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NAVY DEPARTMENT

BUREAU OF ENGINEERING

REPORT ON

Test of RCA Victor Company Test Oscillator

Model TMV-97-A - Serial No.785

Range 150 to 25000 Kc.

NAVAL RESEARCH LABORATORY
ANACOSTIA STATION
WASHINGTON, D.C.

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Authorization: BuEng.let. S67/74(12-26-W8) of 27 December, 1933.

Date of Test: Tests conducted from 10 January to 17 January 1934.

Reported by: _____
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Approved by: _____
H. R. Greenlee, Captain,USN.,
Director.

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APPENDICES

1. AUTHORIZATION:

The test of this equipment was authorized in Bureau of Engineering letter S67/74 (12-26-W8) of 27 December, 1933. Bueng Prob. F1-5.

2. PURPOSE OF TESTS:

The investigation and test of R.C.A. Victor Company Test Oscillator, Model TMV-97-A, serial number 785, to determine its suitability for Naval use.

3. EQUIPMENT UNDER TEST:

This instrument is manufactured by the R.C.A. Victor Company, Inc., Camden, New Jersey, and consists of a radio frequency oscillator tube, commercial type 30, and a modulator tube, also type 30, which modulates the r.f. output at 400 cycles. The frequency range is 150 Kc to 25,000 Kc., which is covered by a seven position range switch. Tuning is accomplished by a single vernier dial, graduated 0 to 100, the higher numbers indicating higher frequencies.

Other controls on the panel are an attenuator dial, 0 to 100, and an 'on' and 'off' filament switch. There are two binding posts marked 'ANT' and 'GND' for output terminals. One 4-1/2 volt filament battery (Burgess No. 2370 or equivalent) and one 22-1/2 volt plate battery (Burgess No.4156 or equivalent) are contained in the case. This case is metal, black finished with a leather handle, the front of the case constituting the panel, which measures 6.5" high by 9.75" wide. The case is 4.5" deep, and weighs 3.5 lbs. including batteries.

The r-f oscillator has a tuned grid, with condenser and grid leak, and inductive feed-back in the plate circuit, the range switch cutting in a different set of inductances for each of the seven bands. The modulator has an oscillation transformer, the primary of which is in the grid circuit, with a grid condenser and leak. The secondary of this transformer, which is in the plate circuit, is tuned with a fixed capacity and is also conductively coupled to the plate circuit of the oscillator tube for modulating the r-f output.

The output is obtained with a fixed capacitive potential divider in parallel with the grid tuning circuit, which consists of a 4.5 mmf. and a 5000 mmf. condenser in series. From a center tap a 2000 ohm variable resistor is shunted across the 5000 mmf condenser to ground, which serves as an attenuator, the output leads being taken from the resistor arm and ground. A schematic diagram of the circuit is shown on Plate 1.

4. METHOD OF CONDUCTING TESTS:

A model LC standard signal generator also a type 604A General Radio Company test signal generator were used to supply input voltages to an experimental model receiver, to measure the output of the subject test oscillator by substitution method. A General Electric cathode-ray oscillograph type HC-10-A1 was used to determine the character and percentage of modulation. The output of the subject oscillator was amplified by using the tuned r-f stages of the experimental receiver, in order to produce operating voltages of sufficient magnitude at the signal terminals of the cathode-ray oscillograph, and the result is shown by photographic reproduction of the image appearing on the screen.

The following tests were made:

(a) Measurement of maximum output at three points in each band.

(b) Determination of frequency range of each band, and overlap.

(c) Operation of attenuator.

(d) Stability of frequency with operation of attenuator, and test for dead spots in the oscillator.

(e) Recording of Modulation envelope by cathode-ray oscillograph.

5. RESULT OF TESTS:

(a) The maximum output at three points in each band is given in the following tabulation, as obtained by substitution method:

Band	Frequency KC	Microvolts output
1	150	6500
1	250	11000
1	330	4900
2	330	6000
2	500	7800
2	720	7000
3	720	7000
3	1000	5000
3	1460	4600
4	1460	870
4	2200	1500
4	3050	1350
5	3050	500
5	5000	1000
5	7400	1550
6	7400	580
6	10000	750
6	14300	168
7	14300	190
7	19500	1450
7	25000	350

(b) The frequency range checks with that shown in the manufacturer's instruction book, with ample overlap for each band. One measurement was taken on the same frequency at the upper end of each band, and the lower end of the following band.

The frequency range covered in the seven bands is shown below:

Band	Frequency range
1	150- 330
2	330- 720
3	720-1460
4	1460-3050
5	3050-7400
6	7400-14300
7	14300-25000

(c) Attenuation from maximum output to zero is obtained by rotating the attenuator dial from 100 to 0, with no minimum output being indicated at zero, as measured with a receiver having a sensitivity averaging 18 microvolts for standard output of 5 milliwatts. It is necessary, however, to qualify this statement when operating on the higher frequencies in ranges 5, 6 and 7, when it becomes necessary to remove the oscillator a short distance from receiver, and rotate the oscillator case until a position is found where direct coupling to the receiver is eliminated. This adjustment becomes more critical in the highest frequency range number 7.

