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SERVICING CENTER TESTS USING 5U (J98705U) TEST SET TYPE N, O AND ON CARRIER SYSTEMS GENERAL

CONTENTS PAGE

1. GENERAL

1.01 This section replaces Issue 1 and is reissued to include information not previously covered. This section and its associated point sections describe the methods of testing, adjusting and repairing the plug-in units and components of type N, O and ON carrier systems by means of the 5U Servicing Center Test Set. This test set is essentially a switching device for establishing the necessary test connection to the component under test. Descriptive information for the 5U Servicing Center Test Set is given in Section E40.668 (A702.597).

1.02 This section has been arranged as a general section and a number of associated point sections to facilitate reissuance as the need arises. Arrows normally used to indicate changes have been omitted from this section due to the extent of the changes.

1.03 The associated point sections covering tests and adjustments on the plug-in units, subassemblies and components of the various systems are listed on Table A. This arrangement provides for easier addition of associated point sections as they become available.

2. TEST EQUIPMENT

2.01 For most of the tests an external oscillator, a vacuum tube voltmeter and a volt-ohm-milliammeter are essential associated equipment. An electron tube test set is a desired addition to the associated test equipment. An oscilloscope is optional and a frequency counter is available for use at the larger test centers. A 72A Frequency Test Set may also be used to check the 3700-cycle oscillator frequencies.

2.02 The tests covered in the various point sections require the use of the following test equipment, filters, cords, adapters, resistors and capacitors. The test equipment should be periodically calibrated in accordance with Bell System Practices listed:

Tester, Tube KS-15560, L1 or L2	E40.559 (A702.656) E40.560 (A702.658)
Oscillator Hewlett-Packard 200CD or 200H (See E40.668 for circuit arrangement)	E40.329 (A702.571) E40.335 (A702.570)
Voltmeter, Hewlett-Packard 400D or 400C	E40.672 (A702.589) E40.665 (A702.590)
Volt-Ohm-Milliammeter, KS-14510, L1 or	E40.582 (A702.032)
Volt-Ohm-Milliammeter, Simpson Model 260	
Cathode Ray Oscillograph	E40.622 (A702.669)
DuMont, 304A, 304H or 208	E40.621 (A702.667) E40.620

72A Frequency Meter (J64072A) or — E40.571 (A702.636)

Meter, Berkely Scientific 5558-B
Eput — Frequency Counter or

Meter, Hewlett-Packard 524A Frequency Counter

Adapters Required

123A
124A
124B
124C
125A
126A
127A
127B
134A

Cords Required

1 — P2CC
1 — P3AK
1 — P4AF
2 — P2OD
2 — P2BP
2 — W2EB
2 — Shorting Cords

Filters Required

529C
530M
530N

Resistors Required

135-Ohm (145A)
135-Ohm ± 5%

Capacitors Required

1 mf Capacitor (150v)

3. GENERAL TESTING PROCEDURE

3.01 This section describes a general procedure for making the various tests given in the point sections. Any deviation from the given procedure or any special testing routine will be indicated in the point section covered. Tests given in the point sections should be made in sequence unless the trouble is obvious. After the trouble has been located and repaired, the unit should meet all the requirements given in the point section. Individual subassemblies such as those in the channel units should be tested first before making the over-all tests.

3.02 The following general steps should be made in sequence:

(1) Set switches A, B, C and D to the specified settings. This will set up the necessary connections and terminations for the test to be made. The switch settings are given on the test chart.

(2) Connect the unit under test using the cords and adapters as specified in the test chart.

(3) If required, make any strapping connections in the unit under test before applying the power.

(4) Turn POWER to ON, adjust FIL ADJ to the given value. Filament voltage is read on the upper scale (0-50V) of the panel meter. The meter will read a negative voltage. Depress PLT VOLTS and check the plate voltage on the lower scale (0-150V).

(5) Set the oscillator frequency to the value specified in the test chart (OSC FREQ).

(6) Set the ATTEN to the value given in the test chart; depress the CAL lever. Hold it in this position and set the oscillator AMPLITUDE control for a VTVM reading given in the test chart under CAL. This reading will be either in db or volts as specified in the test chart.

(7) Release the CAL lever and set up any other conditions specified on the test chart such as XTAL OSC, etc.

(8) Read the output on the VTVM. If the unit is functioning correctly, it should be within the test limits given on the test chart.

