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A&A Report No. 228
Project No. 2004-154

OS-5 BEAT FREQUENCY OSCILLATOR

[redacted] PROTOTYPE

25X1

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21 October 1959

1. INTRODUCTION

The OS-5 Beat Frequency Oscillator was subjected to a Class B evaluation. The device, originally designed by the R&D Laboratory, is a prototype and was fabricated by [redacted] 25X1
[redacted] 25X1

The OS-5 operates on a frequency of 455 kc + 3 kc [redacted] 25X1
[redacted] 25X1
[redacted] The OS-5 may be directly coupled to the antenna input terminals of the receiver or may be inductively coupled to the mixer section of the receiver by wrapping the BFO lead around the mixer tube. 25X1

The mechanical and electrical characteristics of the [redacted] 25X1 prototype #219 and of the R&D model #218 were compared. The results of the tests conducted on each unit are described in paragraph 2. Photographs of the units are shown on pages 6, 7 and 8.

2. TEST RESULTS

2.1. Size and Weight

Prototype OS-5:	3-1/16" x 2-5/16" x 1-13/16"	-	4-1/2 ounces
R&D OS-5 :	3-1/16" x 2-5/16" x 1-13/16"	-	4-1/2 ounces

2.2. Frequency Range

Prototype OS-5:	453.280 - 457.061 kc
R&D OS-5 :	454.337 - 461.072 kc

2.3. Tuning Range

The kilocycle tuning range of the units below and above 455 kc is:

	kc below 455 kc	kc above 455 kc	total kc
Prototype OS-5:	1.720	2.061	3.781
R&D OS-5 :	0.663	6.272	6.735

2.4. OS-5 DC Input Power

The OS-5 oscillator uses a standard penlite battery such as the RCA No. VS074 1.5 volt type.

Prototype OS-5:	0.45 ma/1.5 volts - 0.68 milliwatt
R&D OS-5 :	0.34 ma/1.5 volts - 0.51 milliwatt

.22

2.5. OS-5 Output Voltage

The OS-5 output voltage measured with an HP-410B VTVM is;

Prototype OS-5: 0.210 volt
R&D OS-5 : 0.273 volt
spec .3 volt RMS

Late remeasured
340 mv
330 mv RMS
∴ both above spec.

2.6. OS-5 Frequency Drift Versus Temperature

Prototype OS-5

Temperature °C	OS-5 Output Frequency Kilocycles	Frequency Drift (cycles) from reading at 23°C
-40	464.462	+10,823
-20	462.750	+ 9,111
+23	453.639	0
+30	* 457.095	+ 3,456
+40	* 457.811	+ 4,172
+50	* 453.723	+ 84

R&D OS-5

Temperature °C	OS-5 Output Frequency Kilocycles	Frequency Drift (cycles) from reading at 23°C
-40	462.228	+ 8,073
-20	461.504	+ 6,349
+23	454.155	0
+30	453.811	- 344
+40	453.336	- 819
+50	452.433	- 1,722

