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Report on

Test of First Production Sample

of

Models RAG-1/RAH-1 Receiving Equipments

Complete as called for under Contract NOs-32226.

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AUTHORIZATION

1. The tests herein reported were authorized by reference (a). Other pertinent data are listed as references (b) to (u) inclusive.

Reference: (a) BuEng. ltr. NOs-32226(8-27-W8) of 10 September 1935.
(b) Specifications RE 13A 466B.
(c) NRL Report No. R-1178.
(d) BuEng. ltr. NOs-32226(6-25-W8) of 3 July 1935 to BuS&A.
(e) BuEng. ltr. NOs-32226(7-1-W8) of 3 July 1935 to INM New York.
(f) BuEng. List of Corrections dated 1 July 1935.
(g) BuS&A ltr. NOs-32226(SPM) of 27 August 1935 to Hygrade Sylvania Corp. via INM New York.
(h) Hygrade Sylvania Corp. ltr. to INM New York of 20 March 1936 and INM New York 1st end. EN8/Ct 32226(A) of 25 March 1936 to BuEng.
(i) BuEng. ltr. S67/46(12-21-W8) of 24 December 1934 with enclosure "Minutes of Conference of 12-13 December 1934."
(j) BuEng. ltr. NOs-32226(10-16-W8) of 2 January 1935 to INM New York.
(k) BuS&A ltr. NOs-32226(SPM) of 2 February 1935 to Hygrade Sylvania Corp.
(l) BuEng. ltr. NOs-32226(2-7-W8) of 25 February 1935 to INM New York.
(m) BuEng. ltr. S67/46(7-30-W8) of 1 August 1934.
(n) Specifications RE 13A 488B Foil Paper Capacitors.
(o) Specifications 17-I-12 Electrical Indicating Instruments.
(p) Specifications RE 10A 263H Nameplates.
(q) Specifications RE 13A 346U Vacuum Tubes.
(r) Specifications RE 13A 317F Ceramic Insulating Materials.
(s) Specifications 17-I-14 Phenolic Insulating Materials.
(t) Specifications RE 13A 481B Telephone Jacks.
(u) Hygrade Sylvania Corp. Descriptive Specifications.

OBJECT OF TEST

2. The object of this test was to determine first, whether or not subject equipment meets existing specification requirements, as covered by references (b), (f), (k) and (m); second, to determine whether or not defects listed in reference (c) have been eliminated and the desired refinements have been incorporated; third, to obtain data on any details of construction and performance not specifically covered, but which would require corrective action prior to the release of production.

ABSTRACT OF TEST

3. The subject equipments were set up in the Laboratory and given a general inspection of mechanical construction and wiring. The following tests were made to determine specification compliance with regard to electrical performance:

(a) Sensitivity - a.c. operation.
(b) Selectivity - at optimum gain.
(c) Maximum noise level.
(d) Resonant overload.
(e) Audio frequency characteristics.
(f) Automatic volume control characteristics.
(g) Frequency overlap.
(h) Frequency range of oscillator wobbler (Model RAH-1).
(i) Capacity range and variation of oscillator wobbler (Model RAH-1).
(j) Frequency stability with change in input signal intensity.
(k) Frequency stability with change in sensitivity control setting.
(l) Frequency stability with change in line voltage.
(m) Frequency stability with change in antenna trimmer (Model RAH-1).
(n) Transrectification.
(o) Voltage characteristic of CHS-20032 rectifier power unit.
(p) Sensitivity with complete change of tubes.
(q) Range and linearity of sensitivity control.
(r) Output signal plus noise characteristic.

Conclusions

(a) In general, it can be said as regards mechanical construction, neatness, and accessibility, that these equipments have not been equalled by any similar equipment previously tested at this Laboratory.

(b) The wiring and soldering in the case of the Model RAH-1 are exceptionally neat and well arranged. In the case of the Model RAG-1 the wiring and soldering, although very satisfactory, are not as neat as in the Model RAH-1.

(c) The construction is considered to be rugged, and with one slight exception all parts fit neatly into their respective positions. In performance, results are found to be equal to or better than those obtained with the preliminary models, except that the electrical defects which existed in those models have with one exception been corrected in the subject production sample. This exception refers to the resonant overload which occurs at a slightly lower level than in the previous model. This is considered, however, an unimportant defect from all practical viewpoints.

(d) The defects noted in the test of subject models are all of a mechanical nature and of comparatively minor importance as compared with the otherwise generally satisfactory details of materials, construction and performance.

Recommendations

(a) That the bottom cover plate over the band switch compartment in the Model RAG-1 be changed to produce a more satisfactory fit.

(b) That the seizing on the ends of the interconnecting cables be made up in a more durable manner.

(c) That the rubber grommets through which the cables pass in entering the backs of the power and control units be increased in diameter to give a free running fit.

(d) That the marking of the component items of the equipments be augmented to include those items which are now incompletely marked.

(e) That the name plates on the plug-in coil assemblies be revised, as proposed by manufacturer in reference (h).

(f) That the panel securing screws be equipped with more durable retaining springs, and suitable clearance provided.

(g) That the sharp edges on the clamping dogs of the cabinet container for the plug-in coil assemblies be removed.

(h) That the oscillator test button switch spring in the Model RAH-1 receiver be bent with a greater radius to spread the area of flexing thus preventing the probable breakage at the present sharp bend.

(i) That since the Model RAH-1 has been designed to use shields over all radio frequency tubes but not over the oscillator tube, and to use no shield caps over the tops of any tubes, this fact be stated in the instruction books provided with the equipments to avoid a possible installation of same and the resulting misalignment of circuits from such use.

(j) That the subject equipments be considered satisfactory for the Naval Service provided changes are made in accordance with the above recommendations.

(k) That the receiver specifications for future equipments be modified to require that the volume control not only comply with the present linearity requirements but that its required decibel range of control be accomplished in not less than 150° of rotation.

DESCRIPTION OF MATERIAL UNDER TEST

4. The material under test consisted of one sample production model of Class IV radio receiving equipment, consisting of the following:

1 Model RAG-1 radio receiving equipment complete.
1 Model RAH-1 radio receiving equipment complete.
1 Type CHS-23067 control unit with necessary interconnecting cables.

Subject equipment was manufactured by the Hygrade Sylvania Corporation, Clifton, New Jersey, and was received at the Laboratory on 13 March 1936. The Model RAG-1 radio receiving equipment covers a rated frequency range of from 15 to 600 kilocycles and consists of the following units:

(a) One Navy Type CHS-46042 receiver.
(b) One Navy Type CHS-20032 power unit.
(c) One set interconnecting cables.

5. The Model RAH-1 radio receiving equipment covers a rated frequency range of from 0.3 to 23 megacycles and consists of the following units:

(a) One Navy Type CHS-46043 receiver.
(b) One Navy Type CHS-47090 inductance system.
(c) One Navy Type CHS-20032 power unit.
(d) One set interconnecting cables.

The Navy Type CHS-23067 control unit contains auxiliary power supply switches, telephone jacks and an audio output mixing switch for both receiver units.

6. In the following discussion, reference will be made to Laboratory report, reference (c), which covered retest of the preliminary model. Where paragraphs of reference (c) apply equally well to the production sample equipment now being reported upon, no further discussion of the subject matter contained in such paragraphs will be included in this report.

7. It will also be assumed that the presentation of discussion in detail under a reference paragraph in this report is only because the discussion as set forth in reference (c) does not apply and that the discussion of similar details in the previous report, reference (c), is to be ignored in connection with the subject production sample.

METHOD OF TEST

8. The methods used were similar to those used in tests of the preliminary models, reference (c).

DATA RECORDED DURING TEST

9. Complete data were recorded on all tests conducted and this information is contained in Tables 1 to 21 inclusive, and Plates 1 to 45 inclusive.

PROBABLE ERRORS IN RESULTS

10. The estimated overall accuracy of the results obtained during these tests is the same as given in reference (c) covering the tests of preliminary models.

RESULTS OF TESTS

11. Par. 4-3, Par. 95(c). The cover plate over the band switch compartment which fits around the antenna trimmer condenser assembly in the Model RAG-1 does not fit neatly into its position. On one side of the trimmer condenser the shield fits flat against the surface to which it is secured while on the other side it has not been cut away sufficiently that it can rest upon this surface, but does ride on top of the trimmer condenser shield.

12. All wire used in radio frequency circuits has a good quality of rubber insulation, except those running from the coils to the switch in the low frequency unit. These are of formed solid wire with empire cloth tubing and do not contact each other or ground throughout their lengths. All parts are readily accessible in the Model RAH-1 receiver. In the case of the Model RAG-1 receiver the only parts that are not immediately accessible for replacement are the audio frequency sockets, and in addition thereto, some disassembly is essential prior to the removal of the radio frequency coil systems. It is also necessary that a terminal strip be removed prior to the removal of the AVC transformer and that the band pass filter be removed prior to the removal of one of the audio transformers. Space limitation prevents making any recommendation as to a more satisfactory arrangement for accessibility.

13. The wiring and soldering in the case of the Model RAH-1 are exceptionally neat and well arranged. In the case of the Model RAG-1 the wiring and soldering, although very satisfactory, is not as neat as in the Model RAH-1.

14. Par. 4-3, Par. 37(c). The bottom plate of the receiver chassis is now secured with 12 screws and is considered satisfactory.

15. Par. 4-3, Par. 41(c). All interconnecting cables are of the rubber covered type of construction. The material used in the construction of these cables is satisfactory. The seizing on the terminal ends is not satisfactory in that it has a tendency to loosen, as in one case the seizing has separated from the rubber covering by as much as 3/16 inch, and in another case it has become almost completely unwrapped. The

rubber grommets in the backs of the power unit and control unit boxes are too small for the diameter of the cable used, so much so that withdrawal of the panels of these units with their terminals connected may cause the grommet to pull out of the box wall. Grommets with greater clearance are desired.

16. The terminals furnished on the battery cables are of the light weight, open end, spade type for use with 8-32 screws. These will be entirely satisfactory if it is intended that they connect to a terminal board and not direct to the batteries.

17. Par. 4-4, Par. 42(c). The main tuning condensers for both Models RAG-1 and RAH-1 have 3/8 inch shafts with sturdy set screws to lock the rotating plates thereto. The variable condenser construction appears to be satisfactory. The method of making contact to the rotor plates which is through silver contacts is worthy of favorable comment.

18. Par. 43(c). The design of the cable clamps in the type CHS-23067 control unit has been improved and the terminal studs have been increased to 8-32 and are satisfactory.

19. Par. 4-14, Par. 47(c). The marking of the component items of the equipments is as follows: Both symbol numbers and Navy type numbers have been placed on the R.F. chokes, potentiometers and variable resistors, toggle and telephone switches, telephone jacks, and electrical indicating instruments. No marks are visible, without disassembly, on the variable capacitors, except that the trimmers for the gang condensers have symbol numbers marked on the shield adjacent to each condenser. The low frequency interstage coupling gang is marked with a symbol number.

20. Audio transformers are marked with both symbol and Navy type numbers, but the filter coils are not marked individually. A symbol number is given to the filter system as a whole.

21. Wire wound fixed resistors are marked with "RA" numbers and in some cases with symbol numbers. The non-inductive resistors have the standard color coding. Fixed capacitors over .25 mfd. are marked with both symbol and Navy type numbers.

22. Large molded mica condensers are marked with "CD" numbers, medium sized with "PL" numbers, and small, both paper and mica, are marked with "RA" numbers, all mica molded condensers being of Dubilier manufacture. In both receivers the radio frequency tubes have a symbol number marked adjacent to the socket, but no Navy type numbers. A.F. and AVC tubes have both symbol numbers and Navy type numbers.

23. Par. 4-14, Par. 48(c). The name plates of the plug-in coil assembly of the Model RAH-1 equipment are not in accordance with the specifications. Reference (h) implies that the contractor is cognizant of this fact and will furnish proper name plates on all equipment. The power unit name plates meet the requirements of reference (f).

24. Par. 4-16, Par. 49(c). In the plug-in coil assembly the wires are soldered directly to the contact pins, a special type of pin having been made for this purpose.

25. Par. 4-12-a, Par. 59(c). The receiver and power unit panel securing screws, with their retaining springs, interfere with the hole edges in the box into which they fit to the extent that the springs become distorted and disconnected from the assembly unless great care is exercised when the chassis is placed in the box. The springs are retained on the screw studs by having one end of the spring wire bent at right angles, this end fitting into a hole in the stud approximately 1/16 inch deep. This method of securing is unsatisfactory. Should this defect be overcome, there would still be considerable danger to the spring, unless a greater clearance is provided in the hole in the box into which these springs fit. No springs are furnished on the control box panel securing screws and they are locked with a "C" washer made of wire, to prevent loss. The wire is that soft that both of the locks came off during test.

26. Par. 4-20-a, Par. 135(c). The soldering of the terminal leads in the R.F. coils has now been done in a very satisfactory manner.

27. Par. 4-26-a, Par. 67(c). The cabinet container for the plug-in coil assembly has been greatly improved. The clamping dogs, however, have a tendency to distort the contact springs on the face of the coil assembly when operated to lock or unlock these units in their positions in the coil box. It is suggested that this defect might be removed if the clamping dogs were rounded off at their edges so that they would slide freely over the springs when operated.

28. Par. 4-31-a, Par. 71(c). The main tuning control knobs are provided with coarse fluted surfaces and conform with the other knobs.

29. Par. 4-41-a, Par. 77(c). The oscillation test button switch on the Model RAH-1 is less rugged than that used on the Model RAG-1. As most of the flexing of the spring contact occurs at a rather sharp angle bend, it is believed that the metal will eventually crystallize and fracture.

30. Par. 4-44-a, Par. 79(c). The telephone jacks are of such design as to permit replacement with Navy standard jacks, meeting specifications, reference (t).

31. Par. 5-1, Par. 82 and 83(c). The average sensitivities were, in general, slightly improved over the previous model. The exact values are shown on Plate 3 for the low frequency model, as taken with the original Hygrade Sylvania tubes supplied by manufacturer. The effect on sensitivities due to substitution of tubes of RCA manufacture is shown in Table 10.

32. The values for the high frequency model are shown on Plate 27 as taken with the original Hygrade Sylvania tubes furnished by manufacturer

and on Plate 28 as taken with substituted tubes of RCA manufacture.

33. The mutual conductances for the various tubes are shown on Table 11 for the low frequency model, and on Table 20 for the high frequency model.

34. At the completion of other tests, Band 7 was realigned and showed a slight improvement with the antenna trimmer at zero, and about the same average sensitivities with the antenna trimmer at optimum setting, as indicated in Table 22.

35. Par. 5-2, Par. 91(c). Selectivities were not greatly changed over the previous model and were all well within the governing specifications. Selectivity for the low frequency model is shown on Plates 5, 6, 7 and 8 and for the high frequency model on Plates 30, 31, 32 and 33.

36. Par. 5-3, Par. 93(c). The maximum noise level is within the specification limits in the case of both low frequency and high frequency receivers, although it has been slightly increased in some cases, it has been materially reduced in others. Noise level for maximum sensitivity control settings is shown for the low frequency model on Plate 4 and for the high frequency model on Plate 29.

37. Par. 5-4, Par. 95(c). The resonant overload in the case of the low frequency receiver occurs at a higher level than in the preceding model. In the case of the high frequency unit, it has been slightly reduced over the preceding model.

38. Resonant overload curves are shown for the low frequency model on Plates 9, 10, 11 and 12 and for the high frequency model on Plates 34 to 40 inclusive. Resonant overload points for the low frequency model are also shown on Table 2.

39. Par. 5-19, Par. 100(c). The total supply line power consumption for the Model RAG-1 is 60.3 watts at 115 volts, and for the Model RAH-1, 64 watts at 115 volts. Both are well within specification limits.

40. Par. 5-29, Par. 104(c). The frequency overlap was found to be within the limits as set by the governing specifications. Measurements for the Model RAG-1 will be found in Table 1 and for Model RAH-1 in Table 21.

41. Par. 5-30, Par. 105(c). Main tuning dial calibration is shown for the Model RAG-1 on Plate 1 and for the Model RAH-1 on Plate 45. Antenna trimmer and sensitivity control calibration for Model RAG-1 are shown on Plate 2.

42. Par. 5-31, 32, Par. 106, 107(c). The frequency wobbler range has been substantially reduced over that of the previous model, and presents a practically linear capacity change with rotation. The linearity of the variation is shown on Plate 44. Oscillator frequency

variation is shown in Table 17.

43. Par. 5-33, 34, Par. 108(c). The output transformer load impedance characteristics were found to be substantially the same as in the previous models. Output load characteristics of the Model RAG-1 are shown on Plate 20.

44. Par. 5-36, Par. 109(c). Frequency stability vs. change in line voltage complies with the specifications and is shown for the Model RAG-1 in Table 3 and for the Model RAH-1 in Table 13.

45. Par. 5-38. Frequency stability vs. change in trimmer setting was negligible in the low frequency unit, and although very noticeable in the case of the high frequency unit, was well within specifications. Measurements for the Model RAH-1 are shown in Table 15.

46. Par. 5-39. Frequency stability under vibration is satisfactory in the case of the low frequency unit. Such vibration as is known to exist on shipboard would in the case of the high frequency receiver in the highest frequency band produce a wobbly note with a variation in frequency that would probably exceed 100 cycles but not seriously affect readability.

47. Par. 5-40, Par. 111(c). Frequency stability vs. change in input was found to be well within the governing specifications in the case of both units. This is shown for the Model RAG-1 in Table 4 and for the Model RAH-1 in Table 14.

48. Par. 5-41, Par. 112(c). Frequency stability vs. change in sensitivity control was found to be well within specifications in both models, and is shown for Model RAG-1 in Table 5 and for Model RAH-1 in Table 16.

49. Par. 5-45, Par. 113(c). The band pass filter characteristic, although close to the specification limits, is considered to be passable within the limits of accuracy of measurement. Measurements are shown on Plates 21, 22 and 24.

50. Par. 5-54, 55, Par. 117, 118(c). The attenuation characteristics of the variable attenuators comply with specifications, and are shown on Plates 21 and 25. The use of the attenuators does not incur an attenuation in the audio amplification of more than 5 decibels except at the overlap point between the two taps. The highest frequency end of the low frequency tap attenuates as much as 8.9 decibels but this frequency is covered on the second tap with a gain of over 5 decibels.

51. Par. 5-60, Par. 120(c). The range of the sensitivity control complies with the governing specifications in both units. Operation of the AVC switch does not cause any noticeable change in gain or frequency (see Par. 5-71 below).

52. Par. 5-61, Par. 121(c). The transrectification current, as measured in accordance with governing specifications was found to be

considerably less than in the previous models. This is shown for the Model RAG-1 in Table 9, and for the Model RAH-1 in Table 18.

53. Par. 5-63, Par. 122(c). The linearity of the sensitivity control is within specification limits. Sensitivity control characteristics are shown for Model RAG-1 on Plates 13, 14, 15 and 16 and for Model RAH-1 on Plates 41 and 42.

54. Par. 5-65, Par. 123(c). The sensitivity control effect on signal to noise ratio is shown for Model RAG-1 on Plate 17 and for Model RAH-1 on Plate 43, indicating that specification requirements are substantially met.

55. Par. 5-71, Par. 125(c). The effect of cutting the AVC in or out, on the overall gain below the limiting point is negligible in the case of these models. In this respect the operation is more satisfactory than with any like device previously tested, as there is practically no attenuation due to the cutting in of the AVC.

56. Par. 5-72, 73, Par. 126, 127(c). The AVC limiting action is within the requirements of the governing specifications, and is shown on Plate 18. The range and linearity of the AVC level control is shown on Plate 19.

57. Audio frequency characteristics of the audio amplifier without filters, and with and without AVC are shown on Plate 23.

58. Voltage variation characteristics for the Type CHS-20032 rectifier power unit are shown on Plate 26.

59. The input impedance of both units was measured, and is shown for Model RAG-1 in Table 12 and for Model RAH-1 in Table 19.

60. No spare parts were furnished for this test.

SUMMARY OF DEFECTS

61. The following is a summary of defects noted and a list of items in connection with which further corrective action is required prior to the release of production.

62. Par. 4-3. The cover plate over the band switch compartment in the Model RAG-1 is not a good fit, and requires cutting away to clear the antenna trimmer condenser assembly.

63. The seizing on the ends of the interconnecting cables is not of durable quality, and the rubber grommets through which these cables pass in the backs of the power unit and control unit boxes are of too small diameter.

64. Par. 4-14. The marking of the component items of the equipments is not complete, particularly with respect to the tube sockets. The tube sockets should be marked with the type of tube required in each

case. The name plates on the plug-in coil assemblies are not in accordance with specifications. However, corrective action is already indicated by the manufacturer in reference (h).

65. Par. 4-12-a. The panel securing screws of all units have unsatisfactory retaining springs, and in the receiver units have insufficient clearance.

66. Par. 4-26-a. The clamping dogs in the cabinet container for the plug-in coil assemblies have too sharp edges with a tendency to distort the contact springs.

67. Par. 4-41-a. The oscillator test button switch in the Model RAH-1 is considered less rugged than that used on the Model RAG-1.

CONCLUSIONS

68. In general, it can be said as regards mechanical construction, neatness, and accessibility, that these equipments have not been equalled by any similar equipment previously tested at this Laboratory.

69. The wiring and soldering in the case of the Model RAH-1 are exceptionally neat and well arranged. In the case of the Model RAG-1 the wiring and soldering, although very satisfactory, are not as neat as in the Model RAH-1.

70. The construction is considered to be rugged, and with one slight exception all parts fit neatly into their respective positions. In performance, results are found to be equal to or better than those obtained with the preliminary models, except that the electrical defects which existed in those models have with one exception been corrected in the subject production sample. This exception refers to the resonant overload which occurs at a slightly lower level than in the previous model. This is considered, however, an unimportant defect from all practical viewpoints.

71. The defects noted in the test of subject models are all of a mechanical nature and of comparatively minor importance as compared with the otherwise generally satisfactory details of materials, construction and performance.

TABLE 1.

Model RAG-1, Serial 1.

Frequency Overlap

Band No.	Freq. Range (Kcs.)	Overlap Bands	Overlap Freq.(Kcs.)	Per Cent of Overlap
1	14.35 to 39.3			4.34*
		1 and 2	38.0	10.25
2	35.4 to 99.3			
		2 and 3	95.0	8.21
3	91.5 to 246.0			
		3 and 4	240.0	10.62
4	220.5 to 626			4.34**

* Per cent of overlap from 14.35 to 15.00 Kcs.
** Per cent of overlap from 600 to 626 Kcs.

TABLE 2.

Model RAG-1, Serial 1.

Resonant Overload

Band No.	Freq. (Kcs.)	Microvolts Input for Resonant Overload	Output at Resonant Overload - Milliwatts*
1	38	42.0	289
2	95	28.5	280
3	240	20.5	280
4	600	20.0	252

* Approved limit - 250 milliwatts.

TABLE 3

Model RAG-1 Serial 1.

Frequency Stability vs. Change in Line Voltage

Band No.	Freq. (Kcs.)	Beat Note Frequency Change - Cycles*		
		103.5 Volts	115 Volts	126.5 Volts
1	38	+11	0	-9
2	95	+10	0	-8
3	240	+13	0	-10
4	600	+18	0	-16

* Specification limit - 100 cycles.

TABLE 4

Model RAG-1, Serial 1.

Frequency Stability vs. Change in Input Signal Intensity

Band No.	Freq. (Kcs.)	Change in Oscillator Freq. Cycles*
1	38	0
2	95	2
3	240	3
4	600	4

* Specification limit - 100 cycles.

TABLE 5

Model RAG-1, Serial 1.

Frequency Stability vs. Change in Sensitivity Control Setting

Band No.	Freq. (Kcs.)	Change in Oscillator Frequency*
1	38	1 cycle
2	95	2 cycles
3	240	0.00083%
4	600	0.00067%

* Specification limits:

15 to 200 Kcs. 100 cycles.

200 to 600 Kcs. .05%.

TABLE 6

Model RAG-1, Serial 1.

Peak Frequency Attenuation of Variable Attenuators

for 6 MW Output

Range	Tap	Peak Freq. Cycles	Attenuation at Peak Freq. Db.*	Range	Tap	Peak Freq. Cycles	Attenuation at Peak Freq. Db.*
Low	0	375	+3.05	High	0	655	+7.16
	1	400	+2.54		1	695	+7.12
	2	427	+2.30		2	745	+6.69
	3	453	+1.94		3	780	+6.19
	4	479	+1.51		4	820	+5.48
	5	520	+0.34		5	904	+4.71
	6	590	-1.66		6	1020	+3.35
	7	663	-3.92		7	1155	+1.58
	8	735	-7.24		8	1275	+0.09
	9	782	-8.20		9	1370	-0.91
	10	822	-8.90		10	1435	-1.36

* Specification limit - 8.0 decibels.

TABLE 7

Model RAG-1, Serial 1

Summary of Attenuation Characteristics of Variable Attenuators

Range	Tap	Peak Freq. Cycles	Attenuation in Decibels +5% Peak Freq.	-5% Peak Freq.	+150% Peak Freq.	-60% Peak Freq.
Low	0	375	-4.4	-2.9	-26.9	-24.6
	5	520	- 4.4	-2.9	-26.7	-27.4
	10	822	- 2.3	-3.1	-22.0	-25.4
High	0	655	- 3.3	-2.0	-26.4	-26.5
	5	904	- 4.4	-4.4	-27.8	-30.8
	10	1435	- 2.2	-2.8	-23.1	-30.2

* Specification limits:

Down not more than 6 decibels at ± 5% of peak frequency.

Down not less than 20 decibels at + 150% or -60% of peak frequency.

TABLE 8

Model RAG-1, Serial 1

Range of Sensitivity Control

Band No.	Freq. (Kcs.)	Input Range Microvolts	Sensitivity Control Range - Div.	Attenuation Range Decibels
1	15	4.08 - 500,000	10 to 2.3	+1.73 to -100
4	600	1.85 - 500,000	10 to 4.4	0 to -108.7

TABLE 9.

Model RAG-1, Serial 1.

Total Transrectification of all R.F. Tubes

Band No.	Freq. (Kcs.)	Sensitivity Control Setting	Total Plate Current - μA Input = Zero	Total Plate Current - μA Input = 0.5 Volt	Change in Total Plate Current Microamperes
1	38	0	1.0	3.25	2.25
2	95	0	0.9	5.00	4.10
3	240	0	0.75	5.55	4.80
4	600	0	1.05	6.10	5.05

TABLE 10.

Model RAG-1, Serial 1.

Effect on CW Sensitivity and Maximum Noise Level when Original R.F. Amplifier, Detector and Oscillator Tubes are Replaced by RCA Tubes.

		Hygrade Sylvania Tubes						RCA Tubes					
Band No.	Freq. (Kcs.)	Ant. Trim. Div.	Input μV.	Max. Noise μW.	Ant. Trim. Div.	Input μV.	Max. Noise μW.	Ant. Trim. Div.	Input μV.	Max. Noise μW.	Ant. Trim. Div.	Input μV.	Max. Noise μW.
	15	0	4.90	73.5	-1.8	5.00	73.5	0	5.00	50.0	-1.8	4.80	50.0
	19	0	4.78	112.0	-3.0	4.15	192.0	0	4.90	80.5	-3.0	4.90	102.0
1	24	0	4.98	131.0	-3.0	4.32	323.0	0	4.30	66.5	-3.3	3.92	150.0
	30	0	4.27	96.0	-2.0	3.40	170.0	0	4.60	60.0	-2.0	4.05	130.0
	38	0	3.62	267.0	0	3.62	267.0	0	4.90	73.5	-0.3	4.48	80.5
	38	0	2.64	73.5	-1.5	2.41	66.5	0	2.72	73.5	-0.8	2.82	76.8
	48	0	3.02	66.5	-2.8	2.30	140.0	0	3.02	73.5	-2.8	2.38	140.0
2	60	0	3.16	50.0	-2.5	2.11	170.0	0	3.55	50.0	-2.5	2.50	122.0
	75	0	2.32	66.5	-0.6	2.21	92.0	0	2.88	50.0	-0.6	2.44	73.5
	95	0	5.30	26.0	+2.0	2.45	170.0	0	6.20	23.9	+1.8	2.80	84.0
	95	0	1.80	104.0	-1.6	1.70	170.0	0	1.93	193.0	-1.6	1.96	227.0
	120	0	1.72	80.5	-3.0	1.48	293.0	0	1.85	53.8	-2.8	1.58	352.0
3	150	0	1.42	50.0	-2.0	1.28	217.0	0	1.62	69.5	-2.0	1.40	241.0
	190	0	1.54	108.0	+0.8	1.40	217.0	0	1.55	130.0	+0.8	1.45	193.0
	240	0	4.00	39.8	+3.5	1.82	560.0	0	4.20	34.8	+3.5	1.81	322.0
	240	0	1.58	28.0	-1.2	1.32	35.0	0	1.52	28.0	-1.0	1.32	39.8
	300	0	3.08	12.0	-3.2	1.00	42.5	0	2.98	10.7	-2.8	0.92	50.0
4	375	0	3.35	9.4	-2.5	1.00	37.5	0	3.38	8.2	-2.6	0.88	56.8
	475	0	3.05	9.4	-0.6	2.41	21.8	0	3.21	13.4	-0.8	1.90	16.7
	600	0	5.30	5.0	+1.8	1.60	23.8	0	5.80	13.4	+1.7	2.00	73.5

TABLE 11.

