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Subject

Report on

Test of Model GO-4 Transmitting Equipment

by

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NAVY DEPARTMENT

Report

on

Test of Model GO-4 Transmitting Equipment.

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Appendix II

Naval Air Station, Anacostia, D. C. Flight Test Report

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AUTHORIZATION

1. The tests herein reported were authorized by Bureau of Engineering letter, reference (a). Additional references pertinent to these tests are listed as references (b) to (e).

Reference: (a) BuEng.conf.ltr. F42-1 (9-18-R6) of 19 Sept. 1939.
(b) Conf.Spec. RE 13A 558A.
(c) Conf.Spec. RE 13A 558B.
(d) Contract NOs-61445, Model GO-4 Transmitter.
(e) Contract NOs-66283, Model GO-5 Transmitter.

OBJECT OF TEST

2. The object of these tests is to determine the compliance of the equipment with the requirements of the specifications, references (b) and (c).

ABSTRACT OF TEST

3. The equipment was checked for size and weight, mechanical construction, electrical performance, and its adaptability for use in the Naval Service as required by references (b) and (c).

4. The equipment was tested for frequency range, overlap, stability, power output, adjustment accuracy, frequency change due to lost motion, frequency change due to detuning of circuits, operation of tune-operate control, operation of power output control, frequency change with change of vacuum tubes, frequency change with variations in supply voltage, frequency change due to variation of ambient temperature, frequency change due to variations in humidity, frequency change with locked and intermittent key, frequency change due to inclination, roll, and pitch, frequency change due to vibration, rectifier ripple, rectifier regulation, rectifier efficiency and subjected to acceleration tests.

5. At the conclusion of the type tests, the equipment was submitted to the Naval Air Station, Anacostia, for flight tests in accordance with references (b) and (c).

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EQUIPMENT UNDER TEST

5. The Model GO-4 equipment consists of two transmitter units and a single power supply unit arranged to supply power to either transmitter but not both simultaneously. Each transmitter consists of a master oscillator, intermediate power amplifier, and final power amplifier. The h-f unit utilizes frequency multiplication in the master oscillator output and the intermediate power amplifier stage. No frequency multiplication is used in the final power amplifier. The i-f unit does not employ frequency multiplication in any amplifier stage. The master oscillator stage of the h-f unit is divided into two frequency ranges, approximately 3000 to 4500 and 4500 to 6000 kilocycles, the frequency range selection being made by the frequency band switch. The frequency tuning control of each unit tunes the master oscillator, i-f amplifier, and power amplifier plate circuits with one operation. There are six frequency bands on the h-f unit and four on the i-f unit.

6. The three units may be mounted together forming a complete unit covering the frequency ranges of 300 to 600 and 3000 to 26,500 kilocycles, or may be mounted together forming a complete unit covering either of the above frequency ranges. The rectifier or power supply unit is located between the i-f and h-f units, the i-f unit on the left and the h-f unit on the right, and supplies power to either transmitter unit required for transmission, with the exception of the keying voltage. Either transmitter unit may readily be removed from the mounting base without interrupting operation of the other unit; the rectifier unit may be readily removed without removal of either transmitter unit.

7. The equipment is provided with removable front shields and a hinged door permitting of easy access for tube replacement from the front. Side and rear removable shields are provided, allowing access to all parts of the equipment. The i-f unit continuously covers the frequency range of 300 to 600 kilocycles and the h-f unit continuously covers the range of 3000 to 26,500 kilocycles. Both transmitters provide cw and mcw transmission with a power output from 15 to 200 watts, depending upon the electrical characteristics of the antenna being energized.

8. The power supply unit supplies both filament and plate power to either transmitter unit and in addition provides side tone for transmission monitoring. This unit embodies the antenna relay and crystal calibrator. The power supply unit receives its primary power from either a Type NEA-2 or NEB-1A alternator which also supplies the power for energizing the antenna relay. The power supply unit requires approximately 120 volts, 7 amperes, 800 cycles while the antenna relay requires approximately 14.3 volts direct current, 3 amperes. The rectifier unit utilizes two Type 38266A half-wave high vacuum tubes as a full-wave rectifier for the high voltage rectifier, and one Type 38593 full-wave high vacuum tube for the low voltage rectifier. The h-f transmitter unit utilizes one Type 38837 power amplifier pentode tube as a voltage compensated master oscillator, one Type 38807 beam power tube as an intermediate amplifier and frequency doubler, and two Type 814 beam power tubes connected in parallel as a final power amplifier.

[redacted]

9. The i-f transmitter unit utilizes the same tube line-up as the h-f unit but does not use any tube as a frequency multiplier.

10. The crystal calibrator utilizes one Type 38076 triode amplifier tube for the crystal oscillator, one Type 38667 triode-pentode tube as detector-amplifier, and one Type 38076 triode for final audio amplifier.

11. The frequency calibrated scale of both transmitter units is calibrated directly in kilocycles, thus presenting a visual calibration covering the complete frequency range of both transmitters.

12. The transmitted frequencies of both units are accurately adjusted aurally by use of the crystal calibrator which employs two quartz crystals, one of 100 kilocycles whose harmonics are of sufficient strength to provide crystal check points every 20 kilocycles on the i-f unit. The other crystal is 1000 kilocycles which provides crystal check points every 100 kilocycles on the h-f unit. The crystals are selected by a two point switch located on the front panel of the rectifier unit. A telephone jack is also provided for telephones.

13. The visual frequency calibration of each transmitter unit is clearly marked with red numerals which indicate the crystal calibrator frequency check points every 50 or 500 kilocycles on the i-f and h-f unit respectively. The accuracy of transmitted frequencies occurring between these crystal check points relies upon the accuracy of the frequency dials' calibration.

METHOD OF TEST

14. A description of the method used in conducting the tests follows.

15. The equipment was checked for size, weight and mechanical construction. It was then assembled and tested to determine its compliance with the electrical requirements of the specifications, references (b) and (c).

16. Power measurements were made on at least one frequency in each band. Measurements were made on the i-f unit using antenna constants corresponding to trailing wire and fixed antennas. The procedure in measurements was as follows. The proper antenna constants were selected and a Weston panel type r-f ammeter of suitable range was connected in the ground return of the dummy antenna. The meter was first checked at 60 cycles to insure its accuracy. The inductance or capacity element of the dummy antenna was connected to the antenna post of the set. Then the transmitter was tuned in the cw position. After all adjustments had been made, the readings were taken and the emission selector turned to the mcw position and a second set of readings taken. Ward Leonard placques were used for dummy antenna resistors. The same procedure was followed for the determination of the power delivered by the h-f unit into a fixed antenna. Other power measurements on the h-f unit were made with a calibrated lamp and photocell.

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observed and recorded with the Model LK-1 frequency drift indicator.

26. The change in frequency between the locked key and the intermittently keyed condition was obtained by adjusting to a suitable beat note with the Model LK-1 frequency drift indicator and observing the frequency. The key was locked for a period of 10 minutes and then left up for a period of 20 minutes and closed for 10 seconds. The frequency was recorded during the 10 minute locked key period and again during the 10 second period. Two series of tests were run, one with the filaments energized during the 20 minute key up period and another with the filaments not energized during the 20 minute key up period.

27. The equipment was keyed at 18 words per minute by a Creed automatic keying relay for 30 minutes. Then the key was opened for a period of 20 minutes and the key closed at the end of this period for 10 seconds, the filaments being energized during the 20 minute key up period. The frequency was observed and recorded during the 30 minute continuously keyed period and again during the 10 second key closed period with the Model LK-1 frequency drift indicator.

28. To determine the frequency change due to inclination the equipment was placed on a suitable device and inclined to a maximum angle of 45° each side the vertical position at a rate of 5 cpm and the frequency change observed and recorded on the Model LK-1 frequency drift indicator.

29. To measure the set in frequency due to vibration the equipment was placed on a vibration table and vibrated at frequencies of from 10 to 30 cycles per second for a period of 30 minutes. The set in frequency due to this vibration was observed and recorded with the Model LK-1 frequency drift indicator.

30. To determine the ratio from tune to full power position the transmitter was adjusted for full power, a suitable dummy antenna being used. The voltage across the resistance element of the dummy antenna was measured using a vacuum tube voltmeter. The transmitter was then adjusted to the tune condition and the voltage across the resistance element again measured.

31. The overlap was determined by measuring the maximum and minimum frequency on each band with the Model LD-3 crystal frequency indicator.

32. The side tone output control was measured by connecting resistors of suitable values across the side tone winding and the voltage developed across them measured with a vacuum tube voltmeter.

33. The d-c voltage developed by the rectifier was measured at full load and 75% of full load. These values were then plotted and a straight line drawn through them and the voltage at no load read from this curve. Voltage regulation was then calculated from the values of no load and full load voltage.

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34. The 800 cycle input to the plate transformer was measured with a Weston wattmeter. The d-c power output was measured by the use of a calibrated resistor and Weston panel type milliammeter of suitable range. The efficiency of the rectifier was calculated from these values.

35. The a-c ripple in the high tension d-c supply was measured by placing a high resistance a-c voltmeter in series with a suitable condenser across the high tension supply. A string oscillograph photograph was also made of this ripple and on the same plate a standard voltage was recorded. The total rms voltage was then calculated for the photographic method.

DATA RECORDED DURING TEST

36. Data recorded during the tests in the form of tables, charts, and photographs are appended to this report. Tables including the actual and allowable weights and measurements were made. Data were recorded on the following:

(a) Power output.
(b) Tuning time.
(c) Adjustment accuracy.
(d) Power reduction.
(e) Side tone voltage control.
(f) Modulation frequency.
(g) Filament voltage variation.
(h) D-C power consumption.
(i) Rectifier voltage regulation.
(j) Rectifier efficiency.
(k) Rectifier ripple voltage.
(l) Power loss vs. humidity.
(m) Frequency drift after vibration.
(n) Weights and dimensions.
(o) Frequency range and overlap.
(p) Frequency change due to lost motion, back and torque lash.
(q) Frequency change due to variations in line voltage.
(r) Frequency drift due to variation in ambient temperature.
(s) Frequency drift due to variation in humidity.
(t) Frequency change due to inclination.
(u) Frequency change due to vibration.
(v) Frequency change with tune-operate control operation.
(w) Frequency change with detuning of circuits.
(x) Frequency change with power output control operation.
(y) Frequency change with change of tubes.
(z) Frequency drift with locked key operation.
(aa) Frequency change with locked key to intermittently keyed operation.
(ab) Frequency change with continuously keyed to intermittently keyed operation.

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DISCUSSION OF PROBABLE ERRORS

37. The following is a list of apparatus used with the margin of error according to the manufacturer's guarantee.

(a) Model LM-1 crystal frequency indicator, Serial No. 5	± 0.01%
(b) Model LM-2 crystal frequency indicator, Serial No. 1	± 0.01%
(c) Model LD-3 crystal frequency indicator, Serial No. 2	± 0.005%
(d) Model LK-1 frequency drift indicator, Serial No. 1	± 20 cycles
(e) General Radio vacuum tube voltmeter, Type 726-A, Serial No. 465	± 2%
(f) A-C wattmeter, Model 310, Serial No. 8922	± 0.25%
(g) A-C ammeter, Model 370, Serial No. 2123	± 0.25%
(h) A-C voltmeter, Model 341, Serial No. 8661	± 0.25%
(i) General Radio power output meter, Type 583A, Serial No. 72	± 5%
(j) A-C voltmeter, Model A, Serial No. 9952	± 1%
(k) R-F ammeter, Model 405, Serial No. 28854	± 1%
(l) A-C voltmeter, Model 370, Serial No. 4576	± 0.25%
(m) D-C milliammeter, Model 301, Serial No. 1050466	± 2%
(n) D-C milliammeter, Model CX, Serial No. 919551	± 2%
(o) D-C voltmeter, Model 301, Serial No. 859705	± 2%
(p) Temperature control room	± 5%

RESULTS OF TEST

38. The following results were obtained relative to specifications, reference (b). Paragraph numbers conform to paragraph numbers in specifications. Specification paragraphs not commented upon are considered as having been complied with in their entirety.

I - INTRODUCTION

Par. 1-1 to 1-6 inclusive are introductory and are covered in more detail in the following sections.

II - GENERAL

2-3. This equipment is ruggedly constructed and high quality material has been used throughout.

2-3(1). All contacts are suitable for many cycles of operation.

2-3(2). All switches are of the self-positioning type and wherever practicable are of the self-cleaning type.

2-3(3). All variable resistors are of the wire wound type.

2-4. Workmanship in general is excellent.

2-5. Suitable resistance to corrosion has been incorporated in the finishes applied to all parts.

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2-6. The use of iron and steel has been kept to a minimum.

2-7. This equipment is not operable at temperatures below -10°C. The main power switch will not close, the main tuning controls are immovable, and all controls are harder to operate at temperatures below -10°C.

2-8. Suitable overload protection has been incorporated.

2-9. Ample provision has been made for ventilation and cooling.

2-10. The time delay relay requires the addition of two series resistors, each 100 ohms, 10 watts, in order to maintain a minimum closing time of 40 seconds to adequately protect the high vacuum rectifier tubes.

2-11. Improvements to the top shock mount on the second model meets this requirement.

2-12. The design of this equipment does not include the use of wood except for transformer wedges.

2-13(1). All machine screws have been secured in an approved manner.

2-13(2). Where necessary, wires are securely fastened and do not depend upon solder for mechanical strength.

2-13(3). Solder connections are coated with red lacquer.

2-13(4). Complied with on second model.

2-16. Protective screen has been installed on bottom of rectifier unit on second model.

2-17. This requirement has been met on second model as stated in paragraph 2-11.

2-19(2). All component items may be replaced without extensive dissembly.

2-20. Tube mountings permit easy removal of tubes and prevent them from jarring loose.

2-21. All sockets are of the single unit type.

2-22. The design and control of this equipment permit operation by relatively inexperienced personnel.

2-23(2). This requirement has been met on the second model.

2-24. All meters except r-f meters have been protected by suitable by-pass units.

2-25(1). Clockwise rotation increases the final controlled effect on all controls.

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2-25(3). Frequency controls and locking devices do not meet this specification. The frequency control is not positive, clutch slippage is excessive, locking device is inadequate to securely lock frequency controls.

2-26. The major units have been housed in suitably grounded metal cabinets with black wrinkle finish.

2-27. This specification is met but recommendation is made for slip type locking nut such as the Cannon or A and N type plugs.

2-28. All external fixed connections associated with the antenna system have been mounted on stand-off insulators.

2-29. All cables supplied met this specification.

2-32. This specification has been complied with on the second model.

2-33. Complied with wherever possible.

2-50. Practically all parts may be replaced without extensive dissembly, the exception being the frequency band change switch which would require an extensive dissembly operation in order to replace defective switch.

2-51. The keying relay in the second model meets this specification.

2-52. Suitable permanent identifying marks have been incorporated on the second model.

2-56 to 2-57. All units are adequately shielded, all shafts, bushings, and knobs are suitably grounded and insulated.

2-59. This equipment without instruction books weighs 172 pounds.

2-60. Any unit of this equipment will pass through a hatch 18 by 18 inches.

2-61 to 2-62. This equipment will operate satisfactorily using the NEA-2 alternator.

2-63. No signs of flashover were observed during the type tests.

2-65. Complied with on second model.

2-67. Report of Naval Air Station, Anacostia, on flight tests is appended hereto.

2-68. All ceramics in contact with hard metal are protected by the use of lead or fiber washers.

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III - TRANSMITTERS

3-1. This equipment consists of three units.

3-2. The design of this equipment is based on two complete radio frequency units and one common power unit.

3-3. Suitable provision has been made for the operation of either transmitter in case of failure of the other.

3-4. The mounting dimensions do not comply with these specifications, but comply with manufacturer's drawing T7660783 as amended by the contract.

3-5. The design of the equipment complies with this specification.

3-6. The circuits and controls facilitate setting and operation and minimize the danger of transmitting on a harmonic of the desired frequency.

3-7(2)(a). This equipment delivers the required power into the trailing wire antenna.

3-7(2)(b). This equipment delivered the required power into the fixed antenna at high frequencies. Results show that the i-f unit failed to deliver the specified power into the fixed antenna. The results are recorded in Tables 1 and 2.

3-11. The equipment is capable of operating as adjusted for full power without damage to any part when the antenna is open circuited or grounded.

3-12(1). A single control is employed to vary the frequency of all stages and circuits with the exception of the antenna coupling and antenna tuning circuits. A band change switch is used to select operating bands.

3-12(2). The master oscillator circuits are coupled to a crystal frequency indicator containing two crystals. A calibration corrector is provided on each master oscillator. The low frequency 100 kilocycle crystals supplied with this unit do not operate satisfactorily; one crystal is extremely hard to start oscillating and the other is sluggish in starting. Tests show that in other circuits these crystals operate satisfactorily, which indicates improper circuits for the low frequency crystals. This condition should be remedied. The two 100 kilocycle crystals are ground to within 0.02% of absolute frequency, and their temperature coefficients are 0.9 cycles/10^6 cycles/°C. and 0.83 cycles/10^6 cycles/°C. respectively, which meets the specifications. One of the 1000 kilocycle crystals is within 0.0079% of absolute frequency and has a temperature coefficient of 1.4 cycles/10^6 cycles/°C. which meets the specifications for frequency but possesses a greater temperature coefficient than that allowed of 1 cycle/10^6 cycles/°C. The other 1000 kilocycle crystal measures 0.048% of absolute frequency and has a temperature coefficient of 9 cycles/10^6 cycles/°C., both values being in

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excess of that allowed, the specifications requiring 0.02% of absolute frequency and a temperature coefficient of 1 cycle/10^6 cycles/°C.

3-12(3). Two trimmers are employed in the h-f unit and one in the i-f unit.

3-12(4). Three antenna controls are incorporated in the h-f unit and three in the i-f unit. An additional antenna coupling is also provided as amended by Contract Note.

3-12(5). This equipment may be tuned in one man minute. See Table 4.

3-12(6)(a). The adjustment accuracy is within the specified limit. See Tables 5 and 5A.

3-12(6)(b)(aa). The frequency variation with change in ambient temperature with but few slight exceptions of the h-f unit is within the specifications as amended by Contract Note. Data are contained in Tables 12 to 12(i).

3-12(6)(b)(bb). The frequency change with 8% change in line voltage is within the specifications.

3-12(6)(b)(cc). The frequency change with 20% detuning of antenna circuit is within the specifications.

3-12(6)(b)(dd). The frequency change with variation of relative humidity does not meet the specifications. Data are contained in Table 13, page 8.

3-12(6)(c). The emission is practically free from effects of vibration.

3-12(6)(d). No momentary or periodic frequency variations such as lilt or abrupt jumps in frequency were observed.

3-13. This requirement has been omitted by Contract Note.

3-14. The frequency change when shifted from test to full power operation is within the specified limit of 0.01%. Data are contained in Table 7.

3-16. Plug-in coils are not employed.

3-17. It is possible to adjust this equipment to any frequency in the bands 300 to 600 and 3000 to 26,500 kilocycles.

3-18. The frequency overlap between bands is at least 2%. See Table 20.

3-19. Non-critical control has been provided.

3-20. Suitable friction type locking devices have been provided on some controls. On the main tuning controls, the locking is insufficient.

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3-41. Access to the individual units has been provided.

3-42. All access doors have been securely fastened with suitable snap slides. Removable shields on back and sides have been fastened with weak, impracticable fasteners liable to breakage and loss. These fasteners are not suitable for Service use.

3-44. A hinged door is used on the rectifier unit on which are mounted the filament voltmeter, IPA, and PA plate meters. This hinged door was authorized by contract revision.

IV - POWER SUPPLY AND RECTIFIER UNIT

4-1. These provisions have been met. The direct current is within the specified limits of 3 amperes as revised by contract change.

4-2. When operating from a Type NEB-1a generator, the output of the equipment will be reduced approximately 25%; however, as this is an emergency condition, the reduced output is considered satisfactory.

4-3. The rectifier unit supplied contains all necessary equipment for converting and controlling all electrical energy for operating the equipment.

4-4. All necessary connections have been supplied.

4-5. High vacuum rectifier tubes have been employed. The protective time delay relay supplied with the equipment is not capable of maintaining its closing time over a long period of time. It will be necessary to incorporate two series resistors in order to adequately protect the rectifiers over a long period of time. The addition of the resistors has been tested and the results are contained on Plate 45.

4-7. The rectifiers are of the full wave type. Voltage regulation and rectifier efficiency are within the specified limits. Data are contained in Tables 25 and 26.

4-8. The addition to the second model of a metal screen on the bottom of the rectifier unit provides adequate protection to personnel.

4-9. Commented on in paragraph 3-35.

4-10. The total rms voltage ripple in the high tension d-c supply is greater than the specified limit. However, the 1600 cycle ripple is a minor portion of this ripple; most of the ripple is 40 cycles due to the generator commutation. Therefore, it is recommended that this discrepancy be waived. Data are contained in Table 27 and Plate 1.

4-11. The variation in filament voltage between the key open and key closed condition is greater than the specified limits when operating on mcw. Data are contained in Table 23.

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V - MOUNTINGS

5-1. The mountings supplied on the second model are satisfactory.

5-2. The mountings are in accordance with the manufacturer's drawing No. T7660783 as by contract revision.

VI - CABLES AND CONNECTORS

6-1. A suitable shielded connection has been provided.

6-2. All connections between rectifier power unit and transmitter units may be disconnected by the manipulation of two switch knobs.

6-3. All antenna terminals are located on the top of the transmitter units and have suitable detachable fittings.

6-4. Suitable connecting jacks have been provided on the front panel for monitoring and keying.

6-5. Two 10-foot monitor cables have been supplied.

39. The following results were obtained relative to specifications, reference (c). Paragraph numbers conform to paragraph numbers in specifications. Specification paragraphs not commented upon are considered as having been complied with in their entirety.

I - INTRODUCTION

1-1 to 1-7 inclusive are introductory and are covered in more detail in the following sections.

II - GENERAL

2-3. This equipment is ruggedly constructed and high quality material has been used throughout.

2-3(1). All contacts are suitable for many cycles of operation.

2-3(2). All switches are of the self-positioning type and wherever practicable are of the self-cleaning type.

2-3(3). All variable resistors are of the wire wound type.

2-4. Workmanship in general is excellent.

2-5. Suitable resistance to corrosion has been incorporated in the finishes applied to all parts.

2-6. The use of iron and steel has been kept to a minimum.

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2-7. This equipment is not operable at temperatures below -10°C. The main power switch will not close, the main tuning controls are immovable, the antenna inductance control on the h-f unit is immovable, and all controls are harder to operate at temperatures below -10°C.

2-8. Suitable overload protection has been incorporated.

2-9. Provision has been made for ventilation and cooling.

2-11. Improvements to the top shock mount on the second model meets this requirement.

2-12. The design of this equipment does not include the use of wood except for transformer wedges.

2-13(1). All machine screws have been secured in an approved manner.

2-13(2). Where necessary, wires are securely fastened and do not depend upon solder for mechanical strength.

2-13(3). Solder connections are coated with red lacquer.

2-13(4). Complied with on second model.

2-16. Protective screen has been installed on bottom of rectifier on second model.

2-17. This requirement has been met on second model as stated in paragraph 2-11.

2-19(3). All toggle or push button switches are mounted so that replacement can conveniently be made without removal of other units.

2-20. Tube mountings permit easy removal of tubes and prevent them from jarring loose.

2-21. All sockets are of the single unit type.

2-22. The design and control of this equipment permits operation by relatively inexperienced personnel.

2-23(1). All indicating instruments and controls are so arranged as to permit ease of operation and present a pleasing appearance on the second model.

2-23(2). All markings on the front panel are readable from a distance of 24 inches.

2-24. All meters except r-f meters have been protected by suitable by-pass units.

2-25(1). A clockwise rotation increases the final controlled effect on all controls.

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2-25(3). Frequency controls and locking device do not meet this requirement. The clutch slips and the locks are not firm.

2-26. The major units of this equipment have been housed in suitable grounded metal cabinets with a black wrinkle finish.

2-28. All external fixed connections associated with the antenna system have been mounted on stand-off insulators.

2-29. All cables supplied may be bent to a radius of 3 inches.

2-30. Bright finishes have not been used on external parts.

2-31. All snaps, catches and screw heads which are manipulated or removed in the normal process of installation or servicing have a dull nickel or chromium finish.

2-32. Complied with on second model.

2-33. Wiring in this equipment has been suitably color coded wherever possible.

2-45. Friction and pressure contacts have been kept to a minimum and where used are properly designed to prevent the development of noise.

2-46. All parts may be replaced without extensive disassembly with the exception of the frequency band switch.

2-47. The keying relay in the second model meets this requirement.

2-48. Suitable permanent identifying marks have been incorporated in the second model.

2-52. All external parts except power and antenna leads are at ground potential.

2-53. All shafts, bushings and knobs are suitably grounded and insulated.

2-55. This equipment without instruction books weighs 172 pounds.

2-56. Any unit of this equipment will pass through a hatch 18 by 18 inches.

2-57 to 2-58 inclusive. This equipment will operate satisfactorily using the NEA-2 alternator.

2-59. This equipment showed no signs of flashover while under test.

2-60. Complied with on second model.

2-61. The units of this equipment may be placed on their faces or any side without being damaged.

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3-11. This equipment is capable of operating as adjusted for full power without damage to any part when the antenna is open circuited or grounded.

3-12(1). A single control is employed to vary the frequency of all stages and circuits with the exception of the antenna coupling and antenna tuning circuits. A band change switch is used to select operating bands.

3-12(2). The master oscillator circuit has associated with it a suitable crystal circuit containing two crystals. A calibration corrector is included in the master oscillator. The low frequency 100-kilocycle crystals do not operate satisfactorily; one is hard to start oscillating and the other is sluggish. Tests indicate that the circuits are improper for normal crystal operation.

3-12(3). Two trimmers are employed in the h-f unit and one in the i-f.

3-12(4). Four antenna controls are incorporated in the h-f unit and one in the i-f.

3-12(5). This equipment may be tuned in one man minute. See Table 4.

3-13(1). The adjustment accuracy is within the specified limit. See Table 5.

3-13(2). The frequency difference due to lost motion, back and torque lash in the main tuning control is within the specified limits. See Table 6.

3-13(3). The change in frequency between the initial adjusting condition and the full power position does not exceed 0.005%. See Table 7.

3-13(4). The frequency change resulting from detuning of any circuit by an amount indicated by a 25% change in plate current is within the specified limits. See Table 8.

3-13(5). The variation in frequency between the low power position and full power output is within the specified limits. See Table 9.

3-13(6). The frequency change resulting from change of tubes is within the specified limits. See Table 10.

3-13(7). Frequency change resulting from variation of 5% below to 5% above normal value of line voltage is within the specified limits. See Table 11.

3-13(8). The average variation in frequency for any 10°C. change in ambient is within the specified limits. See Table 12.

3-13(9). The variation in frequency resulting from a variation in relative humidity from 30% to 95% at 40°C. exceeds the specified limit by from 50 to 100% for the h-f unit and is within the specified limit for the i-f unit. Since the exact nature and magnitude of the effects of humidity upon frequency is not known, and provision is made for

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correcting frequency drift by the crystal calibrator, it is recommended that this discrepancy be minimized. It is further recommended that the Navy study these effects and revise the specifications in accordance with the results of this study. Data are contained in Table 13.

3-13(10). The variations in frequency for the 1/2-hour key locked condition at 50°C. are given in Table 14. The contract revision left this specification indefinite.

3-13(11). The change in frequency between the full power and the intermittently keyed condition is within the specified limits. See Table 15.

3-13(12). The change in frequency between the continuously keyed condition and the intermittently keyed condition is within the specified limits with but a slight variation. The frequency change for the h-f unit is 0.0053% at 4500 kilocycles, while 0.005% is the specified limit. See Table 16.

3-13(13). The change in frequency due to the equipment being inclined at any angle up to 45° from the vertical in any direction is within the specified limits. See Table 17.

3-13(14). The maximum set in frequency due to vibration is outside the specified limits for the h-f unit at 3000 and 6000 kilocycles on bands 1 and 2. However, the amplitude of the vibration could not be controlled. The specifications require vibration amplitudes of 1/32"; the vibrations to which the equipment was subjected varied from 1/64" to 3/32". It is recommended that consideration be given the equipment's performance under these conditions. Data are contained in Table 18.

3-15. A tuning position has been provided. Power radiated in this position is down more than 35 decibels. See Table 19.

3-16. Suitable means have been provided to permit the adjustment of the transmitter to the frequency of the associated receiver and for the use of aircraft frequency standards.

3-17. A suitable electrical zero corrector has been provided.

3-18. It is possible to adjust this equipment to any frequency in the bands 300-600 kilocycles and 3000-26,500 kilocycles.

3-19. The frequency overlap between bands is at least 2%. See Table 20.

3-20. Non-critical control has been provided.

3-21. Suitable friction type locking devices have been provided on some controls. On the main tuning controls the locking is insufficient.

3-22. Suitable provision has been made to record necessary reset data.

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3-24. The design of this equipment permits shifting from intermediate to high frequency transmission or from continuous to modulated continuous wave transmission without readjustment of filament, bias or plate voltage.

3-25. It is possible to vary the power output of the transmitters from full power to a minimum value by means of a single three-step switch. See Table 19 for powers on the various steps.

3-26. Control of power by regulating the field is not employed.

3-28. A switch has been incorporated to remove all a-c power from the transmitter. This switch is inoperable at temperatures below -10°C. and should be replaced. Incoming power connections have been suitably fused.

3-29. All contacts which may produce sparking or arcing in service use have been suitably enclosed.

3-30 to 3-35 inclusive. The relay incorporated in the second model is of the evacuated type and successfully keyed at 28 words per minute while operating at an R.F. potential of 8500 volts. Further tests of this relay at high altitude are contained in Appendix II.

3-36. Suitable provision has been made to obtain a side tone signal of 800 cycles. The specified power of 500 milliwatts by contract revision is unobtainable. If the specified power is desired, it will require a redesign of the entire tertiary winding on the transformer. The specified voltages were obtained. Data are contained in Table 21.

3-40. This equipment includes integral within the assembly all parts necessary for its operation except the alternator and flameproof hand telegraph key.

3-41. This equipment has been suitably shielded.

3-42. Access to the individual units has been provided.

3-43. All access doors have been securely fastened with suitable snap slides. Removable shields on back and sides have been fastened with a snap type fastener liable to damage in service use and is not considered satisfactory. No protective interlock switches are incorporated with the side shields.

3-44. Access doors have been designed to prevent variable shielding effects.

IV - POWER SUPPLY AND RECTIFIER UNIT

4-1. The d-c current drawn to operate the equipment is within the specified limits of 3 amperes.

4-3. The rectifier unit supplied contains all necessary equipment for converting and controlling all electrical energy for operating this equipment.

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CONCLUSIONS

40. The tests of the Model GO-4 Transmitting Equipment were conducted on one model and additional tests were made upon a second model. As a result of these tests, the following conclusions were reached.

(a) The equipment possessing various difficulties to successful operation, as required by reference (b), is not considered suitable for use on Naval aircraft. The difficulties to operation and failure to meet the specifications are enumerated as follows:

Frequency controls inoperable at temperatures below -10°C.
Failure to meet required i-f power into fixed antenna.
Excessive frequency change with high relative humidity.
Rectifier ripple in excess of specifications.
Impracticable shield fasteners.
Failure of main power switch.
Inadequate frequency control locking device.
Failure of Time Delay Relay to provide continuous protection.
Minimum of three antenna circuit controls is exceeded.
C.F.I. crystals do not operate properly.

(b) Additional tests were conducted in conformity with reference (c), the equipment failing in each of the above points and in addition to the following:

Change in frequency with variation in humidity, h-f unit.
Change in frequency from continuously keyed to intermittently keyed condition, h-f unit.
Set in frequency due to vibration, h-f unit.
Power required for side tone monitoring.
Voltage regulation, key up - key down.
Frequency change due to inclination, h-f unit.
Failure of time delay relay to protect rectifier tubes.

(c) The equipment satisfactorily met the requirements of references (b) and (c) on the following:

Power output into trailing wire antennas.
Adjustment accuracy.
Operation of tune-operate control.
Antenna keying relay.
Operation of power output control.
Change of tubes.
Variation in supply line voltage.
Variation in ambient temperature.
Locked key operation.
Frequency overlap.
Rectifier efficiency.
Rectifier voltage regulation.
Lost motion, back and torque lash.

Shock mountings and dimensions are in accordance with manufacturer's drawing T7660783.

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(d) The points wherein the equipment does not meet the requirements of the specifications are, except for humidity coefficient, frequency controls inoperable at low temperatures, and low I.F. power into fixed antenna, of a nature that may be remedied without a major redesign of the equipment.

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[redacted]

Table 1

Model GO-4 Transmitter
Power Output

H. F. Unit
Lamp Load, 66 ohms

Frequency kc	Input watts	R-F Output watts	Overall Efficiency, %
3000	690	223	32.4
4500	670	227	33.9
6000	690	220	32.0
7500	690	202	29.2
10500	692	207	30.0
15000	700	182	26.0
20000	708	151	21.3
26000	700	138	19.8

Specifications: Minimum power 135 watts from 3000 to 13,575 kc.
Minimum power 125 watts from 13,575 to 22,000 kc.

Fixed Antenna

Freq. kc	Ant C, mmf	Ant R, ohms	Ant I, amp.	Input watts	R-F Output watts	Overall Efficiency, %
3000	250	3.23	5.67	700	104	14.9
6000	40	66	1.65	701	180	25.6
10000	10 μh*	50	1.25	700	79	11.1
15000	40	66	1.55	710	159	22.3
20000	40	66	1.10	730	80	10.9
26500	40	66	.80	710	42.2	6.0

Specifications: Minimum power 65 watts

* Antenna capacity negative, equivalent inductance 10 μh.

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Table 2

Model GO-4 Transmitter
Power Output

I.F. Unit
Trailing Wire Antenna

Freq kc	Ant Length	Ant C mmf	Ant R ohms	Cond R ohms	Total R ohms	Ant I amp	R-F Output watts	Input watts	Overall Eff.-%
325	500 ft.	700	6.67	1.19	7.86	4.19	138	721	19.0
385	500	700	16.45	1.08	17.53	3.05	163	720	22.5
460	400	575	9.9	.94	10.84	3.72	150	715	21.0
550	400	650	16.45	.78	17.23	3.00	155	710	22.0

Specifications: Not less than 135 output watts.

Fixed Antenna

Freq kc	Ant C mmf	Ant R ohms	Cond R ohms	Total R ohms	Ant I amp.	R-F Output 1/2 power watts	R-F Output full power watts
300	140	3.39	.33	3.72	1.40	7.3	13.9
400	140	3.39	.24	3.63	1.50	8.2	15.5
450	140	3.39	.22	3.61	1.68	10.2	19.4
600	140	3.39	.16	3.55	1.79	11.4	21.6

Air condenser used, 16" sq. plates, 1/2" spacing, radiation R not included.
Power determined from 1/2 power by power change ratio of 1.9 from 1/2 to full power.
Specifications: Not less than 25 output watts.

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Table 3

Model GO-4 Transmitter

Power Output, MCW

H.F. Unit

Freq. kc	Output CW	MCW	% MCW of CW
3000	223	201	90
4500	227	203	89.5
6000	220	196	89
7500	202	172	85
10500	207	182	88
15000	182	157	86.5
20000	151	122	81
26000	138	118	85.5
I.F. Unit			
325	96	75	78
387	106.5	81.7	76.5
462	106.5	81.7	76.5
550	114	86.7	76

Specifications: The mcw power shall be at least 70% of cw power.

Table 4

Model GO-4 Transmitter

Tuning Time

Controls Misadjusted and Reset by Calibration

H.F. Unit

	Control Settings						Operating Adjustment Time, 1 min. Including IPA and PA Trimming
G	H	J	K	M	N	P	
3500 kc	59	1	8	35	3	65	43 seconds
12000 kc	52	4	9.4	35	4	20	55 seconds

I.F. Unit

A	B	C	D	E	F	
350 kc	48	2	2	21	71.5	44 seconds
550 kc	61.5	4	4	13.5	44	43 seconds

Specifications: It shall be practicable to tune the equipment for proper operation in an airplane in a time not exceeding one man minute.

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Table 5

Model GO-4 Transmitter

Adjustment Accuracy

I.F. Unit

Band	Initial CFI setting, kc	Absolute freq. kc, reset	Actual freq. kc	Freq.diff. cycles	% Diff.
1	300	305	304.996	-4	.0014
		345	345.000	0	0
2	350	355	355.025	+25	.007
	400	415	415.025	+25	.006
3	425	430	430.024	+24	.0056
	500	473.33	473.33	0	0
4	500	533.33	533.305	-25	.0047
	600	590	590.025	+25	.0042

Specifications: The resulting output frequency shall be within .02% of the desired absolute frequency.

H.F. Unit

1	3000	3040	3040.190	+190	.0063
		3060	3060.147	+147	.0049
	3200	3240	3240.000	0	0
		3260	3260.387	+387	.012
	4000	4040	4040.000	0	0
	4100	4060	4060.050	+50	.0012
2	5000	5040	5040.708	+708	.014
	5100	5060	5059.705	-295	.0057
	6000	5960	5959.750	-250	.0042
3	7000	7040	7040.060	+60	.0085
	8800	8760	8761.250	+1250	.0142
4	10000	10040	10040.600	+600	.0057
	11200	11120	11120.960	+960	.0086
5	12000	12160	12160.240	+240	.0002
	16000	16160	16160.000	0	0
6	18000	18080	18079.760	-240	.00013
	24000	24160	24160.250	+250	.001

Specifications: The resulting output frequency shall be within .02% of the desired absolute frequency.

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Table 6

Model GO-4 Transmitter
Lost Motion, Back and Torque Lash

	Direction of approach	H.F. Unit Freq.kc	Avg. Freq.Diff.	%	Max. Freq.Diff.	%
Band 1						
3000 kc	c	3000.260				
	cc	3000.260				
	c	3000.000				
	cc	3000.100	120 cy.	.0057	580	.0193
	c	2999.680				
	cc	3000.100				
Band 3						
6000 kc	c	6001.050				
	cc	6001.780				
	c	6001.360				
	cc	6001.260	36 cy	.0006	730	.012
	c	6001.780				
	cc	6001.260				
Band 5						
12,000 kc	c	12002.520				
	cc	12002.940				
	c	12002.520	210 cy.	.00175	420	.0035
	cc	12002.730				
	c	12002.730				
	cc	12002.730				

Specifications: The frequency difference due to lost motion, back and torque lash in the controls for the master oscillator frequency determining circuits, shall not exceed .02%. The maximum departure from the initial frequency during any trial shall not exceed .05%

Band 2						
5,000 kc	c	5000.000				
	cc	5000.000				
	c	5000.500				
	cc	5000.400	200 cy.	.004	800	.016
	c	5000.800				
	cc	5000.300				
Band 4						
10,000 kc	c	10003.800				
	cc	10004.000				
	c	10003.000				
	cc	10004.200	67 cy.	.0067	800	.008
	c	10003.600				
	cc	10003.200				
Band 6						
20,000 kc	c	20002.800				
	cc	20003.200				
	c	20001.200				
	cc	20001.200	133 cy.	.00066	3200	.016
	c	19999.600				
	cc	19999.600				

Specifications: The frequency difference due to lost motion, back and torque lash in the controls for the master oscillator frequency determining circuits, shall not exceed .02%. The maximum departure from the initial frequency during any trial shall not exceed .05%.

