In units equipped with the Test Pattern/ID Generator option, the video signal is first DC-restored to remove any DC offset. This is necessary when the ID is placed in the vertical interval to maintain proper DC levels. The DC restorer is followed by a three-position electronic switch. This switch selects between three input signals: video, color bars or the 761.5 kHz *(1,512 kHz for PAL)* video test tone. The input is switched from the video source to the Test Pattern/ID Generator input during the ID vertical interval. The video DC restorer is automatically enabled when the Video with ID is selected from the front panel.

The video at the video input of the baseband processor is monitored by the microprocessor. This monitoring point detects the presence of video, black video or video sync. The microprocessor utilizes this information combined with the Standby Mode selection receiver from the *Smart Display* to control the standby modes. These modes were described in Section 5.1.

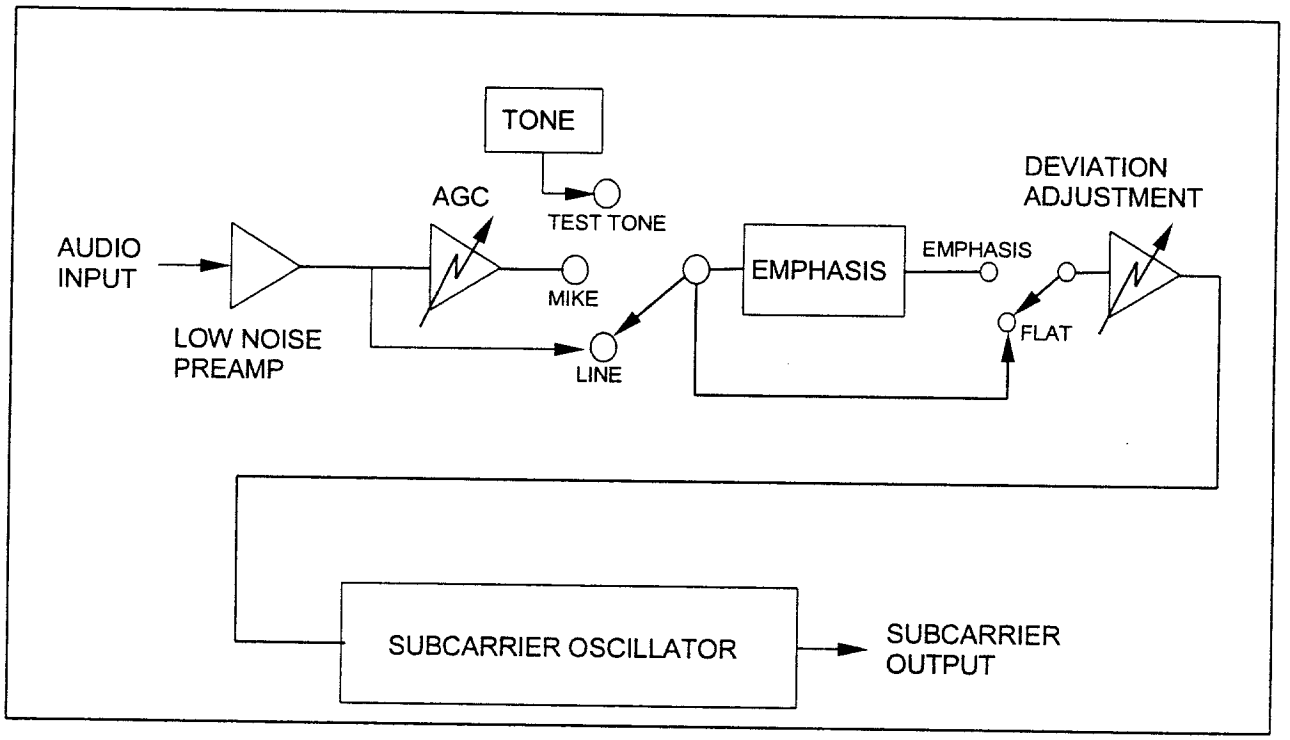

Figure 6-3 Audio Subcarrier Modulator Block Diagram

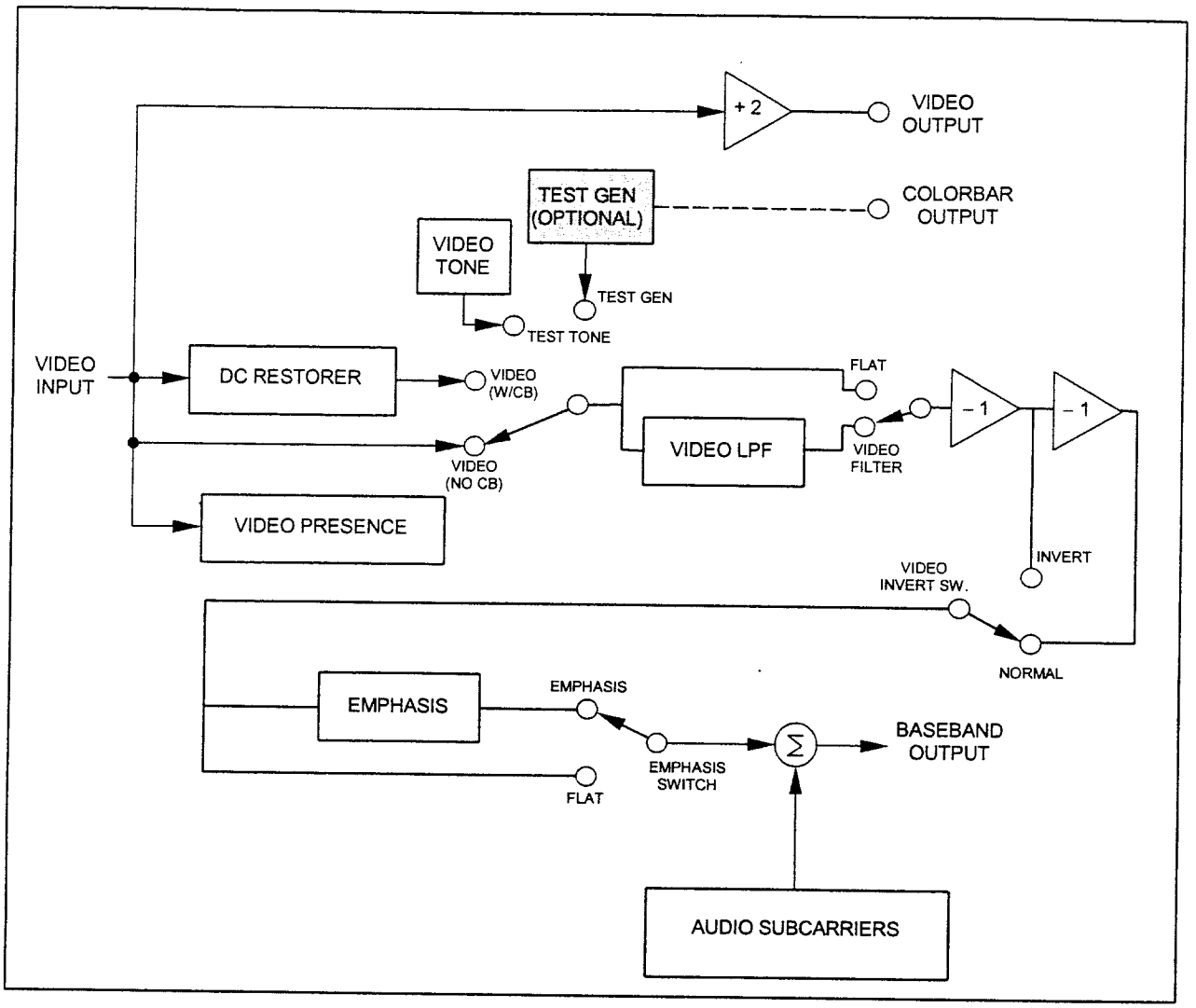

Figure 6-4 Video Modulator Block Diagram

6.2.3. 70 MHz Modulator Board

The 70 MHz output is passed through a switch to select either the 70 MHz from the internal modulator or 70 MHz from the external input connector. The output of the baseband processor is routed to the 70 MHz modulator. The baseband signal FM modulates the 70 MHz carrier. The 48 VDC from the power supply is combined with the 70 MHz IF through a diplexer and routed to the RF Interface connector.