Model RAG-1, Serial 1.

Mutual Conductance of Tubes Used for Data shown on Table 10

Position of Tube	Type of Tube	Mutual Conductance		Navy Specification Limits	
		Original Hygrade Sylvania Tubes	Substituted RCA Tubes	Minimum	Maximum
1st R.F.	6D6	1890	1520	1325	1900
2nd R.F.	6D6	1725	1600		
3rd R.F.	6D6	1790	1640		
Detector	76	1130	1175	1250	1650
Oscillator	6D6	1830	1560		

TABLE 12

Model RAG-1, Serial 1.

Input Impedance of Receiver

Band No.	Freq. (Kcs.)	Input Impedance - Ohms	
		Antenna	Comm. Antenna
1	15	38,000	41,000
1	38	21,100	22,300
2	38	8,200	10,300
2	95	6,200	7,600
3	95	3,050	4,300
3	240	2,300	3,750
4	240	900	2,350
4	600	840	2,100

TABLE 13.

Model RAH-1, Serial 1.

Frequency Stability with Change in Line Voltage.

Resonant Frequency (Kcs.)	Frequency at 115 V. (Cycles)	Frequency at 103.5 V. (Cycles)	Frequency at 126.5 V. (Cycles)
610	998	962	1036
5160	998	958	1048
23000	1700		400
23000	1000	2100	

TABLE 14.

Model RAH-1, Serial 1.

Frequency Stability with Change in Input.

Resonant Frequency (Kcs.)	Output Frequency at 5 μV. Input (Cycles)	20 μV. (Cycles)	50 μV. (Cycles)
610	998	996.2	1000
5160	998	998	998
23000	998	998	998

TABLE 15.

Model RAH-1, Serial 1.

Frequency Stability with Change in Antenna Trimmer.

Resonant Frequency (Kcs.)	Output Frequency at Zero (Cycles)	at -1 (Cycles)	at -5 (Cycles)	at +5 (Cycles)
610	998		998	998
5160	998		1001	1001
23000	1700	700	936	1257

TABLE 16.

Model RAH-1, Serial 1.

Frequency Stability with Change in Sensitivity Control.

Resonant Frequency (Kcs.)	Output Frequency (Cycles) at 10	9	8	7	6	5	4	3	2	1
610	998	996.5	999	1000	1002	1003	1004	1005	1005	-
5160	992	997	975	963	954	949	947	943	-	-
23000	1000	100	-	-	-	-	-	-	-	-

TABLE 17.

Model RAH-1, Serial 1.

Frequency Wobbler.

Oscillator Frequency Variation.

Resonant Frequency (Kcs.)	Wobbler Setting	Frequency Variation	Total Variation (Kcs.)	Per Cent Variation
300 Band 1	0	1000 cycles		
	-5	704		
	+5	1310	0.606	0.202
610 Band 1	0			
	-5	2576 cycles		
	+5	2627	5.203	0.85
610 Band 2	0	1000		
	-5	384		
	+5	1633	1.249	0.204
1210 Band 2	0	1210 Kcs.		
	-5	1214.8		
	+5	1205.2	9.6	0.79
1210 Band 3	0	1210		
	-5	1211.44		
	+5	1208.64	2.8	0.23
2480 Band 3	0	2480		
	-5	2490		
	+5	2469.6	20.4	0.82
2480 Band 4	0	2480		
	-5	2482.4		
	+5	2477.6	4.8	0.193
5160 Band 4	0	5160		
	-5	5187.14		
	+5	5135.85	51.29	0.99
5160 Band 5	0	5160		
	-5	5165.06		
	+5	5155.4	9.66	0.187
10680 Band 5	0	10680		
	-5	10728		
	+5	10630.8	97.2	0.91

TABLE 17(Continued)

Resonant Frequency (Kcs.)	Wobbler Setting	Frequency Variation	Total Variation (Kcs.)	Per Cent Variation
10680 Band 6	0	10680		
	-5	10707		
	+5	10653	54	0.50
15820 Band 6	0	15820		
	-5	15908		
	+5	15732	176	1.11
15820 Band 7	0	15820		
	-5	15853		
	+5	15788.1	64.9	0.41
23000 Band 7	0	23000		
	-5	23124.16		
	+5	22883.6	240.56	1.04

TABLE 20

Model RAH-1, Serial 1.

Mutual Conductance of Tubes Used for Measurements

Shown on Plates 27 and 28, in Micromhos.

Position of Tube	Type of Tube	Original Hygrade Sylvania Tubes	Substituted RCA Tubes	Navy Specification Limits	
				Minimum	Maximum
1st R.F.	6D6	1600	1520	1325	1900
2nd R.F.	6D6	1575	1600		
3rd R.F.	6D6	1560	1600		
4th R.F.	6D6	1650	1560		
Detector	76	1170	1560	1250	1650
Oscillator	6D6	1575	1640		
1st A.F.	76	1350	1530		
2nd A.F.	41	2260	2200	2000	3000

TABLE 21

Model RAH-1, Serial 1.

Frequency Overlap.

Band No.	Frequency Range (Kcs.)	Overlap Bands	Overlap Frequency (Kcs.)	Per Cent of Overlap
1	286.8 to 635			4.40*
		1 and 2	607.5	9.03
2	580 to 1242			
		2 and 3	1207	5.80
3	1172 to 2595			
		3 and 4	2476.5	9.56
4	2358 to 5300			
		4 and 5	5137.5	6.33
5	4975 to 11150			
		5 and 6	10787.5	6.72
6	10425 to 16400			
		6 and 7	15985	5.19
7	15570 to 23550			2.39**

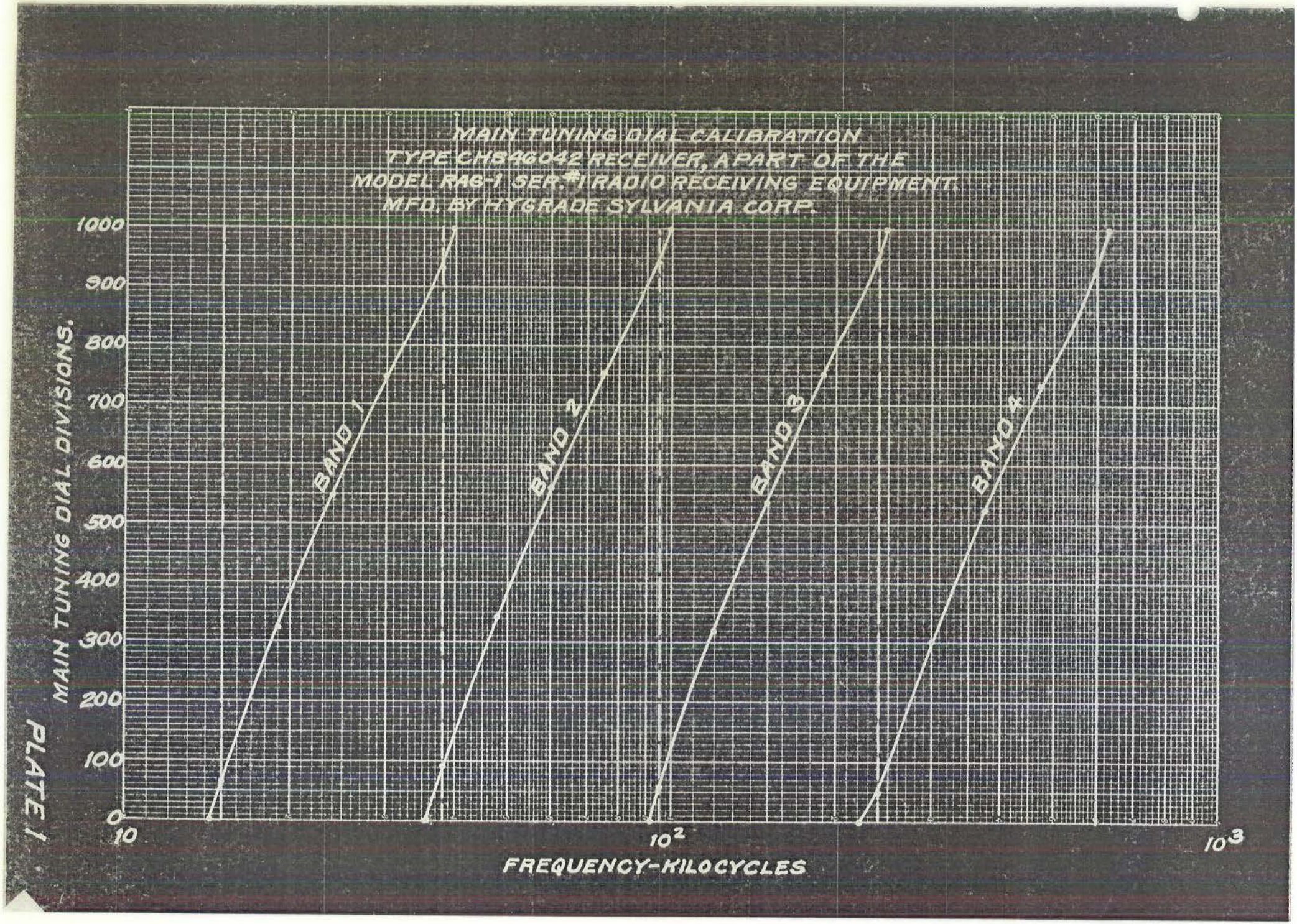
* Per cent overlap from 286.8 to 300 kcs.
** Per cent overlap from 23000 to 23550 kcs.

TABLE 22

Model RAR-1, Serial 1.

Sensitivity - Band 7.

Freq. (Kcs.)	Before Realignment		After Realignment	
	μV. Input Ant. Trim. 0	uV. Input Ant. Trim. Optimum	μV. Input Ant. Trim. 0	μV. Input Ant. Trim. Optimum
15820	26.2	24.2	13.5	12.9
17800	17.1	15.1	17.8	17.8
19800	33.0	16.8	26.3	23.3
21500	42.6	15.8	23.9	22.7
23000	26.8	23.0	18.3	18.3

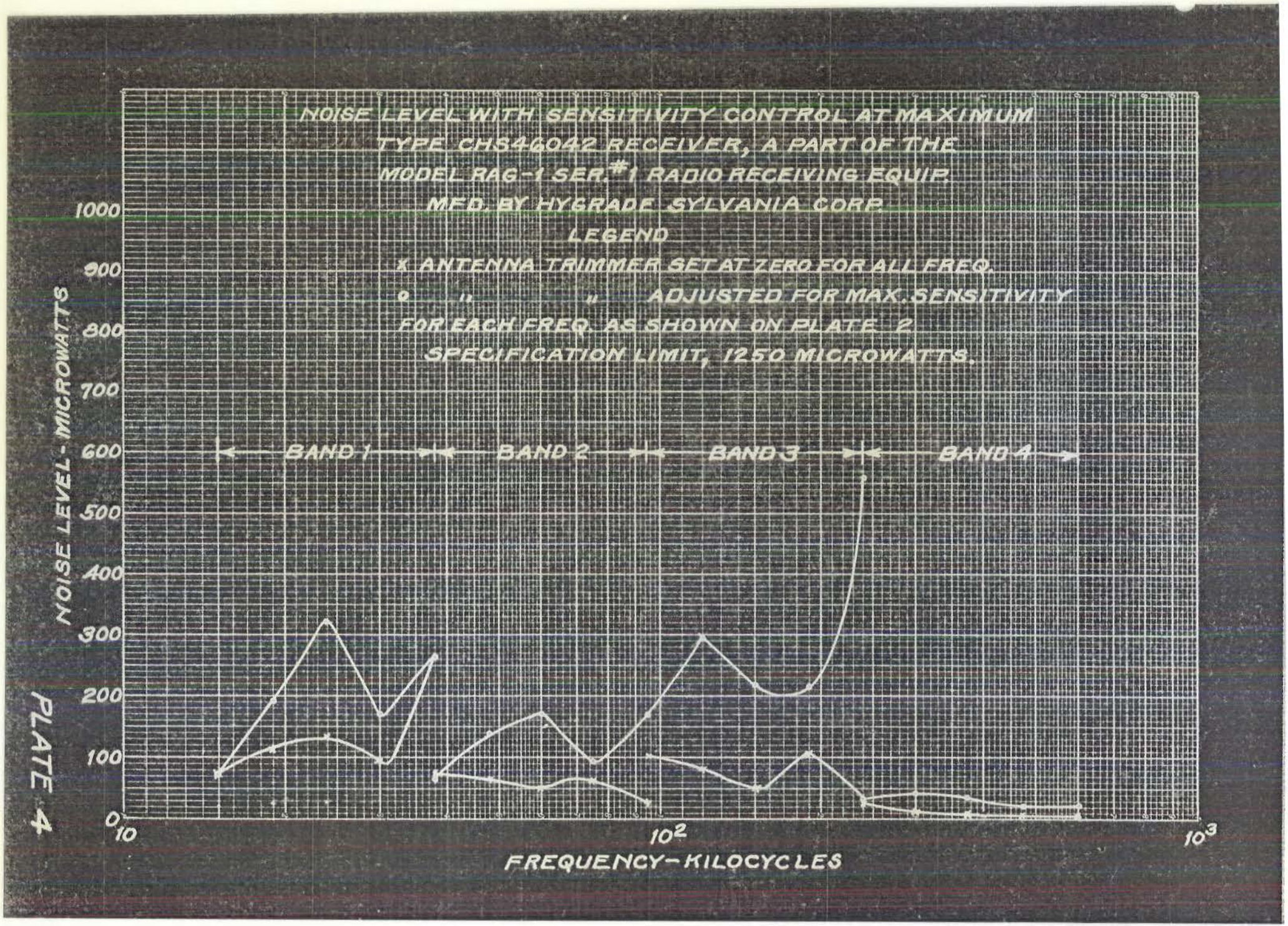

MAIN TUNING DIAL CALIBRATION
TYPE CHB46042 RECEIVER, A PART OF THE
MODEL RAG-1 SER.#1 RADIO RECEIVING EQUIPMENT.
MFD. BY HYGRADE SYLVANIA CORP.
BAND 1
BAND 2
BAND 3
BAND 4
MAIN TUNING DIAL DIVISIONS.
1000
900
800
700
600
500
400
300
200
100
0
10
10^2
10^3
FREQUENCY-KILOCYCLES
PLATE 1

ANTENNA TRIMMER AND SENSITIVITY CONTROL
CALIBRATIONS FOR OPTIMUM SENSITIVITY.
TYPE CHS 46042 RECEIVER, A PART OF THE
MODEL RAG-1 SER. #1 RADIO RECEIVING EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
BAND 1
BAND 2
BAND 3
BAND 4
FREQUENCY—KILOCYCLES
SENSITIVITY CONTROL SETTING DIVISIONS
ANTENNA TRIMMER CONTROL SETTING DIVISIONS

PLATE 2

MICROVOLTS INPUT FOR 6 MW OUTPUT.
10.0
1.0
0.1
10
10²
10³
FREQUENCY-KILOCYCLES
SPECIFICATION LIMIT FOR MAX. INPUT.
C.W. SENSITIVITY
TYPE 01S4A0A2 RECEIVER, A PART OF THE
MODEL RA-1 SERIES RADIO RECEIVING EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
LEGEND
BAND 1 ++ BAND 2 ++ BAND 3 ++ BAND 4
* ANTENNA TRIMMER SET AT ZERO FOR ALL FREQ.
* ANTENNA TRIMMER ADJUSTED FOR MAX. SENSITIVITY.
(ANTENNA TRIMMER SETTINGS ARE SHOWN ON PLATE 2)

PLATE 3


NOISE LEVEL WITH SENSITIVITY CONTROL AT MAXIMUM
TYPE CHS46042 RECEIVER, A PART OF THE
MODEL RAG-1 SER.#1 RADIO RECEIVING EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
LEGEND
X ANTENNA TRIMMER SET AT ZERO FOR ALL FREQ.
o " " ADJUSTED FOR MAX. SENSITIVITY
FOR EACH FREQ. AS SHOWN ON PLATE 2
SPECIFICATION LIMIT, 1250 MICROWATTS.
BAND 1
BAND 2
BAND 3
BAND 4
NOISE LEVEL - MICROWATTS
1000
900
800
700
600
500
400
300
200
100
0
10
10^2
10^3
FREQUENCY - KILOCYCLES
PLATE 4

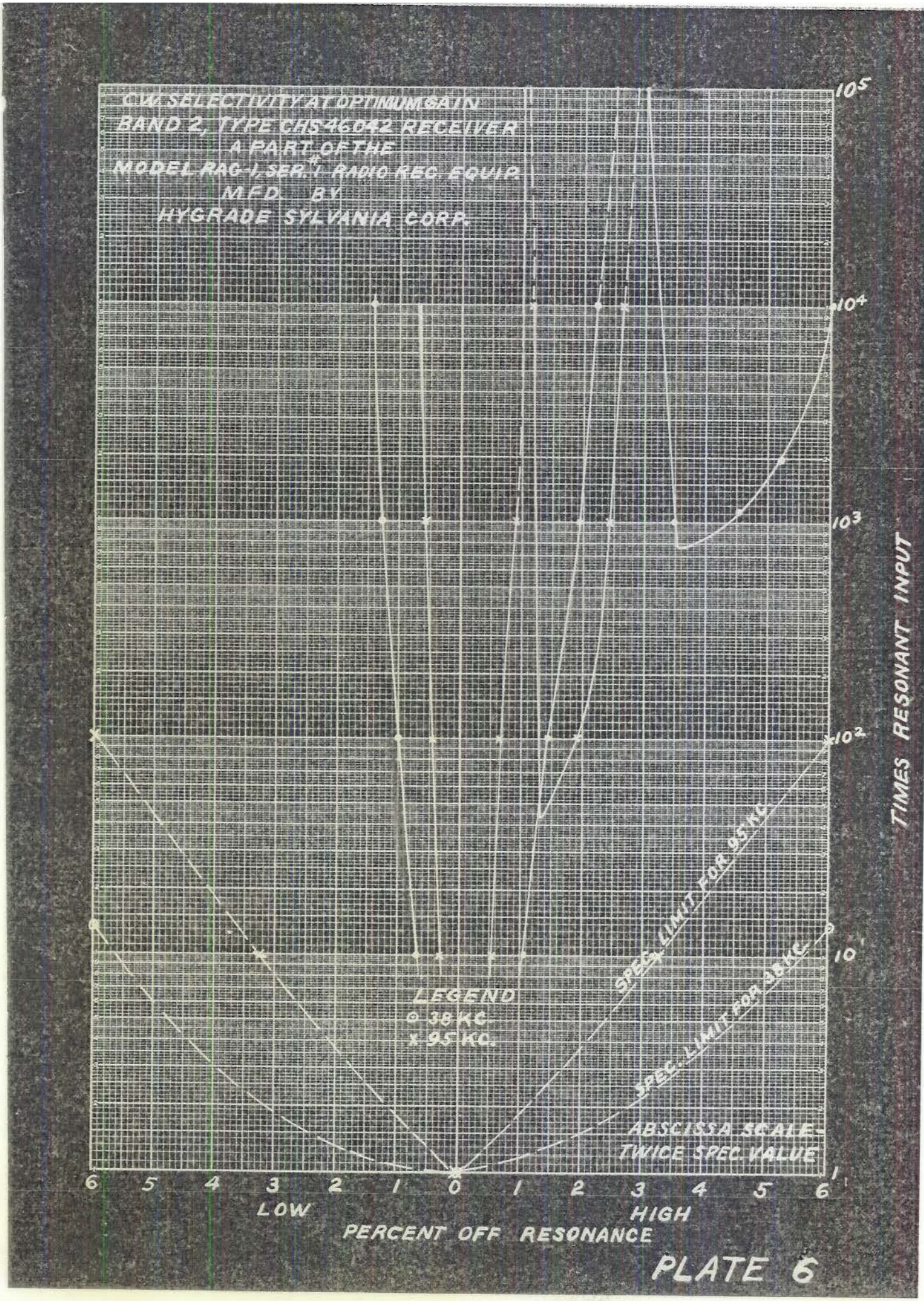

C.W. SELECTIVITY AT OPTIMUM GAIN
BAND 2, TYPE CAS-46042 RECEIVER
A PART OF THE
MODEL RAG-1, SER. # RADIO REC. EQUIP.
M F D. BY
HYGRADE SYLVANIA CORP.
105
10⁴
10³
10²
10¹
1
TIMES RESONANT INPUT
SPEC. LIMIT FOR 95 KC.
SPEC. LIMIT FOR 38 KC.
LEGEND
○ 38 KC.
× 95 KC.
ABSCISSA SCALE:
TWICE SPEC. VALUE
6 5 4 3 2 1 0 1 2 3 4 5 6
LOW
HIGH
PERCENT OFF RESONANCE

PLATE 6

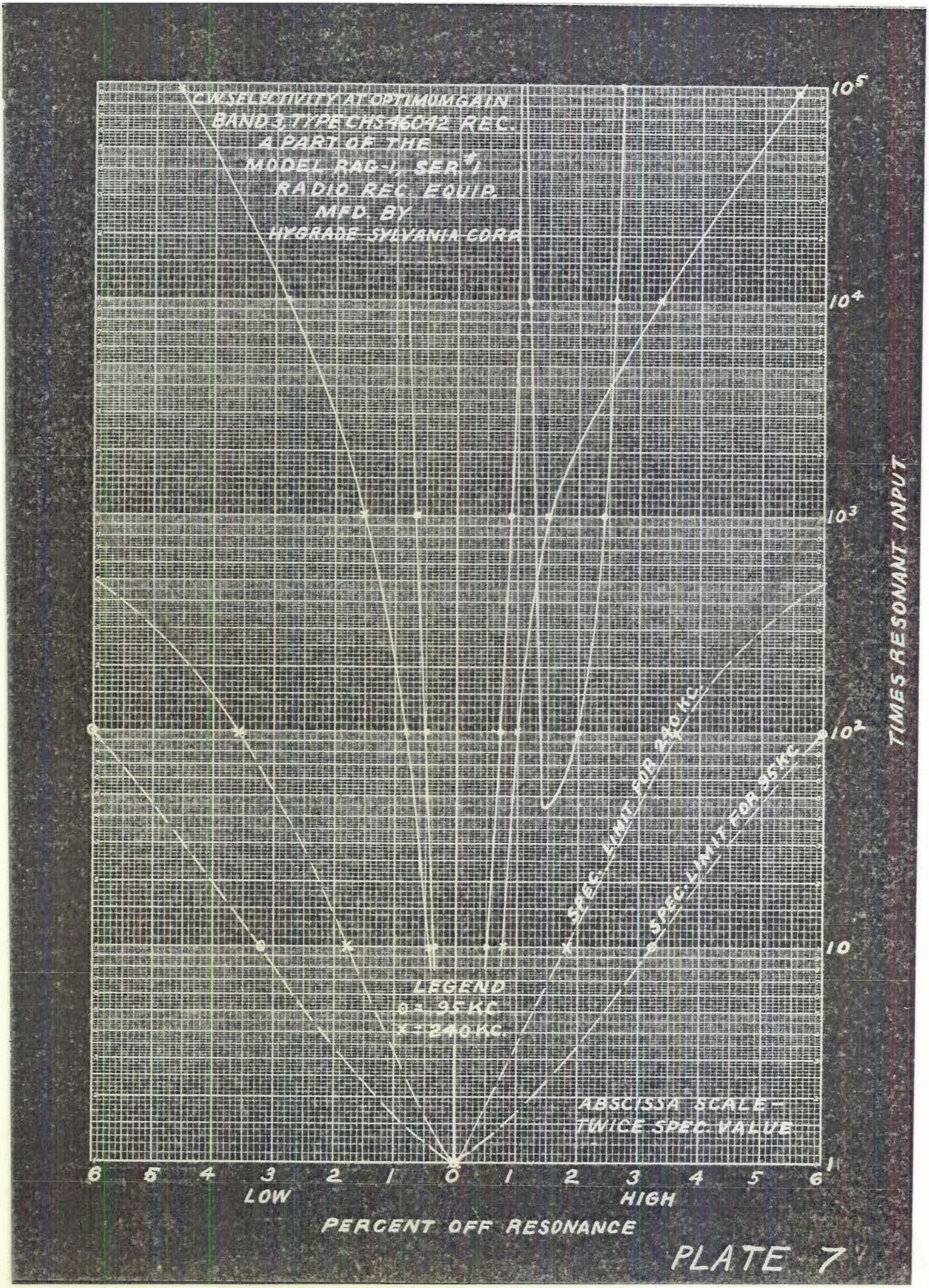

C.W. SELECTIVITY AT OPTIMUM GAIN
BAND 3 TYPE CHS 46042 REC.
A PART OF THE
MODEL RAG-1 SER. #1
RADIO REC. EQUIP.
MFD. BY
HYGRADE SYLVANIA CORP.
10^5
10^4
10^3
10^2
10
1
TIMES RESONANT INPUT
SPEC. LIMIT FOR 240 KC.
SPEC. LIMIT FOR 95 KC.
LEGEND
o = 95 KC.
x = 240 KC.
ABSCISSA SCALE =
TWICE SPEC. VALUE
6 5 4 3 2 1 0 1 2 3 4 5 6
LOW
HIGH
PERCENT OFF RESONANCE

PLATE 7

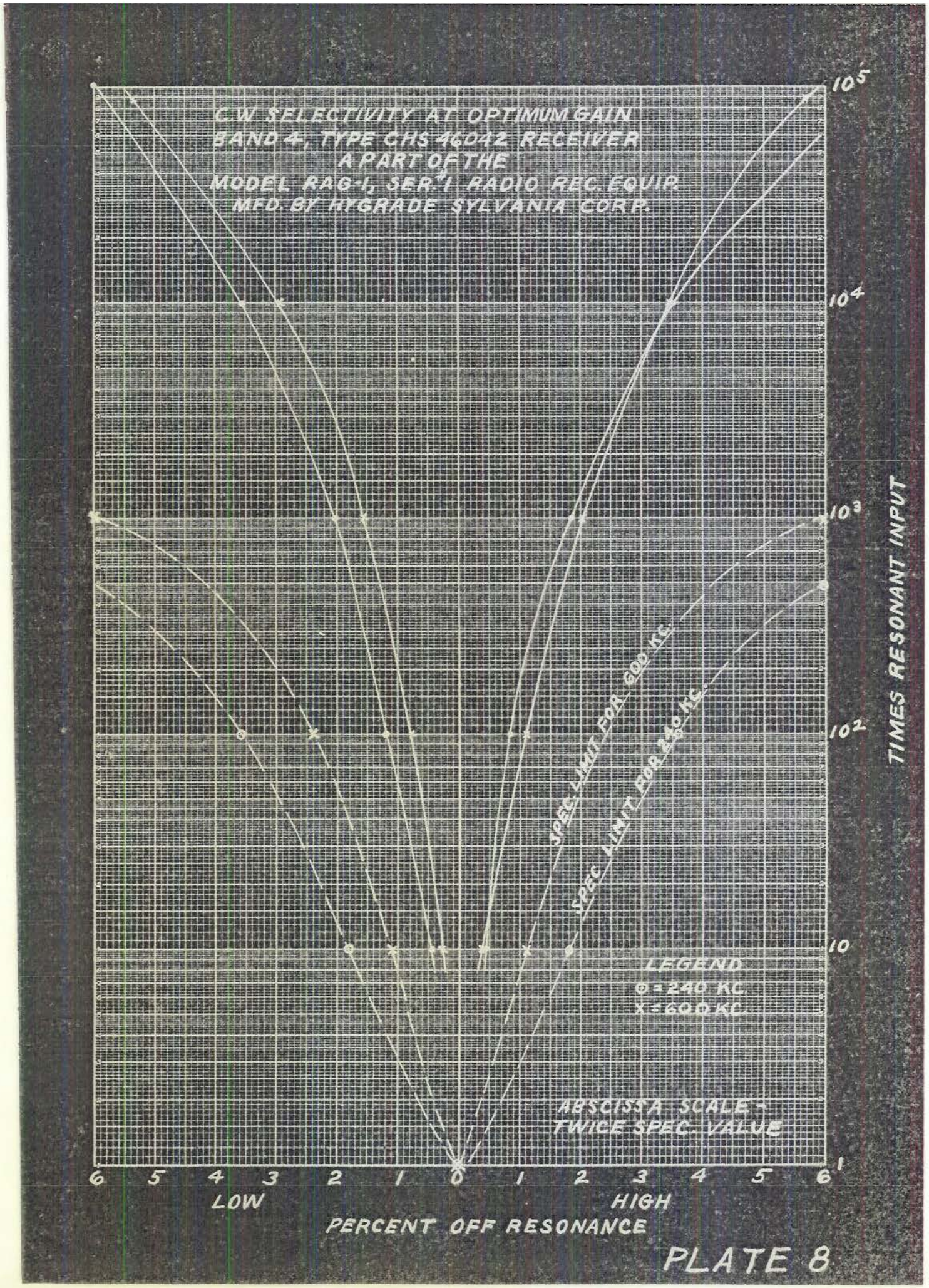
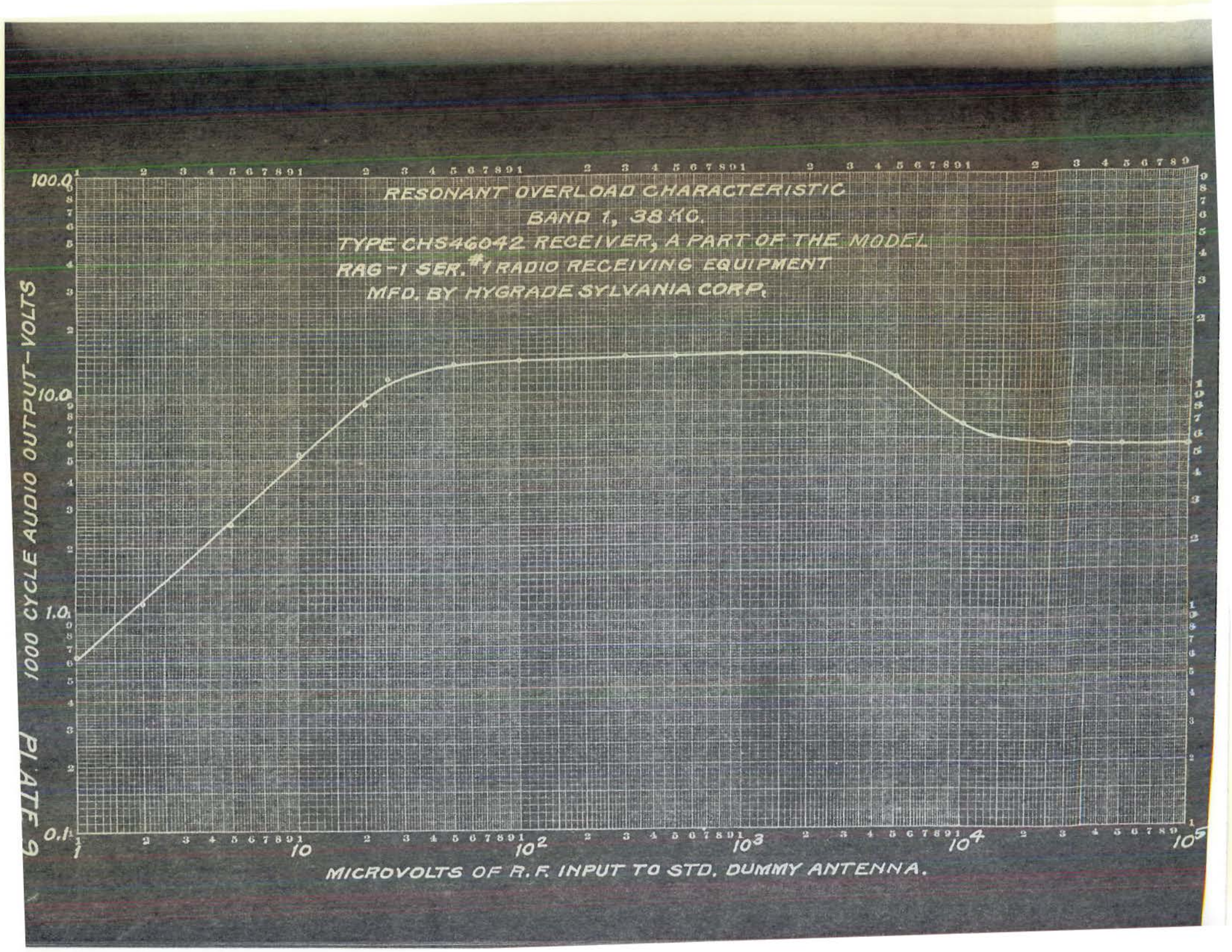

