

## SECTION I GENERAL DESCRIPTION

### 1.1. GENERAL.

1.1.1. PURPOSE OF BOOK. - This instruction book has been prepared to assist in the installation, operation and maintenance of the Collins Model 51J Radio Communications Receiver.

1.1.2. PURPOSE OF EQUIPMENT. - Collins 51J-4 Receiver is designed for communication applications where stability and dial accuracy of the highest order are the prime requisites. Under normal operating conditions, the receiver operates in the range of 540 kc to 30.5 mc with a total setting error and drift of less than 1 kc at any frequency within its range. The receiver is designed for amplitude-modulated and continuous wave reception, although its accuracy and stability make it suitable for many applications where it is desired to receive or set definite frequencies without searching or making frequent adjustments. This receiver incorporates the new mechanical filter in the intermediate frequency range to obtain the desirable rectangular-shaped passband.

### 1.1.3. DESCRIPTION.

(a) MECHANICAL. - The 51J-4 Receiver is available in two styles. One is a panel and shelf assembly suitable for mounting in a standard rack cabinet. Over-all panel dimensions are: width, 19 inches; height, 10-1/2 inches; and depth behind panel, 13-1/2 inches. A dust cover that fits over the top of the chassis is removable from the rear. The other assembly is in a cabinet suitable for table-mounting. Outside cabinet dimensions are: width, 21-1/8 inches; height, 12-3/8 inches and depth, 13-1/8 inches. Available on special order is a speaker that matches this cabinet. The speaker's dimensions are: width, 13 inches; height, 11 inches; depth, 7 inches. The speaker, the cabinet of the table-mounting assembly, and the front panel of the rack-mounting receiver are finished in St. James Gray wrinkle.

The following controls are located on the front panel:

R-F GAIN	CRYSTAL FILTER
AUDIO GAIN	PHASING
BFO ON-OFF	OFF-ON-STANDBY
CALIBRATE	MEGACYCLE TUNING
ON-OFF	(BAND SWITCH)
BFO PITCH	KILOCYCLE TUNING
AVC ON-OFF	ZERO ADJ

LIMITER OUT-IN	METER OUTPUT-INPUT
ANT. TRIM	CAL (100 K-C ADJUST-
CRYSTAL FILTER	MENTS)
SELECTIVITY	FILTER SELECTOR

The operating range of 540 kc to 30.5 mc is covered by 30 one-megacycle bands that are selected by the band switch knob and indicated by a slide rule dial having graduations of one-tenth megacycle (100-kc) intervals. The main tuning control covers each of these megacycle ranges with 10 turns of a 100 division dial calibrated at one-kilocycle intervals. The receiver's frequency stability is consistent with this finely divided calibration even at the highest frequencies.

A four-ohm headphone jack and a 600-ohm speaker jack are provided on the front panel. The antenna connector, 50-ohm i-f output connector, breakin relay terminals and four-ohm and 600-ohm audio output terminals are provided on the rear. A heavy duty a-c power cord extends from the rear of the chassis.

(b) ELECTRICAL. - When advantageous, the Model 51J-4 Communications Receiver uses single, double, or triple conversion in tuning the entire frequency spectrum of 540 kc to 30.5 mc. Nineteen tubes, three of which are dual, are employed in the receiver. With the exception of the rectifier tube, all are of the miniature type.

The receiver r-f circuits tune from .5 to 30.5 mc, thus Band 1 is referred to as covering the range .5 to 1.5 mc. However, the lower end of the operating range is considered to be 540 kc rather than 500 kc because of the questionable operation in the extreme low end of the band where frequencies approach the receiver i-f frequency of 500 kc. Limited operation at the extreme low end is possible with somewhat reduced performance.

The frequency range of the 51J-4 Receiver, .5 to 30.5 mc, is divided into 30 one-megacycle bands by a system of switches and coils which form the r-f amplifier and first mixer circuits. Band changing consists of moving powdered iron "slugs" into the coils in one megacycle steps until inductance limits of the coils are reached, then changing coils and repeating. Injection voltage for the first mixer is obtained from the fundamental or harmonic output of an oscillator, the frequency of which is controlled