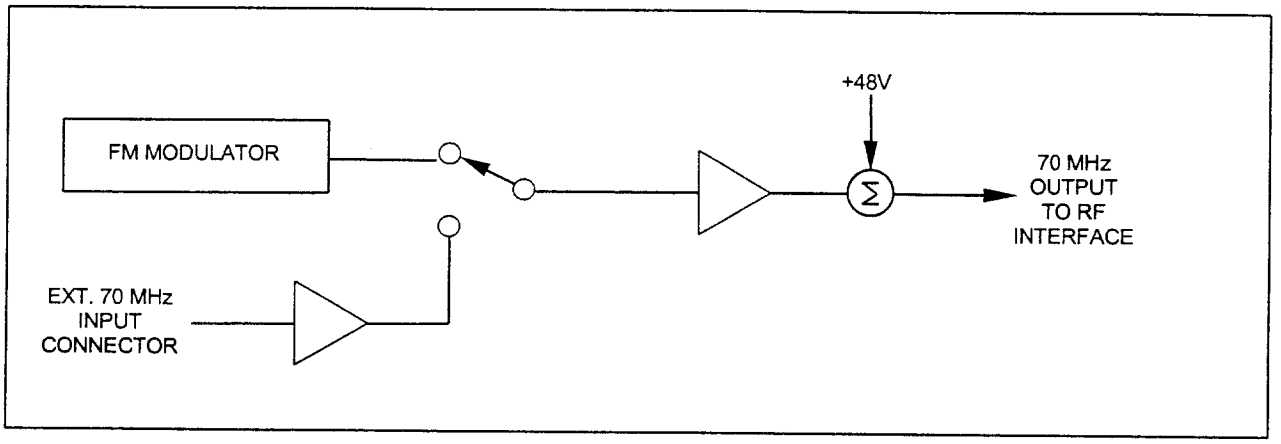

Figure 6-5 Block Diagram 70 MHz Modulator

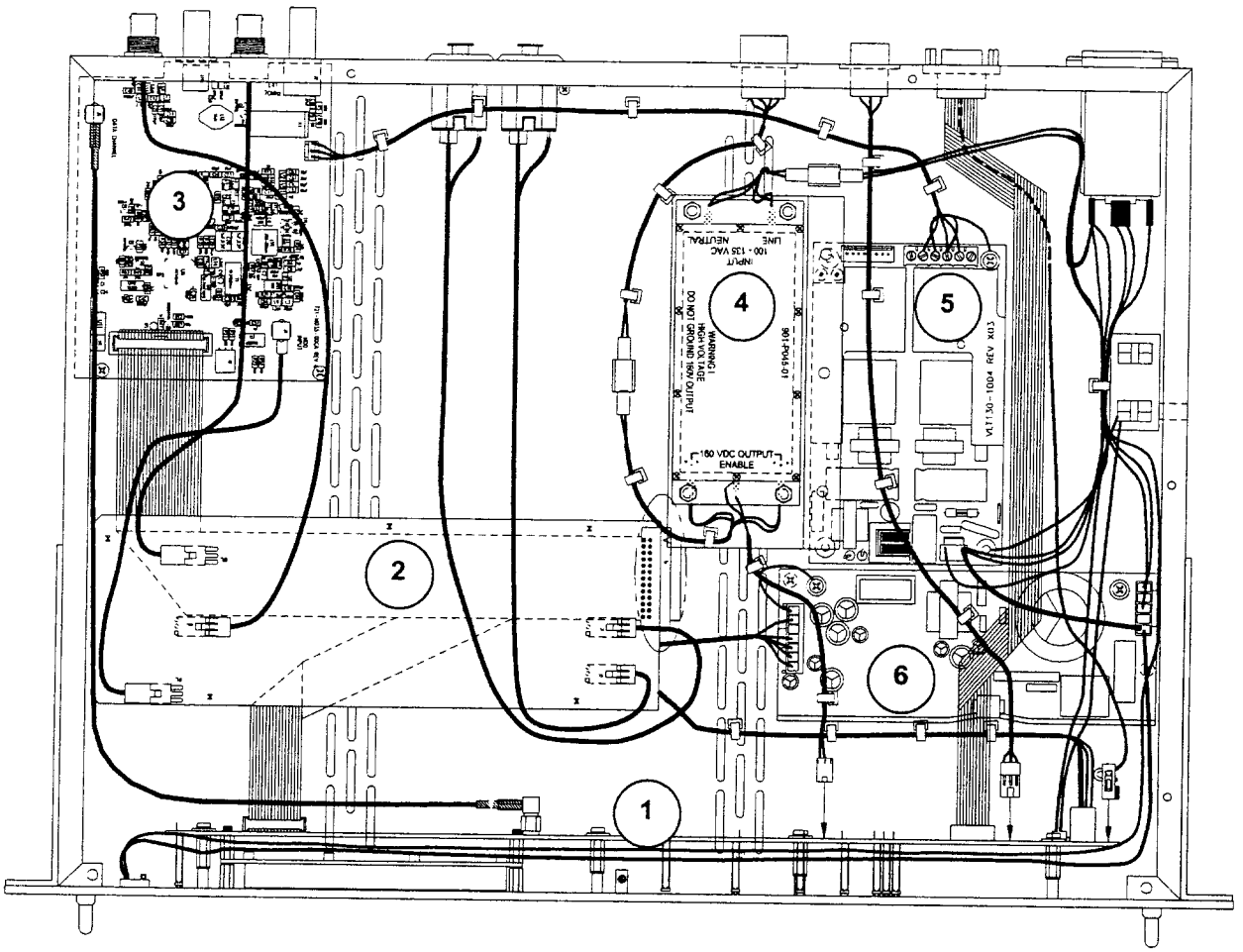

Figure 6-6 NEWSCASTER VT1 Control Unit Interior View

1. Smart Display Control Board (902-C056-XX)
2. Baseband Processor Board (903-V003-XX)
3. 70MHz Modulator Board (902-M035-XX)
4. 160 Volt Power Supply (901-P045-XX)
5. +48 Volt Power Supply (682-P0058-00A)
6. +5V, –12V, +12V Power Supply (683-P0044-00A)

6.2.4. Frequency Synthesizer

The Frequency Synthesizer assembly consists of a phase-lock loop, and a low noise microwave oscillator programmed by an internal microprocessor. The front panel microprocessor communicates with the synthesizer microprocessor telling it what frequency to attain.