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Table 6 (continued)

Model GO-4 Transmitter
Lost Motion, Back and Torque Lash

	Direction of approach	Freq.kc	I.F. Unit Avg. Freq.Diff.	%	Max. Freq.Diff.	%
Band 3						
444.4 kc	c	447.620				
	cc	447.615				
	c	447.615				
	cc	447.615	2 cy.	.0005	5	.0012
	c	447.615				
	cc	447.615				
Band 4						
500 kc	c	499.720				
	cc	499.710				
	c	499.710				
	cc	499.710	3 cy.	.0006	20	.004
	c	499.700				
	cc	499.700				

Specifications: The frequency difference due to lost motion, back and torque lash in the controls for the master oscillator frequency determining circuits, shall not exceed .02%. The maximum departure from the initial frequency during any trial shall not exceed .05%.

Band 1						
333.33 kc	c	333.365				
	cc	333.373				
	c	333.365				
	cc	333.365	2 cy.	.0006	8	.0024
	c	333.373				
	cc	333.373				
Band 2						
375 kc	c	374.724				
	cc	374.728				
	c	374.724				
	cc	374.724	2 cy.	.00054	4	.001
	c	374.728				
	cc	374.728				

Specifications: The frequency difference due to lost motion, back and torque lash in the controls for the master oscillator frequency determining circuits, shall not exceed .02%. The maximum departure from the initial frequency during any trial shall not exceed .05%.

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Table 7

Model GO-4 Transmitter
Operation of Tune-Operate Control

Freq.kc	PA Power Off Freq.kc	Full Power Freq.kc	Freq.Change cycles	% Freq.change
		H.F. Unit		
3500	3500.250	3500.235	-15	.00043
5500	5500.350	5500.360	+10	.00018
7000	7000.500	7000.350	-150	.0021
11000	11000.700	11000.600	-100	.00091
14000	14001.600	14001.000	-600	.0043
22000	22001.400	22001.220	-180	.00082
		I.F. Unit		
300	300.325	300.335	+10	.0034
400	400.346	400.350	+4	.001
450	450.346	450.350	+4	.00089
550	550.349	550.350	+1	.00018

Specifications: The change in frequency between power off power amplifier and the full power condition shall not exceed .01% for the H.F. and I.F. units.

Table 8

Model GO-4 Transmitter
Detuning of Circuits

Freq.kc	Detune IPA Trimmer Freq.Change	%	Detune PA Trimmer Freq.Change	%	Detune Ant.Circuit Freq.Change	%
			H.F. Unit			
3500	160 cy.	.0045	100 cy.	.0035	50 cy.	.0014
5000	150	.003	125	.0025	50	.001
7000	20	.00029	22	.00031	20	.00029
10000	200	.002	20	.0002	20	.0002
14000	120	.00086	40	.00028	40	.00028
20000	80	.0004	80	.0004	80	.0004

Freq.kc	Detune PA Trimmer Freq.Change	%	Detune Ant.Circuit,High Freq.Change	%	Detune Ant.Circuit,Low Freq.Change	%
			I.F. Unit			
300	0	0	2 cy.	.00066	3 cy.	.001
400	0	0	13	.0032	25	.0062*
450	1	.00022	6	.00133	10	.0022
500	0	0	5	.001	15	.003

Specifications: The maximum change in frequency shall not exceed .003% for the H.F. Unit or .005 for the I.F. Unit.

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Table 9

Model GO-4 Transmitter
Operation of Power Output Control

H.F. Unit

Freq kc	Freq.kc 1/4 power	Freq.kc Full Power	Freq.Change cycles	% Freq.Change
3500	3500.350	3500.375	+25	.00072
5500	5500.325	5500.313	-12	.00022
7000	7000.700	7000.600	-100	.0015
11000	11000.670	11000.730	+60	.00055
14000	14001.400	14001.300	-100	.00072
22000	22001.400	22001.240	-160	.00073

I.F. Unit

300	300.330	300.325	-5	.0017
400	400.350	400.348	-2	.0005
450	450.350	450.347	-3	.00067
550	550.350	550.349	-1	.00018

Specifications: The variation in frequency between the low power (25%) and full power shall not exceed .0025% for the H.F. Unit and .005% for the I.F. Unit.

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Table 10

Model GO-4 Transmitter
Change of Tubes

H.F. Unit - Master Oscillator

Tubes	Freq.kc		Variation from mean freq.	Avg. Var.	%
1	5002.375		+700 cycles		
2	5001.250		-425		
3	5001.600	Mean Freq. kc	-75		
4	5000.500	5001.675	-1175	662 cy.	.013
5	5001.250		-425		
6	5002.850		+1175		

H.F. Unit - 1st IPA

1	5000.420		-30		
2	5000.462		+12		
3	5000.490	Mean Freq.kc	+40		
4	5000.410	5000.450	-40	31	.00062
5	5000.490		+40		
6	5000.478		+28		

Specifications: The average variation in frequency from the mean frequency shall not exceed .10% for master oscillator tubes and .001% for the tube in next stage.

H.F. Unit - Master Oscillator

1	3000.542		-278		
2	3000.150		-670		
3	3000.140	Mean Freq.kc	-680		
4	3000.838	3000.820	+18	420	.014
5	3001.500		+680		
6	3000.625		-195		

H.F. Unit - 1st IPA

1	3000.500		-30		
2	3000.510		-20		
3	3000.542	Mean Freq. kc	+12		
4	3000.522	3000.530	-8	20	.00067
5	3000.560		+30		
6	3000.560		+30		

Specifications: The average variation in frequency from the mean frequency shall not exceed .10% for master oscillator tubes and .001% for the tube in next stage.

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Table 10 (continued)

Model GO-4 Transmitter
Change of Tubes

I.F. Unit - Master Oscillator

Tubes	Freq.kc		Variation. from mean freq.	Avg. Var.	%
1	600.383		-141 cycles		
2	600.430		-94		
3	600.450	Mean Freq.kc	-74		
4	600.500	600.524	-24	98.8	.0164
5	600.665		+141		
6	600.405		-119		

I.F. Unit - 1st IPA

1	600.395		-4		
2	600.402		+3		
3	600.402	Mean Freq. kc	+3		
4	600.403	600.399	+4	2.8	.00047
5	600.398		-1		
6	600.401		+2		

Specifications: The average variation in frequency from the mean frequency shall not exceed .10% for master oscillator and .002% for the tube in next stage.

I.F. Unit - Master Oscillator

1	300.470		+65		
2	300.405		0		
3	300.435	Mean Freq. kc	+30		
4	300.370	300.405	-35	40	.013
5	300.340		-65		
6	300.450		+45		

I.F. Unit - 1st IPA

1	300.430		+3		
2	300.430		+3		
3	300.427	Mean Freq.kc	0		
4	300.425	300.427	-2	1.66	.00055
5	300.428		+1		
6	300.428		+1		

Specifications: The average variation in frequency from the mean frequency shall not exceed .10% for master oscillator and .002% for the tube in next stage.

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Table 11

Model GO-4 Transmitter
Variation in Line Voltage

Time	Line Voltage -5%	H.F. Unit Freq.	Normal	+5%	Freq.	Total Freq. Change Cycles	% Freq. Chg.-5% Line E to +5% Line E
1 min.	133.48	3500.600	140.5	147.52	3500.570	-30	.000855
5 min.	133.48	3500.535	140.5	147.52	3500.650	+115	.00285
1 min.	128.25	5000.435	135	141.75	5000.355	-80	.0016
5 min.	128.25	5000.600	135	141.75	5000.500	-100	.002
1 min.	128.25	7001.300	135	141.75	7001.250	-50	.000715
5 min.	128.25	7001.380	135	141.75	7001.320	-60	.000857
1 min.	128.25	10001.070	135	141.75	10000.980	-90	.0009
5 min.	128.25	10001.040	135	141.75	10000.960	-80	.0008
1 min.	128.25	14002.620	135	141.75	14002.500	-120	.00086
5 min.	128.25	14002.640	135	141.75	14002.480	-160	.0014
1 min.	128.25	20002.560	135	141.75	20002.480	-80	.0004
5 min.	128.25	20002.640	135	141.75	20002.500	-140	.0007

Specifications: Frequency change not more than .005% with voltage change from 5% below to 5% above normal.

I.F. Unit

1 min.	128.25	300.610	135	141.75	300.620	+10	.0033
5 min.	128.25	300.610	135	141.75	300.617	+7	.0023
1 min.	128.25	400.603	135	141.75	400.611	+8	.002
5 min.	128.25	400.603	135	141.75	400.608	+5	.00125
1 min.	128.25	450.610	135	141.75	450.610	0	0
5 min.	128.25	450.602	135	141.75	450.610	+8	.0018
1 min.	128.25	550.600	135	141.75	550.602	+2	.00036
5 min.	128.25	550.598	135	141.75	550.594	-4	.00073

Specifications: Frequency change not more than .01% with voltage change from 5% below to 5% above normal.

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Table 12

Model GO-4 Transmitter
Variation in Ambient Temperature

H.F. Unit

Band 2 - 6000 kilocycles

Time	Temp °C	% Humidity	Freq.kc	Freq. Change,cycles	Total Freq. Change,cycles	% Freq. Chg./°C
1 hr	-25	-	5996.320			
1100	-21.1	-	5996.550	+230		
1110	-21.4	-	5996.820	+270		
1120	-20.0	-	5996.835	+15	600	.002
1130	-19.8	-	5996.920	+85		*.010
1140	-10.0	-	5997.275	+355		
1150	-9.8	-	5997.665	+390	1110	.00183
1200	-9.8	-	5997.854	+189		*.00915
1210	-10.4	-	5998.030	+176		
1220	0.0	-	5998.350	+320		
1230	0.0	-	5998.825	+475		
1240	-0,8	-	5999.075	+250	1145	.00191
1250	0.0	-	5999.175	+100		*.00955
1305	9.5	41	5999.660	+485		
1315	10.4	40	6000.000	+340	1150	.00191
1325	10.2	36	6000.230	+230		*.00955
1335	9.5	36	6000.335	+105		
1350	19.0	33	6000.975	+640		
1400	20.2	35	6001.515	+540	1715	.0028
1410	20.2	35	6001.860	+345		*.0140
1420	19.8	35	6002.050	+190		
1430	29.5	22	6002.435	+385		
1440	30.0	22	6002.950	+515	1440	.0024
1450	30.0	22	6003.275	+325		*.0120
1500	30.6	22	6003.490	+215		
1520	40.3	14	6004.050	+560		
1530	39.5	16	6004.200	+150	920	.0015
1540	42.0	16	6004.325	+125		*.0075
1550	41.5	16	6004.410	+85		
1600	50.1	10	6004.810	+400		
1610	50.0	9	6004.940	+130	705	.00117
1620	50.0	9	6005.050	+110		*.00585
1630	50.0	6	6005.115	+65		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .003%.

*Specification RE 13A 558A, frequency change not to exceed .01% for 5° C change.

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Table 12(a)

H. F. Unit

Band 2 - 4500 kilocycles

Time	Temp °C	% Humidity	Freq. kc	Freq. Change, cycles	Total Freq. Change, cycles	% Freq. Chg./°C
40 min.	-27.5	-	4495.800			
1120	-20.2	-	4496.175	+375		
1130	-19.2	-	4496.470	+295	915	.0023
1140	-19.0	-	4496.635	+165		*.0115
1150	-19.2	-	4496.715	+80		
1210	-10.8	-	4497.185	+470		
1220	-11.5	-	4497.140	-45	545	.0012
1230	-8.2	-	4497.210	+70		*.0060
1240	-8.0	-	4497.260	+50		
1255	0.0	57	4497.650	+390		
1305	0.0	62	4497.850	+200	740	.0017
1315	0.0	60	4497.950	+100		*.0085
1325	- .80	64	4498.000	+50		
1350	9.2	48	4498.425	+425		
1400	9.5	54	4498.625	+200	750	.00167
1410	10.0	53	4498.735	+110		*.00835
1420	9.8	58	4498.750	+15		
1430	19.2	44	4498.950	+200	710	.00173
1440	18.8	40	4499.235	+285		*.00865
1450	19.0	41	4499.375	+140		
1500	18.8	41	4499.460	+85		
1510	30.5	24	4499.675	+215		
1520	29.5	24	4500.000	+325	1025	.0025
1530	29.7	24	4500.315	+315		*.0125
1540	30.6	24	4500.485	+170		
1550	41.0	24.5	4500.625	+140		
1600	40.0	18.0	4501.000	+375	715	.0016
1610	40.0	14.5	4501.140	+140		*.0080
1620	40.5	11.0	4501.200	+60		
1630	50.0	8	4501.440	+240		
1640	50.5	8	4501.700	+260	725	.0016
1650	50.0	8	4501.850	+150		*.0080
1700	50.3	8	4501.925	+75		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .003%.

*Specification RE 13A 558A, frequency change not to exceed .01%.

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Table 12(b)

H.F. Unit

Band 1 - 4500 kilocycles

Time	Temp. °C	% Humidity	Freq. kc	Freq. Change, cycles	Total Freq Change, cycles	% Freq. Chg./° C
30 min.	50.8	32	4503.535			
1000	40.0	35	4503.500	-35		
1010	39.8	35	4503.275	-225		
1020	40.3	35	4503.135	-140		
1030	40.2	35	4503.060	-75	555	.00123
1040	40.5	35	4503.025	-35		*.00615
1050	40.2	35	4502.995	-30		
1100	40.0	35	4502.980	-15		
1115	30.3	37	4502.800	-180		
1125	30.1	37	4502.625	-175		
1135	30.0	37	4502.550	-75		
1145	30.0	37	4502.510	-40	495	.0011
1155	30.0	35	4502.495	-15		*.0055
1205	29.7	35	4502.490	-5		
1215	29.6	35	4502.485	-5		
1255	19.5	23	4502.240	-245		
1305	20.0	23	4502.150	-90		
1315	20.0	23	4502.125	-25	375	.00083
1325	20.0	23	4502.105	-20		*.00415
1335	20.0	23	4502.105	0		
1345	20.0	23	4502.110	+5		
1355	19.5	23	4502.110	0		
1415	9.5	32	4501.875	-235		
1425	10.2	38	4501.710	-165		
1435	10.7	43	4501.625	-85	600	.00133
1445	10.0	49	4501.555	-70		*.00665
1455	10.0	49	4501.535	-20		
1505	10.5	49	4501.510	-25		
1515	10.0	49	4501.510	0		
1530	1.00	-	4501.350	-160		
1535	.20	-	4501.230	-120		
1540	1.00	-	4501.115	-115		
1545	.20	-	4501.055	-60	535	.0019
1550	.20	-	4501.030	-25		*.0095
1555	1.50	-	4500.975	-55		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .003%.

*Specification RE 13A 558A, frequency change not to exceed .01%.

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Table 12(c)

H.F. Unit

Band 1 - 4500 kilocycles

Time	Temp.°C	% Humidity	Freq.kc	Freq. Change,cycles	Total Freq Change,cycles	% Freq. Chg./°C
2 hr	0.0	-	4502.500			
1135	-10	-	4502.000	-500		
1145	-11	-	4501.800	-200	800	.0018
1155	-9.0	-	4501.705	-95		*.0090
1205	-9.6	-	4501.700	-5		
1330	-20	-	4501.160	-540		
1340	-20.3	-	4501.100	-60	700	.00155
1350	-20.5	-	4501.040	-60		*.00775
1400	-20.5	-	4501.000	-40		
1555	-30.1	-	4500.560	-440		
1605	-30.0	-	4500.400	-160	640	.00142
1615	-30.0	-	4500.370	-30		*.00710
1625	-30.0	-	4500.360	-10		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .003%.

* Specification RE 13A 558A, frequency change not to exceed .01%.

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Table 12(d)

H.F. Unit

Band 1 - 3000 kilocycles

Time	Temp. °C	% Humidity	Freq. kc	Freq. Change, cycles	Total Freq. Change, cycles	% Freq. Chg./°C
40 min	50	29	3000.325			
1030	39.5	33	3000.325			
1040	40.0	31	3000.250	-75		
1050	40.0	31	3000.050	-200		
1100	40.5	33	3000.020	-30	-385	.00128
1110	40.0	31	2999.950	-70		*.00640
1120	40.3	33	2999.940	-10		
1130	40.0	31	2999.940	0		
1150	29.5	37	2999.750	-190		
1200	29.8	32	2999.600	-150		
1210	29.5	32	2999.500	-100		
1220	30.0	35	2999.450	-50	-535	.00178
1230	30.0	32	2999.430	-20		*.00890
1240	30.2	32	2999.415	-15		
1250	30.0	32	2999.405	-10		
1315	20.0	23	2999.305	-100		
1325	20.0	20	2999.220	-85		
1335	20.0	20	2999.160	-60		
1345	20.0	20	2999.150	-10	-280	.00093
1355	20.1	20	2999.135	-15		*.00465
1405	19.2	20	2999.125	-10		
1415	19.6	20	2999.125	0		
1440	10.7	32	2998.990	-135		
1450	9.6	32	2998.875	-115		
1500	10.6	32	2998.815	-60		
1510	10.2	32	2998.780	-35	-375	.00125
1520	10.7	32	2998.755	-25		*.00625
1530	10.0	32	2998.750	-5		
1540	9.5	32	2998.750	0		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .003%.

*Specification RE 13A 558A, frequency change not to exceed .01%.

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Table 12(e)

H.F. Unit

Band 1 - 3000 kilocycles

Time	Temp. °C	% Humidity	Freq. kc	Freq. Change, cycles	Total Freq. Change, cycles	% Freq. Chg./°C
20 min.	9.0	35	3002.400			
0915	0.0		3002.425	+25		
0925	.80		3002.400	-25		
0935	.40		3002.150	-250	-300	.0011
0945	.50		3002.100	-50		*.0055
1005	-9.5		3001.975	-125		
1015	-10.0		3001.805	-170	-415	.00138
1025	-10.0		3001.740	-65		*.00690
1035	-10.1		3001.690	-50		
1145	-20.0		3001.400	-290		
1155	-20.0		3001.350	-50	-390	.0013
1205	-20.0		3001.320	-30		*.0065
1215	-20.0		3001.300	-20		
1445	-31.0		3001.000	-300		
1455	-31.2		3000.995	-5	-305	.00089
1505	-31.5		3000.995	0		*.00445
1515	-31.9		3000.995	0		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .003%.

*Specification RE 13A 558A, frequency change not to exceed .01%.

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Table 12(f)

I.F. Unit

Band 1 - 300 kilocycles

Time	Temp. °C	% Humidity	Freq. kc	Freq. Change, cycles	Total Freq. Change, cycles	% Freq. Chg./°C
1 hr	-31	-	299.785			
1040	-20	-	299.788	+3		
1050	-20	-	299.790	+2	5	.000139
1100	-20	-	299.791	+1		*.000695
1110	-20	-	299.790	-1		
1140	-10	-	299.790	0		
1150	-10	-	299.788	-2	10	.00033
1200	-10	-	299.782	-6		*.00165
1210	-10	-	299.780	-2		
1305	-0.5	-	299.778	-2		
1315	-0.8	-	299.775	-3		
1325	0.0	-	299.780	+5	9	.0003
1335	0.0	-	299.771	-9		*.0015
1345	9.8	24	299.772	+1		
1355	9.8	22	299.770	-2	8	.000272
1405	9.8	24	299.765	-5		*.001360
1415	10.0	24	299.763	-2		
1420	20.0	24	299.764	+1		
1430	22.0	25	299.760	-4	12	.00041
1440	19.2	25	299.758	-2		*.00205
1450	20.0	25	299.751	-7		
1500	30.0	14	299.751	0		
1510	30.0	14	299.751	0		
1520	30.0	14	299.750	-1	2	.000066
1530	30.0	14	299.749	-1		*.000330
1540	42.0	1.0	299.745	-4		
1550	40.2	1.0	299.740	-5	18	.00055
1600	41.0	1.0	299.734	-6		*.00275
1610	40.2	1.0	299.731	-3		
1620	50.2	4.0	299.733	+2		
1630	51.0	4.0	299.722	-11	19	.00063
1640	50.2	4.0	299.715	-7		*.00315
1650	50.5	4.0	299.710	-5		

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .006%.

*Specification RE 13A 558A, frequency change not to exceed .02%.

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Table 12(g)

I.F. Unit

Band 4 - 550 kilocycles

Time	Temp. °C	% Humidity	Freq. kc	Freq. Change, cycles	Total Freq. Changes, cycles	% Freq. Chg./°C
1 hr	-31	-	550.310			
1030	-20	-	550.316	+6		
1040	-20	-	550.297	-19	38	.0007
1050	-20	-	550.279	-18		*.0035
1100	-20	-	550.272	-7		
1120	-10	-	550.290	+18		
1130	-10	-	550.285	-5	29	.00052
1140	-10	-	550.264	-21		*.00260
1150	-10	-	550.243	-21		
1200	0.0	-	550.240	-3		
1210	2.0	-	550.210	-30		
1220	0.0	-	550.175	-35	83	.00158
1230	0.0	-	550.150	-25		*.00790
1245	9.0	19	550.197	+47		
1255	9.0	19	550.142	-55	79	.0016
1305	9.0	19	550.100	-42		*.0080
1315	9.0	19	550.071	-29		
1335	20	18	550.070	-1		
1345	21	18	550.040	-30	41	.00074
1355	19	18	550.035	-5		*.00370
1405	19	18	550.030	-5		
1415	31.5	14	550.025	-5		
1425	30.0	14	550.020	-5		
1435	30.0	14	550.020	0	20	.00037
1445	30.0	14	550.010	-10		*.00185
1505	39.8	8	550.015	+5		
1515	40.0	8	550.010	-5		
1525	40.0	8	550.005	-5	5	.000091
1535	40.0	8	550.005	0		*.000455
1550	51.0	4	550.015	+10		
1600	51.0	4	550.002	-13		
1610	51.0	4	549.995	-7	10	.000182
1620	51.0	4	549.995	0		*.000910

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .006%.

*Specification RE 13A 558A, frequency change not to exceed .02%.

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Table 12(i)

I.F.Unit

Band 2 - 400 kilocycles

Time	Temp.°C	% Humidity	Freq.kc	Freq. Change,cycles	Total Freq. Change,cycles	% Freq. Chg./°C
2 hr.	-31	-	400.196			
1110	-20	-	400.210	+14		
1120	-20	-	400.213	+3	14	.000318
1130	-20	-	400.212	-1		*.001590
1140	-20	-	400.210	-2		
1150	-10	-	400.220	+10		
1200	-10	-	400.221	+1	10	.00025
1210	-10	-	400.221	0		*.00125
1220	-10	-	400.220	-1		
1240	-1.0	-	400.228	+8		
1250	-1.0	-	400.227	-1		
1300	-1.0	-	400.225	-2	5	.000139
1310	-0.5	-	400.225	0		*.000695
1325	10.0	26	400.230	+5		
1335	10.0	26	400.226	-4		
1345	9.5	26	400.224	-2	3	.000077
1355	9.5	26	400.222	-2		*.000385
1405	20.0	22	400.225	+3		
1415	20.0	21	400.223	-2	9	.0000208
1425	20.0	21	400.220	-3		*.0001040
1435	22.5	21	400.213	-7		
1440	30.0	21	400.217	+4		
1450	30.0	0	400.218	+1	5	.000139
1500	30.0	0	400.218	0		*.000695
1510	30.0	0	400.218	0		
1520	41.3	8	400.222	+4		
1530	40.0	9	400.219	-3	3	.000073
1540	40.0	9	400.217	-2		*.000365
1550	40.0	8	400.215	-2		
1600	50.0	8	400.210	-5		
1610	49.5	11	400.200	-10		
1620	49.0	11	400.185	-15	43	.00107
1630	49.0	11	400.172	-13		*.00535

Specifications: The average variation in frequency per degree Centigrade permanent change in ambient temperature for any 10° change in ambient shall not exceed .006%.

*Specification RE 13A 558A, frequency change not to exceed .02%.

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Table 13

Model GO-4 Transmitter
Variations in Humidity

H. F. Unit
Band 2 - 6,000 kilocycles

Time	Temp. °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	
1205	40	30	6003.520		195		1st Test
1235	40	30	6003.525		195		
1237	40	34	6003.400		195	-125	
1238	40	40	6003.225		195	-300	
1240	40	50	6003.025		195	-500	
1242	40	62	6002.725		195	-800	Increase
1244	40	68	6001.880		195	-1645	humidity
1246	40	77	6001.300		195	-2225	to 95%
1248	40	86	6000.725		195	-2800	
1250	40	93	6000.250		195	-3255	
1251	40	94	6000.000		195	-3505	
1252	40	95	5999.700		195	-3805	
1254	40	95	5999.670		195	-3835	
1256	40	95	5999.550		195	-3955	
1258	40	95	5999.510		195	-3995	2nd Test
1300	40	95	5999.420		195	-4085*	
1305	40	95	5999.520		195	-3985	
1310	40	95	5999.484		195	-4021	
1315	40	95	5999.490		195	-4015	
1322	40	95	5999.542		195	-3963	
1324	40	94	5999.600		195	-3905	
1325	40	93	6000.000		195	-3505	
1326	40	92	6000.400		195	-3105	Decrease
1328	40	86	6001.150		195	-2355	humidity
1330	40	74	6001.740		195	-1765	to 30%
1333	40	62	6002.250		195	-1255	
1335	40	52	6002.500		195	-1005	
1337	40	45	6002.650		195	-855	
1339	40	42	6002.805		195	-700	
1341	40	36	6002.975		195	-530	
1343	40	34	6003.000		203	-505	
1350	40	30	6003.195		203	-310	
1400	40	30	6003.300		203	-205	3rd Test
1410	40	30	6003.340		203	-165	
1420	40	30	6003.355		211	-170	

* Maximun frequency change, 4085 cycles, 0.066% exceeds specifications. No output power loss observed.

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .04%. Output power shall not decrease more than 15%.

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Table 13 (continued)

H. F. Unit
Band 1 - 4500 kilocycles

Time	Temp. °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	
0855	40	30	4503.750	780	193		1st Test
0925	40	30	4503.760	778	193		
0928	40	32	4503.660	778	193	-100	
0930	40	43	4503.490	788	193	-270	
0932	40	62	4503.250	788	193	-510	
0934	40	66	4502.900	781	193	-860	
0937	40	74	4502.500	781	193	-1260	
0939	40	80	4502.275	785	193	-1485	Increase
0941	40	86	4501.975	785	193	-1785	humidity
0943	40	88	4501.850	785	193	-1910	to 95%
0945	40	89	4501.790	785	193	-1970	
0947	40	90	4501.625	777	193	-2135	
0950	40	90	4501.475	777	193	-2285	
0952	40	93	4501.150	784	193	-2610	
0955	40	95	4500.500	784	193	-3260	
0957	40	95	4500.250	784	193	-3510	
0959	40	95	4500.000	784	193	-3760	
1001	40	95	4499.700	784	193	-4060	2nd Test
1002	40	95	4499.624	784	193	-4136	
1008	40	95	4499.610	784	193	-4150*	
1010	40	95	4499.670	784	193	-4090	
1013	40	95	4500.000	784	193	-3760	
1020	40	95	4500.400	794	193	-3360	
1025	40	95	4500.350	794	193	-3410	
1027	40	93	4500.000	794	193	-3760	
1029	40	85	4501.600	794	193	-2160	
1031	40	72	4501.750	794	193	-2010	
1034	40	61	4502.310	794	193	-1450	Decrease
1036	40	53	4502.725	794	193	-1035	humidity
1039	40	48	4503.000	794	193	-760	to 30%
1041	40	43	4503.165	794	193	-595	
1045	40	40	4503.300	803	195	-460	
1050	40	34	4503.460	806	197	-300	
1055	40	30	4503.600		197	-160	
1205	40	30	4503.745	794	193	-15	
1215	40	30	4503.660	794	193	-100	3rd Test
1225	40	30	4503.950	794	193	+190	
1235	40	30	4503.965	794	193	+205	

* Maximum frequency change, 4150 cycles, .092% exceeds specifications. No output power loss observed.

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .04%. Output power shall not decrease more than 15%.

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Table 13 (continued)

H. F. Unit
Band 2 - 4500 kilocycles

Time	Temp. °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	
1220	40	30	4504.525	881	209		1st Test
1250	40	30	4504.525	881	209		
1252	40	34	4504.375	910	209	-150	
1255	40	41	4504.205	871	207	-320	
1257	40	55	4504.025	892	207	-500	Increase
1259	40	65	4503.700	892	207	-825	humidity
1301	40	83	4503.200	877	207	-1325	to 95%
1303	40	93	4502.500	877	207	-2025	
1305	40	95	4502.190	875	207	-2335	
1307	40	95	4501.925	875	207	-2600	
1310	40	95	4501.550	875	207**	-2975	
1311	40	95	4501.525	882	207	-3000*	
1315	40	95	4501.780	908	207	-2745	
1327	40	95	4501.785	917	211	-2740	2nd Test
1337	40	95	4502.175	901	213	-2350	
1338	40	93	4502.450	900	213	-2075	
1341	40	87	4503.005	900	213	-1520	
1343	40	80	4503.450	900	213	-1075	Decrease
1345	40	71	4503.750	900	213	-775	humidity
1347	40	60	4503.985	900	213	-540	to 30%
1350	40	45	4504.200	900	213	-325	
1355	40	36	4504.375	900	213	-150	
1400	40	31	4504.480	902	213	-45	
1405	40	30	4504.555	902	211	+30	
1415	40	30	4504.595	902	211	+70	3rd Test
1425	40	30	4504.610	902	211	+85	
1435	40	30	4504.615	902	211	+90	

* Maximum frequency change, 3,000 cycles, .066% exceeds specifications.

** Maximum output power loss, 2 watts, .95%.

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .04%. Output power shall not decrease more than 15%.

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Table 13 (continued)

H. F. Unit
Band 1 - 3000 kilocycles

Time	Temp. °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	
0840	40	30	3003.650	890	212	0	
0910	40	30	3003.660	890	212	0	1st Test
0913	40	36	3003.540	893	212	-120	
0916	40	46	3003.375	896	212	-285	
0920	40	68	3003.175	896	212	-485	Increase
0922	40	83	3002.860	903	212	-800	humidity
0925	40	87	3002.500	903	212	-1160	to 95%
0926	40	90	3002.200	901	212	-1460	
0927	40	93	3002.065	905	212	-1595	
0928	40	94	3001.960	905	212	-1700	
0929	40	95	3001.915	909	212	-1745	
0930	40	95	3001.860	909	210	-1800*	
0940	40	95	3002.000	890	193**	-1660	
0950	40	95	3002.050	894	193	-1610	2nd Test
1000	40	95	3002.000	894	193	-1660	
1005	40	90	3002.300	880	193	-1360	
1006	40	87	3002.550	890	193	-1110	
1007	40	84	3002.755	890	193	-905	
1008	40	81	3002.900	890	200	-760	Decrease
1009	40	70	3003.015	890	200	-645	humidity
1010	40	61	3003.150	890	200	-510	to 30%
1011	40	57	3003.230	890	205	-430	
1012	40	55	3003.315	890	205	-345	
1013	40	51	3003.355	890	205	-305	
1015	40	47	3003.400	890	205	-260	
1017	40	42	3003.500	890	205	-160	
1030	40	30	3003.650	885	198	-10	
1040	40	30	3003.675	887	198	+15	3rd Test
1050	40	30	3003.680	887	198	+20	
1100	40	30	3003.660	891	198	0	

* Maximum frequency change, 1800 cycles, .06% exceeds specifications.

** Maximum output power loss, 19 watts, 8.6%.

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .04%. Output power shall not decrease more than 15%.

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Table 13 (continued)

I. F. Unit
Band 4 - 550 kilocycles

Time	Temp. °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles
1035	40	33	550.366	663	87	
1055	40	30	550.365	664	87	
1105	41	30	550.365	658	83.5	
1135	41	95	550.100	646	79.5*	-265
1205	41	95	550.015	645	79.5	-350**
1245	41	30	550.336	644	79.5	-29
1255	40	30	550.352	652	87	-13
1305	40	30	550.360	646	79.5	-5
1315	40	30	550.358	641	79.5	-7

* Maximum output power loss, 4 watts, 4.8%.

**Maximum frequency change, 350 cycles, .063%

Specifications: Frequency shall not vary during 2nd and 3rd test from end of 1st test by more than .08%. Output power shall not decrease more than 15%.

Band 3 - 450 kilocycles

1315	41	30	450.611	700	60		
1345	41	30	450.611	703	60		1st Test
1400	41	94	450.458	703	60	-153	
1430	41	97	450.385	703	60	-226#	2nd Test
1510	41	30	450.582	705	60	-29	
1520	41	30	450.594	703	60	-17	3rd Test
1530	41	30	450.601	703	60	-10	
1540	41	30	450.605	703	60	-6	

Maximum frequency change, 226 cycles, .05%

No output power loss observed.

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .08%. Output power shall not decrease more than 15%.

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Table 13 (continued)

I. F. Unit
Band 2 - 400 kilocycles

Time	Temp. °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	
0935	40	30	400.719	925	162		1st Test
1005	40	30	400.719	925	162		
1010	40	32	400.714	977	161	-5	
1015	40	36	400.710	963	161	-9	
1020	40	41	400.705	957	161	-14	Increase
1025	40	51	400.702	957	161	-17	humidity
1030	40	60	400.681	957	154	-38	to 95%
1032	40	71	400.652	957	153	-67	
1035	40	80	400.630	956	152	-89	
1037	40	87	400.593	956	152	-126	
1040	40	90	400.575	941	152	-144	
1042	40	93	400.528	945	151	-191	
1044	40	94	400.512	920	151	-207	
1050	40	97	400.532	920	151	-187	
1100	40	95	400.497	920	151	-222	
1110	40	97	400.482	920	149*	-237**	2nd Test
1120	40	97	400.509	920	149	-210	
1125	40	71	400.552	920	149	-167	
1130	40	60	400.598	920	149	-121	Decrease
1135	40	49	400.633	920	149	-86	humidity
1140	40	38	400.657	920	152	-62	to 30%
1145	40	35	400.680	926	152	-39	
1150	40	31	400.699	946	152	-20	
1200	40	30	400.700	946	152	-19	
1210	40	30	400.710	933	154	-9	3rd Test
1220	40	30	400.715	933	158	-4	
1230	40	30	400.718	933	159	-1	

* Maximum output power loss, 13 watts, 8%.

**Maximum frequency change, 237 cycles, .059%

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .08%. Output power shall not decrease more than 15%.

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Table 13 (continued)

I. F. Unit
Band 1 - 300 kilocycles

Time	Temp °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	
1210	40	30	300.680	894	96		1st Test
1240	40	30	300.680	894	96		
1243	40	62	300.673	894	96	-7	
1247	40	74	300.655	894	96	-25	Increase
1250	40	77	300.640	894	96	-40	humidity
1253	40	90	300.596	888	93	-84	to 95%
1256	40	93	300.561	888	93	-119	
1300	40	95	300.565	888	93	-115	
1310	40	97	300.536	873	91.5*	-144	
1320	40	97	300.532	873	91	-148**	2nd Test
1330	40	97	300.535	873	91	-145	
1333	40	87	300.558	873	91	-122	
1338	40	74	300.586	873	91.5	-94	Decrease
1343	40	49	300.609	874	94	-71	humidity
1348	40	47	300.631	875	96	-49	to 30%
1400	40	31	300.655	873	93	-25	
1410	40	30	300.665	873	93	-15	3rd Test
1420	40	30	300.670	905	96	-10	
1430	40	30	300.678	897	96	-2	

* Maximum output power loss, 4.5 watts, 4.7%

** Maximum frequency change, 148 cycles, .049%

Specifications: Frequency shall not vary during 2nd and 3rd tests from end of 1st test by more than .08%. Output power shall not decrease more than .08%.

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Table 13

The foregoing Table 13, pages 1 to 7, is made with respect to Specification RE 13A 558B for Model GO-5 equipment. The requirements of Specification RE 13A 558A for Model GO-4 equipment are tabulated as follows:

Variation in Humidity

Table	Freq.kc	Freq.change, cps	% Freq.Change
13,page 1	4500	4150	.092
13,page 2	4500	3000	.066
13,page 3	3000	1800	.06
13,page 4	550	350	.063
13,page 5	450	226	.05
13,page 6	400	237	.059
13,page 7	300	148	.049

Specifications: The frequency change from the absolute shall not exceed .01% for the high frequency transmitter and .02% for the low frequency transmitter.

