Operational Description

CIRCUIT DESCRIPTION POLARIS (UT888Z)

1. FREQUENCY SYNTHESIZER

Both of TX and RX local frequencies are generated by means of a phase locked loop frequency synthesizer. These frequencies are directly obtained from VCO (Voltage Controlled Oscillator). A 21.25MHz Crystal oscillator is provided as a reference frequency that is divided by 850 in order to produce 25kHz of channel spacing. Therefore, the final frequency is determined by calculated as follows:

(Example: 156MHz in TX mode)
Since channel spacing is 25kHz, therefore; $N = 156 \times 1 / 0.025 = 6240$

In case of RX mode;
Since a 1st IF is set to 21.4MHz, the following formula can be expressed.

$$FL = FR - 21.4 \text{ (MHz)}$$

Where FR is receiving frequency and FL is local frequency. When the FL is specified for incoming signal, each dividing ratio can be obtained the same step as taken in TX mode.

IC002 is CPU that recognizes the rotary type channel selector switch and also read out the data from the read only memory for conversion into serial data. The serial data is then fed into PLL IC (IC403). Overall frequency stability of the unit is determined depending on crystal oscillator X401. Stability rank of X401 is +/- 8 ppm in the temperature range from -20 degree C to +55 degree C.

2. TRANSMITTER

The carrier frequency generated in the VCO (Q302) is amplified by Q303, Q215, Q216,

Q218, and Q219 and then fed into antenna terminal. Adjusting gate voltage of Pre Drive AMP device Q216 controls TX power level. Q206 and Q207 are TX inhibit transistors.

IC202 and Q317 are amplifiers that provide 6dB/oct of pre-emphasis limiting circuit. IC201, Q201 and Q202 are consisted of audio input selector that selects microphone signals, either from built-in microphone or optional WHAM (WIRELESS MICROPHONE).

3. RECEIVER

Q101 is RF amplifier and Q102 and Q104 function as mixer. The local frequency obtained from frequency synthesizer is applied to Q102, Q104 and their deferential component, 21.4MHz is extracted to obtain a 1st IF frequency.

The 1st IF frequency is fed to crystal filter FT101 and Q103 is 1st IF frequency RF amplifier then fed to IC101 which contains 2nd mixer, 2nd local oscillator, amplifier, limiter and detector circuits.

X101 (20.945MHz) is crystal oscillator used to produce 2nd local frequency. At the 2nd mixer portion in IC101, the 2nd IF frequency of 455kHz is obtained and is then filtered by FT103.

Q106 is switching circuit that works for squelching operation. The demodulated audio signal is fed to IC104 (electrical volume control IC).
Then demodulated audio signal goes to signal selector circuit IC105. Finally, the demodulated audio signal goes to IC106, IC107 and is amplified to drive the loud speaker.

4. MICROCOMPUTER (CPU)

IC002 is a microcomputer that controls all of operative function switches and indicates LCD channel number/status.