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SUBJECT

TESTS OF MODEL TBF TRANSMITTING EQUIPMENTS, SERIAL NOS. 32, 34 and 35.

BY

NAVAL RESEARCH LABORATORY

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NAVY DEPARTMENT

BUREAU OF ENGINEERING

Report on

Tests of Model TBF Transmitting Equipments, Serial Nos. 32, 34, & 35.

NAVAL RESEARCH LABORATORY
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REPORTED BY - R. B. Meyer, Assoc.Rad.Eng. (Chief of Section) O. C. Dresser, Assoc.Rad.Eng.

REVIEWED BY - A. Hoyt Taylor, Superintendent of Radio Division.

APPROVED BY - H. R. Greenlee, Capt.USN. Director.

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1. AUTHORIZATION

The tests herein reported were authorized by the Bureau of Engineering in letter NOs-26769(12-29-W8) of 6 January 1934 to Director, Naval Research Laboratory.

2. OBJECT OF TESTS

The object of the tests was to determine whether three production models of TBF transmitting equipment complied with paragraph 3-7-2 of Specifications RE 13A 442B and with the two special requirements contained in paragraph (1) of Bueng letter NOs-26769(12-29-W8) of 6 January 1934 to Director, Naval Research Laboratory, which is quoted below:

> "A bonus for exceeding the requirement of Par. 3-7-2 will be as follows: Two percent of the contract price shall be allowed in case the temperature coefficient of frequency is reduced to 0.0012 per cent per degree Centigrade. An additional two per cent of the contract price shall be allowed in case the temperature coefficient of frequency is reduced to 0.0009 per cent per degree Centigrade. The figure upon which this bonus shall be determined will be the average temperature coefficient of frequency determined from the several transmitters which are subjected to the type tests under which these measurements are required."

3. MATERIALS UNDER TEST

The materials under test were three Model TBF Transmitting Equipments supplied by the Westinghouse Electric and Manufacturing Company under contract NOs-26769.

Serial No.	Destined for Installation on:
32	USS MINNEAPOLIS
34	USS TUSCALOOSA
35	USS RANGER

4. REFERENCES

The following references were used as a guide for the conduct of the tests:

(a) Bueng letter NOs-26769(12-29-W8) of 6 Jan.1934 to Dir.N.R.L.
(b) NRL Report No. RE-171 (BuEng Prob.T5-3) (Test of Preliminary Model TBF Transmitter).
(c) Specifications RE 13A 442B.

5. METHOD OF TEST

Each of the three Model TBF equipments was installed in the temperature controlled chamber at the U.S. Bureau of Standards and tests conducted in accordance with paragraph 3-7-2 of reference (c) as modified by

paragraph 1 of reference (a). The Bureau of Engineering was informed (orally) of the results of these tests and after a conference on January 31, 1934 between representatives of the Bureau of Engineering and the Naval Research Laboratory, it was decided to have a representative of the Westinghouse Electric and Manufacturing Company make such adjustments of the equipment under test as were deemed necessary. The results of each adjustment were carefully observed and recorded.

6. DATA RECORDED

Observations were recorded at ten minute intervals during the numerous test runs required. This data is submitted in tabulated form and in the form of curves in the tables and plates appended hereto.

7. RESULTS

Model TBF; Serial No. 32

The first test conducted with Transmitter Ser. No. 32 was made at 3000 KC. The ambient temperature was varied from 25 degrees Centigrade to 30, to 35, to 50 and then back to 25 degrees. During this test the original adjustment of the compensating condenser in the master oscillator circuit was used. Table No. 1 and Plate No. 1 list the results of this test.

Table No. 2 and Plate No. 2 record the results of a test conducted at 3000 KC where the ambient temperature was varied from 25 degrees to 15, to 10, to 5, to zero and back to 25 degrees. The original setting of compensating condenser was used.

Table No. 3 and Plate No. 3 record the results of a test which was conducted in order to check the results of the test listed in Table No. 1. It was discovered that in the first test (Table No.1) the LH measuring equipment had been adjusted to the first harmonic of 3000 KC; therefore, in order to eliminate any possible discrepency, the test listed in Table No. 3 was conducted with the LH equipment adjusted to 3000 KC. The close agreement between the two tests indicate that no errors were introduced by the method of measurement used in the first test.

A study of Tables 1 and 3 indicated that a greater frequency change per degree centigrade occurred in the region of 25 to 35 degree when the ambient temperature was varied in 5 degree steps than in the region of 35 to 50 degrees or 50 degrees to 25 degrees when the ambient was varied in 15 and 25 degree steps. In order to determine whether any large temperature coefficient was missed or obscured due to the larger changes in ambient temperature it was decided to conduct a test wherein the temperature was varied between the limits of 25 and 50 degrees in 5 degree steps. Table No. 4 and Plate No. 4 list the results of this test.

Since the previous tests demonstrated that the temperature coefficient in some parts of the temperature range were in excess of 0.0009%, the compensating condenser was readjusted in an attempt to improve the performance of the transmitter. Table No. 5 and Plate No. 5 list the results of a test conducted at 3000 KC wherein the ambient temperature

was varied from 25 to 30, to 35, to 50 and back to 25 degrees. This data shows that the readjustment of the compensating condenser improved the performance of the equipment at this frequency (3000 KC) and at this range of temperature (25 to 50 degrees).

Table No. 6 and Plate No. 6 record the results of a test conducted at a frequency of 2000 KC wherein the ambient temperature was varied from 25 degrees to 10, to 5 to zero and back to 25 degrees. In all instances the temperature coefficient was less than 0.0009%. The original setting of the compensating condenser was used during this test.

Table No. 7 and Plate No. 7 record the results of a test conducted at a frequency of 2000 KC wherein the ambient temperature was varied from 25 degrees to 30, to 35, to 50 and back to 25 degrees. This test also was conducted with the original setting of the compensating condenser. It will be noted that the temperature coefficient was less than 0.0009% in all cases.

Table No. 8 and Plate No. 8 record the results of a test conducted at a frequency of 4500 KC wherein the ambient temperature was varied from 25 degrees to 35, to 50 and back to 25 degrees. This test, conducted with the original setting of the compensating condenser, shows that the temperature coefficient over this range of ambient temperature was in excess of 0.0015%.

Table No. 9 and Plate No. 9 record the results of a test conducted at a frequency of 4500 KC wherein the ambient temperature was varied from 25 degrees to 10, to 5, to zero and back to 25 degrees. This test was conducted with the original setting of the compensating condenser. The data shows that as the ambient temperature approached zero degrees centigrade the temperature coefficient became increasingly larger until between 5 and zero degrees the temperature coefficient was 0.0017%.

Table No. 10 and Plate No. 10 record the results of a test conducted at a frequency of 4500 KC wherein the ambient temperature was varied from 25 degrees to 50 degrees in 5 degree steps and then returned from 50 degrees to 25 degrees in one step. This test was conducted with the original setting of the compensating condenser. The data shows that the temperature coefficient varied between the limits of 0.001 and 0.002% over this range of ambient temperature.

Table No. 11 and Plate No. 11 record the results of a test conducted at a frequency of 4500 KC wherein the ambient temperature was varied from 25 degrees to 35, to 50 and back to 25 degrees. This test was made after the compensating condenser had been re-adjusted. The data shows that this re-adjustment of the compensating condenser greatly improved the temperature coefficient in this range of ambient temperatures.

Attention is invited to Tables Nos. 4, 9 and 10. Two Model LH Visual Frequency Measuring Equipments were used to record these tests. The agreement between the two sets of readings secured in this manner is so close that it removes any doubts as to the accuracy of the measurements.

During the course of the foregoing tests it was observed that the

greatest temperature coefficient existed at the highest frequency of the transmitter (4500 KC). Therefore, it was decided that whenever a re-adjustment of the compensating condenser was made sufficient information as to the efficacy of the adjustment could be obtained by conducting tests at 4500 KC only. Table No. 12 records the results of a test conducted with transmitter Serial No. 32 at a frequency of 4500 KC wherein the ambient temperature was varied from 35 degrees to 50 degrees and from 5 degrees to zero degrees. This test was conducted after the compensating condenser had been re-adjusted a second time by the Manufacturer's representative. The results of this test show that the second re-adjustment improved the temperature coefficient between the ambient temperatures of 35 degrees to 50 degrees from 0.0014% to 0.00083%.

A third re-adjustment of the compensating condenser was made on March 2nd and a test conducted at 4500 KC wherein the ambient temperature was varied from 5 degrees to zero, to 35 degrees and then to 50 degrees. The results of this test show that this third re-adjustment of the compensating condenser still further improved the operation of the transmitter. After this last adjustment the temperature coefficient between 5 degrees and zero was 0.00188%; between 0 and 35 degrees 0.00053% and between 35 and 50 degrees 0.00041%. The detailed results of this test will be found in Table No. 13.

Table No. 31 summarizes the results attendant upon the various adjustments of the compensating condenser made on TBF transmitter Serial No. 32 at 4500 KC.

Table No. 32 summarizes the results of the various tests conducted in connection with Transmitter Serial No. 32 with the compensating condenser at the original setting as received from the Manufacturer.

Model TBF; Serial No. 34

Transmitter No. 34 was tested at 4500 KC only, since the previous tests in connection with Transmitter Serial No. 32 indicated that if the proper setting of the compensating condenser was obtained the temperature coefficients at 2000 KC and 3000 KC were always smaller than at 4500 KC.

Table No. 14 lists the results obtained with the compensating condenser left set at the original adjustment as received from the Manufacturer. The ambient temperature was varied through the range of 35 degrees to 50 degrees. The temperature coefficient obtained during this test was 0.0022%.

Table No. 15 and Plate No. 12 list the results of a test after the first re-adjustment of the compensating condenser had been made by the Manufacturer's representative. This test was conducted at 4500 KC wherein the ambient temperature was varied from 25 degrees to 30, to 35, to 50 and back to 25 degrees. The data shows that a decided improvement resulted in the temperature range of 35 to 50 degrees, the temperature coefficient being 0.00038% instead of 0.0022% as obtained with the original adjustment. The coefficient over the range of 25 to 50 degrees did not exceed 0.00073%.

Table No. 16 lists the results obtained when the ambient temperature was varied from 5 degrees to zero. The compensating condenser was at the same adjustment as recorded in test listed under table No. 15. The

temperature coefficient at this range of ambient, 5 degrees to zero, was 0.00194%.

Table No. 17 lists the results of a test conducted after a second re-adjustment had been made, wherein the adjusting screw of the compensating condenser had been turned 40 degrees past the point of contact with the condenser plate. It will be noted that the temperature coefficient over the range of 5 degrees to zero is substantially the same as in Table No. 16.

Table No. 18 covers an ambient temperature variation of 35 degrees to 50 degrees, using the 40 degree adjustment of the compensating condenser described under Table No. 17. The temperature coefficient at this range of ambient temperature is 0.00046%.