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Table 14 (continued)

Locked Key 1/2 hour

H. F. Unit
Band 1 - 3000 kilocycles

Time	Temp °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	% Freq. Change
1114	45	18	3003.450	866	190		
1115	45	18	3003.325	866	190	-125	.0042
1116	45	18	3003.290	861	190	-160	.0053
1117	45	18	3003.245	861	190	-205	.0067
1119	45	18	3003.230	865	190	-220	.0073
1121	45	18	3003.225	865	190	-225	.0075
1124	45	18	3003.225	865	190	-225	.0075
1130	45	18	3003.215	865	190	-235*	.0078
1135	45	18	3003.225	865	190	-225	.0075
1140	45	18	3003.215	866	190	-235	.0078
1144	45	18	3003.225	866	190	-225	.0075

* Maximum frequency change, 235 cycles, .0078%

I. F. Unit
Band 4 - 550 kilocycles

1130	45	21	550.555	888	107		
1131	45	21	550.540	888	107	-15	.0027
1132	45	21	550.529	888	106	-26	.0047
1133	45	21	550.521	886	106	-34	.0062
1134	45	21	550.517	886	106	-38	.0069
1135	45	21	550.512	886	106	-43	.0078
1145	45	21	550.498	866	104	-57	.0103
1155	45	21	550.490	864	102	-65	.0118
1200	45	21	550.486	864	102	-69**	.0125

** Maximum frequency change, 69 cps, .0125%

Band 3 - 450 kilocycles

1030	45	18	450.518	896	122		
1031	45	18	450.502	896	122	-16	.0035
1032	45	18	450.498	895	121	-20	.0044
1033	45	18	450.492	895	120	-26	.0058
1034	45	18	450.490	888	119	-28	.0062
1035	45	18	450.488	888	119	-30	.0066
1045	45	18	450.477	888	119	-41	.0091
1055	45	18	450.472	887	117	-46***	.0102
1100	45	18	450.473	887	117	-45	.010

*** Maximum frequency change, 46 cps, .0102%

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Table 14 (continued)

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NAVAL RESEARCH LABORATORY

Locked Key 1/2 hour

I. F. Unit
Band 2 - 400 kilocycles

Time	Temp °C	% Humidity	Frequency kc	Input VA	R-F Output watts	Total Freq. change, cycles	% Freq. Change
0930	45	20	400.461	903	130		
0931	45	20	400.449	903	130	-12	.003
0932	45	20	400.441	903	130	-20	.005
0933	45	20	400.438	900	130	-23	.0057
0934	45	20	400.435	900	130	-26	.0065
0935	45	20	400.432	900	130	-29	.0072
0945	45	22	400.430	900	128	-31*	.0077
0955	45	22	400.430	897	128	-31	.0077
1000	45	22	400.432	897	128	-29	.0072

* Maximum frequency change 31 cps, .0077%

Band 1 - 300 kilocycles

1435	45	20	300.528	851	97		
1436	45	20	300.521	851	97	-7	.0023
1437	45	20	300.519	851	98	-9	.003
1438	45	20	300.518	848	98	-10	.0033
1439	45	20	300.515	848	98	-13	.0043
1440	45	20	300.513	848	98	-15	.005
1450	45	20	300.508	846	95	-20	.0067
1500	45	20	300.505	846	95	-23	.0077
1505	45	20	300.503	848	95	-25**	.0083

** Maximum frequency change 25 cps, .0083%

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Table 15

Model GO-4 Transmitter
Locked Key to Intermittently Keyed

Filaments energized during 20 minute key up period

I. F. Unit
Band 3 - 450 kilocycles

Initial freq. kc	Freq.kc at end of 20 min.	Freq.change cps	% Freq. Change
450.491	450.505	14	.0031

H. F. Unit
Band 2 - 4500 kilocycles

4502.415	4502.625	210	.0046

Specifications: The change in frequency shall not exceed .02% for the I.F. Unit and .01% for the H.F. Unit.

Filaments not energized during 20 minute key up period

I. F. Unit
Band 3 - 450 kilocycles

450.470	450.510	40	.0089

H. F. Unit
Band 2 - 4500 kilocycles

4503.025	4503.500	475	.015

Specifications: The change in frequency shall not exceed .05%

Table 16

Model GO-4 Transmitter
Continuously Keyed to Intermittently Keyed

I. F. Unit
Band 3 - 450 kilocycles
Keying speed, 18 words per minute

Initial freq.kc	Freq.kc at end of 20 min.	Freq.change cps	% Freq. Change
450.509	450.512	3	.00067

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H. F. Unit
Band 2 - 4500 kilocycles

4502.509	4502.560	240	.0053*

Specifications: The change in frequency shall not exceed .005% for the H.F. Unit and .01% for the I.F.Unit.

* Exceeds specifications.

[redacted]

Table 17

Model GO-4 Transmitter
Inclination

H. F. Unit
Band 2 - 5000 kilocycles
Transmitter Rotation Side to Side

Time	Rotation	Frequency kc	Input VA	R-F Output watts	Stationary Max. Inclination 45° frequency kilocycles
1355		5000.720	947	191	
1441		5000.868	947		
1445*		5000.870	947	191	
	R	5000.868			Vertical - 5000.870
1446	L	5000.895	947	191	Right - 5000.868
	R	5000.865			Left - 5000.895
1448	L	5000.895	950	191	
	R	5000.870			
1450	L	5000.901	950	191	
	R	5000.867			
1455	L	5000.898	950	191	
	R	5000.870			Vertical - 5000.870
1500	L	5000.895	950	191	Right - 5000.902
	R	5000.880			Left - 5000.865
1505	L	5000.906	950	191	
	R	5000.882			
1510	L	5000.906	950	191	
	R	5000.901			Vertical - 5000.900
1516	L	5000.902	946	191	Right - 5000.900

* Required 50 minutes to stabilize frequency, starting medium temperature.
Rotation frequency, 5 rpm.

		Rotating	Stationary
Max. freq. change	Vertical-Right	31 cps - .00062%	32 cps - .00064%
" " "	Vertical-Left	36 cps - .00072%	25 cps - .0005%
" " "	Right-Left	31 cps - .00062%	37 cps - .00074%

Specifications: Frequency change not to exceed .002%.

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Table 17 (continued)

H. F. Unit
Band 1 - 3500 kilocycles
Transmitter Rotation Forward Backward

Time	Rotation	Frequency kc	Input VA	R-F Output watts	Stationary Max. Inclination 45° frequency kilocycles
1102		3500.528	910	213	
1135*		3500.620	910	213	
	F	3500.600			Vertical - 3500.645
1135	B	3500.680	910	213	Front - 3500.660
	F	3500.610			Back - 3500.680
1140	B	3500.690	910	213	
	F	3500.616			
1145	B	3500.710	910	213	
	F	3500.620			Vertical - 3500.660
1150	B	3500.703	910	213	Front - 3500.625
	F	3500.620			Back - 3500.710
1155	B	3500.700	910	213	
	F	3500.615			
1200	B	3500.705	908	213	
	F	3500.626			Vertical - 3500.655
1205	B	3500.703	908	213	Front - 3500.628
					Back - 3500.700

* Required 31 minutes to stabilize frequency starting warm.

Rotation frequency 5 rpm.

		Rotating	Stationary
Max. freq.change	Vertical-Front	20 cps - .00057%	35 cps - .001%
" " "	Vertical-Back	90 cps - .0026%	50 cps - .0014%
" " "	Front - Back	94 cps - .0027%	85 cps - .0024%

Specifications: Frequency change not to exceed .002%

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Table 17 (continued)

H. F. Unit
Band 2 - 5000 kilocycles
Transmitter Rotation Forward-Backward

Time	Rotation	Frequency kc	Input VA	R-F Output watts	Stationary Max. Inclination 45° frequency kilocycles
0822		5000.490	887	202	
0826		5000.370	887	202	
0900		5000.703	891	202	
0947		5001.103	898	202	
0952		5000.965	906	202	
1022		5001.103	906	202	
1030*		5000.488	907	202	
	F	5000.480			Vertical - 5000.480
1030	B	5000.560	907	202	Front - 5000.560
	F	5000.500			Back - 5000.488
1033	B	5000.584	914	202	
	F	5000.520			
1035	B	5000.605	914	202	
	F	5000.545			
1040	B	5000.625	914	202	
	F	5000.553			Vertical - 5000.588
1045	B	5000.632	914	202	Front - 5000.561
	F	5000.570			Back - 5000.638
1050	B	5000.648	912	202	
	F	5000.597			
1055	B	5000.670	912	202	
	F	5000.600			Vertical - 5000.636
1100	B	5000.675	912	202	Front - 5000.603
					Back - 5000.677

* Required 2 hours 8 minutes to stabilize frequency starting cold.

Rotation frequency 5 rpm.

		Rotating	Stationary
Max.freq.change	Vertical-Front	120 cps - .0024%	80 cps - .0016
" " "	Vertical-Back	187 cps - .0037%	50 cps - .001%
" " "	Front - Back	85 cps - .0017%	77 cps - .0054%

Specifications: Frequency change not to exceed .002%

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Table 17 (continued)

Inclination due to Roll and Pitch

I.F. Unit
Band 3 - 450 kilocycles
Transmitter Rotation Forward-Backward

Time	Rotation	Frequency cps	Input VA	R-F Output watts	Stationary Max. Inclination 45° frequency cps
1328		450276.0	890	133	
1333		450268.5	890	133	
1350		450302.5	890	133	
1350		450302.5	890	133	
	F	450300.0			Vertical - 450302.5
1355	B	450296.0	892	127	Front - 450300.0
	F	450300.0			Back - 450296.0
1400	B	450296.0	892	127	
	F	450299.0			
1405	B	450295.0	892	127	
	F	450299.0			Vertical - 450302.0
1410	B	450295.0	892	127	Front - 450300.0
	F	450299.0			Back - 450296.0
1415	B	450295.5	892	127	
	F	490299.0			
1420	B	450295.5	892	127	
	F	450300.0			Vertical - 450302.0
1425	B	450296.5	892	127	Front - 450300.0
					Back - 450296.5

Rotation frequency 5 rpm.

		Rotating	Stationary
Max.freq.change	Vertical-Front	3.5 cps - .00078%	2.5 cps - .00055%
" " "	Vertical-Back	7.5 cps - .0017%	6 cps - .0013%
" " "	Front - Back	4 cps - .00089%	4 cps - .00089%

Specifications; Frequency change not to exceed .01%.

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Table 17 (continued)

Inclination

I. F. Unit
Band 3 - 450 kilocycles
Transmitter Rotation Side to Side

Time	Rotation	Frequency cps	Input VA	R-F Output watts	Stationary Max. Inclination 45° frequency cps
0958		450295.5	855	133	
	R	450295.5			Vertical - 450295.5
1000	L	450291.5	855	133	Right - 450295.5
	R	450293.0			Left - 450291.5
1005	L	450289.0	855	133	
	R	450290.0			
1010	L	450286.0	856	133	
	R	450289.0			Vertical - 450289.0
1015	L	450285.0	857	131	Right - 450289.0
	R	450287.0			Left - 450285.0
1020	L	450283.0	858	133	
	R	450285.0			
1025	L	450281.0	858	133	
	R	450285.0			Vertical - 450285.0
1030	L	450281.0	858	133	Right - 450285.0
					Left - 450281.0

Rotation frequency 5 rpm.

		Rotating	Stationary
Max. freq. change	Vertical-Right	10.5 cps-.0022%	0 cps - 0%
" " "	Vertical-Left	14.5 cps-.0032%	4 cps - .00089%
" " "	Right - Left	4 cps-.00089%	4 cps - .00089%

Specifications: Frequency change not to exceed .01%

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Table 18

Model GO-4 Transmitter
Vibration

H.F. Unit
Band 1 - 4500 kilocycles

Time	Vibration Freq. cps	Frequency kc	Input VA	R-F Output watts	Total Freq. Change, cps	% Freq. Change
1220	15	4500.510	792	191		
1222	15	4500.480	792	191	-30	.00066
1225	15	4500.510	792	191	0	0
1230	15	4500.534	792	191	+24	.00053
1235	15	4500.532	793	191	+22	.00049
1240	15	4500.535	793	191	+25	.00055
1245	15	4500.555	794	191	+45	.001
1250	14	4500.550	794	191	+40	.00089

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps.
Specifications: Frequency not to exceed .0015%

Band 2 - 6000 kilocycles

1530	21	6000.455	851	213		
1535	21	6000.540	851	213	+85	.0014
1540	21	6000.560	851	213	+105	.00175
1545	21	6000.565	851	213	+110	.00183
1550	21	6000.578	851	213	+123	.00205
1555	21	6000.598	851	213	+143	.00238
1600	21	6000.600	851	213	+145	.00242

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps.
Specifications: Frequency change not to exceed .0015%.

Band 1 - 3000 kilocycles

1230	22	3002.515	852	190		
1235	22	3002.675	852	190	+160	.0053
1240	22	3002.715	857	190	+200	.0066
1245	22	3002.715	860	190	+200	.0066
1250	22	3002.625	860	190	+110	.0036
1255	22	3002.650	863	190	+135	.0045
1300	22	3002.725	863	180	+210	.007
1305	22	3002.680	863	180	+165	.0055

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps.
Specifications: Frequency change not to exceed .0015%

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Table 18 (continued)

Band 2 - 4500 kilocycles

Time	Vibration Freq. cps	Frequency kc	Input VA	R-F Output watts	Total Freq. Change, cps	% Freq.Change
1405	18	4500.583	876	190		
1410	18	4500.599	876	190	+16	.00036
1415	20	4500.617	876	190	+34	.00075
1420	20	4500.621	876	190	+38	.00084
1425	21	4500.608	890	190	+25	.00055
1430	22	4500.590	890	190	+7	.00015
1435	22	4500.618	890	190	+35	.0078

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps.
Specifications: Frequency change not to exceed .0015%.

I.F. Unit

Band 4 - 550 kilocycles

		Freq.cps				
1528	21	550332.5	917	142		
1530	21	550332.5	917	142		
1531	21	550332.5	917	142	0	0
1533	21	550332.5	915	142	0	0
1535	21	550333.0	915	142	+.5	.000091
1540	21	550332.5	915	142	0	0
1545	21	550332.5	915	142	0	0
1550	21	550332.5	916	142	0	0
1555	21	550335.0	917	142	+2.5	.00045
1600	21	550335.0	917	142	+2.5	.00045

Vibration amplitude varied from 1/64" to 3/32"
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps.
Specifications: Frequency change not to exceed .005%.

Band 3 - 450 kilocycles

1448	14	450327.5	906	133		
1450	14	450327.5	906	133		
1451	14	450326.0	906	133	-1.5	.00033
1452	14	450326.0	906	133	-1.5	.00033
1455	14	450326.0	906	133	-1.5	.00033
1500	14	450326.0	906	133	-1.5	.00033
1505	14	450326.0	906	133	-1.5	.00033
1510	14	450326.0	906	133	-1.5	.00033
1515	14	450326.0	906	133	-1.5	.00033
1520	14	450326.0	906	133	-1.5	.00033

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps.
Specifications: Frequency change not to exceed .005%.

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Table 18 (continued)

I.F. Unit
Band 2 - 400 kilocycles

Time	Vibration freq, cps	Frequency cps	Input VA	R-F Output watts	Total Freq. Change, cps	% Freq.Change
1408	11	400346.5	897	133		
1410	11	400346.5	897	133		
1411	11	400345.0	897	133	-1.5	.00037
1412	11	400345.5	897	133	-1.0	.00025
1415	11	400346.0	897	133	-.5	.000125
1420	11	400347.5	895	133	+1.0	.00025
1425	11	400347.5	895	132	+1.0	.00025
1430	11	400346.0	895	132	-.5	.000125
1435	21	400348.0	898	132	+1.5	.00037
1440	21	400349.5	902	132	+3.0	.00075

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps
Specifications: Frequency change not to exceed .005%.

Band 1 - 300 kilocycles

		Freq. kcs				
1300		300.295	897	123		
1320		300.295	897	123		
1321	30	300.285	897	123	-10	.0033
1322	30	300.284	900	123	-11	.0036
1323	30	300.282	900	123	-12	.0041
1325	30	300.282	895	122	-12	.0041
1330	30	300.282	895	122	-12	.0041
1335	30	300.282	895	122	-12	.0041
1340	30	300.282	895	122	-12	.0041
1345	30	300.282	900	122	-12	.0041
1350	30	300.282	902	122	-12	.0041

Vibration amplitude varied from 1/64" to 3/32".
CW and MCW operation satisfactory over vibration frequency 15 to 30 cps
Specifications: Frequency change not to exceed .005%.

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Table 19

Model GO-4 Transmitter
Power Reduction, Full Power to Tune

I. F. Unit - 440 kilocycles, Band 3

	Ant R E drop	Voltage Ratio	DB	Specified Power Reduction
Full power	35.9			
1/2 power	26.0	1.38	-2.8	-3.0 approx.
1/4 power	18.4	1.95	-5.8	-6.0 approx.
Tune	.150	240	-47.6	-35.0 or more

H. F. Unit - 3000 kilocycles, Band 1

Full power	70			
1/2 power	48.3	1.45	-3.22	-3.0 approx.
1/4 power	33.7	2.08	-6.36	-6.0 approx.
Tune	.20	350	-50.88	-35.0 or more

H. F. Unit - 25000 kilocycles, Band 6

Full power	100.5			
1/2 power	76.5	1.31	-2.34	-3.0 approx.
1/4 power	52.5	1.91	-5.62	-6.0 approx.
Tune	1.36	74	-37.38	-35.0 or more

Specifications: Power reduced in the tune position shall be 35 decibels or more.

Table 20

Model GO-4 Transmitter
Frequency Range and Overlap

H. F. Unit

Band	Min. Freq.kc	Dial Setting	Max. Freq.kc	Dial Setting	Overlap kilocycles	Overlap %
1	2826.65	2790	4552.50	4595		
2	4246.40	4145	6827.50	6890	306.10	7.25
3	5653.30	5580	9105.00	9190	1174.20	20.8
4	8492.80	8290	13655.00	13780	612.20	7.2
5	11306.60	11160	18210.00	18380	2348.40	20.7
6	16985.60	16580	27310.00	27560	1224.40	7.2

% below 3000 kilocycles = 5.78 % above 26,500 kilocycles = 2.31

I. F. Unit

1	279.705	278.80	353.45	355.50		
2	345.40	344.52	436.71	439.00	8.05	2.32
3	411.19	410.00	519.65	522.00	25.72	6.20
4	493.56	492.00	623.77	627.20	26.09	5.03

% below 300 kilocycles = 6.76 % above 600 kilocycles = 3.96

Specifications: The continuity of the frequency range shall be 2% between bands for the H.F. and I.F. Units.

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Table 21

Model GO-4 Transmitter
Side Tone Voltage Control

Output Resistance 600 ohms

Min. Output volts	Max. Output volts	Max. Output Power milliwatts
0	9	100

Output Resistance 100 ohms

0	6	225

Circuit Impedance 95 ohms.

Specifications: Output voltage variable from 1/2 to 6 volts across output impedance of from 150 to 300 ohms and at least 500 milliwatts of power.

Table 22

Model GO-4 Transmitter
Modulation Frequency

The modulation frequency is twice the rectifier input frequency.

Rectifier Input Frequency	Modulation Frequency
800 cps	1600 cps
600 cps	1200 cps

Specifications: Modulation frequency to be from 1200 to 1600 cycles per second.

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[redacted]

Table 23

Model GO-4 Transmitter
Filament Voltage Variation

CW Operation, Full Power

Condition	Filament Volts	% Change Filament Voltage
Key open	10.1	1%
Key closed	10.0	

Specifications not more than 1%.

MCW Operation, Full Power

Key open	10.4	5.7*
Key closed	9.8	

*Specifications not more than 5%.

Filament voltage variation

	Full load	
Maximum voltage	10 volts	% change
Minimum voltage	8.7 volts	13%

	No load	
Maximum voltage	9.9 volts	% change
Minimum voltage	9.0 volts	9.1%

Specifications not less than 5% change.

Table 24

Model GO-4 Transmitter
Keying Relay D-C Power

Volts	Amperes	Watts	Volts	Amperes	Watts
13.8	2.02	27.9	12.7	1.85	23.5

Specifications: The current drawn shall not exceed 3 amperes.

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Table 25

Model GO-4 Transmitter
Rectifier Voltage Regulation

High Voltage Rectifier

No Load Voltage	75% Full Load Voltage	Full Load Voltage	Regulation
1238	1135	1100	12.5%

Low Voltage Rectifier

536	490	475	12.8%

Specifications: The main rectifier (high voltage) shall be of the full wave type and shall have a voltage regulation of not more than 20% as determined by drawing a straight line between the full load voltage point and a point on the curve at 75% of full load current. Auxiliary rectifiers (low voltage) shall have a regulation of not more than 25% based on the above method. See Plate 42 for above determination of regulation.

Table 26

Model GO-4 Transmitter
Rectifier Efficiency
High Voltage Rectifier

Volts Input	Watts Input	Watts Output	Efficiency	Output Volts	Output Amperes
112	500	418	83.5%	1100	.380
112	384	324	84.5%	1135	.285

Low Voltage Rectifier

112	82.4	59.4	72.2%	475	.125
112	66.0	46.0	69.8%	490	.094

Overall Efficiency

$$\frac{\text{Total Watts Output}}{\text{Total Watts Input}} \times 100 = \frac{477.4}{582.4} \times 100 = 82\%$$

Specifications: The full load efficiency of total power conversion, A.C. to D.C., shall not be less than 80%.

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Table 27

Model GO-4 Transmitter
Rectifier Output Voltage Ripple

High Voltage Rectifier

D-C Voltage	Ripple Voltage	% Ripple
1060	14.5	1.36

Low Voltage Rectifier

430	4	.93

Note: Above voltages obtained with meters.

Specifications: Total rms voltage ripple not more than 1% of the average d-c voltage.

Plate 1, Fig. 2, shows oscillogram of calibration voltage and ripple voltage.

Calibration voltage = 5 volts (.336")
Ripple voltage = 9.65 volts (.650")
Ripple percentage = .91%

[redacted]

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Table 28

Model GO-4 Transmitter
Observation of Output Power Loss vs Humidity

H. F. Unit
Band 5 - 18,000 kilocycles

Time	Temp °C	% Humidity	Input VA	R-F Output watts
1430	40	30	818	245
1440	40	30	832	245
1450	40	69	832	245
1500	40	90	832	245
1510	40	95	832	243*
1520	40	95	832	243
1530	40	95	832	252

* Output power loss, 2 watts, .82%

H. F. Unit
Band 6 - 26,000 kilocycles

0915	40	30	857	227
0920	40	34	857	227
0925	40	80	855	225
0930	40	95	858	225
0940	40	97	859	225
0950	40	97	859	223*
1000	40	97	858	223

* Maximum output power loss, 4 watts, 1.75%

Specifications: Output power loss not more than 15%.

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Table 29

Model GO-4 Transmitter
Observation of Frequency Drift
after Vibration and Inclination Tests

H. F. Unit
Band 2 - 5,000 kilocycles

Time	Frequency kc	Input VA	R-F Output watts	Total Freq Change, cps	% Freq. Change, cps	Temperature °C PA Stage	Temperature °C Ambient
			Transmitter Started Warm				
1210	5000.590	910	213			59.2	21.6
1215	5000.588	915	213	-2	.00004	59.2	21.6
1220	5000.574	915	213	-16	.00032	59.2	21.6
1225	5000.589	917	213	-1	.00002	59.2	21.6
1230	5000.609	917	213	+19	.00038	59.2	21.6
1240	5000.631	917	213	+41	.00082	59.5	21.6
1245	5000.640	917	213	+50	.001	59.5	21.4
1250	5000.650	917	213	+60	.0012	59.7	21.4
1255	5000.650	917	213	+60	.0012	59.7	21.4
			Stabilization Time 40 minutes				
			Transmitter Started After 3-1/2 Hours Cooling				
1430	5000.570	916	190			42.5	21.8
1431	5000.400	916	190	-170	.0033	42.5	21.8
1433	5000.300	916	190	-270	.0054	44.5	21.8
1433	5000.250	920	190	-320	.0064	46.5	21.8
1437	5000.200	920	190	-370	.0074	48.5	21.8
1438	5000.190	920	190	-380	.0076	50.0	21.8
1440	5000.180	921	190	-390	.0078	53.0	21.7
1445*	5000.220	921	190	-350	.0070	53.5	21.7
1447	5000.240	921	190	-330	.0066	54.5	21.7
1450	5000.240	921	180	-330	.0066	55.0	21.7
1452	5000.250	921	180	-320	.0064	56.8	21.6
1458	5000.355	920	180	-215	.0043	58.4	21.4
1505	5000.360	920	180	-210	.0042	59.4	20.8
1512	5000.400	918	180	-170	.0033	60.0	20.5
1520	5000.440	918	180	-130	.0026	60.7	21.0
1530	5000.500	918	180	-70	.0014	61.5	21.0
1537	5000.522	918	180	-48	.00096	62.0	21.5
1555	5000.600	920	180	+30	.0006	62.9	21.0
1600	5000.630	920	180	+60	.0012	62.9	21.0
1615	5000.632	920	180	+62	.00124	62.9	21.0

Stabilization Time 1 hour 45 minutes

Frequency change per ° C = .0042% for first 35 minutes.

* Frequency drift reversed.

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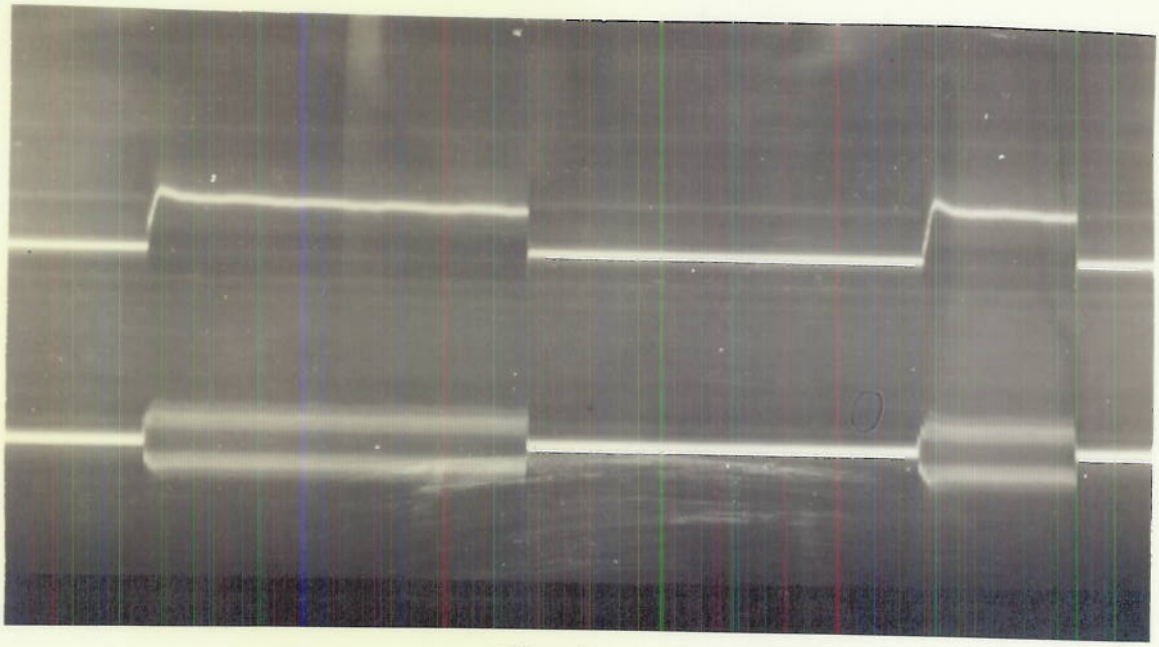

Fig.1

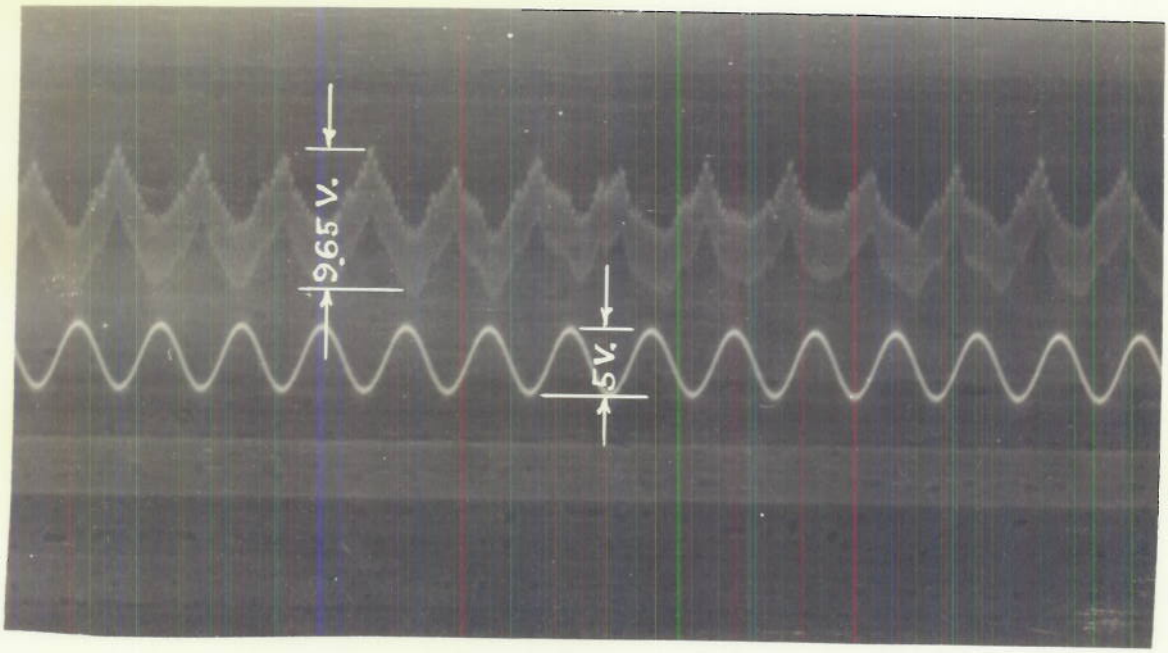

Fig.2

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Plate 1

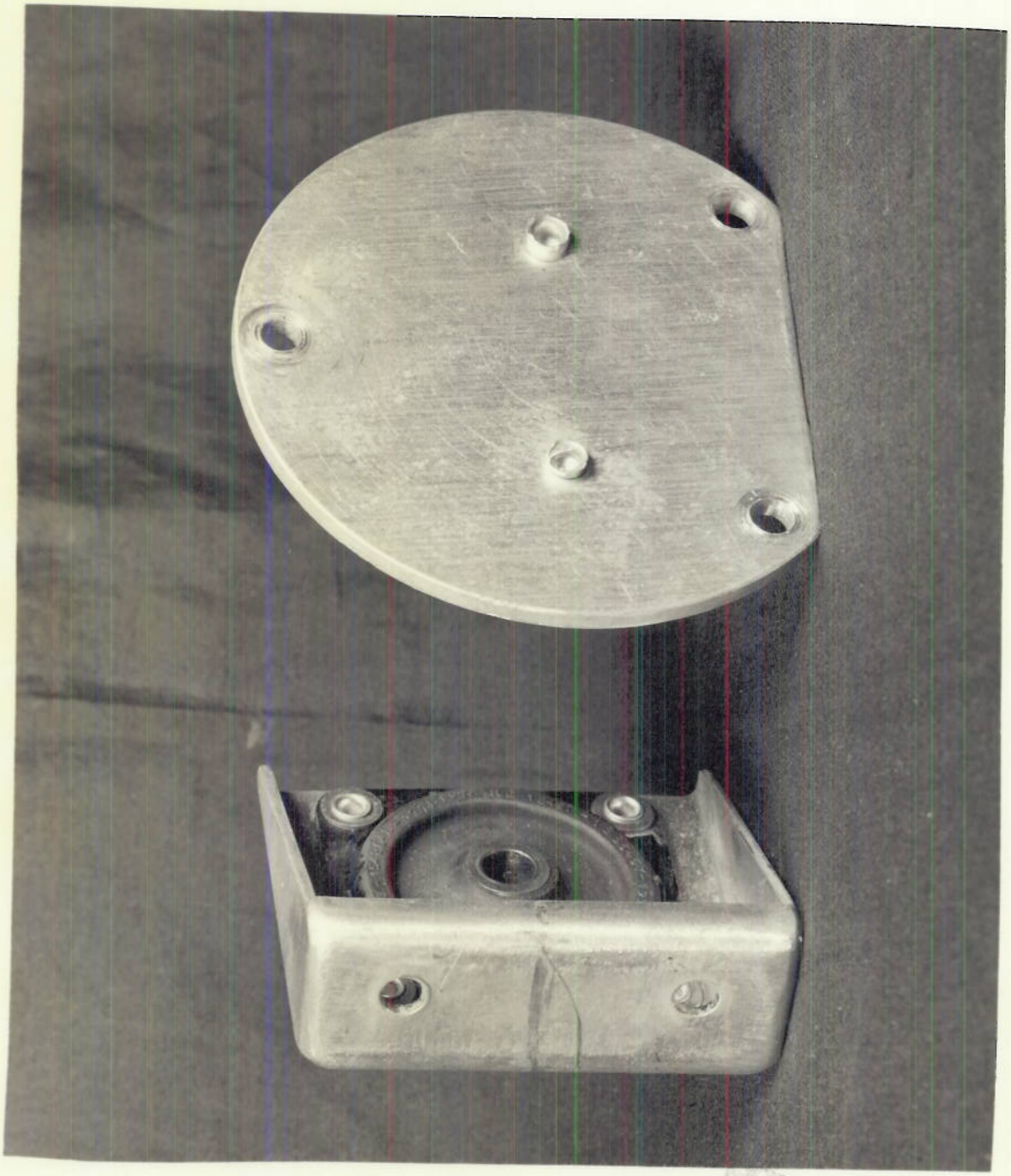

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Plate 2

BELLEVUE, D. C. DATE

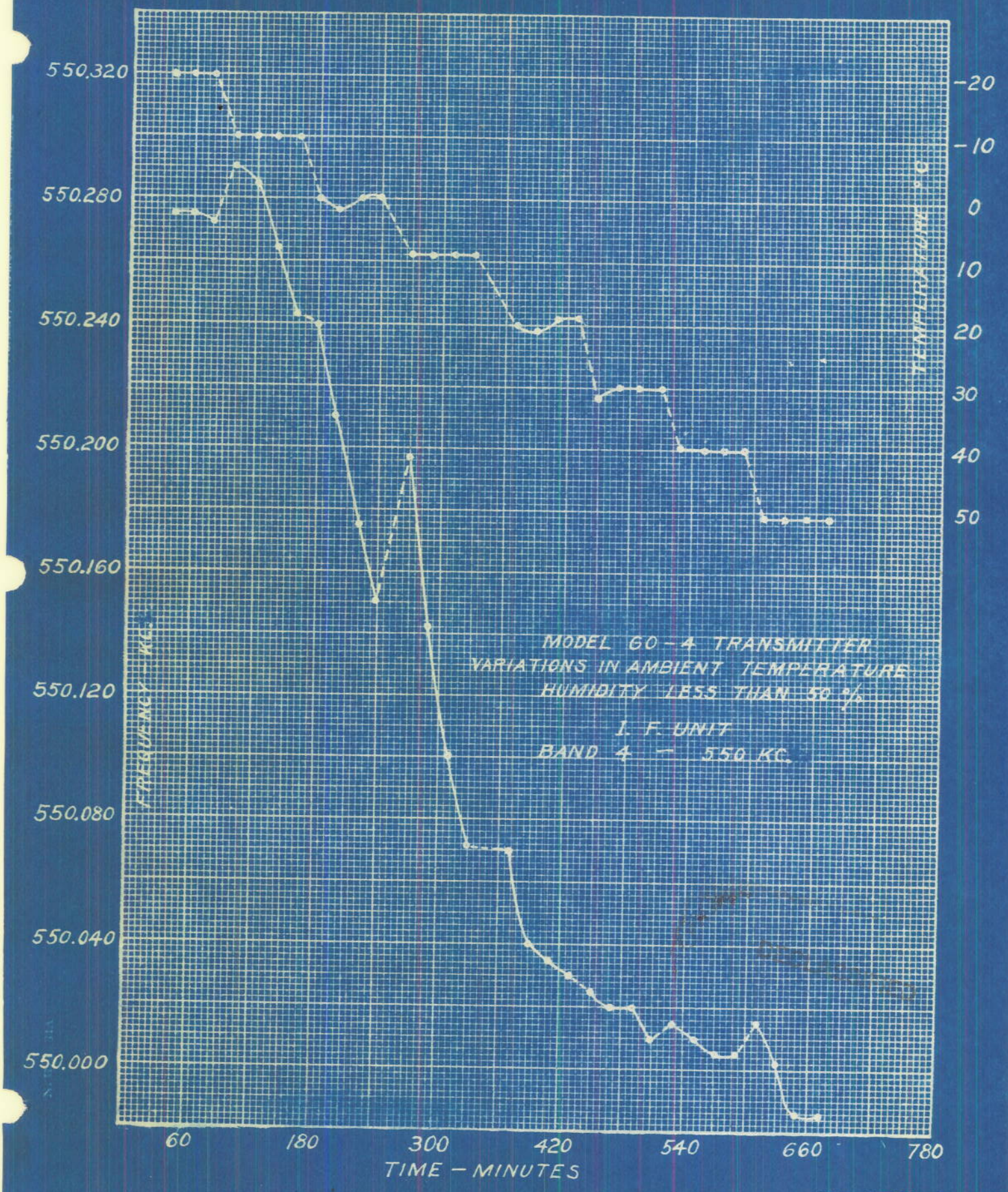

PLATE 3

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BELLEVUE, D. C.