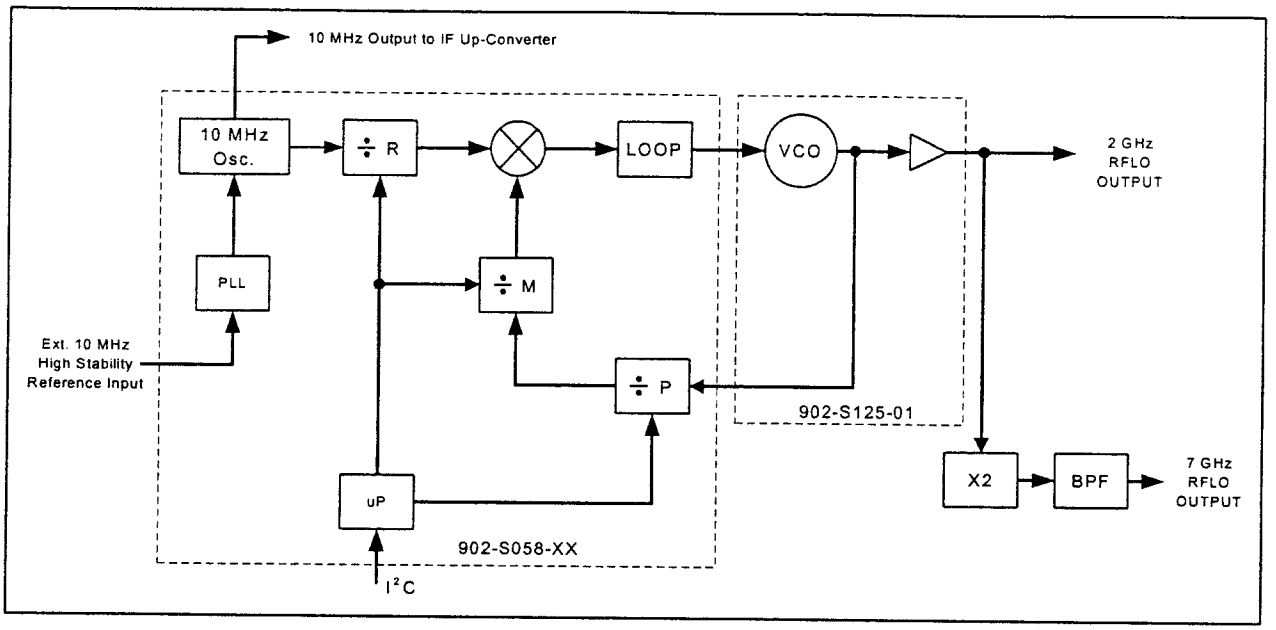

Figure 6-7 Simplified Block Diagram RFLO Low Noise Microwave Synthesizer

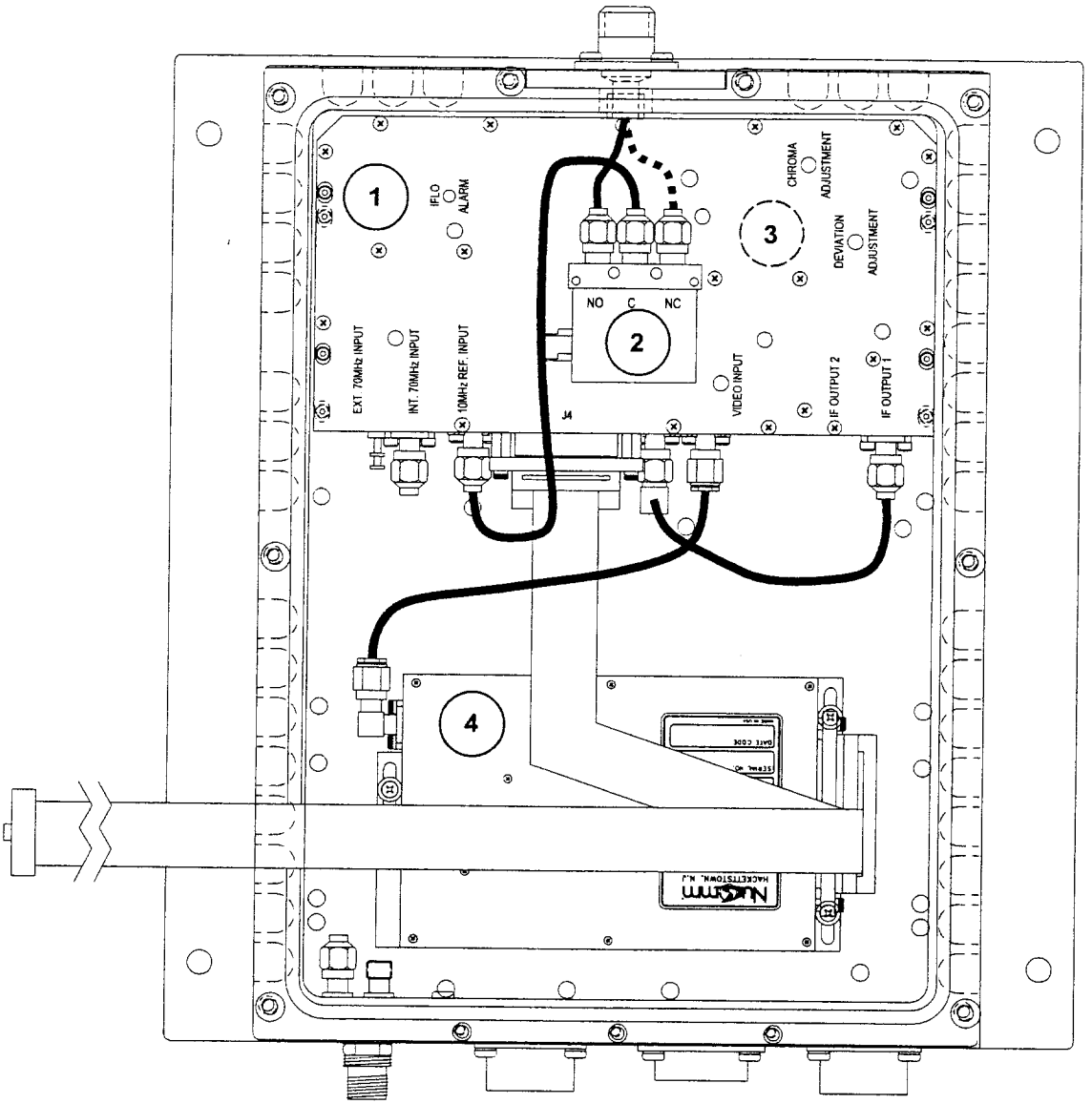

Figure 6-8 Single-Band NEWSCASTER VT1 RF Unit Interior View

1. IF Up-Converter Assembly (See Tables 6-1 and 6-2)
2. RF Relay (Switches between Directional and Omni antennas)
3. RF Up-Converter/Amplifier (Not shown – located under IF Up-Converter, See Tables 6-3 and 6-4)
4. Microwave Synthesizer (901-S058-XX)