3.03 Sometimes it may be necessary to make measurements at various terminals or jacks on the unit under test. This will be specified on the test chart. A W2EB cord connected in the REC jack will make the connection between the unit under test and the VTVM. If it is required to send a signal into the unit at the various terminals and jacks (usually in trouble shooting tests) a W2EB cord connected in the SEND jack will make the necessary connections.

4. NONREGENERATIVE GAIN TESTS

4.01 Nonregenerative gain tests are made on all N and ON repeater amplifiers and all N group unit amplifiers. Basically, nonregenerative gain is the gain with the feedback removed. This test is a measure of the frequency response of the amplifier without feedback and it is used in place of the modulation tests which were formerly made with the J94002T Test Set.

4.02 Figs. 1 through 6 show typical nonregenerative gain characteristics of the units for which this test is made. These curves can be used to supplement the three frequency tests made in the point sections.

4.03 The readings obtained by testing, as described in the point sections, must be adjusted for pad loss and calibration in order to compare them with the indicated characteristic. The following formula can be used for this purpose.

Gain in db = 50 * + attenuator setting + VTVM reading — calibration

* A 50 db correction required to compensate for the 5U Test Set circuit loss used for these tests.

Since impedance coupled amplifiers are used in the units the gain will peak at the resonant frequency determined by the inductance of the interstage coil and the stray tube and wiring capacities. The frequency is checked to determine whether the amplifier is properly tuned. The gain at this frequency may vary considerably with the individual units and tubes.

4.04 One of each of the other frequency checks should be made on each side of the resonant peak. The lower one checks the inductance of the coil and the higher checks the stray tube and wiring capacities.

4.05 These checks should be an aid in trouble location. If the gain is below the test limits, substituting new tubes in the amplifier will probably increase the gain to within the test limits.

5. TROUBLE SHOOTING INFORMATION

5.01 It is planned to provide additional information at an early date which will be useful in locating trouble in units which fail to meet test requirements. This information consisting of additional diagrams and procedures will be designed to isolate the trouble to specific circuit components. In anticipation of these trouble shooting tests, a column designated TS TEST has been included in the test charts to accommodate cross-reference information.

