ON" they will be combined with the external baseband signal. This allows the ability to insert subcarriers in a baseband repeater configuration.