

## TR-800 Operational Description

### A. Microphone Amplifier

U1 amplifies the signal from the microphone by an amount determined by the user adjustable gain control. The range of adjustment is from 0 to 40 dB.

### B. Modulation Limiter

U2A is configured as a variable gain amplifier and U3 is configured as a window detector. When the audio fed into U3 exceeds the preset threshold, U3A pulls low on negative peaks and U3B pulls low on positive peaks. This discharges C13 and reduces the gain of U2A until the input to U3 is just at the threshold of limiting.

### C. Compressor

U2C is a linear compressor that is used to improve the system signal to noise ratio. A complementary expander is used at the receiver.

### D. Gate

U4A is configured as an audio gate. When Q3 is off the audio entering U4A is amplified by a factor of 2. When Q3 is on the audio is gated off.

### E. Pre-emphasis

U4B provides pre-emphasis which begins at 100 microseconds and ends at 15 microseconds. The output of U4B feeds the modulation limiter.

### F. Low Pass Filter

U4D is a 3 pole low pass filter with a cutoff frequency of 10 kHz.

### G. PLL

HY801 is a VCO operating on the output frequency. U802 is a phase locked loop that controls HY801. U802 is serially loaded with frequency data by U901. The modulating signal is fed into the loop via VR801, which is used to set the frequency deviation.

### H. Output Amplifiers

Q803, Q804, Q808 and Q810 amplify the signal from HY801 and provide reverse isolation. Q807 is used to turn these stages on only after the loop has achieved lock. C831, C832, C833, L809 and L810 provide impedance matching and harmonic suppression.

Operational Description.  
TR-800 Receive Board Assembly  
Rev PB 12-05-00

RF Signals from the antenna arrive at J301-1 and are applied to the Ceramic resonator Circuits of Z301, 302, Z303 and their components. These parts add selectivity before the signal is applied to the 1<sup>st</sup> RF Amplifier Q301. The signal is amplified by Q301 and routed to Z304, Z305 and their components where further selectivity is applied. Total selectivity at this point is 18 MHz bandwidth. The signal is then fed to U402, the 1<sup>st</sup> IF IC. Also fed to U402, through C424 is the 1<sup>st</sup> LO Signal.

The 1<sup>st</sup> LO is a PLL VCO consisting of the VCO HY401, and U401A the main PLL lock circuit that receives its frequency data off-board. The frequency range of the VCO is from 452.3 MHz to 638.3 MHz, in 18 MHz wide bands. (low end of each band –65.7 MHz).

The LO signal is subtracted from the RF signal in mixer U402 to produce the 1<sup>st</sup> IF frequency of 65.700 MHz. This IF signal flows through T401/L401 and their components resonant at 65.7 MHz.

The 65.7 MHz signal is then routed to U403A-1, the 2<sup>nd</sup> mixer. Crystal Y401 and its components oscillate at 55.0 MHz and are applied to mixer U403A. The difference signal between 55.0 and 65.7 is selected as the 2<sup>nd</sup> IF signal of 10.7 MHz.

The 10.7 MHz IF signal is applied to L403 and its components and ceramic filter FL401 for additional selectivity. This signal is applied to U403B-18 where it is amplified and fed to another ceramic filter, FL402.

The filtered IF signal is then applied to U403C-14 where the signal is limited, detected and a RSSI signal is available at U403C-7 for use as a transmit power control signal. L405 is the Quadrature detector inductor and is tuned for best audio at U403C-8. This audio is fed to IC U405 where the signal is buffered and set to the correct level for its following circuits.

Q401 is used to set the VCO and PLL IC operating voltage to 5.0 VDC.

END