Note: The following Tune-up Procedure was taken from Section 2.5 of the report.

2.0 TECHNICAL DESCRIPTION

2.5 Alignment Procedure

In the following procedure, the complete multi-channel translator is adjusted for optimum performance. This alignment procedure is performed by adjusting each circuit for its specified performance while observing the appropriate output parameters of the board or subassembly being adjusted.

Because of the broadband nature of the amplifier stages, this is a straightforward procedure, easily accomplished is RF test equipment is available. In this procedure, the input signals are first connected and each circuit is adjusted in sequence by connecting the test equipment to the specified point.

Equipment required:

1. Spectrum Analyzer (with tracking generator)
2. Network Analyzer
3. Power Meter
4. Multi-channel test signal
5. 30 dB Coupler
6. Attenuators
7. Digital Multimeter (DMM)
8. Frequency Counter

VHF Generator, X8 Multiplier, UHF Bandpass Filter, X3 Multiplie r
(A28, A29-1, A30, A31) 1500-1102, 1067-1109, 1107-1101, 1003-1004

1. Connect frequency counter to 10 MHz input cable (J3) of VHF Generator Board and adjust the 10 MHz oscillator for 10 MHz ±1Hz..

2. With J2 and J3 jumpers removed, adjust R19 for –3.0 volts at TP3.

3. Monitor J15 with a spectrum analyzer and J16 with a frequency counter.

4. Adjust L3, .L4, C12 and C21 to peak output signal at J15.

5. Adjust C11 for the correct frequency ±20Hz.

6. Reconnect jumpers on J2 and .J3 and reconnect J15.

7. Visually monitor DS1 to verify PLL locks. If the PLL remains unlocked, use oscilloscope to minimize spikes on chip U1 by adjusting R46.

8. Monitor J2 on X8 Multiplier assembly with spectrum analyzer with center frequency set to eight times the crystal frequency.

2.0 TECHNICAL DESCRIPTION

2.5 Alignment Procedure - continued

9. Maximize the eighth harmonic (10 to 13 dBm) and minimize the seventh and ninth harmonic by adjusting C4, C6, C10, C12, C18 and C20.

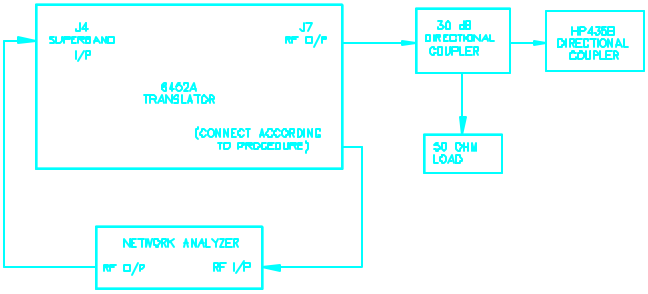
10. Reconnect J2 and connect analyzer to the output of the UHF Bandpass Filter (A30).

11. Tune filter to maximize the eighth harmonic of the crystal. Seventh and ninth harmonic should be at least 55 dB below eighth harmonic peak.

12. Monitor the output of the X3 Multiplier and tune filter to peak the LO (2278 MHz) signal.

Superband Bandpass Filter, 4 Section Bandpass Filter, 3 Section Broadband Filter (A24-A1, A26, A11) 1509-1107, 2140-1043, 2500-2700

1 . Normalize cables of the network analyzer and connect the analyzer as shown below. Set analyzer to sweep the input frequency range. Note: The analyzer will be used to monitor various points throughout the translator.



2. Connect the RF input of the analyzer toJ3 of the Super band Bandpass Filter (A24-A1) and tune C2, C3, C4 C10, C11 and C12 to flatten the response of the module..

3. Move the input to the analyzer to the output of the Superband Bandpass Filter (J2) and retune capacitors for flat response

4. Disconnect analyzer and set to sweep from 2500 to 2700 MHz. Normalize cables then connect analyzer output to the input of the 4 Section Bandpass Filter (A26). Connect the analyzer input to J5 on the rear panel.

5. Tune the 4 Section Bandpass Filter to flatten response.

6. Connect the RF input of the analyzer to the output of the 3 Section Broadband Filter (A11) and tune the filter for flat response.