C.W. SELECTIVITY AT OPTIMUM GAIN
BAND 4, TYPE CHS 46042 RECEIVER
A PART OF THE
MODEL RAG-1, SER.# 1 RADIO REC. EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
SPEC. LIMIT FOR 600 KC.
SPEC. LIMIT FOR ±30 KC.
LEGEND
o = 240 KC.
x = 600 KC.
ABSCISSA SCALE -
TWICE SPEC. VALUE
10⁵
10⁴
10³
10²
10
1
TIMES RESONANT INPUT
6 5 4 3 2 1 0 1 2 3 4 5 6
LOW
HIGH
PERCENT OFF RESONANCE

PLATE 8


RESONANT OVERLOAD CHARACTERISTIC
BAND 1, 38 MC.
TYPE CHS46042 RECEIVER, A PART OF THE MODEL
RAG-1 SER. #1 RADIO RECEIVING EQUIPMENT
MFD. BY HYGRADE SYLVANIA CORP.
PLATE & 1000 CYCLE AUDIO OUTPUT-VOLTS
100.0
10.0
1.0
0.1
1
10
10²
10³
10⁴
10⁵
MICROVOLTS OF R.F. INPUT TO STD. DUMMY ANTENNA.

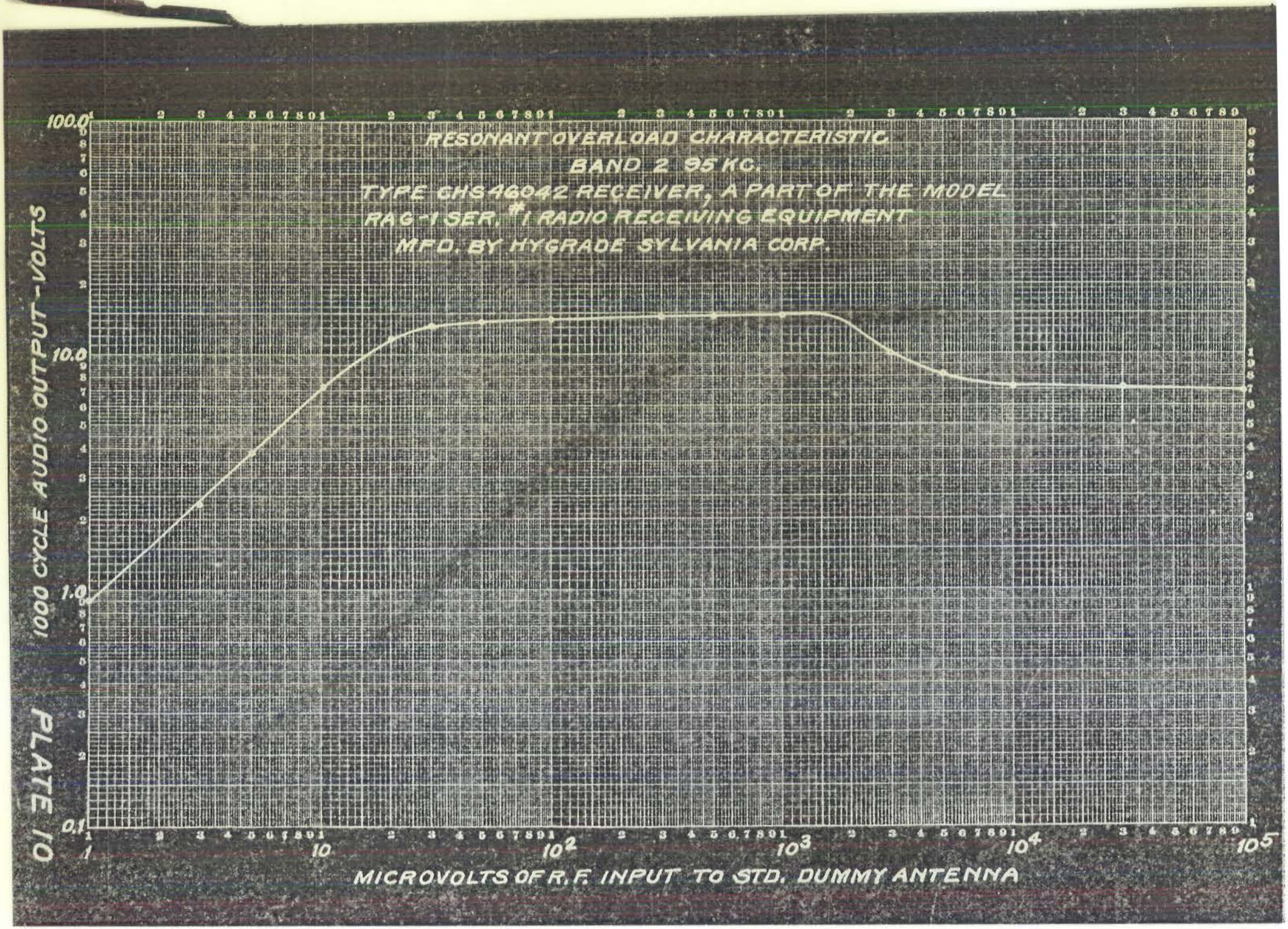

RESONANT OVERLOAD CHARACTERISTIC
BAND 2 95 KC.
TYPE GHS 46042 RECEIVER, A PART OF THE MODEL
RAG-1 SER. #1 RADIO RECEIVING EQUIPMENT
MFD. BY HYGRADE SYLVANIA CORP.
1000 CYCLE AUDIO OUTPUT-VOLTS
100.0
10.0
1.0
0.1
1
10
10^2
10^3
10^4
10^5
MICROVOLTS OF R.F. INPUT TO STD. DUMMY ANTENNA

PLATE 10

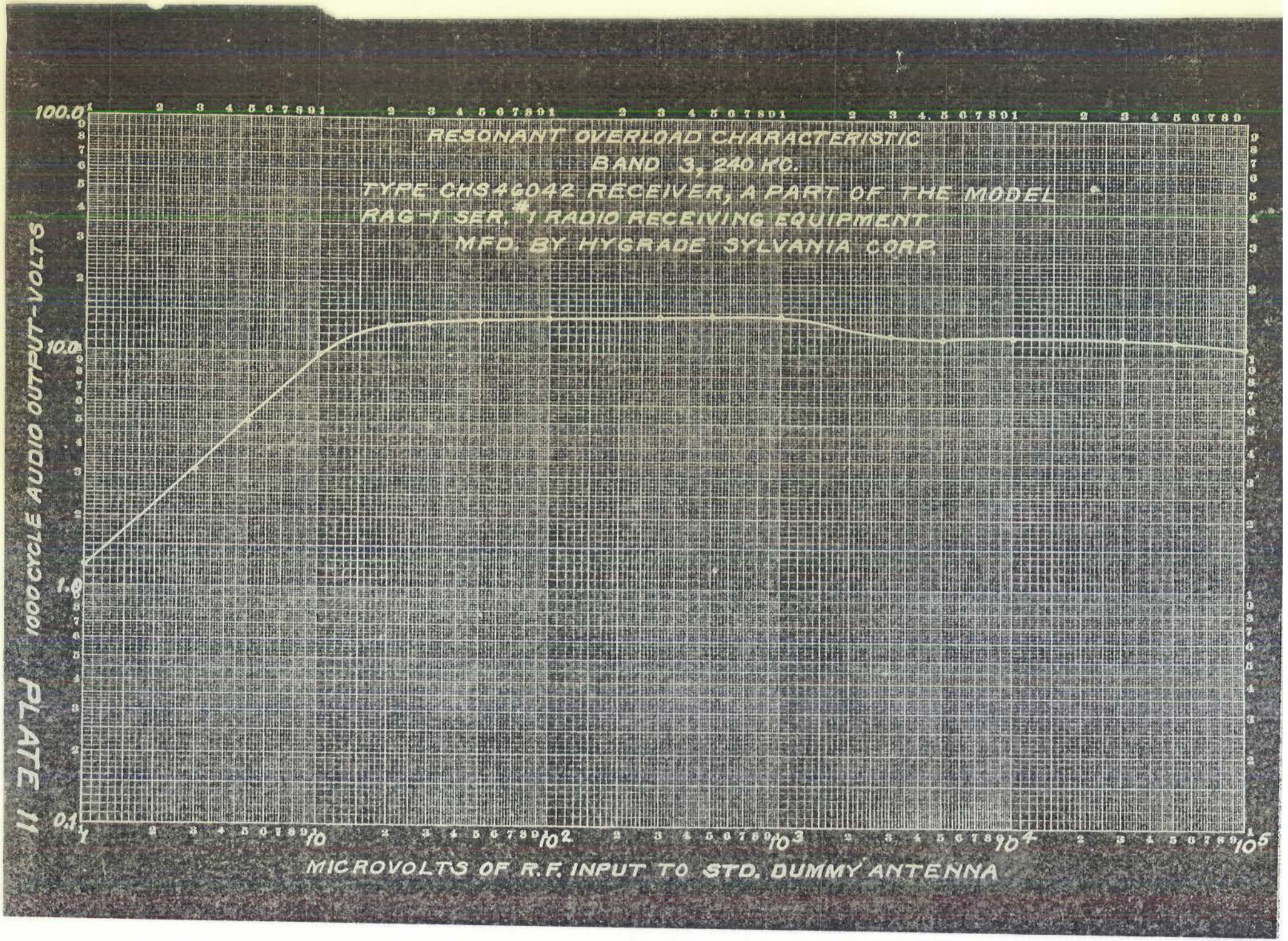

RESONANT OVERLOAD CHARACTERISTIC
BAND 3, 240 KC.
TYPE CHS 46042 RECEIVER, A PART OF THE MODEL
RAG-1 SER. # 1 RADIO RECEIVING EQUIPMENT
MFD. BY HYGRADE SYLVANIA CORP.
100.0
10.0
1.0
0.1
1000 CYCLE AUDIO OUTPUT-VOLTS
1
10
10²
10³
10⁴
10⁵
MICROVOLTS OF R.F. INPUT TO STD. DUMMY ANTENNA

PLATE 11

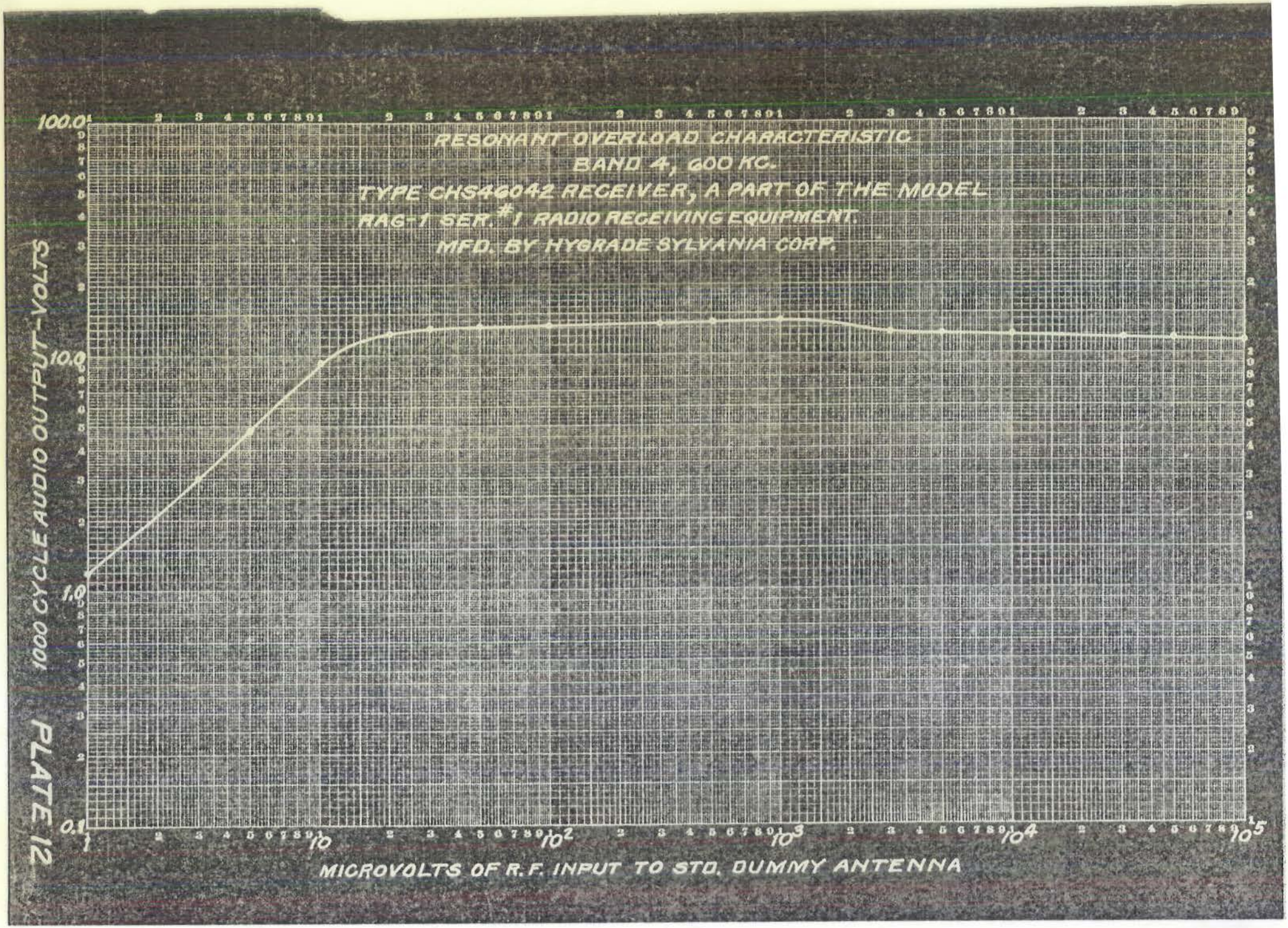

RESONANT OVERLOAD CHARACTERISTIC
BAND 4, 600 KC.
TYPE CHS46042 RECEIVER, A PART OF THE MODEL
RAG-1 SER. #1 RADIO RECEIVING EQUIPMENT.
MFD. BY HYGRADE SYLVANIA CORP.
100.0
10.0
1.0
0.1
1000 CYCLE AUDIO OUTPUT-VOLTS
1
10
10²
10³
10⁴
10⁵
MICROVOLTS OF R.F. INPUT TO STD. DUMMY ANTENNA

PLATE 12

BELLEVUE, D. C.

DATE

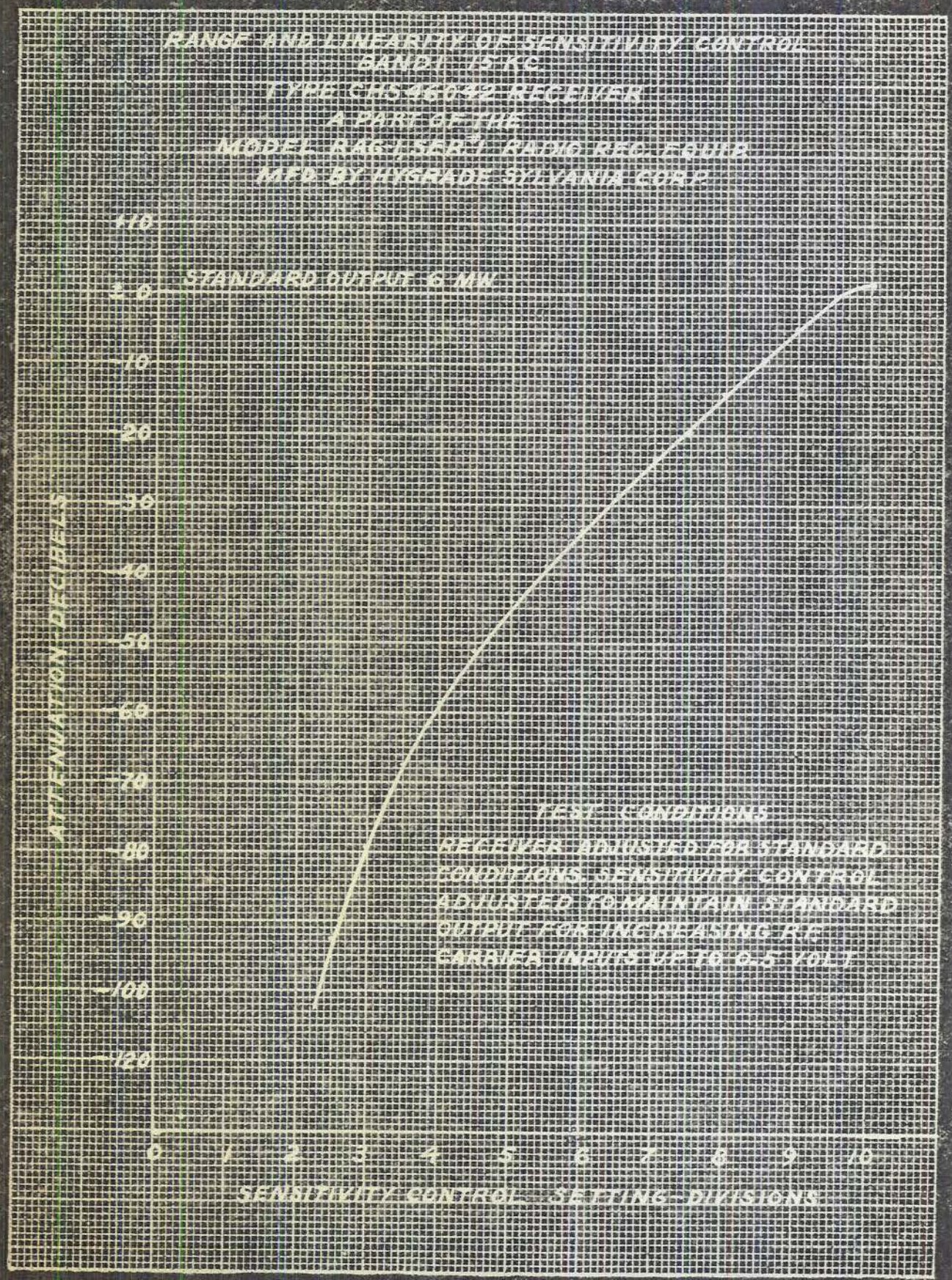


PLATE 13

BELLEVUE, D. C.

DATE

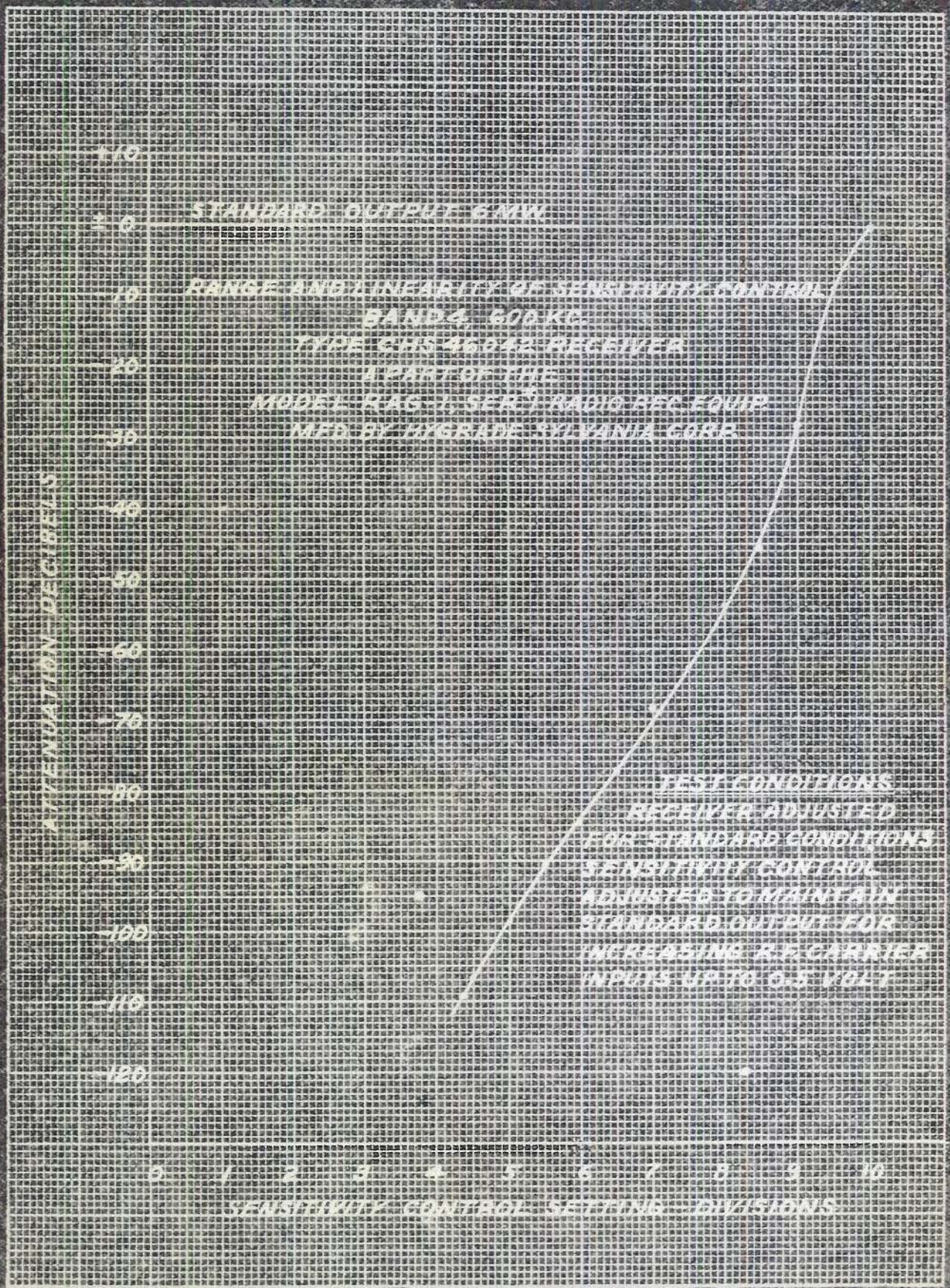


PLATE 14

BELLEVUE, D. C.