Table No. 33 summarizes the results obtained with the various adjustments of the compensating condenser of Transmitter Serial No.34.

Model TBF; Serial No. 35

Table No. 19 lists the results of a test with the original adjustment of the compensating condenser wherein the ambient temperature was varied between the limits of 35 and 50 degrees. This test was conducted at a frequency of 4500 KC and the temperature coefficient was determined to be 0.00115%.

Table No. 20 and Plate No. 13, list the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 25 degrees to 30, to 35, to 50 and back to 25 degrees. The compensating condenser had been adjusted to a 35 degree setting, i.e.; the adjusting screw of the compensating condenser had been turned 35 degrees past the point of contact with the condenser plate.

Table No. 21 and Plate No. 14 list the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 25 degrees to 30, to 35, to 50 and back to 25 degrees. The compensating condenser had been adjusted to a 55 degree setting.

Table No. 22 and Plate No. 15 list the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 25 degrees to 10, to 5, to zero and back to 25 degrees. The compensating condenser was at the same setting as in the test listed under Table No. 21, namely 55 degrees.

Table No. 23 and Plate No. 16 list the results of a test conducted at 3000 KC wherein the ambient temperature was varied from 25 degrees to 30, to 35, to 50 and back to 25 degrees. The compensating condenser was adjusted to a 50 degree setting.

Table No. 24 lists the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 5 degrees to zero. The compensating condenser was adjusted to a 50 degree setting.

Table No. 25 lists the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 5 degrees to zero. The

compensating condenser was adjusted to a 45 degree setting.

Table No. 26 lists the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 5 degrees to zero. The compensating condenser was adjusted to a 40 degree setting.

Table No. 27 lists the results of a test conducted at 4500 KC wherein the ambient temperature was varied from 35 degrees to 50 degrees. The compensating condenser was adjusted to a 40 degree setting.

Table No. 28 lists the results of a test conducted at 3000 KC wherein the ambient temperature was varied from 25 degrees to 10 degrees, to 5 degrees, and then to zero. The compensating condenser was adjusted to a 40 degree setting.

Table No. 29 lists the results of tests conducted at 2000 KC wherein the ambient temperature was varied from 5 degrees to zero and from 35 degrees to 50 degrees. The compensating condenser was adjusted to a 40 degree setting.

Table No. 30 lists the result of a test conducted at 3000 KC wherein the ambient temperature was varied from 35 degrees to 50 degrees. The compensating condenser was adjusted to a 40 degree setting.

Table No. 34 summarizes the results obtained with the various adjustments of the compensating condenser of Transmitter Serial No. 35.

8. SUMMARY

A summary of all the tests conducted with Transmitter Serial No. 32 with the compensating condenser at the original setting as received from the Manufacturer is listed in Table No. 36. This table shows that the average temperature coefficient of the transmitter at all the frequencies measured and over the entire temperature range from zero to 50 degrees Centigrade is 0.00094%. The average temperature coefficient at 2000 KC is 0.00053%; at 3000 KC it is 0.00082% and at 4500 KC 0.00135%. After the transmitter had been adjusted by setting the compensating condenser to 40 degrees (the final value arrived at) the average temperature coefficient at 4500 KC was reduced to 0.00094%.

Transmitter Serial No. 34 was not submitted to the large number of tests to which Serial No. 32 was submitted. The test conducted with Transmitter Serial No. 34 in its original condition was made at 4500 KC at ambient temperatures between the limits of 35 and 50 degrees Centigrade. The temperature coefficient was found to be 0.0022%. After Transmitter Serial No. 34 was adjusted so that the compensating condenser was set to the optimum value (40 degrees) the temperature coefficient at 4500 KC between the limits of 35 and 50 degrees Centigrade was 0.00046% and the average coefficient over the range from zero to 50 degrees was 0.00119%.

The temperature coefficient of Transmitter Serial No. 35 with the original adjustment of the compensating condenser between the limits of 35 and 50 degrees Centigrade was found to be 0.00115% at 4500 KC. After this transmitter had been subjected to a large number of tests wherein numerous adjustments of the compensating condenser were tried, it was

determined that the optimum value for the compensating condenser was an adjustment where the adjusting screw was rotated in a clockwise direction 40 degrees past the point of contact with the condenser plate. This adjustment was made in an ambient temperature of 20 degrees Centigrade. The average temperature coefficient at this 40 degree adjustment determined from tests conducted at 2000 KC, 3000 KC and 4500 KC, over a range of ambient temperatures of zero to 50 degrees Centigrade, was 0.00051%.

The average temperature coefficient of all three sets, Serial Nos. 32, 34 and 35, after the compensating condensers had been adjusted to the 40 degree setting, was 0.00088%.

A study of Table No. 34 will reveal that the compensating condenser of any TBF transmitter may be so adjusted that it will favor any given portion of the temperature range between 0 and 50 degrees Centigrade. However, as the coefficient at the zero degree end becomes smaller the coefficient at the 50 degree end becomes larger. It will further be noted that the 40 degree adjustment of the compensating condenser is the adjustment which permits one to obtain the smallest temperature coefficient simultaneously at both ends of the temperature range, namely, zero and 50 degrees Centigrade.

9. CONCLUSIONS

A survey of the data collected during these tests indicates that the results may be influenced by a number of factors. For instance, the tests show that the temperature coefficient at 2000 KC is always smaller than the temperature coefficient at 4500 KC. Therefore, in obtaining an average coefficient based on all tests, this value would be smaller if a preponderance of the tests were conducted at 2000 KC, and, conversely, the coefficient would be larger if the greatest number of tests were conducted at a frequency of 4500 KC. For example, Table No. 32 lists a series of 42 temperature coefficients, 8 of which are figures based on 2000 KC, 21 on 3000 KC and 13 on 4500 KC. If 21 of these temperature coefficient calculations had been based on results obtained at 4500 KC, the average coefficient would have been greater, while if 21 of the tests had been conducted at 2000 KC the average coefficient would have been smaller.

The data shows also that although the final setting of the condensers of all three transmitters was adjusted to 40 degree great an accuracy as possible, the temperature coefficient of between 0 degrees and 5 degrees Centigrade at a frequency o between the limits of 0.00108% and 0.00192%. This would compensating condensers of the various transmitters are duplicates, or that it is impossible to arrive at exac regardless of the pains expended in making the adjust

It should be borne in mind that the adjustme condenser involves measurements and mechanical magnitudes. A change in adjustment of the com degrees to 45 degrees causes a portion of th through a distance of approximately 0.0058" to 50 degrees causes a movement of about

an adjustment which requires this degree of precision will remain fixed over any considerable period of time under service conditions since the movable plate of the compensating condenser is fabricated from bi-metallic material which may suffer from aging effects.

10. PROBABLE ERRORS IN RESULTS

It will be noted that numerous calculations in this report are carried out to the fifth decimal place. It should be understood that the limit of accuracy of the Model "LH" Visual Frequency Measuring Equipment is to the fourth decimal place. During the course of these tests it was discovered, however, that due to the minute adjustments which were necessary in determining the optimum setting of the compensating condenser it was necessary to take into consideration calculations which extended to the fifth decimal place in order to determine the trend of the adjustments.

11. DISCUSSION

Reference (a) requests that comments be forwarded regarding any errors or omissions noted in the preliminary instruction books furnished with the TBF transmitting equipments. The instructions books were found to be adequate for placing the equipment into commission and for locating any troubles which might arise when new equipment is being operated for the first time. It is believed, however, that it would be desirable to require that preliminary instruction books contain a calibration curve of the master oscillator and the various amplifier circuits. The contractor did furnish a list of transmitter settings but it would be more convenient to have this information in the form of a curve.

The various items entering into the construction of the transmitters are given symbol numbers and letters in the instruction books and upon the wiring diagrams. However, in the transmitter itself such items as resistors, condensers, inductors, etc., are merely marked with the value and type number, but are not marked with the symbol number. Since numerous items entering into the construction may have the same value and type numbers it is difficult to locate the particular item with which one is concerned. It is recommended that in future specifications it be required that the symbol number be attached to the corresponding part in the transmitter. Some equipment supplied under Navy specifications is so marked and it has been found to be a great aid when servicing the equipment.

The type test data forwarded with reference (a) has been examined. A number of errors were discovered in the data submitted on Transmitter Serial No. 59 headed "Government Witness Type Test." These errors consist of duplications, erroneous calculations and applying data obtained at 3000 KC to the 2000 KC tests. Notations have been made on the data sheets indicating these errors.

Reference (a) requests that the production models be examined to determine whether the defects noted in the preliminary model as reported in reference (b) had been corrected in accordance with the procedure outlined by the Bureau of Engineering. Referring to paragraph 4 (pages 1, 2, 3 and 4) of reference (b), the following comments are submitted:

Par. 2-8. In the production models potentials in excess of 500 volts are insulated by means of micalex or Isolantite.

Par. 2-10. The design of the antenna coupling condenser has been improved to prevent the possibility of arcing.

Par. 2-11. The plate overload relays may be adjusted to operate at slightly more than normal load.

Par. 2-24. No metallic handles are used on the controls of the transmitter.

Par. 3-1. An improved construction has been incorporated into the production models so that it is possible to service the thermostat and the interior of the master cabinet with a minimum of trouble.

Par.3-7-8. The temperature controlled cabinet of the transmitter has been so modified that it reaches equilibrium at 60 degrees in a period of three hours.

Par. 3-10. The control of the "master oscillator range switch" has been modified so that it may be operated with ease and precision.

Par. 3-14. Controls "E", "F", "H" and "K" have been modified so that they conform to the requirements of "Positive Gearing".

Par. 3-15. The knurled head screws in the locking device of the tuning controls have been modified so as to prevent the possibility of loss.

Par. 3-16. The tuning inductors in the Intermediate and Power Amplifiers have been increased in value so that accurate resonance conditions can be obtained at 2000 KC.

Par. 3-30. A check of the filament voltmeter shows that it is accurate to within 0.2 volt.

Par. 3-32. The rear shield of the transmitter has been divided into two sections for ease in handling.

Par. 3-36. The "Adjust-Tune-Operate" switch has been provided with stops.

Par. 3-37. An improved form of test key had been provided which overcomes the objections to the original test key.

Par. 10-2-1. All transmitters were so packed that no damage resulted in shipment. It was noted, however, that the flexible leads connecting to the rear of the master oscillator unit had a tendency to chafe against the aluminum support at this point. This support is in the form of a shallow aluminum channel about three inches wide, lined with sponge rubber. All danger of chafing is eliminated if a portion of the top web of this channel is removed. This modification was made to sets No. 32, 34 and 35 before they were re-crated for shipment.

All filament life meters functioned accurately and recorded correctly during the course of the test.