DATE

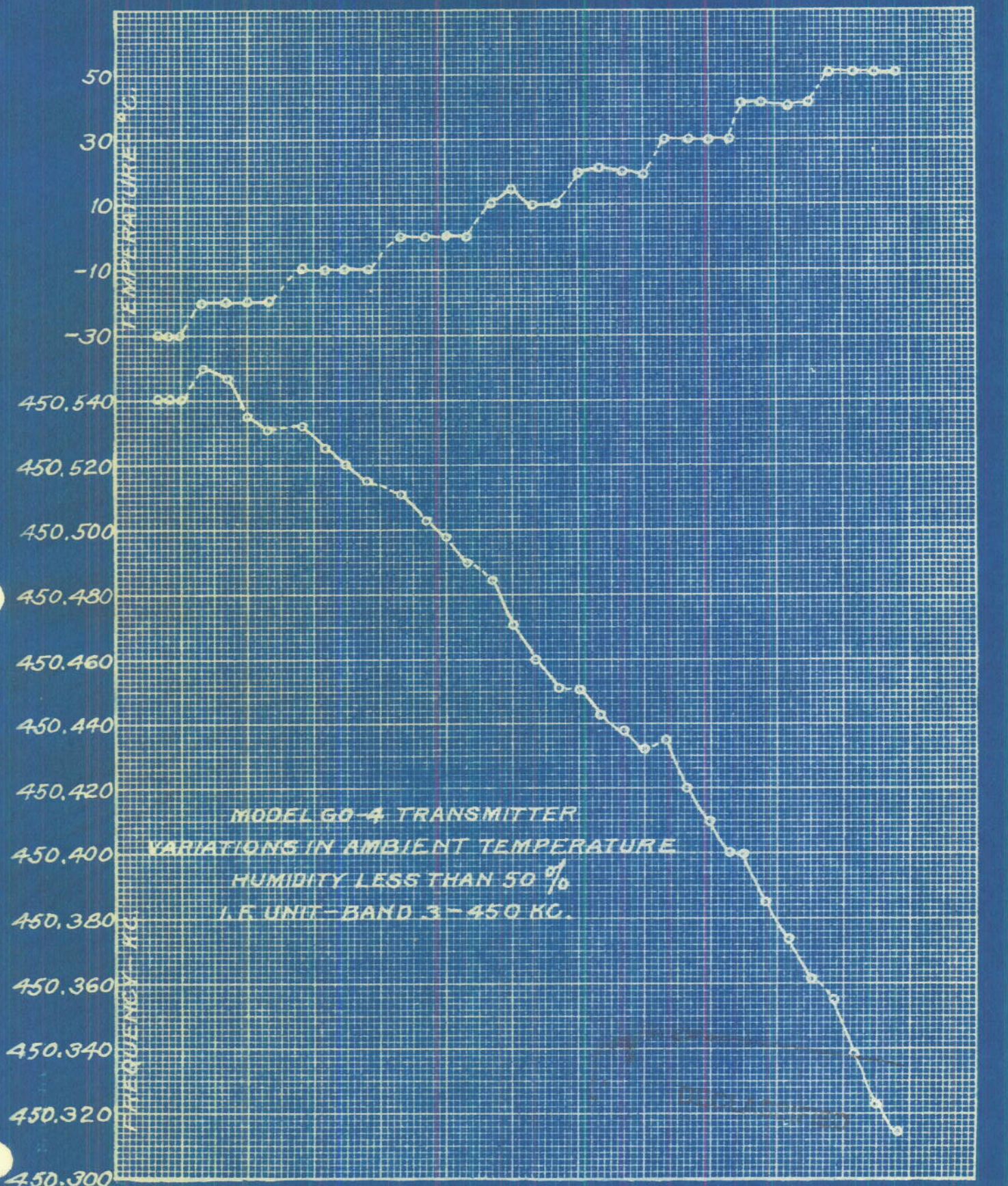

PLATE 4

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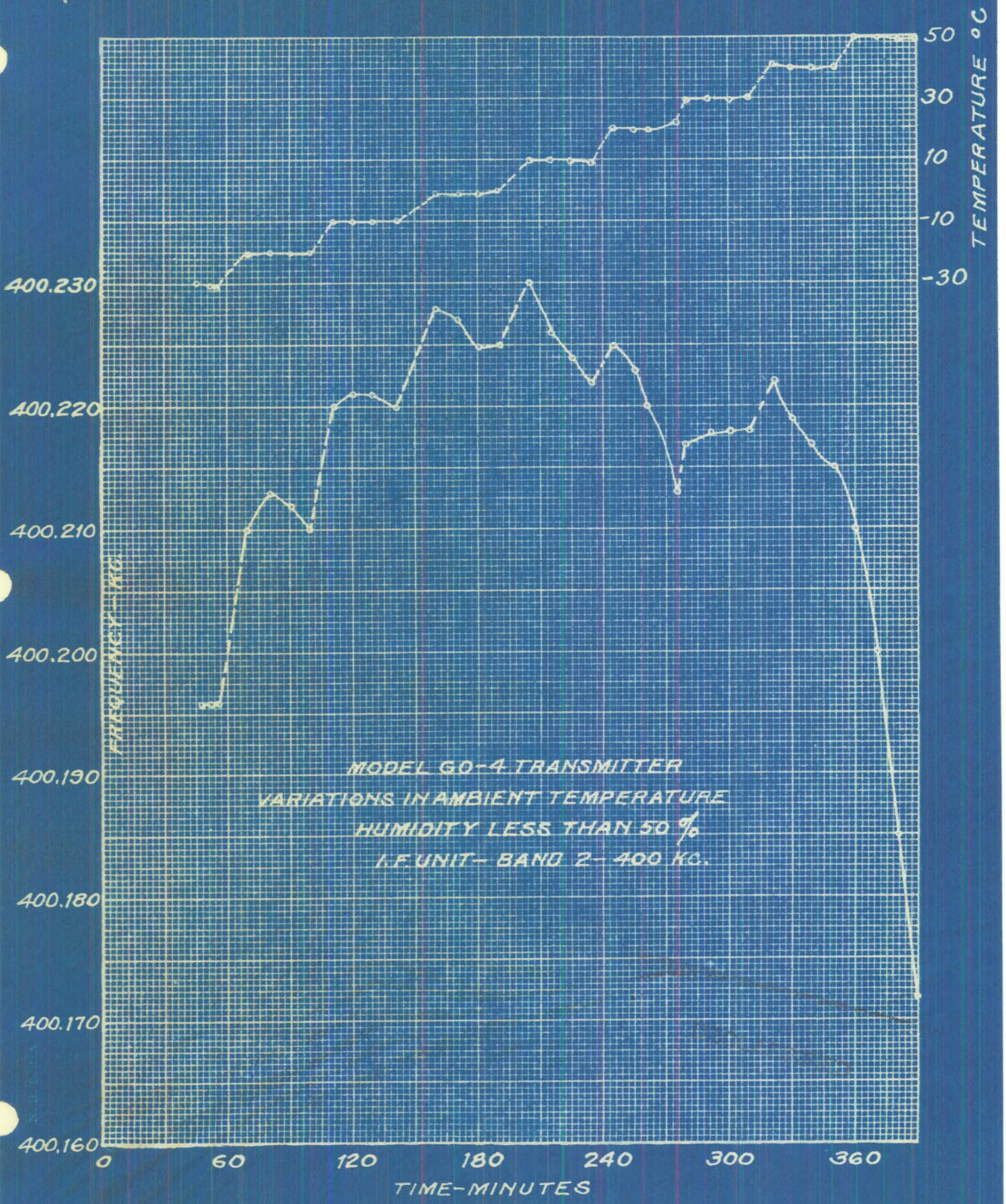

PLATE 5

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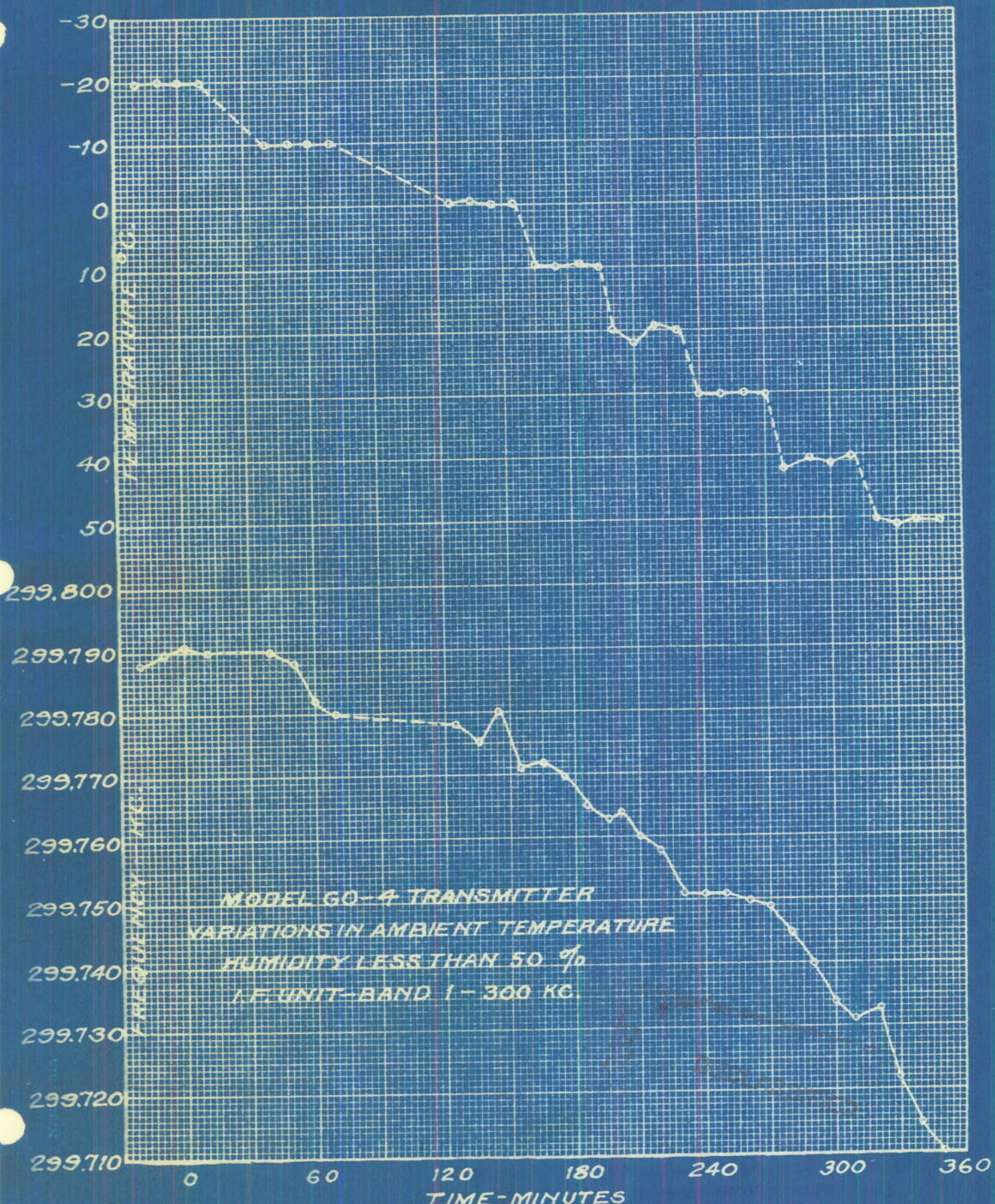

PLATE 6

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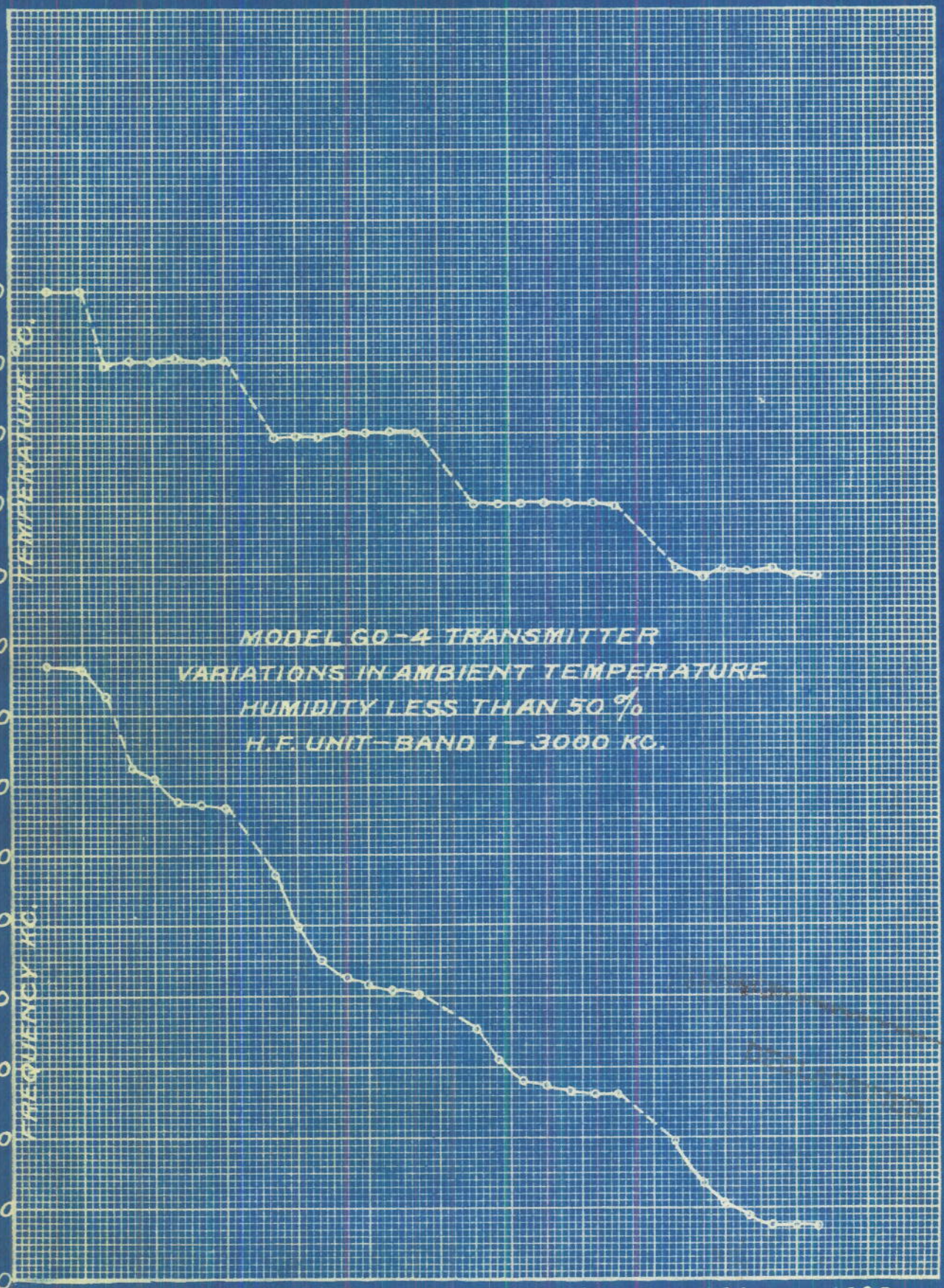

PLATE 7

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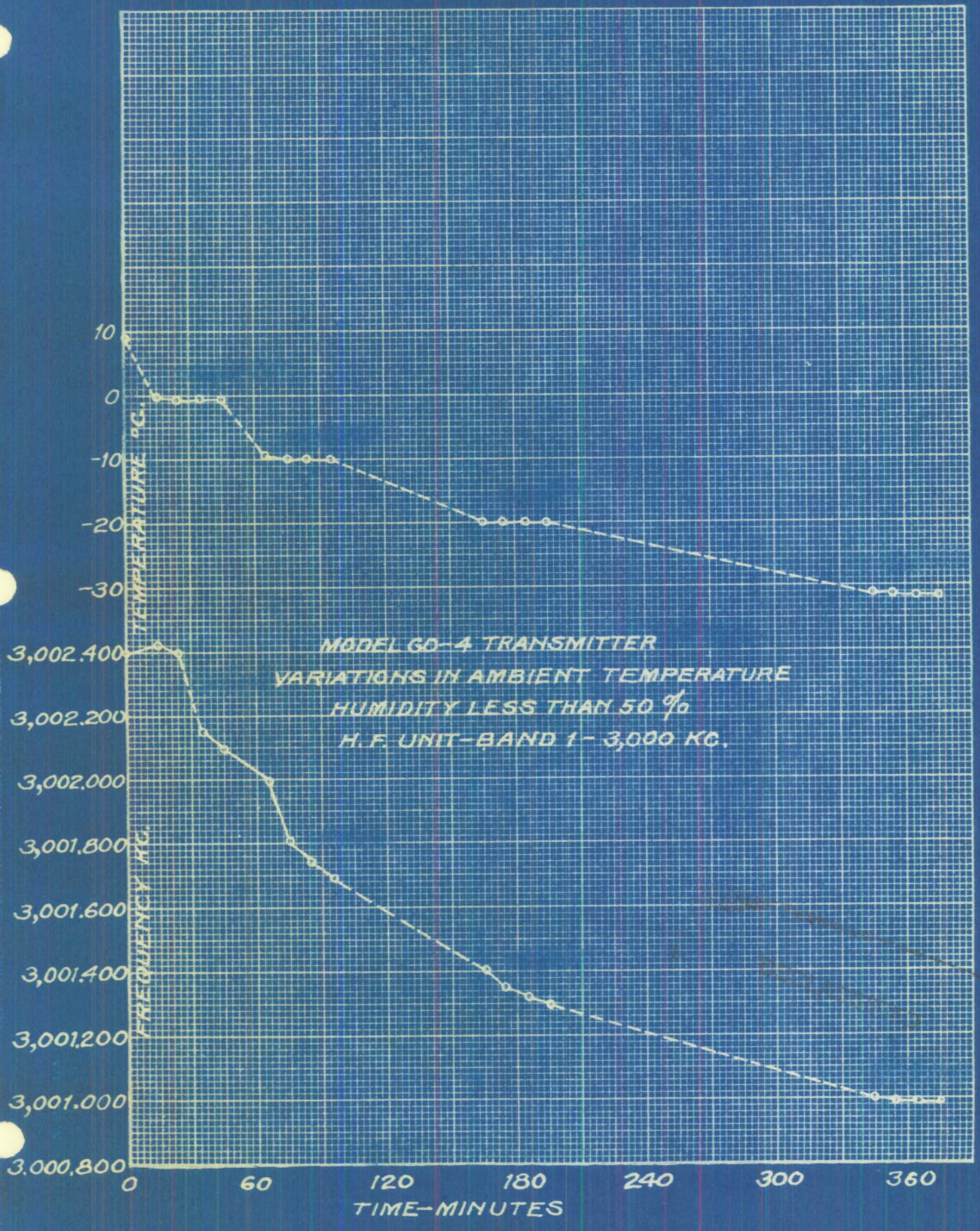

PLATE 8

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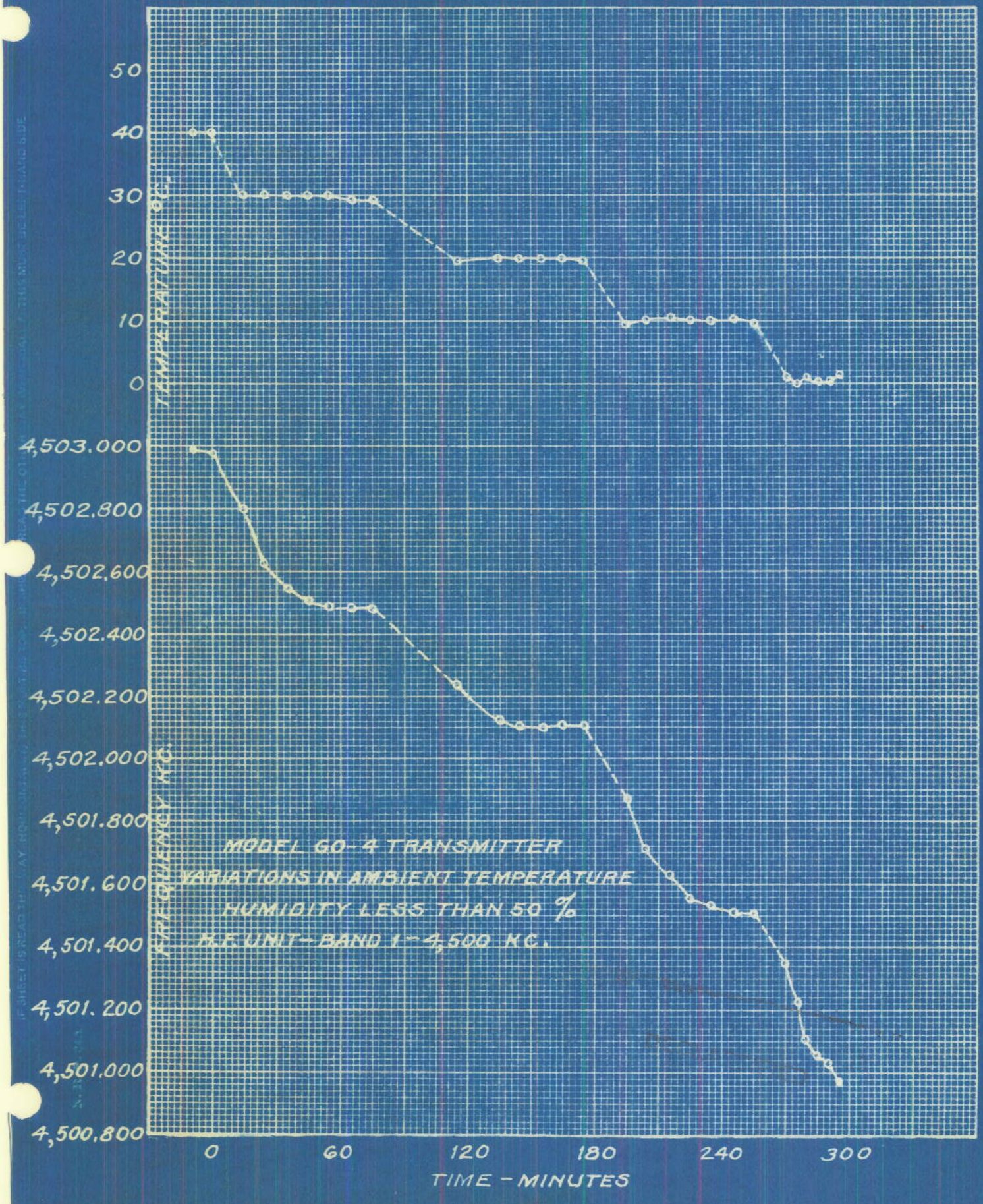

PLATE 9

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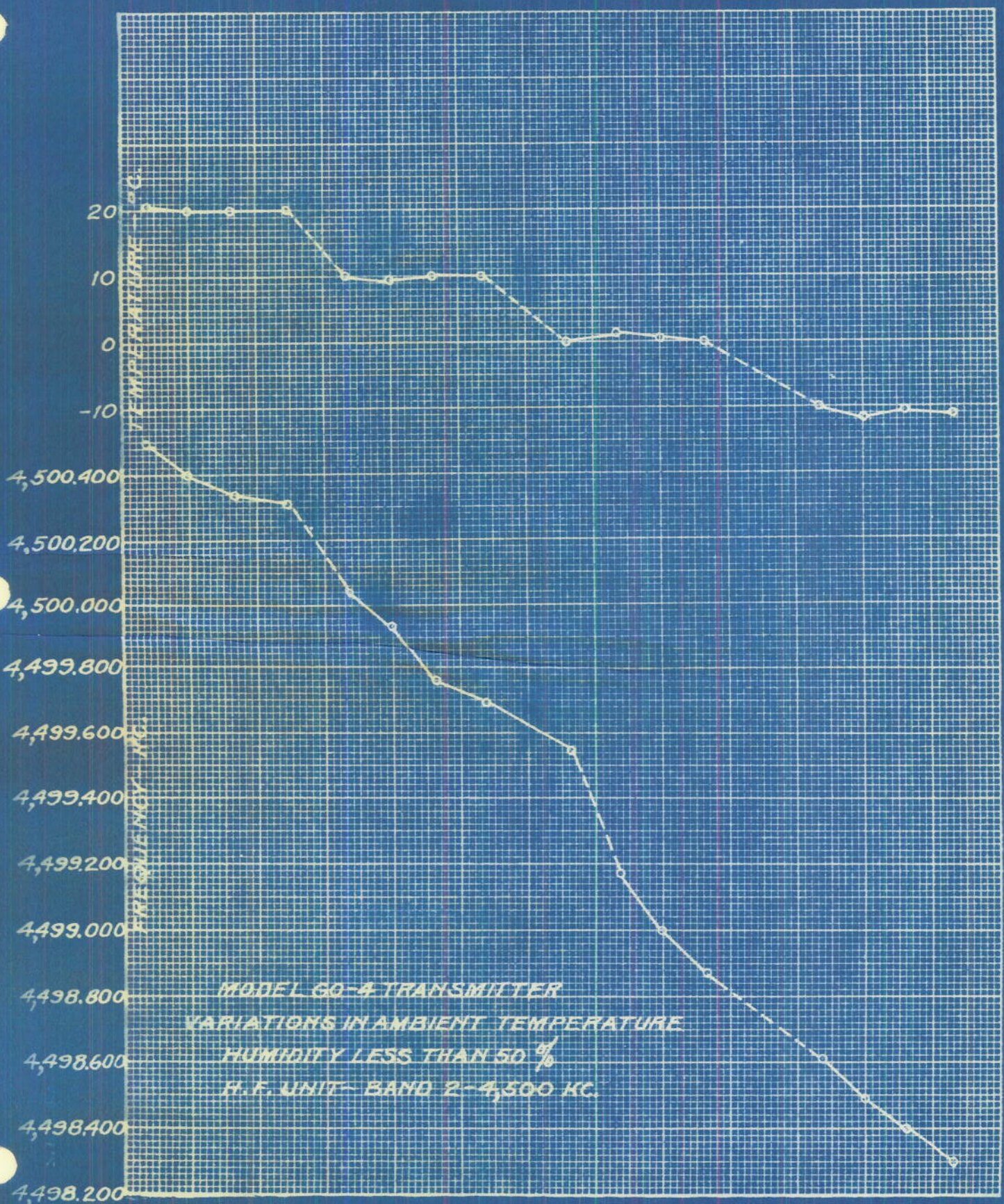

PLATE 10

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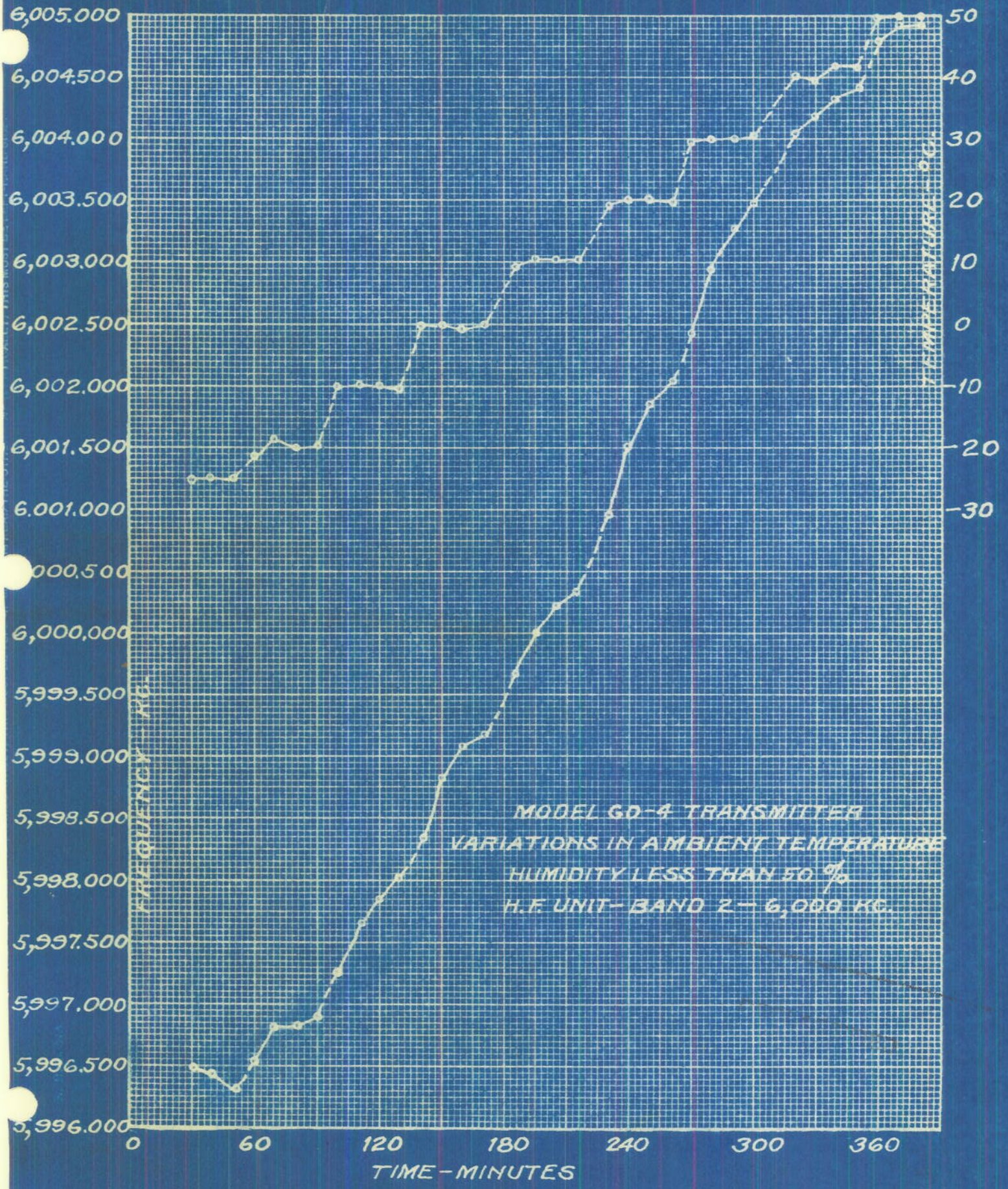

PLATE 11

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BELLEVUE, D. C.

DATE

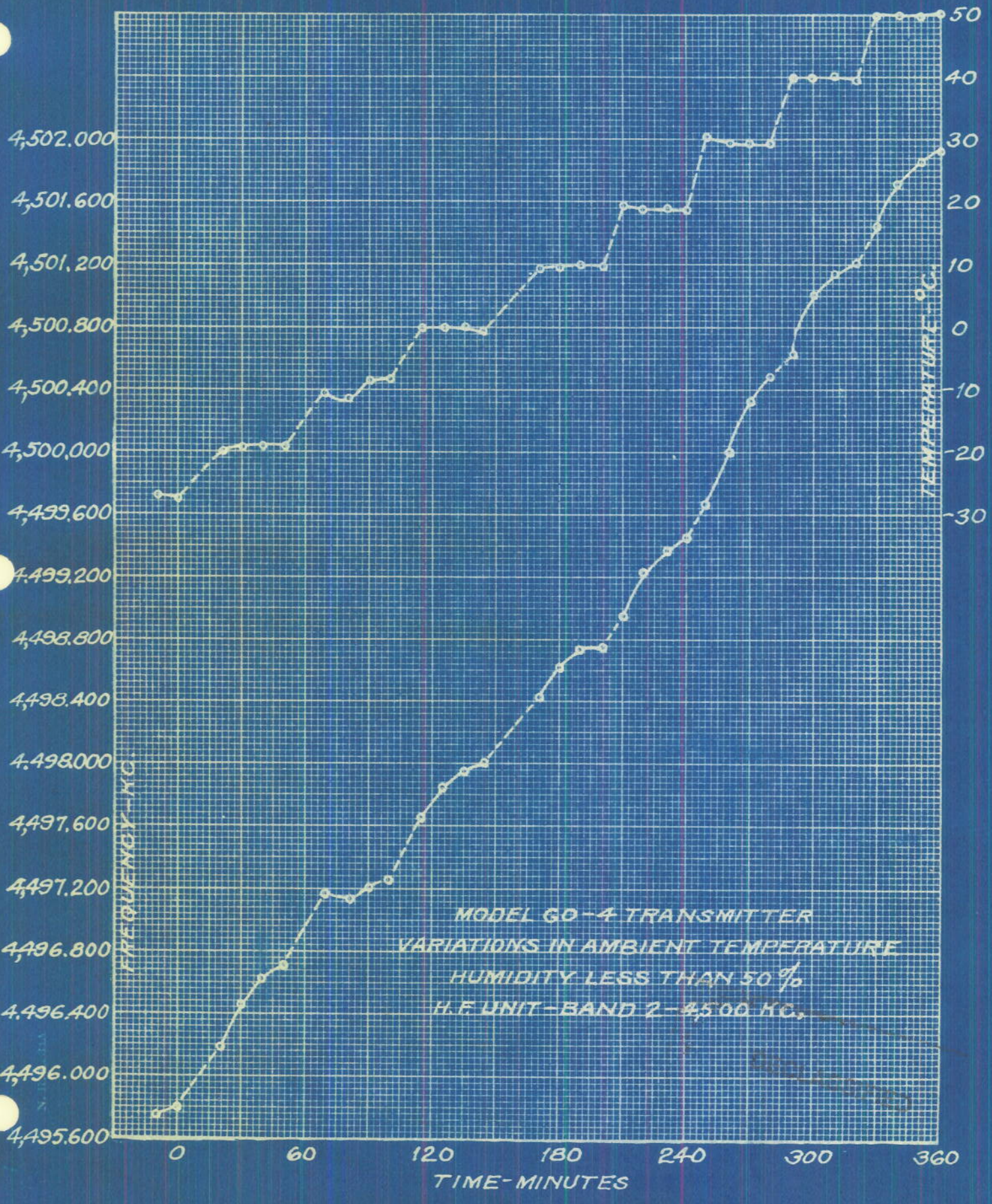


PLATE 12

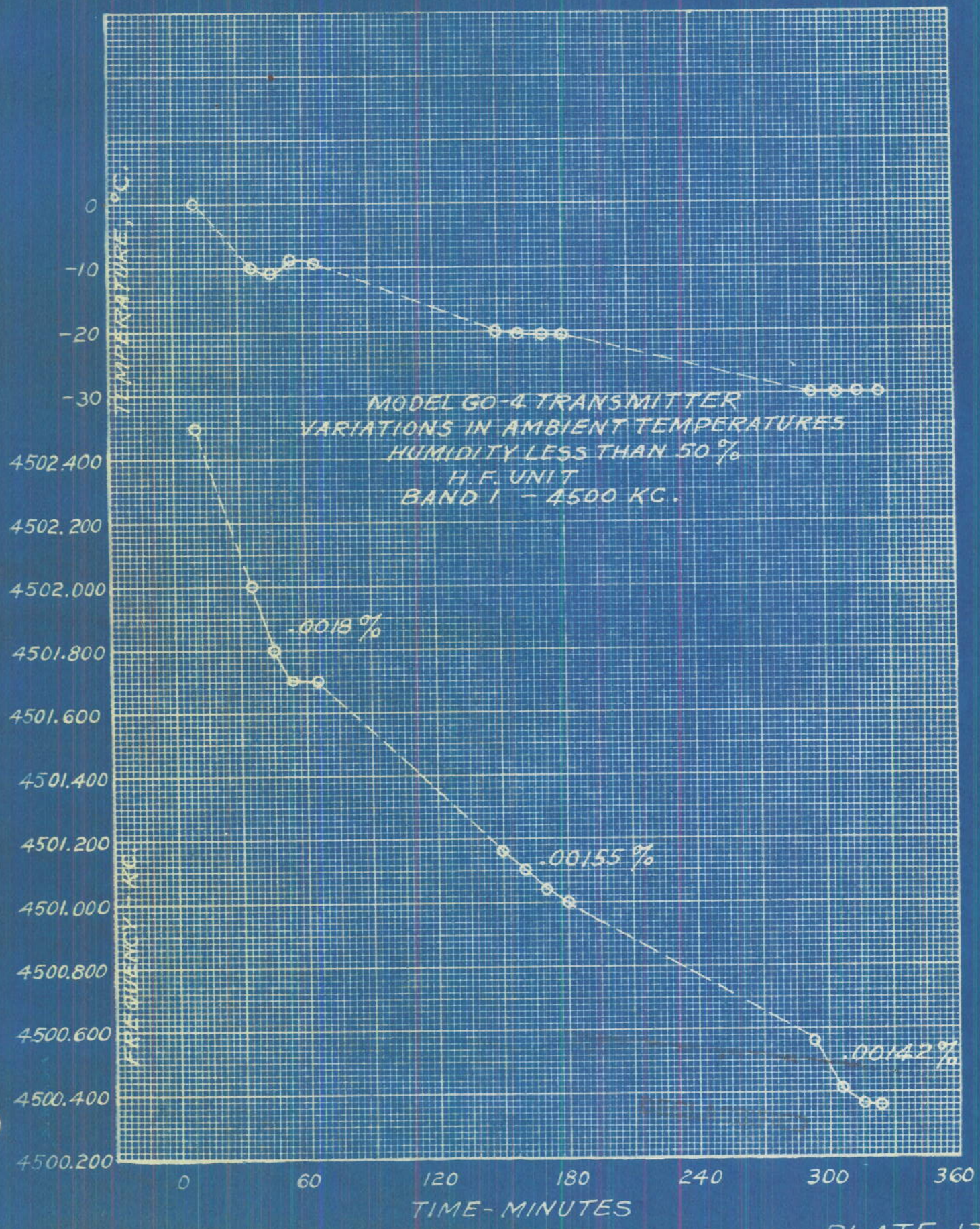

MODEL GO-4 TRANSMITTER
VARIATIONS IN AMBIENT TEMPERATURES
HUMIDITY LESS THAN 50 %
H.F. UNIT
BAND 1 - 4500 KC.
AMBIENT TEMPERATURE °C.
0
-10
-20
-30
FREQUENCY - KC
4502.400
4502.200
4502.000
4501.800
4501.600
4501.400
4501.200
4501.000
4500.800
4500.600
4500.400
4500.200
.0018 %
.00155 %
.00142 %
0
60
120
180
240
300
360
TIME - MINUTES