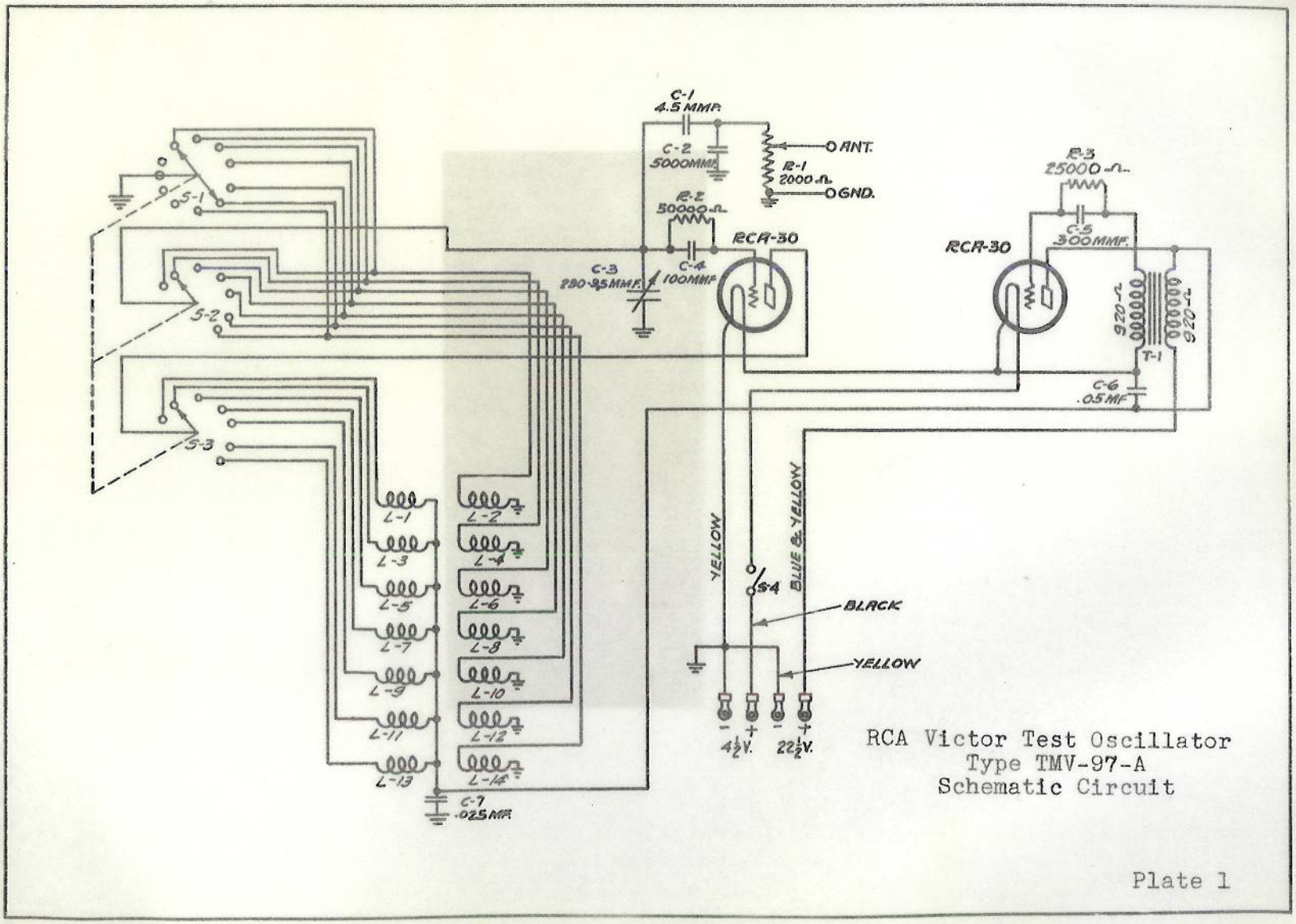
(d) There is no apparent change in frequency due to variation of the attenuator. Test throughout the entire frequency range shows no dead spots.

(e) An oscillogram of the modulation envelope is shown on Plate 2. From this it may be seen that the percentage of modulation is approximately 40. The oscillator output is continuously modulated, there being no provision for obtaining a pure CW output.

6. CONCLUSIONS:

The output of subject oscillator, with respect to wave form is considered satisfactory, with good control of attenuation. The maximum output at frequencies from 150 to 1460 Kc is considered sufficient for ordinary servicing purposes, and while the output is greatly diminished at higher frequencies, the lowest being 168 microvolts at 14300 Kc., it is believed this oscillator would be useful as a readily portable servicing instrument, for such purposes as the limitations of the equipment permit. No provision is made in the instrument for determining the magnitude of the output.

Typical calibration curves only are furnished with the equipment, and it is necessary to make individual curves for each instrument. However, due to the lack of temperature control or other provision for accurate frequency setting, the frequency stability of this instrument is not considered adequate for lining up the i-f stages in the Models RAA and RAB receivers without reference to a suitable frequency standard.



RCA Victor Test Oscillator
Type TMV-97-A
Schematic Circuit

Plate 1

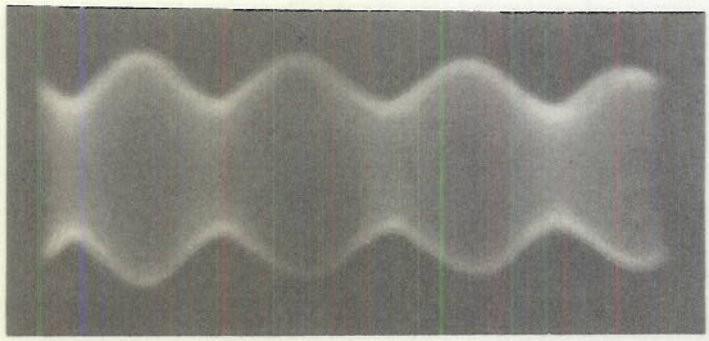


Plate 2