TABLE NO.1

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

(Original Adjustment of Compensating Condenser)

Frequency - 3000 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	24.5	60.1	3000.350	228
20	25.0	60.1	255	229
30	25.5	60.5	209	229
40	25.2	60.75	160	228
50	24.9	61.0	133	228
10:00	25.2	61.1	103	228
10	25.0	61.25	086	226
20	25.1	61.25	064	227
	(Key open 10 minutes while temperature was changed)			
30	30.0	61.5	175	228
40	29.9	61.5	147	226
50	29.8	61.5	170	223
11:00	30.0	61.5	187	226
10	30.4	61.75	194	228
20	30.0	61.8	189	226
30	30.2	61.9	192	226
40	30.4	62.0	191	228
	(Key open 10 minutes while temperature was changed)			
50	34.8	62.0	287	229
12:00	34.9	62.0	300	228
10	35.4	62.0	336	228
20	34.9	62.0	345	228
30	35.1	62.0	343	226
40	35.0	62.2	351	226
50	35.2	62.1	357	228
13:00	35.0	62.2	345	226
	(Key open 20 minutes while temperature was changed)			
20	51.0	62.0	644	225
30	49.4	62.0	680	225
40	50.8	62.1	722	225
50	50.0	62.2	730	225
14:00	49.8	62.4	3000.750	226
10	50.4	62.5	753	226
20	50.0	62.5	755	225
30	50.4	62.6	772	225
	(Key open 20 minutes while temperature was changed)			

TABLE NO. 2

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

(Original Adjustment of Compensating Condenser)

Frequency - 3000 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	24.5	60.25	3000.574	234
20	25.0	60.5	520	232
30	25.0	60.8	458	234
40	24.8	61.0	407	234
50	25.2	61.25	369	234
10:00	25.2	61.5	342	232
10	25.0	61.6	324	231
20	25.0	61.75	307	235
	(Key open 10 minutes while temperature was changed)			
10:30	14.8	61.75	3000.274	235
40	14.6	61.9	262	234
50	15.0	62.0	246	235
11:00	15.0	62.0	234	233
10	15.0	62.0	220	234
20	14.0	62.0	212	233
30	15.0	62.0	209	235
40	15.0	62.0	200	234
	(Key open 10 minutes while temperature was changed)			
50	9.8	62.0	180	234
12:00	10.2	62.0	171	238
10	10.0	62.0	152	234
20	9.8	62.0	144	235
30	10.0	62.0	132	233
40	10.0	62.0	125	236
50	9.8	62.0	114	235
13:00	10.0	62.0	108	236
	(Key open 10 minutes while temperature was changed)			
13:10	5.6	62.0	087	232
20	5.0	62.0	086	232
30	4.9	62.0	085	232
40	5.0	61.9	067	231
50	4.6	61.8	052	232
14:00	5.0	61.75	045	232
10	5.0	61.8	036	233
20	5.0	61.8	033	231
	(Key open 10 minutes while temperature was changed)			

TABLE NO.2 Cont'd.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:30	0.0	61.75	2999.995	233
40	0.0	61.7	987	232
50	-.4	61.6	972	231
15:00	0.0	61.6	952	232
10	0.0	61.6	935	230
20	0.0	61.6	927	228
30	-.2	61.6	912	229
40	0.0	61.5	900	232
(Key open 20 minutes while temperature was changed)				
16:00	25.0	61.25	267	231
10	25.0	61.4	217	231
20	25.1	61.5	209	232
30	25.0	61.75	200	232
40	25.0	61.8	197	231
50	25.2	62.0	191	229
17:00	25.0	62.0	184	232
10	25.0	62.0	182	232

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Difference between readings taken at 10:20 and 11:40
Ambient Temperature - 10°Centigrade
Difference in frequency - 107 cycles
Difference per degree Centigrade - 10.7 cycles
.00035%

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 92 cycles
Difference per degree Centigrade - 18 cycles
.0006%

Difference between readings taken at 1300 and 1420
Ambient temperature - 5° Centigrade
Difference in frequency - 75 cycles
Difference per degree Centigrade - 15 cycles
.0005%

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 5° Centigrade
Difference in frequency - 133 cycles
Difference per degree Centigrade - 26 cycles
.00086%

Difference between readings taken at 15:40 and 17:10
Ambient temperature - 25° Centigrade
Difference in frequency - 282 cycles
Difference per degree Centigrade - 11 cycles
.00037%

Difference between readings taken at 10:20 and 17:10
Ambient temperature - None
Difference in frequency - 125 cycles
.0041%

TABLE NO. 3

TBF Transmitter; Serial No. 32

Effect of change in Ambient Temperature

Original Adjustment of Compensating Condenser.

Frequency - 3000 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	27.0	60.2	3000.710	229
20	25.7	60.2	620	227
30	25.5	60.2	585	225
40	25.1	60.3	550	226
50	25.0	60.7	520	225
10:00	25.2	61.0	495	225
10	25.1	61.1	474	224
20	25.0	61.2	465	224
	(Key open 10 minutes while temperature was changed)			
10:30	29.5	61.2	565	226
40	30.2	61.4	582	225
50	30.3	61.5	599	226
11:00	30.0	61.6	605	225
10	30.3	61.6	607	225
20	29.8	61.7	612	226
30	30.0	61.8	617	224
40	30.0	61.8	615	225
	(Key open 10 minutes while temperature was changed)			
11:50	35.0	61.8	730	226
12:00	35.0	61.8	732	225
10	35.1	61.9	752	226
20	35.0	62.0	760	226
30	35.0	62.0	762	225
40	35.0	62.0	767	225
50	35.0	62.1	761	225
13:00	35.0	62.1	760	226
	(Key open 10 minutes while temperature was changed)			
13:10	51.2	62.1	010	
20	50.2	62.2	070	
30	49.8	62.2	097	
40	49.4	62.4	123	
50	50.0	62.5	153	
14:00	50.0	62.5	168	
10	50.2	62.6	182	
20	50.0	62.6	194	
	(Key open 10 minutes while temperature was changed)			

TABLE NO.3 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:30	25.0	62.3	3001.160	226
40	25.0	62.2	3000.955	227
50	24.8	62.2	.875	228
15:00	24.8	62.1	.810	227
10	26.0	62.0	760	228
20	25.0	62.0	727	227
30	25.0	62.0	698	228
40	25.2	62.0	691	232

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Difference between readings taken at 10:20 and 11:40
Ambient temperature - 5° Centigrade
Difference in frequency - 150 cycles
Difference per degree Centigrade - 30 cycles
.001%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 145 cycles
Difference per degree Centigrade - 29 cycles
.00096%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 15° Centigrade
Difference in frequency - 434 cycles
Difference per degree Centigrade - 28.9 cycles
.00096%.

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 24.8° Centigrade
Difference in frequency - 503 cycles
Difference per degree Centigrade - 20.3 cycles
.00067%.

Difference between readings taken at 10:20 and 15:40
Ambient Temperature - 0.2° Centigrade
Difference in frequency - 226 cycles
.0075%

TABLE NO. 4

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

Original Adjustment of Compensating Condenser.

Frequency - 3000 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:20	28.0	60.0	3000.317	231
30	25.0	60.3	245	230
40	25.0	60.5	215	230
50	25.2	60.8	183	228
10:00	25.2	61.0	157	230
10	25.5	61.2	142	230
20	25.4	61.4	117	229
30	25.0	61.5	119	228
	(Key open for 10 minutes while temperature was changed)			
40	30.0	61.5	215	228
50	30.0	61.6	242	226
11:00	29.8	61.7	265	229
10	30.0	61.8	287	227
20	30.0	61.8	292	225
30	30.2	62.0	297	224
40	30.2	62.0	299	225
50	30.2	62.0	289	227
	(Key open 10 minutes while temperature was changed)			
12:00	35.2	62.0	415	230
10	35.2	62.0	441	225
20	35.0	62.0	453	226
30	35.2	62.1	462	225
40	35.2	62.1	465	228
50	35.0	62.2	462	229
13:00	35.0	62.2	456	228
10	35.0	62.2	455	228
	(Key open 10 minutes while temperature was changed)			
13:20	40.5	62.2	592	228
30	40.5	62.2	606	228
40	40.0	62.2	615	226
50	40.0	62.2	620	228
14:00	40.2	62.4	625	225
10	40.1	62.4	628	227
20	40.0	62.4	632	228
30	40.0	62.4	628	227
	(Key open 10 minutes while temperature was changed)			

TABLE NO. 4 Cont'd.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:40	44.0	62.4	3000.760	225
50	44.6	62.3	770	226
15:00	45.0	62.4	785	227
10	45.0	62.5	790	225
20	45.0	62.5	795	226
30	45.0	62.5	805	225
40	45.2	62.5	806	229
50	45.0	62.6	805	228
(Key open 10 minutes while temperature was changed)				
16:00	49.4	62.5	925	229
10	50.8	62.5	930	228
20	50.0	62.5	935	230
30	50.0	62.6	940	231
40	49.8	62.7	935	229
50	50.4	62.8	940	232
17:00	50.2	62.9	930	233
10	50.0	62.9	920	233
(Key open 10 minutes while temperature was changed)				
17:20	25.0	62.6	820	231
30	25.2	62.5	714	229
40	24.8	62.4	612	234
50	25.2	62.4	550	233
18:00	25.6	62.3	511	236
10	25.0	62.2	510	237
20	25.0	62.2	508	239
30	25.0	62.2	478	239

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Readings as per L.H.-1

Difference between readings taken at 10:30 and 11:50
Ambient temperature - 5° Centigrade.
Difference in frequency - 172 cycles.
Difference per degree Centigrade - 34.4 cycles
.0011%.

Difference between readings taken at 11:50 and 13:10
Ambient temperature - 5° Centigrade
Difference in frequency - 163 cycles
Difference per degree Centigrade - 32.6 cycles
.00109%.

TABLE NO. 4 Cont'd.

Difference between readings taken at 13:10 and 14:30
Ambient temperature - 5° Centigrade
Difference in frequency - 178 cycles
Difference per degree Centigrade - 35.6 cycles
.00118%.

Difference between readings taken at 14:30 and 15:50
Ambient temperature - 5° Centigrade
Difference in frequency - 172 cycles
Difference per degree Centigrade - 34.4 cycles
.00115%.

Difference between readings taken at 15:50 and 17:10
Ambient temperature - 5° Centigrade
Difference in frequency - 115 cycles
Difference per degree Centigrade - 23 cycles
.00065%

Difference between readings taken at 17:10 and 18:30
Ambient temperature - 25° Centigrade
Difference in frequency - 444 cycles
Difference per degree Centigrade 17.8 cycles
.000565%.

Difference between readings taken at 10:30 and 18:30
Ambient temperature - none
Difference in frequency - 356 cycles
.0186%.

Readings as per L.H.-2

Difference between readings taken at 10:30 and 11:50
Ambient temperature - 5° Centigrade
Difference in frequency - 170 cycles
Difference per degree Centigrade - 34 cycles
.0011%.

Difference between readings taken at 11:50 and 13:10
Ambient temperature - 5° Centigrade
Difference in frequency - 166 cycles
Difference per degree Centigrade - 33 cycles
.0011%.

