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DATE 9/16/53	Supplementary Instruction Manual Mod 1 CFA - 11B	THE TECHNICAL MATERIEL CORPORATION MAMARONECK, NEW YORK	
DRN.			
CHKD. A. J. J.		SHEET 2 OF 6	NO. IN - 118
APPD. A. J. J.			

1. DESCRIPTION:

Small frequency shifts are most usually used in the lower frequency spectrum bands to overcome the large radiation losses encountered in these regions. Unfortunately, it is here that noise problems become most pronounced and, at the same time, some of the F.M. advantages inherent in the frequency shift system are lost.

The CFA - LLB conversion enables the user to extract every possible additional margin of advantage out of the frequency shift principle even though he is operating at low shift. This unit has been optimized for operation with a total shift of 40 cps (centered on 2700 cps) where total center frequency drifts in the order of 130 cps may be expected before teleprinter errors are incurred. It is possible, however, to obtain excellent results over a wide range of shifts - 20 to 200 cps with varying degrees of drift being permitted.

Regarding the receivers with which the CFA - LLB is to be used, it is strongly recommended that common beat frequency and high frequency oscillators, respectively, be shared in dual diversity operation so as to prevent drift in opposite directions. These oscillators should also be as stable as is possible (crystal, where practical) since the shift and, hence, the drift limits are accordingly reduced.

Where dual diversity is not used, as will most frequently be the case at low shifts, the highest economy of utilization will be obtained when each CFA - LLB is fed one standby channel and one actively operating channel. In this manner the operator may, by simply reversing the channel switches, quickly transfer his equipment from one circuit to another.

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1. DESCRIPTION: (Ctd.)

The general theoretical approach to the CFA - 1LB is almost identical to that contained in the instruction book proper issued with every CFA. The major difference is in operating procedure, the revised version being contained in Section 2 (below) of this pamphlet.

2. OPERATION:

(a). Tune the receiver to the proper discriminator center as indicated by the Monitor. (A full description of how the Monitor may be interpreted is contained in the CFA instruction book proper).

If only one circuit is to be used, it is advised that both CFA - 1LB channels not be used in parallel since this will result in a slight, but unnecessary, shifting of the discriminator center. The channel switch which applies to the standby circuit should, therefore, be left in the OFF position.

(b). An additional control, the MONITOR GAIN, has been installed to adjust for the extremely wide variations in shift which the operator may possibly encounter. As has been previously stated, the unit as a whole (including the MONITOR GAIN) has been optimized for 40 cps shift. If a change is found to be necessary, the MONITOR GAIN, which is located on the rear apron, must be turned fully counter-clockwise and then advanced until the Monitor pattern opens to the right or left with drift. Since the pattern is of qualitative importance only, the degree of opening for a given amount of drift is purely up to the operator to choose. The expansion to right or left should be set for each shift, less Monitor gain being desired for the higher shifts.

(c). For operation with 50 cps (total shift) and below, the THRESHOLD control must be set very roughly near its center point. The MARK BIAS should then be rotated until two extremes are found where the teleprinter

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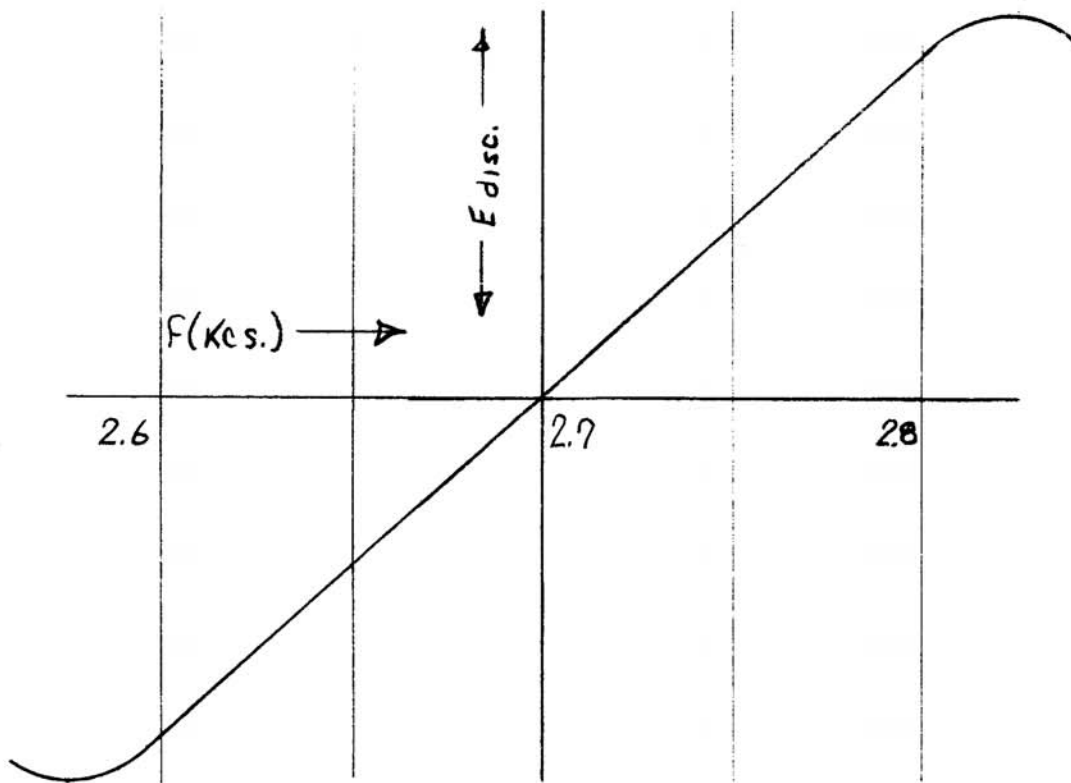
2. OPERATION (Ctd.):