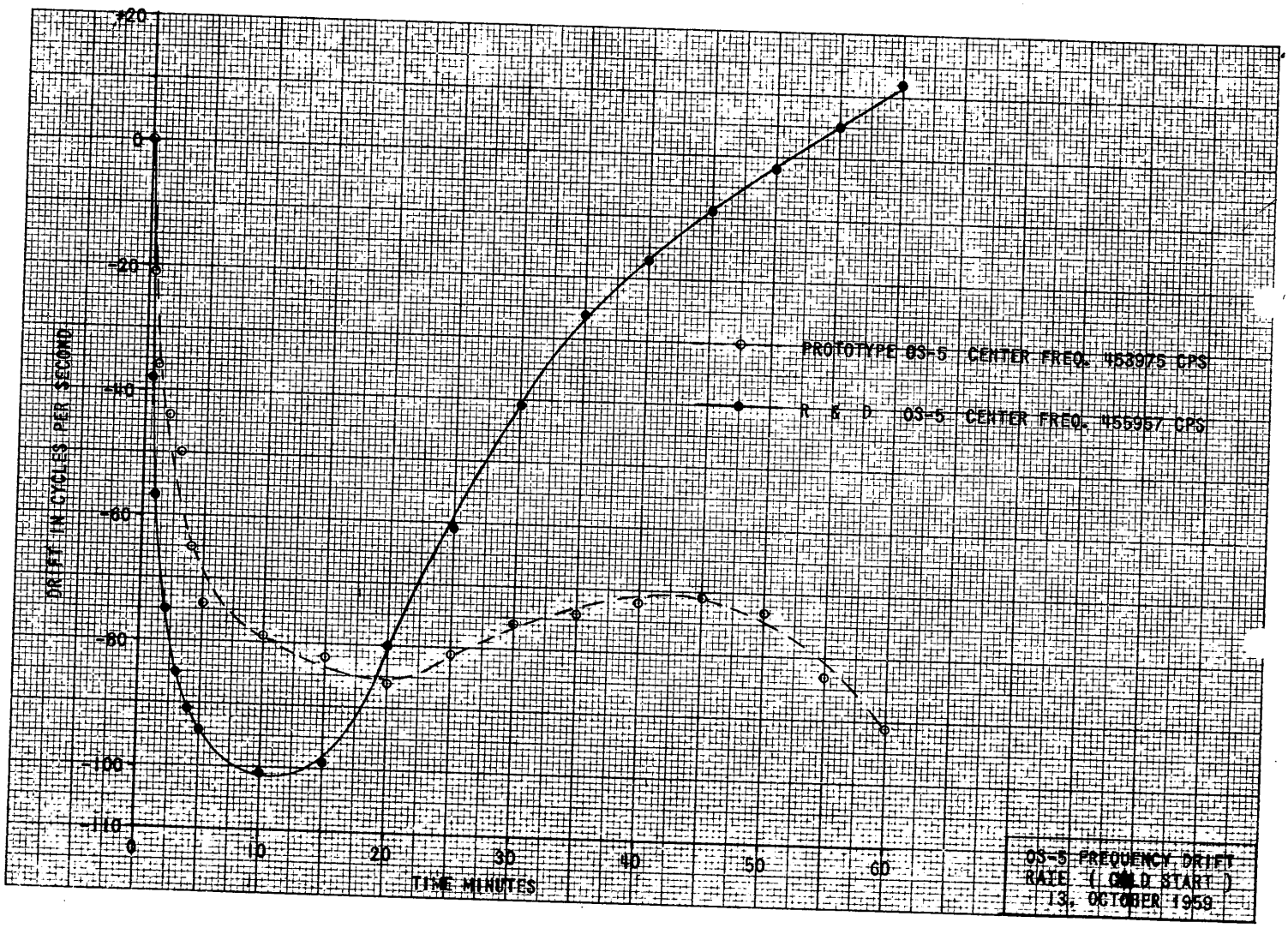
* The frequency readings taken at 30°, 40°, and 50° are not reproducible. The OS-5 prototype is unstable and changes output frequency due to the tuning slug changing its position in the oscillator coil.

2.7. OS-5 Cold Start Frequency Drift Rate

The OS-5 frequency drift was measured from a cold start. The ambient temperature was 23°C. See curve, figure 1.

Prototype OS-5			R&D OS-5		
Time Minutes	Frequency Kilocycles	Cycles Drift	Time Minutes	Frequency Kilocycles	Cycles Drift
0	455.957	0	0	453.975	0
15 sec	455.947	-10	15 sec	453.948	-27
30 sec	455.936	-21	30 sec	453.938	-37
45 sec	455.926	-31	45 sec	453.925	-50
1	455.919	-36	1	453.918	-57
2	455.913	-44	2	453.900	-75
3	455.907	-50	3	453.890	-85
4	455.892	-65	4	453.884	-91
5	455.883	-74	5	453.881	-94
10	455.878	-79	10	453.874	-101
15	455.875	-82	15	453.876	-99
20	455.871	-86	20	453.895	-80
25	455.876	-81	25	453.914	-61
30	455.881	-76	30	453.934	-41
35	455.883	-74	35	453.946	-26
40	455.885	-72	40	453.958	-17
45	455.886	-71	45	453.966	- 9
50	455.884	-73	50	453.973	- 2
55	455.874	-83	55	453.980	+ 5
60	455.866	-91	60	453.987	+12

359-11 KEUFFEL & ESSER CO.