Difference between readings taken at 13:10 and 14:30
Ambient temperature - 5° Centigrade
Difference in frequency - 173 cycles
Difference per degree Centigrade - 34.6 cycles
.00115%

TABLE NO. 4 Cont'd.

Difference between readings taken at 1430 and 1550
Ambient temperature - 5° Centigrade
Difference in frequency - 177 cycles
Difference per degree Centigrade - 35.4 cycles
.00118%

Difference between readings taken at 1550 and 17:10
Ambient temperature - 5° Centigrade
Difference in frequency - 115 cycles
Difference per degree Centigrade - 23 cycles
.00065%.

Difference between readings taken at 17:10 and 18:30
Ambient temperature - 25° Centigrade
Difference in frequency - 442 cycles
Difference per degree Centigrade - 17.7 cycles
.00059%.

Difference between readings taken at 10:30 and 18:30
Ambient temperature - none.
Difference in frequency - 359 cycles
.0197%.

TABLE NO. 5

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature.

After 1st re-adjustment of compensating condenser.

Frequency - 3000 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	24.6	60.2	3000.668	228
20	24.4	60.2	605	225
30	24.6	60.2	573	226
40	25.0	60.6	543	229
50	25.0	60.9	518	228
10:00	25.0	61.0	492	228
10	25.0	61.2	472	228
20	25.0	61.4	455	229
	(Key open 10 minutes while temperature was changed)			
30	30.0	61.4	545	228
40	29.8	61.5	492	226
50	30.0	61.6	470	225
11:00	30.0	61.7	454	226
10	30.2	61.8	440	225
20	Main line power failed. On at 11:22.			
30	29.6	61.8	463	228
40	29.6	61.9	447	227
50	30.3	62.0	437	228
12:00	29.8	62.0	425	230
10	30.2	62.0	420	230
	(Key open 10 minutes while temperature was changed)			
20	34.5	62.0	535	230
30	35.5	62.0	485	228
40	35.0	62.0	476	229
50	35.4	62.1	480	227
13:00	35.2	62.1	475	228
10	34.8	62.2	472	229
20	35.0	62.2	470	226
30	35.0	62.2	476	226
	(Key open 10 minutes while temperature was changed)			
40	49.8	62.2	675	225
50	50.0	62.3	750	226
14:00	50.0	62.4	800	226
10	50.0	62.5	825	227
20	49.8	62.6	840	228
30	50.0	62.6	860	228

TABLE NO. 5 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:40	49.8	62.7	3000.865	227
50	50.0	62.7	875	228
(Key open 10 minutes while temperature was changed)				
15:00	25.0	62.5	745	230
10	24.8	62.2	660	231
20	24.8	62.2	600	229
30	24.9	62.2	563	231
40	24.8	62.2	532	229
50	24.8	62.2	510	229
16:00	25.0	62.2	488	232
10	25.0	62.2	476	234

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Difference between readings taken at 10:20 and 12:10
Ambient temperature - 5.2° Centigrade
Difference in frequency - 35 cycles.
Difference per degree Centigrade - 6.7 cycles
.00022%.

Difference between readings taken at 12:10 and 13:30
Ambient temperature - 4.8° Centigrade
Difference in frequency - 56 cycles
Difference per degree Centigrade - 11.6 cycles
.00038%.

Difference between readings taken at 13:30 and 14:50
Ambient temperature - 15° Centigrade
Difference in frequency - 399 cycles
Difference per degree Centigrade - 26.6 cycles
.00088%.

Difference between readings taken at 15:50 and 16:10
Ambient temperature - 25° Centigrade
Difference in frequency - 399 cycles
Difference per degree Centigrade - 16 cycles
.00053%.

Difference between readings taken at 10:20 and 16:10
Ambient temperature - None
Difference in frequency - 21 cycles
.0007%.

TABLE NO. 6

TBF Transmitter; Serial No. 32

Effect of change in Ambient Temperature

Original Adjustment of Compensating Condenser.

Frequency - 2000 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	25.0	62.2	2000.705	232
20	25.2	60.2	615	232
30	24.8	60.5	569	233
40	25.4	60.7	540	232
50	24.8	61.0	513	232
10:00	25.0	61.2	493	232
10	25.2	61.5	475	229
20	25.2	61.6	462	231
	(Key open 10 minutes while temperature was changed)			
30	9.8	61.4	550	233
40	9.8	61.4	471	233
50	10.2	61.5	445	229
11:00	9.8	61.5	428	229
10	9.7	61.5	413	230
20	10.5	61.6	401	231
30	10.0	61.6	392	232
40	10.0	61.7	384	232
	(Key open 10 minutes while temperature was changed)			
11:50	4.0	61.5	465	230
12:00	5.0	61.5	400	232
10	5.0	61.5	369	232
20	5.0	61.5	348	231
30	5.0	61.5	330	231
40	5.2	61.5	320	231
50	5.0	61.5	310	231
13:00	5.1	61.5		
	(Key open 10 minutes while temperature was changed)			
13:10	-.2	61.3		230
20	0.0	61.2		230
30	0.0	61.3		233
40	0.0	61.4		232
50	0.2	61.4		233
14:00	0.2	61.5		231
10	-.2	61.5		231
20	0.0	61.5		231
	(Key open 20 minutes while temperature was changed)			

TABLE NO. 6 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:40	24.8	61.3	2000.450	230
50	25.0	61.4	407	229
15:00	25.0	61.5	392	230
10	25.4	61.7	385	229
20	25.2	61.9	380	232
30	24.8	62.0	375	231
40	25.2	62.0	372	229
50	25.0	62.0	370	233

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Difference between readings taken at 10:20 and 11:40
Ambient temperature - 15.2° Centigrade
Difference in frequency - 78 cycles
Difference per degree Centigrade - 5.1 cycles
.00025%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 4.9
Difference in frequency - 82 cycles
Difference per degree Centigrade - 16.5 cycles
.00082%

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 5.1° Centigrade
Difference in frequency - 49 cycles
Difference per degree Centigrade - 9.6 cycles
.00048%.

Difference between readings taken at 14:20 and 15:50
Ambient temperature - 25° Centigrade
Difference in frequency - 113 cycles
Difference per degree Centigrade - 4.5 cycles
.000225%.

Difference between readings taken at 10:20 and 15:50
Ambient temperature 0.2° Centigrade
Difference in frequency - 92 cycles
.0046%.

TABLE NO. 7

TBF Transmitter; Serial No. 32

Effect of change in Ambient Temperature

Original Adjustment of Compensating Condenser.

Frequency - 2000 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	25.0	60.2	2000.750	230
20	24.8	60.3	646	230
30	25.6	60.25	600	230
40	24.8	60.75	568	228
50	25.0	61.0	550	228
10:00	24.8	61.2	628	226
10	24.8	61.4	515	226
20	25.0	61.5	507	228
	(Key open 10 minutes while temperature was changed)			
30	30.1	61.5	600	226
40	30.0	61.5	572	226
50	29.8	61.7	570	224
11:00	30.2	61.75	568	226
10	30.3	62.0	564	226
20	30.2	62.0	566	227
30	30.0	62.1	558	228
40	30.0	62.2	555	226
	(Key open 10 minutes while temperature was changed)			
50	35.0	62.1	655	226
12:00	35.4	62.1	634	226
10	35.2	62.2	633	226
20	35.3	62.25	633	228
30	35.5	62.25	633	230
40	34.8	62.4	626	227
50	34.8	62.4	624	225
13:00	35.0	62.4	622	225
	(Key open 20 minutes while temperature was changed)			
20	49.5	62.2	840	222
30	50.4	62.3	813	223
40	49.5	62.3	820	224
50	50.0	62.5	825	225
14:00	50.6	62.6	830	224
10	50.0	62.7	836	224
20	51.0	62.8	838	225
30	50.0	62.9	845	226
	(Key open 20 minutes while temperature was changed)			

TABLE NO. 7 Cont'd.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:40	25.0	62.5	2000.860	230
50	25.0	62.4	760	230
15:00	25.3	62.3	724	230
10	25.0	62.3	696	230
20	25.0	62.3	678	230
30	25.2	62.3	662	230
40	25.0	62.3	646	230
50	25.1	62.3	637	230

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Difference between readings taken at 10:20 and 11:40
Ambient temperature - 5° Centigrade.
Difference in frequency - 48 cycles
Difference per degree Centigrade - 9.6 cycles
.00048%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 67 cycles
Difference per degree Centigrade - 13 cycles
.00065%.

Difference between readings taken at 13:00 and 14:30
Ambient temperature - 15° Centigrade
Difference in frequency - 223 cycles
Difference per degree Centigrade - 14.8 cycles
.00074%.

Difference between readings taken at 1480 and 15:50
Ambient temperature - 24.9° Centigrade
Difference in frequency - 208 cycles
Difference per degree Centigrade - 8.3 cycles
.00041%.

Difference between readings taken at 10:20 and 15:50
Ambient temperature - 0.1° Centigrade
Difference in frequency - 130 cycles
.0065%

TABLE NO. 8

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

Original Adjustment of Compensating Condenser

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
11:40	24.5	60.8	4500.900	232
50	25.5	60.8	750	232
12:00	25.4	60.8	737	233
10	25.0	61.0	725	232
20	25.1	61.0	725	233
30	25.1	61.0	712	231
40	25.0	61.1	720	232
50	25.0	61.1	702	232
	(Key open 10 minutes while temperature was changed)			
13:00	36.0	61.2	065	230
10	35.0	61.2	162	228
20	35.0	61.4	256	229
30	35.4	61.4	317	229
40	35.3	61.5	357	230
50	35.0	61.5	362	230
14:00	35.0	61.6	382	230
10	35.0	61.6	417	230
	(Key open 10 minutes while temperature was changed)			
20	48.0	61.6	862	228
30	50.0	61.8	067	229
40	50.0	62.0	199	229
50	50.0	62.0	267	230
15:00	51.0	62.0	374	230
10	50.0	62.1	427	230
20	49.8	62.2	466	229
30	50.0	62.2	485	232
	(Key open 10 minutes while temperature was changed)			
15:40	25.7	62.0	970	232
50	24.7	61.8	700	233
16:00	25.0	61.7	618	232
10	25.1	61.6	504	233
20	25.0	61.6	380	233
30	25.0	61.6	317	235
40	25.1	61.5	272	232
50	25.0	61.5	172	234

TABLE NO.8 Cont'd

Difference between readings taken at 12:50 and 14:10
Ambient temperature - 10° Centigrade
Difference in frequency - 715 cycles
Difference per degree Centigrade - 71.5 cycles
.0015%.

Difference between readings taken at 14:10 and 15:30
Ambient temperature - 15° Centigrade
Difference in frequency - 1068 cycles
Difference per degree Centigrade - 71 cycles
.0015%.

Difference between readings taken at 1530 and 16:50
Ambient temperature - 25° Centigrade
Difference in frequency - 1313 cycles
Difference per degree Centigrade - 52.5 cycles
.0011%.