PLATE 13

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

DATE

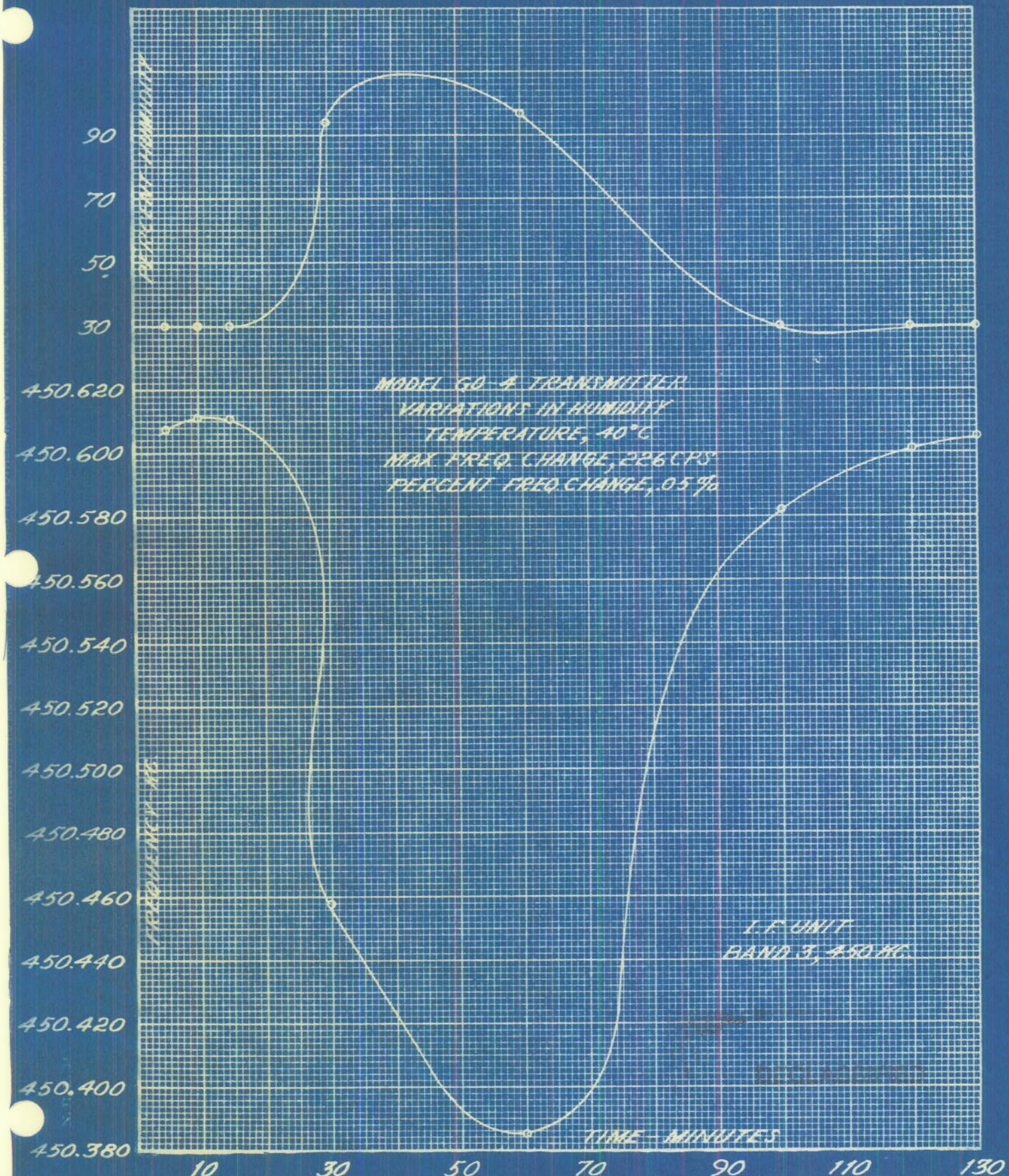


PLATE 14

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

DATE

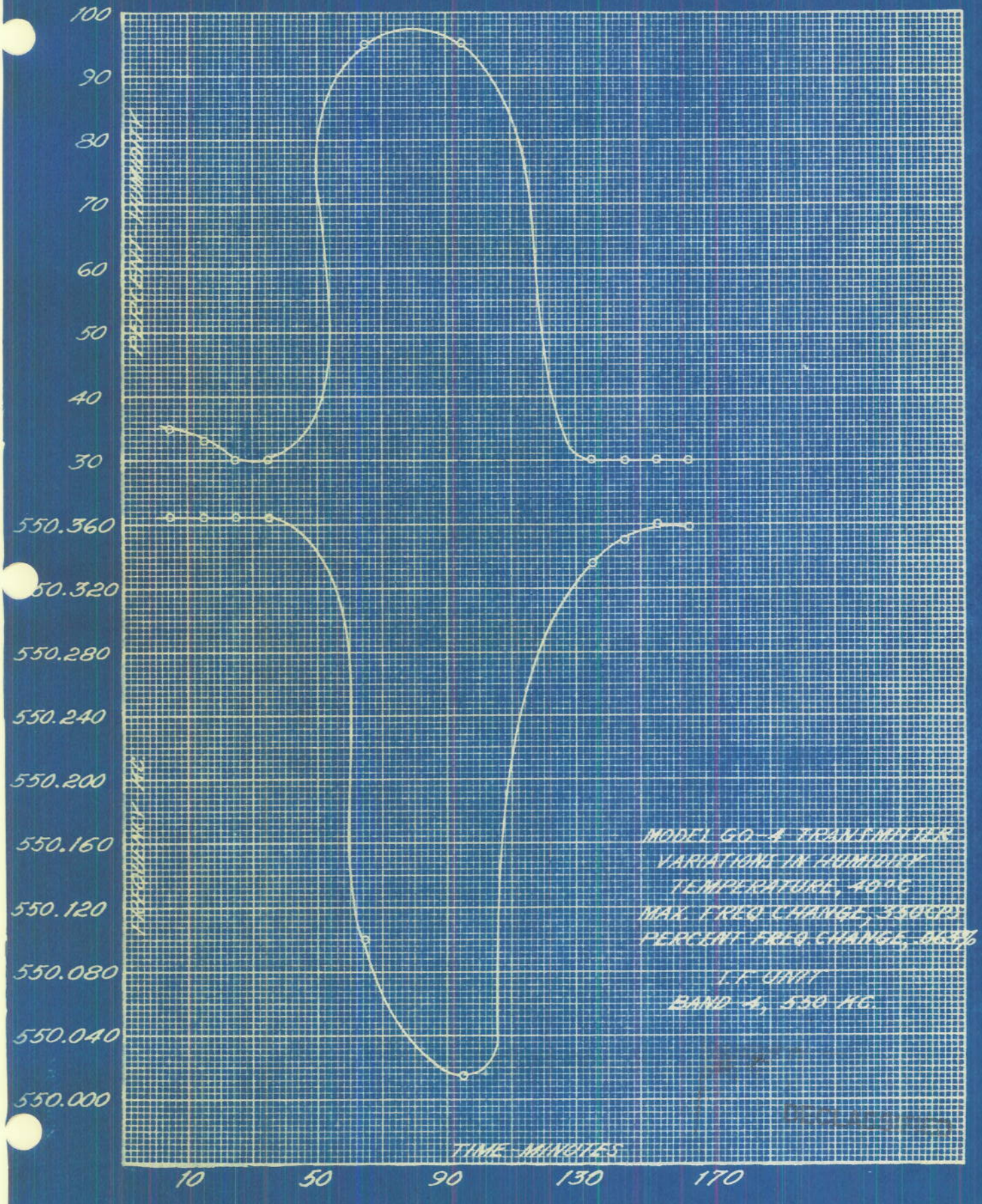


PLATE 15

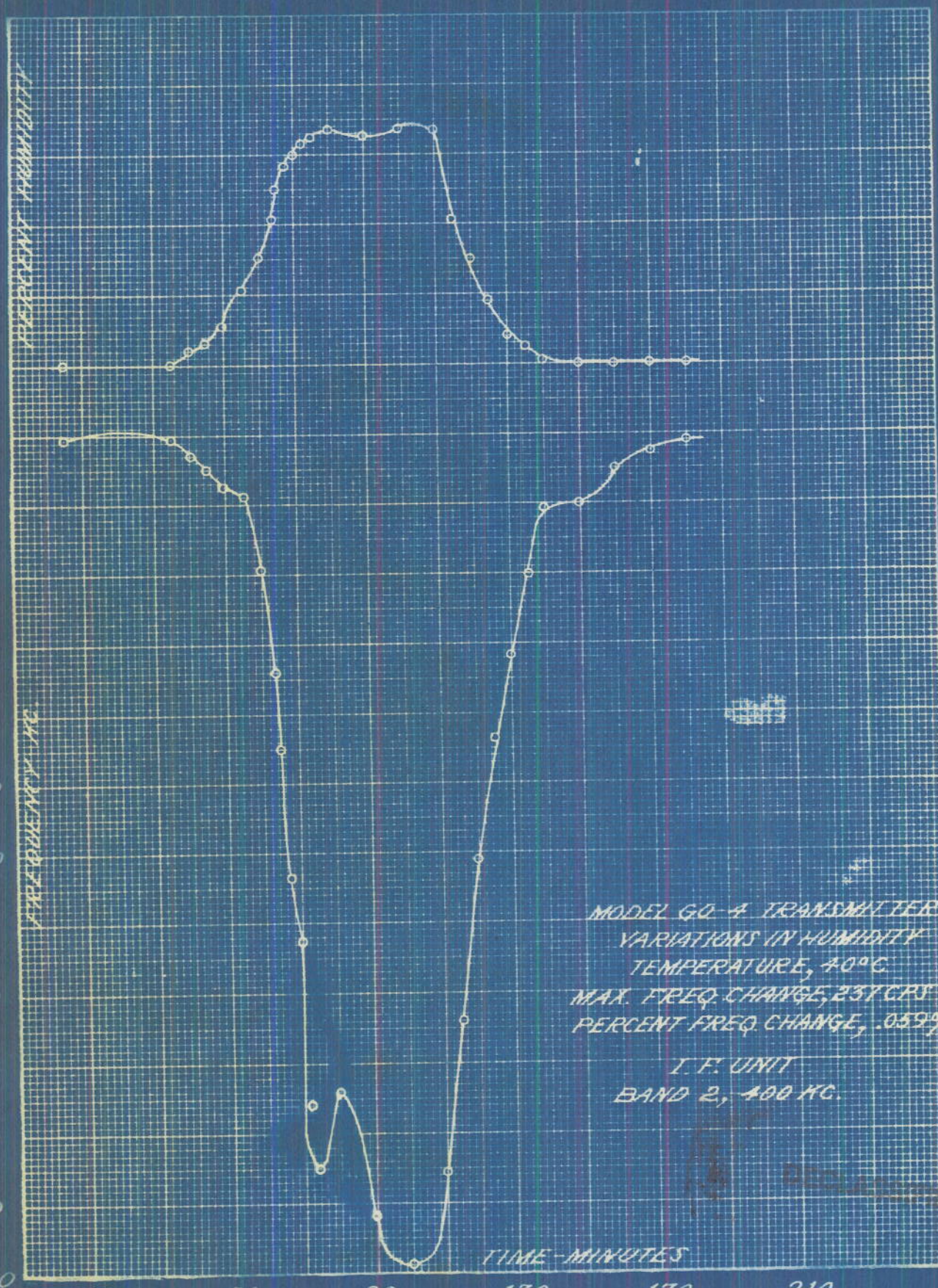

HUMIDITY
90
70
50
30
FREQUENCY MC.
400.720
400.700
400.680
400.660
400.640
400.620
400.600
400.580
400.560
400.540
400.520
400.500
400.480
10
50
90
130
170
210
TIME-MINUTES
MODEL GO-4 TRANSMITTER
VARIATIONS IN HUMIDITY
TEMPERATURE, 40°C.
MAX. FREQ. CHANGE, 237 CPS
PERCENT FREQ. CHANGE, .059%
I. F. UNIT
BAND 2, 400 KC.

PLATE 16

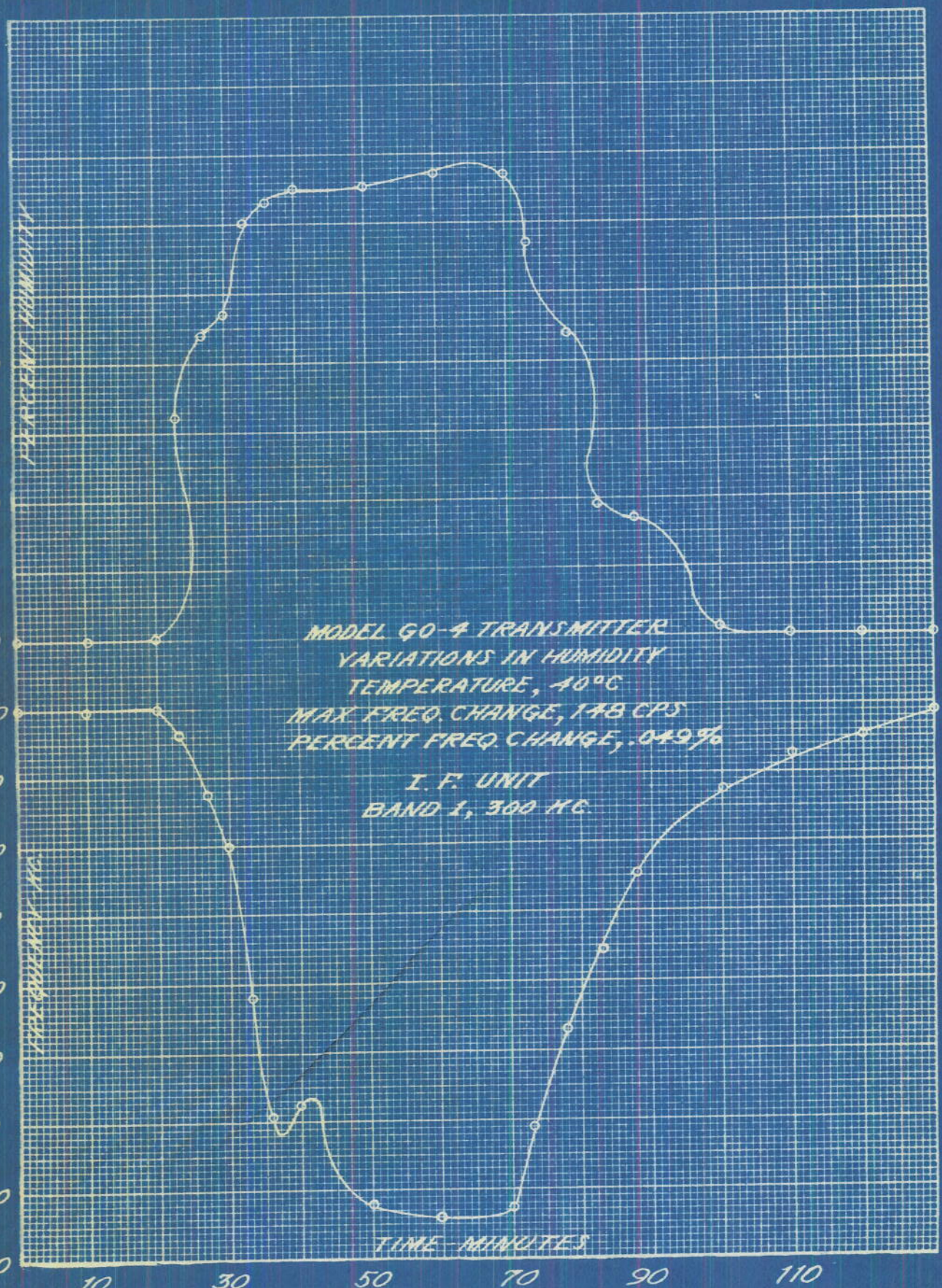

100
90
80
70
60
50
40
30
PERCENT HUMIDITY
300.680
300.660
300.640
300.620
300.600
300.580
300.560
300.540
300.520
FREQUENCY MC.
MODEL GO-4 TRANSMITTER
VARIATIONS IN HUMIDITY
TEMPERATURE, 40°C
MAX FREQ. CHANGE, 148 CPS
PERCENT FREQ. CHANGE, .049%
I. F. UNIT
BAND 1, 300 MC.
TIME - MINUTES
10
30
50
70
90
110

PLATE 17

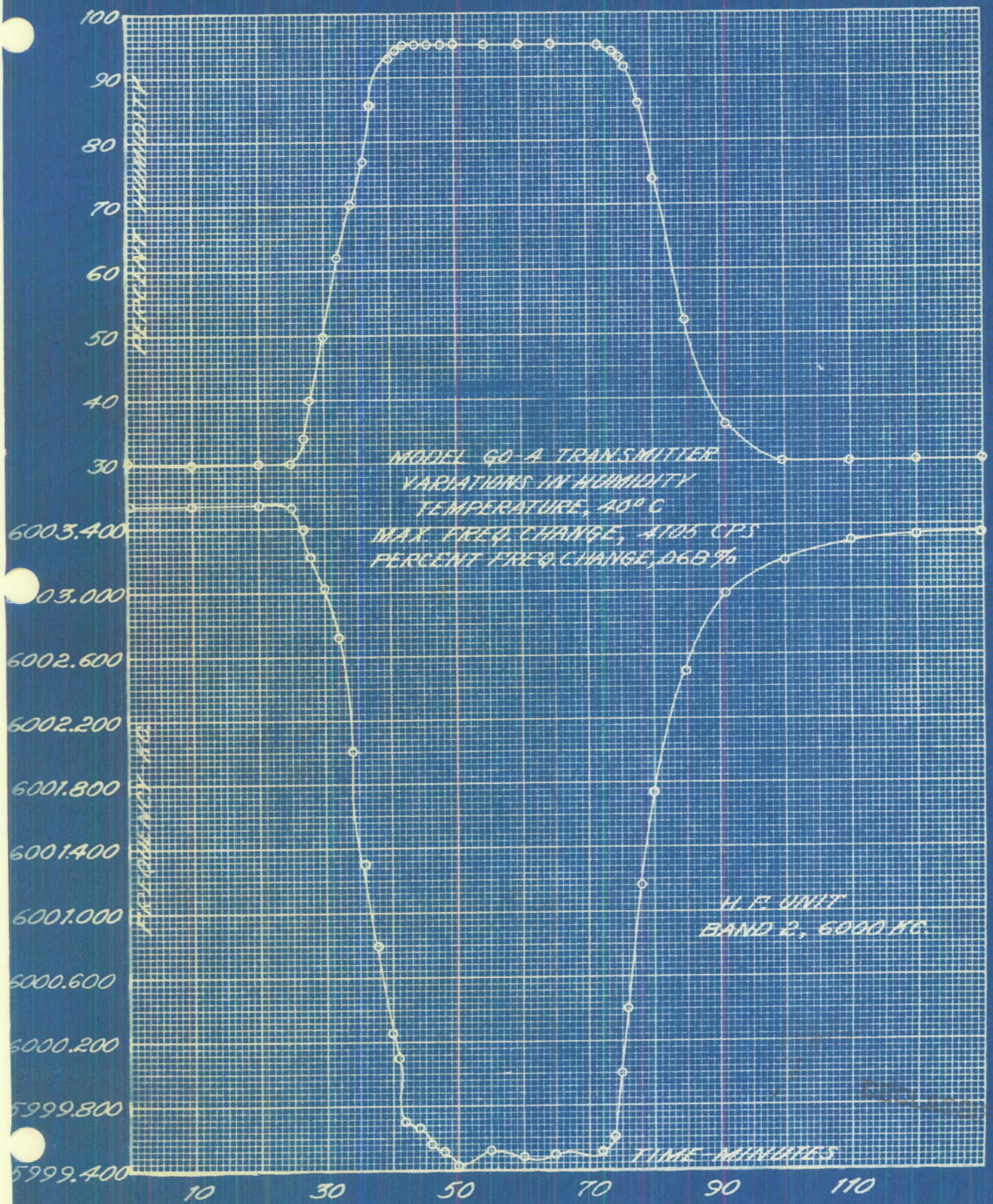

100
90
80
70
60
50
40
30
PERCENT RELATIVE HUMIDITY
6003.400
03.000
6002.600
6002.200
6001.800
6001.400
6001.000
6000.600
6000.200
5999.800
5999.400
FREQUENCY IN MC
MODEL GO A TRANSMITTER
VARIATIONS IN HUMIDITY
TEMPERATURE, 40° C
MAX. FREQ. CHANGE, 4105 CPS
PERCENT FREQ. CHANGE, 068%
W. E. UNIT
BAND 2, 6000 MC.
10
30
50
70
90
110
TIME MINUTES

PLATE 18

RESEARCH LABORATORY
BELLEVUE, D.C.
DATE

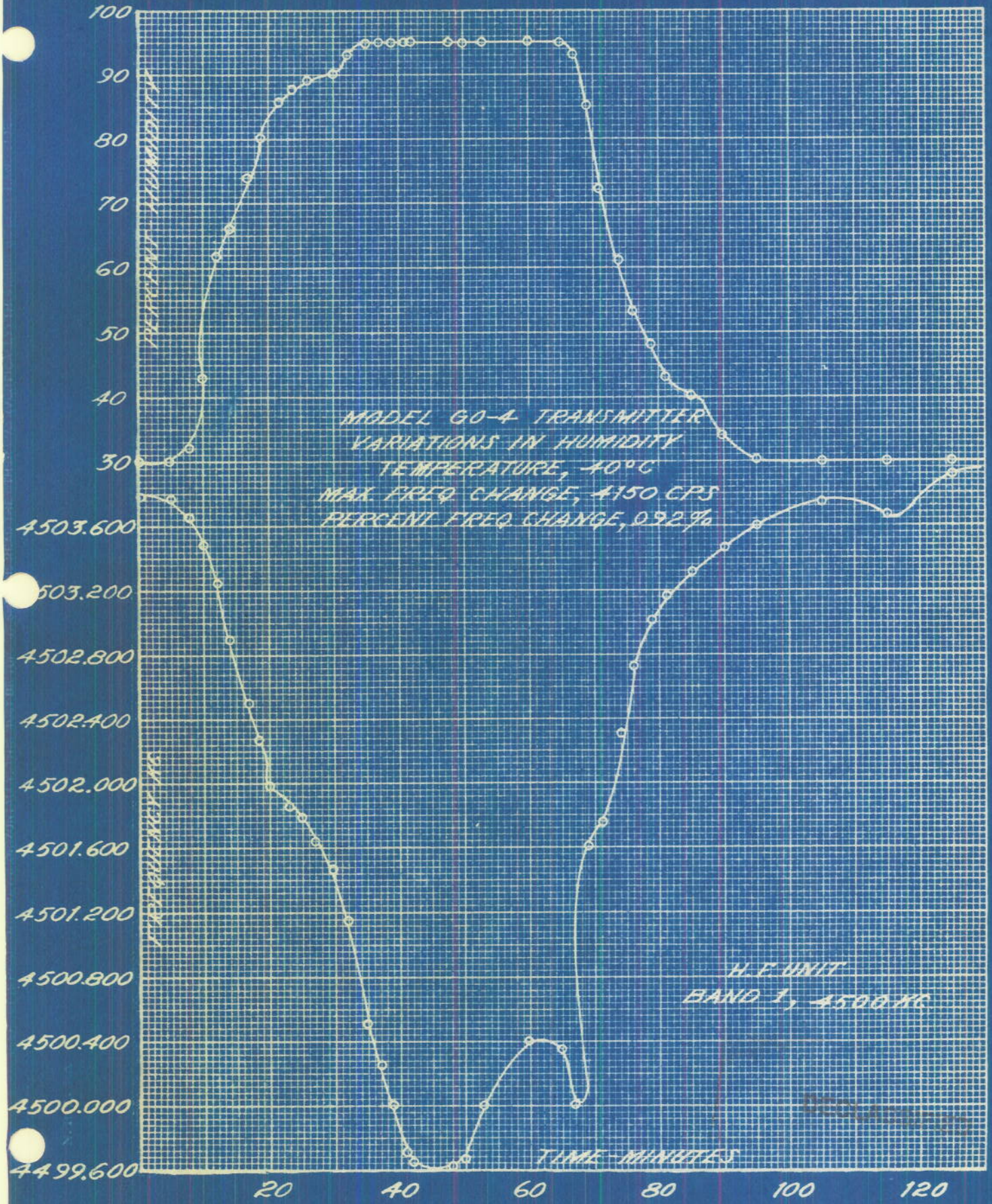


PLATE 19

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

DATE

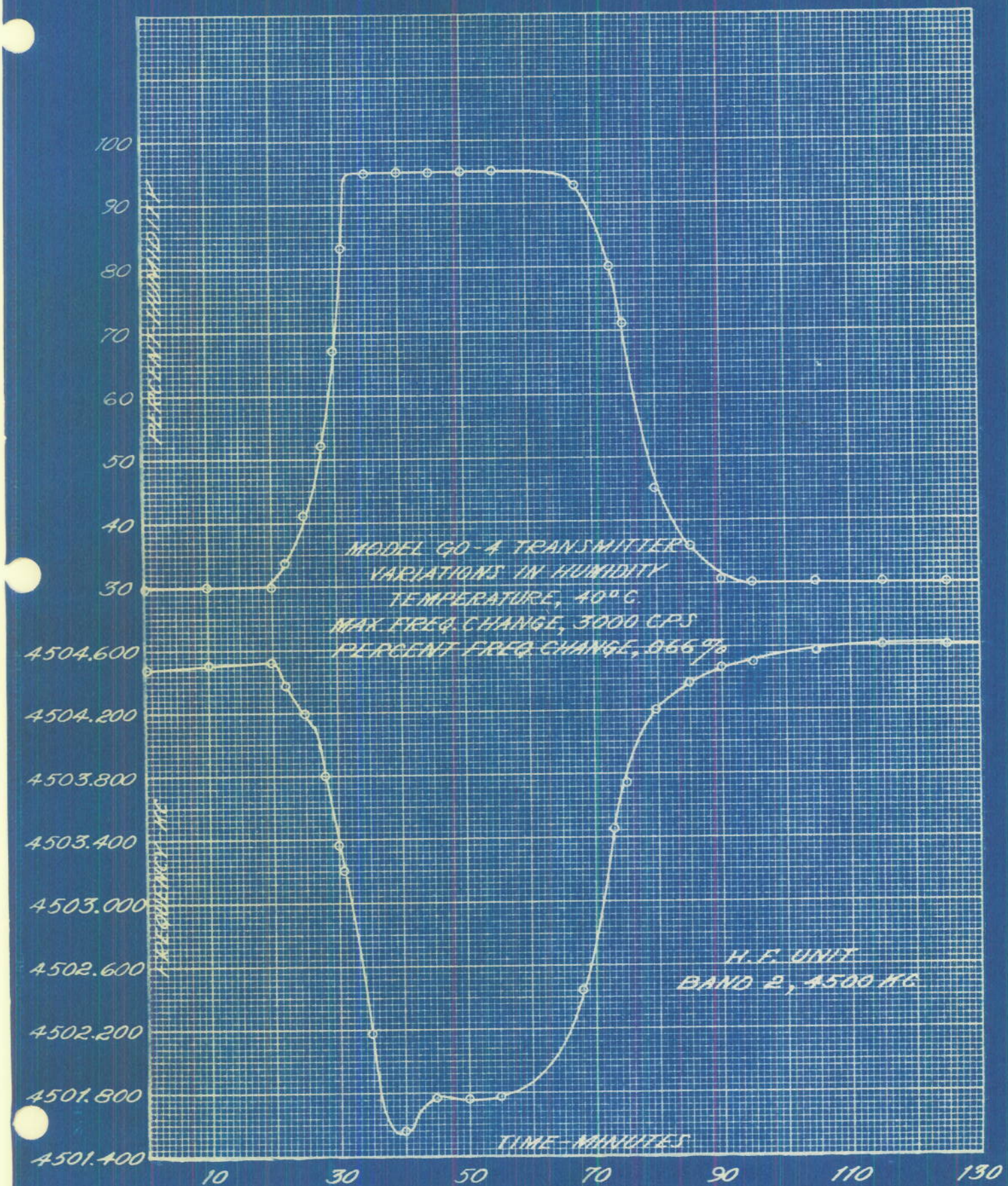


PLATE 20

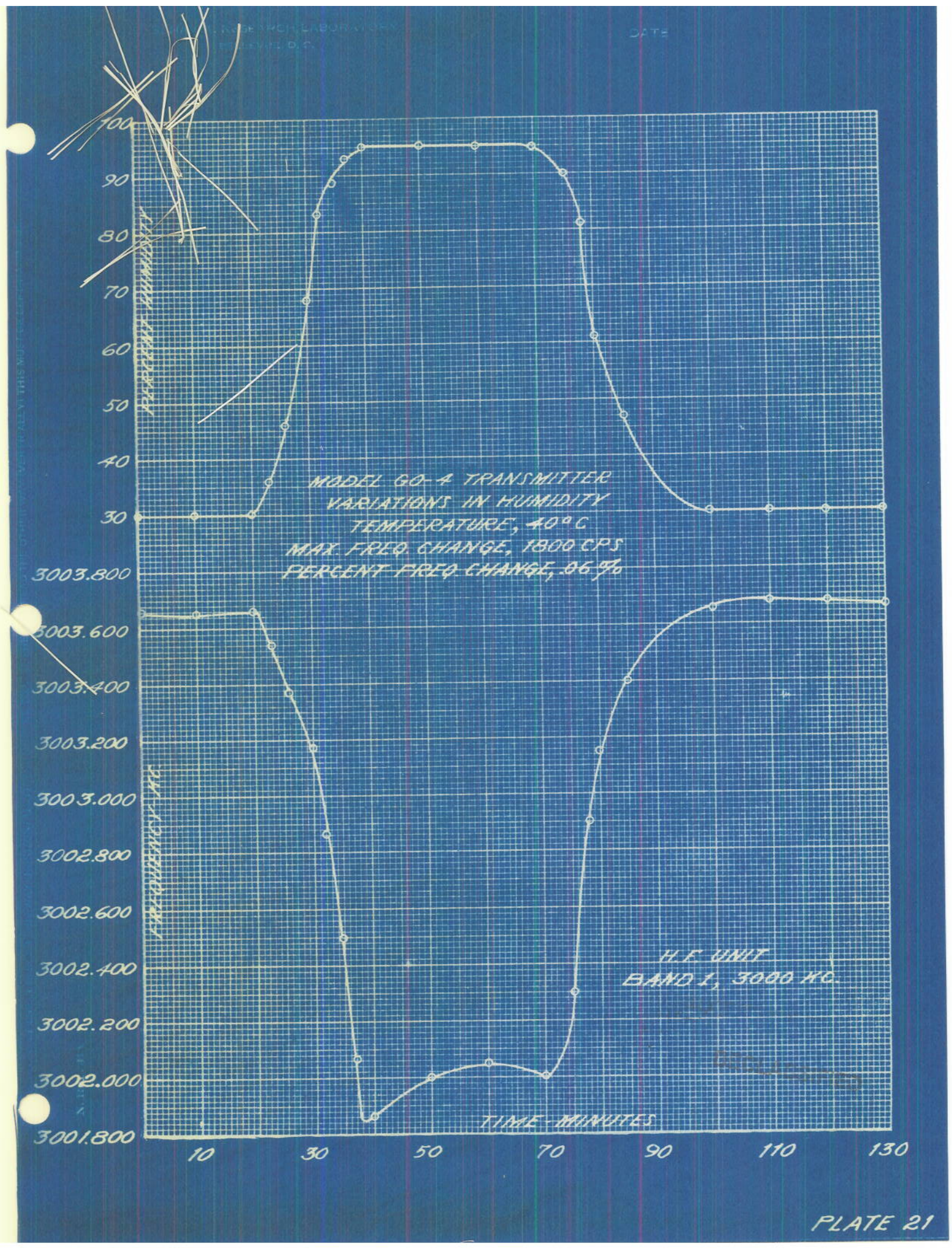
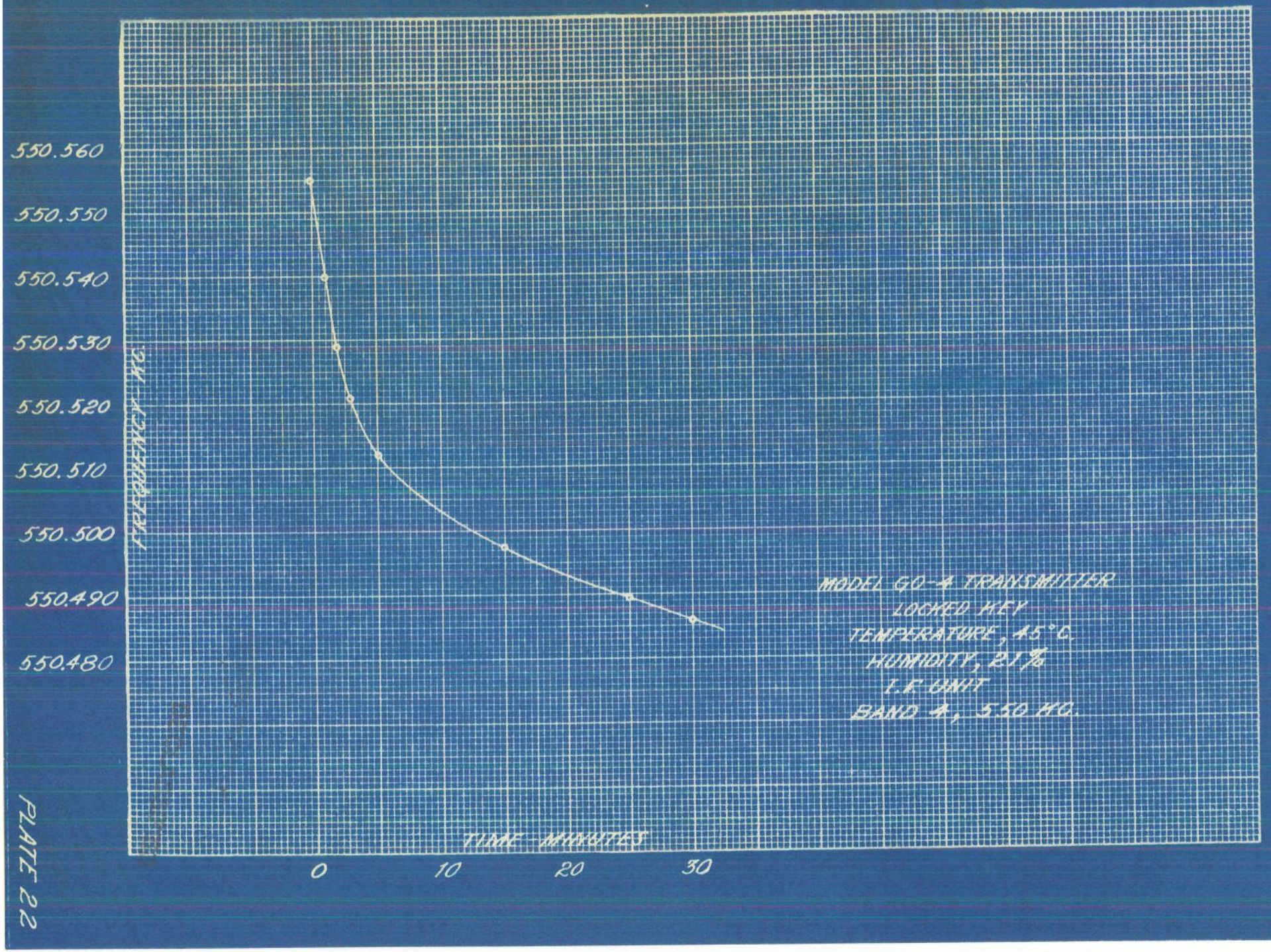

100
90
80
70
60
50
40
30
3003.800
3003.600
3003.400
3003.200
3003.000
3002.800
3002.600
3002.400
3002.200
3002.000
3001.800
10
30
50
70
90
110
130
TIME MINUTES
MODEL GO-4 TRANSMITTER
VARIATIONS IN HUMIDITY
TEMPERATURE, 40° C
MAX. FREQ. CHANGE, 1800 CPS
PERCENT FREQ. CHANGE, .06 %
H.F. UNIT
BAND 1, 3000 KC.

PLATE 21


550.560
550.550
550.540
550.530
550.520
550.510
550.500
550.490
550.480
24 HOUR FREQUENCY MC
TIME MINUTES
0
10
20
30
MODEL GO-4 TRANSMITTER
LOCKED KEY
TEMPERATURE, 45°C.
HUMIDITY, 21%
I.F. UNIT
BAND 4, 550 KC.
U. S. NAVAL RESEARCH LABORATORY
BELLEVUE, D.C.
DATE
PLATE 22

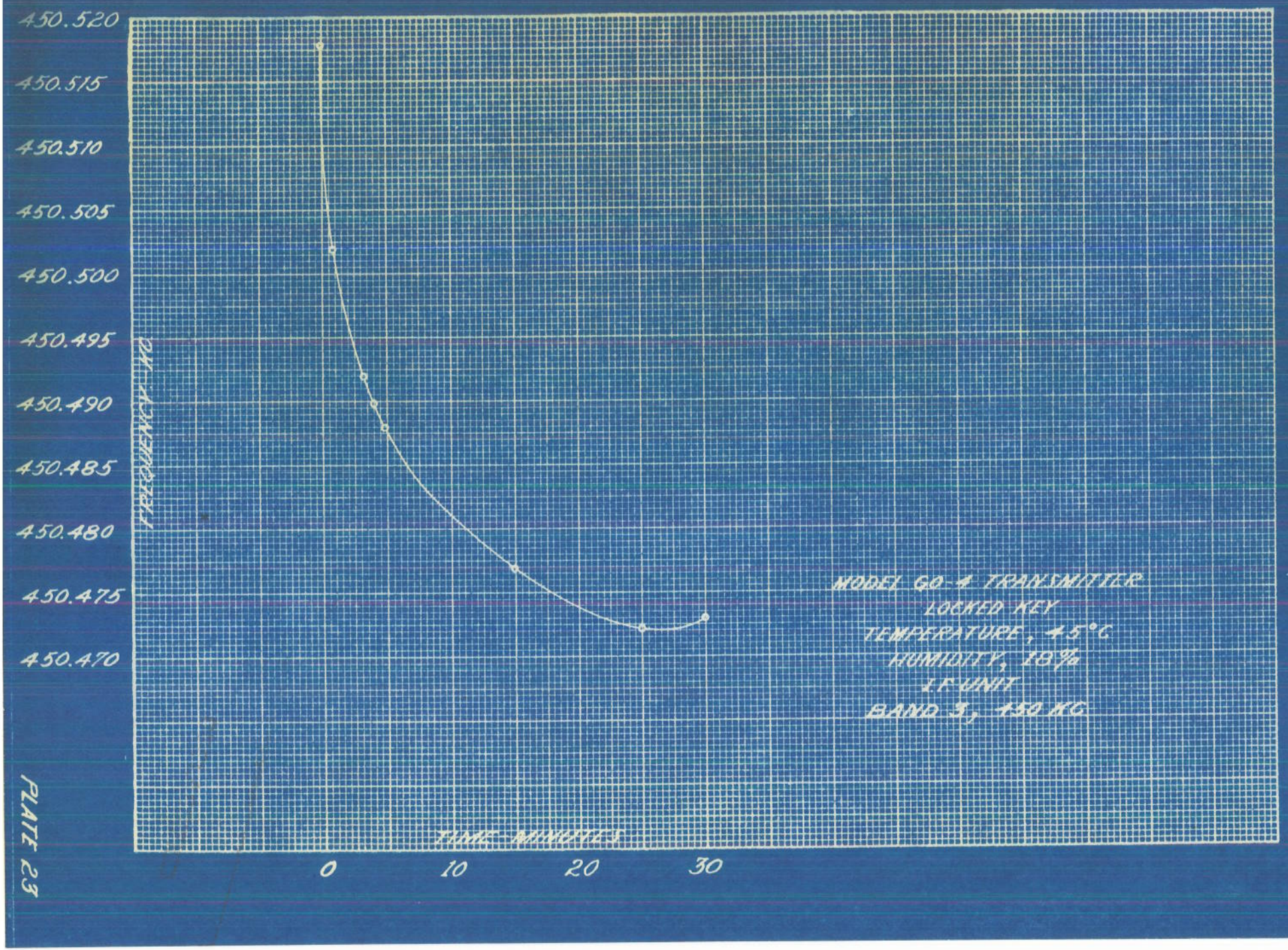


PLATE 23

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

DATE

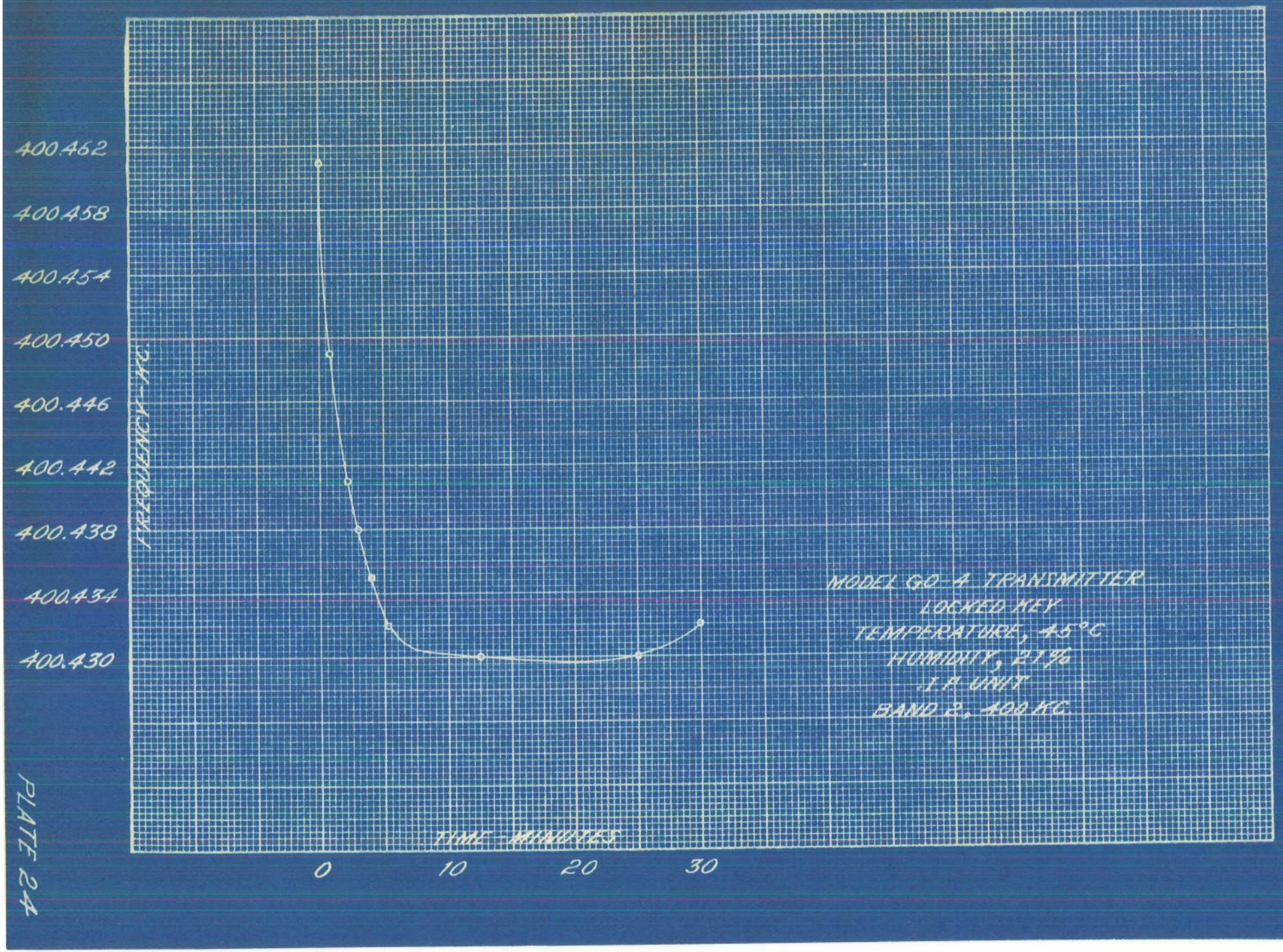

400.462
400.458
400.454
400.450
400.446
400.442
400.438
400.434
400.430
FREQUENCY IN MEGACYCLES
TIME IN MINUTES
0
10
20
30
MODEL GO-A TRANSMITTER
LOCKED KEY
TEMPERATURE, 45°C
HUMIDITY, 21%
I.F. UNIT
BAND B, 400 MC.