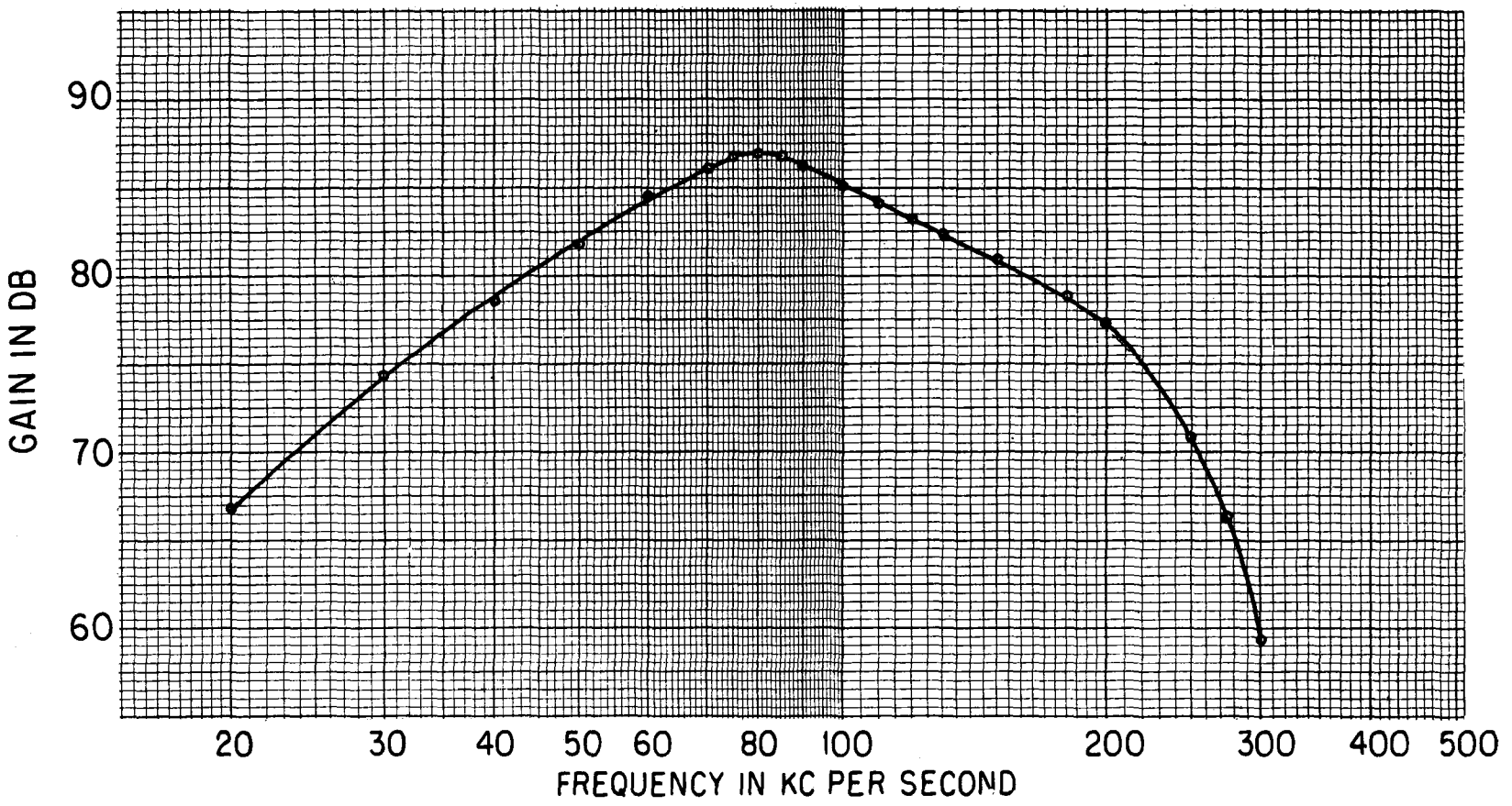

Fig. 1 — Nonregenerative Gain J98703L & LA; J98706 CA, DA, C & D; J98706 EA, FA, E, F, J & K (LL Subassembly) Repeater