3. CONCLUSIONS AND RECOMMENDATIONS

3.1. Conclusions

The [redacted] OS-5 Prototype compares favorably with the R&D OS-5 regarding: 25X1

(1) size
(2) weight
(3) circuitry.

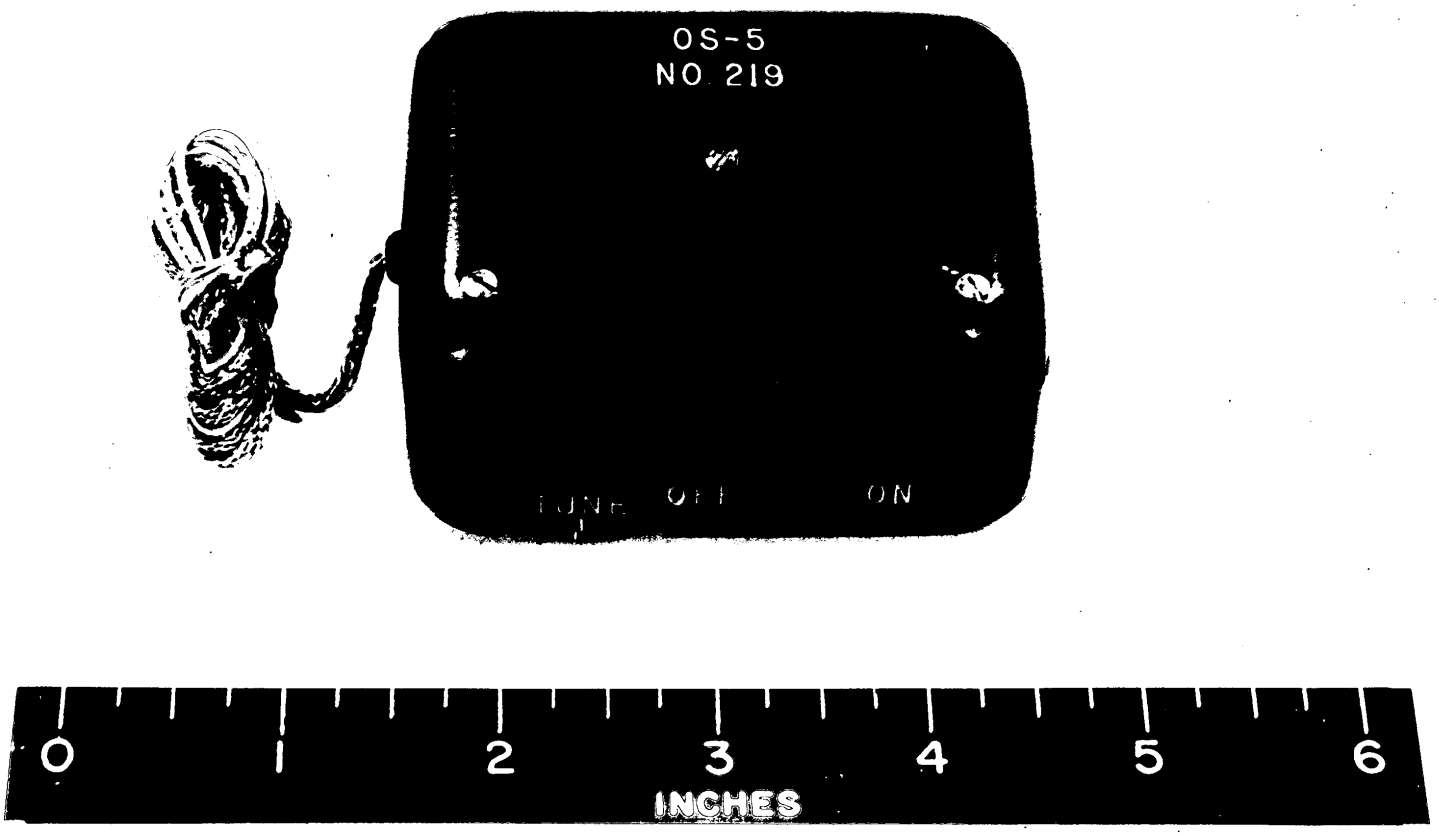
The [redacted] OS-5 prototype does not compare favorably with the R&D OS-5 regarding: 25X1