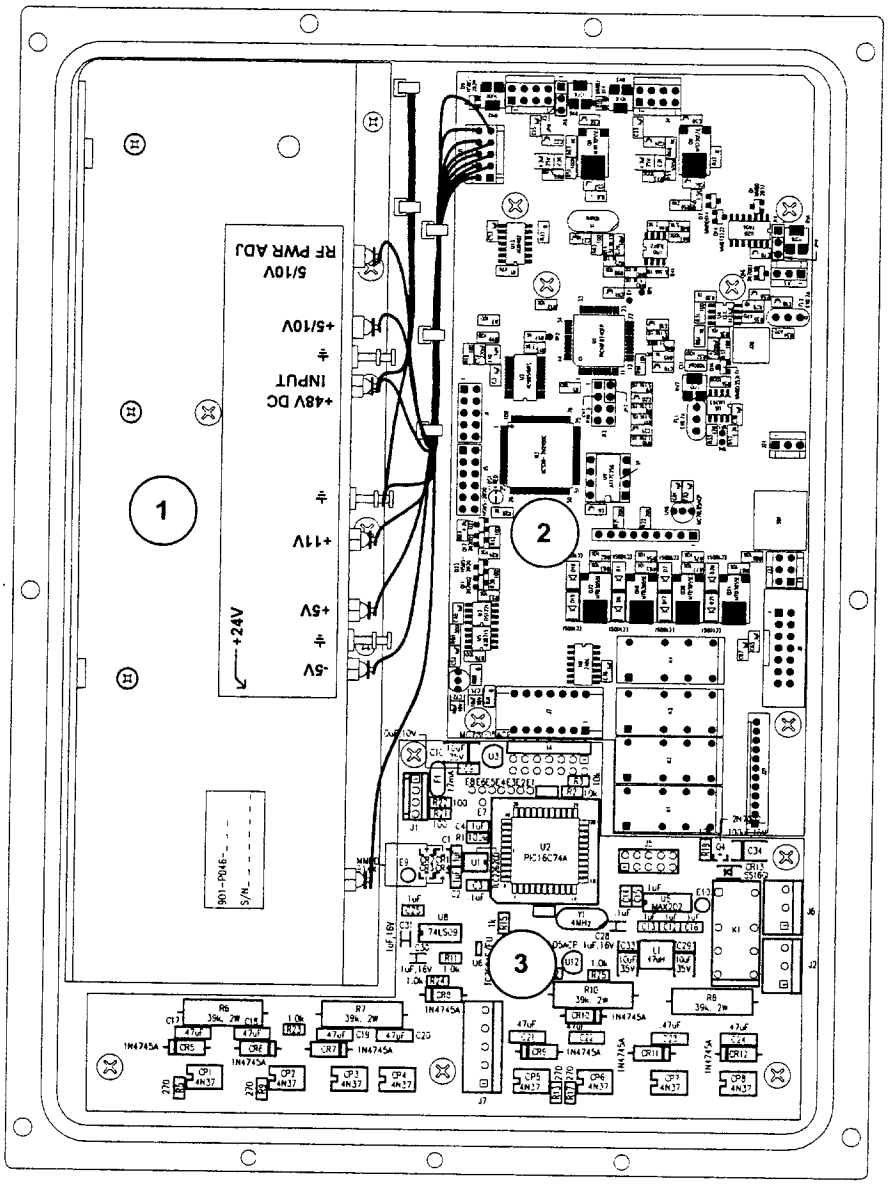

Figure 6-9 NEWSCASTER VT1 RF Unit Power Supply and Control Boards

1. RF Unit Power Supply (901-P046-XX)
2. RF Unit Control Board (902-C057-XX)
3. Pan & Tilt Assembly Controller (902-C061-XX)

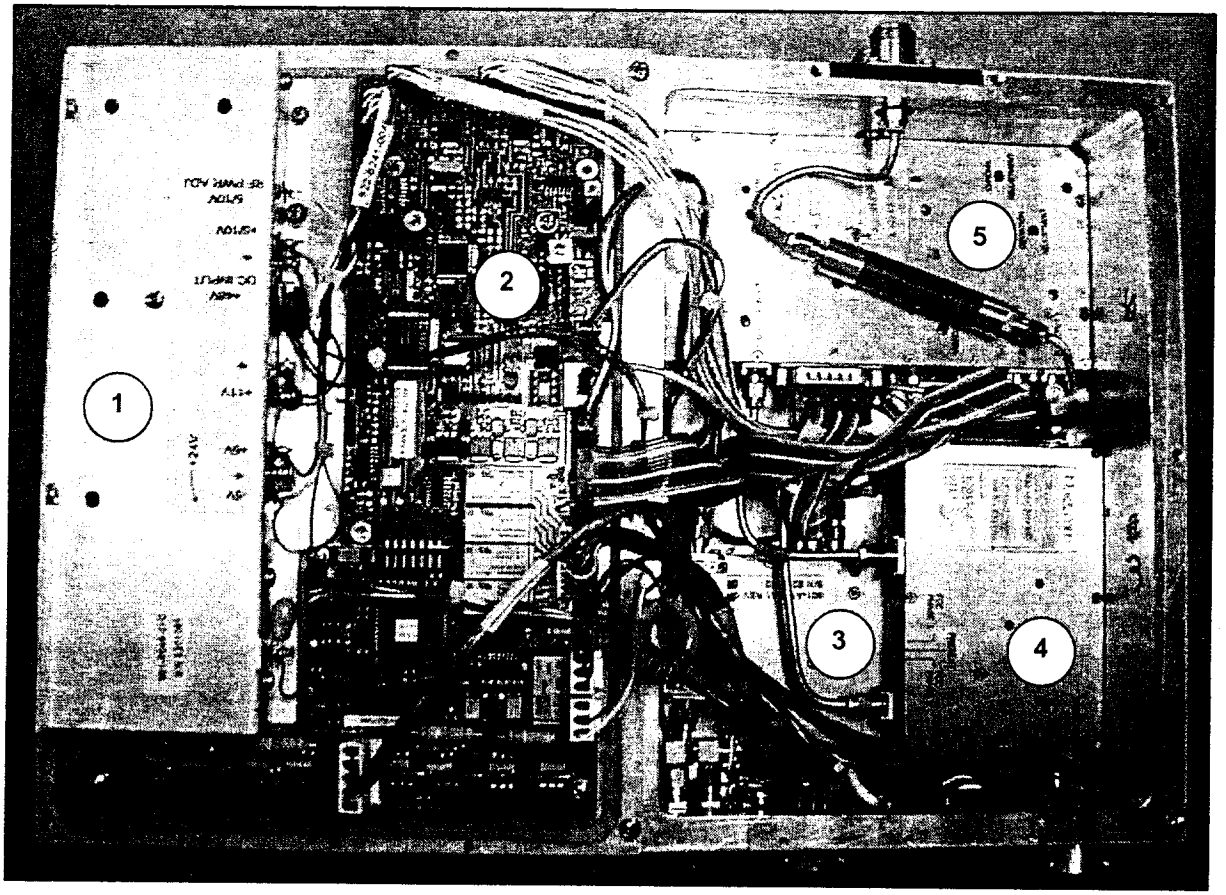

Figure 6-10 Dual-Band NEWSCASTER VT1 RF Unit w/Pan & Tilt Option Interior View

1. RF Unit Power Supply (901-P046-XX)
2. RF Unit Control Board (902-C057-XX)
3. RF Up-Converter/Amplifier (See Tables 6-3 and 6-4)
4. Microwave Synthesizer (901-S058-XX)
5. IF Up-converter Assembly (See Tables 6-1 and 6-2)
6. Pan & Tilt Assembly Controller (902-C061-XX)

6.2.5. RF Unit Control Board

The RF Unit contains a control board that is used to control the RF Unit. These controls include the following:

- Setting antenna polarization
- Power amp selection
- RF level (High or Low power)
- Setting the RF frequency
- Power supply voltage monitoring
- RF Unit trouble condition monitoring
- Relay output control

This control board receives all of its commands from the Smart Display in the Control Unit.

6.2.6. IF and RF Microwave Up-Converter and Power Amplifier

The IF signal from the Control Unit is passed through a diplexer to remove the DC from the signal. The IF signal is passed to the IF Up-Converter and the +48 VDC is routed to the RF Head power supply. Two up-converters are used to convert the 70 MHz modulated signal from the Control Unit to the final RF output frequency.

The IF Up-Converter up converts the 70 MHz input signal to the 1500 MHz frequency range. The IF output frequency may differ depending on the final RF output frequency.

The RF Microwave Up-Converter and Power Amplifier up converts the 1500 MHz signal to the final microwave frequency and amplifies it to the required power output level.

6.2.7. IF Up-Converter (P/N 901 I027-XXB)

A block diagram of the IF Up-Converter is shown in Figure 6-12. The 70 MHz input signal from the Control Unit is amplified in the AGC amplifier and inputted to the mixer. This signal is mixed with the synthesizer frequency to produce the 1500 MHz IF. The IF signal is band limited by the Band-Pass-Filter to remove the synthesizer signal. The IF signal is rectified and fed back to the AGC amplifier to maintain a constant -5dBm IF output level as the 70 MHz input signal varies.

6.2.8. RF Microwave Up-Converter (See Tables 6-3 and 6-4)

A block diagram of the RF Up-Converter is shown in Figure 6-13. The 1500 MHz input signal from the IF Up-Converter input is amplified in the AGC amplifier and inputted to the mixer. This signal is combined with the microwave synthesizer frequency to produce the final RF output signal. The RF signal is band limited by the Band-Pass-Filter to remove the synthesizer signal. The filtered RF signal is amplified to the final desired output power level. The RF signal is rectified and fed back to the AGC amplifier to maintain a constant RF output level as the 1500 MHz input signal varies. For FM signals, the AGC is set to full gain to run the PA in a saturated mode. For all digital signals, the AGC is enabled backing the amplifier out of saturation.

