NAVY MODEL FRE

FREQUENCY SHIFT RECEIVER CONVERTING EQUIPMENT

INSTRUCTIONS

RCA VICTOR COMPANY LIMITED
MONTREAL, CANADA

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Supplied to

NAVY DEPARTMENT - BUREAU OF SHIPS

By

RCA VICTOR DIVISION

Of

RADIO CORPORATION OF AMERICA
Camden, N.J., U.S.A.

SECTION II

INTRODUCTION

Navy Model FRE Frequency Shift Converter is designed to adapt the Navy Model RDM Diversity Radio Receiver for the reception of frequency shift keying signals having any shift from mark to space frequency of 200 to 850 cycles. The Converter functions to convert frequency shift signals received on the RDM Receiver to polar or neutral D.C. outputs suitable for operating teleprinters, black and white facsimile, and others. It is designed to be directly connected into an existing RDM system. When so connected, it functions to combine any one, two or three receivers of the RDM Diversity Receiver. With diversity reception the diversity action is such that a change in input level of 3 db between any two receivers causes the output to switch from one channel to the other. Provision is also made to obtain tone output from the Tone Keyer CALO-35049 which is part of the RDM equipment. In addition, switching is provided for the simultaneous reception of amplitude modulated signals when frequency shift signals are being received from the Converter. Voltage tap switches are provided for operation in two ranges 100 to 165 and 190 to 260 volts 50/60 cycle A.C..

"Frequency Shift" keying varies from "On-Off" keying inasmuch as instead of keying the carrier on and off as in the latter case the "mark" and "space" pulses are transmitted by shifting the carrier a small amount in frequency, the carrier being maintained at the same level at all times. The shift from "mark" to "space" frequency generally lies in the range of 200 to 850 cycles, with 850 cycles the most common. In some instances a 200 cycle phase modulation of one radian is superimposed on the carrier when the wider shifts are used.

Operation of System:

The accompanying block diagram shows the general operation of the system. Three separate I.F. channels are provided, one being fed from each of the receivers of the RDM Receiver. The first tube of each channel is a conventional I.F. amplifier operated at high gain with no AVC voltage applied. This is followed by a limiter, which functions to limit amplitude variations and provide D.C. for operating the electronic diversifying gates. The output of the limiter is fed to a conventional Foster-Seeley discriminator which furnishes the audio output. A reversing switch is connected across the discriminator output so that "mark" or "space" pulses of either polarity can be received. This output then passes through a coupling capacitor to the electronic gate, allowing only the strongest of the three signals to pass at any instant. The use of this coupling capacitor has an important bearing on the operation of the system as it permits the signal to shift up and down the discriminator curve without destroying the sense of the signal. This characteristic makes the system relatively independent of normal frequency drift.

After going through the electronic gate the signal is amplified and passed through a low pass filter which attenuates the remaining high frequency noise components. The signal is then fed to a locking circuit which holds either

a "mark" or "space" pulse until an opposite pulse is received. The output of the first locking circuit is fed to a power locking stage which supplies the D.C. output. A signal is also supplied to operate the Tone Keyer to supply keyed tone where required.

SECTION #1

Electrical Characteristics

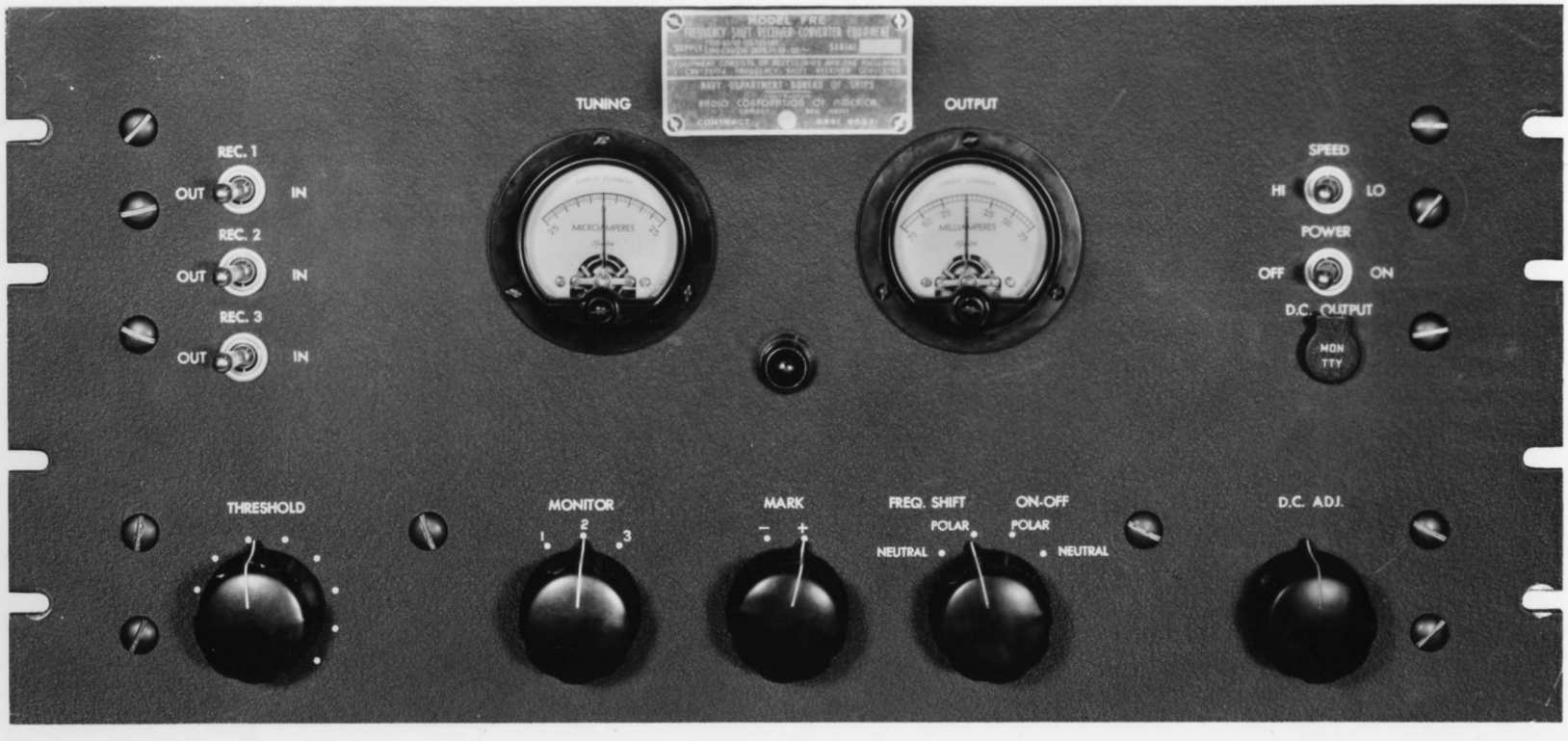
Frequency Range (when used with Model RDM Receiver)	535 to 32000 kc.
Intermediate Frequency	455 kc.
Neutral Direct Current Output	60 ma.
Polar Direct Current Output	25 ma.
Direct Current Load Impedance	130 to 1800 ohms
Undistorted Tone Output (from Tone Keyer)	12 milliwatts
Output Impedance of Tone Keyer	600 ohms
Power Supply Rating	100-117; 117-135; 135-165; 190-230; 230-260 volts 50/60 cycles a.c.
Power Requirements	175 watts

