BASIC RTTY THEORY

Radioteletype (abbreviated RTTY) is a form of telegraphic communication employing typewriter-like machines for generating a coded set of electrical impulses when a key is pressed on the keyboard and converting a received set of such impulses into the corresponding character.

With the application of home computers to the amateur's use, we are now able to use a computer to do all decoding and generation of the coded set of electrical impulses. Further, computers require practically no maintenance, whereas old teletype gear required frequent oiling and maintenance.

More important than the computer, is the terminal unit (TU) which handles the conversion of the two-toned signal into a string of DC high and low (1 or 0) level signals. This is called a demodulator because it demodulates the tones into something the computer can understand. A TU should also have some method of generating a two-tone signal from a high/low going signal. This is called a modulator. When a demodulator and modulator are combined into the same package, it is referred to as a modem.

The CP-1 is a modem. The demodulator in the CP-1 employs a sophisticated dual filtering system and an automatic threshold circuit. The two tones (received from the air) are separately demodulated and then fed into a threshold circuit. The threshold circuit then automatically decides which is the stronger of the two filter signals and allows that one to pass. However, when one of the signals fade out or is jammed or removed altogether, the threshold circuit automatically switches over to the clear tone.

This sort of a system is especially nice under poor signal conditions when a condition called selective fading is present. Selective fading is when one of the RTTY tones fades away and then reappears. When this happens, the threshold circuit automatically adjusts to the other tone. Another nice feature of the threshold circuit is if interference eliminates one of the RTTY tones or if one of the tones is jammed, the threshold circuit will again switch over to the tone remaining in the clear.

It is obvious that a dual filtering system which uses both filters and a threshold circuit, will perform much better than a single filter system or a phase-locked loop system that uses only one filter for decoding.

U.S amateurs are allowed to use 60 wpm, 67 wpm, 75 wpm, and 100 wpm Baudot, and 110 baud and 300 baud ASCII on the HF bands. ASCII is a code made up of 7 bits and 1 parity bit. However, the parity bit is left out. Baudot is made up of a 5 bit code and includes a start bit and stop bit. The start bit sets the sending and receiving mechanisim in

operation. The stop bit indicates the end of the operation (character) and sets the machines up for the next character. Since both RTTY Baudot and RTTY ASCII are teletype sent over a radio, technically both are RTTY. However, RTTY Baudot is usually referred to as RTTY and RTTY ASCII is referred to as ASCII. In this manual when we say RTTY we mean both Baudot and ASCII. This may sound a bit confusing, but if you just remember that both are 'radio teletype' that are made up of different codes; you should not remain confused for too long. Most amateurs you find will be running 60 wpm (45 baud). (A baud is defined as the number of pulses per second). The North American standard is to use mark as 2125 and space as 2295 (for a shift of 170 Hz). Generally, a good place to find RTTY/ASCII signals is on the 20 meter band between 14.080 and 14.100. The best thing to do is listen in on some QSO's in action and see how they operate before getting on the air yourself. To do this with the CP-1 you must use lower sideband and use AFSK (Audio Frequency Shift Keying). You who have a rig with a RTTY position on your mode switch may want to use FSK (Frequency Shift Keying). The CP-1 is set up for AFSK, however, you can modify it to do FSK (see Appendix D). The CP-1 has an internal AFSK generator. This is called the modulator. It generates the two-tone signal upon command. This signal is then fed to your microphone input on your transceiver.