DATE

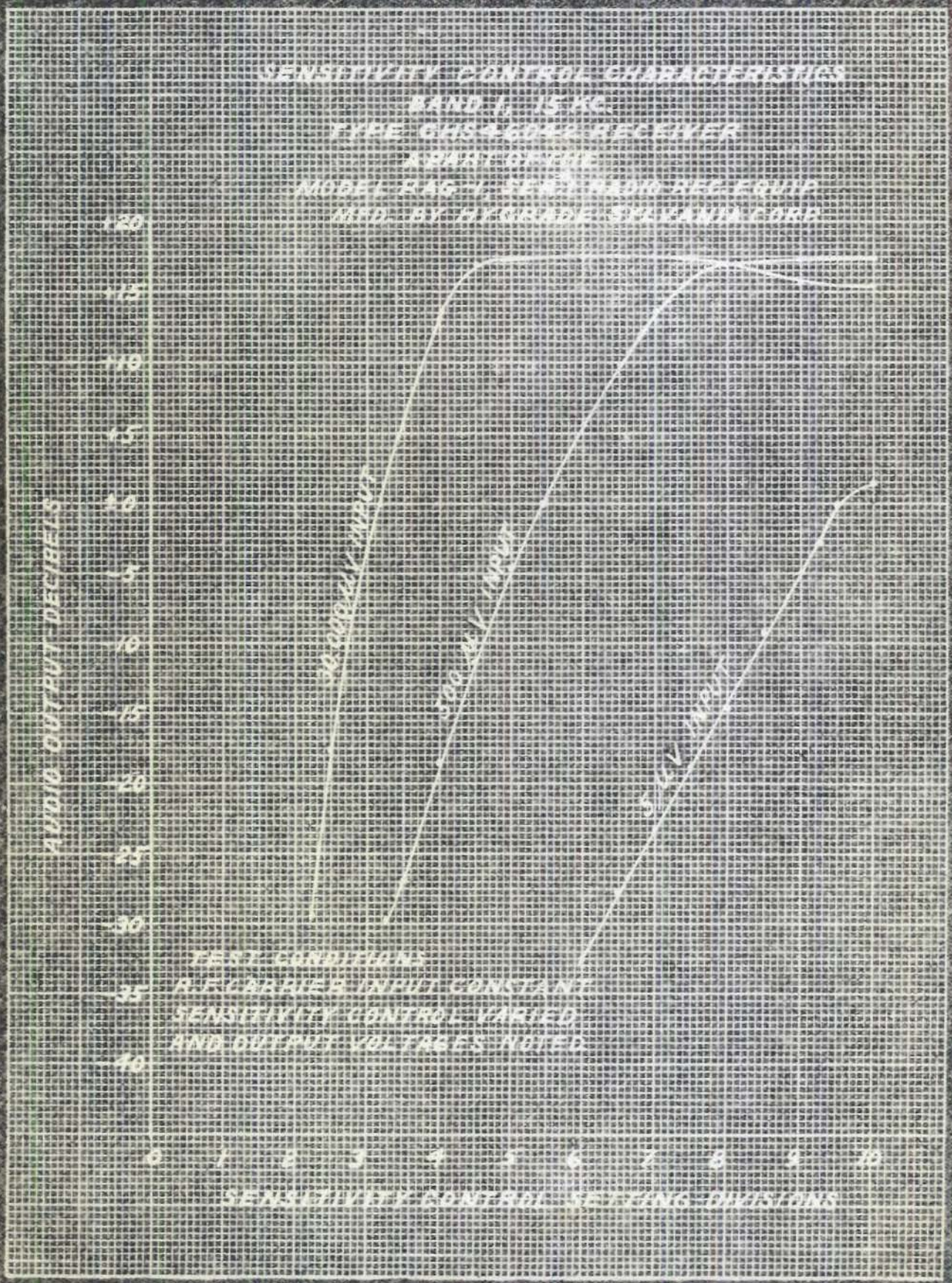


PLATE 15

U. S. NAVAL RESEARCH LABORATORY
BELLEVUE, D. C.

DATE

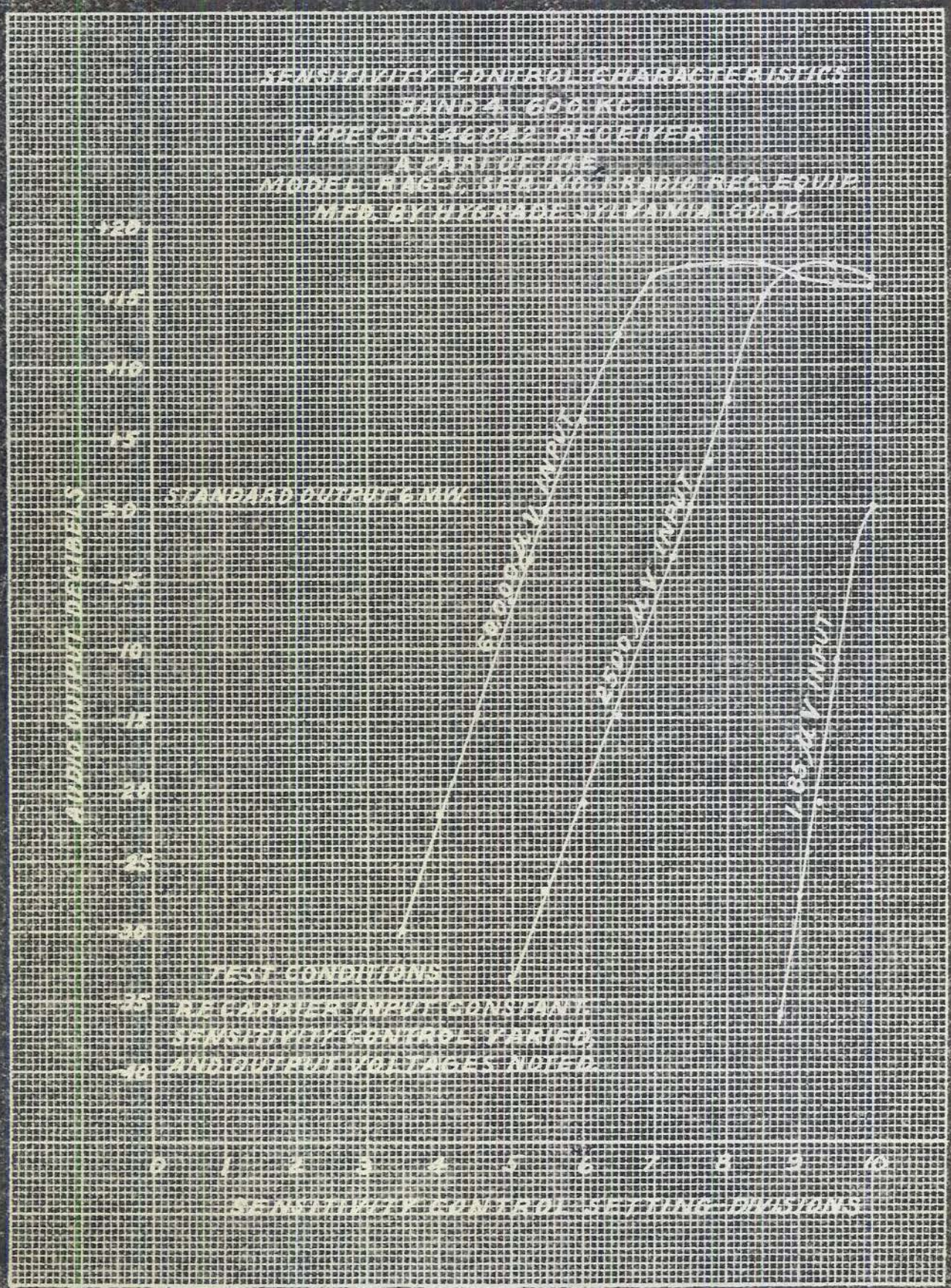


PLATE 16

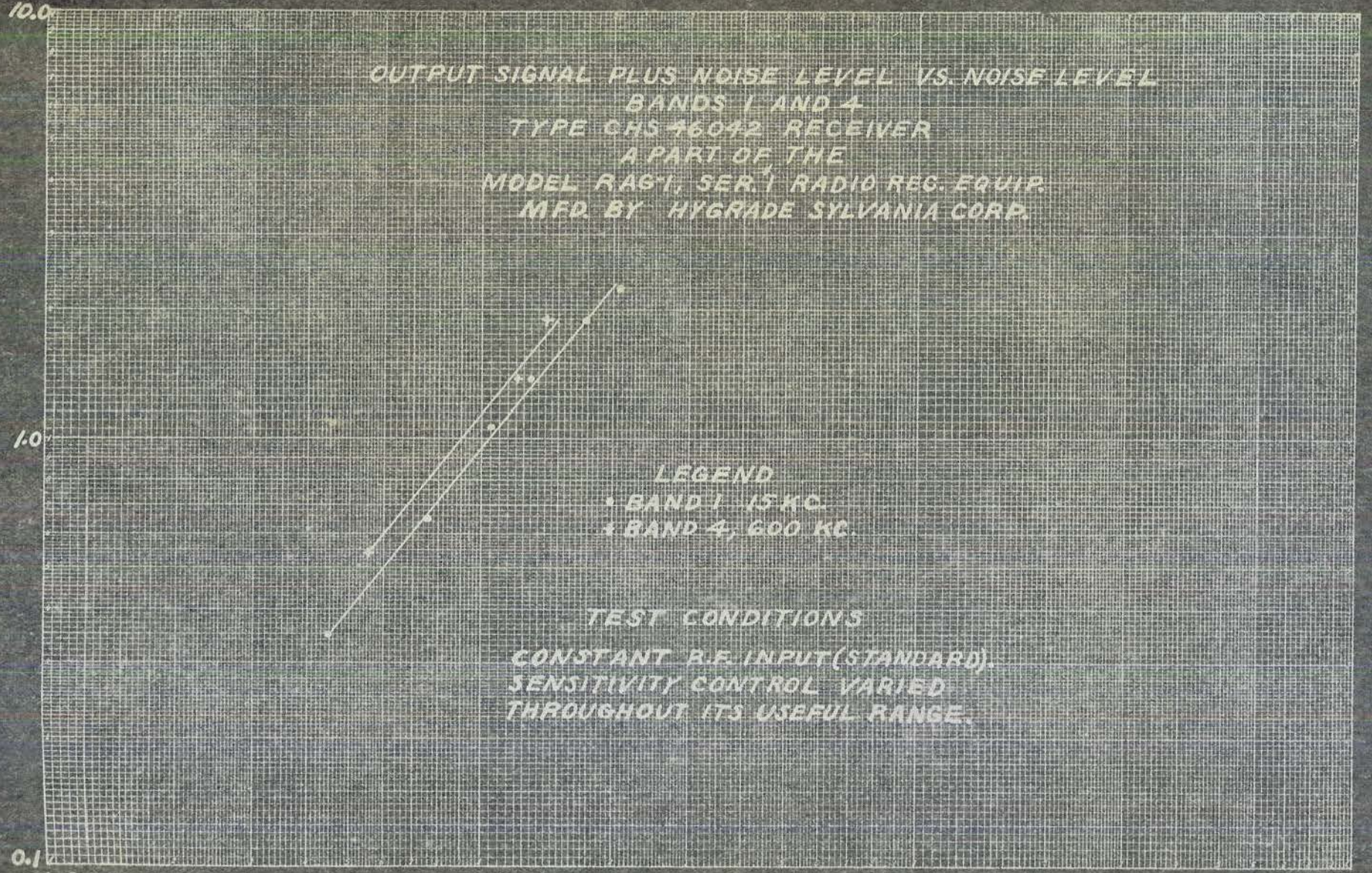
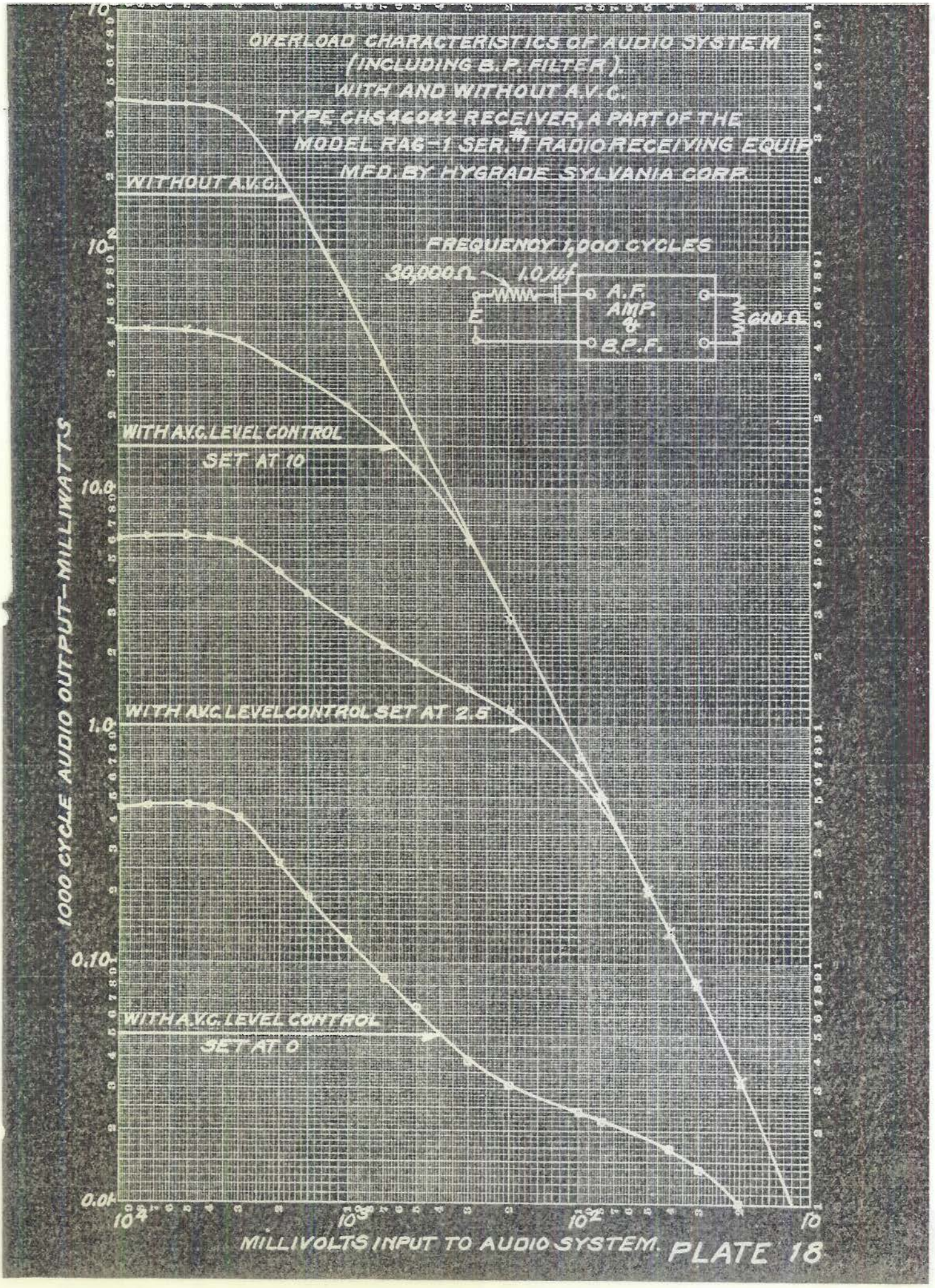

OUTPUT SIGNAL PLUS NOISE LEVEL VS. NOISE LEVEL
BANDS 1 AND 4
TYPE CRS 46042 RECEIVER
A PART OF THE
MODEL RAG-1, SER. 1 RADIO REC. EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
LEGEND
• BAND 1, 15 KC.
x BAND 4, 600 KC.
TEST CONDITIONS
CONSTANT R.F. INPUT (STANDARD).
SENSITIVITY CONTROL VARIED
THROUGHOUT ITS USEFUL RANGE.
OUTPUT SIGNAL PLUS NOISE - VOLTS
10.0
1.0
0.1
0.01
0.1
1.0
10.0
NOISE LEVEL - VOLTS

PLATE 17


OVERLOAD CHARACTERISTICS OF AUDIO SYSTEM
(INCLUDING B.P. FILTER).
WITH AND WITHOUT A.V.C.
TYPE CHS4C042 RECEIVER, A PART OF THE
MODEL RAG-1 SER. #1 RADIO RECEIVING EQUIP
MFD. BY HYGRADE SYLVANIA CORP.
WITHOUT A.V.C.
FREQUENCY 1,000 CYCLES
30,000 Ω
1.0 μf
E
A.F. AMP. & B.P.F.
600 Ω
WITH A.V.C. LEVEL CONTROL SET AT 10
WITH A.V.C. LEVEL CONTROL SET AT 2.5
WITH A.V.C. LEVEL CONTROL SET AT 0
1000 CYCLE AUDIO OUTPUT - MILLIWATTS
10
1.0
0.10
0.01
10⁴
10³
10²
10
MILLIVOLTS INPUT TO AUDIO SYSTEM.
PLATE 18

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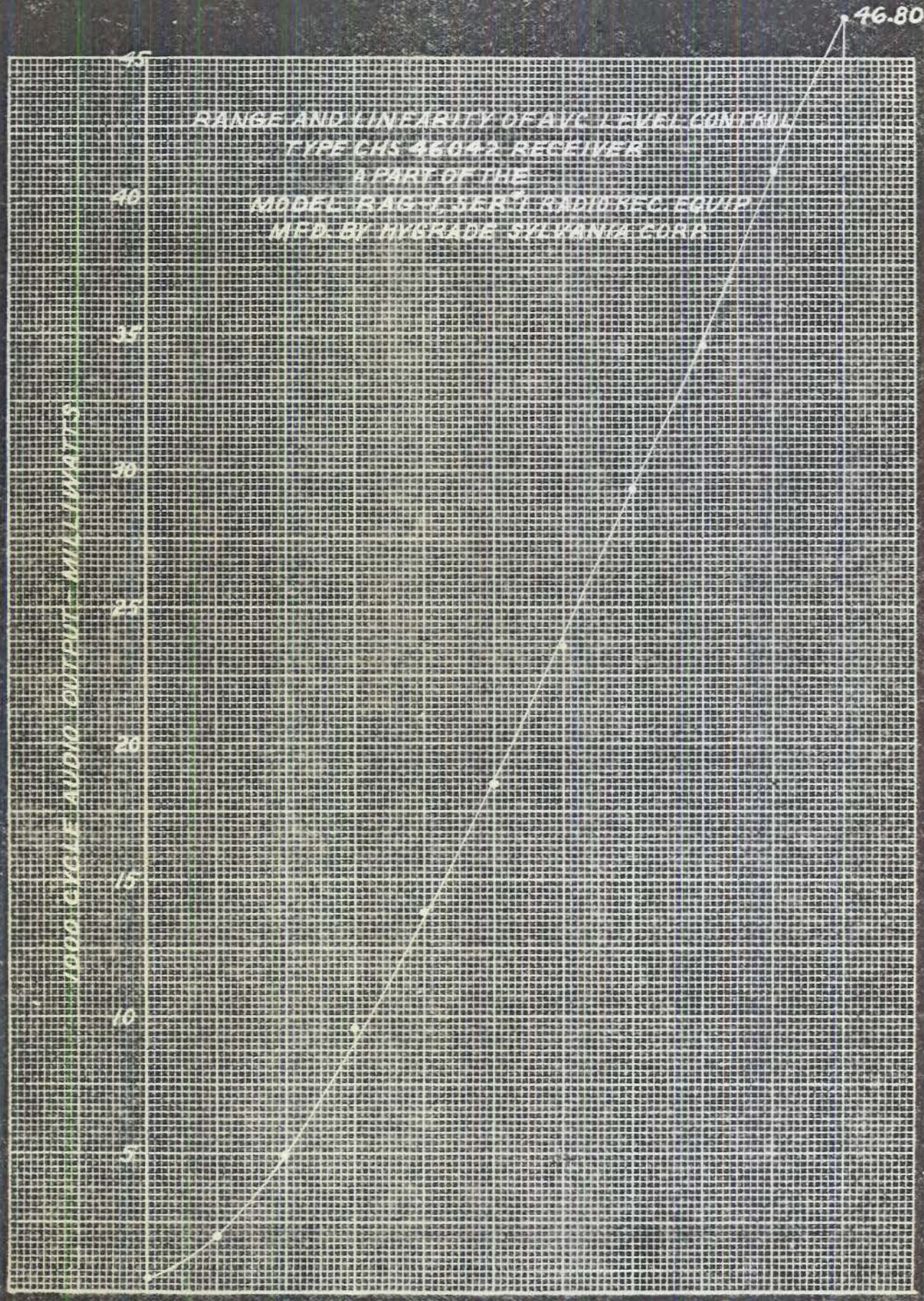


PLATE 19

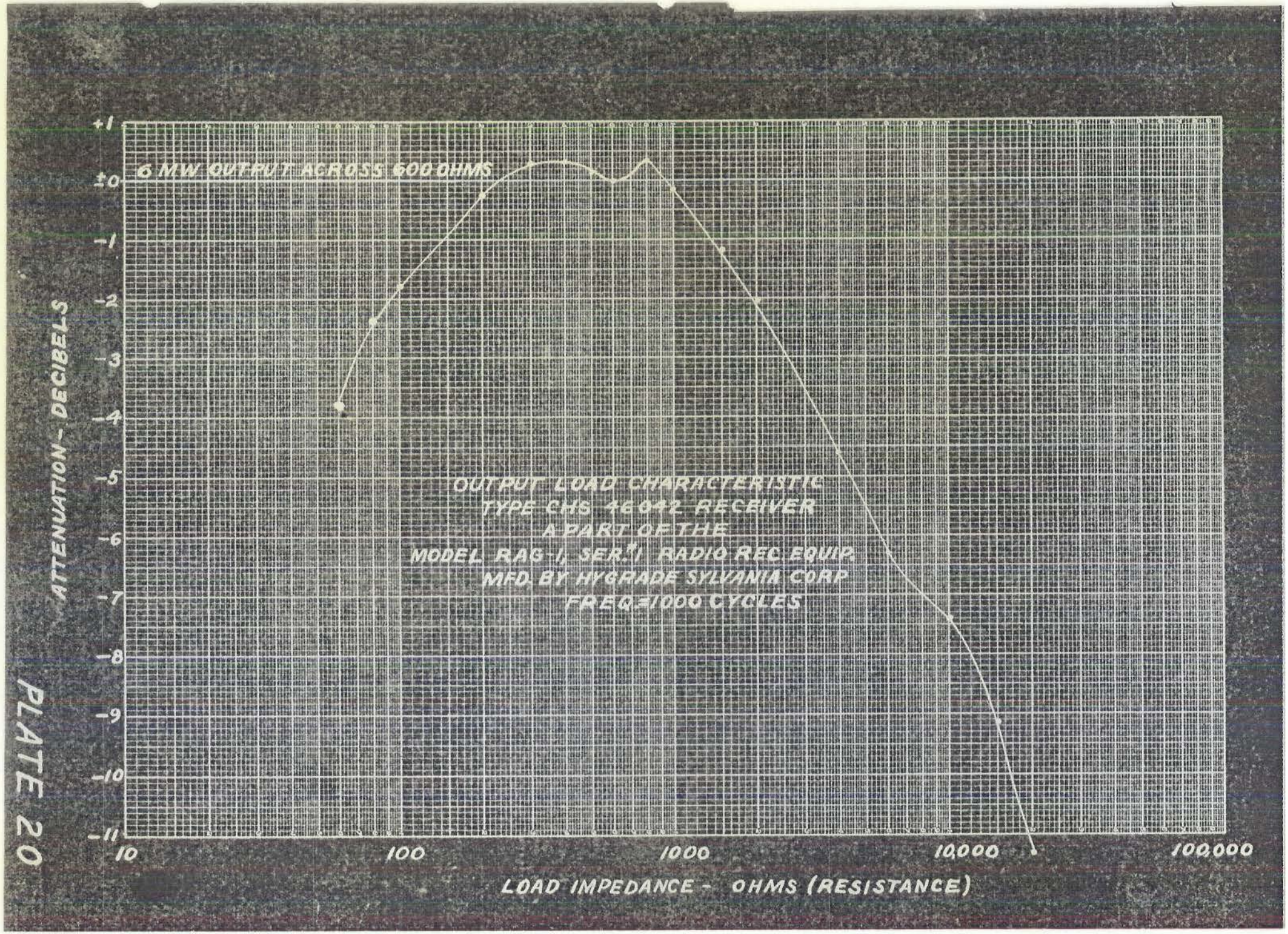
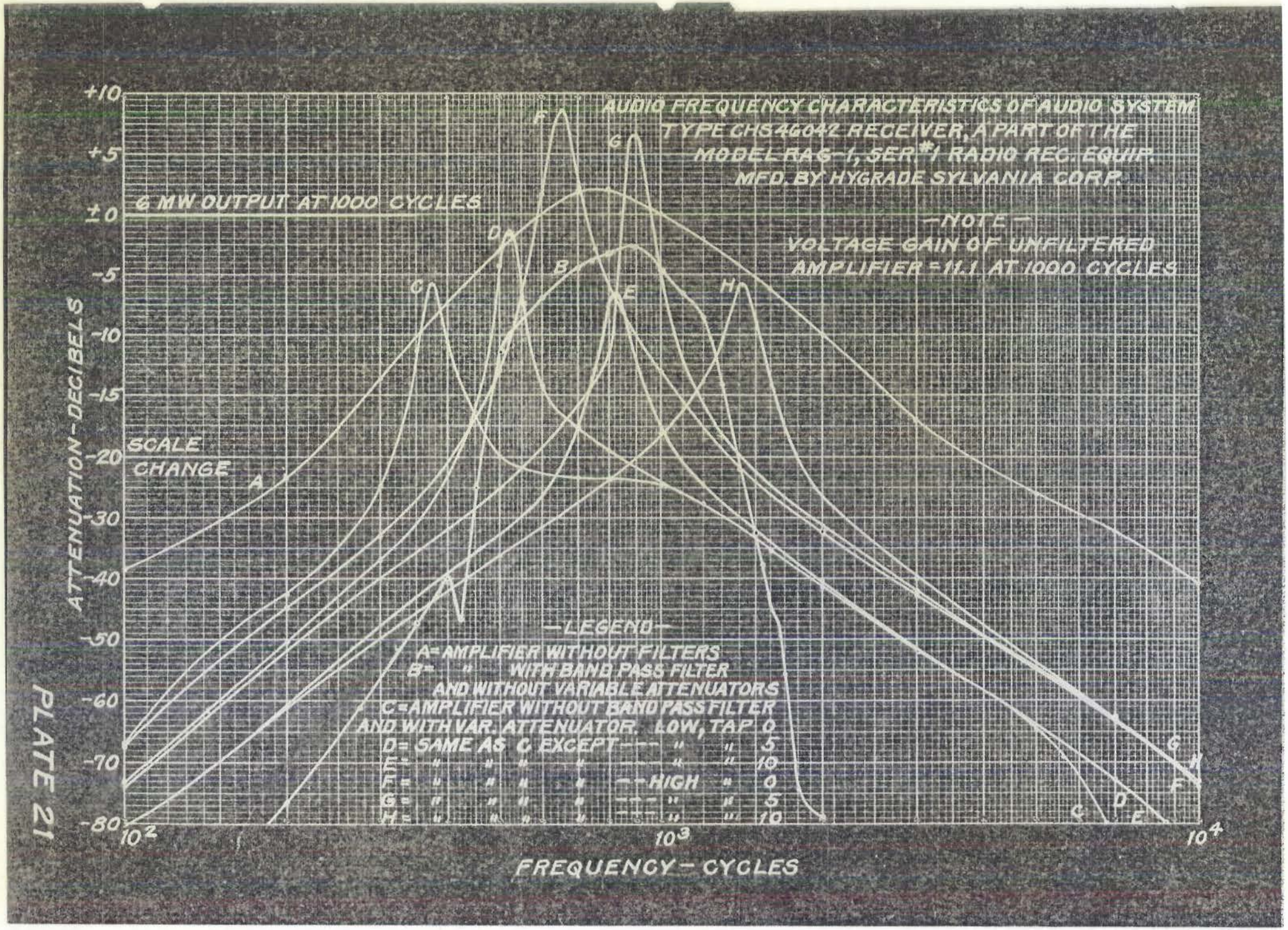
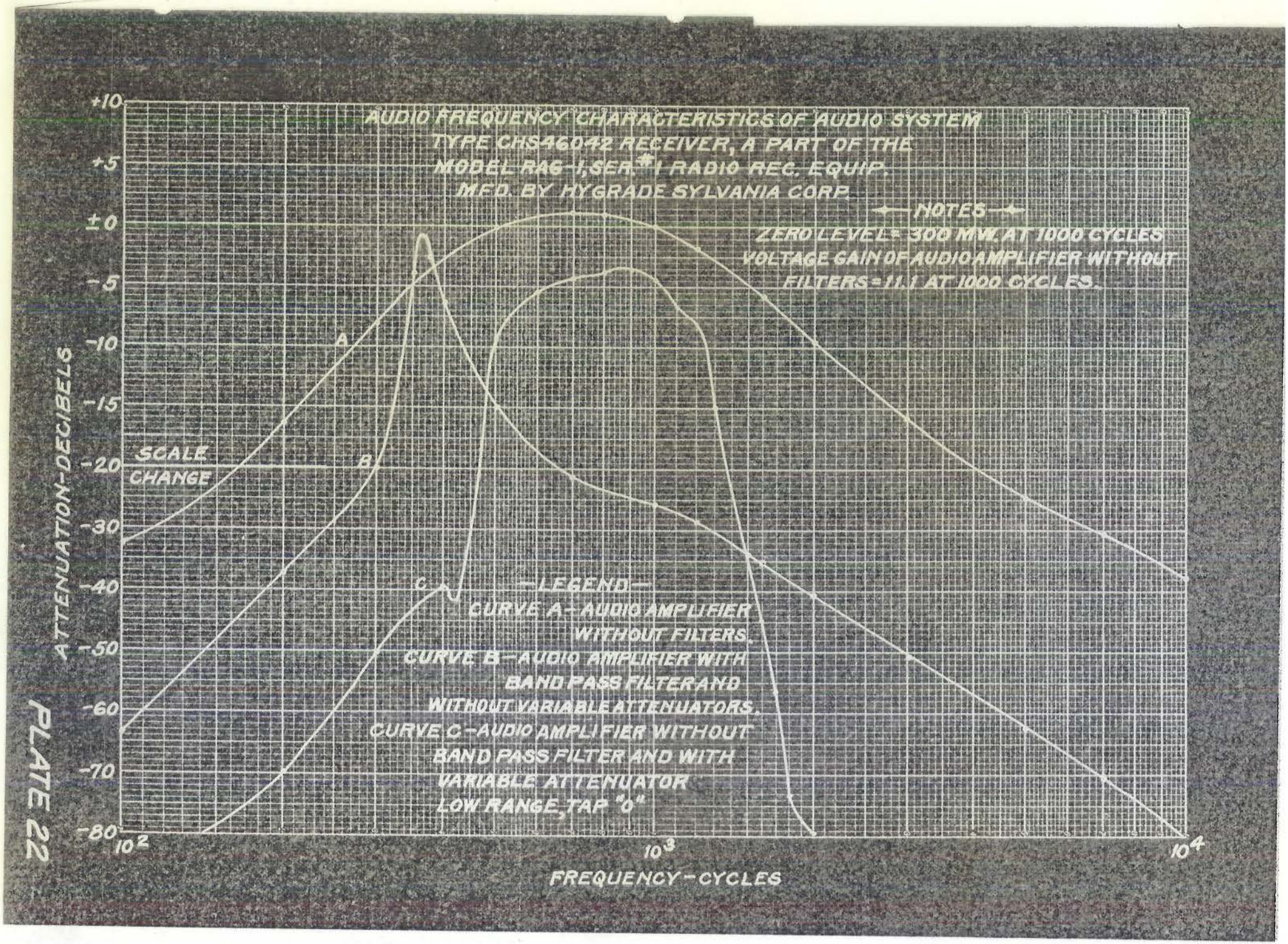

6 MW OUTPUT ACROSS 600 OHMS
OUTPUT LOAD CHARACTERISTIC
TYPE CHS 46042 RECEIVER
A PART OF THE
MODEL RAG-1, SER.#1 RADIO REC. EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
FREQ.=1000 CYCLES
+1
±0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
ATTENUATION - DECIBELS
10
100
1000
10,000
100,000
LOAD IMPEDANCE - OHMS (RESISTANCE)

PLATE 20


AUDIO FREQUENCY CHARACTERISTICS OF AUDIO SYSTEM TYPE CHS4G042 RECEIVER, A PART OF THE MODEL RAG-1, SER.#1 RADIO REC. EQUIP. MFD. BY HYGRADE SYLVANIA CORP.
—NOTE—
VOLTAGE GAIN OF UNFILTERED AMPLIFIER = 11.1 AT 1000 CYCLES
6 MW OUTPUT AT 1000 CYCLES
SCALE CHANGE
ATTENUATION - DECIBELS
+10
+5
±0
-5
-10
-15
-20
-30
-40
-50
-60
-70
-80
10^2
10^3
10^4
FREQUENCY - CYCLES
—LEGEND—
A = AMPLIFIER WITHOUT FILTERS
B = " WITH BAND PASS FILTER AND WITHOUT VARIABLE ATTENUATORS
C = AMPLIFIER WITHOUT BAND PASS FILTER AND WITH VAR. ATTENUATOR. LOW, TAP 0
D = SAME AS C EXCEPT — " " 5
E = " " " " — " " 10
F = " " " " — HIGH " 0
G = " " " " — " " 5
H = " " " " — " " 10
A
B
C
D
E
F
G
H
PLATE 21