Mechanical Specifications

Overall Dimensions	19" wide x 8¼" high x 16" deep.
Total weight	55 lbs.

Tube Complement

I-F Amplifiers	3 RCA 6SH7
Limiters	3 RCA 6SH7
Discriminators	3 RCA 6H6
Gating Tubes	2 RCA 6H6
A-F Amplifier	1 RCA 6SJ7
First Locking Tubes	2 RCA 6SJ7
Power Locking Tubes	2 RCA 6L6
Rectifiers	3 RCA 5Y3-GT/G


MODEL FRE
FREQUENCY SHIFT RECEIVER-CONVERTER EQUIPMENT
NAVY DEPARTMENT - BUREAU OF SHIPS
RADIO CORPORATION OF AMERICA
TUNING
OUTPUT
REC. 1
OUT
IN
REC. 2
OUT
IN
REC. 3
OUT
IN
SPEED
HI
LO
POWER
OFF
ON
D.C. OUTPUT
MON
TTY
THRESHOLD
MONITOR
1
2
3
MARK
–
+
FREQ. SHIFT
POLAR
NEUTRAL
ON-OFF
POLAR
NEUTRAL
D.C. ADJ.

PREPARED FOR: MI-22274

PREPARED BY: M Duplessy

CHECKED BY:

APPROVED BY: Denton May 30/45

RCA VICTOR COMPANY LIMITED, MONTREAL, CANADA

EQUIPMENT **SPARE PARTS LIST**

MODEL F.R.E.

FREQUENCY SHIFT RECEIVER CONVERTER EQUIPMENT

PL-120281

ISSUE: Ø X 23

SHEET 1 OF 5 SHEETS

SCHEMATIC DIAGRAM W-107130

ITEM	QTY.	REPLACEMENT FOR	DESCRIPTION	Navy Type #	MFR.	MANUFACTURER'S DESIGNATION	RCA DESIGNATION
1	1	T10	Power Transformer		18		121155-1
2	1	T11	Power Transformer		18		121302-1
3	1	L19	Low Pass Filter Reactor		18		121164-1
4	1	L20, L21	Transformer Reactor Pack		18		121153-1
5	1	L22, L23	Transformer Reactor		18		121154-1
6	2	C59, C61	Electrolytic Capacitor		2		110905-1
7	1	C55, C56,C57,C58,C60	Filter Capacitor		2	AWS.CP70 BIEF 405 PL	110906-1
8	1	S1,S2,S3,S12,S13,S14	Toggle Switch		3		118460-1
9	2		Pilot Light		4		849546-1
10	1		Pilot Light Socket & Jewel		5		99042-5
11	1	M1	Meter 25-0-25 Microamps		15		110907-1
12	1	M2	Meter 75-0-75 Milliamps		15		110908-1
13	1	S10, S11	Tap Switch		6		99585-1
14	1		Connector Socket 3-Pt.	AN-3102 10SL-3P	8		110956-2
15	1		Connector Socket 1-Pt.	CPH49194	6		110956-1
16	1		Tube Socket	CPH49373	6	SS-8M	856956-6
17	1	T1, T4, T7	I.F. Transformer		1		107663-501
18	1	T2, T5, T8,	I.F. Transformer		1		107663-502