2.0 TECHNICAL DESCRIPTION

2.4 Circuit Description

General

The 605C Broadband Booster is comprised of a remote preamplifier, booster amplifier and external power supply. The preamplifier may be chosen with a gain of 15 or 25 dB and is mounted in an outdoor enclosure suitable for mounting near the receive antenna. The preamplifier output is normally connected through low loss coaxial cable to the input of the booster. The booster includes automatic level control, power amplification stages, DC/DC power converter, and control circuitry. The combined peak envelope output power of the tray is used to develop the automatic level control voltage. The booster unit receives power through a coaxial connector from an external power supply module. The external power supply is supplied with standard 117V/220 VAC power.

Preamplifier

The amplifier stages of the preamplifier are wideband gallium arsenide transistor amplifier stages. The input stage uses low noise devices to maintain a low system noise figure. The second stage uses higher power transistors to insure a wide dynamic range. Both stages are wideband microstrip designs with class A bias and no operation adjustments.

Booster Amplifier

The amplified signal from the preamp enters the booster at J6 on the bottom of the unit and is applied to a circulator then fed to the Broadband Bandpass Filter (2140-1004) which provides the initial selectivity to the system. The output of the filter is fed to a second circulator and then to the input (J1) of the Two Stage Amplifier Module (11576-1126). This module consist of two cascaded GaAs FET amplifiers (ATF10136 driving a FLL 101ME) with an overall gain of approximately 27 dB.

The output of the Two Stage Amplifier Module is fed to the PIN Diode Attenuator Module (1575-1135) which uses a series configuration Pin Diode attenuator circuit. The gain of the attenuator is controlled using a peak detected sample of the output amplifier. By controlling the gain of this attenuator, the output power can be regulated, maintaining a constant output regardless of minor changes in the input signal.

The Output signal from the PIN Diode Attenuator is fed to the Single Stage Amplifier Module which consist of a single GaAs FET (ATF10136) amplifier stage with a gain of approximately 13 dB. The output of this module is applied to a circulator then to the Three Stage Amplifier Module (1516-1107) which consist of three cascaded GaAS FET amplifiers (FLL101ME driving a FLL351ME driving a FLL120 MK) with an overall gain of approximately 37 dB. The output of the Three Stage Amplifier Module is applied to a circulator then fed to the input of a Broadband Filter (2140-1033) then to the input of the Single Stage 10W Amplifier Module (1576-1117 or 1576-1118) which consist of a single GaAs FET amplifier (FLL200IB-3) with a gain of approximately 11 dB. The output of the module (J2) is applied to a circulator then to the RF output jack (J2) on the bottom of the unit. An internal 20 dB microstrip coupler is used to obtain a sample of the RF output. This RF sample connects to the Average Power Detector/Buffer Board (1517-1104).

2.0 TECHNICAL DESCRIPTION

2.4 Circuit Description - continued

The signal enters the Average Detector/Buffer Board at J1 and is applied to a Wilkinson Coupler which splits the signal. One output of the splitter is amplified and fed to the RF sample output jack (J4) of the module, which connects to the RF sample jack (J5) on the bottom of the unit. The other output of the coupler is applied to an average detector circuit that generates an ALC voltage, which is used to control the PIN Diode Attenuator.

The Booster Control Board (1576-1101), provides the capability to control and monitor the operating status of the booster. The board is designed to protect the booster in the event of one of the following faults: over temperature, loss or reduction in output power, loss of input signal and loss of the -5 VDC GaAs FET bias voltage. The Booster Control Board also provides the capability to remotely control and monitor the booster status via the Remote Diagnostics (J8) and External Control (J7) jacks located on the bottom of the unit.

The DC biasing of the FET amplifiers within the various modules is controlled and filtered by daughter boards, which are soldered directly to the main boards. The DC bias drain to source currents are set by adjusting the negative gate to source voltages which are adjusted by potentiometers on the daughter boards.

The 605C booster is powered by an external 60VAC source. The AC source enters the booster at J3 and is applied to the Input Protection Board (1517-1102) which provides over voltage and over current protection using a 3A inline fuse and MOV varistor. The output of the Input Protection Board is connected to a Toroid transformer.

The Toroid transformer provides two 20 VAC secondary windings. The first winding is sent to a full wave bridge rectifier, which supplies a positive 48 VDC to the DC/DC Converter Board (1517-1111). The second winding is supplied to a full wave bridge rectifier circuit located on the ±12V -5V DC Power Supply Board (1576-1102) then to negative 5 volt and negative 12 volt voltage regulators.

The DC/DC Converter Board contains a DC/DC converter IC and the required support circuitry to produce a constant regulated 10VDC output signal that is used to supply the FET amplifiers in the Three Stage Amplifier Module and the Single Stage 10W Amplifier Module via the Two Section Bias Protection Board (1576-1102). An Inhibit input from the Booster Control Board drives a magnetic latching relay, which in tun drives the on/off (enable) input of the DC/DC converter IC. This input is used to shut off the converter IC and remove power from the output amplifiers in the event of an input signal loss.

The Bias Protection Board distributes the -5V gate bias and + 10V drain bias to the Three Stage Amplifier and Single Stage Amplifier Modules. The -5V line from the -5V/±12 Power Supply Board is looped through the board at J2 and J4. This line is also fed to the Booster Control Board, which will disable the DC/DC converter upon loss of the -5V bias.