AUDIO FREQUENCY CHARACTERISTICS OF AUDIO SYSTEM
TYPE CRS46042 RECEIVER, A PART OF THE
MODEL RAG-1, SER. #1 RADIO REC. EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
NOTES
ZERO LEVEL = 300 MW. AT 1000 CYCLES
VOLTAGE GAIN OF AUDIO AMPLIFIER WITHOUT FILTERS = 11.1 AT 1000 CYCLES.
+10
+5
±0
-5
-10
-15
-20
-30
-40
-50
-60
-70
-80
SCALE CHANGE
A
B
C
ATTENUATION-DECIBELS
LEGEND
CURVE A - AUDIO AMPLIFIER WITHOUT FILTERS.
CURVE B - AUDIO AMPLIFIER WITH BAND PASS FILTER AND WITHOUT VARIABLE ATTENUATORS.
CURVE C - AUDIO AMPLIFIER WITHOUT BAND PASS FILTER AND WITH VARIABLE ATTENUATOR LOW RANGE, TAP "0"
10^2
10^3
10^4
FREQUENCY - CYCLES
PLATE 22

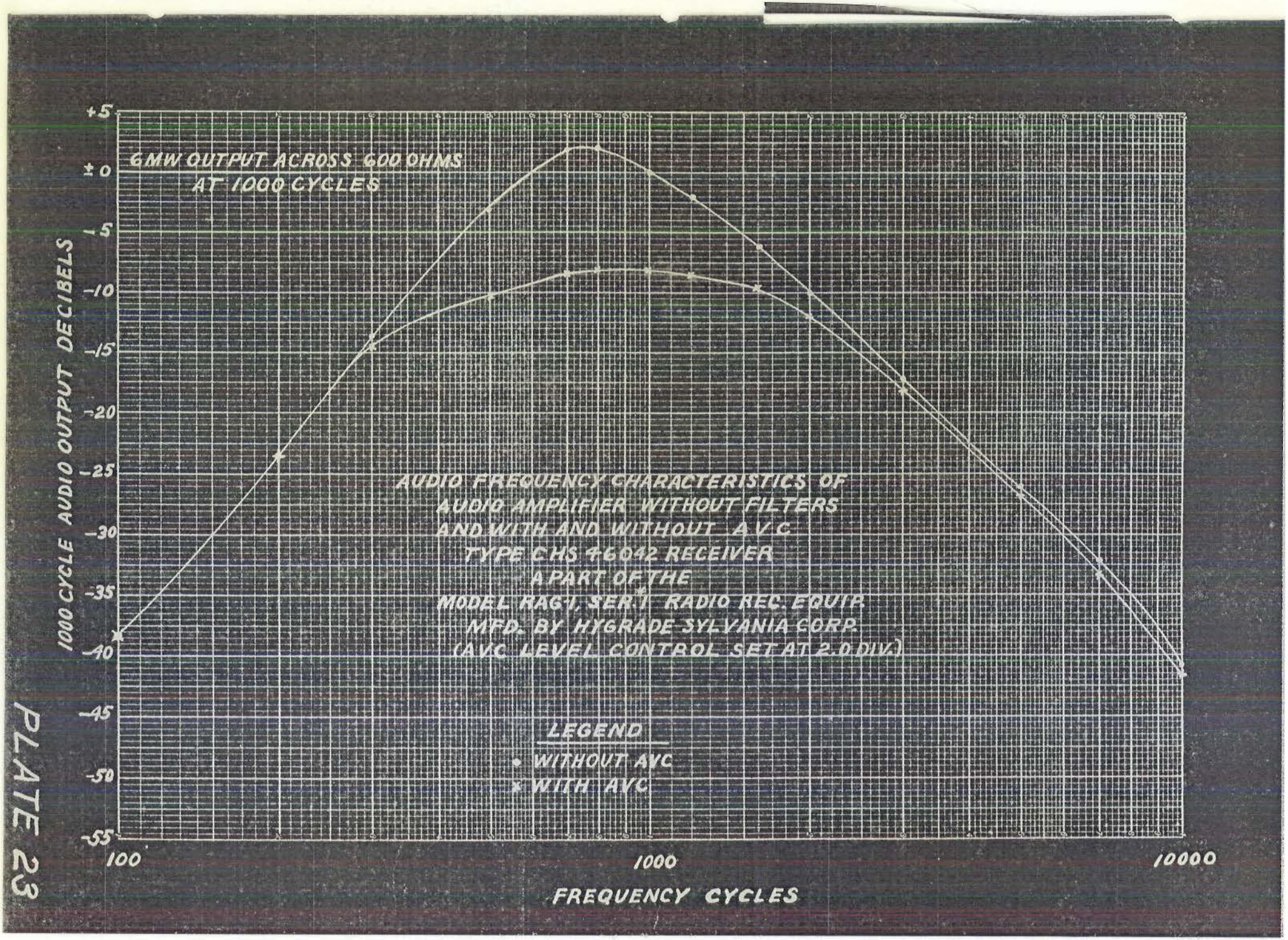

6 MW OUTPUT ACROSS 600 OHMS
AT 1000 CYCLES
+5
±0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
1000 CYCLE AUDIO OUTPUT DECIBELS
AUDIO FREQUENCY CHARACTERISTICS OF
AUDIO AMPLIFIER WITHOUT FILTERS
AND WITH AND WITHOUT A.V.C.
TYPE CHS 46042 RECEIVER
A PART OF THE
MODEL RAG-1, SER.# RADIO REC. EQUIP.
MFD. BY HYGRADE SYLVANIA CORP.
(A.V.C. LEVEL CONTROL SET AT 2.0 DIV.)
LEGEND
• WITHOUT AVC
× WITH AVC
100
1000
10000
FREQUENCY CYCLES

PLATE 23

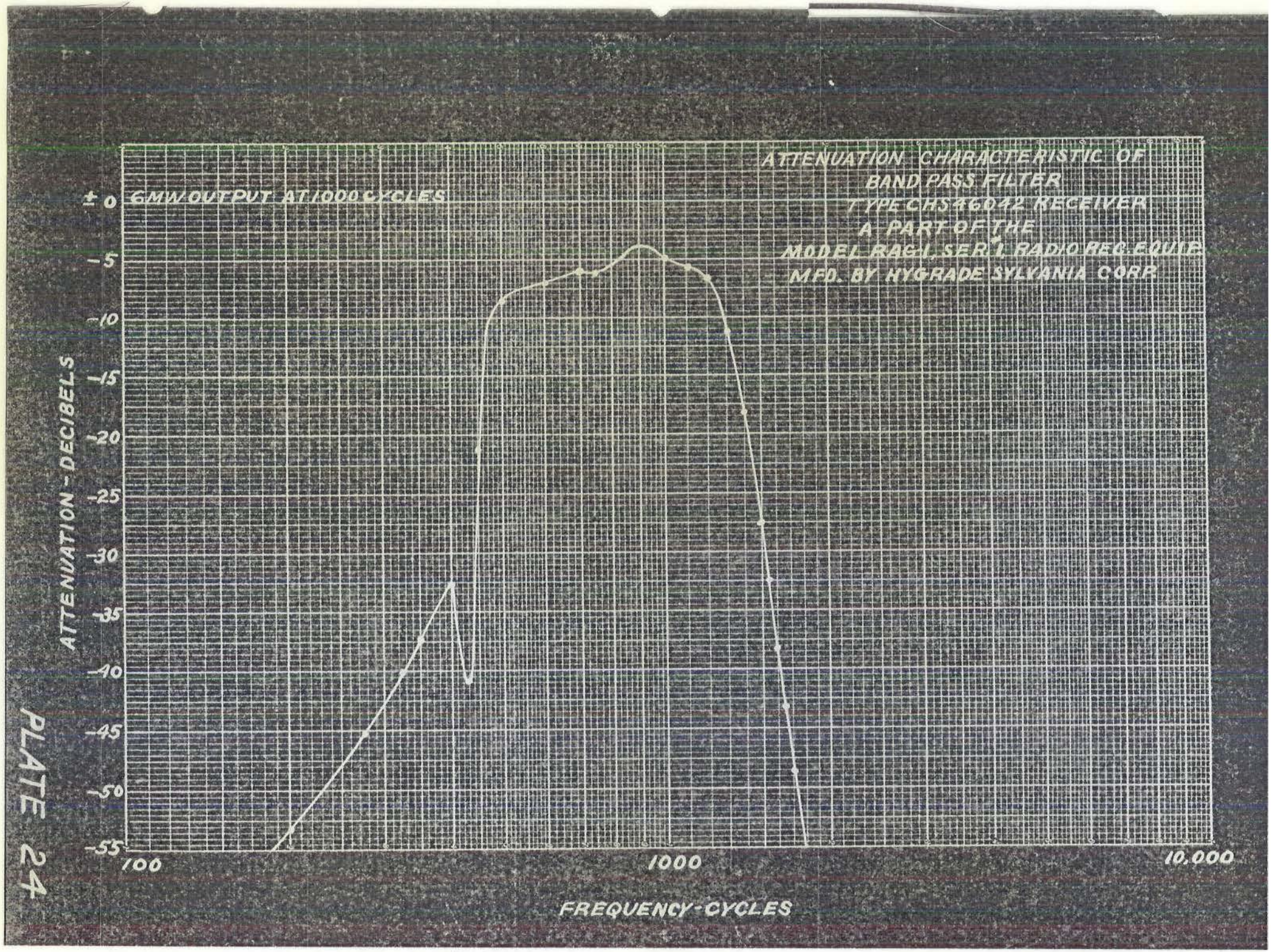
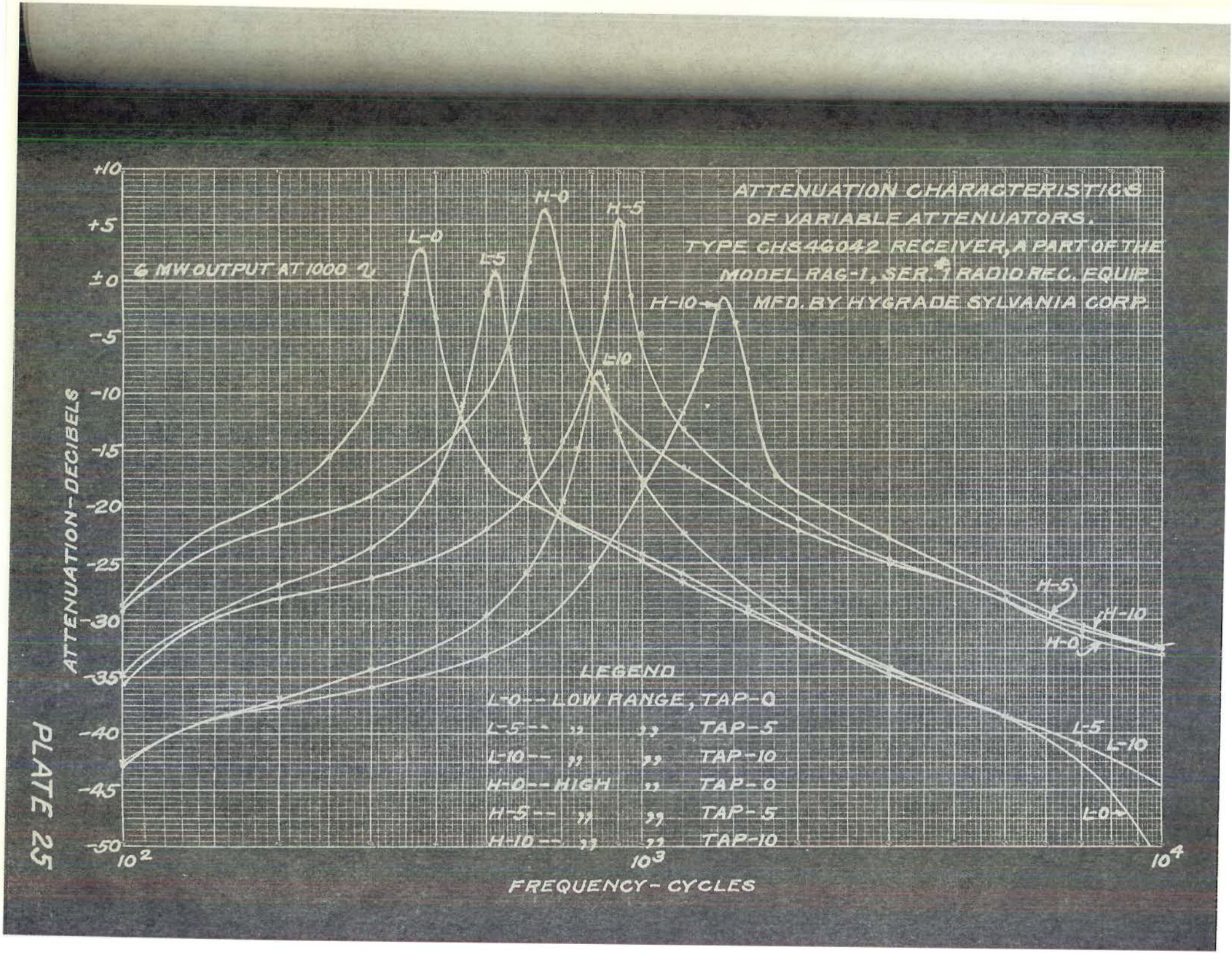
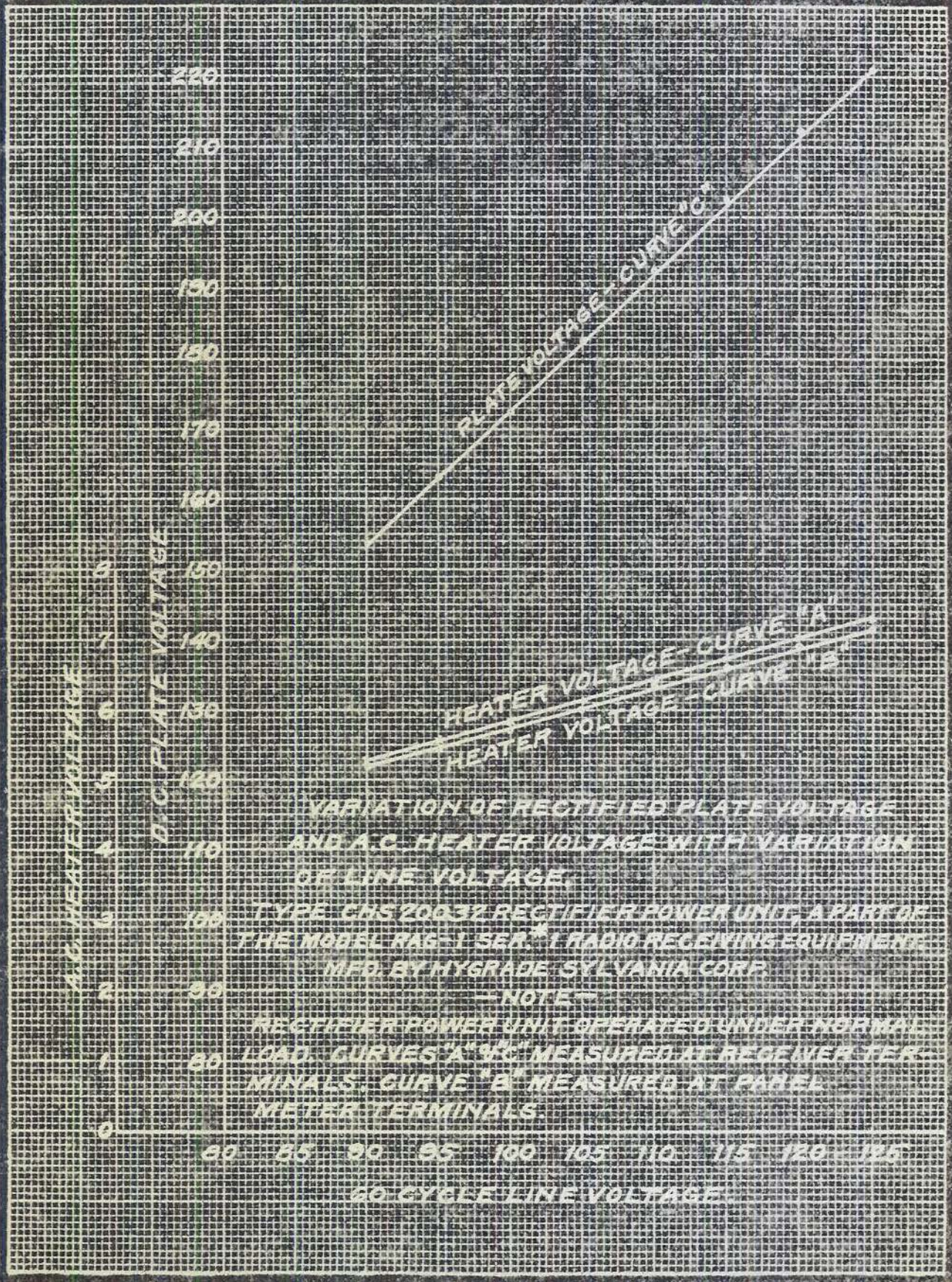

ATTENUATION CHARACTERISTIC OF
BAND PASS FILTER
TYPE CHS46042 RECEIVER
A PART OF THE
MODEL RAG-1 SERIES RADIO RECEIVER
MFD. BY HYGRADE SYLVANIA CORP.
6 MW OUTPUT AT 1000 CYCLES
± 0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
ATTENUATION - DECIBELS
100
1000
10,000
FREQUENCY - CYCLES

PLATE 24


ATTENUATION CHARACTERISTICS OF VARIABLE ATTENUATORS. TYPE CHS4G042 RECEIVER, A PART OF THE MODEL RAG-1, SER. 1 RADIO REC. EQUIP. MFD. BY HYGRADE SYLVANIA CORP.
6 MW OUTPUT AT 1000 ~
ATTENUATION - DECIBELS
+10
+5
±0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
L-0
L-5
L-10
H-0
H-5
H-10
LEGEND
L-0 -- LOW RANGE, TAP-0
L-5 -- " " TAP-5
L-10 -- " " TAP-10
H-0 -- HIGH " TAP-0
H-5 -- " " TAP-5
H-10 -- " " TAP-10
10^2
10^3
10^4
FREQUENCY - CYCLES
PLATE 25

BELLEVUE, D. C.

DATE



VARIATION OF RECTIFIED PLATE VOLTAGE AND A.C. HEATER VOLTAGE WITH VARIATION OF LINE VOLTAGE.

TYPE GDS 200-32 RECTIFIER POWER UNIT A PART OF THE MODEL RAG-1 SER.* 1 RADIO RECEIVING EQUIPMENT MFD. BY INTERGRADE SYLVANIA CORP.

—NOTE—

RECTIFIER POWER UNIT OPERATED UNDER NORMAL LOAD. CURVES "A" & "B" MEASURED AT RECEIVER TERMINALS. CURVE "C" MEASURED AT PANEL METER TERMINALS.

PLATE 26

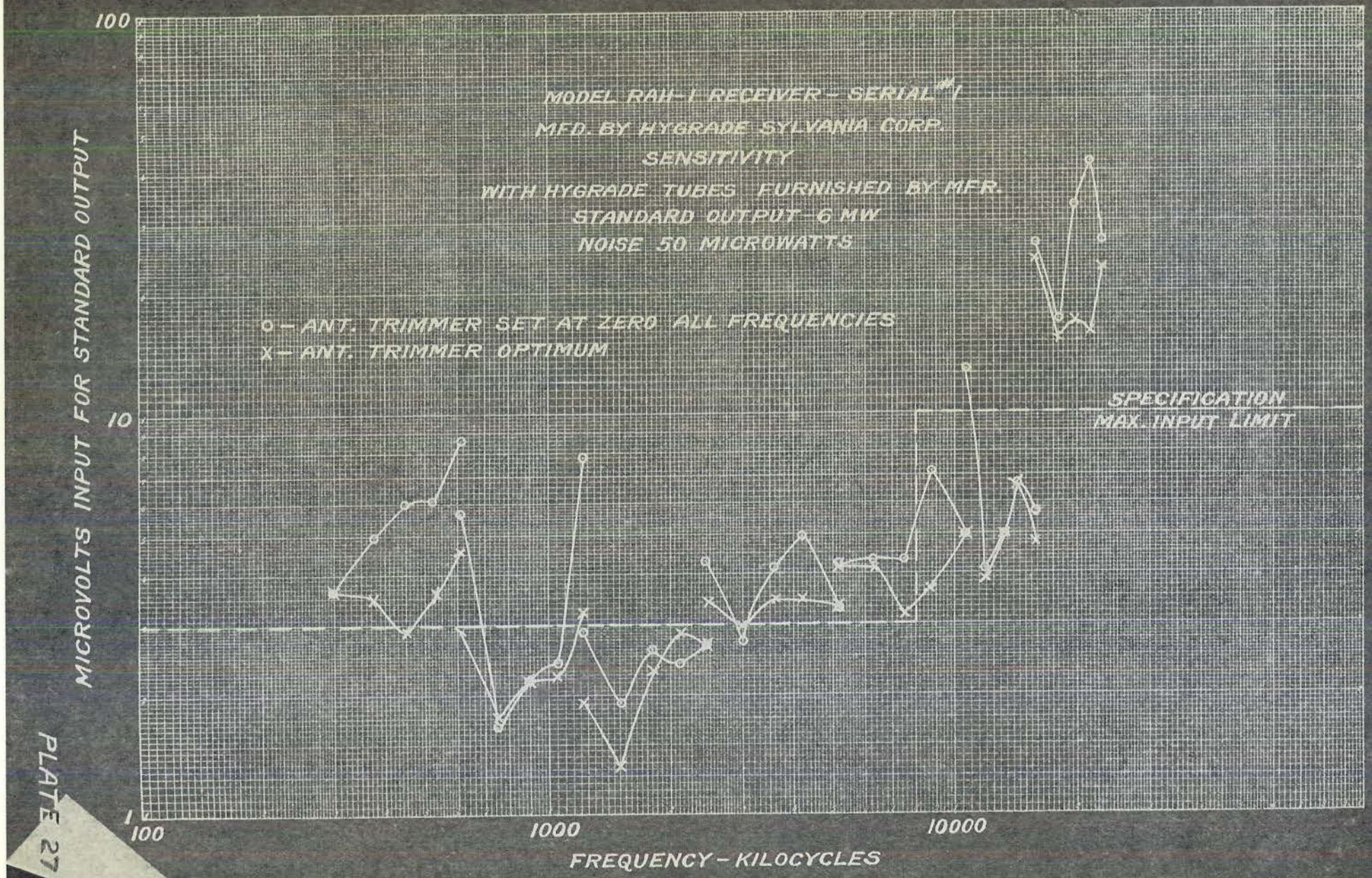

MODEL RAH-1 RECEIVER – SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP.
SENSITIVITY
WITH HYGRADE TUBES FURNISHED BY MFR.
STANDARD OUTPUT – 6 MW
NOISE 50 MICROWATTS
o – ANT. TRIMMER SET AT ZERO ALL FREQUENCIES
x – ANT. TRIMMER OPTIMUM
SPECIFICATION
MAX. INPUT LIMIT
100
10
1
100
1000
10000
MICROVOLTS INPUT FOR STANDARD OUTPUT
FREQUENCY – KILOCYCLES

PLATE 27

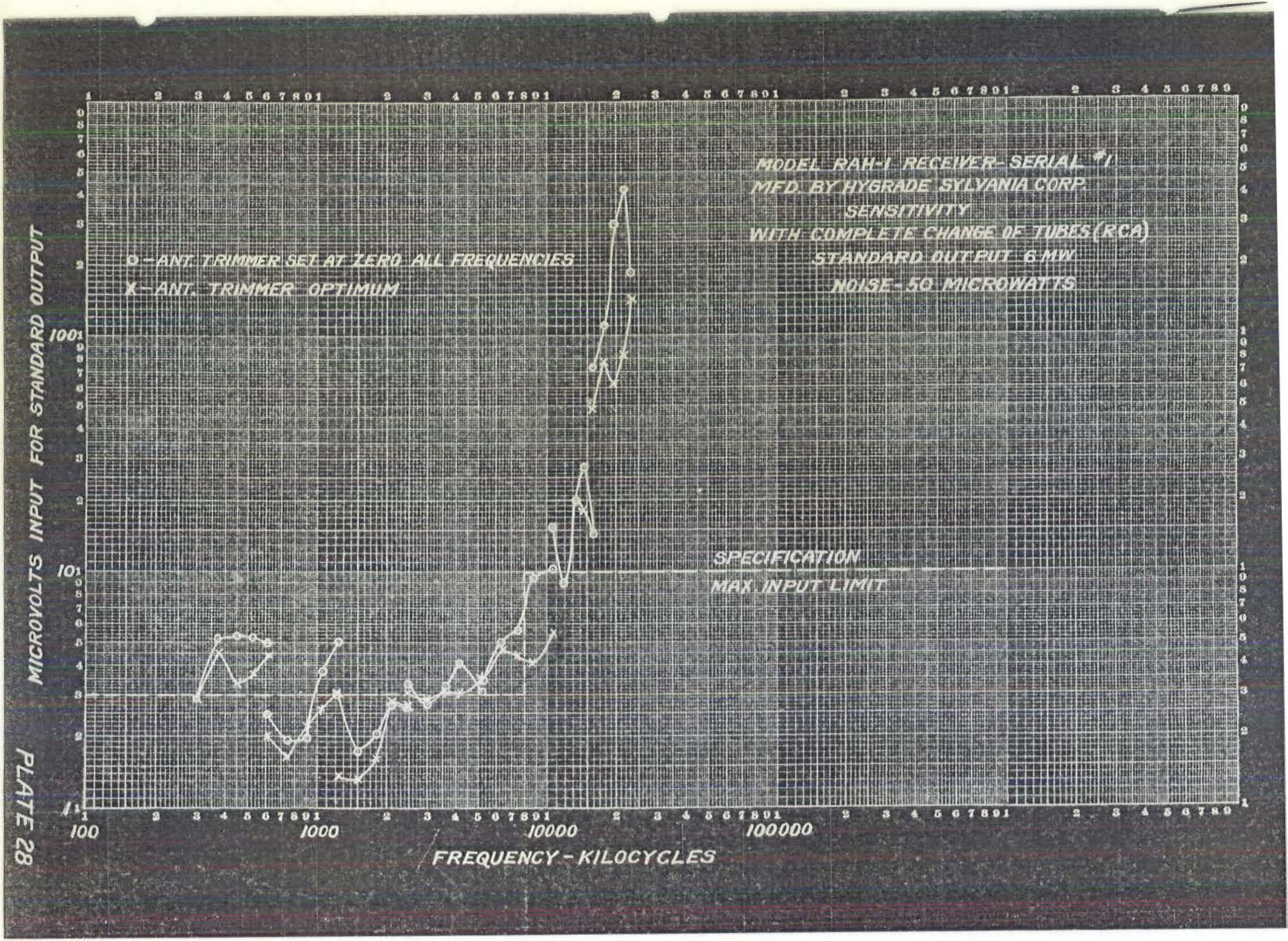

MODEL RAH-1 RECEIVER - SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP.
SENSITIVITY
WITH COMPLETE CHANGE OF TUBES (RCA)
STANDARD OUTPUT 6 MW
NOISE - 50 MICROWATTS
O - ANT. TRIMMER SET AT ZERO ALL FREQUENCIES
X - ANT. TRIMMER OPTIMUM
SPECIFICATION
MAX. INPUT LIMIT
MICROVOLTS INPUT FOR STANDARD OUTPUT
FREQUENCY - KILOCYCLES
100
1000
10000
100000

PLATE 28

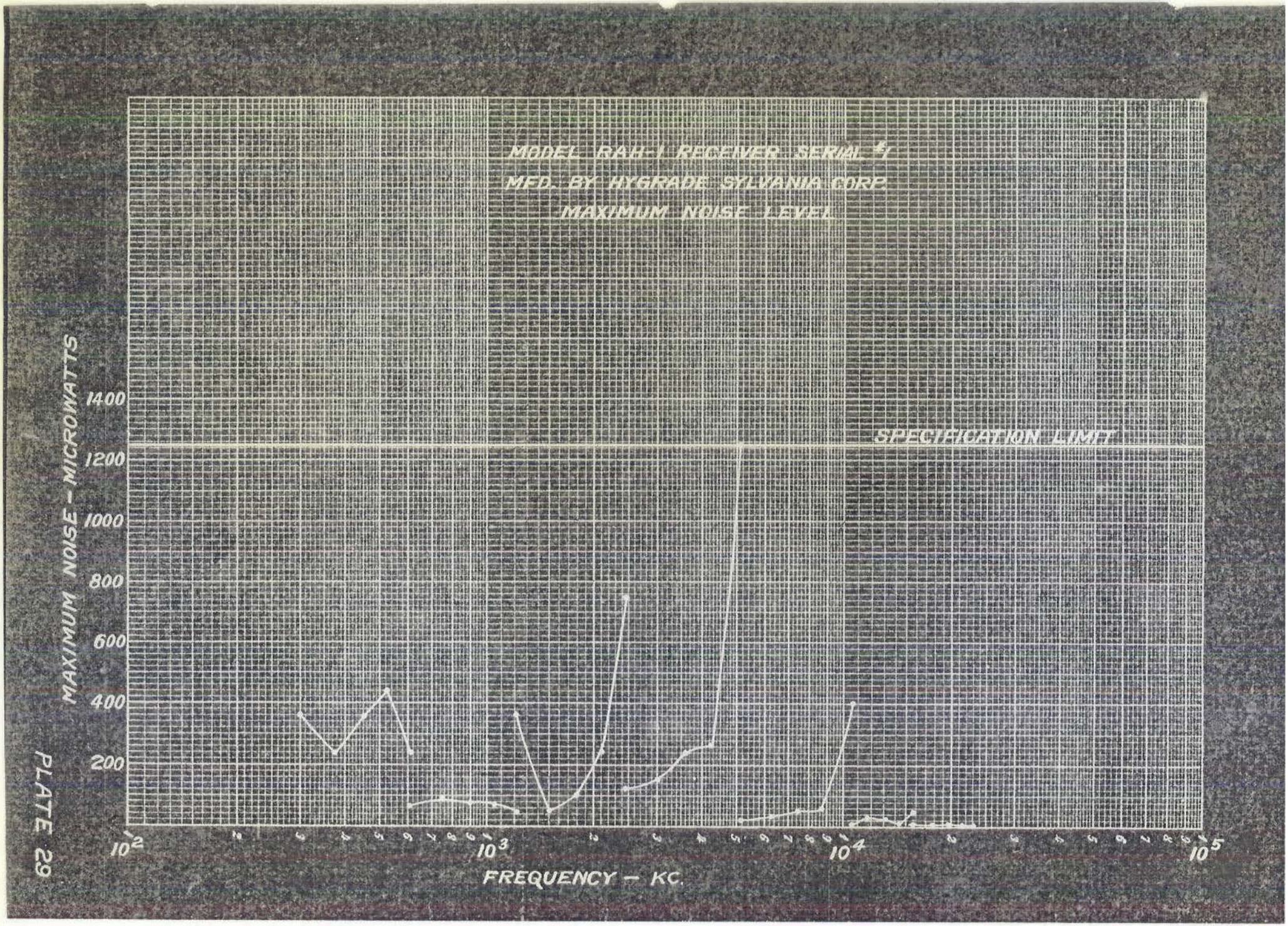

MODEL RAH-1 RECEIVER SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP.
MAXIMUM NOISE LEVEL
SPECIFICATION LIMIT
MAXIMUM NOISE - MICROWATTS
1400
1200
1000
800
600
400
200
10^2
10^3
10^4
10^5
FREQUENCY - KC.