PLATE 24

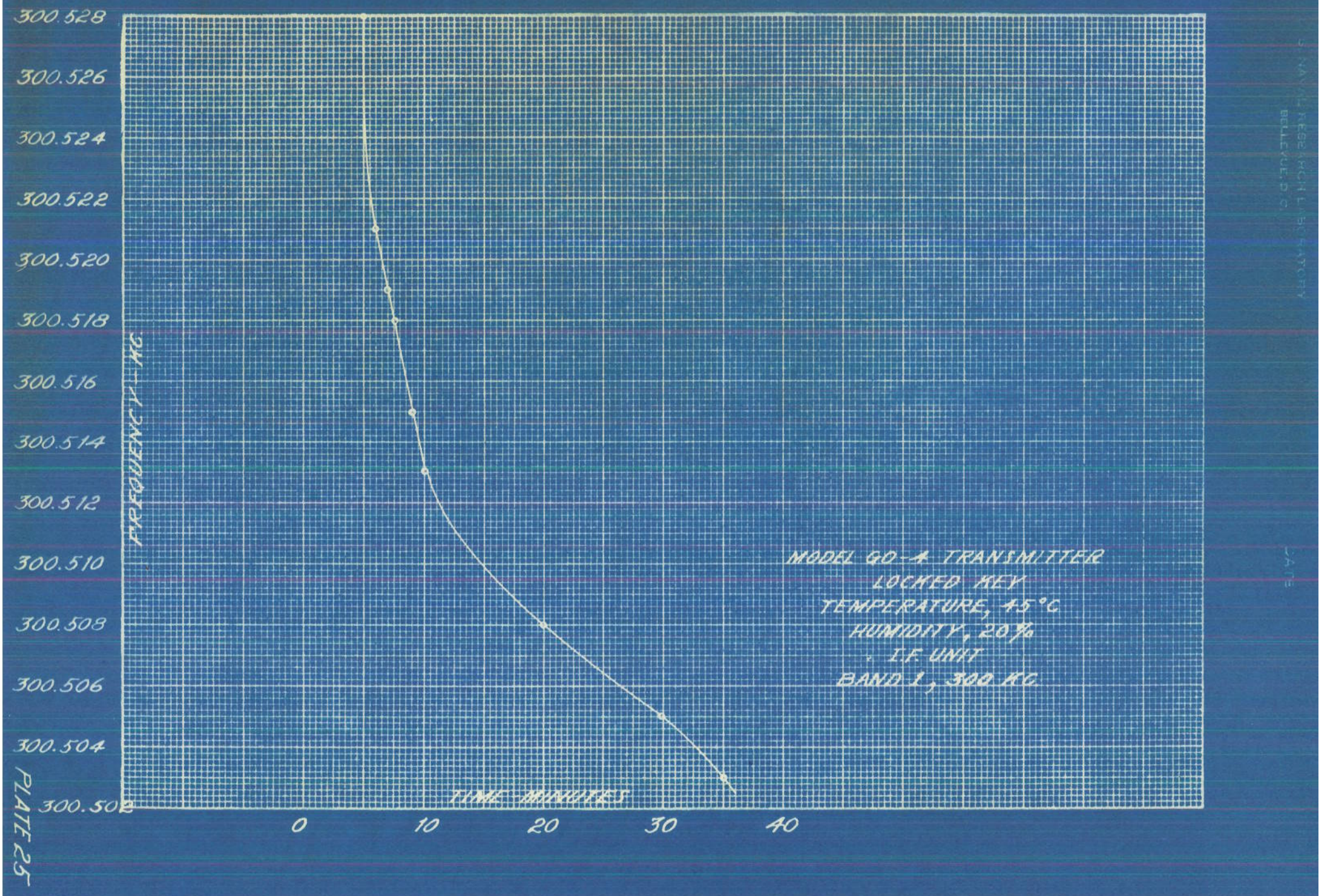

300.528
300.526
300.524
300.522
300.520
300.518
300.516
300.514
300.512
300.510
300.508
300.506
300.504
300.502
FREQUENCY MC
0
10
20
30
40
TIME MINUTES
MODEL GO-A TRANSMITTER
LOCKED KEY
TEMPERATURE, 45°C
HUMIDITY, 20%
I.F. UNIT
BAND 1, 300 KC.

PLATE 25

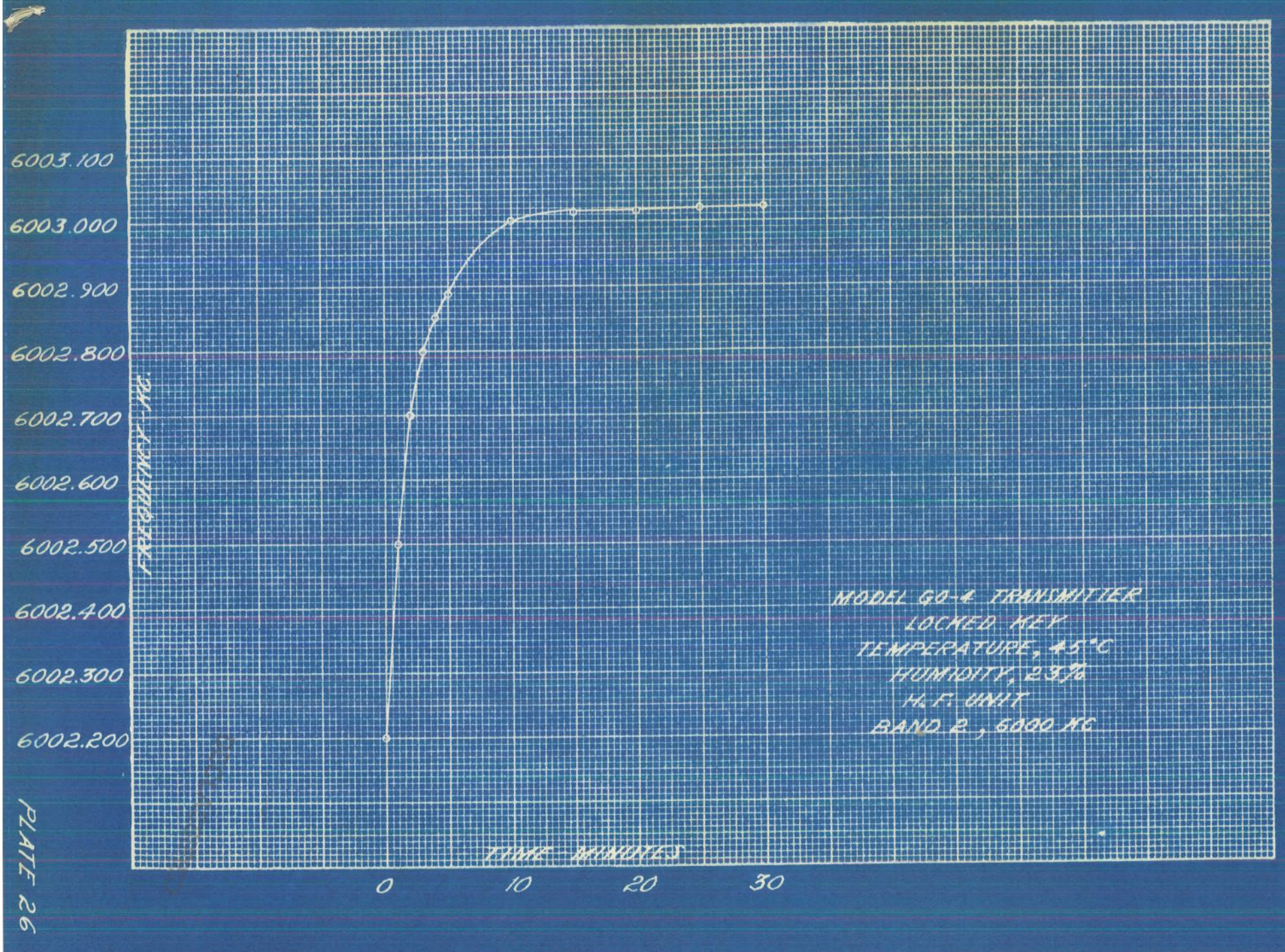


PLATE 26

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

DATE

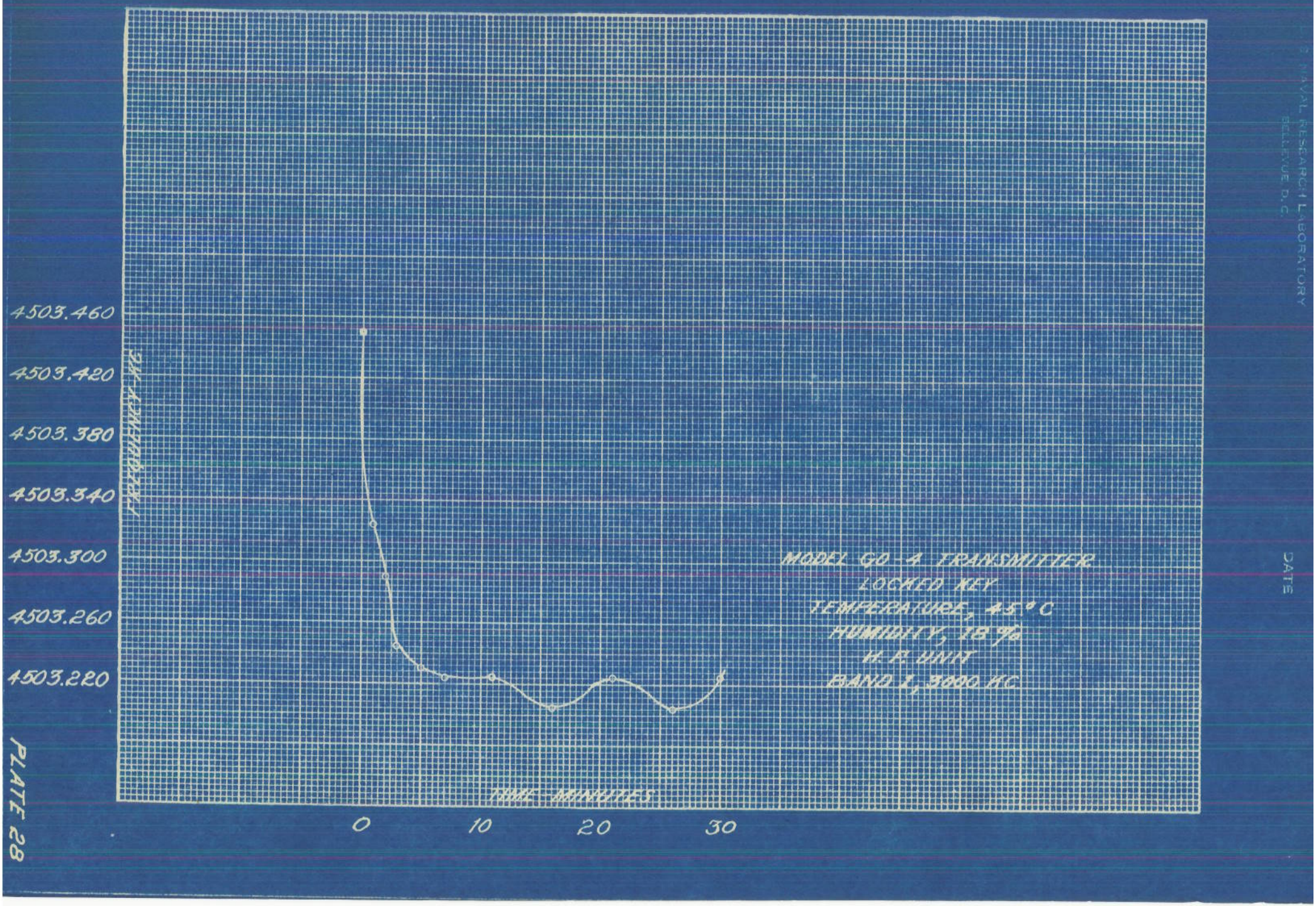


PLATE 28

DATE

NAVAL RESEARCH LABORATORY
BELLEVUE, D.C.

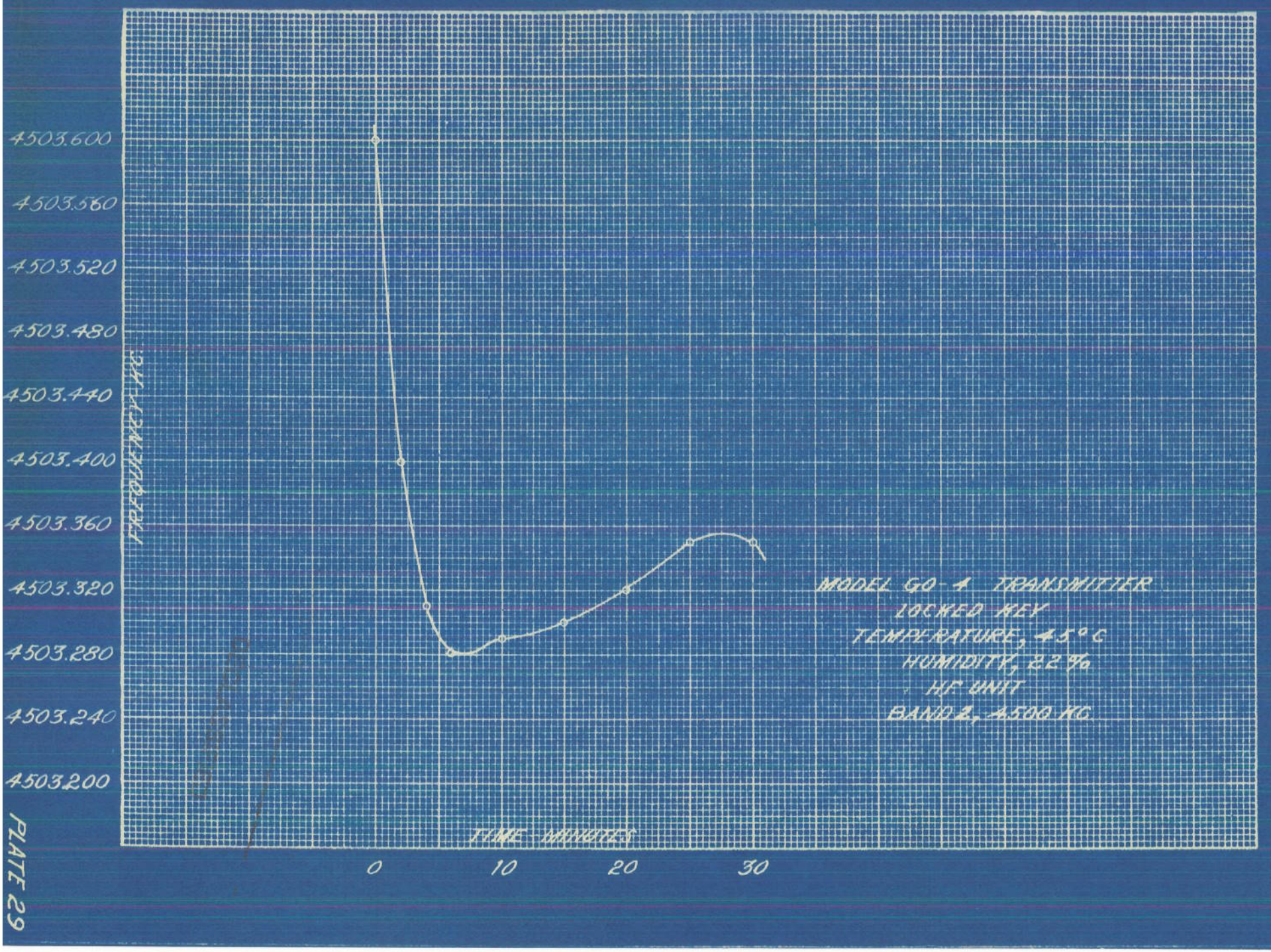

4503.600
4503.560
4503.520
4503.480
4503.440
4503.400
4503.360
4503.320
4503.280
4503.240
4503.200
FREQUENCY MC
TIME MINUTES
0
10
20
30
MODEL GO-4 TRANSMITTER
LOCKED KEY
TEMPERATURE, 45° C
HUMIDITY, 22 %
HF UNIT
BAND 2, 4500 KC

PLATE 29

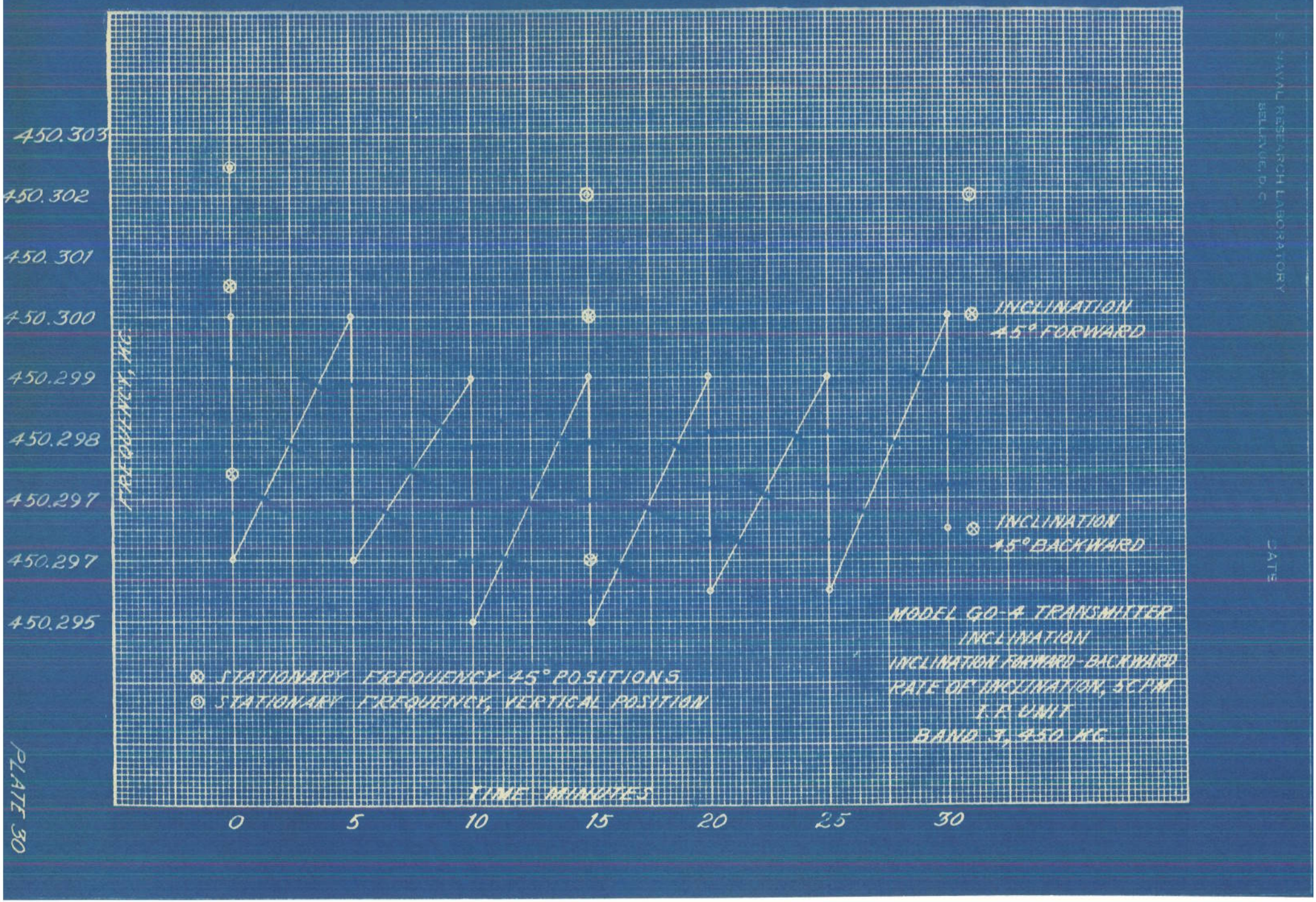
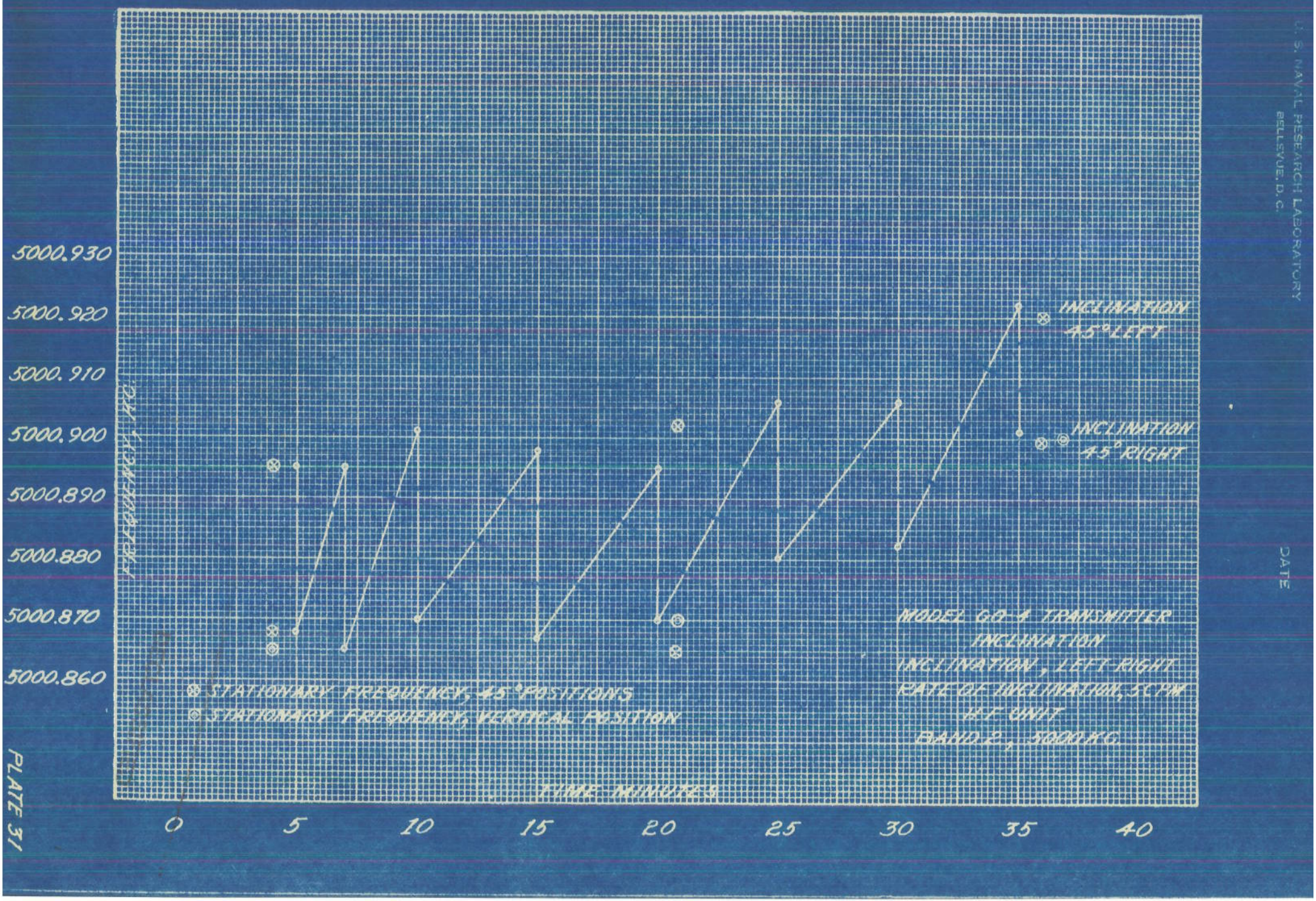


PLATE 30

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

DATE



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

DATE

PLATE 31

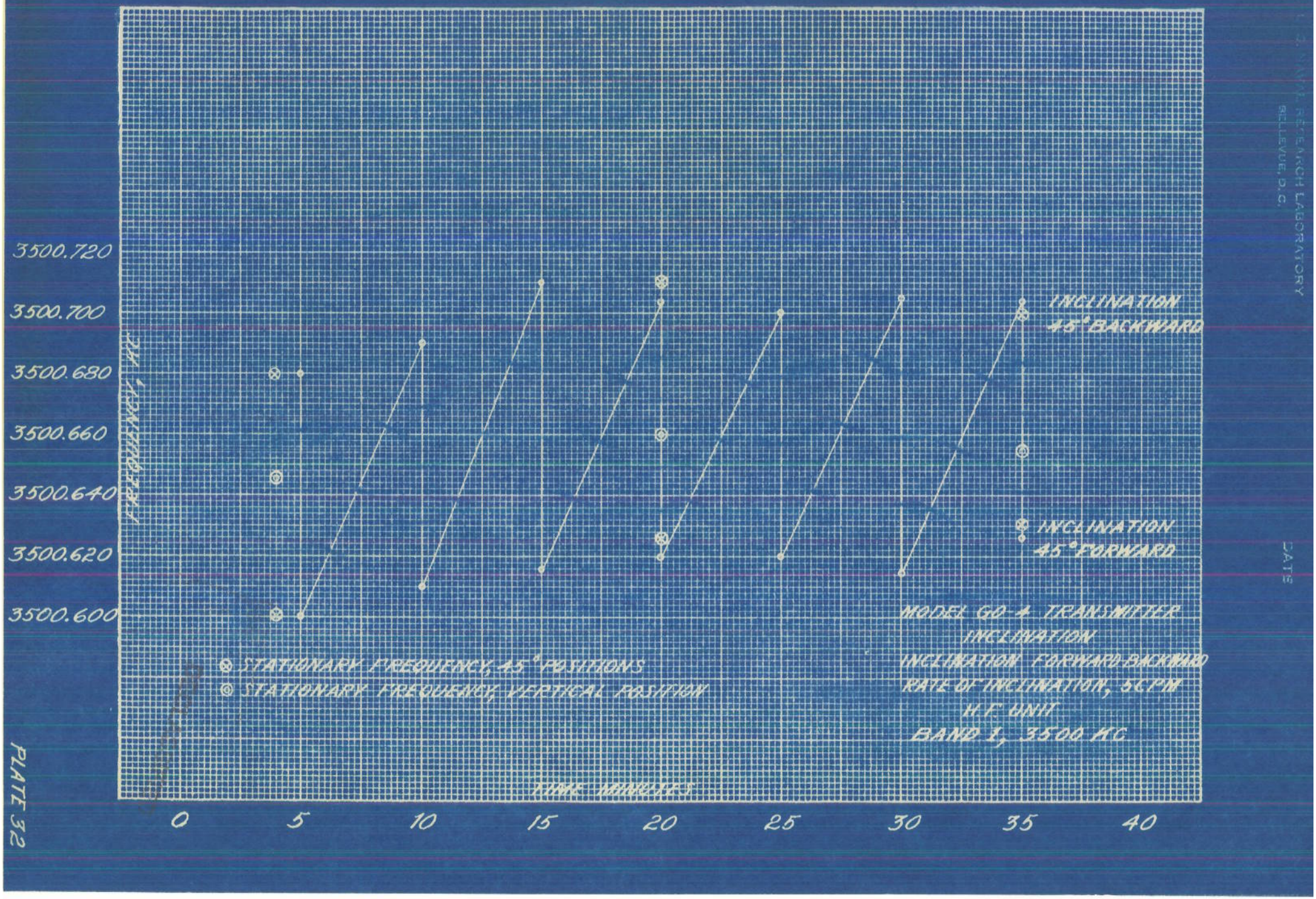

3500.720
3500.700
3500.680
3500.660
3500.640
3500.620
3500.600
FREQUENCY, KC, MONITORED
0
5
10
15
20
25
30
35
40
TIME, MINUTES
INCLINATION 45° BACKWARD
INCLINATION 45° FORWARD
⊗ STATIONARY FREQUENCY, 45° POSITIONS
⊗ STATIONARY FREQUENCY, VERTICAL POSITION
MODEL GO 4 TRANSMITTER
INCLINATION
INCLINATION FORWARD-BACKWARD
RATE OF INCLINATION, 5 CPM
H.F. UNIT
BAND 1, 3500 KC

PLATE 32

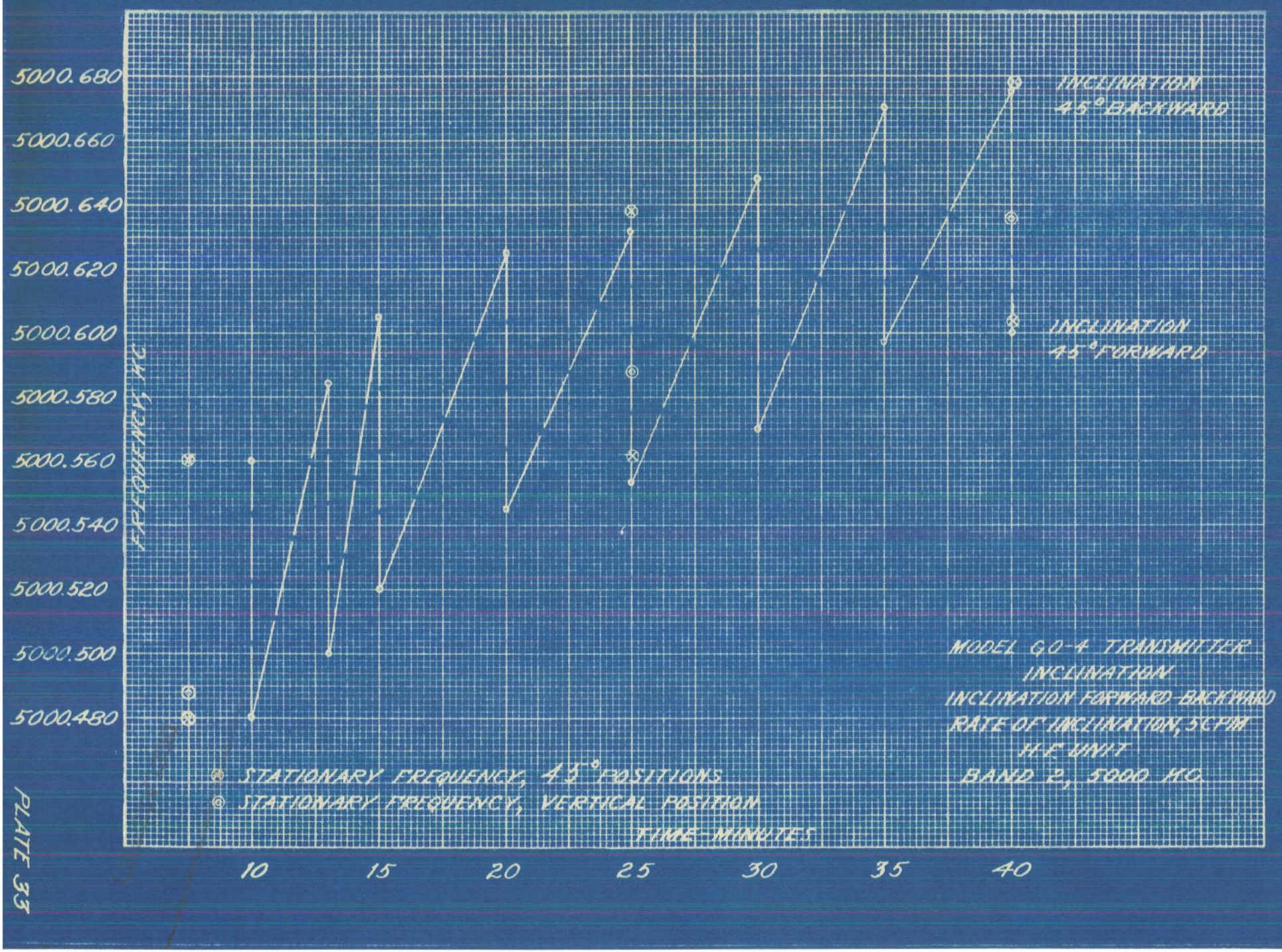

5000.680
5000.660
5000.640
5000.620
5000.600
5000.580
5000.560
5000.540
5000.520
5000.500
5000.480
FREQUENCY IN KILOCYCLES
INCLINATION 45° BACKWARD
INCLINATION 45° FORWARD
MODEL GO-4 TRANSMITTER
INCLINATION
INCLINATION FORWARD-BACKWARD
RATE OF INCLINATION, 3 CPM
H.F. UNIT
BAND E, 5000 KC.
⊗ STATIONARY FREQUENCY, 45° POSITIONS
◎ STATIONARY FREQUENCY, VERTICAL POSITION
TIME-MINUTES
10
15
20
25
30
35
40

