REPORT OF TEST

ON

THE MODEL XFK, FREQUENCY SHIFT EXCITER

Albert J. Jurafsky

THE TECHNICAL MATERIEL CORPORATION

JULY, 1955

TEST REPORT ON THE MODEL XFK

July 1955

A.S.S.

S-277

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1. NOTICES

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2. ADMINISTRATIVE DATA

PURPOSE OF TEST: July, 1955

This test has been conducted to determine if the equipment referred to herein has characteristics which are in accordance with the manufacturer's specifications.

MANUFACTURER:	THE TECHNICAL MATERIEL CORPORATION
MANUFACTURER'S TYPE OR MODEL NO.:	PMO
DRAWING, SPECIFICATION OR EXHIBIT:	COMMERCIAL
QUANTITY OF ITEMS TESTED:	THREE
SECURITY CLASSIFICATION OF ITEMS:	UNCLASSIFIED
DATE TEST COMPLETED:	JULY 30, 1955
TEST CONDUCTED BY:	A.J.Jurafsky Project Engineer

3. FACTUAL DATA

3.1. DESCRIPTION OF TEST APPARATUS:

(a). Vacuum Tube Voltmeter -- Hewlett-Packard Model 410B -- Calibrated at monthly intervals against a laboratory standard.

(b). Non-inductive load: 72 ohms, 10w (or 5 parallel connected RC42GF361K).

(c). Stable 100 Kc Oscillator with mixer and audio amplifier combination or Communications Receiver - Technical Materiel Corporation Model GPR 90.

(d). Four crystals (CR27/U) approximating these frequencies 1, 2.2, 2.4, 6.6 mc.

(e). Adjustable Line Transformer - General Radio Typ V-5MT.

(f). Line Meter - 0 to 150 VAC, General Electric Mod 1 8AO58VCT42.

(g). Frequency Meter - Hewlett-Packard Model 500 B.

(h). Graphical Recorder - Esterline-Angus Model A.W.

.2. T st Proc dur :

NOTE: BEFORE ANY TESTS RELATING TO FREQUENCY STABILITY ARE PERFORMED, IT IS UNDERSTOOD THAT THE UNIT HAS BEEN PERMITTED A PULL 24 HOUR WARM-UP PERIOD.

3.2.1. **Power** Output Test:

3.2.1.1. Purpose - To determine the maximum power output of the Model XFK.

3.2.1.2. Procedure - The output appearing at J1 on the rear apron of the unit must be connected to a 72 ohm load. The power dissipated in this termination is then calculated from the voltage appearing across its terminals.

The power output is measured at both extremes of each band, four crystals being necessary to accomplish this. In each case the sideband which is 200 Kcs. above the crystal frequency is chosen by properly adjusting the output Tuning knob. The Pow r control is adjusted for maximum output.

3.2.1.3. Set Up - Please refer to Appendix I, Part 3.2.5.1.

3.2.2. Frequ ncy Stability Vs. Pow r Lin Change Test:

3.2.2.1. Purpose - To determine the degree to which the frequency stability of the unit is affected by line voltage changes.

3.2.2.2. Procedure - The A.C. Line input is first passed through a line control transformer whose output is meter monitored. The R.F. output from the Model XFK is converted to an audio difference frequency by means of a 100 Kcs. oscillator-mixer-audio amplifi r test jig combination. The same result will, of course, be obtained if a convenient r - ceiver is substituted for the mixer-audio amplifier combination. However, in this case, care must be exercised not to overload the receiver.

A 1 Mcs. crystal is inserted in the Model XFK to obtain a 1.2 Mcs. output which in turn is combined with the 12th harmonic of 100 Kcs. to produce an audible beat at th output of the test jig.

The Shift control is first locked at zero shift and then the Frequency control knob is varied until a useable beat in the order of 100 to 200 cps results.

The line is then raised 10% above the 110 volt nominal potential and the Model XFK oscillators given about 60 seconds to which to reach their maximum excursion and stabiliz before the deviation is noted. The same procedure is followed in bringing the lin back down to the nominal voltage and then, after the appropriate 60 second pause and reading, to the point which is 10% below nominal voltage.

3.2.2.3. Set Up - Please refer to Appendix I, Part 3.2.5.2.

3.2.3. Frequency Stability Vs. K y Line Voltag T st:

3.2.3.1. Purpose - To determine the degree to which the frequency stability of the Model XFK is affected by key line voltage variations in excess of the 25 volt saturation level.