PLATE 29

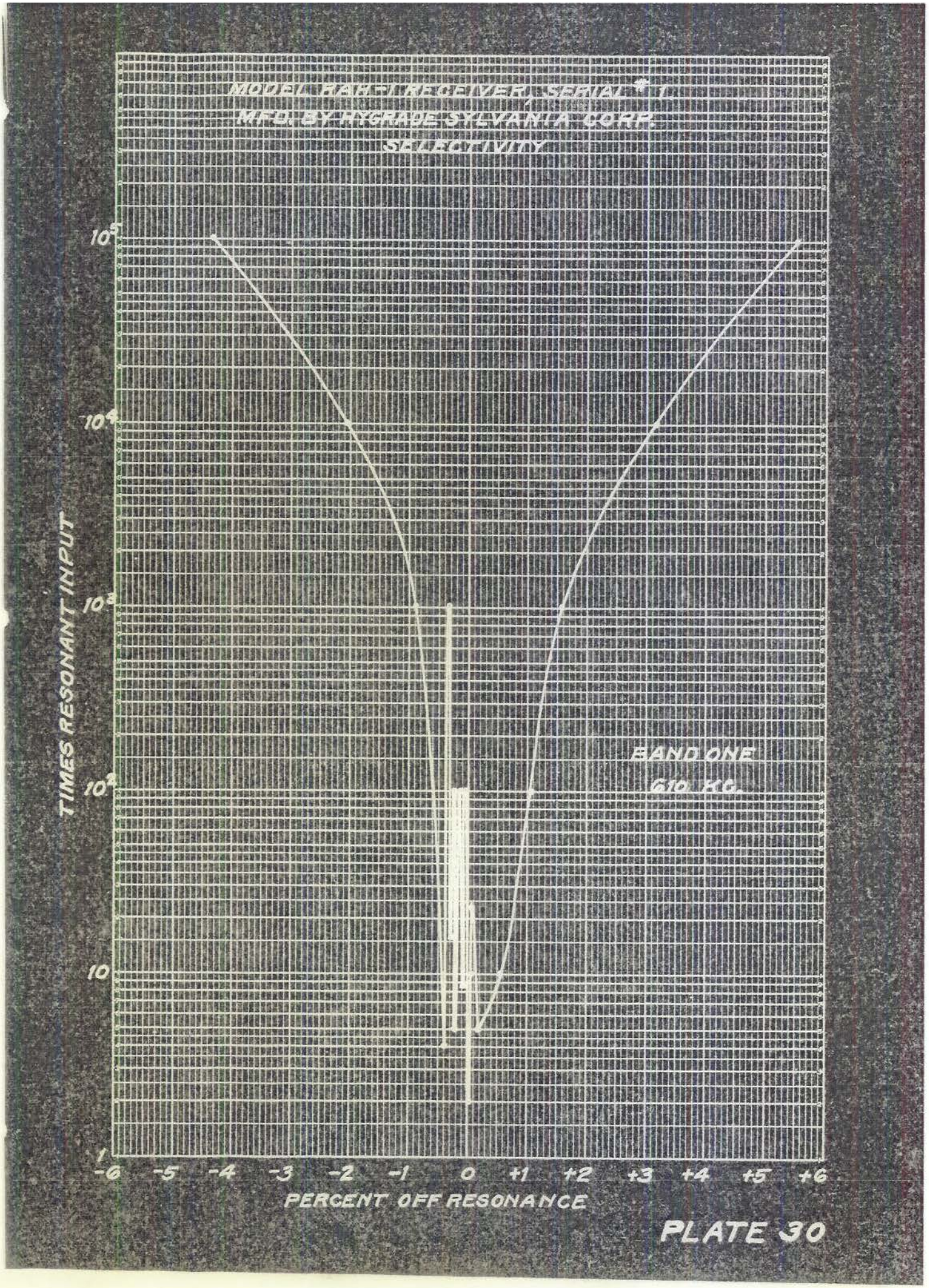

MODEL RAH-1 RECEIVER, SERIAL #1
MFD. BY PYGRADE SYLVANIA CORP.
SELECTIVITY
10^5
10^4
10^3
10^2
10
1
TIMES RESONANT INPUT
BAND ONE
610 KC.
-6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6
PERCENT OFF RESONANCE

PLATE 30

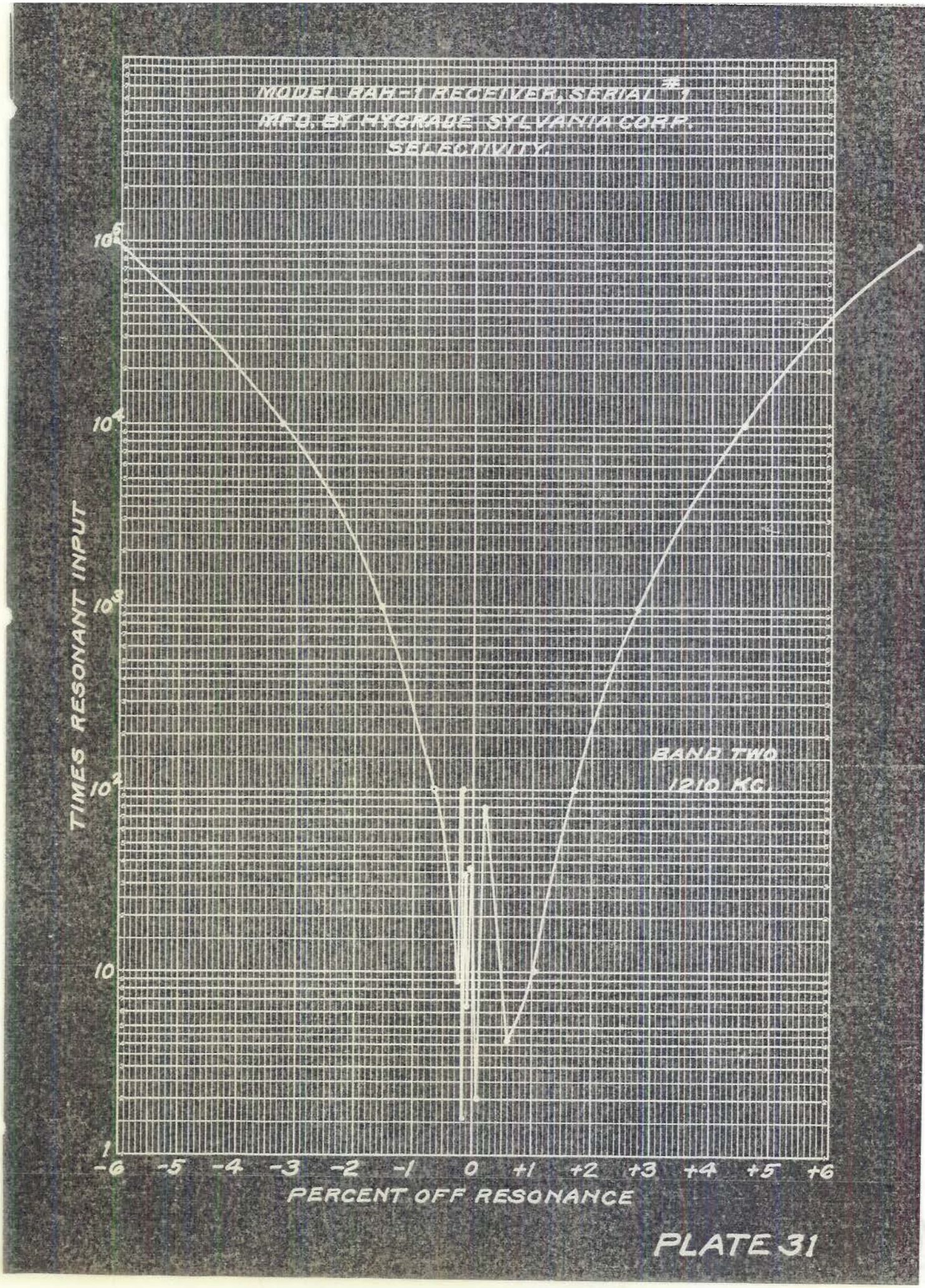

MODEL BABC1 RECEIVER SERIAL #1
MFG. BY HYGRADE SYLVANIA CORP.
SELECTIVITY
BAND TWO
1210 KC.
TIMES RESONANT INPUT
10^5
10^4
10^3
10^2
10
1
-6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6
PERCENT OFF RESONANCE

PLATE 31

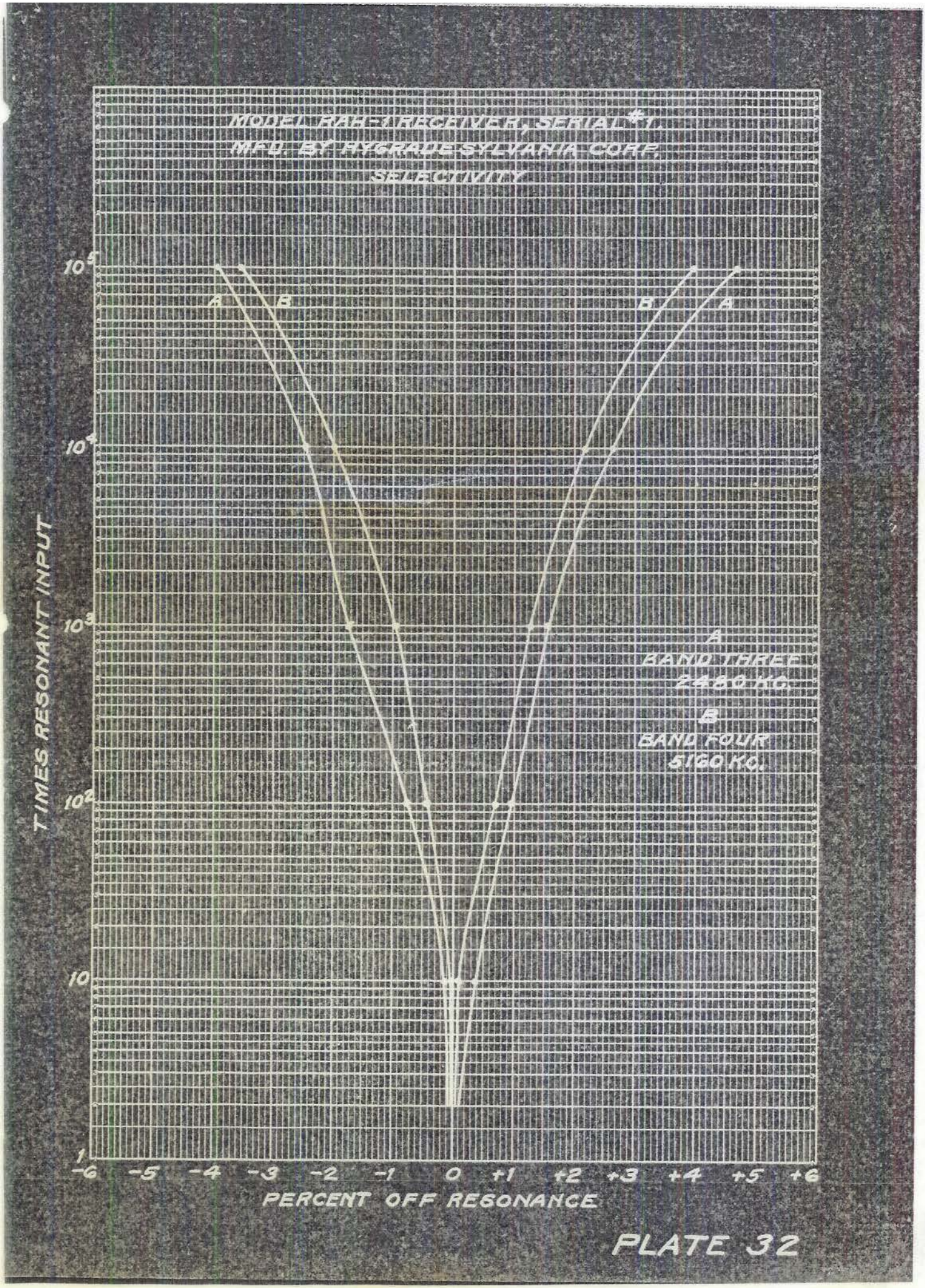

MODEL RAK-2 RECEIVER SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP.
SELECTIVITY
TIMES RESONANT INPUT
10^5
10^4
10^3
10^2
10
1
A
B
B
A
A
BAND THREE
2440 KC.
B
BAND FOUR
5160 KC.
-6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6
PERCENT OFF REGONANCE

PLATE 32

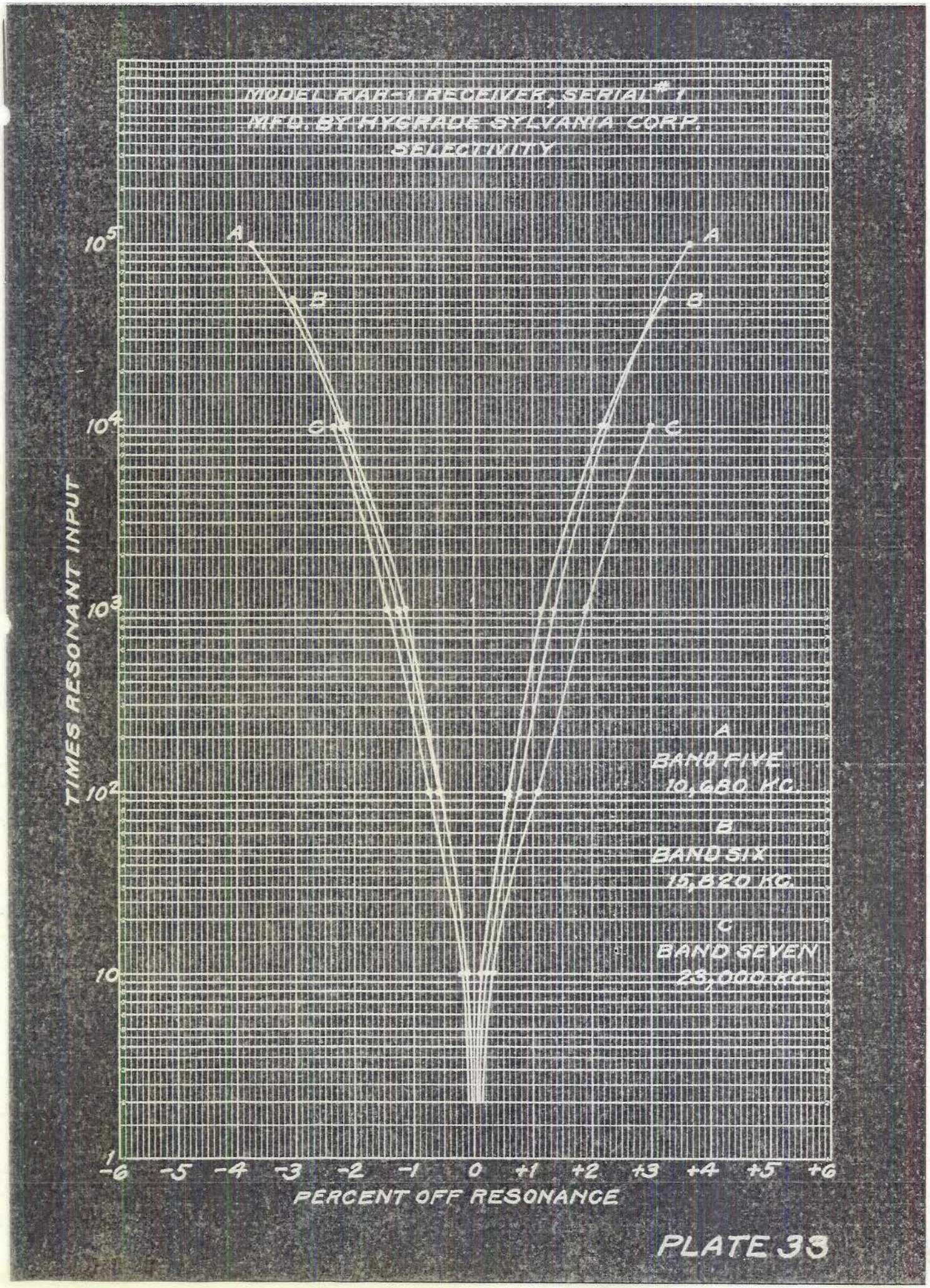

MODEL RAK-1 RECEIVER, SERIAL # 1
MFD. BY HYGRADE SYLVANIA CORP.
SELECTIVITY
TIMES RESONANT INPUT
10^5
10^4
10^3
10^2
10
1
A
B
C
A
BAND FIVE
10,680 KC.
B
BAND SIX
15,820 KC.
C
BAND SEVEN
23,000 KC.
-6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6
PERCENT OFF RESONANCE

PLATE 33

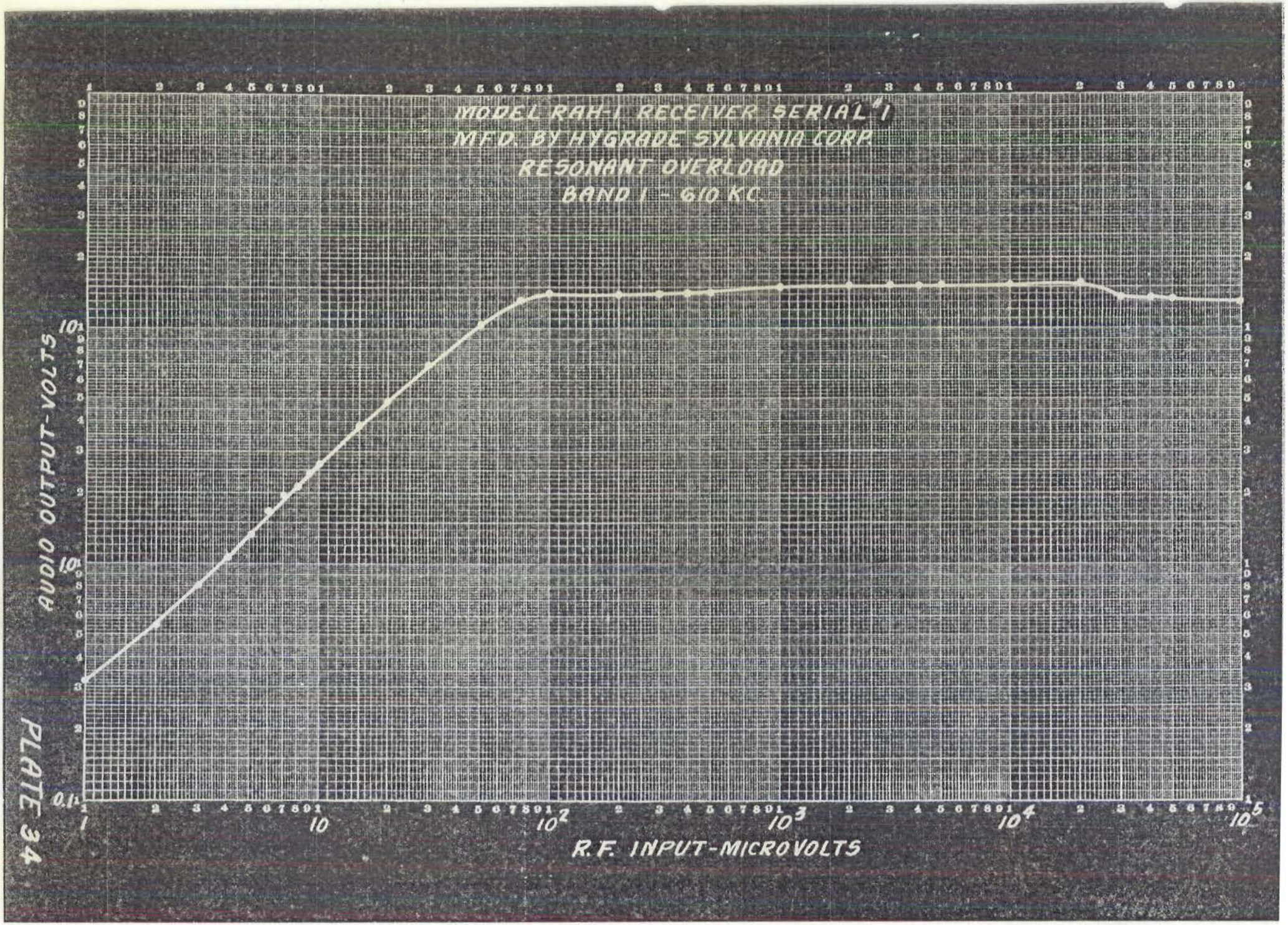

MODEL RAH-1 RECEIVER SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP.
RESONANT OVERLOAD
BAND I - 610 KC.
AUDIO OUTPUT-VOLTS
R.F. INPUT-MICROVOLTS
1
10
10²
10³
10⁴
10⁵
0.1
1.0
10

PLATE 34

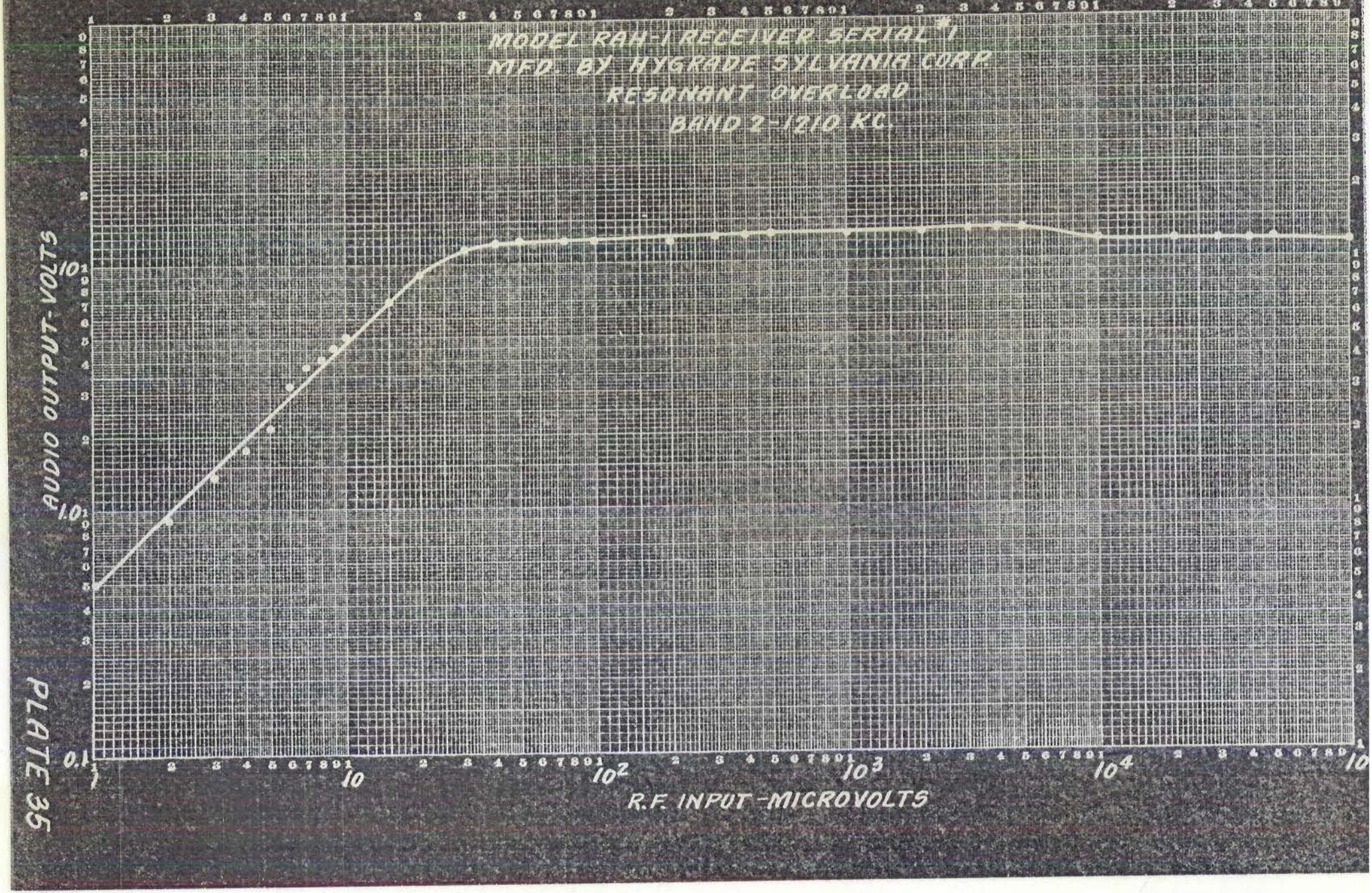

MODEL RAH-1 RECEIVER SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP.
RESONANT OVERLOAD
BAND 2 - 1210 KC.
AUDIO OUTPUT-VOLTS
1.0
0.1
10
R.F. INPUT - MICROVOLTS
10
10²
10³
10⁴

PLATE 35

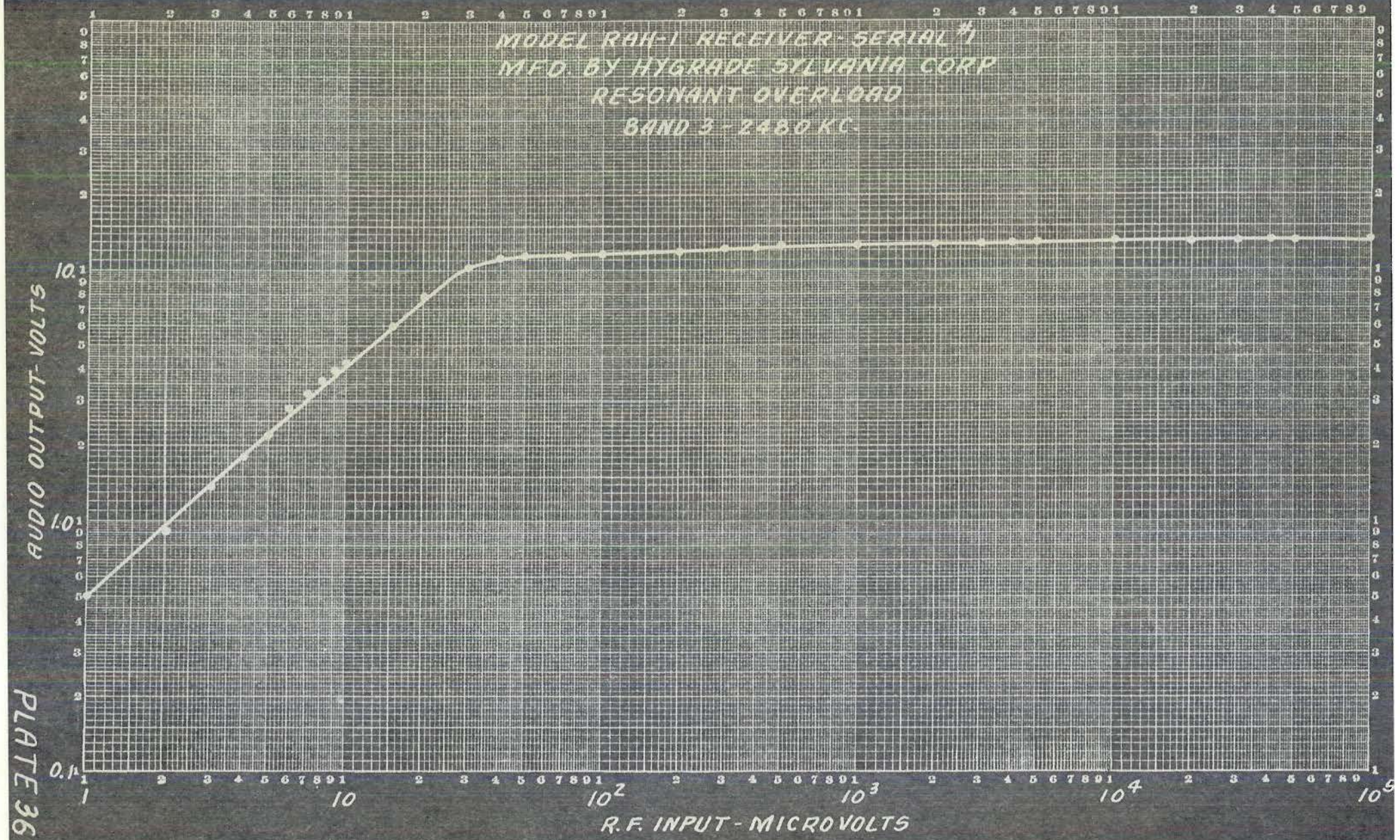

MODEL RAH-1 RECEIVER - SERIAL #1
MFD. BY HYGRADE SYLVANIA CORP
RESONANT OVERLOAD
BAND 3 - 2480 KC.
AUDIO OUTPUT - VOLTS
10.
1.0
0.1
1
10
10²
10³
10⁴
10⁵
R.F. INPUT - MICROVOLTS