Difference between readings taken at 12:50 and 16:50
Ambient temperature - None
Difference in frequency - 470 cycles
.01%.

TABLE NO. 9

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

Original Adjustment of Compensating Condenser

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	25.2	60.2	4500.995	228
20	24.8	60.2	900	222
30	25.2	60.4	887	225
40	24.8	60.5	860	225
50	25.1	60.6	840	224
10:00	25.2	60.7	837	224
10	25.2	60.8	822	225
20	25.0	61.0	800	229
	(Key open 10 minutes while temperature was changed)			
30	12.5	60.8	845	229
40	11.0	60.8	718	228
50	10.1	60.8	693	226
11:00	10.4	60.8	662	228
10	9.7	60.8	616	229
20	10.5	60.8	583	228
30	10.0	60.8	556	229
40	10.0	60.8	537	227
	(Key open 10 minutes while temperature was changed)			
50	4.8	60.7	534	229
12:00	5.0	60.6	450	232
10	4.8	60.6	420	229
20	5.2	60.6	382	230
30	4.8	60.6	341	229
40	4.9	60.6	306	230
50	4.8	60.6	307	231
13:00	5.0	60.6	**281**	**229**
	(Key open 10 minutes while temperature was changed)			
10	0.0	60.5	268	231
20	0.4	60.5	168	230
30	0.0	60.5	103	230
40	0.0	60.5	113	231
50	0.3	60.5	093	231
14:00	0.0	60.5	061	230
10	0.3	60.5	043	229
20	0.0	60.5	018	230
	(Key open 10 minutes while temperature was changed)			

TABLE NO. 2 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:30	25.5	60.5	4500.430	225
40	25.3	60.7	520	225
50	25.0	60.8	590	225
15:00	24.8	61.0	636	224
10	25.3	61.0	678	225
20	25.0	61.2	695	227
30	25.0	61.2	712	227
40	25.2	61.2	725	229

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Readings as per L.H. 1

Difference between readings taken at 10:20 and 11:40
Ambient temperature - 15° Centigrade
Difference in frequency - 264 cycles
Difference per degree Centigrade - 17.6 cycles
.00039%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 263 cycles
Difference per degree Centigrade - 52 cycles
.0011%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 5° Centigrade
Difference in frequency - 265 cycles
Difference per degree Centigrade - 53 cycles
.0017%.

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 25.2° Centigrade
Difference in frequency - 718 cycles
Difference per degree Centigrade - 28.4 cycles
.00063%.

Difference between readings taken at 10:20 and 15:40
Ambient temperature - 0.2° Centigrade
Difference in frequency - 74 cycles
.00164%.

Readings as per L.H. 2

Difference between readings taken at 10:20 and 11:40
Ambient temperature - 15° Centigrade
Difference in frequency - 263 cycles
Difference per degree Centigrade - 17.5 cycles
.00039%.

TABLE NO. 9 Cont'd

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 256 cycles
Difference per degree Centigrade - 51 cycles
.0011%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 5° Centigrade
Difference in frequency - 263 cycles
Difference per degree Centigrade - 52.2 cycles
.0015%

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 25.2° Centigrade
Difference in frequency - 707 cycles
Difference per degree Centigrade - 28 cycles
.00062%.

Difference between readings taken at 10:20 and 15:40
Ambient temperature - 0.2° Centigrade
Difference in frequency - 75 cycles
.00165%.

TABLE NO. 10

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

Original Adjustment of Compensating Condenser

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	26.0	60.0	4500.323	226
20	25.8	60.1	273	225
30	25.2	60.4	241	225
40	25.0	60.5	201	228
50	25.0	60.5	177	230
10:00	24.8	60.6	148	230
10	25.0	60.8	131	229
20	25.0	61.0	125	227
	(Key open 10 minutes while temperature was changed)			
30	30.2	61.0	329	227
40	30.4	61.0	388	225
50	29.8	61.1	440	227
11:00	30.2	61.2	480	228
10	30.0	61.2	496	225
20	30.0	61.2	490	225
30	30.0	61.3	520	227
40	30.0	61.4	526	225
	(Key open 10 minutes while temperature was changed)			
50	35.6	61.4	750	225
12:00	35.0	61.5	865	228
10	34.8	61.5	940	227
20	35.0	61.5	975	229
30	35.0	61.5	980	229
40	35.4	61.7	4501.007	231
50	35.0	61.6	4500.985	230
13:00	35.0	61.6	997	228
	(Key open 10 minutes while temperature was changed)			
10	40.0	61.6	4501.188	227
20	40.5	61.6	362	226
30	40.0	61.7	385	223
40	40.0	61.8	400	224
50	40.1	61.8	420	224
14:00	40.3	61.8	440	224
10	40.1	61.9	450	224
20	40.0	61.9	445	225
	(Key open 10 minutes while temperature was changed)			

TABLE NO. 10 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:30	45.0	61.8	4501.698	224
40	44.8	61.8	742	226
50	45.0	62.0	775	225
15:00	45.4	62.0	810	227
10	45.0	62.0	810	227
20	45.2	62.0	835	228
30	45.2	62.1	840	228
40	45.2	62.1	850	228
	(Key open 10 minutes while temperature was changed)			
50	49.8	62.0	4502.085	228
16:00	50.0	62.0	090	229
10	50.1	62.1	101	230
20	50.1	62.1	126	232
30	50.2	62.2	128	231
40	50.8	62.2	149	231
50	50.0	62.2	117	229
17:00	50.0	62.2	123	234
	(Key open 10 minutes while temperature was changed)			
10	26.5	62.0	4501.620	236
20	25.3	61.7	323	237
30	25.0	61.6	133	233
40	25.0	61.5	038	233
50	25.0	61.5	4500.943	237
18:00	25.0	61.5	863	235
10	25.0	61.5	808	235
20	25.0	61.5	693	237

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Readings per L.H. 1.

Difference between readings taken at 10:20 and 11:40
Ambient temperature - 5° Centigrade
Difference in frequency - 416 cycles
Difference per degree Centigrade - 83 cycles
.0018%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 477 cycles
Difference per degree Centigrade - 95 cycles
.0021%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 5° Centigrade
Difference in frequency - 445 cycles
Difference per degree Centigrade - 89 cycles
.0019%.

TABLE NO. 10 - Cont'd

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 5.2° Centigrade
Difference in Frequency - 400 cycles
Difference per degree Centigrade - 77 cycles
.0017%.

Difference between readings taken at 15:40 and 17:00
Ambient temperature - 4.8° Centigrade
Difference in frequency - 275 cycles
Difference per degree Centigrade - 57 cycles
.0012%.

Difference between readings taken at 17:00 and 18:20
Ambient temperature - 25° Centigrade
Difference in frequency - 1441 cycles
Difference per degree Centigrade - 57.5 cycles
.00125%.

Difference between readings taken at 10:20 and 18:20
Ambient temperature - none
Difference in frequency - 428 cycles
.0095%.

Readings per L.H. 2.

Difference between readings taken at 10:20 and 11:40
Ambient temperature - 5° Centigrade
Difference in frequency - 401 cycles
Difference per degree Centigrade - 80 cycles
.0017%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 471 cycles
Difference per degree Centigrade - 94 cycles
.002%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 5° Centigrade
Difference in frequency - 448 cycles
Difference per degree Centigrade - 89.5 cycles
.0019%

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 5.2° Centigrade
Difference in frequency - 405 cycles
Difference per degree Centigrade - 78 cycles
.0017%.

Difference between readings taken at 15:40 and 17:00
Ambient temperature - 4.8° Centigrade
Difference in frequency - 273 cycles
Difference per degree Centigrade - 57 cycles
.0012%.

TABLE NO. 10 Cont'd

Difference between readings taken at 17:00 and 18:20
Ambient temperature - 25° Centigrade
Difference in frequency - 1430 cycles
Difference per degree Centigrade - 57 cycles
.0012%.

Difference between readings taken at 10:20 and 18:20
Ambient temperature - none
Difference in frequency - 432 cycles
.0095%.

TABLE NO. 11

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

After first re-adjustment of Compensating Condenser

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
12:00	24.9	60.0	4501.377	227
10	24.8	60.0	280	228
20	25.2	60.2	217	229
30	25.1	60.3	177	229
40	25.1	60.3	131	228
50	24.8	60.6	090	225
13:00	25.0	60.7	078	225
10	25.2	60.8	064	224
	(Key open 10 minutes while temperature was changed)			
20	34.8	60.9	262	225
30	35.0	61.0	220	226
40	34.8	61.1	176	225
50	35.0	61.2	178	226
14:00	35.2	61.3	180	225
10	35.0	61.4	206	224
20	35.2	61.5	237	224
30	35.0	61.5	242	224
	(Key open 10 minutes while temperature was changed)			
40	49.8	61.6	595	220
50	50.2	61.6	805	222
15:00	50.2	61.7	961	222
10	50.0	61.8	4502.007	223
20	50.0	62.0	070	224
30	50.0	62.0	115	225
40	50.3	62.0	150	227
50	50.0	22.1	185	225
	(Key open 10 minutes while temperature was changed)			
16:00	25.0	62.0	4501.835	232
10	24.8	61.8	600	231
20	25.0	61.7	440	230
30	25.0	61.6	350	234
40	25.0	61.6	270	232
50	25.0	61.6	222	233
17:00	25.0	61.6	204	237
10	25.0	61.6	198	236

TABLE NO. 11 Cont'd

Difference between readings taken at 13:10 and 14:30
Ambient temperature - 9.8° Centigrade
Difference in frequency - 178 cycles
Difference per degree centigrade - 18.1 cycles
.0004%.

Difference between readings taken at 14:30 and 15:50
Ambient temperature - 15° Centigrade
Difference in frequency - 943 cycles
Difference per degree Centigrade - 62.8 cycles
.0014%.

Difference between readings taken at 15:50 and 17:10
Ambient temperature - 25° Centigrade.
Difference in frequency - 987 cycles
Difference per degree Centigrade - 39.5 cycles
.00088%.

Difference between readings taken at 13:10 and 17:10
Ambient temperature - 0.2° Centigrade
Difference in frequency - 134 cycles
.003%.

TABLE NO. 12

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

After second re-adjustment of Compensating Condenser was made by Manufacturer's Representative.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:30	34.8	60.1	4500.720	227
40	35.0	60.2	715	229
50	35.2	60.5	704	227
10:00	35.0	60.6	670	226
10	35.2	60.8	650	226
20	35.0	61.0	630	225
30	35.0	61.1	613	225
40	35.0	61.2	603	224
(Key open 10 minutes while temperature was changed)				
50	51.0	61.4	870	227
11:00	50.2	61.5	782	226
10	50.0	61.6	870	227
20	50.0	61.8	970	226
30	49.8	61.9	4501.025	226
40	49.8	62.0	070	225
50	50.0	62.0	115	226
12:00	50.0	62.1	165	228

Difference in Temperature - 15° Centigrade
Difference in frequency - 562 cycles
Difference per degree - 37.5 cycles = .00083%.