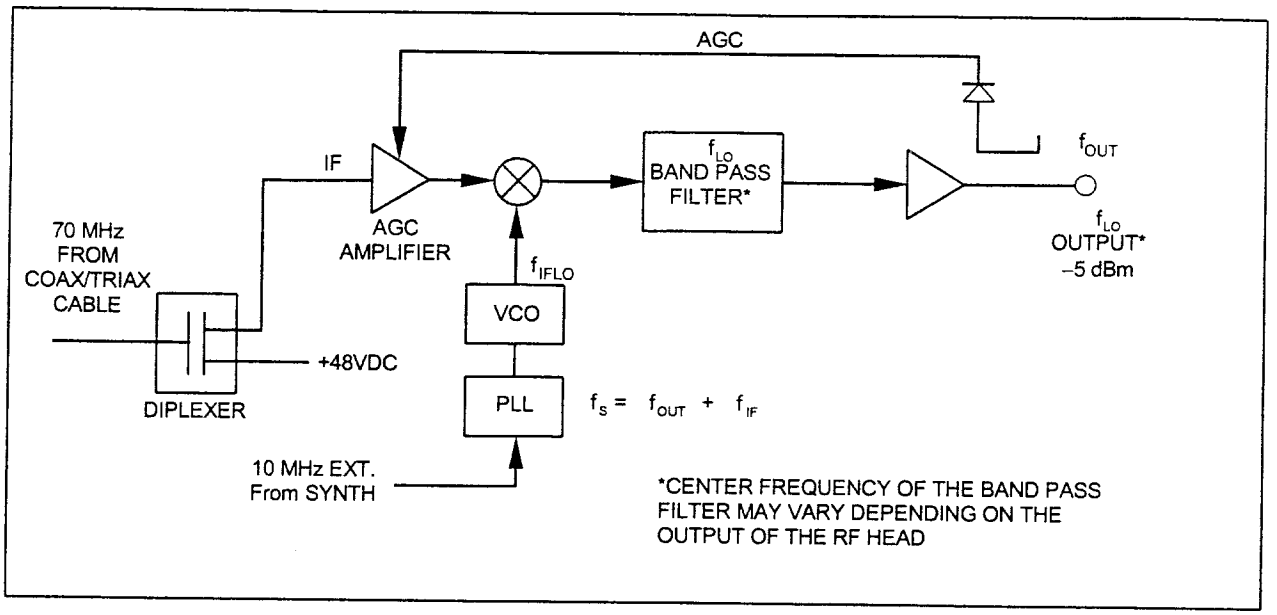

Figure 6-11 Block Diagram of the IF Up-Converter

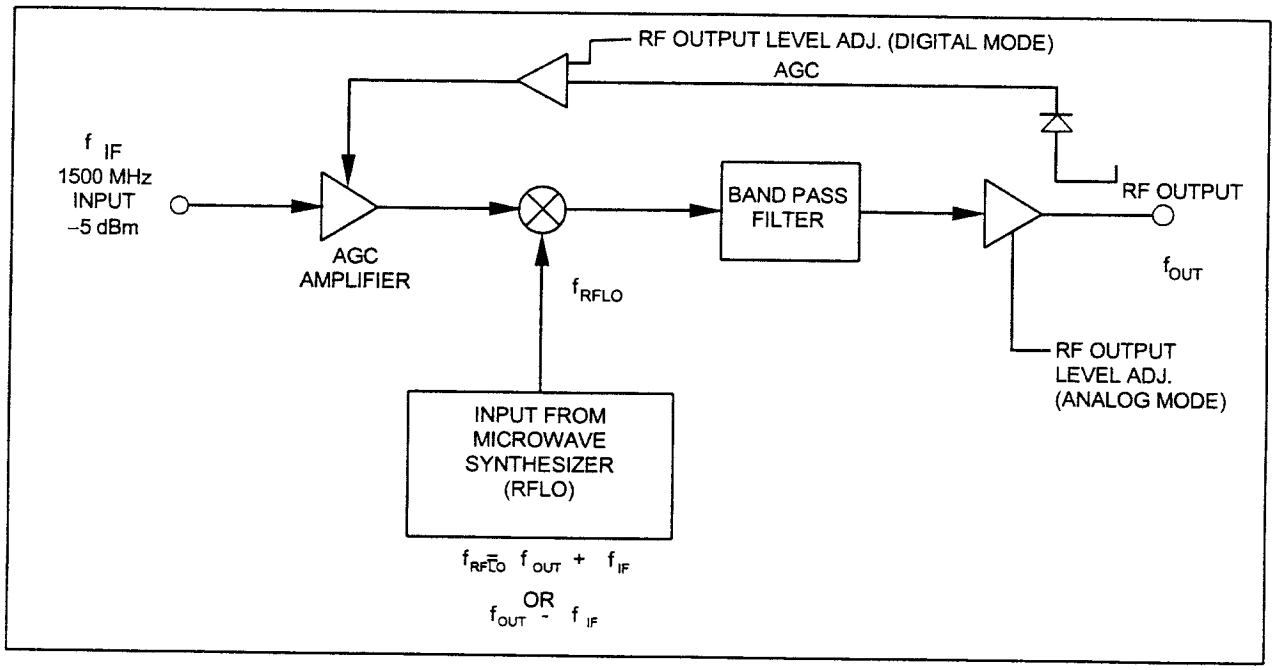

Figure 6-12 Block Diagram of the Microwave Up-Converter

Table 6-1 Single-Band NEWSCASTER VT1 IF Frequencies and Synthesizer

FREQ RANGES			IF Freq.	IFLO	901-	Synthesizer Range			Synthesizer
MHz		MHz	GHz	MHz	I027-XX	MHz		MHz	Part No.
1.340	TO	1.700	1.00	1070.00	TBD	2340.00	TO	2700.00	901-S058-06
1.700	TO	2.000	1.43	1500.00	-04	3130.00	TO	3430.00	901-S058-08
1.900	T0	2.300	1.5	1570.00	-05	3400.00	TO	3800.00	901-S058-09
1.900	TO	2.500	1.5	1570.00	-05	3400.00	TO	4000.00	901-S058-10
2.300	TO	2.700	1.5	1570.00	-05	3800.00	TO	4200.00	901-S058-10
3.000	TO	3.500	1.43	1500.00	-04	4430.00	TO	4930.00	901-S058-12
3.500	TO	4.000	1.5	1570.00	-05	5000.00	TO	5500.00	TBD
3.500	TO	4.000	1.5	1570.00	-05	5000.00	TO	5500.00	TBD
4.400	TO	5.000	1.43	1500.00	-04	5830.00	TO	6430.00	
5.300	TO	5.925	1.6	1670.00	-06	6900.00	TO	7525.00	
5.925	TO	6.425	1.43	1500.00	-04	7355.00	TO	7855.00	
6.425	TO	7.125	1.5	1570.00	-05	7925.00	TO	8625.00	
6.425	TO	7.125	1.5	1570.00	-05	7925.00	TO	8625.00	
6.425	TO	7.125	1.5	1570.00	-05	7925.00	TO	8625.00	
6.725	TO	7.420	1.6	1670.00	-06	8325.00	TO	9020.00	
7.100	TO	7.700	1.6	1670.00	-06	8700.00	TO	9300.00	
7.100	TO	7.700	1.6	1670.00	-06	8700.00	TO	9300.00	
7.100	TO	7.700	1.6	1670.00	-06	8700.00	TO	9300.00	
7.700	TO	8.500	1.5	1570.00	-05	9200.00	TO	10000.00	
7.700	TO	8.500	1.5	1570.00	-05	9200.00	TO	10000.00	
10.000	TO	10.700	1.6	1670.00	-06	11600.00	TO	12300.00	
10.700	TO	11.700	1.5	1570.00	-05	12200.00	TO	13200.00	
12.700	TO	13.250	1.5	1570.00	-05	14200.00	TO	14750.00	
12.700	TO	13.250	1.5	1570.00	-05	14200.00	TO	14750.00	
14.500	TO	15.350	1.6	1670.00	-06	16100.00	TO	16950.00	
14.500	TO	15.350	1.6	1670.00	-06	16100.00	TO	16950.00	
14.875	TO	14.975	1.6	1670.00	-06	16475.00	TO	16575.00	
14.875	TO	14.975	1.6	1670.00	-06	16475.00	TO	16575.00	

