

THEORY OF OPERATION

Refer to Block Diagram Drawing No. 597-6020-1 and appropriate Schematic Diagrams.

POWER SUPPLY, 913-2121

This board receives the 20 VAC 60 Hz power signal from the transformer secondary and rectifies it to an unregulated DC voltage. This board contains a bridge rectifier (DB1), and filter capacitors C1 and C2. The unregulated DC output voltage of this supply (17 - 20 Volts) is fed to the 15-Amp regulator located on the Two-Stage RF Power Amp board (800-373).

INPUT OUTPUT FILTERS, 913-2120

All input/output circuits connected to ACCESSORY connector J4, as well as the AC line input, have radio-frequency filters.

ALARM CONTROL BOARD, 800-376

This board contains a toggle switch to control the RF output ("OFF" - "ON") of the transmitter. The state of this switch is monitored by the synthesizer for control purposes. This board also includes the TRANSMIT, AFC LOCK, HIGH VSWR, and HIGH TEMP LED's. The synthesizer controls the state of these LED's. Refer to the OPERATION section of this manual for a more detailed description.

AUDIO PROCESSING BOARD, 800-285

The 800-285 Audio Processing Board is programmable (by jumper plugs) for composite stereo or monaural signal processing:

COMPOSITE SIGNAL PATH:

There are two subcarrier inputs and one composite audio input to the Audio Processing Board. The two incoming subcarrier inputs (SUB 1 and SUB 2) are summed and inverted into one output. The summed signal is then reduced to 10% injection level. The

incoming composite (COMPOSITE IN) audio signal is amplified (by 6 dB) and pre-conditioned (for maximum separation at the receiving end). The reduced subcarrier and the amplified and pre-conditioned composite audio signals are summed to produce the "MODULATION OUT" signal.

MONAURAL SIGNAL PATH:

The 600 ohm balanced audio input to the transmitter is connected to the inputs of a unity gain differential amplifier IC-1A. A potentiometer, R20, is provided for adjusting the amplifier to produce the maximum common mode rejection (CMR). The output of the differential amplifier is direct-coupled to the pre-emphasis amplifier and has two capacitors selected by jumpers JP5 and JP6, which provide options of 0, 25, 50 or 75 microseconds pre-emphasis. Following the pre-emphasis circuit are two stages of active Butterworth low-pass filtering, (IC2A and IC2B). The signal is fed to IC5A through JP4, then to the modulator. The MOD METER sample is calibrated by R34.

T/R SYNTHESIZER, 800-375

The frequency synthesizer consists of a Phase-Locked Loop, a Voltage-Controlled Oscillator, a Pre-scaler, a Reference Frequency, and a Loop Filter. The PLL is a programmable device with the reference frequency generated by a crystal oscillator. The loop filter is an active type and the pre-scaler is used to pre-scale the VCO frequency to make it compatible to the PLL. The audio output from the 800-285 board is fed into T/R SYNTHESIZER's VCO which FM modulates the signal at the final output frequency. This modulated RF output signal is then sent to the 800-373 for final amplification.

Included on the T/R SYNTHESIZER board is a high-speed microcontroller. This controller decodes and acts on instructions sent from the SYNTHESIZER CONTROL (800-377) board. The controller also monitors and regulates forward power, monitors VSWR and PA temperature, performs auto foldback of power due to high VSWR and then recovers when VSWR lowers, and performs auto shutdown of power due to very high temp. The

controller also detects synthesizer lock and unlock as well as enabling a fastlock feature for far frequency changes.

SYNTHESIZER CONTROL BOARD, 800-377

This board, with the use of the dip switches and the pushbutton switch, send the desired instruction with parameters to the T/R SYNTHESIZER board. For the STL-20C the instructions include the following:

1. Frequency Change
2. Forward Power Calibration
3. Reverse Power Calibration
4. Normal Operation
5. Power Control = Max
6. Store Raw Power Into Cal Position # (#=0-8)

The procedure on when and how to use these instructions is in the TUNE-UP AND ADJUSTMENTS section.

TWO-STAGE RF POWER AMPLIFIER BOARD, 800-373

The RF output signal (50 mW max) from the T/R SYNTHESIZER is fed into this TWO-STAGE RF POWER AMPLIFIER board. The RF goes through two stages of RF amplification. The first stage (U2) is a 1-Watt (max) pre-driver. It has an input and output transformer (T1 and T2) for achieving optimum 50 ohm matching between the stages. The output of T2 is fed into the final PA module (U3) for an output of 20 Watts max. The signal is then low-passed filtered through FL1 and then fed through through a directional coupler for monitoring forward and reflected power. An automatic level control (ALC) circuit residing on the T/R SYNTHESIZER board stabilizes and maintains an accurate output power level by comparing it to a reference power level which is set by the user via the front panel POWER ADJUST pot. The ALC circuit samples the forward power via the coupled forward power on PA board.

This board also provides regulated B+ for powering the PA and the rest of the chassis. Finally, there also exist circuitry for regulating the fan and monitoring PA current.

METER BOARD, 800-290

This board monitors the following signals for viewing via the VU meter:

- Forward Power
- Reflected Power
- PA Current
- Sub Level
- B+ Supply