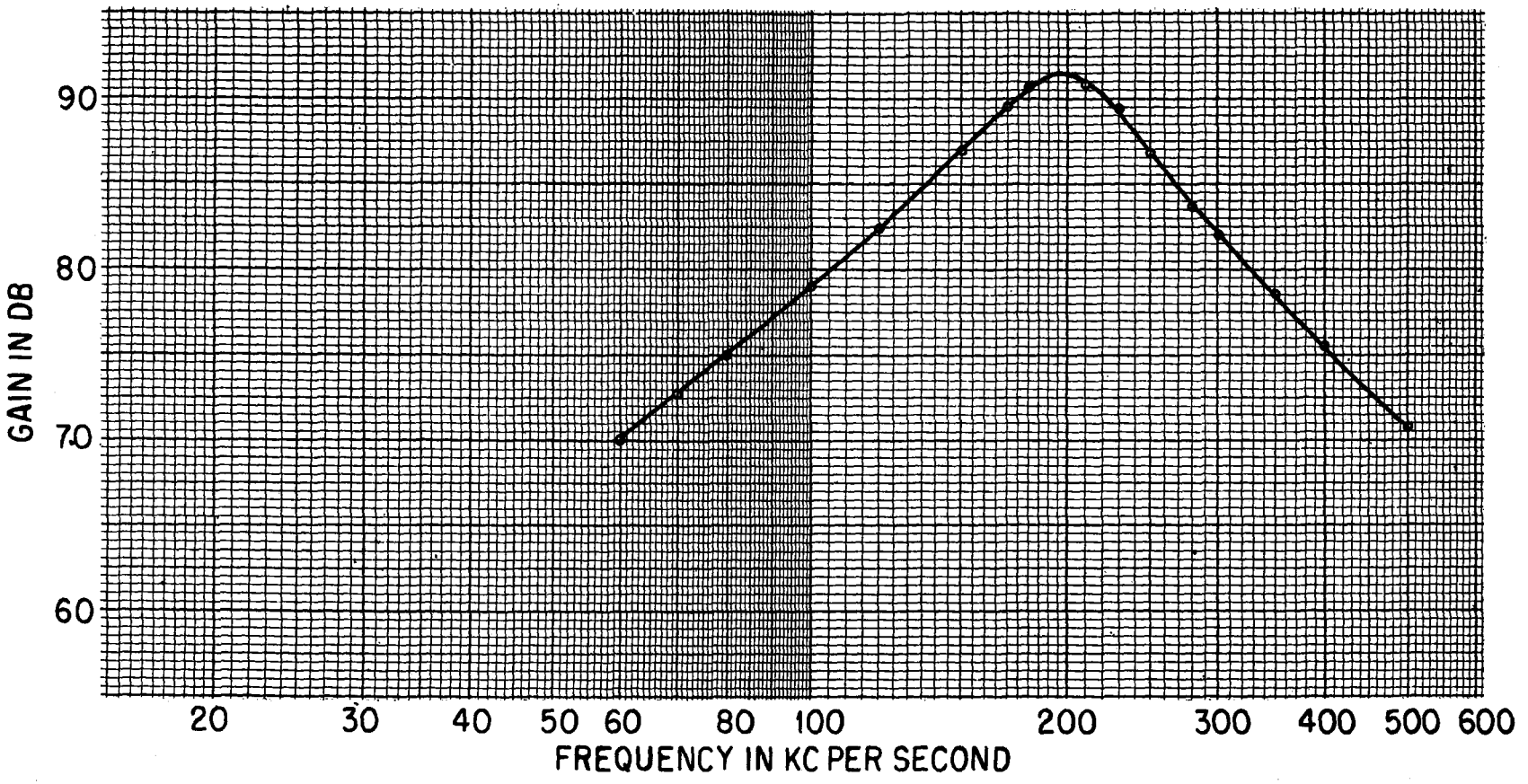

Fig. 2 — Nonregenerative Gain J98703 M & MA; J98706 EA, FA, E & F (LH Subassembly); J98706 J & K (HH Subassembly) Repeaters

