

Description

71-4110

CIRCUIT DESCRIPTION

RECEIVER PART

1) RF section:

An incoming signal is fed to pre-selector (BPF-101), and amplified by Q101, then fed to post-selector (BPF-102). The balanced mixer, consisting of T101, T102, D107 and D108, produces 21.6MHz by injection from the 1st local signal provided by Rx.

2) 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 being amplified by Q113, the signal is fed to 2nd IF processor IC (IC106). The 2nd local crystal oscillator signal is fed to IC106 to produce the 2nd local signal (455KHz). IC106 amplifies the 2nd local signal, which becomes an audio signal after the detector circuit included in IC106. Then, the audio signal is fed to the low-pass filter included in IC107, and fed to audio processor IC (IC3).

3) VCO section:

The oscillator circuit formed by L303, D303, D305 and Q301 produces the 1st local signal (Rx frequency plus 21.6MHz). The 1st local signal is amplified by buffer amplifier Q302, and again amplified by pre-amplifier IC301 and post amplifier Q303. The amplified signal is fed to the balanced mixer.

4) PLL section:

PLL IC with pre-scaler 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 then to the final amplifier.

2) PLL section:

Basically, the circuit description is the same as Rx. PLL IC with pre-scaler 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 (TCXO); this permits very flat modulation characteristics against low frequency (DC).

4) TX Pre-amp section:

The VCO signal is amplified by Q215 to achieve 80mW.

5) PA section:

The signal from pre-amp stage is fed to PM501, then to Q504 and Q505 in parallel (final amplifier) to achieve 110W output power. Then, signal is fed to the LPF to eliminate the harmonics spurious frequencies. An APC circuit formed by IC502 and IC503, stabilizes the output power at the set level. The IC502 also provides overheating protection. The IC501 protects the PA from the reverse power caused by un-matched aerials.

LOGIC PART**1) Microcomputer (CPU) section:**

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

2) EEPROM section:

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

3) Audio processor section:

IC2 is for TX and IC3 is for Rx audio processing. These IC's control all audio processing and encode/decode CTCSS tones as commanded by the CPU. These IC's also have a 2400bps MODEM to enable to form MPT1327 trunking protocols by using external MPT control software.

FRONT CONTROL PANEL PART**1) LCD display section:**

LCD display is constructed by 128 x 32 dot matrix. This allows indication not only of characters but also graphics and symbols as designed.

2) LED display section:

The 4 LED's indicate modes of operation.

3) Audio amplifier section:

IC404 has 2W audio power to drive the 8-ohm speaker mounted on the panel

4) Microphone pre-amplifier section:

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

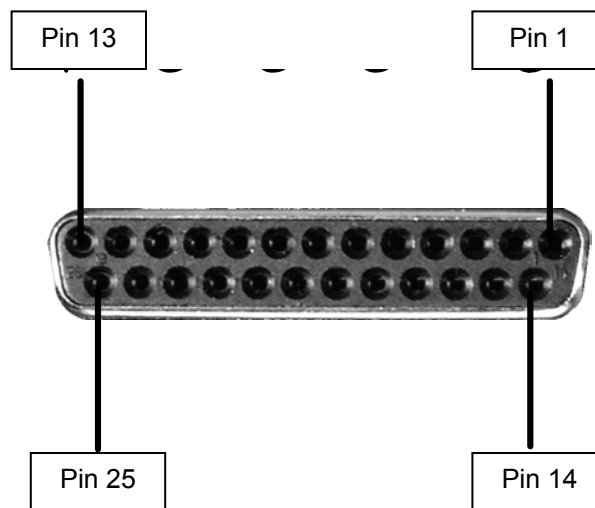
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REMOTE CONTROL

25 pin D-sub connector for remote control is provided on the rear panel. The functions of each pin are as follows:

Pin No.	Name	Description	I/O	Levels	Comments
1	CH0	LSB external binary channel selection	I	0-+5VDC	000000 is channel 1
2	CH1	External binary channel selection	I	0-+5VDC	
3	CH2	External binary channel selection	I	0-+5VDC	
4	CH3	External binary channel selection	I	0-+5VDC	
5	CH4	External binary channel selection	I	0-+5VDC	
6	CH5	MSB external binary channel selection	I	0-+5VDC	
7	GND				
8	RSSI	Receive signal strength indicator	O	0-+2VDC analog	
9	DISC OUT	Discriminator audio out	O	$\approx 330\text{mVrms}$ 1KHz @ $\pm 3\text{KHz}$	
10	SQ CONT	Squelch control	I		
11	BUSY	Channel busy indication	O	0-+5VDC	5V=busy
12	MUTE	External audio mute	I	0-+5VDC	0V=muted
13	MOD1	External audio modulation input	I	$\approx 50\text{mVrms}$ 1KHz for $\pm 3\text{KHz}$	
14	GND				
15	PTT	Push to talk	I	0-+5VDC	0V=transmit
16	MOD2	External modulation input	I	$\approx 400\text{mVrms}$ 1KHz for $\pm 3\text{KHz}$	After limiter and filtering
17	SIMP	Simplex mode selected	O	0-+5VDC	0V=simplex
18	ERR	Alarm indication	O	0-+5VDC	5V=alarm
19	DECODE	Decode valid indication	O	0-+5VDC	5V=valid signaling
20	RX AUD1	Buffered receive audio	O	$\approx 700\text{mVrms}$ 1KHz @ $\pm 3\text{KHz}$	1&2 Can produce 0 dBm into 600
21	RX AUD2	Buffered receive audio	O	$\approx 700\text{mVrms}$ 1KHz @ $\pm 3\text{KHz}$	ohm input
22	TX OUT		O		
23	EXT PW/SW	External power switch	I	0-Open collector	0V=off
24	REMOTE	External channel selection mode	I	0-+5VDC	0V=external
25	+12V				



Rear Panel View