PLATE 33

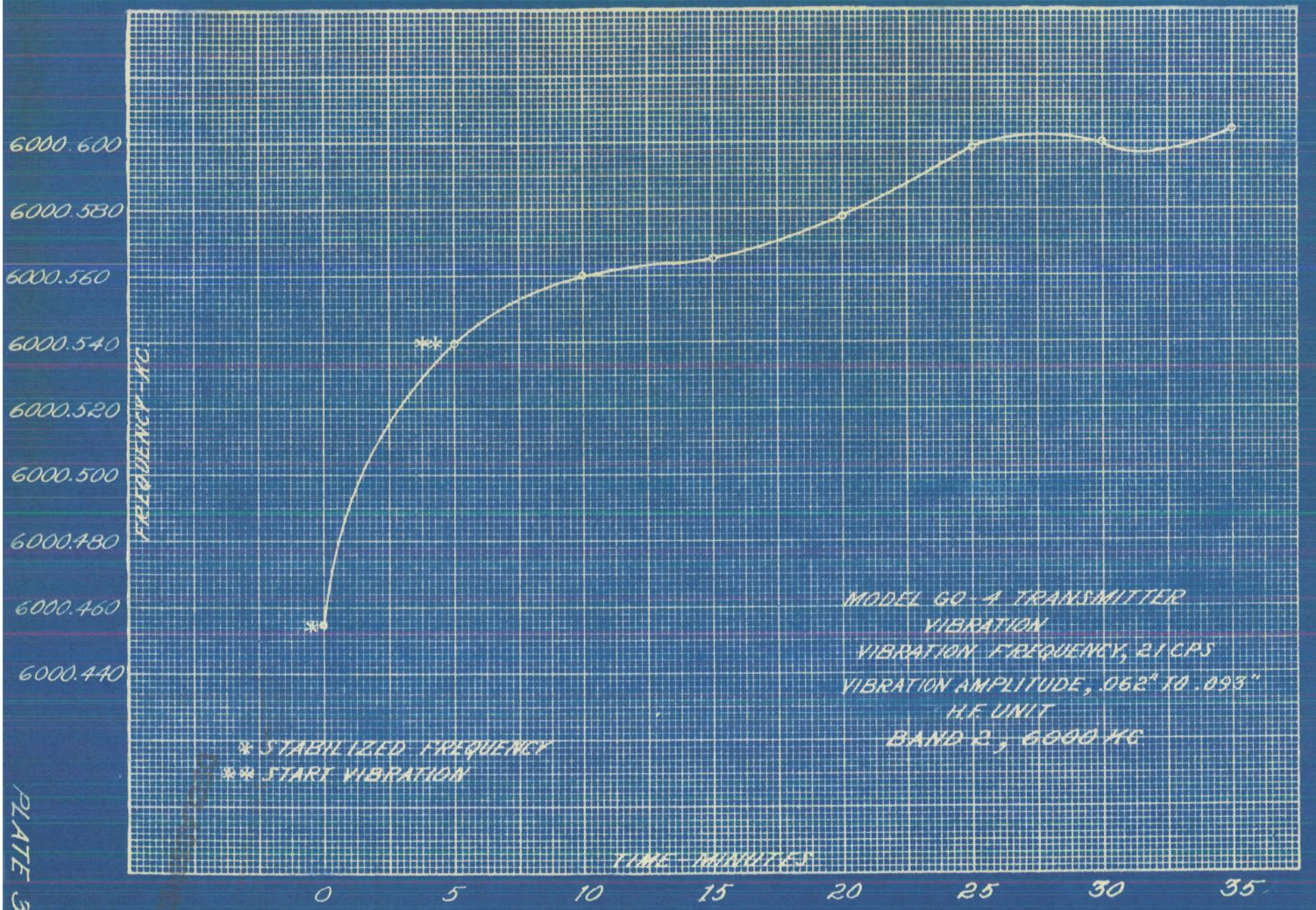


PLATE 34

U. NAVAL RESEARCH LABORATORY
BELLEVUE, D. C.

DATE

N. R. L. 31A

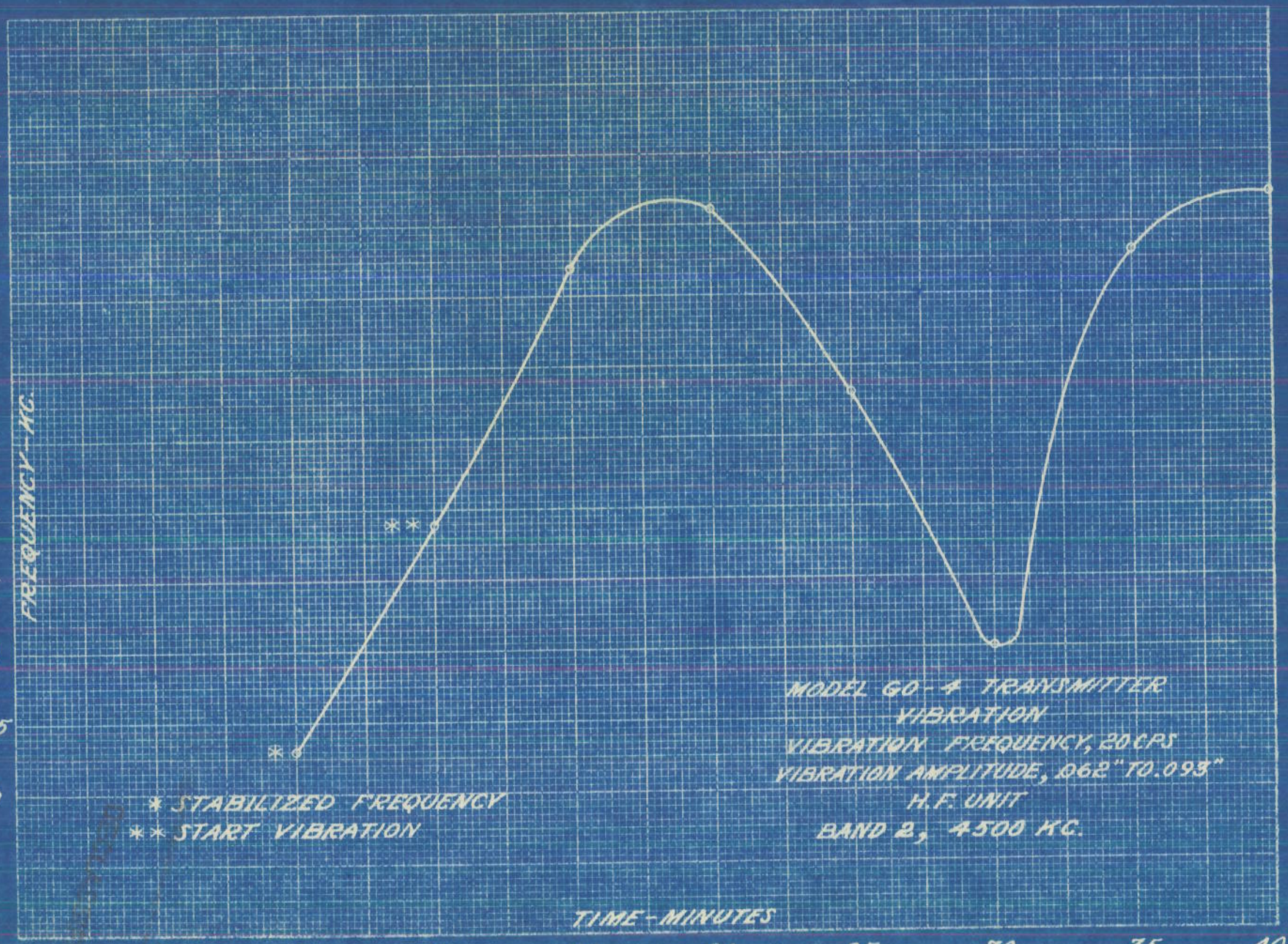


PLATE 35

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

DATE

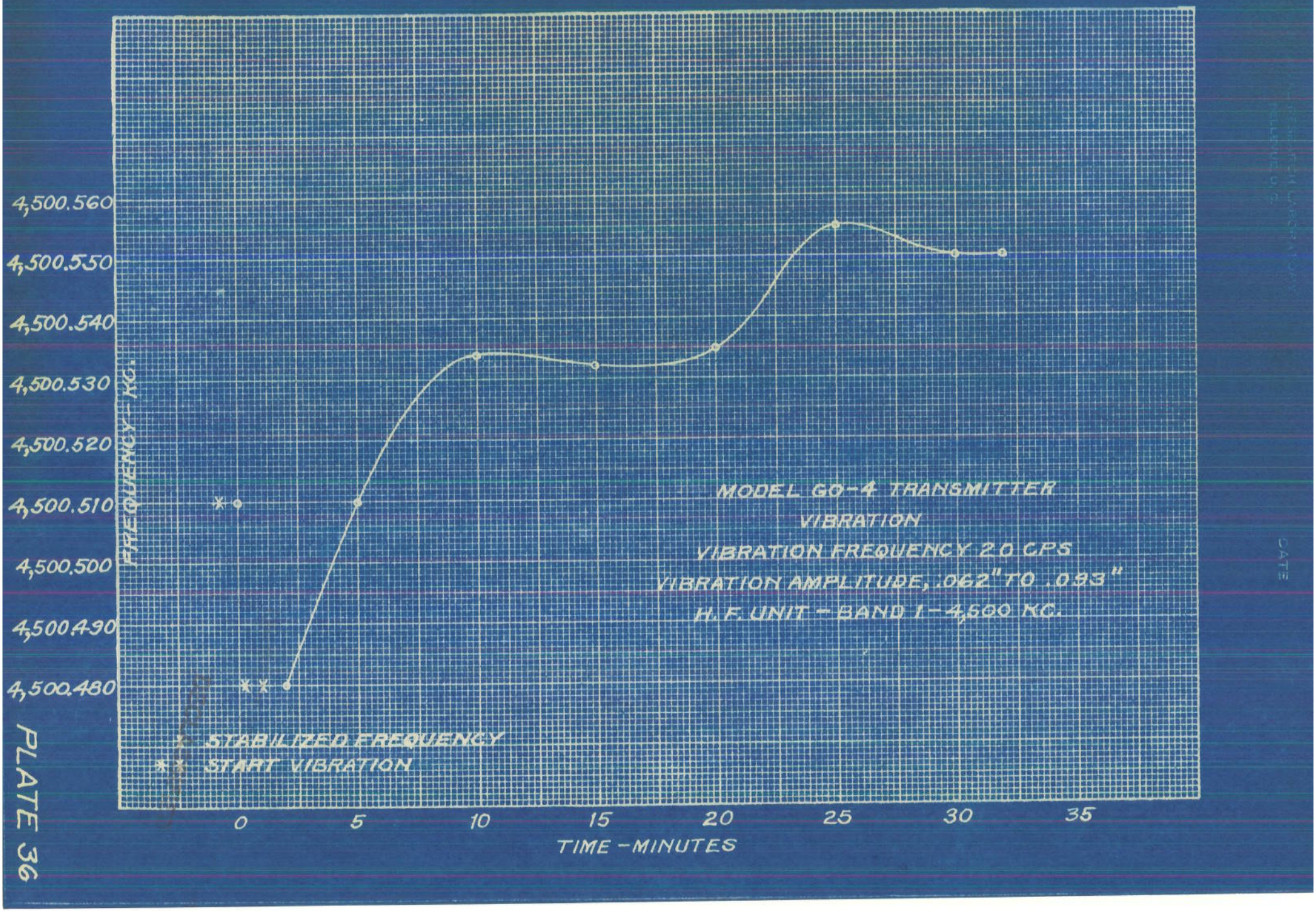

4,500.560
4,500.550
4,500.540
4,500.530
4,500.520
4,500.510
4,500.500
4,500.490
4,500.480
FREQUENCY - KC.
0
5
10
15
20
25
30
35
TIME - MINUTES
MODEL GO-4 TRANSMITTER
VIBRATION
VIBRATION FREQUENCY 20 CPS
VIBRATION AMPLITUDE, .062" TO .093"
H. F. UNIT - BAND 1 - 4,500 KC.
STABILIZED FREQUENCY
START VIBRATION

PLATE 36

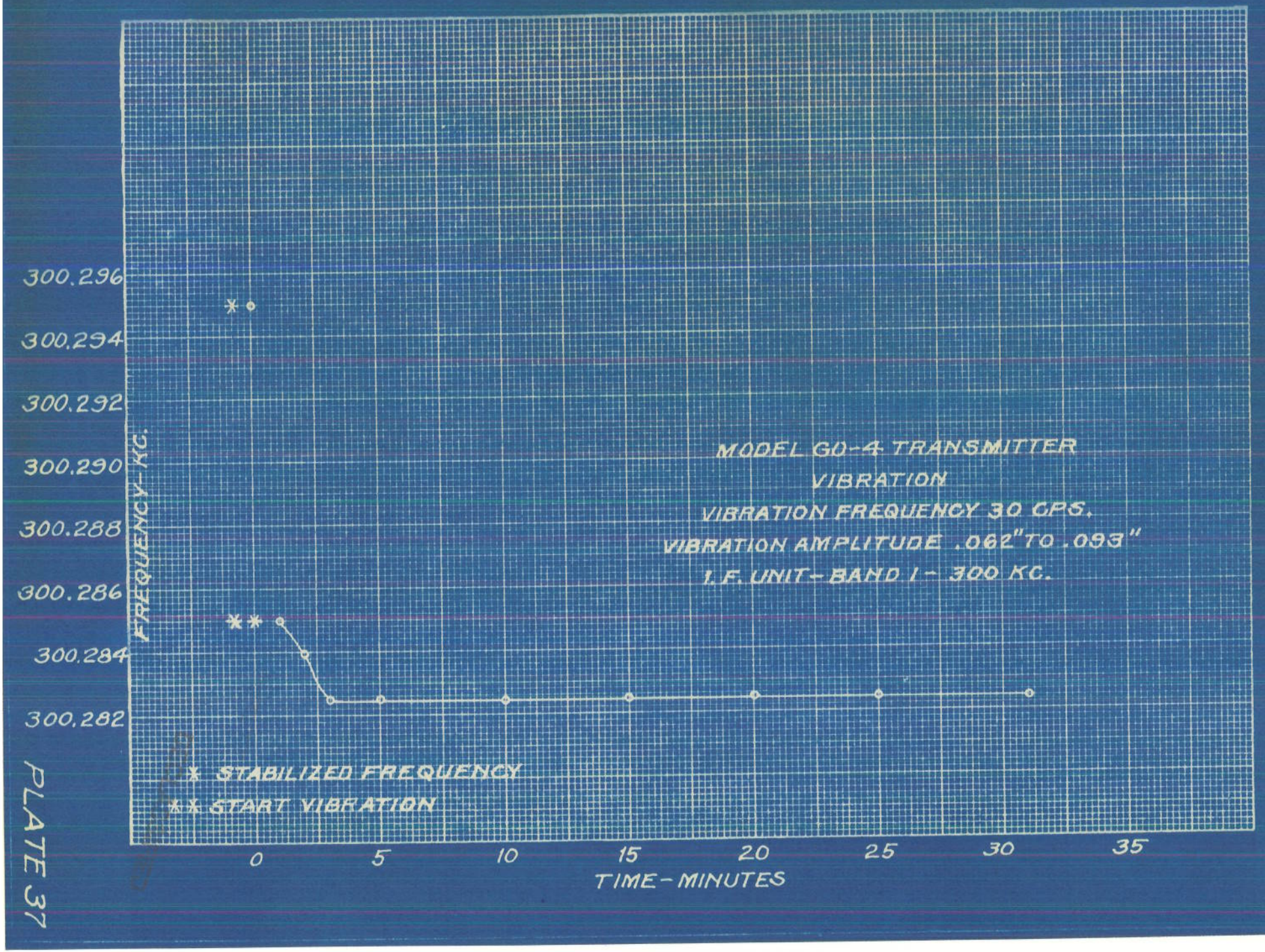

MODEL GO-4 TRANSMITTER
VIBRATION
VIBRATION FREQUENCY 30 CPS.
VIBRATION AMPLITUDE .062" TO .093"
I. F. UNIT - BAND I - 300 KC.
FREQUENCY - KC.
300.296
300.294
300.292
300.290
300.288
300.286
300.284
300.282
0
5
10
15
20
25
30
35
TIME - MINUTES
* STABILIZED FREQUENCY
** START VIBRATION

PLATE 37

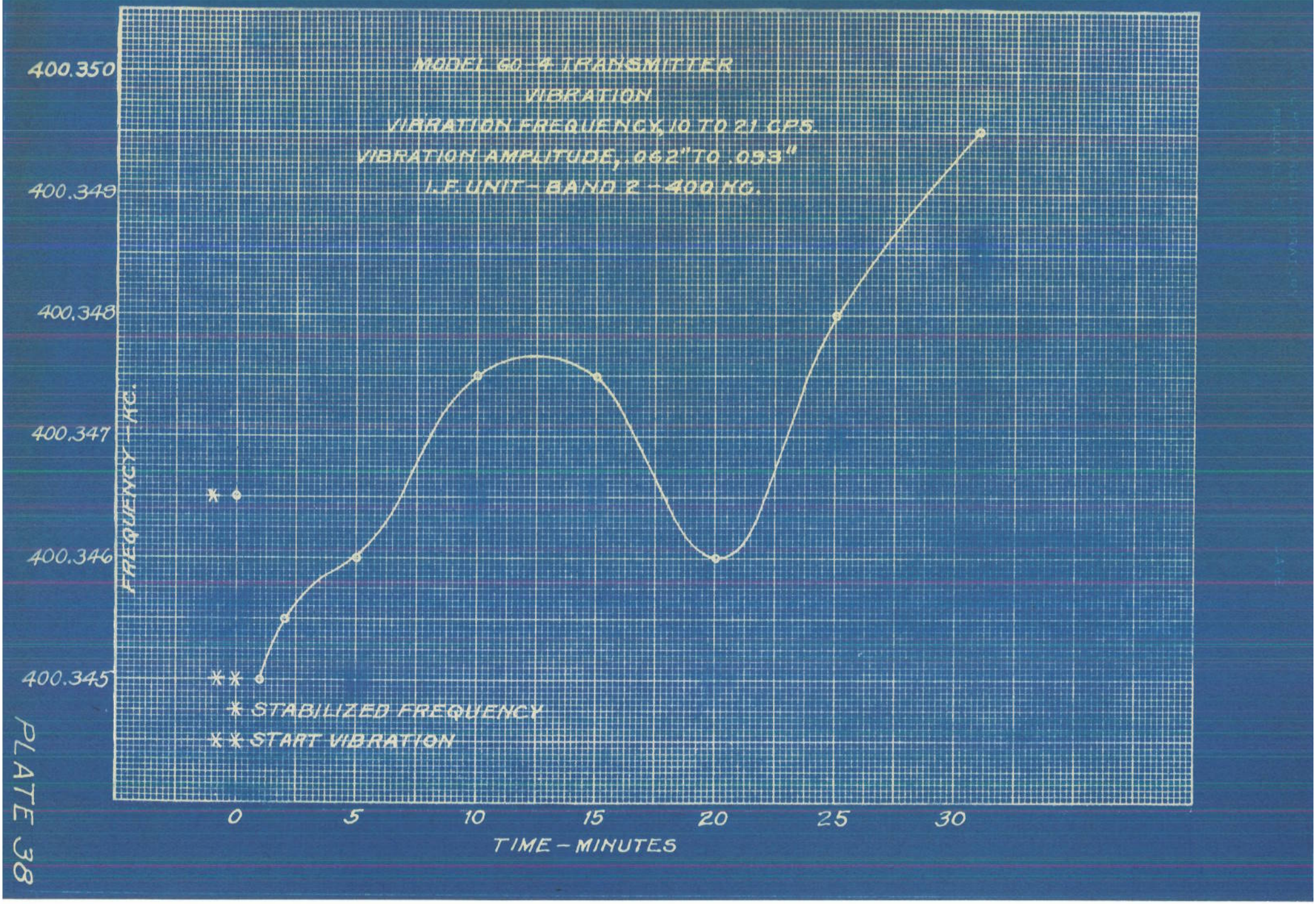

MODEL 60-4 TRANSMITTER
VIBRATION
VIBRATION FREQUENCY, 10 TO 21 CPS.
VIBRATION AMPLITUDE, .062" TO .093"
I.F. UNIT - BAND 2 - 400 KC.
400.350
400.349
400.348
400.347
400.346
400.345
FREQUENCY - KC.
0
5
10
15
20
25
30
TIME - MINUTES
* STABILIZED FREQUENCY
** START VIBRATION

PLATE 38

N. R. L. 31A

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

DATE

MODEL GO-4 TRANSMITTER
VIBRATION
VIBRATION FREQUENCY 14 CPS.
VIBRATION AMPLITUDE, .062" TO .093"
I.F. UNIT - BAND 3 - 450 KC.

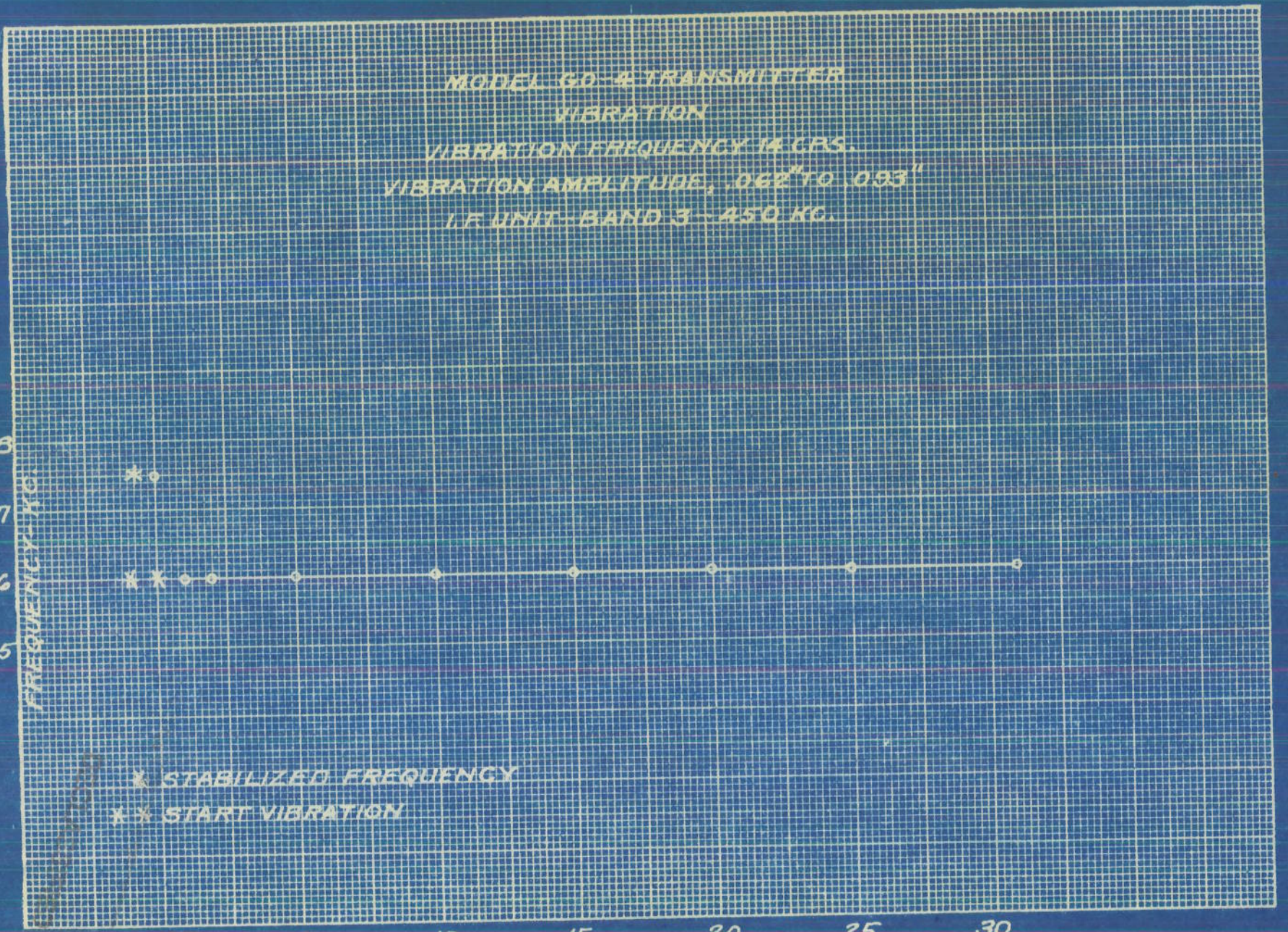


PLATE 39

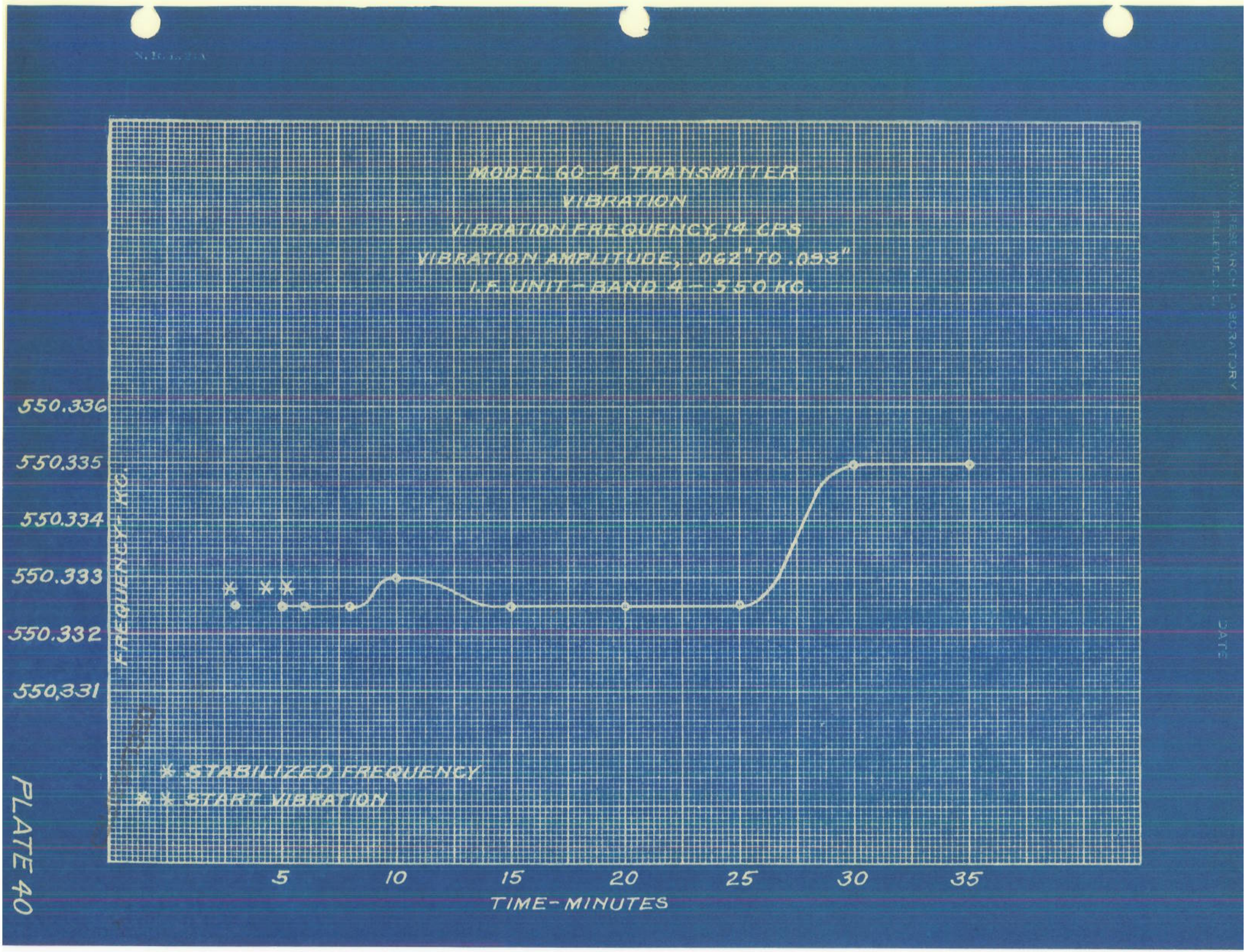

MODEL 60-4 TRANSMITTER
VIBRATION
VIBRATION FREQUENCY, 14 CPS
VIBRATION AMPLITUDE, .062" TO .093"
I.F. UNIT - BAND 4 - 550 KC.
550.336
550.335
550.334
550.333
550.332
550,331
FREQUENCY MC
* STABILIZED FREQUENCY
* * START VIBRATION
5
10
15
20
25
30
35
TIME-MINUTES

PLATE 40

N. R. L. 3:A

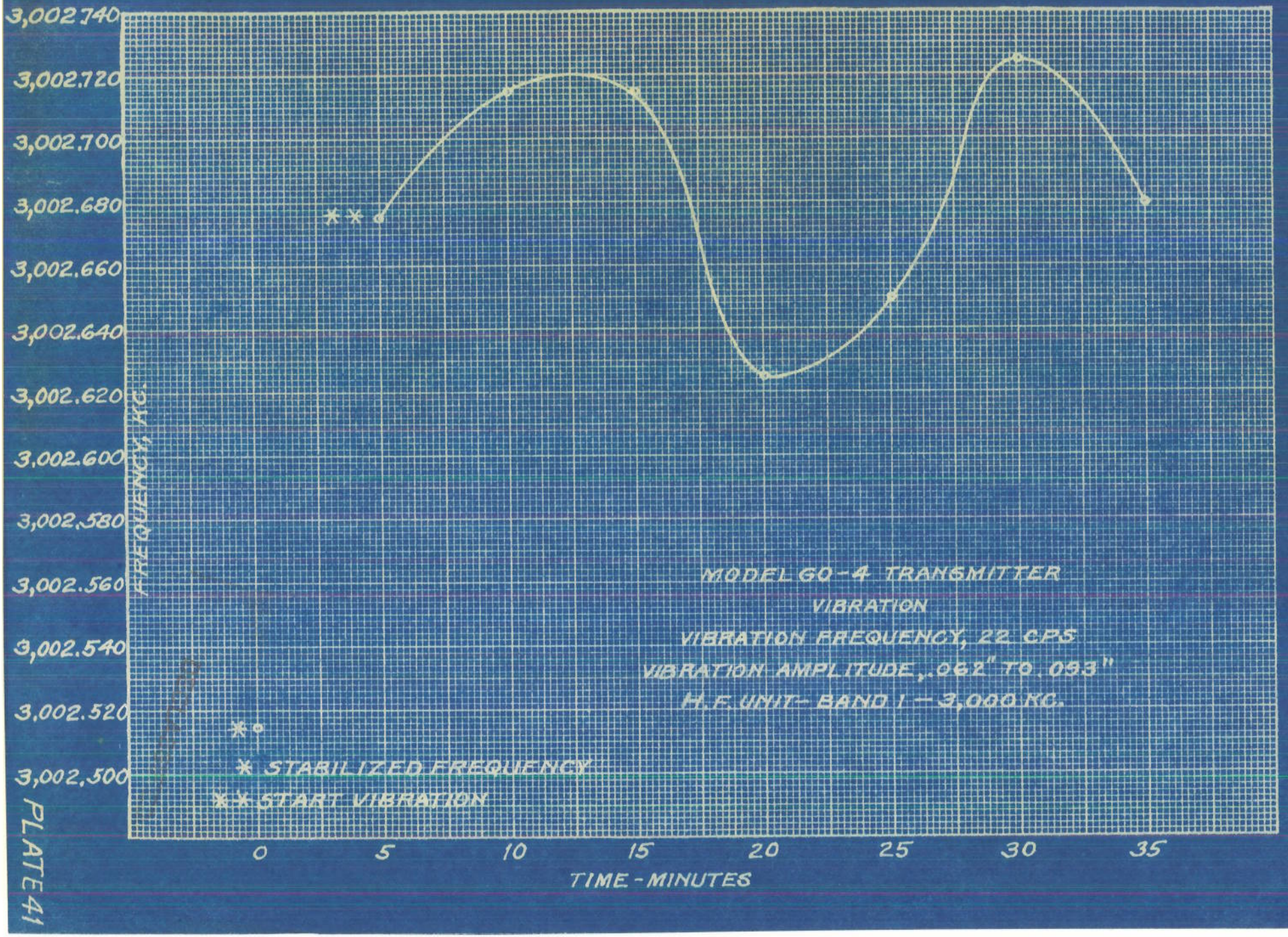


PLATE 41

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

DATE

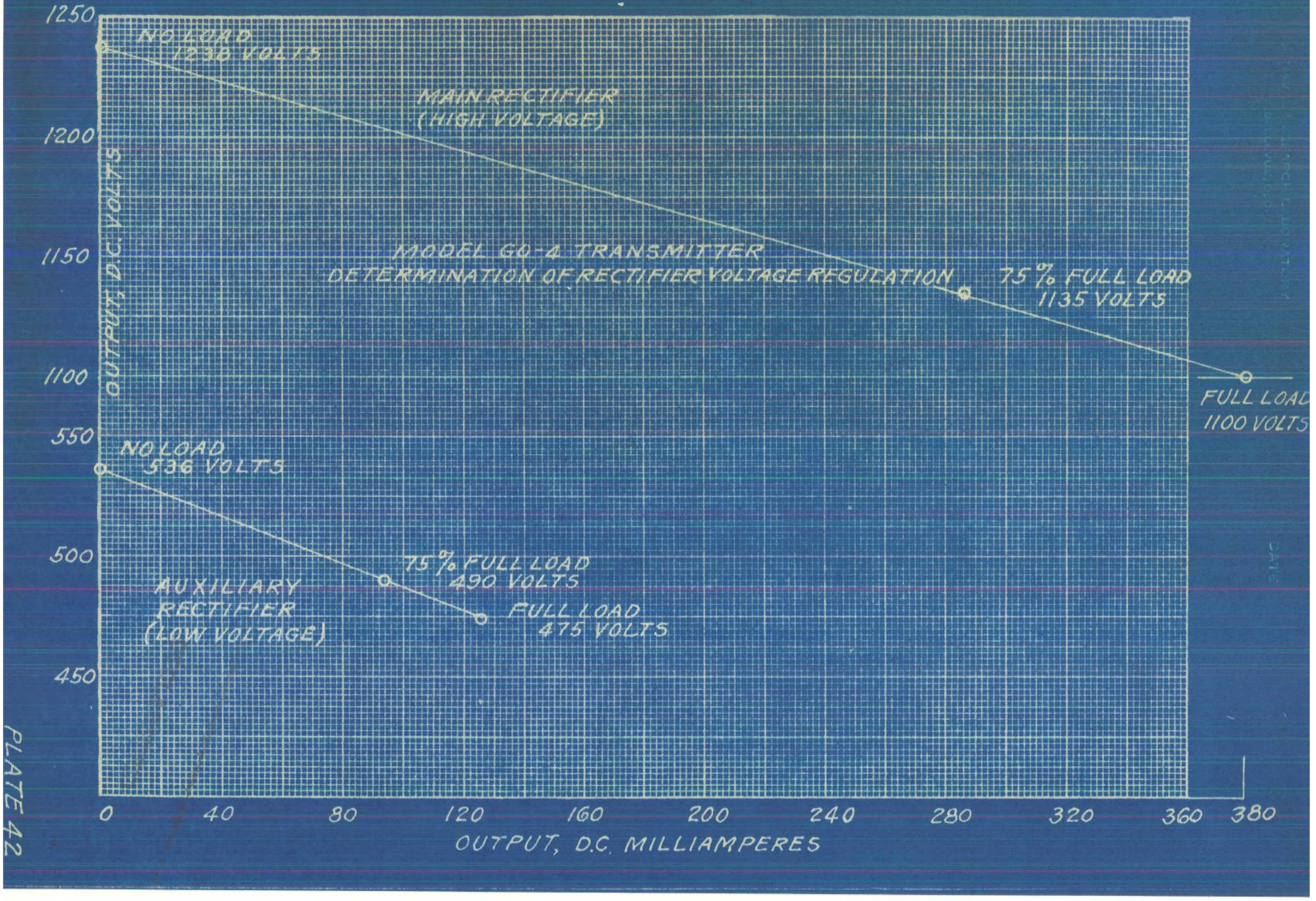

1250
1200
1150
1100
550
500
450
OUTPUT D.C. VOLTS
NO LOAD
1238 VOLTS
MAIN RECTIFIER
(HIGH VOLTAGE)
MODEL GO-4 TRANSMITTER
DETERMINATION OF RECTIFIER VOLTAGE REGULATION
75% FULL LOAD
1135 VOLTS
FULL LOAD
1100 VOLTS
NO LOAD
536 VOLTS
75% FULL LOAD
490 VOLTS
AUXILIARY
RECTIFIER
(LOW VOLTAGE)
FULL LOAD
475 VOLTS
0
40
80
120
160
200
240
280
320
360
380
OUTPUT, D.C. MILLIAMPERES

PLATE 42

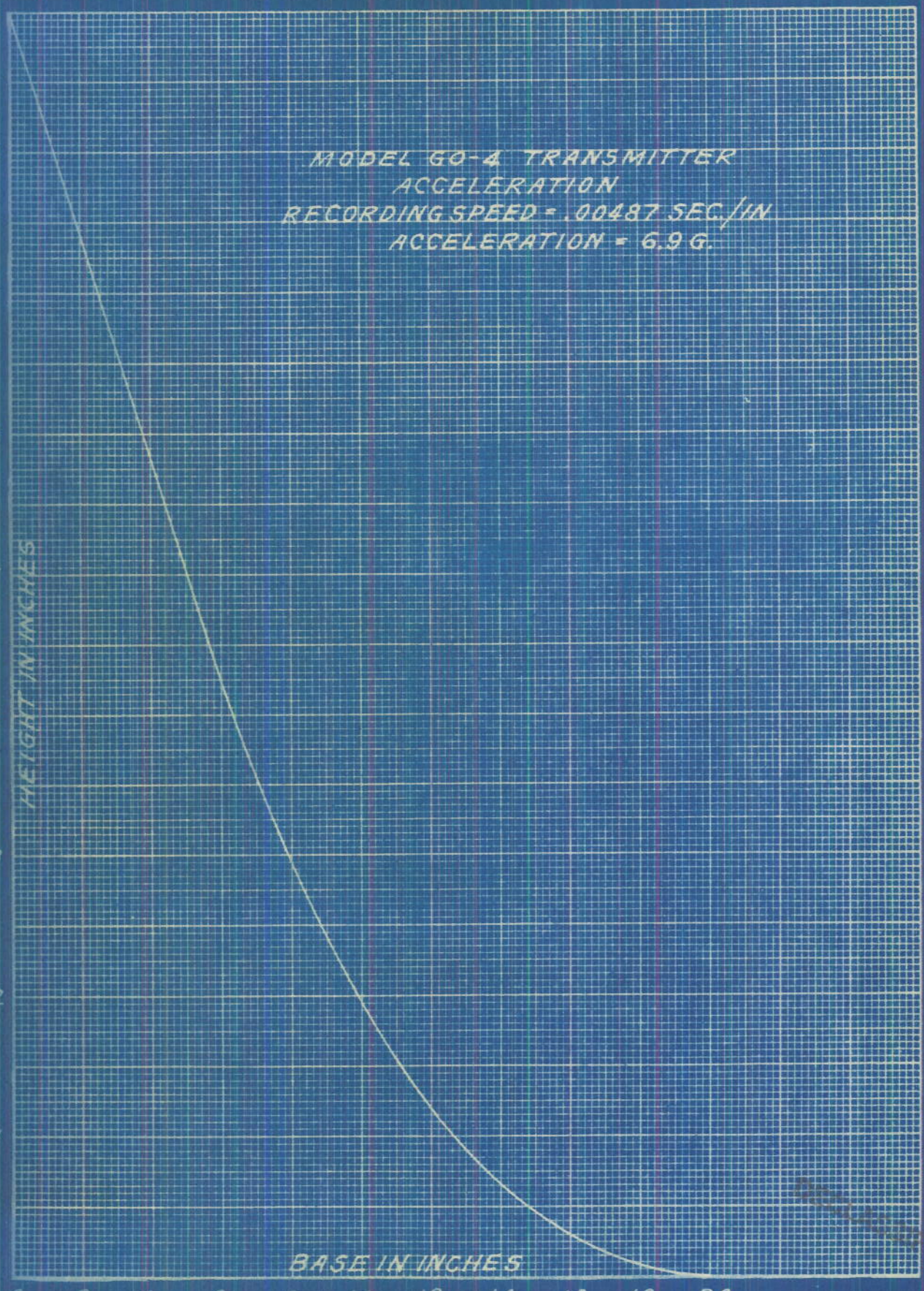

MODEL GO-4 TRANSMITTER
ACCELERATION
RECORDING SPEED = .00487 SEC./IN.
ACCELERATION = 6.9 G.
HEIGHT IN INCHES
9
8
7
6
5
4
3
2
1
BASE IN INCHES
0
2
4
6
8
10
12
14
16
18
20

PLATE 43

NO. 340-L310 EDCO EFFICIENCY SEMI-LOGARITHMIC—3 CYCLES X 70 DIVISIONS EUGENE DIETZGEN CO.