(1) battery power requirements
(2) frequency stability.

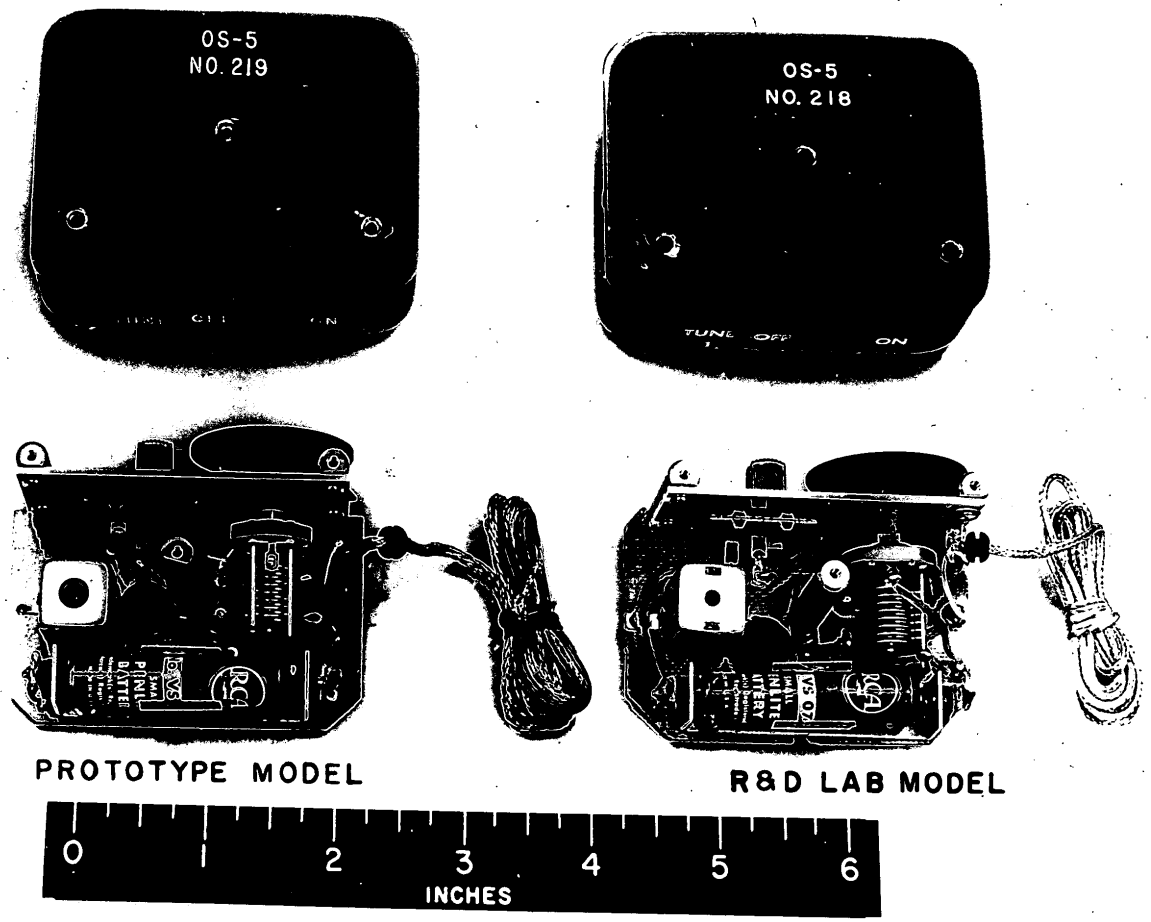
3.2. Recommendations

The prototype OS-5 should be improved by adjusting the biases on the 2N135 transistor circuit. The prototype uses a oscillator coil which is different from the type used in the R&D model. This may account for the increase in battery current which the prototype requires and for the loss of output voltage.

