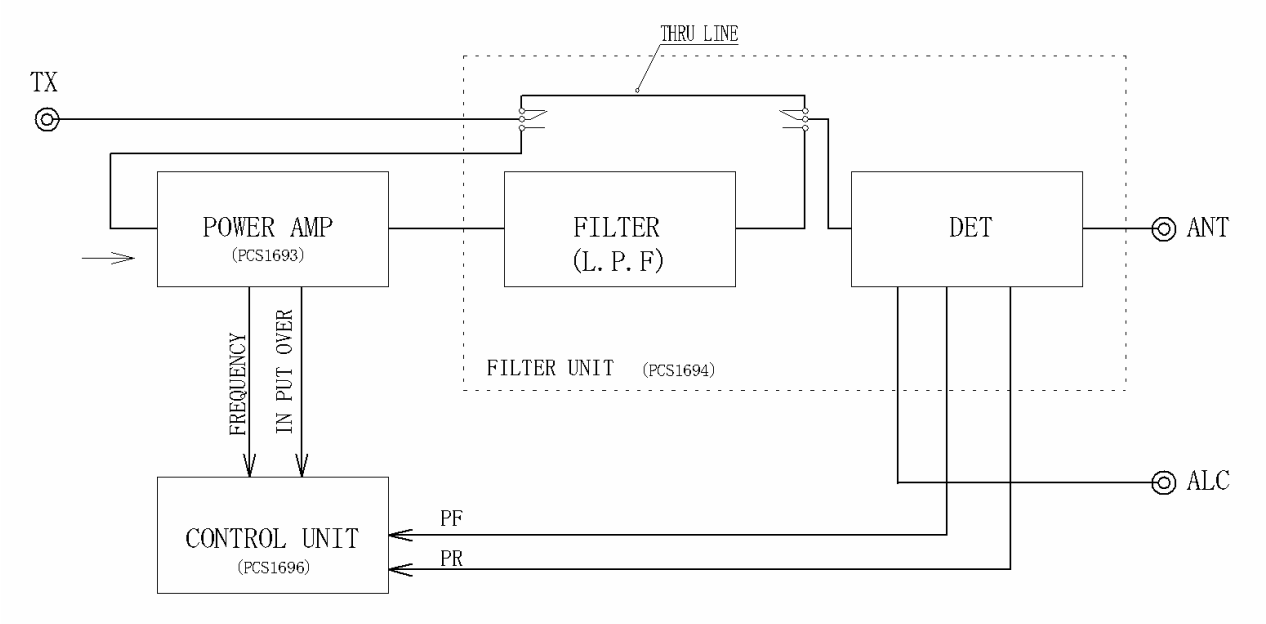
F. Theory of Operation & About Major Circuitry



1. When at RX

When HL-450B is in the receive state (RX), received signal at antenna is lead to ANT connector. Then the signal passes the THRU-LINE, by-passing the Power Amp, to reach TX connector (then to the transceiver).

2. When at TX

When the HL-450B is in the transmit state (TX), the relay contacts of both Input and Output (ANT) are switched to the input side of Power Amp and output side of Filter board respectively. RF drive signal is amplified by Power Amp. The output from the Amp is filtered by L.P.F. and passes DET (RF detector of Pf and Pr), where forward and reflected signal levels are detected.

A part of RF drive signal is fed to Control Unit, where the micro processor (MPU) monitors the frequency of drive signal as well as the drive power magnitude. Pf and Pr are calculated by MPU in Control Unit for output power monitoring with panel meter and also for working the protection circuit.

3. Power Amp (PCS1693)

Even if the Amp is driven, the relay RL101 is switched to R111, 50 ohms resistor, just until frequency counting of drive signal completes in Control Unit. (Drive is thus

terminated with 50 ohms.) A part of drive signal is fed to IC101, 74HC14, where signal is wave-formed. Formed signal is lead to Control Unit through J102-③. In the Control Unit, MPU counts the drive signal frequency, and the corresponding Low Pass Filter for the counted frequency is selected.

When the drive signal frequency is within 26.0 and 28.0MHz, MPU issues the shutdown command, so that PROT LED is lighted, and both RL201 and RL212 are switched to make Power Amp "through". (Thus no gain.) The drive signal, having reached T101, power splitter by way of RL101 relay, is divided into two ports. Each of split power is fed to T102 and T105, wide band input transformers respectively. Then each signal is amplified by the respective wide band power amps. Each of output signals from output transformers T104 andT107 are combined through power combiner, T108. Q101 and Q102 base bias voltage sources feed the regulated forward bias to power transistors, Q103～106 during TX, and bias voltages are cut off during RX.

4. LPF/Power Detector PCS1694 (Output Filter/RF Detector)

Output from T108, combiner will pass the filter of corresponding frequency band. Filter frequency bands are divided into five between 3.5 though 28MHz. CM type power detector produces both forward and reflected voltages of output power signal. Negative ALC voltage is detected by diode, D213.

5. Remote Unit (PCS1695)

Main DC power, having passed "shunt resistor (mounted on chassis)" and "main fuses (on PC1695)" is fed to Power Amps through J301 and J302 connectors. DC voltage generated across shunt resistor is fed to J309 to read current value of DC power line. IC301 is a current detector amp, and makes an over current protection circuit. Its output is connected to Control Unit through J303-⑥.

6. Control Unit (PCS1696)

Using MPU PIC16F876, various monitorings and controls of amp's operation status are performed. Counting incoming drive signal, proper output LPF is selected.

Various protective shut downs are made in this Control Unit, such as, over drive, over voltage/current, high reflected power and so forth. Also, the level of RF output power is transmitted by MPU in PWM mode to drive the analog panel meter.