13:50	5.0	59.6	4501.010	229
14:00	5.0	59.6	4500.850	226
10	5.2	59.7	724	223
20	5.2	59.9	590	223
30	5.6	60.0	488	222
40	4.5	60.0	400	222
50	5.0	60.1	350	223
15:00	5.0	60.1	267	226
(Key open 10 minutes while temperature was changed)				
10	0.0	60.1	287	
20	0.2	60.1	123	
30	0.0	60.1	027	
40	0.0	60.2	4499.942	
50	0.0	60.2	872	
16:00	0.0	60.2	892	
10	0.0	60.2	812	
20	0.0	60.3	802	

TABLE NO. 12 Cont'd

Difference in temperature - 5.0° Centigrade
Difference in frequency - 465 cycles
Difference per degree - 93 cycles = .00206%.

TABLE NO. 13

TBF Transmitter; Serial No. 32

Effect of Change in Ambient Temperature

After making 40° adjustment of Compensating Condenser Adjusting Screw.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
13:00	5.5	59.2	4500.900	226
10	5.2	59.4	638	226
20	4.8	59.5	420	226
30	5.0	59.6	223	226
40	5.0	59.7	089	225
50	5.0	59.9	013	226
14:00	5.2	60.0	4499.967	228
10	5.0	60.0	892	228
	(Key open 10 minutes while temperature was changed)			
20	0.0	60.0	877	230
30	0.0	60.0	723	229
40	0.0	60.0	652	230
50	0.0	60.0	576	230
15:00	0.0	60.0	530	230
10	0.2	60.1	498	230
20	0.0	60.1	476	231
30	0.0	60.1	468	232

Difference in temperature - 5.0° Centigrade
Difference in frequency - 424 cycles
Difference per degree - 84.8 cycles = .00188%.

(Key open 10 minutes while temperature was changed)

15:40	34.2	60.2	4499.902	222
50	35.0	60.4	4500.091	226
16:00	35.2	60.5	197	226
10	35.0	60.8	255	228
20	35.2	61.0	285	228
30	35.0	61.2	273	230
40	35.0	61.3	289	227
50	35.0	61.5	304	228

Difference in temperature - 35.0° Centigrade
Difference in frequency - 836 cycles
Difference per degree - 23.8 cycles = .00053%.

(Key open 10 minutes while temperature was changed)

17:00	50.0	61.5	4500.570	231

TABLE NO. 13 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
17:10	49.8	61.6	4500.494	230
20	50.0	61.8	637	232
30	50.0	62.0	740	230
40	50.2	62.0	820	233
50	50.0	62.1	850	233
18:00	49.8	62.2	920	234
10	50.0	62.2	950	235

Difference in temperature - 15.0° Centigrade
Difference in frequency - 646 cycles
Difference per degree - 18.5 cycles = .00041%.

TABLE NO. 14

TBF Transmitter; Serial No. 34

Effect of Change in Ambient Temperature

Compensating Condenser Adjustment as received from Manufacturer.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:00	34.0	59.3	4500.560	228
10	35.0	59.6	703	228
20	35.2	59.9	823	228
30	35.1	60.1	877	229
40	35.2	60.2	935	227
50	35.1	60.5	4501.010	229
15:00	31.0	60.6	160	222
10	35.0	60.7	147	224
	(Key open 10 minutes while temperature was changed)			
15:20	50.8	60.9	314	226
30	50.0	61.0	640	225
40	50.2	61.2	950	227
50	49.8	61.5	4502.115	228
16:00	50.2	61.6	274	229
10	50.1	61.8	380	229
20	50.0	62.0	464	229
30	50.0	62.0	530	229

Difference in temperature - 15° Centigrade
Difference in frequency - 1383 cycles
Difference per degree - 92.5 cycles = .0022%.

TABLE NO. 15

TBF Transmitter; Serial No. 34

Effect of Change in Ambient Temperature

After 1st re-adjustment of Compensating Condenser

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
10:10	25.1	60.2	4500.525	228
20	24.8	60.3	510	229
30	25.0	60.5	506	228
40	25.0	60.5	490	227
50	25.0	60.6	486	225
11:00	25.0	60.7	483	227
10	25.0	60.8	479	227
20	25.0	60.9	494	227
	(Key open 10 minutes while temperature was changed)			
30	30.0	60.9	790	227
40	29.8	61.0	727	225
50	30.2	61.0	720	227
12:00	30.2	61.1	700	230
10	30.4	61.2	654	230
20	30.2	61.2	654	232
30	30.0	61.3	660	229
40	30.0	61.4	660	229
	(Key open 10 minutes while temperature was changed)			
50	35.0	61.4	945	225
13:00	34.8	61.4	870	228
10	35.0	61.4	858	227
20	35.0	61.5	840	226
30	35.0	61.5	835	229
40	35.2	61.6	832	229
50	35.0	61.6	830	228
14:00	35.0	61.7	825	228
	(Key open 10 minutes while temperature was changed)			
10	50.0	61.7	200	228
20	49.8	61.8	114	227
30	50.0	62.0	105	227
40	50.2	62.1	094	228
50	50.0	62.2	087	225
15:00	50.0	62.3	084	227
10	49.8	62.4	083	226
20	50.0	62.5	078	227
	(Key open 10 minutes while temperature was changes)			

TABLE NO. 15 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
15:30	24.8	62.2	4501.200	233
40	25.0	62.0	025	232
50	25.0	61.9	940	232
16:00	25.0	61.8	895	232
10	24.8	61.7	880	233
20	25.0	61.6	865	235
30	25.0	61.6	840	235
40	25.0	61.6	815	232

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Difference between readings taken at 11:20 and 12:40
Ambient temperature - 5° Centigrade
Difference in frequency - 166 cycles
Difference per degree Centigrade - 33 cycles
.00073%.

Difference between readings taken at 12:40 and 14:00
Ambient temperature - 5° Centigrade.
Difference in frequency - 165 cycles.
Difference per degree Centigrade - 33 cycles
.00073%.

Difference between readings taken at 14:00 and 15:20
Ambient temperature - 15° Centigrade
Difference in frequency - 253 cycles
Difference per degree Centigrade - 16.9 cycles
.00038%.

Difference between readings taken at 15:20 and 16:40
Ambient temperature - 25° Centigrade
Difference in frequency - 263 cycles
Difference per degree Centigrade - 10.5 cycles
.00023%.

Difference between readings taken at 11:20 and 16:40
Ambient temperature - none
Difference in frequency - 265 cycles
.0059%.

TABLE NO. 16

TBF Transmitter; Serial No. 34

Effect of Change in Ambient Temperature

After adjustment of compensating condenser by Manufacturer's representative.

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:20	6.0	59.0	4501.000	234
30	4.8	59.0	4500.860	233
40	4.8	59.1	950	233
50	5.0	59.2	4501.085	234
10:00	5.0	59.4	122	233
10	5.0	59.5	437	232
20	5.0	59.6	487	231
30	5.0	59.7	512	232
	(Key open 10 minutes while temperature was changed)			
40	0.0	59.6	389	232
50	-0.2	59.6	4500.950	232
11:00	0.0	59.6	900	232
10	0.0	59.6	900	232
20	0.0	59.7	4501.117	232
30	0.0	59.7	107	230
40	-0.2	59.8	075	231
50	0.0	59.9	075	230

Difference in temperature - 5° Centigrade
Difference in frequency - 437 cycles
Difference per degree - 87.4 cycles = .00194%.

TABLE NO. 17

TBF Transmitter; Serial No. 34

Effect of Change in Ambient Temperature

After adjusting compensating condenser. Adjusting screw 40° past point of contact with condenser plate.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
12:40	5.8	59.7	4501.050	234
50	4.6	59.7	207	234
13:00	4.4	59.7	460	232
10	4.9	59.8	525	233
20	5.0	59.9	580	235
30	4.8	60.0	580	234
40	4.8	60.0	616	235
50	5.0	60.0	660	233
(Key open 10 minutes while temperature was changed)				
14:00	0.4	60.0	4500.530	234
10	0.0	60.0	400	232
20	0.0	60.0	370	231
30	0.0	60.0	327	231
40	0.0	60.0	299	232
50	0.0	60.0	267	232
15:00	0.0	60.0	247	232
10	0.0	60.0	227	232

Difference in temperature - 5.0° Centigrade
Difference in frequency - 433 cycles
Difference per degree - 86.6 cycles = .00192%.

TABLE NO. 18

TBF Transmitter; Serial No. 34

Effect of Change in Ambient Temperature

After adjusting compensating condenser screw 40° past point of contact with condenser plate.

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:40	34.4	59.1	4500.520	224
50	35.0	59.4	678	223
10:00	34.4	59.7	740	224
10	35.4	60.0	750	225
20	35.0	60.3	750	225
30	35.2	60.5	770	224
40	35.4	60.7	790	224
50	35.0	61.0	807	221
(Key open 10 minutes while temperature was changed)				
11:00	50.2	61.1	162	222
10	50.0	61.2	103	220
20	50.0	61.5	114	222
30	50.0	61.6	130	220
40	50.0	61.8	127	224
50	50.0	62.0	133	225
12:00	50.0	62.1	132	225
10	50.0	62.2	119	225

Difference in temperature - 15.0° Centigrade
Difference in frequency - 312 cycles
Difference per degree - 20.8 cycles = .00046.

TABLE NO. 19

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser adjustment as received from Manufacturer.

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:10	35.8	60.2	4500.802	230
20	35.4	60.2	957	231
30	35.1	60.2	060	230
40	35.2	60.3	204	231
50	34.9	60.5	319	230
15:00	34.6	60.6	448	230
10	35.0	60.6	499	231
20	35.0	60.8	568	224
	(Key open 10 minutes while temperature was changed)			
30	50.2	60.9	014	227
40	51.0	61.0	170	228
50	50.2	61.1	292	229
16:00	49.8	61.2	306	231
10	50.0	61.4	312	232
20	50.0	61.5	309	230
30	50.0	61.5	318	231
40	50.0	61.6	348	229

Difference in temperature - 15.0° Centigrade
Difference in frequency - 780 cycles.
Difference per degree - 52 cycles = .00115%.