3.2.3.2. Procedure - The set up is identical to that called out in 3.2.2.2 with the following exceptions or additions:

(a). The power line level is set at 110 volts.

(b). The Shift control is locked at 1000 cps.

(c). The Test Switch is set at Line.

(d). Patch Xtal 1 into Multiplication Radio 1 on the rear apron.

(e). Plug the 1 Mc. xtal into position 1 and set the Xtal switch accordingly.

(f). After the Output Tuning adjustment has been made at 1.2 Mcs., set the Power control for optimum beat clarity.

(g). Adjust the voltage input at Pin 4 of E1 to 25 volts.

(h). Rotate the Frequency knob until a beat of 100 to 200 cps is obtained.

This test may now be carried out by advancing the voltage input at Pin 4 of E1 to 150 volts and noting the change in beat note. This change will then be in parts per 1.2 million and may readily be converted into parts per million.

3.2.3.3. Test Set Up - Please refer to Appendix I, Part 3.2.5.3.

3.2.4. Frequency Stability Vs. Ambi nt Conditions:

3.2.4.1. Purpose - To observe the variation of the Model XFK oscillator frequencies for ambient conditions similar to those encountered in the field.

3.2.4.2. Procedure - The procedure is identical to that called out in 3.2.2.2. with the following exceptions:

(a). The power line level is maintained at 110 volts.

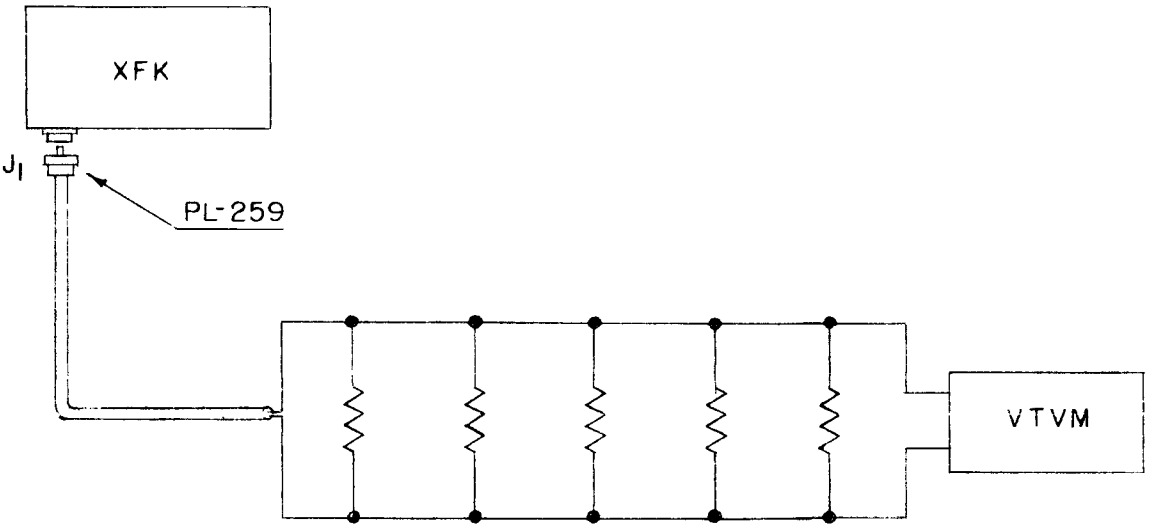
(b). The Test switch is set at Space.

The 100 Kcs. crystal controlled oscillator against which the beat is obtained must have a 24 hour stability of no worse than one part per million. The Model XFK is given 24 hours of uninterrupted warm-up before this test commences. At the end of this period a beat between 100 and 200 cps is obtained; the recorder is started; and the test run for a period of eight hours.

At the conclusion of the test, the frequency change which occurred during the period of the test is expressed in parts per million.