2.0 TECHNICAL DESCRIPTION

2.5 Alignment Procedure - continued

ALC Control Board, Amplifier Attenuator Module
(A17, A12) 151510-1103, 1132-1509

1 . Set S1 on ALC control Board to Manual Mode and adjust R12 for 1.6V at FL3 of Amplifier Attenuator Module (A12).

2. Connect the RF input to the analyzer to the output of the Amplifier Attenuator Module (J2). Place the translator into the operate mode and tune the module to flatten the response.

Three Stage Amplifier Module (A13-A1) 1510-1106

This amplifier does not contain any RF tuning adjustments. The module contains three cascaded broadband GaAsFET amplifier stages providing a nominal gain of 36 dB. The operating current for the first two stages (Q101, Q201) is controlled by a pot mounted on a bias board within the module and can be set by measuring the voltage drop across the across a resister located next to each FET. The bias for the third stage (Q301) is set by measuring the voltage drop across the 0.05 ohm resistor located on the Four Section Bias Protection Board (1500-1114).

1. With no RF signal applied and with the translator off, unsolder the drain leads located near the ferrite beads of Q201 and Q301. Connect a digital voltmeter across R104 located next to Q101. Apply AC power to the transmitter and place the transmitter into the Operate mode.

2. Adjust the bias control resistor (R102) for a reading of 5.5 mV across R104. This voltage represents a bias current of 55 mAmps on Q101.

3 . Place the translator into the standby mode and then turn the translator off. Unsolder the drain lead of Q101 and resolder the drain lead of Q201. Apply AC power to the transmitter and place the transmitter into the Operate mode. Adjust the bias control (R202) for a reading of 60 mV across R204 located next to Q201. This voltage represents a bias current of 0.6 amps on Q201.

4. Place the transmitter into the standby mode and then turn the transmitter off. Resolder the drain leads of Q101 and Q301. Apply AC power to the transmitter and place the transmitter into the Operate mode. Adjust the bias control potentiometer R303 for a reading of 100 mV across R1 on the Four Section Bias Protection Board. This represents a bias current of 2.0 amps on Q301.

The output of this amplifier is fed to the 25 Watt Amplifier Module (A13-A2).

2.0 TECHNICAL DESCRIPTION

2.5 Alignment Procedure - continued

Four Pole Bandpass Filter (A13-A5) 2140-1033

The output of the Three Stage Amplifier Module is fed through a Four Pole Bandpass Filter. This filter eliminates any intermodulation products (IMD) created in the amplifier. This filter has been factory tuned, no user adjustments are necessary.

25Watt Amplifier Module (A13-A2) 1500-1164

This amplifier does not contain any RF tuning adjustments. The module contains two cascaded broadband GaAsFET amplifier stages (one FLL105MK driving two parallel FLL200IB-3's). The operating current for each device (Q101, Q201, Q301) is controlled by a pot mounted near each device within the module and can be set by measuring the voltage drop across the 0.05 ohm resistor located on the Four Section Bias Protection Board (1500-1114).

GaAS FET Transistor	Potentiometer Adjustment	Bias Protection Board Resistor	Voltage Across Bias Protection Resistor	Drain Current Calculated
Q101	R106	R2	9.0 mV	180 mA
Q201	R202	R3	240.0 mV	4.8 A
Q301	R302	R4	240.0 mV	4.8 A

The voltages needed to operate the amplifier modules are provided by the + 12V/21 A switching supplies (A6 and A8) and the ±12 VDC Power Supply board (A3) which produces the –5VDC bias voltage.

The –5 VDC supply is non-adjustable with a regulated output. To prevent damage to the GaAs FET amplifiers, the +12VDC switching supplies will not turn on until the –5VDC bias supply is present.

The +12VDC/21A switching, regulated regulated power supplies do not require any adjustment.

Four Pole Bandpass Filter (A13-A6) 2140-1033

The output of the 25W Amplifier module is fed through a Four Pole Bandpass Filter. This filter eliminates any intermodulation products (IMD) created in the amplifier. This filter has been factory tuned, no user adjustments are necessary.

The output of the Four Pole Bandpass Filter is connected to the RF output jack (J7) on the rear of the tray.