TABLE NO. 20

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

After 1st adjustment of compensating condenser (35°)

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Volts
09:50	25.0	59.6	4500.550	232
10:00	25.2	59.7	565	229
10	25.2	59.8	552	229
20	25.0	60.0	536	228
30	25.0	60.1	550	228
40	24.8	60.2	532	229
50	25.0	60.3	546	231
11:00	25.0	-	560	231
	(Key open 10 minutes while temperature was changed)			
10	30.0	60.5	720	232
20	30.4	61.0	675	232
30	30.0	61.1	683	232
40	30.2	61.2	690	231
50	30.2	61.3	680	231
12:00	29.8	61.4	682	230
10	29.4	61.4	672	234
20	30.0	61.5	700	230
	(Key open 10 minutes while temperature was changed)			
30	34.0	61.5	900	231
40	35.0	61.5	850	231
50	34.0	61.5	850	232
13:00	35.0	61.6	848	230
10	35.0	61.7	857	232
20	35.2	61.7	900	232
30	35.0	61.8	870	232
40	35.0	61.8	845	232
	(Key open 10 minutes while temperature was changed)			
13:50	49.8	61.8	4501.127	227
14:00	50.5	61.9	377	227
10	49.4	62.0	467	226
20	49.6	62.0	545	228
30	50.0	62.1	567	228
40	50.5	62.2	597	228
50	50.0	62.2	589	228
15:00	50.0	62.2	632	228
	(Key open 10 minutes while temperature was changed)			

TABLE NO. 20 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
15:10	25.0	62.0	4501.167	236
20	24.2	61.9	050	235
30	25.0	61.7	4500.975	236
40	24.9	61.7	875	235
50	25.0	61.7	860	234
16:00	25.0	61.7	860.	237
10	25.2	61.7	825	235
20	25.0	61.7	825	237

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Difference between readings taken at 11:00 and 12:20
Ambient temperature - 5° Centigrade
Difference in frequency - 140 cycles
Difference per degree Centigrade - 28 cycles
.00062%.

Difference between readings taken at 12:20 and 13:40
Ambient temperature - 5° Centigrade
Difference in frequency - 145 cycles
Difference per degree Centigrade - 29 cycles
.00064%.

Difference between readings taken at 13:40 and 15:00
Ambient temperature - 15° Centigrade
Difference in frequency - 787 cycles
Difference per degree Centigrade 52.5 cycles
.00115%.

Difference between readings taken at 15:00 and 16:20
Ambient temperature - 25° Centigrade
Difference in frequency - 807 cycles
Difference per degree Centigrade - 32.2 cycles
.000715%.

Difference between readings taken at 11:00 and 16:20
Ambient temperature - none
Difference in frequency - 265 cycles
.0059%.

TABLE NO. 21

TBF Transmitter; Serial No. 35

Effect of change in Ambient Temperature

After 2nd adjustment of compensating condenser (55°)

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:20	25.0	60.1	4500.425	231
30	25.0	60.1	430	228
40	25.0	60.2	460	226
50	24.8	60.4	460	229
10:00	25.0	60.5	464	228
10	25.0	60.7	468	227
20	25.0	60.8	472	228
30	25.0	61.0	484	226
	(Key open 10 minutes while temperature was changed)			
40	29.8	61.0	640	229
50	30.0	61.0	605	223
11:00	30.0	61.1	610	224
10	30.0	61.1	608	223
20	30.2	61.2	604	225
30	29.8	61.2	598	227
40	30.0	61.4	600	228
50	30.0	61.5	592	229
	(Key open 10 minutes while temperature was changed)			
12:00	34.5	61.5	780	231
10	34.9	61.5	734	232
20	35.1	61.5	728	232
30	35.2	61.5	710	232
40	35.0	61.6	700	229
50	35.2	61.6	708	229
13:00	35.0	61.7	705	230
10	35.0	61.7	718	230
	(Key open 10 minutes while temperature was changed)			
20	50.2	61.8	950	229
30	50.2	61.8	890	227
40	50.0	62.0	865	229
50	50.0	62.0	868	228
14:00	49.0	62.1	865	227
10	50.0	62.1	920	227
20	50.0	62.2	935	228
30	50.0	62.2	935	228
	(Key open 10 minutes while temperature was changed)			

TABLE NO. 21 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:40	24.8	62.0	4500.830	232
50	25.0	61.8	751	231
15:00	25.0	61.7	730	234
10	25.1	61.7	706	233
20	25.0	61.7	695	233
30	25.0	61.7	685	233
40	25.0	61.6	673	233
50	25.0	61.6	705	234

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Difference between readings taken at 10:30 and 11:50
Ambient temperature - 5° Centigrade
Difference in frequency - 108 cycles
Difference per degree Centigrade - 21.6 cycles
.00048%.

Difference between readings taken at 11:50 and 13:10
Ambient temperature - 5° Centigrade
Difference in frequency - 126 cycles
Difference per degree Centigrade - 25.2 cycles
.00056%.

Difference between readings taken at 13:10 and 14:30
Ambient temperature - 15° Centigrade
Difference in frequency - 217 cycles
Difference per degree Centigrade - 14.4 cycles
.00032%.

Difference between readings taken at 14:30 and 15:50
Ambient temperature - 25° Centigrade
Difference in frequency - 230 cycles
Difference per degree Centigrade 9.2 cycles
.00022%.

Difference between readings taken at 10:30 and 15:50
Ambient temperature - none
Difference in frequency - 221 cycles
.0049%.

TABLE NO. 22

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

After 2nd adjustment of compensating condenser (55°)

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	25.5	60.2	4500.630	230
20	25.2	60.2	590	231
30	25.2	60.4	585	230
40	25.2	60.4	540	226
50	24.8	60.6	544	233
10:00	25.0	60.7	544	231
10	25.0	60.8	550	228
20	25.0	61.0	550	227
	(Key open 10 minutes while temperature was changed)			
30	10.4	60.8	530	229
40	10.1	60.7	410	227
50	10.0	60.7	327	227
11:00	10.0	60.7	261	228
10	9.8	60.7	193	227
20	10.0	60.6	159	228
30	10.0	60.6	111	227
40	10.0	60.6	079	230
	(Key open 10 minutes while temperature was changed)			
50	4.8	60.5	115	228
12:00	5.0	60.5	047	228
10	5.0	60.5	4499.989	230
20	5.0	60.4	959	229
30	4.8	60.4	962	228
40	4.8	60.4	959	229
50	5.0	60.5	962	229
13:00	5.0	60.5	954	228
	(Key open 10 minutes while temperature was changed)			
10	0.0	60.4	847	230
20	0.0	60.2	782	229
30	-0.3	60.2	719	230
40	0.0	60.2	685	230
50	0.0	60.2	645	230
14:00	0.0	60.2	596	231
10	0.2	60.2	580	231
20	0.0	60.2	560	230
	(Key open 10 minutes while temperature was changed)			

TABLE NO. 22 Cont'd.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:30	25.4	60.3	4499.952	229
40	25.0	60.5	4500.154	228
50	24.9	60.6	294	228
15:00	25.0	60.7	359	229
10	25.0	61.0	386	229
20	24.8	61.0	423	227
30	24.8	61.1	468	223
40	25.0	61.2	466	222

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Difference between readings taken at 10:20 and 11:40
Ambient temperature - 15° Centigrade
Difference in frequency - 471 cycles
Difference per degree Centigrade - 32 cycles
.00071%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 5° Centigrade
Difference in frequency - 125 cycles
Difference per degree Centigrade - 25 cycles
.00055%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 5° Centigrade
Difference in frequency - 394 cycles
Difference per degree Centigrade - 78.8 cycles
.00175%.

Difference between readings taken at 14:20 and 15:40
Ambient temperature - 25° Centigrade
Difference in frequency - 619 cycles
Difference per degree Centigrade - 24.8 cycles
0.00052%.

Difference between readings taken at 10:20 and 15:40
Ambient temperature - none
Difference in frequency - 84 cycles
.00185%.

TABLE NO. 23

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

After 3rd adjustment of compensating condenser (50°)

Frequency - 3000 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:30	24.4	60.1	3000.402	225
40	24.0	60.2	267	225
50	24.8	60.4	237	225
10:00	25.0	60.6	209	225
10	25.0	60.8	177	225
20	25.1	61.0	159	223
30	25.0	61.2	147	224
40	25.0	61.4	130	224
(Key open 10 minutes while temperature was changed)				
50	30.0	61.4	249	225
11:00	30.2	61.5	193	226
10	30.2	61.5	169	225
20	30.0	61.6	166	225
30	30.0	61.7	152	226
40	30.0	61.8	146	227
50	30.4	62.0	134	227
12:00	30.0	62.0	114	228
(Key open 10 minutes while temperature was changed)				
10	35.0	62.0	252	228
20	34.7	62.0	194	228
30	34.8	62.0	175	229
40	34.8	62.0	171	228
50	35.2	62.2	155	228
13:00	34.8	62.2	143	228
10	35.1	62.2	141	227
20	35.0	62.2	135	227
(Key open 10 minutes while temperature was changed)				
30	51.0	62.2	277	226
40	50.0	62.3	225	228
50	49.9	62.5	207	227
14:00	50.0	62.5	210	228
10	50.0	62.6	222	228
20	49.8	62.7	236	227
30	50.2	62.8	247	230
40	50.0	63.0	239	234
(Key open 10 minutes while temperature was changed)				

TABLE NO. 23 Cont'd

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:50	25.0	62.5	3000.237	230
15:00	24.9	62.4	173	231
10	24.8	62.2	162	229
20	25.0	62.2	154	227
30	25.1	62.2	143	230
40	25.2	62.2	135	229
50	25.0	62.1	130	225
16:00	25.0	62.1	122	226

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Difference between readings taken at 10:40 and 12:00
Ambient temperature - 5° Centigrade
Difference in frequency - 16 cycles
Difference per degree Centigrade - 3.2 cycles
.000106%.

Difference between readings taken at 12:00 and 13:20
Ambient temperature - 5° Centigrade
Difference in frequency - 21 cycles
Difference per degree Centigrade - 4.2 cycles
.00014%.

Difference between readings taken at 13:20 and 14:40
Ambient temperature - 15° Centigrade
Difference in frequency - 104 cycles
Difference per degree Centigrade - 6.9 cycles
.00023%.

Difference between readings taken at 14:40 and 16:00
Ambient temperature - 25° Centigrade
Difference in frequency - 117 cycles
Difference per degree Centigrade - 4.7 cycles
0.00016%.

Difference between readings taken at 10:40 and 16:00
Ambient temperature - none
Difference in frequency - 8 cycles
.000266%.

TABLE NO. 24

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser adjusting screw at 50° past point of contact with plate.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
08:30	5.6	59.9	4500.550	231
40	4.8	59.8	172	232
50	5.0	59.9	165	232
09:00	5.3	60.0	105	233
10	5.1	60.0	055	229
20	5.0	60.0	027	232
30	5.0	60.1	4499.991	234
40	5.0	60.2	972	233
	(Key open 10 minutes while temperature was changed)			
09:50	0.8	60.1	847	232
10:00	0.4	60.0	580	233
10	-0.2	60.0	580	235
20	0.0	60.0	590	234
30	0.2	60.0	637	232
40	0.0	60.0	615	231
50	0.0	60.0	625	232
11:00	0.0	60.1	640	230

Difference in temperature - 5.0° Centigrade
Difference in frequency - 332 cycles
Difference per degree Centigrade - 66.4 cycles = .0014%.