Table 6-2 Dual-Band NEWSCASTER VT1 IF Frequencies and Synthesizers

FREQ RANGES			IF Freq.	IFLO	901-	Synthesizer Range			Synthesizer
MHz		MHz	GHz	MHz	I027-XX	MHz		MHz	Part No.
DUAL BAND 2/7 GHz - 12/5 Watt									
1.99	TO	2.50	1.5	1570.00	-14	3490.00	TO	4312.50	901-S058-10
6.425	TO	7.125	1.5	1570.00					
DUAL BAND 2/7 GHz - 12/10 Watt									
1.99	TO	2.50	1.5	1570.00	-14	3490.00	TO	4312.50	901-S058-10
6.425	TO	7.125	1.5	1570.00					
DUAL BAND 2/13 GHz - 12/1.5 Watt									
1.990	TO	2.500	1.5	1570.00	-14	3490.00	TO	4000.00	901-S058-10
12.700	TO	13.250	1.5	1570.00					
DUAL BAND 2/13 GHz - 12/3 Watt									
1.990	TO	2.500	1.5	1570.00	-14	3490.00	TO	4000.00	901-S058-10
12.700	TO	13.250	1.5	1570.00					
DUAL BAND 7/13 GHz - 5/1.5 Watt									
6.425	TO	7.125	1.5	1570.00	-14	7925.00	TO	8625.00	TBD
12.700	TO	13.250	1.5	1570.00		14200.00	TO	14750.00	TBD
DUAL BAND 7/13 GHz - 10/1.5 Watt									
6.425	TO	7.125	1.5	1570.00	-14	7925.00	TO	8625.00	TBD
12.700	TO	13.250	1.5	1570.00		14200.00	TO	14750.00	TBD
DUAL BAND 7/13 GHz - 5/3 Watt									
6.425	TO	7.125	1.5	1570.00	-14	7925.00	TO	8625.00	TBD
12.700	TO	13.250	1.5	1570.00		14200.00	TO	14750.00	TBD
DUAL BAND 7/13 GHz - 10/3 Watt									
6.425	TO	7.125	1.5	1570.00	-14	7925.00	TO	8625.00	TBD
12.700	TO	13.250	1.5	1570.00		14200.00	TO	14750.00	TBD

Table 6-3 Single-Band NEWSCASTER VT1 Power Amplifiers

FREQ. RANGES			Analog		Digital		RF Up-Converter/ Amplifier
MHz		MHz	Typ	Min.	Typ	Min.	Part No.
1.340	TO	1.700	12	10	4.0	2.9	
1.700	TO	2.000	12	10	4.0	2.9	
1.900	T0	2.300	12	10	4.0	2.9	902-A105-01
1.900	TO	2.500	12	10	4.0	2.9	902-A105-01
2.300	TO	2.700	12	10	4.0	2.9	902-A105-02
3.000	TO	3.500	5	4	1.4	1.1	
3.500	TO	4.000	5	4	1.4	1.1	
3.500	TO	4.000	10	8	3.0	2.3	
4.400	TO	5.000	5	4	1.4	1.1	
5.300	TO	5.925	5	4	1.4	1.1	
5.925	TO	6.425	5	4	1.4	1.1	
6.425	TO	7.125	2	1.5	1.0	0.4	902-A104-02
6.425	TO	7.125	5	4	2.0	1.1	902-A104-03
6.425	TO	7.125	10	8	2.9	2.3	902-A102-01
6.725	TO	7.420	5	4	1.4	1.1	902-A112-03
7.100	TO	7.700	2	1.5	1.0	0.4	902-A107-02
7.100	TO	7.700	5	4	1.4	1.1	902-A107-03
7.100	TO	7.700	10	8	2.9	2.3	902-A108-01
7.700	TO	8.500	5	4	1.4	1.1	902-A109-03
7.700	TO	8.500	10	8	2.9	2.3	902-A100-01
10.000	TO	10.700	3	2.5	0.9	0.7	
10.700	TO	11.700	3	2.5	0.9	0.7	
12.700	TO	13.250	1.5	1	0.4	0.3	902-A117-01
12.700	TO	13.250	3	2.5	0.9	0.7	902-A117-02
14.500	TO	15.350	1.5	1	0.4	0.3	902-A101-01
14.500	TO	15.350	3	2.5	0.9	0.7	902-A101-02
14.875	TO	14.975	1.5	1	0.4	0.3	
14.875	TO	14.975	3	2.5	0.9	0.7	

Table 6-4 Dual-Band NEWSCASTER VT1 Power Amplifiers

FREQ. RANGES			Analog		Digital		RF Up-Converter/ Amplifier
MHz		MHz	Typ	Min.	Typ	Min.	Part No.
DUAL BAND 2/7 GHz - 12/5 Watt							
1.99	TO	2.50	12	10	4.0	2.9	902-A105-01
6.425	TO	7.125	5	4	2.0	1.1	902-A104-03
DUAL BAND 2/7 GHz - 12/10 Watt							
1.99	TO	2.50	12	10	4.0	2.9	902-A105-01
6.425	TO	7.125	10	8	3.0	2.3	902-A102-01
DUAL BAND 2/13 GHz - 12/1.5 Watt							
1.990	TO	2.500	12	10	4.0	2.9	902-A105-01
12.700	TO	13.250	1.5	1	0.4	0.3	902-A117-02
DUAL BAND 2/13 GHz - 12/3 Watt							
1.990	TO	2.500	12	10	4.0	2.9	902-A105-01
12.700	TO	13.250	3	2.5	0.9	0.7	902-A117-02
DUAL BAND 7/13 GHz - 5/1.5 Watt							
6.425	TO	7.125	5	4	2.0	1.1	902-A104-03
12.700	TO	13.250	1.5	1	0.4	0.3	902-A117-01
DUAL BAND 7/13 GHz - 10/1.5 Watt							
6.425	TO	7.125	10	8	3.0	2.3	902-A102-01
12.700	TO	13.250	1.5	1	0.4	0.3	902-A117-01
DUAL BAND 7/13 GHz - 5/3 Watt							
6.425	TO	7.125	5	4	2.0	1.1	902-A104-03
12.700	TO	13.250	3	2.5	1.5	1.25	902-A117-02
DUAL BAND 7/13 GHz - 10/3 Watt							
6.425	TO	7.125	10	8	3.0	2.3	902-A102-01
12.700	TO	13.250	3	2.5	0.9	0.7	902-A117-02

6.3. Control Unit Power Supplies

Three power supplies operate from AC power. The switching power supplies achieve high efficiency, while minimizing size and weight. All outputs are short-circuiting protected.

The Control Unit contains two power supply units. One power supply generates the voltages required to run the Control Unit, the second generates the +48V that is used to power the RF Unit.

6.3.1. +12V, +5V & -12V Power Supply

(P/N 683-P0044-03A)

The power supply is automatically configured for the appropriate primary power source when the AC power cord is connected. Input ranges are 90 to 240 VAC. The power supply produces three regulated DC voltages. These voltages are +12 V, +5 V, and -12 V.

6.3.2. +48V Power Supply

(P/N 682-P0058-00A)

This power supply is automatically configured for the appropriate primary power source when the AC power cord is connected. Input ranges are 90 to 240 VAC. The power supply produces +48V regulated DC voltages. This voltage is used to provide power to the RF Unit through the coax cable.