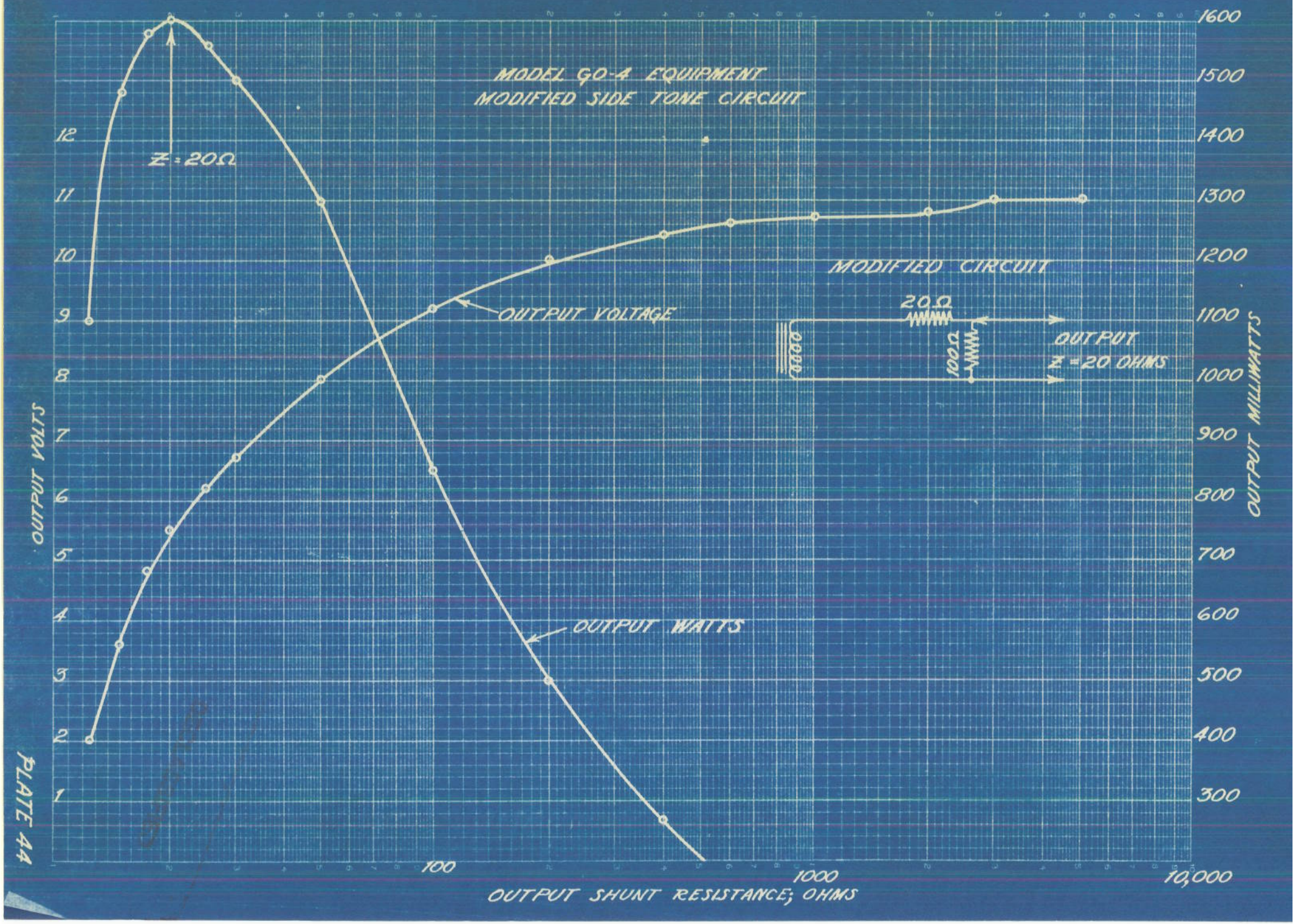


PLATE 44

N. B. L. 31A

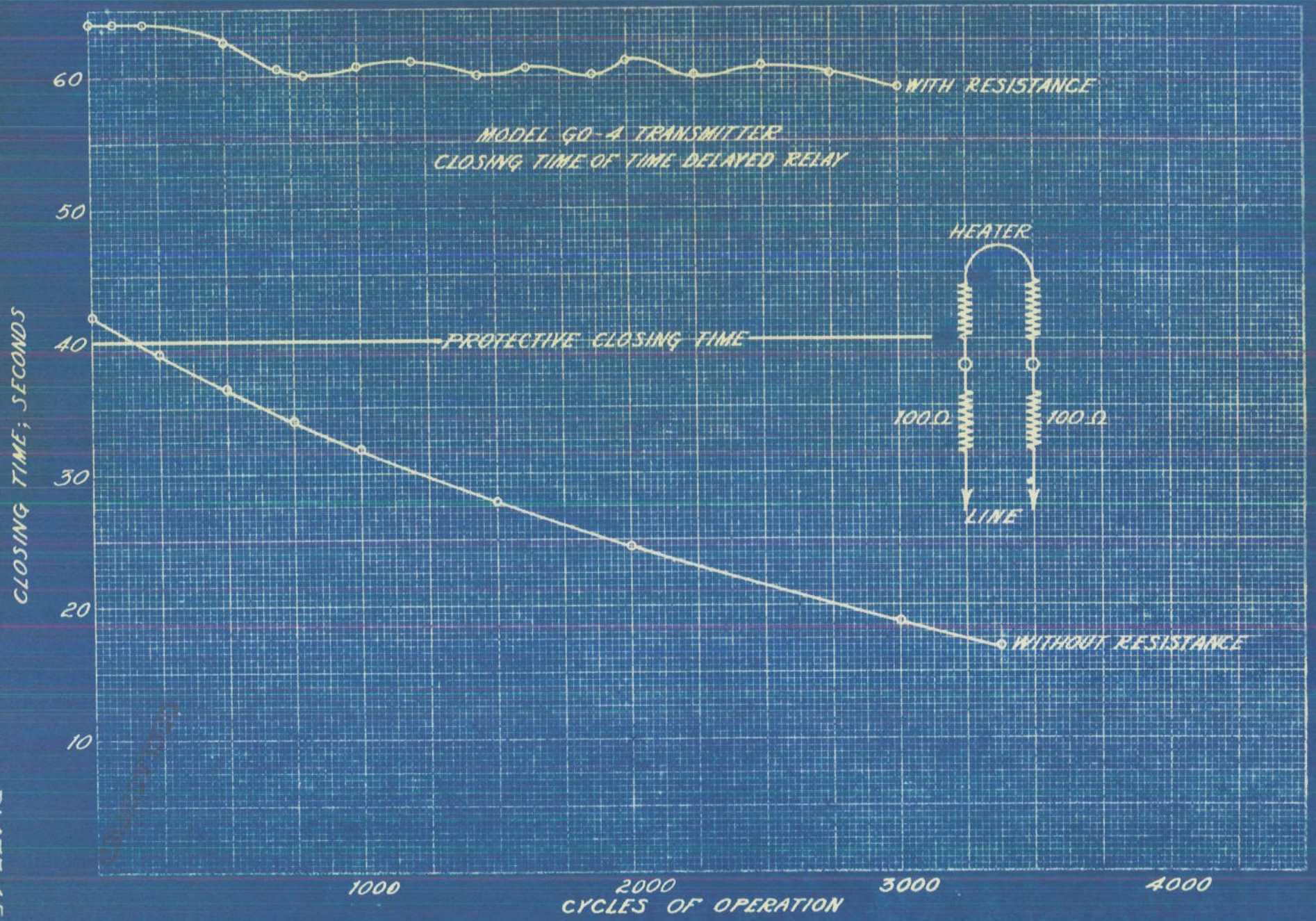


PLATE 45

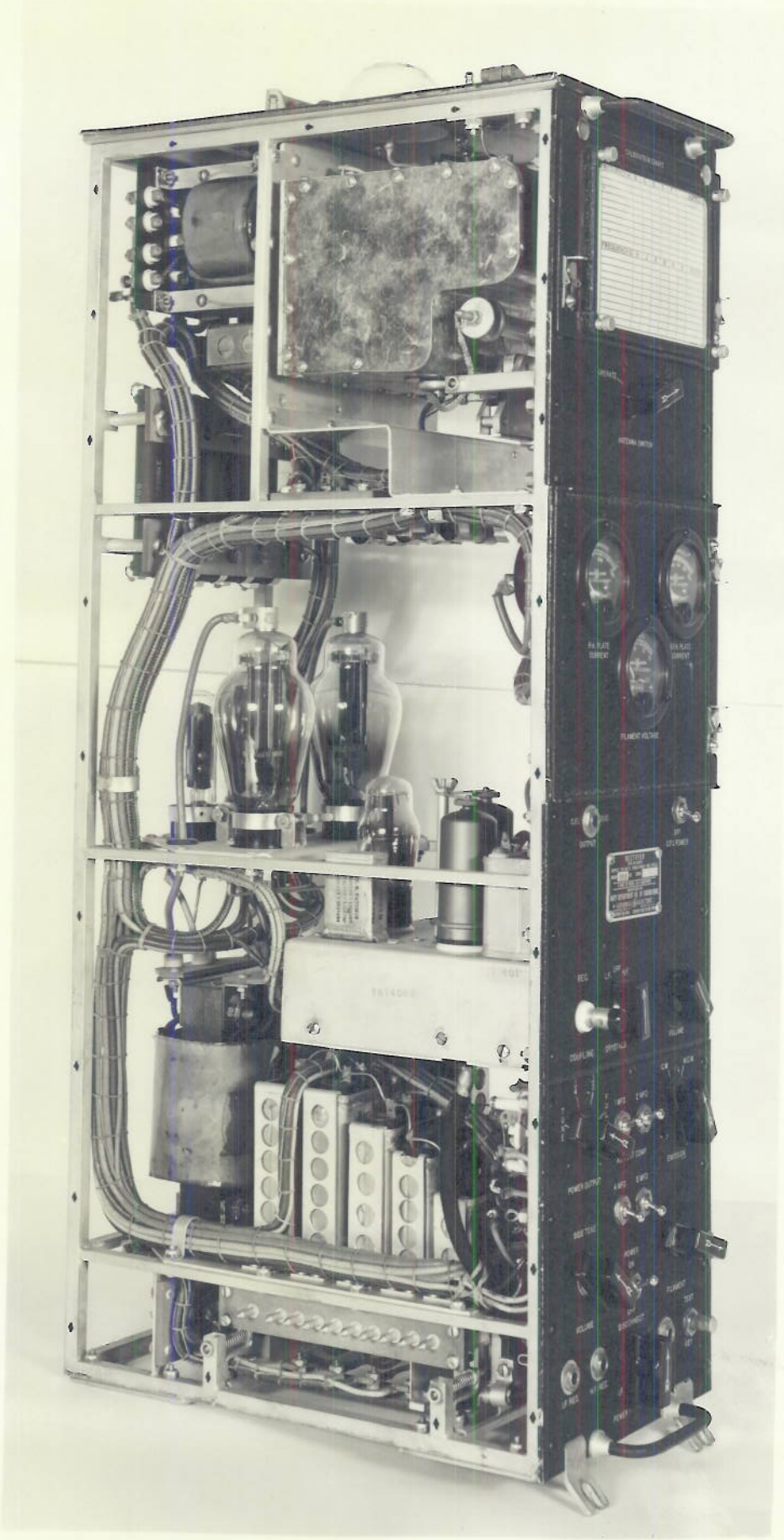


Plate 46

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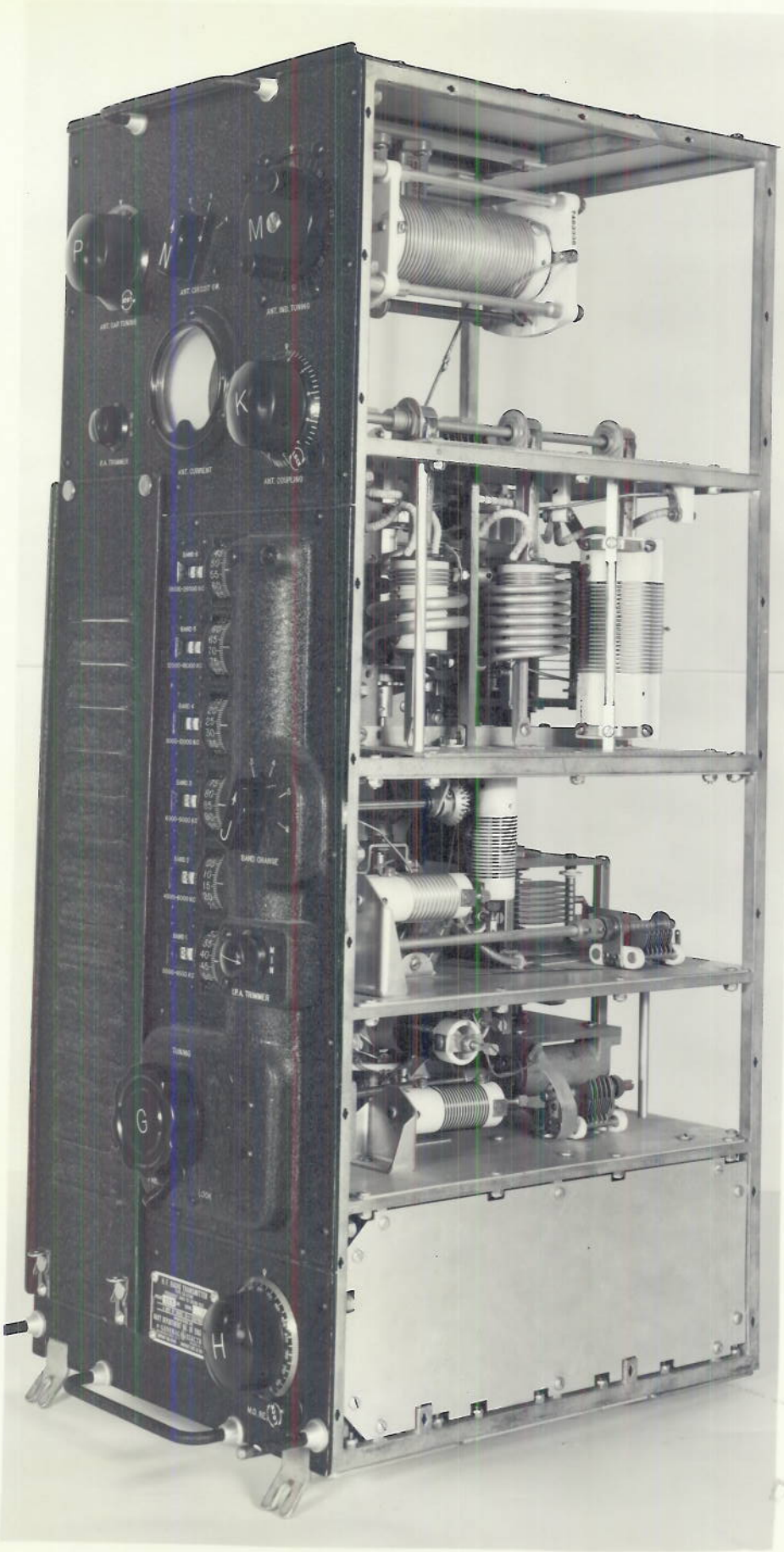

Plate 47

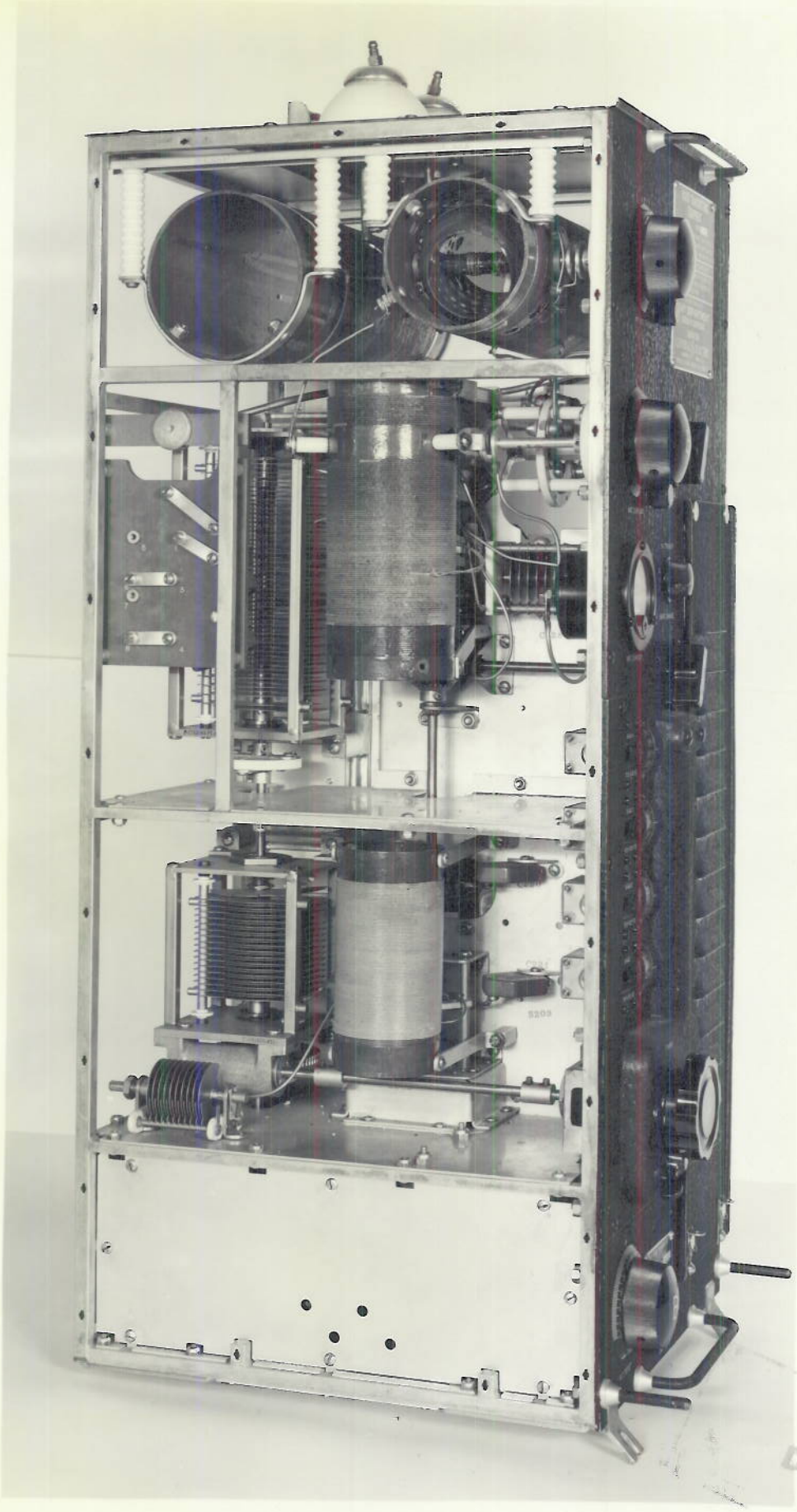

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Plate 48

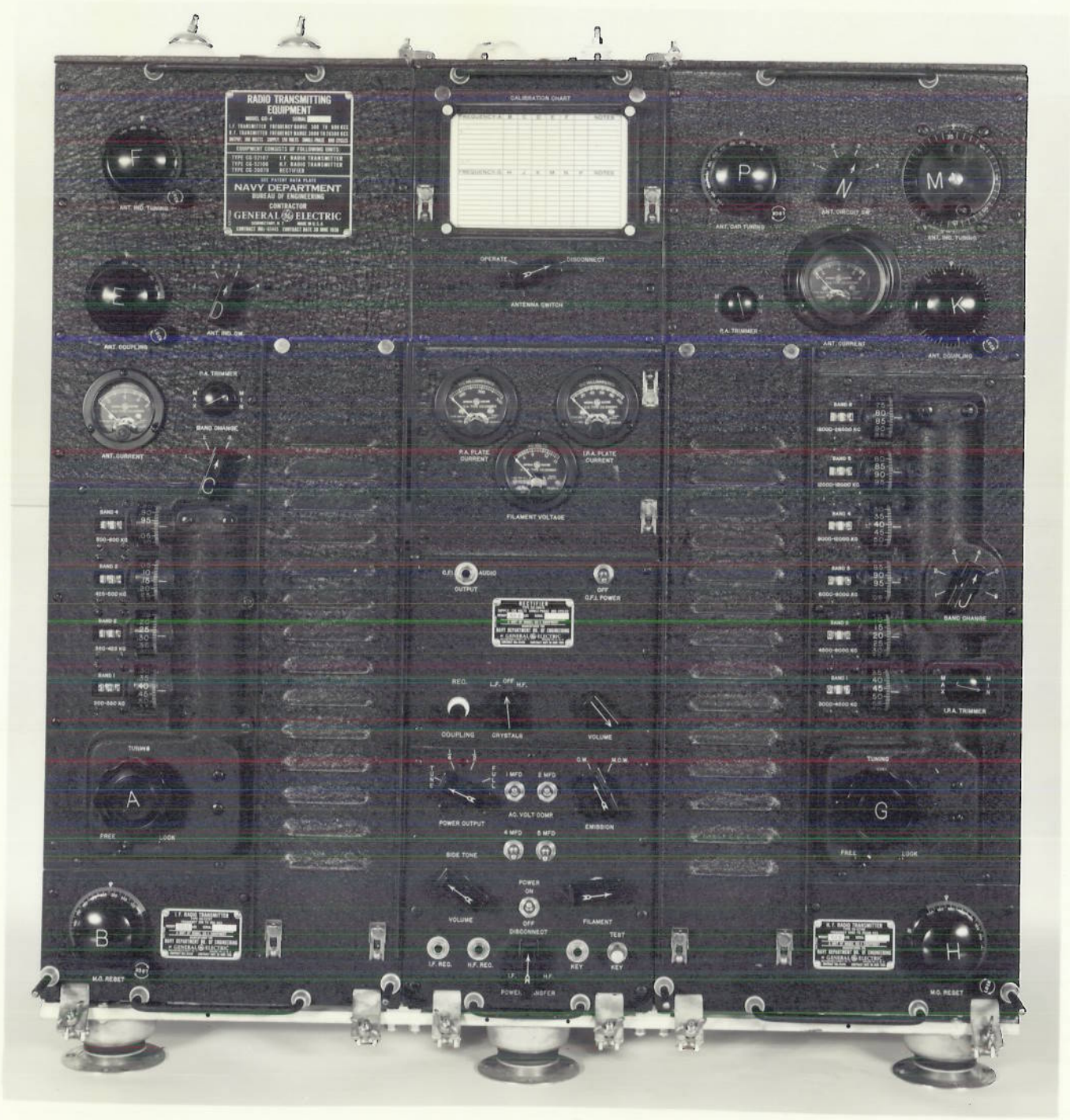

Plate 49

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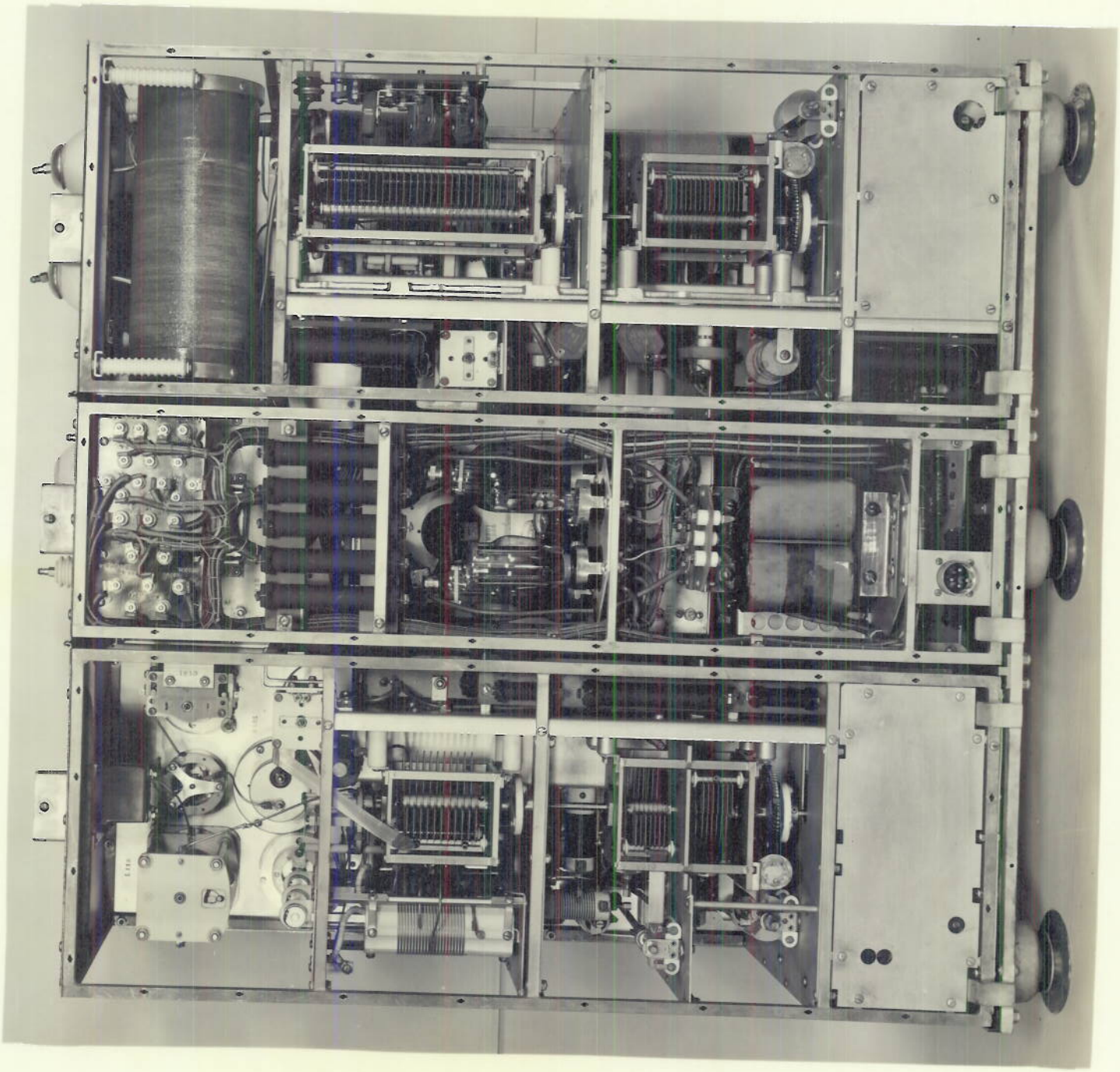

Plate 50

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U.S. NAVAL AIR STATION
Anacostia, D.C.

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NA6/F42-1/52(3)
(215)
Serial 40072

CONFIDENTIAL

10 June 1940

From: Commanding Officer.
To : Director, Naval Research Laboratory.

Subject: Aircraft Radio - Model XGO-4 Equipment Confidential Contract NOs 61445 with General Electric Co. - Report on Tests of.

Reference: (a) BuEng ltr. F42-1(9-18-R6) of 19 September 1939.
(b) BuEng ltr. C-NOs 61445 (9-18-R1) of 20 September 1939.
(c) BuEng specifications RE 13A 558A.
(d) BuEng specifications RE 13A 558B.
(e) BuEng specifications RE 13A 558C.

Enclosure: (A) Photograph AN-54973 - Antenna Reel Showing Blisters Caused by High Voltage in XGO-4 Tests.
(B) Photograph AN-54974 - Fairlead Section Showing Points of Voltage Breakdown in XGO-4 Tests.

1. HISTORY OF TESTS.

The model XGO-4 equipment arrived at this station from the Naval Research Laboratory on April 23. Two days were devoted to mechanical inspection and bench tests before installing subject equipment in JE-1 airplane #0795. Flight tests were begun on April 29 and concluded on June 6. Twenty-two flights were made during this time.

2. DESCRIPTION OF EQUIPMENT.

The model XGO-4 equipment is a patrol plane transmitter with a nominal power output of 125 watts into an optimum antenna. It consists of a central rectifier unit with an I.F. transmitter attached to its left side and an H.F. transmitter attached to its right side. CW and MCW emission is provided throughout the frequency range. The frequency range extends from 300 to 600 kc for the I.F. unit and from 3000 to 26500 kc for the H.F. unit.

3. WEIGHTS AND DIMENSIONS.

The weights of the equipment are:

H.F. Transmitter (including tubes)	54.0
I.F. Transmitter (including tubes)	50.8
Rectifier (including tubes)	53.8
Two sidetone cables	1.3
Slip cover	2.2
Main shock mounting	7.5
Upper shock mounting	1.4
TOTAL	171.0

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The overall dimensions of the complete equipment are:

Height	35 1/8"
Width	30 3/4"
Depth	15" (not including power receptacle)

The vertical mounting dimension is 34 inches. The additional 1 1/8" noted above is the projection of antenna terminals. Sidetone monitoring cables are ten feet long. The mounting provisions do not correspond to the requirements of the drawing on page 42 of reference (c).

4. ANTENNA RESONATING CHARACTERISTICS.

The I.F. unit of the model XGO-4 equipment will resonate all antennas normally encountered in service. Tests were made at 323 kc with trailing antennas varying from 35 to 462 feet. 542 kc was also operated into 462 feet. The H.F. unit as submitted did not operate satisfactorily above 17000 kc. Circuit revisions by contractor representatives made possible the tuning of the set into a wide variety of antennas throughout the frequency band. On the H.F. unit these tests were made on 3005, 9050, 13380, 21175 and 26500 kc into trailing antennas varying from 40 to 140 feet. This variation of trailing antenna is believed to duplicate quite closely, the constants of any patrol plane fixed antenna with which this equipment was intended to operate. At 3005 kc, using 105 feet of trailing antenna, the transmitter could not be coupled up to full power but this was the only point where full power could not be attained.

5. OPERATION AT ALTITUDE.

(a) I.F. UNIT.

A trailing antenna was used to duplicate fixed antenna constants for the first altitude tests in order that a variation of antenna constants might be obtained during flight. However the fairlead and reel broke down when using short antenna lengths in these tests. (See enclosures (A) and (B)). This is admittedly an abnormal use of the reel and fairlead and it is not intended to indicate that these items are unsuitable for their intended purpose. However it was necessary to make final altitude tests on a fixed antenna. Tests were made on 323 kc into a fixed antenna of 200 mmf and also into a fixed antenna of 150 mmf. Satisfactory operation was obtained on full power, CW and MCW, into either antenna up to the specified altitude of 25000 feet. This operation was achieved after replacing the stud in the lead-out insulator with a stud of slightly greater length. The breakdown which occurred at this point was the only breakdown encountered during the tests of the I.F. unit in the transmitter itself.

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Report on Tests of.

(b) H.F. UNIT.

When the H.F. antenna circuit was revised as indicated in paragraph 4 of this letter the variable condenser used did not have adequate spacing to withstand the voltages developed. Break-down occurred at approximately 15000 feet. Replacement of this condenser with a condenser of greater spacing provided satisfactory full power operation up to the specified 25000 feet. Tests were made on 3005 kc.

6. FREQUENCY STABILITY.

In conjunction with the altitude tests reported in the preceding paragraph, measurements of the frequency stability were made on the frequencies indicated below. All measurements were made in the order indicated with the plane descending as rapidly as convenient so as to minimize the change of temperature in the transmitter unit itself.

Altitude	Frequency		
25000	3005.4	5865.0	5795.3
20000	3005.35	5864.8	5794.8
15000	3005.35	5864.5	5794.4
10000	3005.30	5863.7	5794.1
5000	3005.20	5863.4	5793.6
1000	3005.0	5863.2	5793.4
Variation	-0.4 kc	-1.8 kc	-1.9 kc
	0.013%	0.031%	0.033%

7. C.F.I. OPERATION.

The operation of the C.F.I. unit is not considered satisfactory. Three capable operators have at various times made serious errors in setting up frequencies. These errors would be as large as 100 kilocycles and are undoubtedly due to using a spurious crystal check point. Two factors contribute to this difficulty; the range of the H.F. calibration corrector is excessive and the proper crystal check points are not unmistakable throughout the band. The intensity of the crystal check points expressed in volts across 600 ohm phones is indicated in the following table. The audio beat note was always adjusted for maximum output, the C.F.I. volume control was set at maximum and the transmitter was in the "Tune" position:

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Frequency in Megacycles	C.F.I. Output Volts Across 600 Ohm Phones
3	11
4	14
5	10
6	9.5
7	0.3
8	13.5
9	0.2
10	8.5
11	0.1
12	12
13	0.1
14	0.4
15	0.0
16	13.5
17	0.2
18	0.0
19	2
20	8.5
21	0
22	0.4
23	0.2
24	6.5
25	0.4
26	0.5

8. OPERATION IN RADIO TEST POSITION.

Communication was carried on over a distance of approximately six miles on 3005 kc. Communication over considerably greater distances is believed possible under favorable conditions even if the transmitter is in the radio test position.

9. RECOMMENDATIONS.

The attention of the Bureau is invited to the following points for appropriate action:

(1) Improve operation of C.F.I. unit. Crystal check points should be unmistakable and the audio characteristic should emphasize the low tones.
(2) Reduce range of H.F. calibration corrector.
(3) Low frequency crystal in C.F.I. was sluggish. Proper operation should be assured.

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(4) Engraving on C.F.I. terminal should indicate that transmitter output is available. It is suggested that terminal be engraved "R.F. coupling".
(5) A nameplate should be provided on the top of the transmitter to indicate the proper connection of the fixed antenna load coil.
(6) Provide identification markings near control in addition to the engraved knob. Knobs "C" and "D" on I.F. transmitter were reversed on unit submitted to this station for test.
(7) Provide nameplates indicating maximum and minimum setting of antenna loading inductors in I.F. transmitter.
(8) It is suggested that a calibration nameplate be provided for all trimmers to permit setting up a precalibrated frequency without power on the equipment.
(9) Provide discharge resistor across H.V. filter condenser in MCW position.
(10) Provide discharge resistor across compensator condenser.
(11) Provide bypass condensers on power input leads.
(12) Prefer all interlocks in positive D.C. lead similar to GO-3.
(13) Provide interlocks on all band switches, antenna switches, and disconnect switches.
(14) No interlocks are provided on side shields. The GO-3 provides interlocks at this point but the GO-4 design will probably be satisfactory.
(15) The control mechanism of the H.F. antenna inductor froze on the first flight. The complete mechanism was replaced by the contractor and no further trouble was encountered.
(16) The design of the lock on the H.F. antenna inductor should be such that it is not readily confused with the tuning control.
(17) The GO-4 equipment is the first of the GO series in which the filaments of one transmitter are not in the standby condition when the other transmitter is being used.
(18) Two springs which are part of switch detent mechanisms failed during test.
(19) Accessibility of H.F. - I.F. switch is not of the best.
(20) Adjustment of frequency controls cannot be accomplished with ease.
(21) Use only two positions of switch in H.F. antenna circuit.
(22) Designations of controls should be arranged in an orderly manner.
(23) The jumper used to connect the fixed antenna load coil in the circuit should be covered with isolantite beads.

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(24) The tuning condenser in the intermediate amplifier of the H.F. transmitter is so connected that a short circuit across the condenser grounds the plate voltage.
(25) Connect sidetone cables so that white lead is high potential.
(26) Key relay design is such that it becomes necessary to carry spare evacuated contacts.
(27) Change GO-4 mounting provisions to correspond with proposed GO-5 and GO-6 equipments.
(28) Method of attaching side shields is not completely satisfactory.
(29) If future use of the NEA-3 generator is contemplated the power input plug should accommodate a fifth lead.

(Signed) S. P. GINDER

Copies: BuEng (1)
BuAero (2)
NAF Phila (1)

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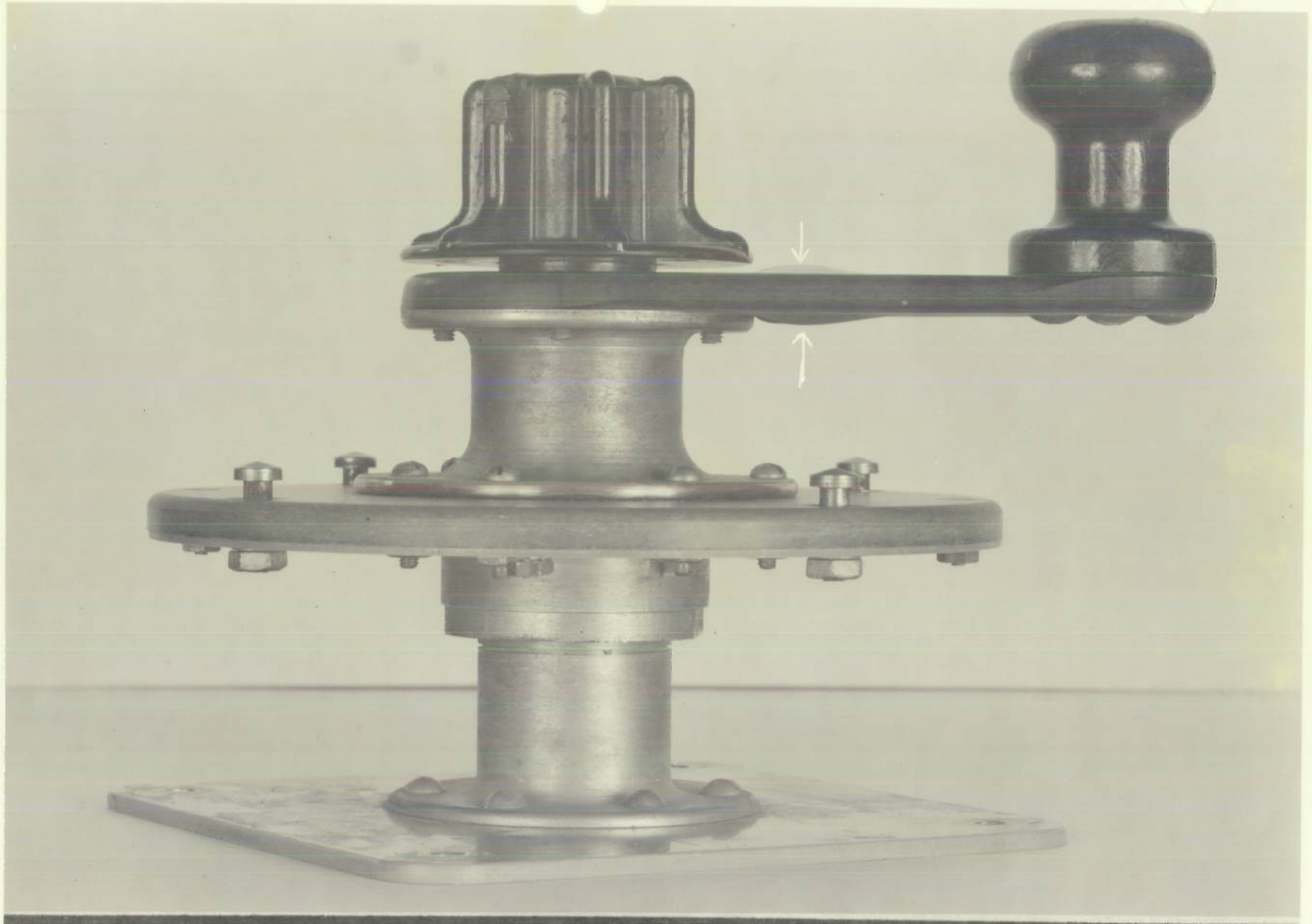

Antenna Reel Showing Blisters Caused by High Voltage in XGO-4 Tests.

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Feirlead Section Showing Points of Voltage Breakdown In XGO-4 Tests.

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