

CIRCUIT DESCRIPTION

TITAN LOW BAND BASE/REPEATER

RECEIVER PART

1) RF section

An incoming signal is fed to pre-selector (BPF-1), and amplified by Q101, Then fed to post-selector (BPF-2). The balanced mixer, consisting of T101, T102, D107 and D108, produces 48.5MHz by injection from the 1st local signal provided by Rx VCO (the 1st local of the 30MHz bands KG510 radios are 21.6MHz).

2) Noise Blanking Section

A noise blanking circuit consists of Q102 (1st noise amplifier), Q121 (buffer amplifier),

Q122 (2nd noise amplifier), Q123 (3rd noise amplifier), Q125 (1st pulse amplifier), Q104

(2nd pulse amplifier) and blanker switch formed by D103 through D106.

An incoming signal is divided by the 1st RF amplifier (Q101) to feed the 2nd BPF and

to feed 1st noise amplifier. A noise is amplified by Q102, Q121, Q122, Q123, Q125 and Q104. Then amplified pulse triggers the blanker switch to eliminate the noise within the RF signal.

3) IF section

The output signal from the balanced mixer is fed to the crystal filters (XF101), then amplified by Q103. Again, this signal is fed to the 4-pole crystal filters and amplified by Q113. After amplified by Q113, signal is fed to 2nd processor IC (IC106). The 2nd local crystal oscillator signal is fed to IC106 to produce the 2nd local signal (455KHz). IV106 amplifies the 2nd local signal and becomes an audio signal by detector circuit inclusive within the IC106. Then, the audio signal is fed to the low-pass filter inclusive in IC107, and fed to audio processor IC (IC3).

4) VCO section

The oscillator circuit formed by L303, D303, D305 and Q301 produces the 1st local signal (Rx frequency minus 48.5MHz). The 1st local signal is amplified by buffer amplifier Q302, and again amplified by pre-amplifier IC301m and post amplifier Q303. The amplified signal is fed to the balanced mixer.

5) PLL section

PLL IC inclusive with pre-scanner IC101 compares the phase between the VCO frequency and reference oscillator frequency (12.00MHz) by method of dividing the frequency, and produces VCO control signal. Then, this control signal is fed to the charge pump, consisting of Q108, Q109 and Q110, and fed to the LPF. The supply voltage of charge pump is multiplied by IC102 (approx. 15V) to achieve greater C/N ratio.

TRANSMITTER PART

1) VCO section

The oscillator circuit formed by L303, D305 and D306 generates transmitter Frequencies. Then this signal is fed to the 3-stage of amplifiers, buffer amplifier Q302, pre-amplifier IC301 and post amplifier Q303 and lead to the final amplifier.

2) PLL section

Basically, the circuit description is the same as Rx. PLL IC inclusive with pre-scanner IC205 compares the phase between the VCO signal and reference oscillator frequency (12.00MHz) by method of dividing the frequency, and produces VCO control signal. Then this VCO control signal is fed to the charge pump, consisting of Q206, Q207 and Q208, and fed to the LPF. The supply voltage of charge pump is amplified by IC206 (approx. 15V) to achieve greater C/N ratio.

3) Modulator section

The modulation signal is fed to both VCO and the reference oscillator (TCVXO), this permits a very flat modulation characteristics against low frequency (DC). This is the advantage when KG510 is used for POCSAG transmitter.

4) Tx younger section

The VCO signal is amplified by Q215 and Q216 to achieve 250mW. But VHF

bands (136-174MHz) has only stage of amplifier Q215 to achieve 100mW.

5) PA section

The signal from younger stage is fed to Q501 (semi-driver), Q506 (driver) and Q454 (final amplifier) to achieve 50W output power. Then, signal is fed to the LPF to eliminate the harmonics spurious frequencies. An APC circuit formed by IC502, IC503, Q504 and Q505 stabilizes the output power at the set level. An IC501 protects PM501 and Q501 from the reverse power caused by the unmatched aerials.

LOGIC PART

1) Microcomputer (CPU) section

A CPU, IC-1, uPD78F005 is the 8-bit processor contained 60K flash memory and 2K RAM inside. This CPU controls all functions of KG510. A flash memory permits ON-BOARD-UP-GRADE when the new software is released.

2) EE ROM section

An IC7 is the 64kbit EEROM. This IC contains all channel parameters

3) Audio processor section

An IC2 is for Tx and an IC3 is for Rx audio processor. These IC's control all audio processing and encode/decode CTCSS tones by commanded by CPU. These IC's are also inclusive with 2400bps MODEM to enable to form MPT1327 trunking protocols by using an external MPT control software.

FRONT CONTROL PANEL PART

1) LCD display section

LCD display is constructed by 128 x 32 dot matrix. This allows to indicate not only characters but also graphics and symbols as you design.

2) LED display section

The 4 LED's are indicating each mode of operation KG510 now works.

3) Audio amplifier section

An IC404 has 2w audio power to drive 8 ohm speaker mounted on the panel

4) Microphone pre-amplifier section

An IC401 is the voice pre-amplifier having -34dBm output to feed Tx modulator.

ALIGNMENT PROCEDURES

KYODO KG510 BASE/REPEATER

RECEIVER PART

1) BPF-1 and BPF-2 alignment

Connect the signal generator to the Rx antenna connector of KG510. Align the BPF-1 and BPF-2 to obtain the maximum sensitivity. For better alignment, if you have spectrum analyzer and tracking generator, connect the tracking generator to the Rx antenna connector and pick up the output signal from J101 to connect spectrum analyzer. Align the BPF-1 and BPF-2 to have cover the desired bandwidth of receiving frequencies.

- 2) FVR101 alignment
This is to adjust the squelch level.
- 3) VCO alignment
Set the VCO voltage at 10.5V by L303 at the highest receiving frequency.

TRANSMITTER PART

- 1) FVR201 alignment
This potentiometer determines the modulation level. Carefully align this potentiometer to obtain flat deviation from the lowest to the highest frequency installed in the transmitter.
- 2) FVR202 alignment
This potentiometer determines the low frequency (below 300Hz) deviation. When POCSAG, CTCSS or DCS are used, necessary to align to have enough deviation at low frequency.
- 3) FVR203 alignment
This potentiometer sets the maximum deviation, normally set at 5KHz. 2KHz or 2.5KHz deviation for narrow spacing can be set by programming software.
- 4) FVR204 alignment
This is to adjust the transmitter output power.
- 5) VCO alignment
Set the VCO voltage at 10.5V at the highest channel frequency.

LOGIC PART

- 1) FVR1 alignment
This potentiometer is to obtain 600 ohm 0dBm output of the RF signal.
- 2) FVR2 alignment
This is to set the deviation level when KG510 is used for a repeater.
- 3) FVR3 alignment
This is to set the Tx output power level indicating on the LCD.
- 4) FVC1 alignment
This is to shift the CPU clock frequency when necessary. A beat interference sometimes happens at certain frequency. In such case, shifting the CPU clock frequency may eliminate the interference.

FRONT CONTROL PANEL PART

- 1) VR401 alignment
This is a volume controller.
- 2) VR402 alignment
This is a squelch level controller.
- 3) FVR401 alignment
This is to set the HI-POWER-LEVEL of the Tx output power.

4) FVR402 alignment

This is to set the LO-POWER=LEVEL of the Tx output power.

5) FVR403 alignment

This is to set the contrast of the LCD back light.