PLATE 36

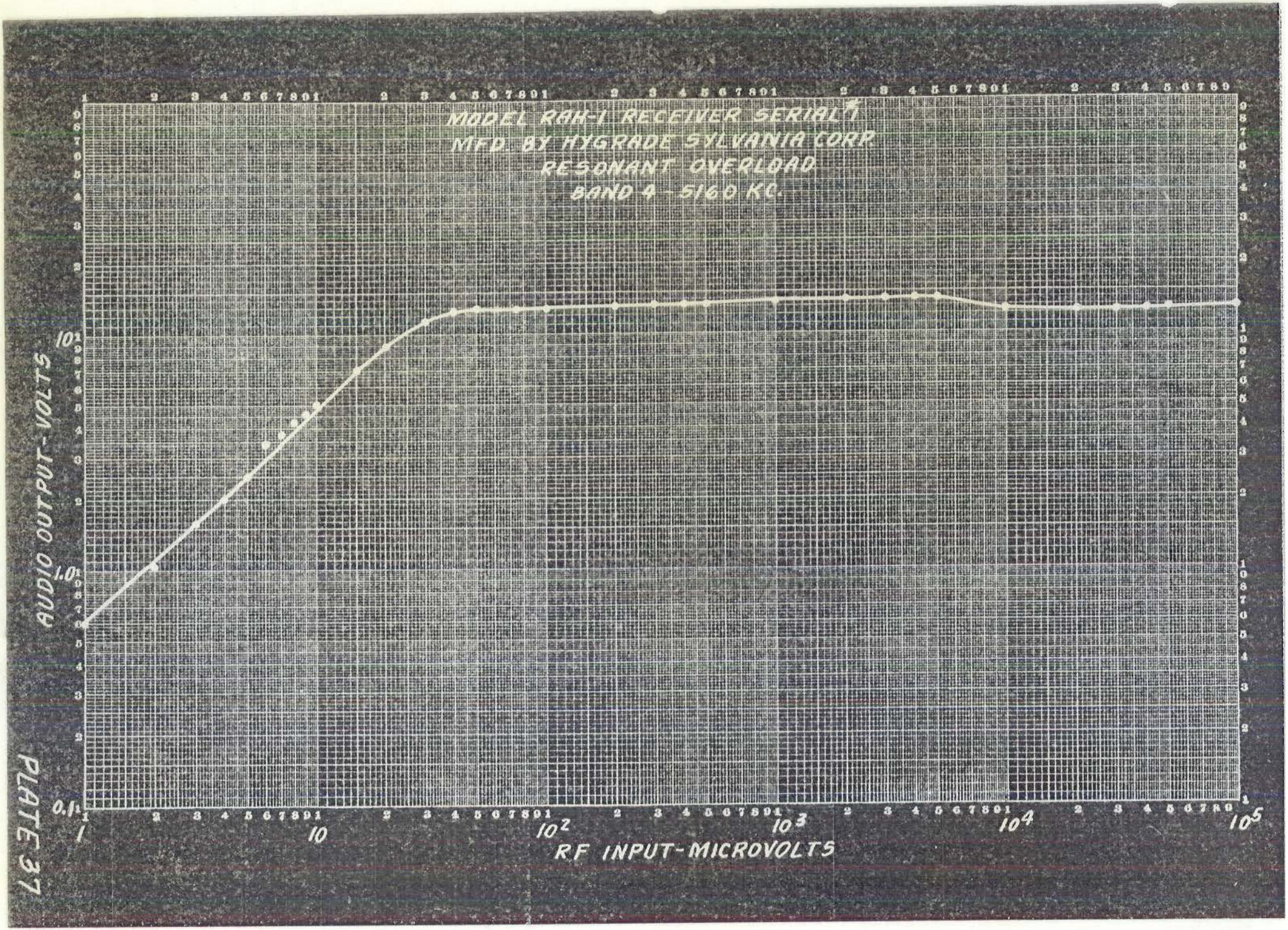

MODEL RAK-1 RECEIVER SERIAL 1
MFD. BY HYGRADE SYLVANIA CORP.
RESONANT OVERLOAD
BAND 4 - 5160 KC.
AUDIO OUTPUT-VOLTS
RF INPUT-MICROVOLTS
0.1
1.0
10
1
10
10²
10³
10⁴
10⁵

PLATE 37

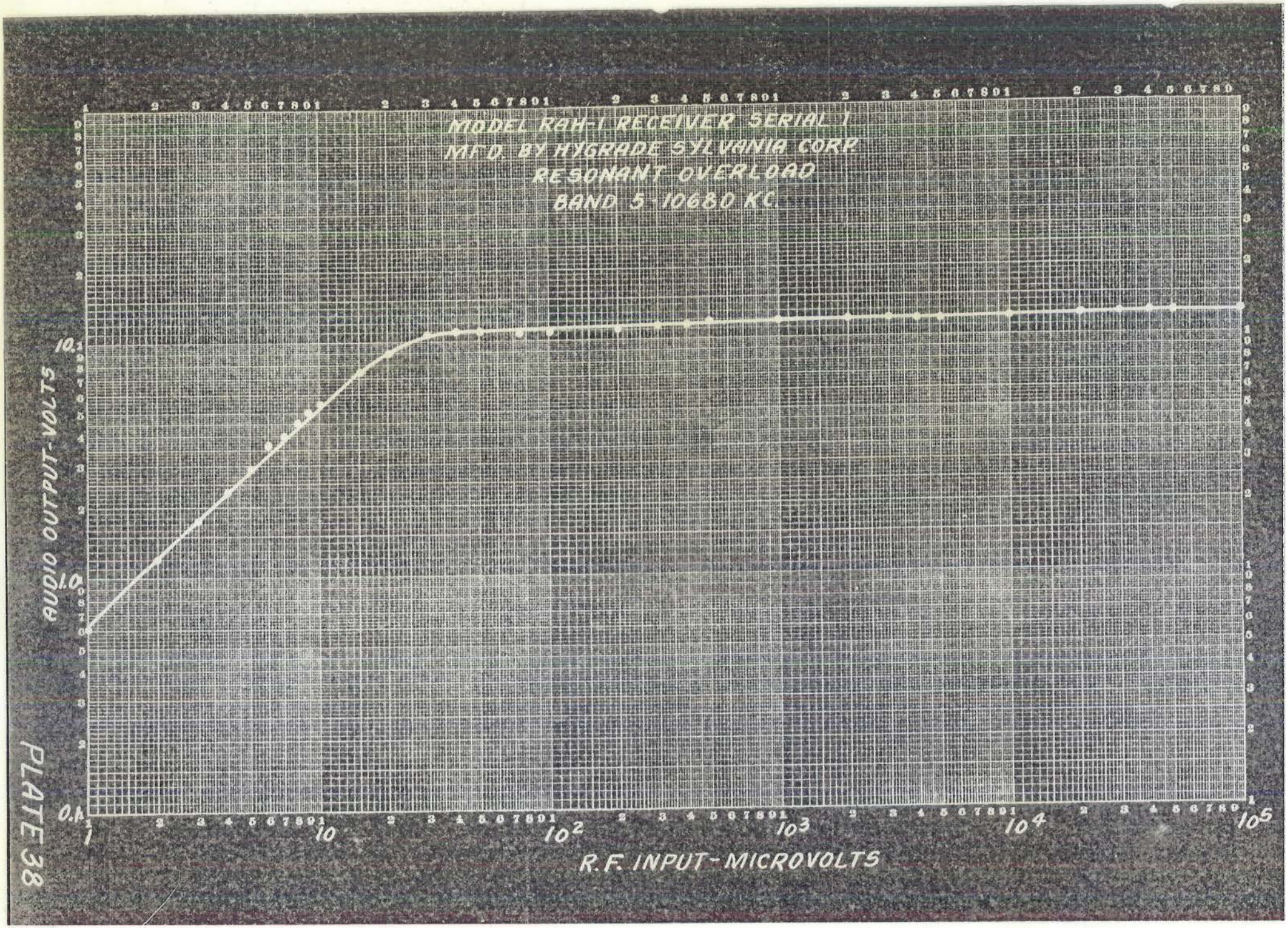
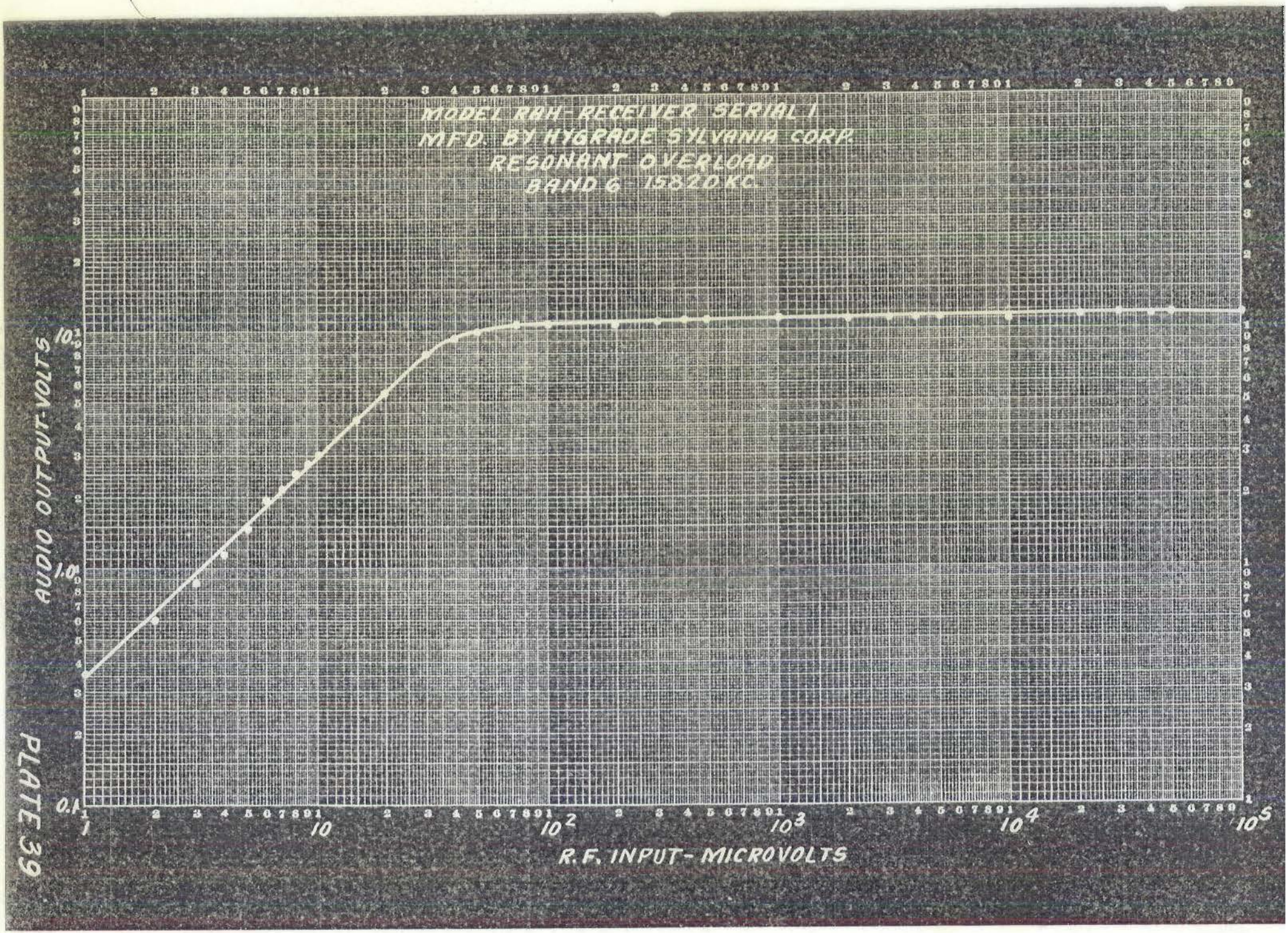

MODEL RAH-1 RECEIVER SERIAL 1
MF'D. BY HYGRADE SYLVANIA CORP.
RESONANT OVERLOAD
BAND 5 - 10680 KC.
AUDIO OUTPUT-VOLTS
10.
1.0
0.1
1
10
10²
10³
10⁴
10⁵
R.F. INPUT-MICROVOLTS

PLATE 38


MODEL RBH - RECEIVER SERIAL 1
MFD. BY HYGRADE SYLVANIA CORP.
RESONANT OVERLOAD
BAND 6 - 15.8 TO 40 KC.
AUDIO OUTPUT-VOLTS
R.F. INPUT - MICROVOLTS
PLATE 39

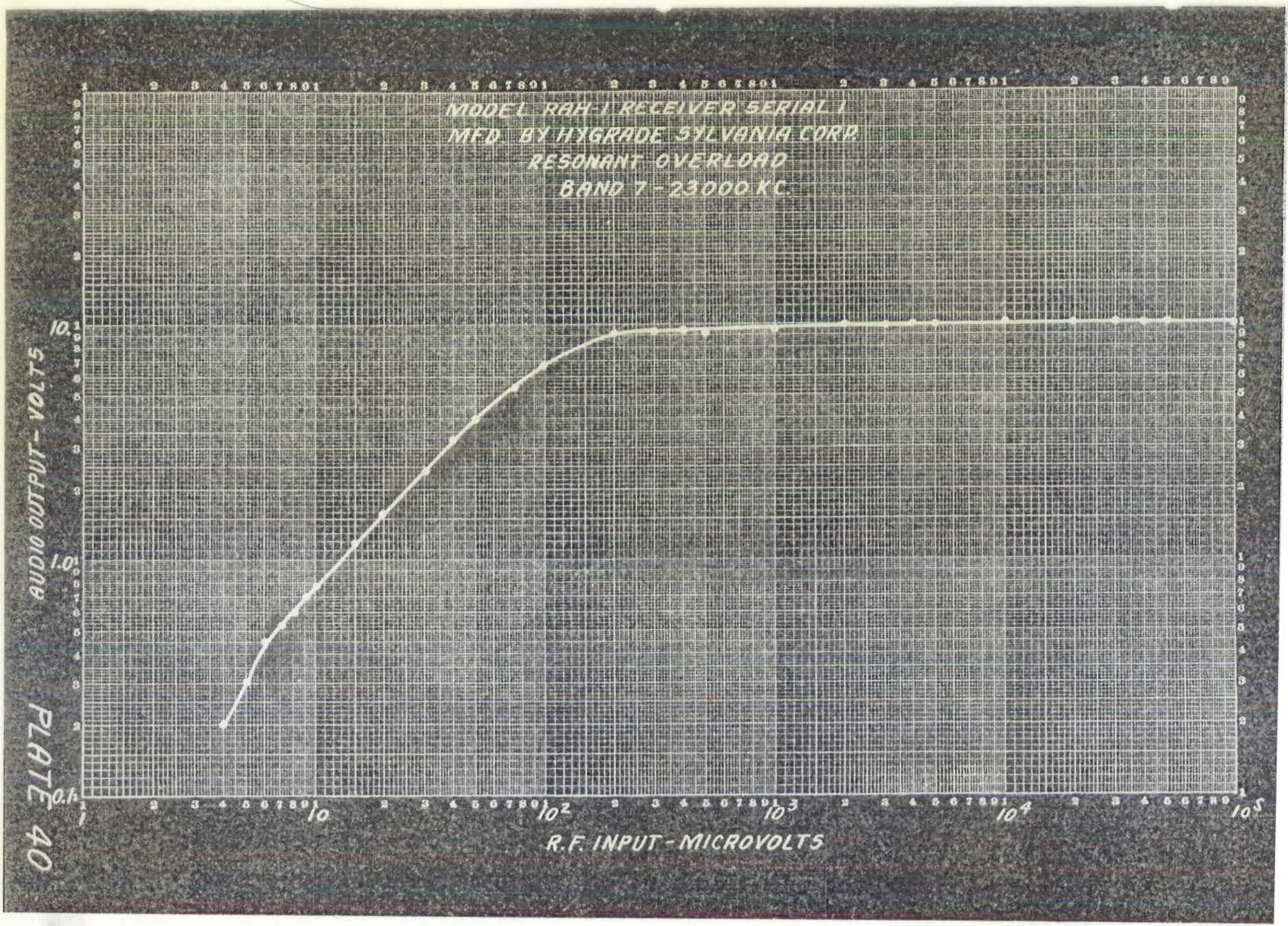

MODEL RAH-1 RECEIVER SERIAL 1
MFD. BY HYGRADE SYLVANIA CORP.
RESONANT OVERLOAD
BAND 7 - 23000 KC.
AUDIO OUTPUT - VOLTS
10.
1.0
0.1
1
10
10²
10³
10⁴
10⁵
R.F. INPUT - MICROVOLTS

PLATE 40

U. S. NAVAL RESEARCH LABORATORY
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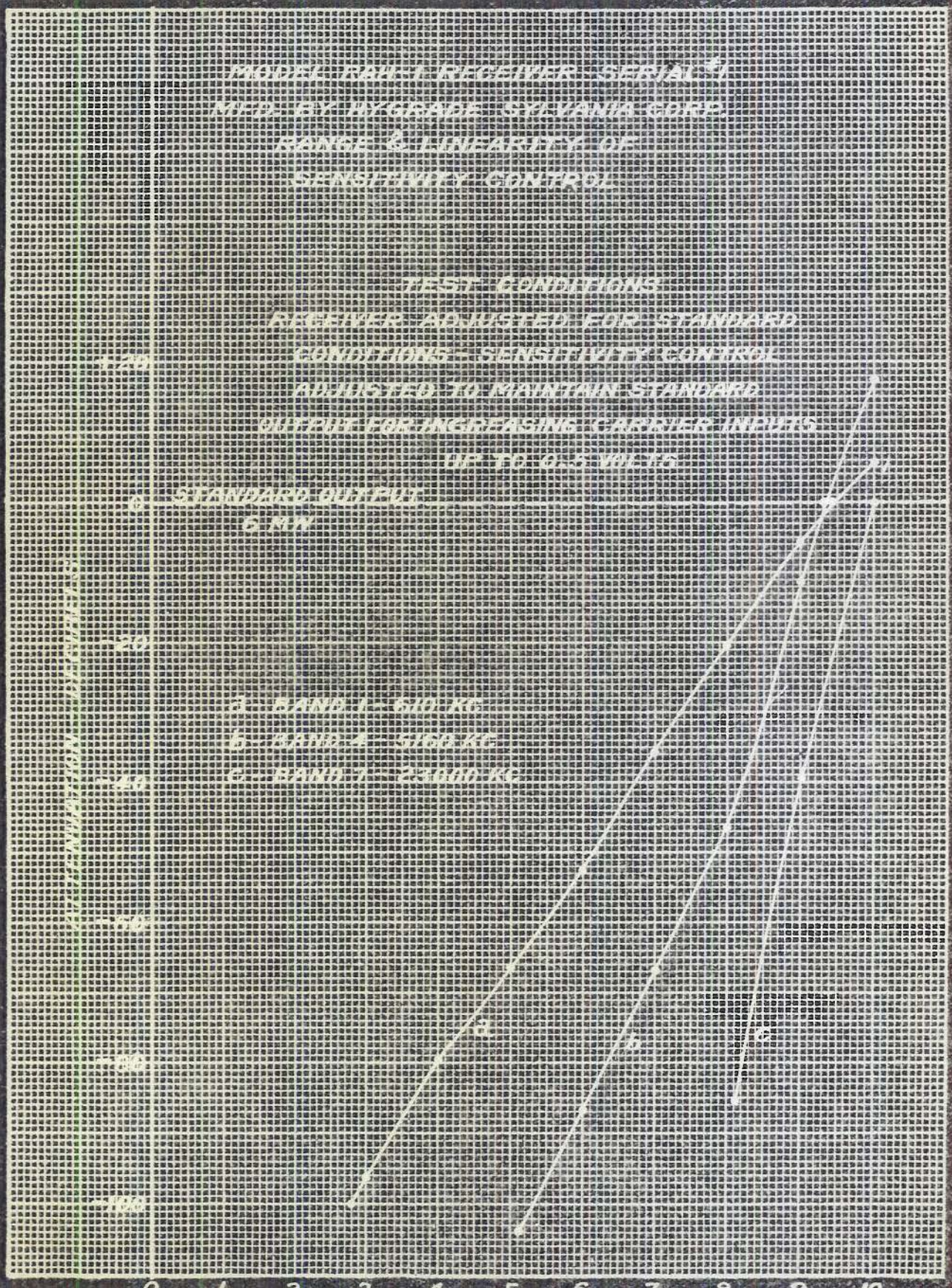


PLATE 41

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MODEL RAU-1 RECEIVER - SERIAL #1
MIXER 1ST STAGE - SYLVANIA 6J8M
SENSITIVITY CONTROL CHARACTERISTICS

TEST CONDITIONS
R.F. CARRIER INPUT CONSTANT
SENSITIVITY CONTROL VARIED
AND OUTPUT VOLTAGES MEASURED

+20
+10
0
-10
-20
-30
-40

STANDARD OUTPUT
0 DB/M

DECIBELS ABOVE OR BELOW STANDARD OUTPUT

a - BAND 1 - 610 KC
b - BAND 2 - 3100 KC
c - BAND 3 - 23000 KC

0 1 2 3 4 5 6 7 8 9 10

SENSITIVITY CONTROL SETTINGS - DIVISIONS

PLATE 42

OUTPUT SIGNAL PLUS NOISE
MODEL RAM RECEIVER SERIAL
MEDIAN HYBRID SYMMETRICAL
CONSTANT R.F. INPUT (STANDARD)
VOLUME CONTROL VARIED
THRU ITS USEFUL RANGE
5160 KC
Ratio
500
400
300
200
100
1.0
0.1
0.01
NOISE LEVEL-VOLTS
1.0
0.1
OUTPUT SIGNAL PLUS NOISE-VOLTS