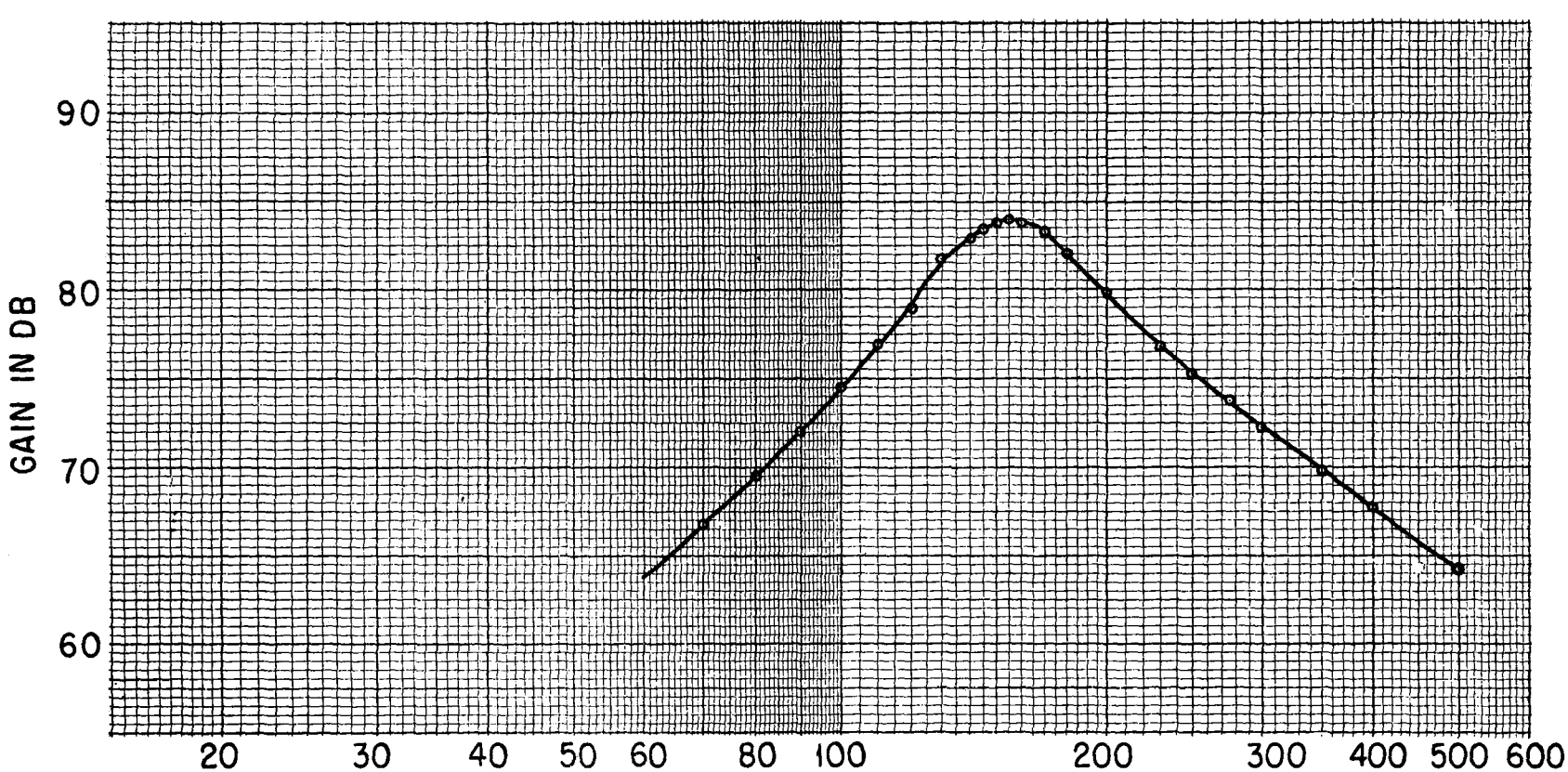

Fig. 3 — Nonregenerative Gain J98703J High Group Receiver

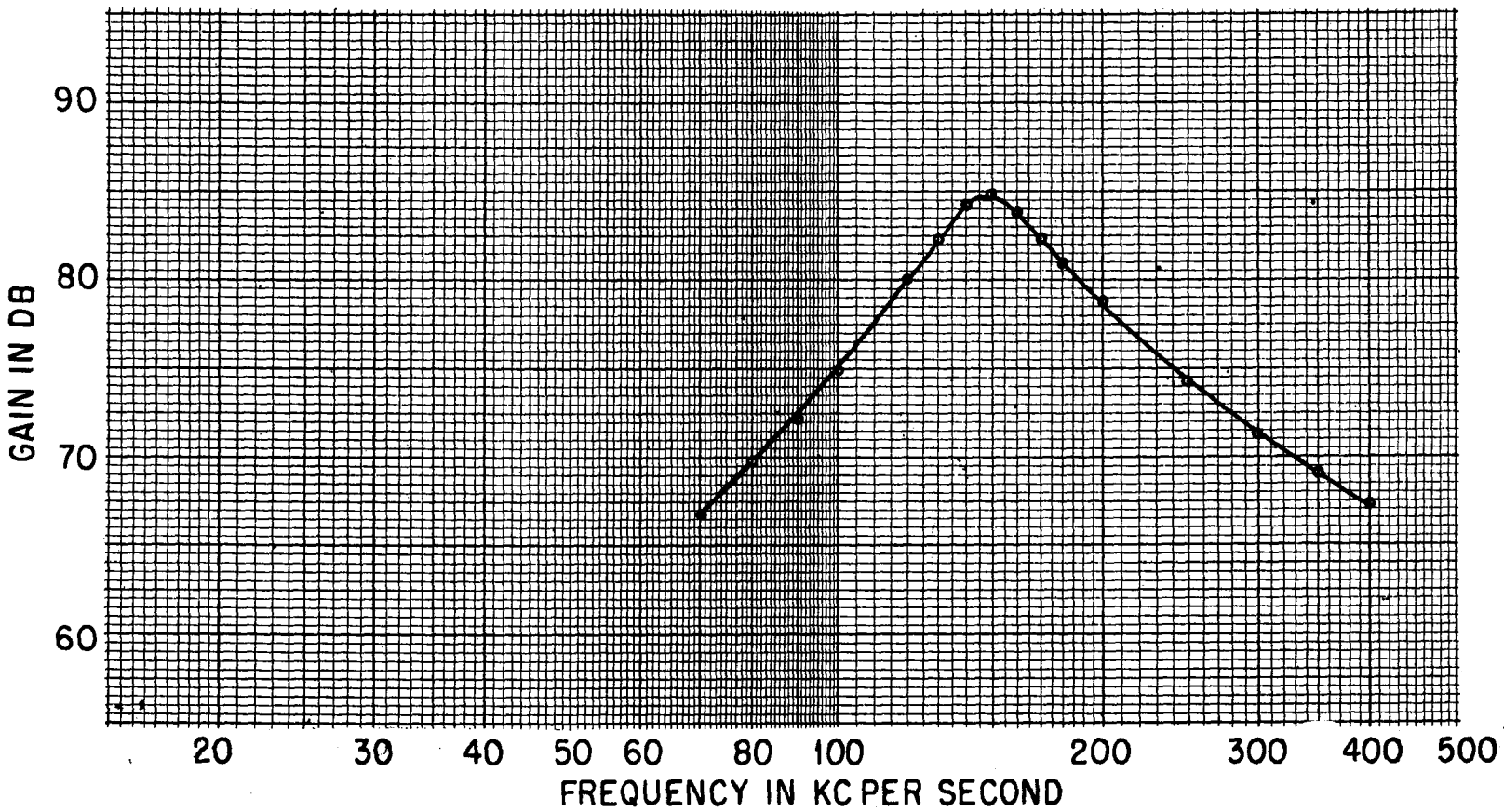

Fig. 4 — Nonregenerative Gain J98703K Low Group Receiver

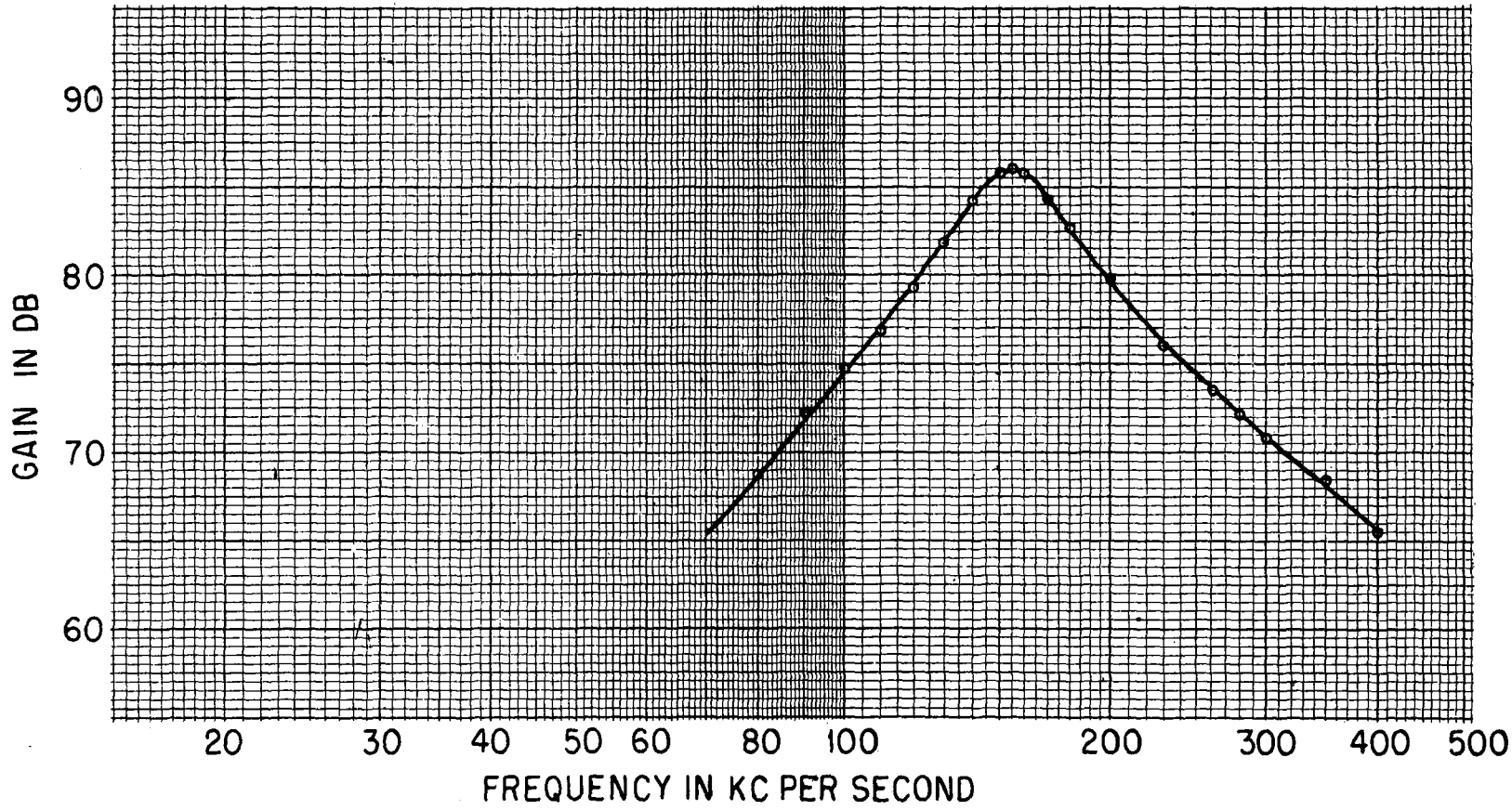

Fig. 5 — Nonregenerative Gain J98703G High Group Transmitter

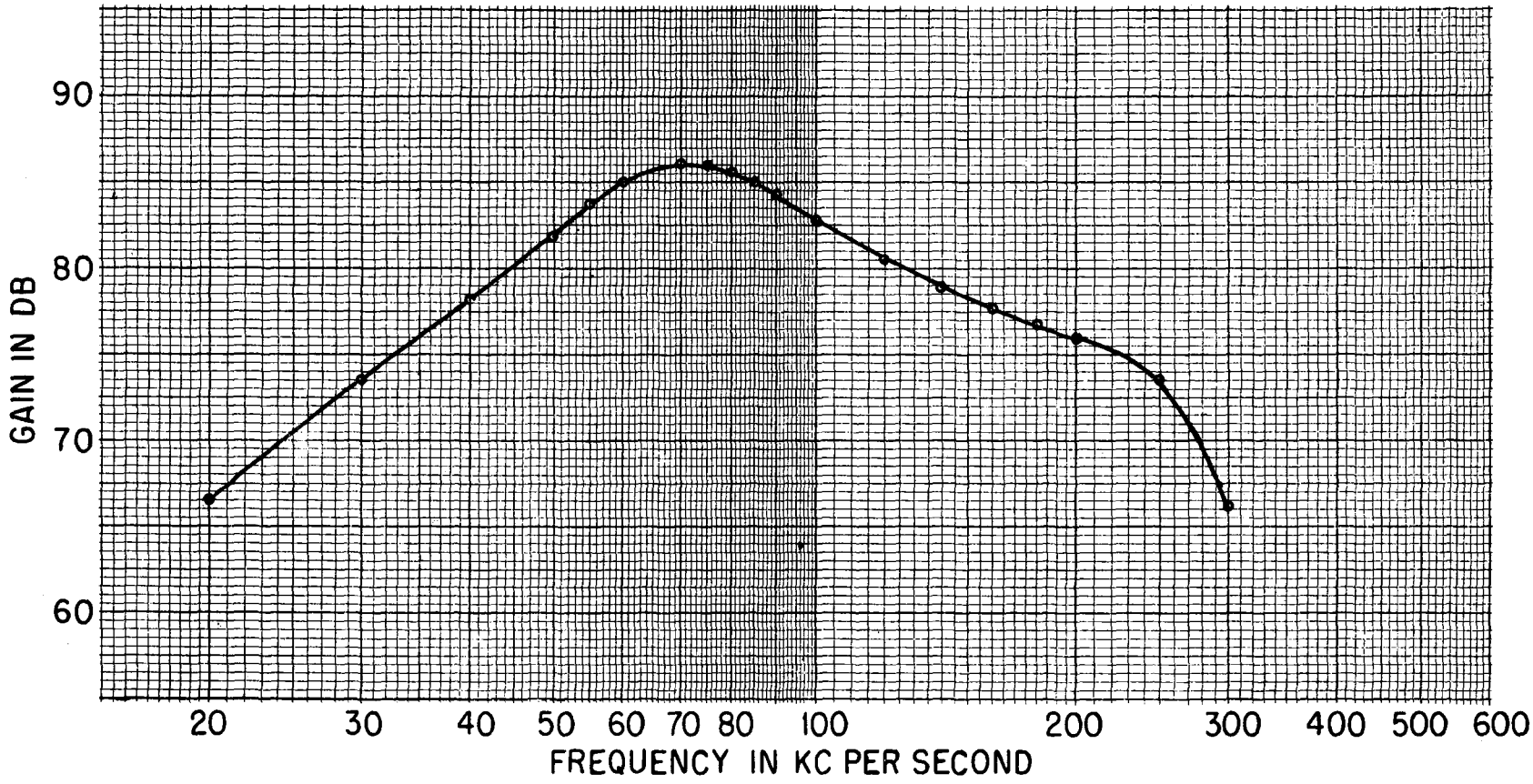

Fig. 6 — Nonregenerative Gain J98703H Low Group Transmitter

TABLE A

ASSOCIATED POINT SECTIONS

SERVICING CENTER TESTS USING 5U TEST SET

E34.035.01 (A207.045.01) — Channel Unit — Type N, O and ON Carrier Systems — Compressor Subassembly Tests

E34.035.02 (A207.045.02) — J98705D Message and J98705AF Thru Channel Unit — O Carrier System — Carrier Frequency Subassembly Tests

E34.035.03 (A207.045.03) — J98703F Channel Unit — N Carrier System — Carrier Frequency Subassembly Tests

E34.035.04 (A207.045.04) — J98703FA Message, J98703TA Program and J98703AH Thru Channel Unit — N Carrier System — Carrier Frequency Subassembly Tests

E34.035.05 (A207.045.05) — Channel Unit — N and O Carrier Systems — Expandor-Signaling Subassembly Tests