(c). commences to err. The proper setting will then be an approximation of the midpoint between these extremes.

(d). For operation above 50 cps, the THRESHOLD must be set at its clockwise extreme and the MARK BIAS adjusted as in part (c), above.

(e). As a further aid to the operator, a qualitative representation of the discriminator curve has been included below. With the shift as a known quantity, it is possible, by means of this graph, to obtain an idea of the drift limits.

It must be kept in mind that the curve below is a typical mean of many production units and that, in actuality, slight shifts in center frequency will be encountered from unit to unit.



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Supplementary Instruction
Manual

Model CFA - 11B

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3. MODIFICATION INSTRUCTIONS:

(a) Modified Parts List --

In making the transition from CFA to CFA-1LB, the following components have been altered and the new values appear below:

<u>SYM</u>	<u>DESCRIPTION</u>	<u>FUNCTION</u>	<u>TMC PART NO.</u>
C11	CAPACITOR, fixed: mica; approx. 4700 mmfd. (determined at time of assembly)	Discriminator Condenser	CM-107-1
C13	CAPACITOR, fixed: mica; approx. 4000 mmfd. (determined at time of assembly)	Discriminator Condenser	CM-107-2
C14	CAPACITOR, fixed: Mica; approx. 4700 mmfd. (determined at time of assembly)	Discriminator Condenser	CM-107-3
C16	CAPACITOR, fixed: mica; approx. 4000 mmfd. (determined at time of assembly)	Discriminator Condenser	CM-107-4
C20	NOT USED (DELETE)	- -	- -
R13	RESISTOR, fixed: comp; 470,000 ohms, ±5%; 1 watt.	Discriminator Resistor	RC30GF474J
R14	NOT USED (Replaced by Jumper)	- -	- -
R15	RESISTOR, fixed: comp. 470,000 ohms, ±5%; 1 Watt.	Discriminator Resistor	RC30GF474J
R28	NOT USED (Replaced by Jumper)	- -	- -
R29	RESISTOR, fixed: comp; 470,000 ohms, ±5%; 1 Watt.	Discriminator Resistor	RC30GF474J
R30	RESISTOR, fixed: comp; 470,000 ohms, ±5%; 1 Watt.	Discriminator Resistor	RC30GF474J
R48	RESISTOR, fixed: comp; 2.2 megohms, ±10%; 1/2 Watt.	Mark bias drop res.	RC20GF225K
R92	RESISTOR, fixed: comp; 470,000 ohms, ±5%; 1 watt.	Discriminator Load	RC30GF474J
R93	RESISTOR, fixed: comp; 470,000 ohms, ±5%; 1 Watt.	Discriminator Load	RC30GF474J
R94	NOT USED (Replaced by Jumper)	- -	- -
R95	NOT USED (Replaced by Jumper)	- -	- -
R98	RESISTOR, variable: comp; 2.5 meg. ±20%; 2 watts, linear taper.	Monitor Gain	RV4ATS255B
S5	NOT USED (DELETE)		

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SUPPLEMENTARY INSTRUCTIONS
MODEL CFA-1LB
FREQUENCY SHIFT CONVERTER

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