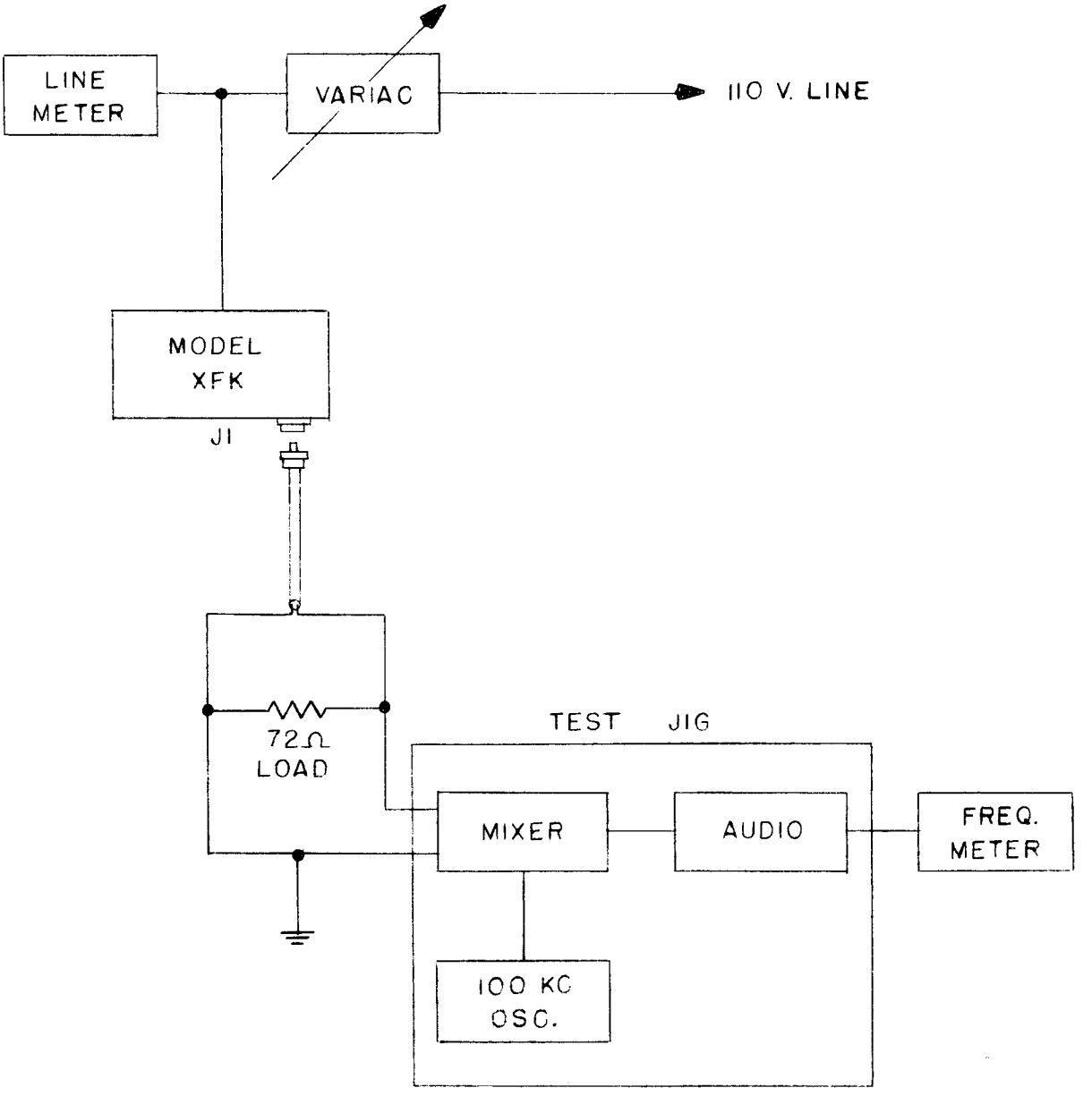
3.2.4.3. Test Set Up - Please refer to Appendix I, Part 3.2.5.4.