6.3.3. +12V, +5V & -12V Power Supply for +11 to +15VDC Source (Optional)

(P/N 681-P0070-00A)

This power module operates over a range of +11 to +15 VDC and provides the +5V, +12V, and –12V used in the control unit. The supply is capable of 60 watts output power (30 watts typical usage). The output of the supply is filtered by the 902-P037-00A PCB to reduce noise and voltage spikes.

6.3.4. +48V Power Supply for +11 to +15VDC Source (Optional)

(P/N 901-P047-02A)

This power module operates over a range of +11 to +15 VDC and provides the +48V output for the RF Head. It is capable of providing 100 watts output power.

6.4. 160V Power Supply for Pan & Tilt (Optional)

(P/N 901-P045-XX)

The standard input voltage range is 100 to 135 VAC. The power supply produces +160V DC. This voltage is used to provide power for the Pan & Tilt Motor/Controller circuit.

6.4.1. RF Unit Power Supply

(P/N 901-P046-XX)

This power supply operates off the +48V from the Control Unit. The +48 volts is diplexed onto the RF coaxial cable to supply the RF Head. This power supply generates the +24V, +11V Fixed, +10V Variable, +5V, and –5V for the RF Unit.

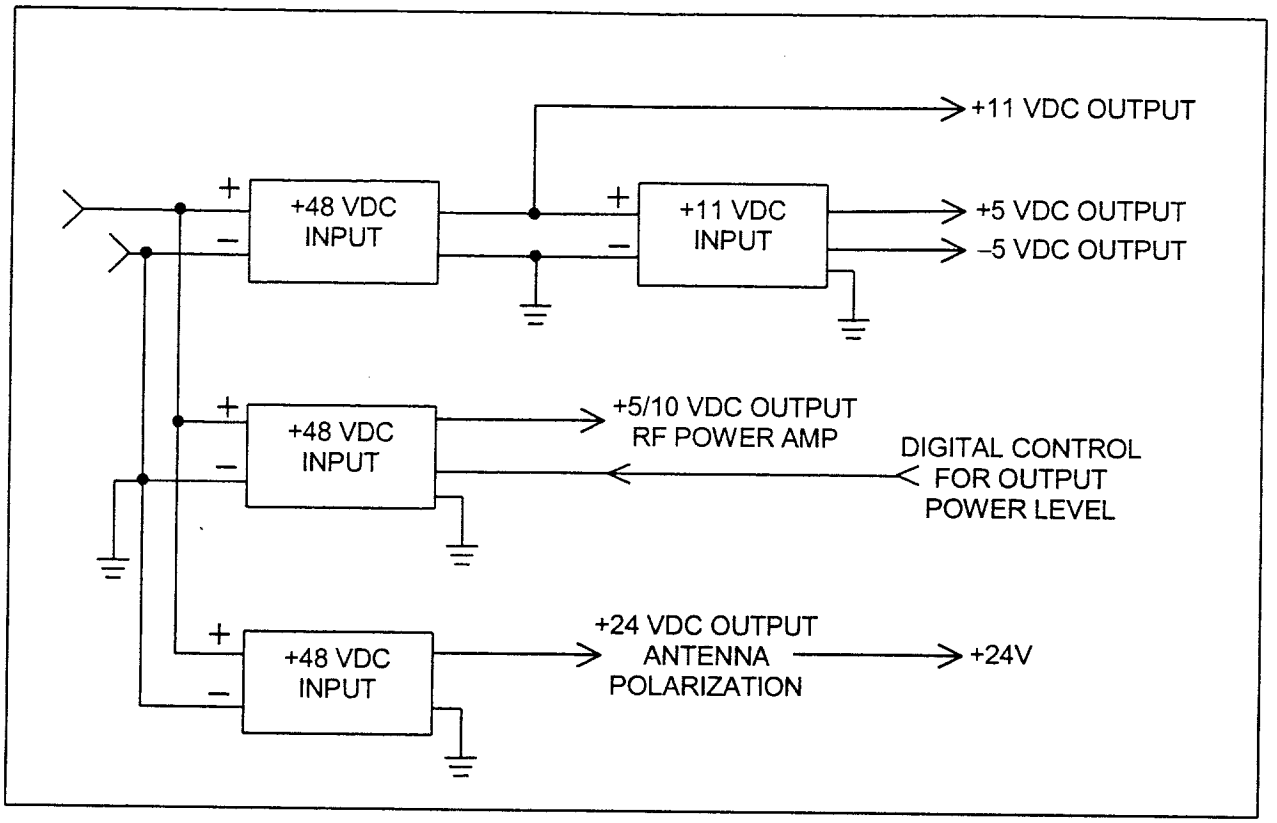

Figure 6-13 NEWSCASTER VT1 RF Head Power Supply Block Diagram

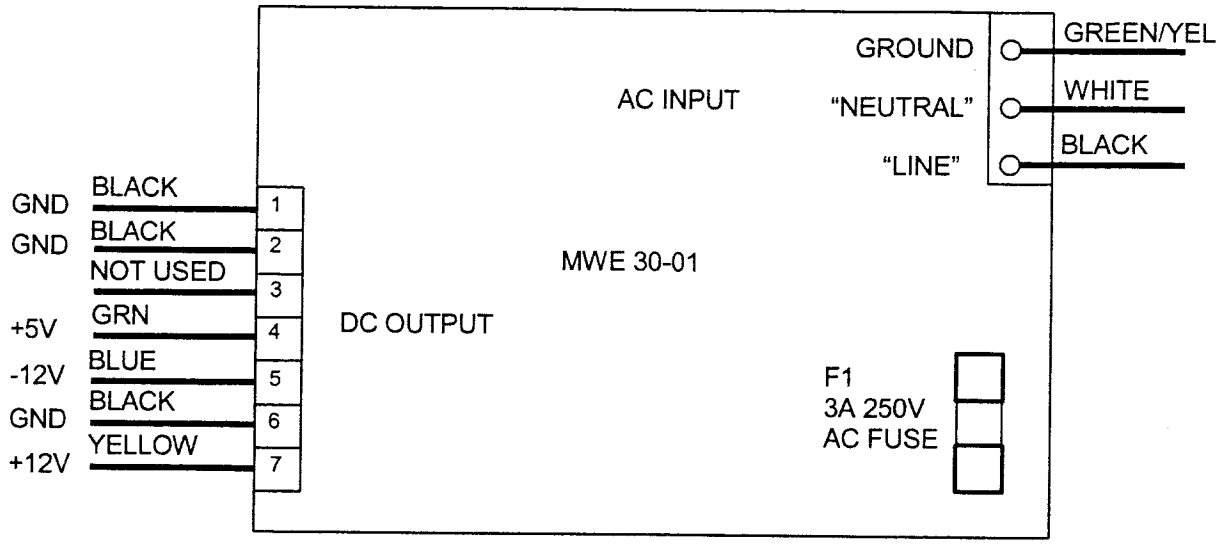

Figure 6-14 Top View of NEWSCASTER VT1 Power Supply 683-P0044-03A

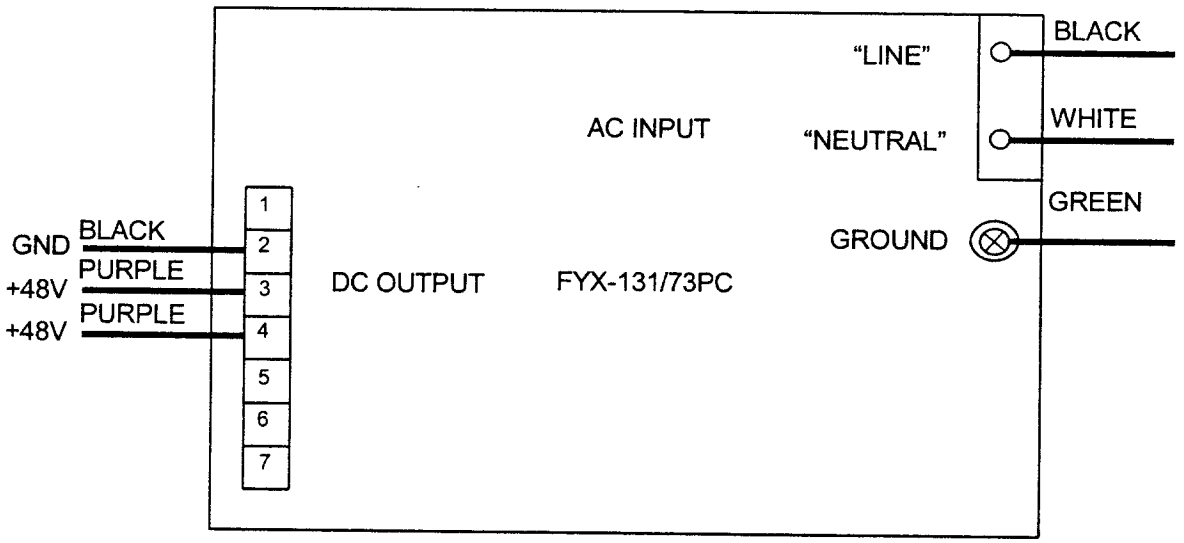

Figure 6-15 Power Supply Interconnection Diagram 682-P0058-00A

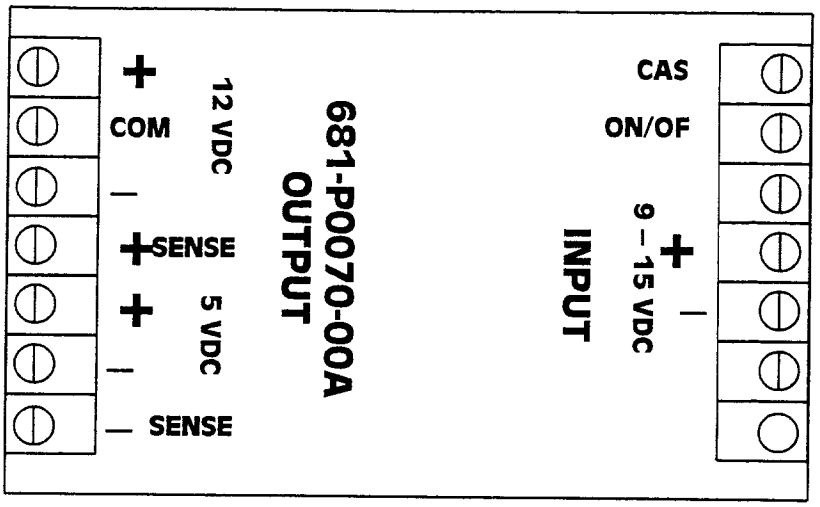