E34.035.06 (A207.045.06) — Channel Unit — N Carrier System — Over-all Test of J98703F and J98703FA Channel Unit

E34.035.07 (A207.045.07) — Channel Unit — O and ON Carrier Systems — Over-all Test of J98705D Channel Unit

E34.035.08 (A207.045.08) — Thru Channel Unit — N and O Carrier Systems — Voice-Frequency Subassembly Tests

E34.035.09 (A207.045.09) — Thru Channel Unit — N and O Carrier Systems — Over-all Test of J98703AH and J98705AF Thru Channel Unit

E34.035.10 (A207.045.10) — J98703L, LA, M, MA Repeaters — N Carrier System — Over-all Tests

E34.035.11 (A207.045.11) — J98703H Low Group Transmitter — N Carrier System — Over-all Tests

E34.035.12 (A207.045.12) — J98703G High Group Transmitter — N Carrier System — Over-all Tests

E34.035.13 (A207.045.13) — J98703K Low Group Receiver — N Carrier System — Over-all Tests

E34.035.14 (A207.045.14) — J98703J High Group Receiver — N Carrier System — Over-all Tests

E34.035.15 (A207.045.15) — J98705AA Group Receiving Circuit — OA and ON Carrier Systems — Over-all Tests

E34.035.16 (A207.045.16) — J98705AB Group Transmitting Circuit — OA and ON Carrier Systems — Over-all Tests

E34.035.17 (A207.045.17) — J98705AC Repeater Amplifier Circuit — OA Carrier System — Over-all Tests

E34.035.18 (A207.045.18) — J98705F Group Transmitting Circuit — OB, OC, OD and ON Carrier Systems — Over-all Tests

E34.035.19 (A207.045.19) — J98705G Group Receiving Circuit and Repeater Amplifier Circuit — OB, OC, OD and ON Carrier Systems — Over-all Tests

E34.035.20 (A207.045.20) — J98705H Group Oscillator Circuit — O and ON Carrier Systems — Over-all Tests

E34.035.21 (A207.045.21) — J98705J and W, 01 Repeater Oscillator and Miscellaneous Oscillator — O and ON Carrier Systems — Over-all Tests

E34.035.22 (A207.045.22) — J98705E Twin Channel Carrier Circuit — O and ON Carrier Systems — Over-all Tests

E34.035.23 (A207.045.23) — J98706C, D, E, and F Repeaters — ON Carrier System — Over-all Tests

E34.035.24 (A207.045.24) — J98706J, K, CA, DA, EA, and FA Repeaters — ON Carrier System — Over-all Tests

E34.035.25 (A207.045.25) — J98703W Schedule A and B Program Channel Units — N Carrier System — Voice-Frequency Subassembly Test

E34.035.26 (A207.045.26) — J98703W Schedule A and B Program Channel Units — N Carrier System — Carrier Frequency Subassembly Test

E34.035.27 (A207.045.27) — J98703W Schedule A and B Program Channel Units — N Carrier System — Over-all Tests

E34.035.28 (A207.045.28) — J98703Y Schedule A and B Program Reversing Channel Units — N Carrier System — Over-all Tests

E34.035.29 (A207.045.29) — J98703TA Schedule C and D Program Channel Units — N Carrier System — Compressor Subassembly Tests

E34.035.30 (A207.045.30) — J98703TA Schedule C and D Program Channel Units — N Carrier System — Expandor Subassembly Tests

E34.035.31 (A207.045.31) — J98703TA Schedule C and D Program Channel Units — N Carrier System — Over-all Tests

E34.035.32 (A207.045.32) — J94002N Group Unit Switching Set — N Carrier System — Over-all Tests

E34.035.33 (A207.045.33) — J94002M Repeater Switching Set — N Carrier System — Over-all Tests

E34.035.34 (A207.045.34) — 529A and B, 530A through 530H, 530J through 530L, 530P or 531B, 530R or 531C and 531F Filters — O and ON Carrier Systems — Filter Tests

E34.035.35 (A207.045.35) — J98703AC Deviation Regulator — N Carrier System — J98703AD Control Unit Tests

E34.035.36 (A207.045.36) — J98703AC Deviation Regulator — N Carrier System — J98703AE Amplifier Unit Tests

E34.035.37 (A207.045.37) — J98703AM and J98705AP Special Services Channel Units — N, O and ON Carrier Systems — Voice-Frequency Subassembly Tests

E34.035.38 (A207.045.38) — J98703AM and J98705AP Special Services Channel Units — N, O and ON Carrier Systems — Over-all Test