3.2.5. Appendix I

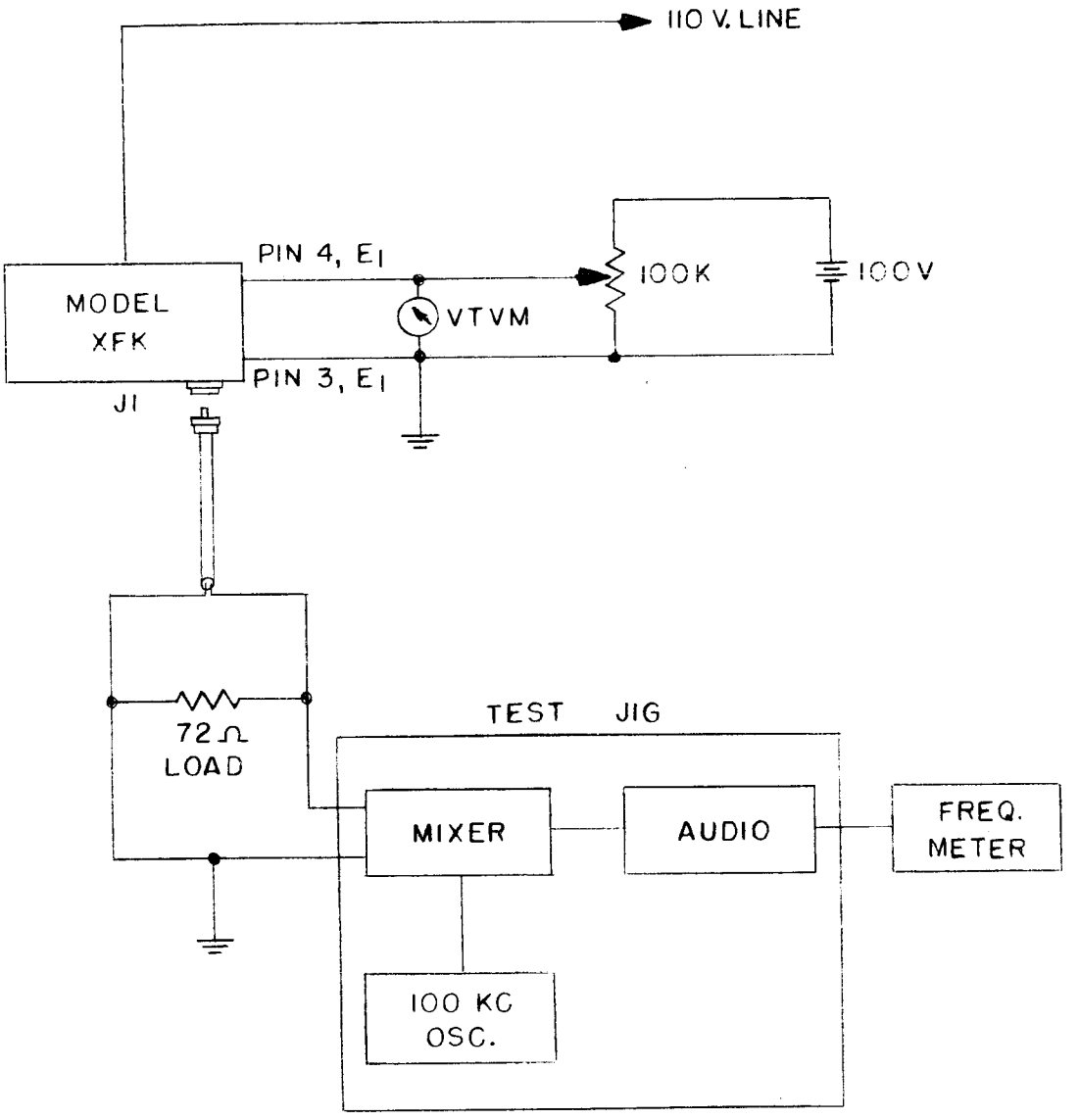


5 COMPOSITION RESISTORS: 360Ω, 2W (RC42GF361K) OR EQUIVALENT.

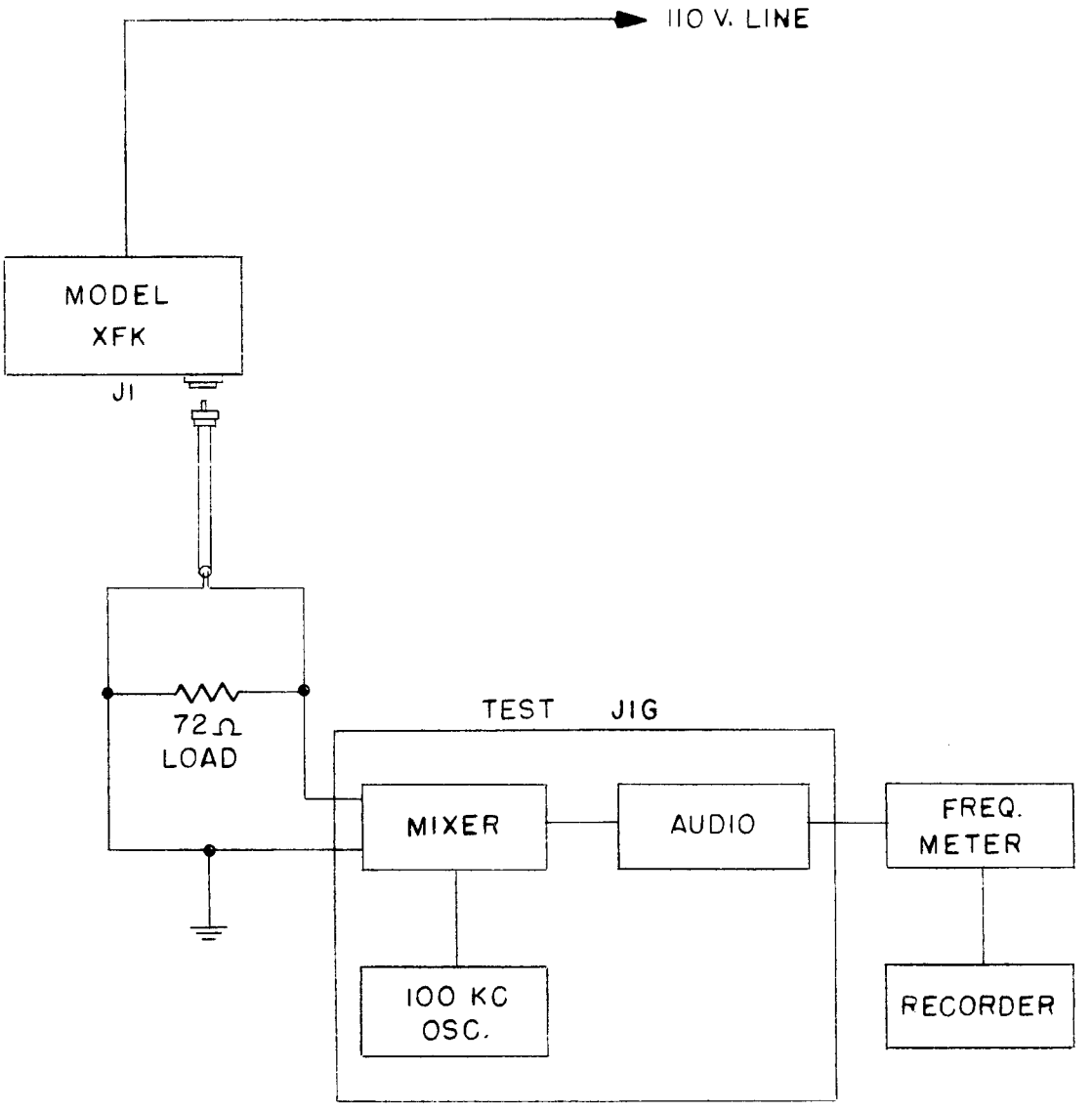
3.2.5.1. Power Output Test.



3.2.5.2. Frequency Stability Vs. Power Line Change Test.



3.2.5.3. Frequency Stability Vs. Key Line Voltage Test.



3.2.5.4. Frequency Stability Vs. Ambient Conditions Test.

3.3. TEST SUMMARY

Reference	Spec. Limits			Measured Values		No. Samples	
				Min.	Max.	Tested	Passed
3.2.1.	Band	f	Min. out.				
	1-2.5	1.2	3 watts	8 watts	11 watts	3	3
	1-2.5	2.4	3 watts	8 watts	11 watts	3	3
	2.5-6.9	2.6	3 watts	5 watts	6 watts	3	3
	2.5-6.9	6.8	3 watts	6.7 watts	8 watts	3	3
3.2.2.	10 cps for 10 volts line change			8 cps	10 cps	3	3
3.2.3.	zero drift			none detected		3	3
3.2.4.	see note			3 cps	10 cps	3	3

NOTE: This is a combined test of all ambient conditions including temperature and humidity.

RECOMMENDATIONS: None. Data merely submitted.

4. Signatures:

Albert J. Jurafsky,
Project Engineer

H. N. Olsen, QARIC,
U. S. Signal Corps