Figure 6-16 NEWSCASTER VT1 Optional DC Power Supply (+5 & +12 VDC Output)

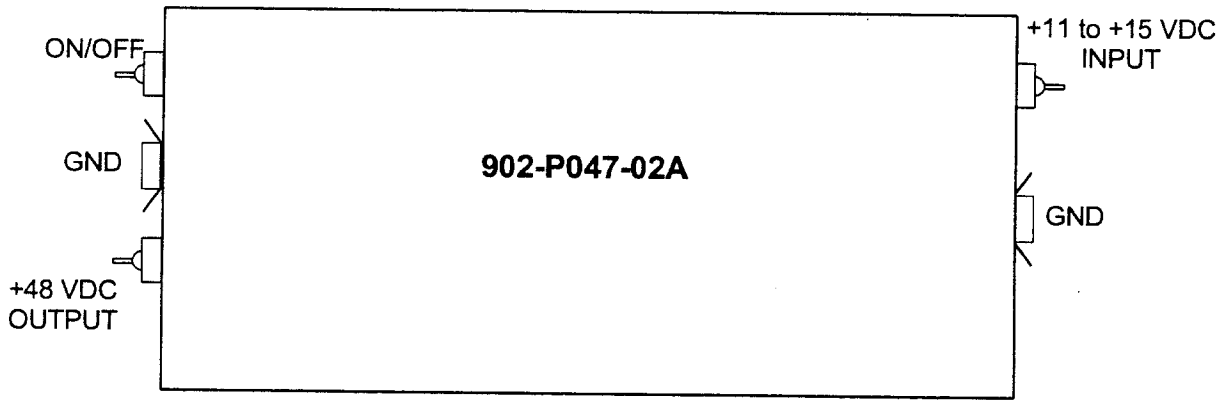

Figure 6-17 NEWSCASTER VT1 Optional DC Power Supply (+48 VDC Output)

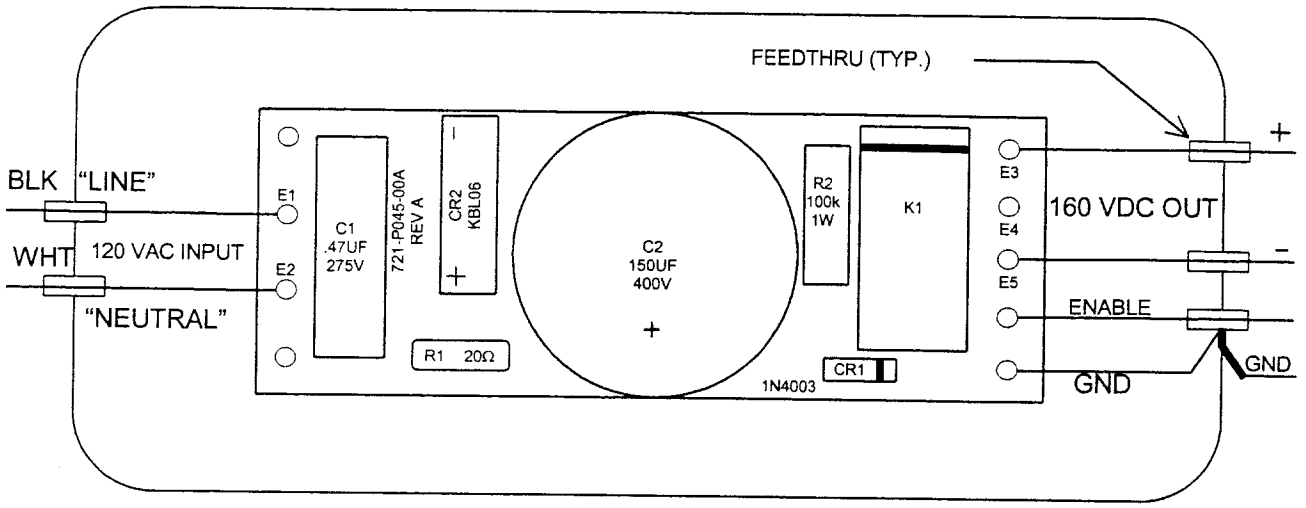

Figure 6-18 Pan & Tilt Motor 160 VDC Power Supply

6.4.2. Pan & Tilt Controller (Optional)

(P/N 902-C061-XX)

The Pan & Tilt Controller assembly located in the RF Unit is used to position the microwave antenna beam by controlling both the antenna elevation and antenna azimuth. The unit provides DC level feedback from both the pan and tilt motors through position potentiometers. The voltage levels are translated into degrees of tilt and rotation angles from a reference point (midpoint of rotation and tilt).

The antenna control information originates at the joystick and is sent through the internal communications network (I^2C) to the 902-C061-XX µP. The local µP on the 902-C061-XX board translates the data into movement by "steering" the 160V DC supply voltage (changing the current flow) through the pan and tilt motors. The polarity of the 160V determines which direction the motor moves.

WARNING!
The 160V-supply voltage to the motors is a FLOATING SUPPLY (Ungrounded), separate from the main power supply.
If grounded (i.e. through a scope probe ground lead) the 160V power supply will be damaged as this will short circuit the AC line to ground through the rectifier diodes.

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