PLATE 43

U. S. NAVAL RESEARCH LABORATORY
BELLEVUE, D. C.

DATE

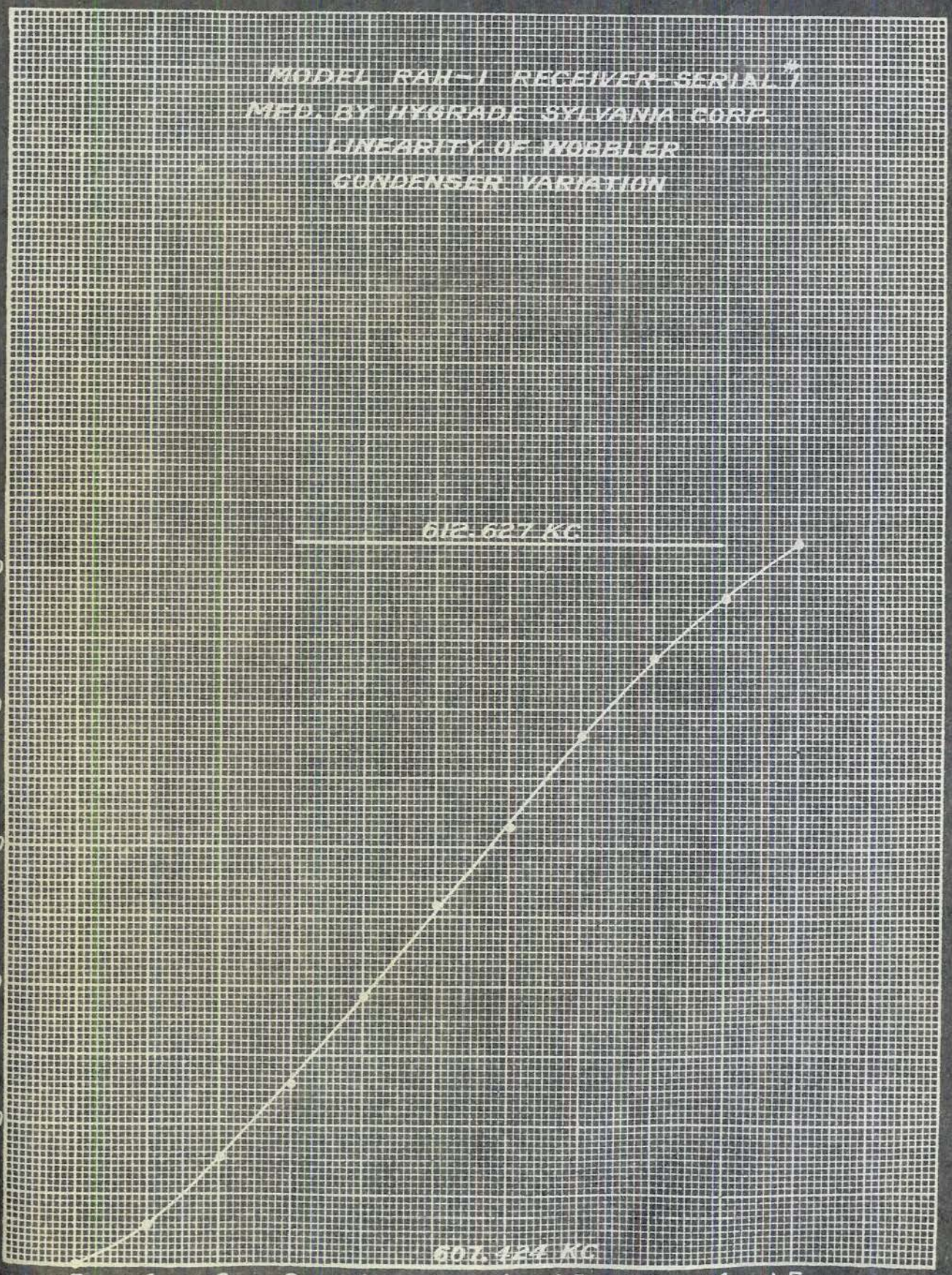


PLATE 44

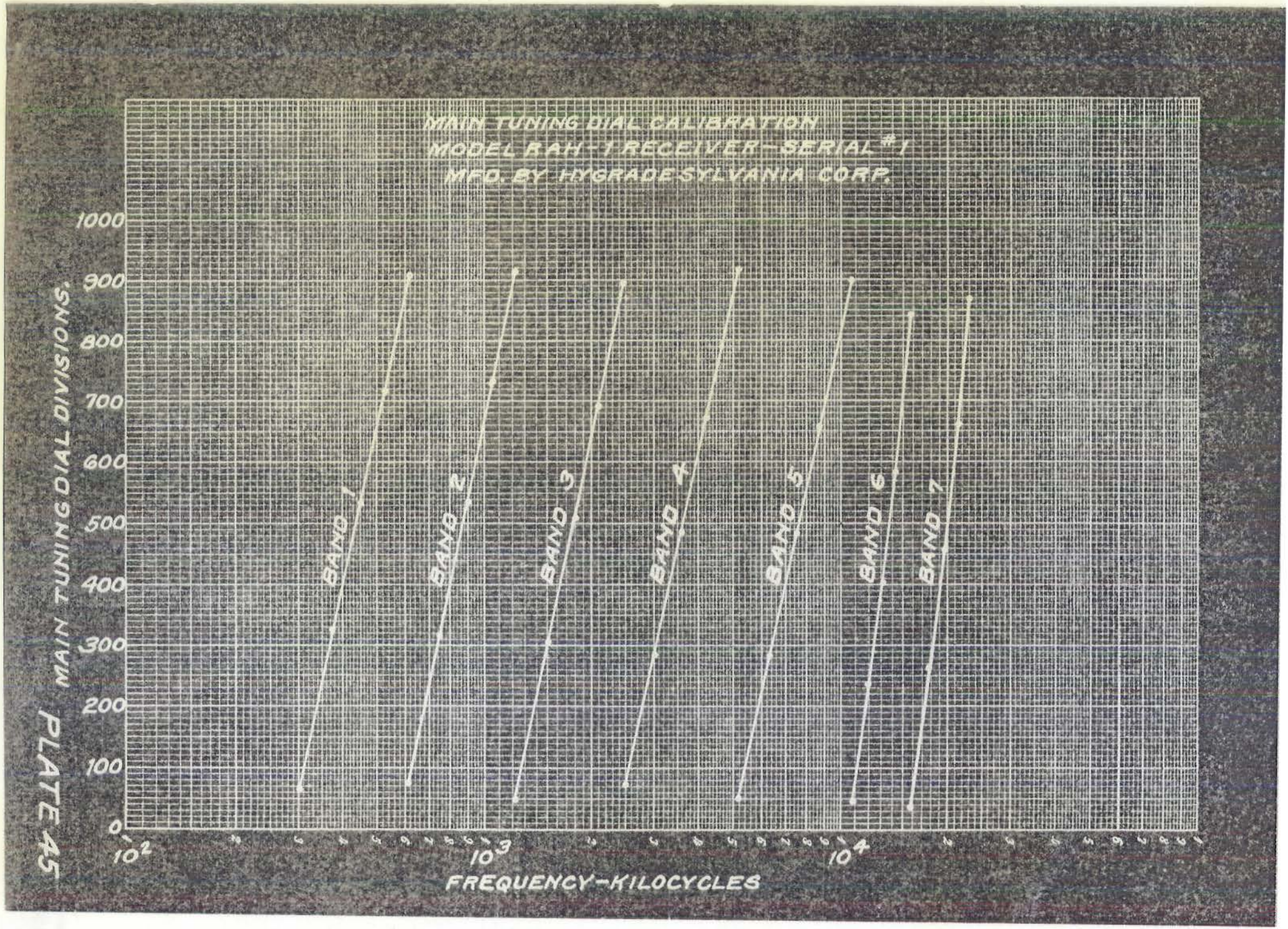
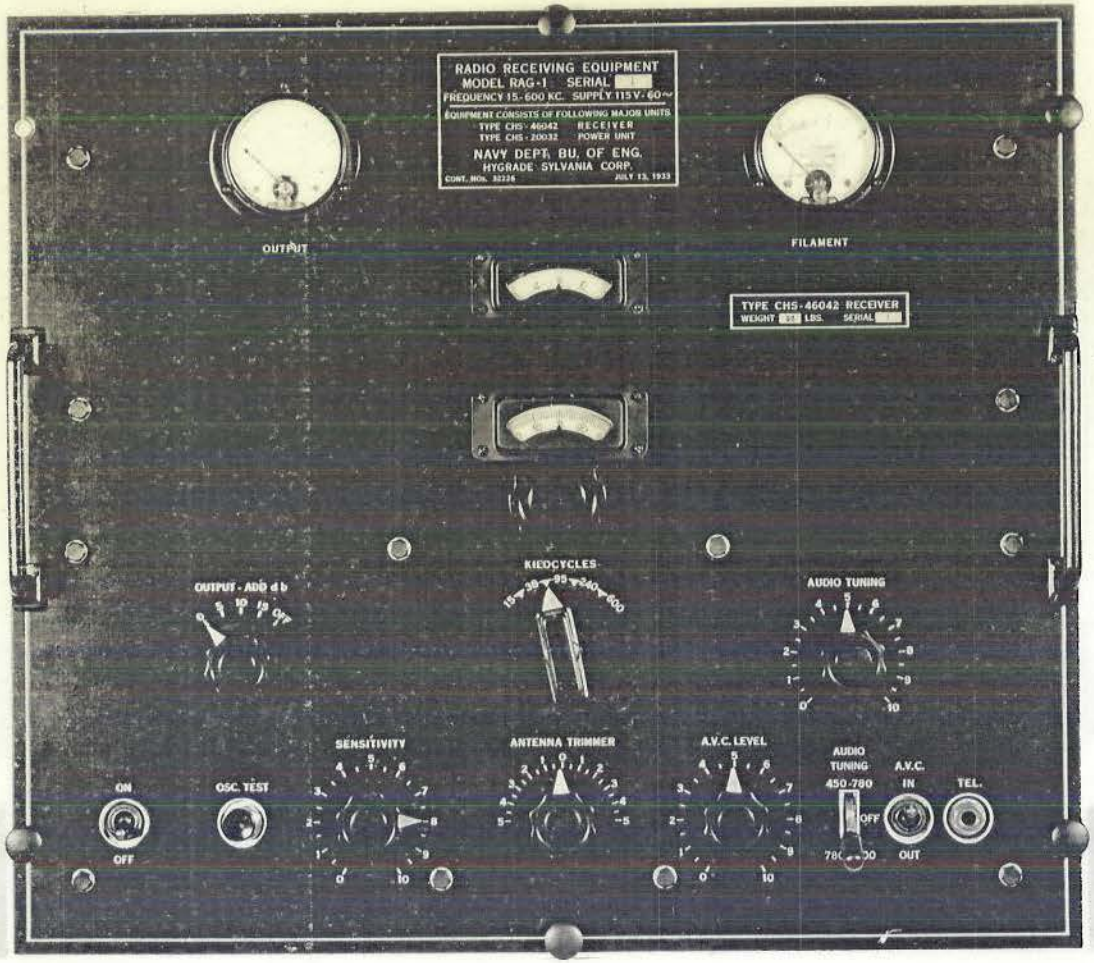

MAIN TUNING DIAL CALIBRATION
MODEL RAH-1 RECEIVER—SERIAL # 1
MFD. BY HYGRADE SYLVANIA CORP.
MAIN TUNING DIAL DIVISIONS
1000
900
800
700
600
500
400
300
200
100
0
BAND 1
BAND 2
BAND 3
BAND 4
BAND 5
BAND 6
BAND 7
10^2
10^3
10^4
FREQUENCY—KILOCYCLES

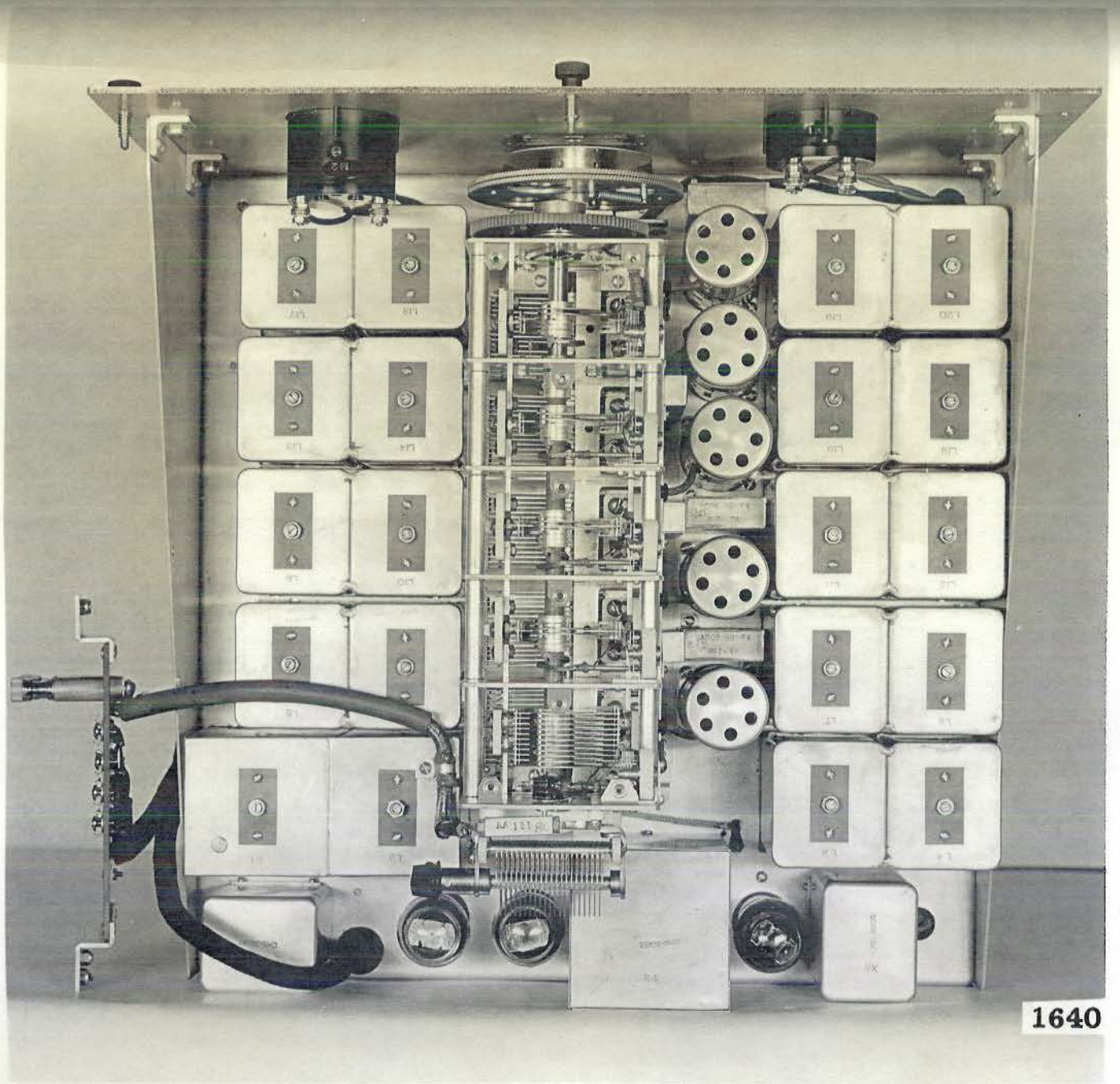
PLATE 45



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Plate 46

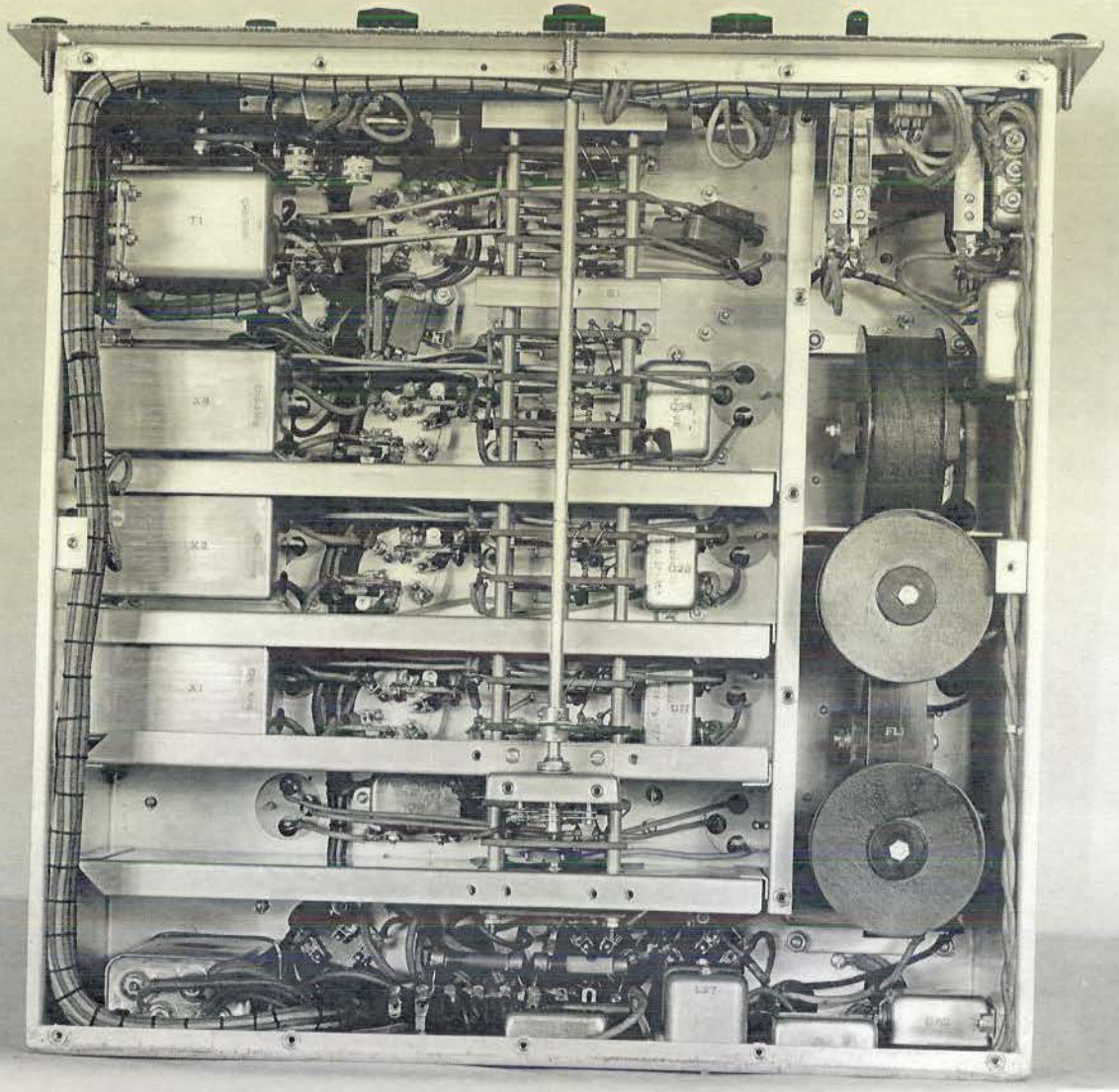
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Plate 47

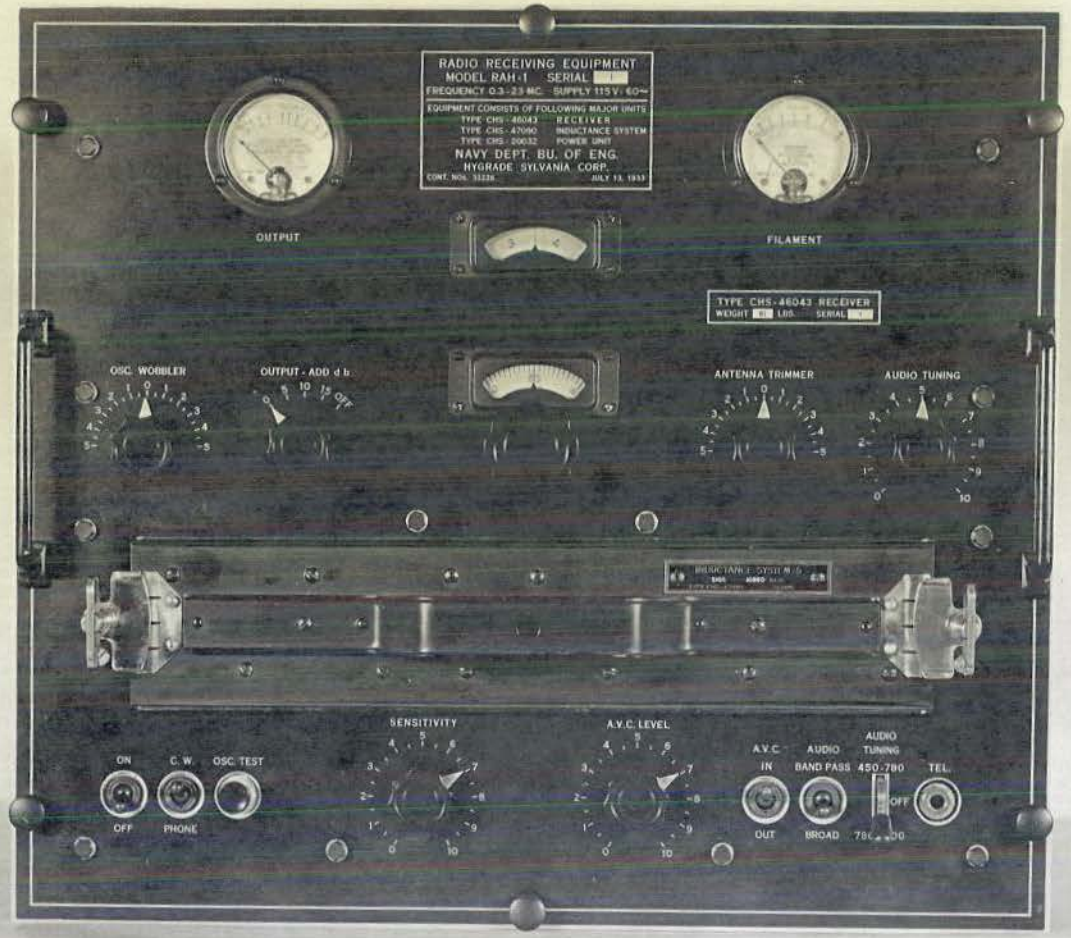
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Plate 48

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Plate 49

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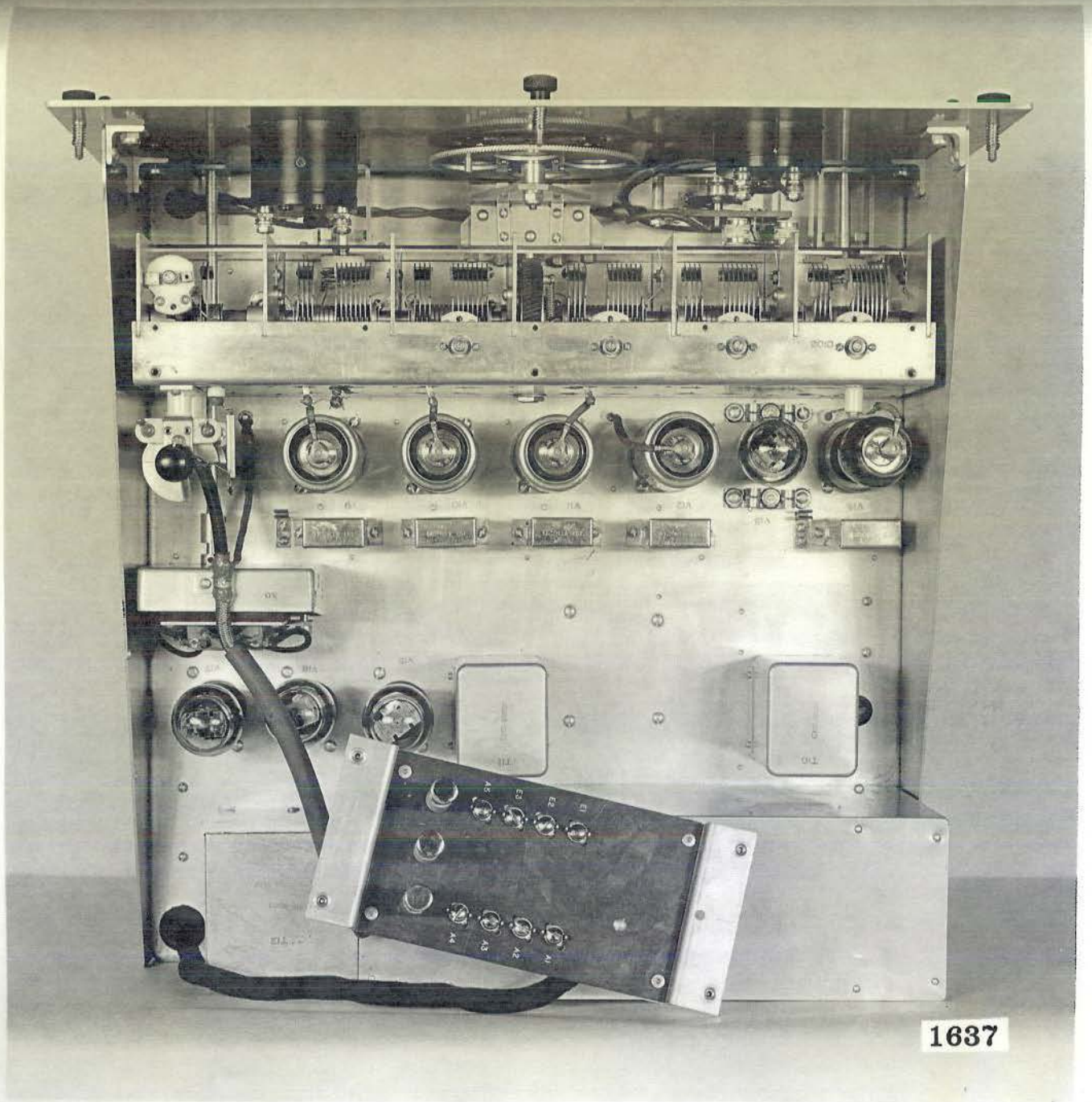
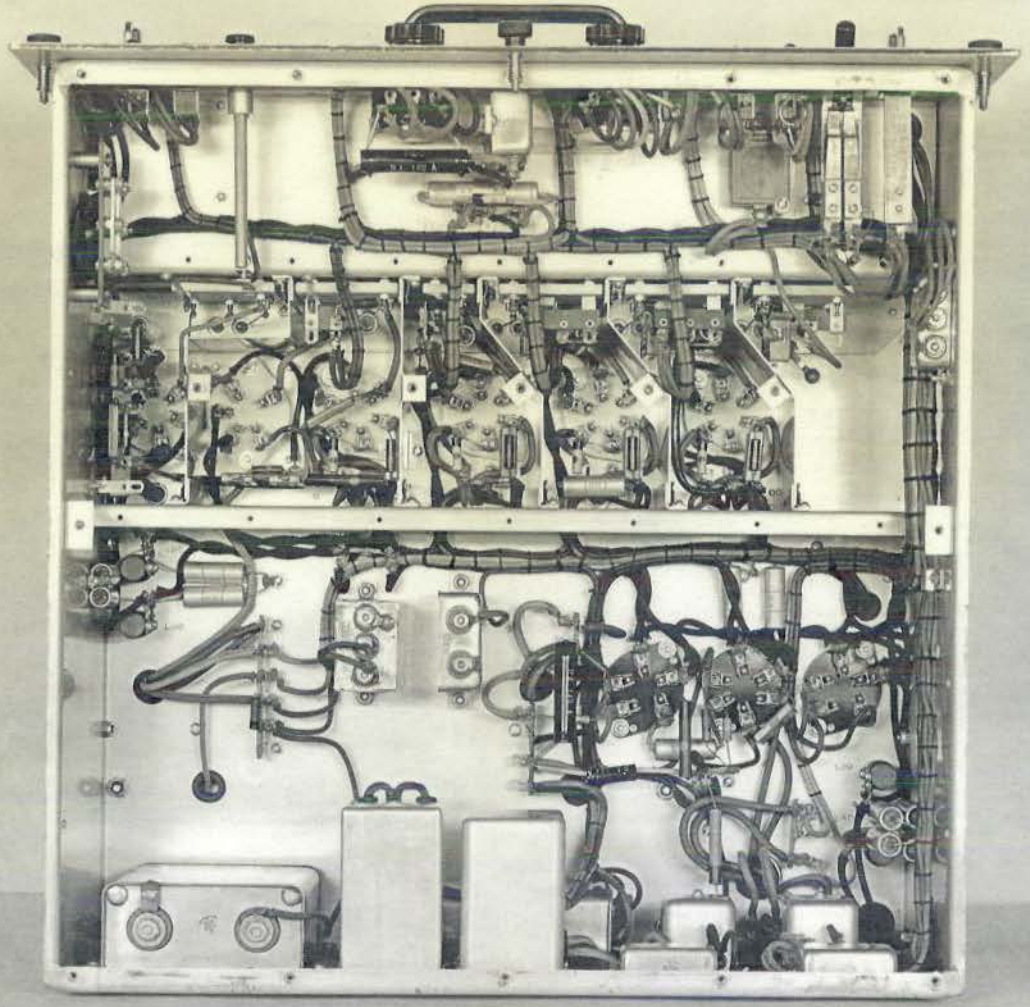


Plate 50



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Plate 51

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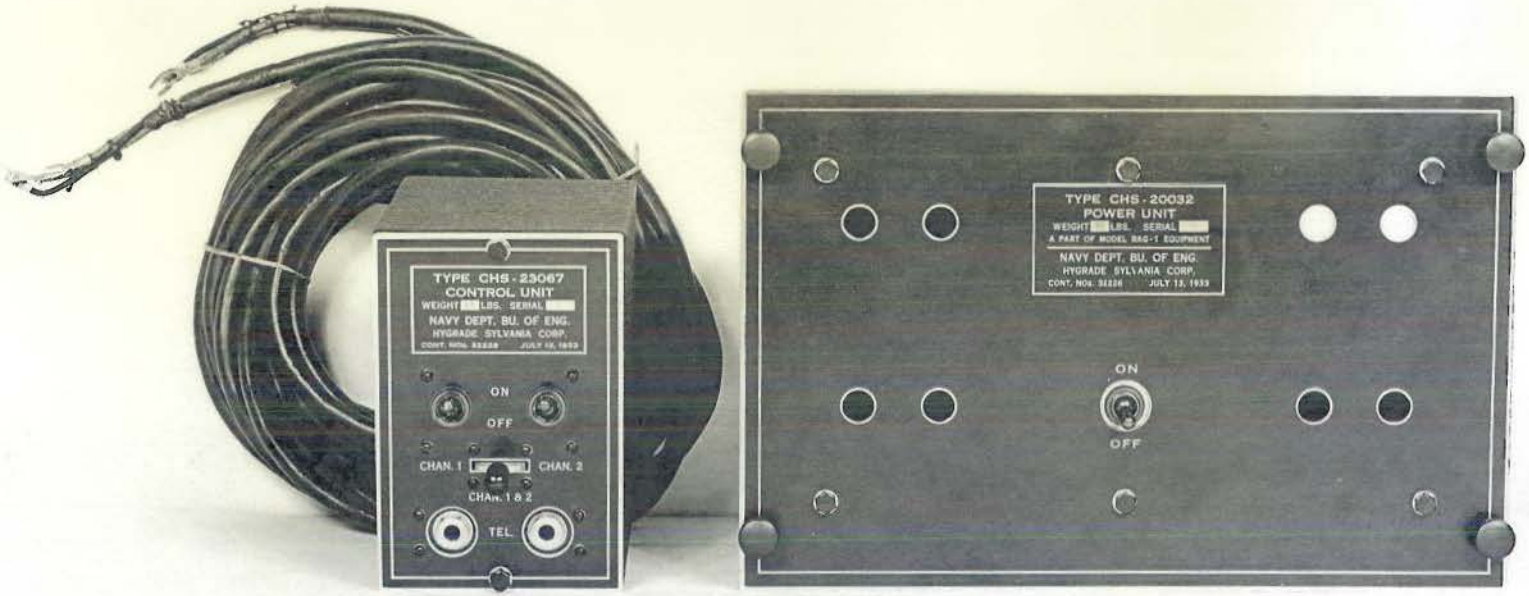
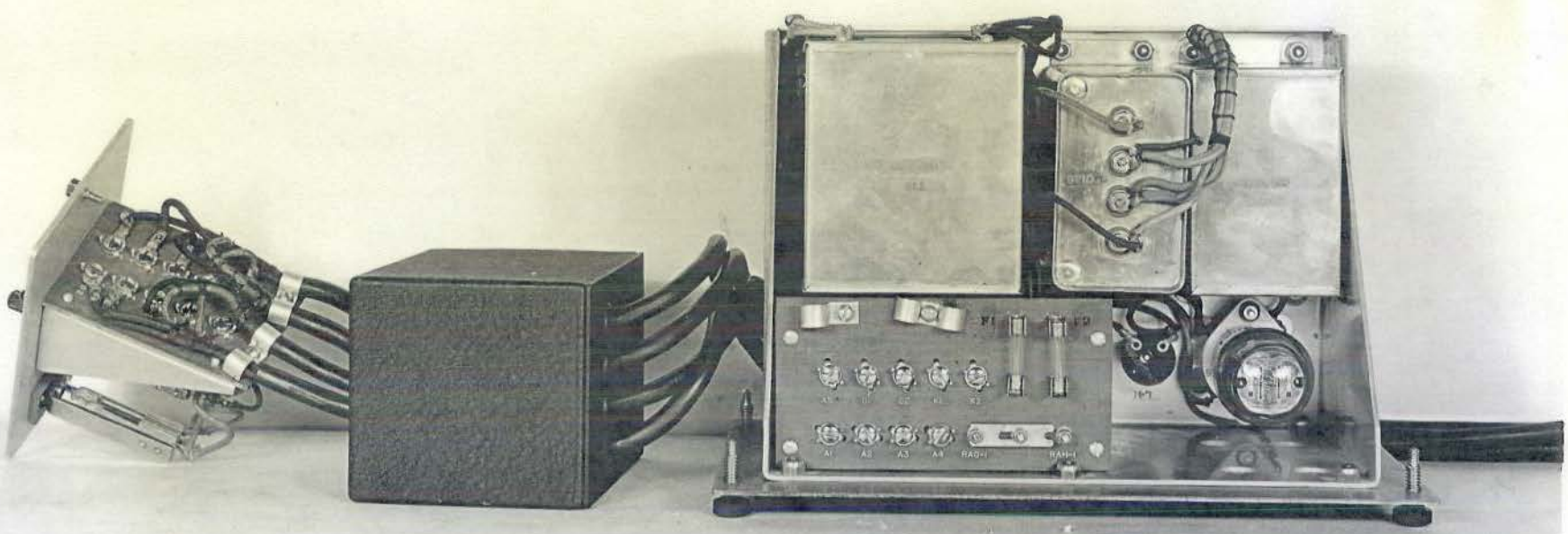


Plate 52

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Plate 53

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