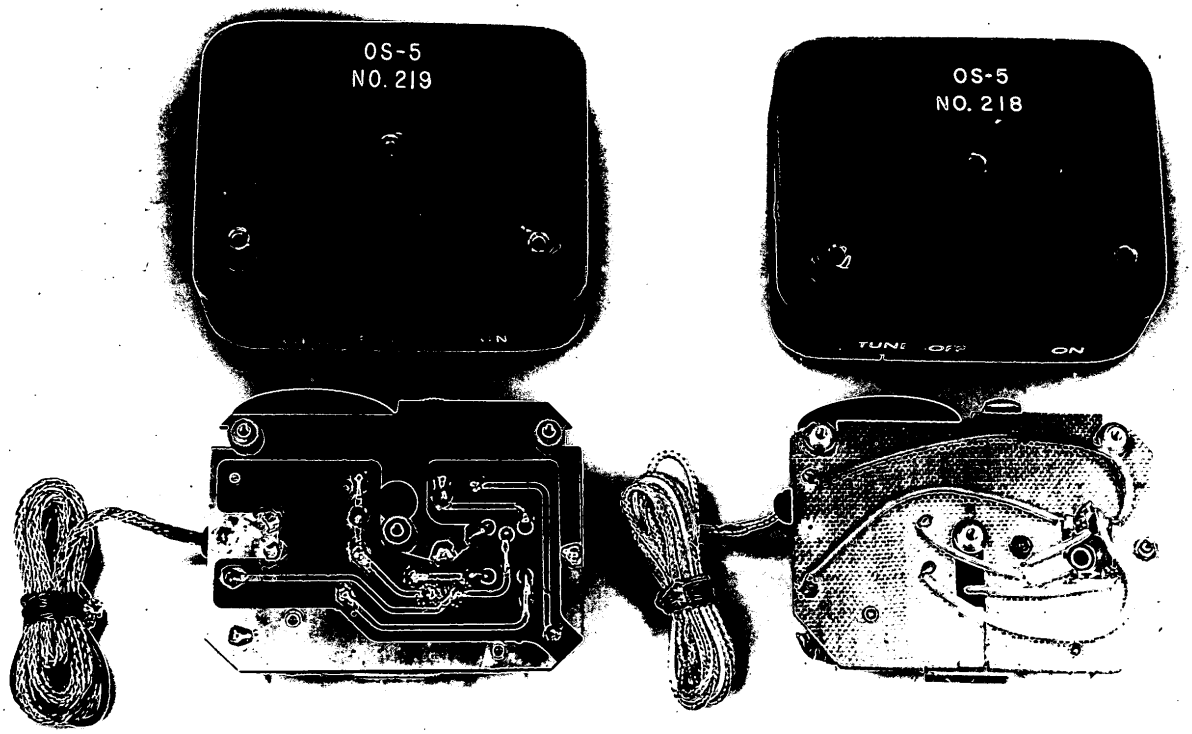
The slug in the oscillator coil changes its position because it does not fit properly in the coil. A larger slug which fits the coil form should be used or the present slug should be sealed in position after tuning the oscillator to 455 kc.



OS-5 BEAT FREQUENCY OSCILLATOR
PROTOTYPE MODEL



OS-5 BEAT FREQUENCY OSCILLATOR
COMPONENT LAYOUT (TOP VIEW)



PROTOTYPE MODEL

R & D LAB MODEL

OS-5 BEAT FREQUENCY OSCILLATORS

COMPONENT LAYOUT (BOTTOM VIEW)

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