TABLE NO. 25

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser adjusting screw at 45° past point of contact with plate.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
12:40	5.2	60.1	4500.705	229
50	4.0	60.0	436	229
13:00	4.8	60.0	327	230
10	5.2	60.0	269	229
20	4.8	60.1	205	227
30	5.0	60.1	149	228
40	4.9	60.1	112	230
50	5.0	60.2	071	230
(Key open 10 minutes while temperature was changed)				
14:00	0.0	60.1	117	231
10	0.0	60.0	4499.995	230
20	0.0	60.1	942	231
30	0.2	60.1	917	230
40	0.2	60.1	862	231
50	0.0	60.1	837	231
15:00	0.0	60.1	812	230
10	0.0	60.1	777	230

Difference in temperature - 5.0° Centigrade
Difference in frequency - 294 cycles
Difference per degree - 58.8 cycles = .0013%.

TABLE NO. 26

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser adjusting screw at 40° past point of contact with plate.

Frequency - 4500 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:20	5.2	60.0	4500.950	231
30	5.0	59.9	770	229
40	4.8	59.9	750	228
50	4.6	60.0	690	227
10:00	4.7	60.0	632	228
10	4.8	60.0	600	228
20	5.1	60.0	580	228
30	5.0	60.0	570	228
(Key open 10 minutes while temperature was changed)				
40	0.0	60.0	532	229
50	0.1	60.0	440	228
11:00	0.1	60.0	422	229
10	0.0	60.0	382	228
20	0.0	60.0	380	227
30	0.0	60.1	362	226
40	0.2	60.1	365	228
50	0.0	60.2	342	226

Difference in temperature - 5.0° Centigrade
Difference in frequency - 228 cycles
Difference per degree Centigrade - 45.6 cycles = .0010%.

TABLE NO. 27

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser adjusting screw at 40° past point of contact with plate.

Frequency - 4500 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
12:30	33.0	60.4	4500.420	225
40	35.0	60.5	455	226
50	34.8	60.7	473	224
13:00	35.0	61.0	445	223
10	35.0	61.0	470	223
20	35.0	61.2	456	225
30	35.0	61.2	480	223
	(D.C. Line power off 3 minutes)			
40	35.0	61.4	550	228
50	34.9	61.5	522	225
14:00	35.0	61.5	534	223
	(Key open 10 minutes while temperature was changed)			
10	49.5	61.5	835	226
20	50.4	61.6	745	224
30	50.2	61.8	895	226
40	50.0	62.0	970	225
50	50.4	62.0	4501.055	226
15:00	50.0	62.0	137	225
10	50.0	62.1	175	226
20	50.0	62.2	212	226

Difference in temperature - 15.0° Centigrade
Difference in frequency - 678 cycles
Difference per degree - 45.2 cycles = .00101%.

TABLE NO. 28

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser screw set at 40° past point of contact with plate.

Frequency - 3000 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	24.0	60.0	3000.830	232
20	24.8	60.1	750	232
30	25.2	60.4	735	230
40	25.0	60.6	720	231
50	25.0	60.9	680	232
10:00	25.0	61.0	660	232
10	25.0	61.2	642	230
20	25.0	61.4	630	232
(Key open 10 minutes while temperature was changed)				
30	9.9	61.2	705	232
40	10.0	61.2	600	231
50	10.4	61.2	564	231
11:00	10.2	61.2	530	232
10	10.2	61.2	495	228
20	10.0	61.2	468	229
30	10.2	61.2	450	230
40	10.0	61.2	430	231
(Key open)				
14:10	5.8	59.5	865	232
20	4.9	59.9	760	232
30	4.8	60.2	750	231
40	5.2	60.5	735	230
50	5.0	60.6	718	232
15:00	5.2	60.7	718	230
10	5.0	60.9	680	230
20	5.0	61.0	680	230
(Key open 10 minutes while temperature was changed)				
30	0.4	60.8	690	232
40	0.0	60.7	594	234
50	0.0	60.7	570	232
16:00	-0.1	60.7	550	234
10	-0.1	60.8	555	234
20	0.0	60.9	560	234
30	0.0	61.0	547	235
40	0.0	61.0	544	233

TABLE NO. 29

TBF Transmitter; Serial No. 35

Effect of Change in Ambient Temperature

Compensating condenser set at 40° past point of contact with plate.

Frequency - 2000 KC.

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
09:10	4.6	60.0	2000.855	230
20	5.2	60.0	740	230
30	5.0	60.0	690	230
40	5.0	60.2	658	230
50	5.0	60.3	634	229
10:00	5.0	60.5	610	228
10	5.0	60.6	593	229
20	5.0	60.7	580	229
	(Key open 10 minutes while temperature was changed)			
30	1.0	60.6	645	217
40	1.0	60.6	648	225
50	1.0	60.6	652	222
11:00	0.2	60.6	660	223
10	0.0	60.7	656	224
20	0.0	60.8	655	223
30	0.0	61.0	654	222
40	0.0	61.0	653	220
	(Key open 10 minutes while temperature was changed)			
50	33.5	61.0	645	217
12:00	34.8	61.1	648	225
10	35.5	61.4	652	222
20	35.0	61.5	660	223
30	35.0	61.7	656	224
40	35.0	62.0	655	223
50	35.2	62.0	654	222
13:00	35.0	62.1	653	220
	(Key open 10 minutes while temperature was changed)			
10	50.4	62.1	770	224
20	50.0	62.2	716	225
30	50.0	62.4	696	222
40	50.0	62.5	705	223
50	50.0	62.6	720	224
14:00	50.0	62.7	726	224
10	50.0	62.7	734	223
20	50.0	62.9	740	224

TABLE NO. 29 Cont'd

Difference between readings taken at 10:20 and 11:40
Ambient temperature - 5.0° Centigrade
Difference in frequency - 78 cycles
Difference per degree Centigrade - 15.6 cycles
.00078%.

Difference between readings taken at 11:40 and 13:00
Ambient temperature - 35° Centigrade
Difference in frequency - 151 cycles
Difference per degree Centigrade - 4.3 cycles
.000215%.

Difference between readings taken at 13:00 and 14:20
Ambient temperature - 15° Centigrade
Difference in frequency - 87 cycles
Difference per degree Centigrade - 5.8 cycles
.00029%.

TABLE NO. 30

TBF Transmitter; Serial No. 35

Effect of change in Ambient Temperature

Compensating condenser adjusting screw set at 40° past point of contact with plate.

Frequency - 3000 KC

Time	Ambient Deg. C.	Cabinet Deg. C.	Frequency	Line Volts
14:30	34.8	62.6	3000.540	228
40	34.8	62.5	528	229
50	34.0	62.5	556	229
15:00	35.0	62.5	528	227
10	35.2	62.5	530	228
20	35.0	62.5	532	227
30	35.0	62.5	532	231
40	35.0	62.5	534	231
(Key open 10 minutes while temperature was changed)				
50	50.0	62.4	682	228
16:00	49.6	62.4	702	227
10	50.0	62.5	736	228
20	50.0	62.6	755	232
30	50.0	62.7	765	232
40	50.0	62.8	770	229
50	50.0	62.8	775	230
17:00	50.0	63.0	775	230

Difference in temperature - 15.0° Centigrade
Difference in frequency - 241 cycles
Difference per degree - 16 cycles = .00053%.

TABLE NO. 31

TBF Transmitter; Serial No. 32

Summary of results obtained with various adjustments of Compensating Condenser.

Temperature Coefficients at:

Range of Ambient Temperatures	Original Adjust-ment.	1st Re-adjust-ment.	2nd Re-Adjust-ment.	3rd Re-adjust-ment (40°)
		(Frequency - 4500 KC)		
5° to 0°	0.0017%		.00206%	.00188%
35 to 50°	0.0015%	.0014%	.00083%	.00041%
0 to 35°				.00053%
50 to 25°		.00088%		
25 to 35°		.0004%		
		(Frequency - 3000 KC)		
30 to 35°		.00038%		
25 to 30°		.00022%		
50 to 25°		.00053%		

TABLE NO. 32

TBF Transmitter; Serial No. 32

Summary of all tests conducted with Transmitter No. 32 with compensating condenser at original adjustment as received from the Manufacturer.

Frequency	Range of Ambient Temperature	Coefficient per Degree Centigrade
2000 KC	25° - 30°	0.00048%
3000	25 - 30	0.00082
3000	25 - 30	0.001
3000	25 - 30	0.0011
4500	25 - 30	0.0018
3000	25 - 35	0.0018
4500	25 - 35	0.0015
2000	30 - 35	0.00065
3000	30 - 35	0.00109
3000	30 - 35	0.00096
3000	30 - 35	0.0011
4500	30 - 35	0.0021
3000	35 - 40	0.00118
4500	35 - 40	0.0019
2000	35 - 50	0.00074
3000	35 - 50	0.00096
3000	35 - 50	0.0009
3000	35 - 50	0.00057
4500	35 - 50	0.0011
4500	35 - 50	0.0015
3000	40 - 45	0.00115
4500	40 - 45	0.0017
2000	50 - 25	0.00041
3000	50 - 25	0.00059
3000	50 - 25	0.00057
3000	50 - 25	0.00077
3000	50 - 25	0.00067
4500	50 - 25	0.00125
4500	50 - 25	0.00112
3000	25 - 15	0.00035
2000	25 - 15	0.00035
2000	25 - 10	0.00025
4500	25 - 10	0.00039
3000	15 - 10	0.0006

TABLE NO. 32 Cont'd

Frequency	Range of Ambient Temperature	Coefficient per Degree Centigrade
2000	10° - 5	0.00082
3000	10 - 5	0.0005
4500	10 - 5	0.0011
2000	5 - 0	0.00048
3000	5 - 0	0.00086
4500	5 - 0	0.0017
2000	0 - 25	0.00023
3000	0 - 25	0.00037
4500	0 - 25	0.00063

TABLE NO. 33

TBF Transmitter; Serial No. 34

Summary of results obtained with various adjustments of Compensating Condenser.

Frequency - 4500 KC

Range of Ambient Temperatures	Coefficient at original Adjustment	Coefficient after 1st Re-adjustment	Coefficient after 2nd Re-adjustment (40°)
5° to 0° C.		0.00194%	0.00192%
35° to 50°	0.0022%	0.00037%	0.00046%

TABLE NO. 34

TBF Transmitters; Serial No. 35

Summary of results obtained with various adjustments of Compensating Condensers.

Range of Ambient Temperatures	Original Adjustment	1st Adjustment (35°)	2nd Adjustment (55°)	3rd Adjustment (50°)	4th Adjustment (45°)	5th Adjustment (40°)
		Temperature Coefficients at:				
		(Frequency - 4500 KC)				
5° to 0°			.00175%	.00147%	.0013%	.00108%
35° to 50°	.00115%	.00115%	.00032%			.00101%
		(Frequency - 3000 KC)				
5° to 0°						.0009%
35 to 50°				.00023%		.00035%
		(Frequency - 2000 KC)				
5° to 0°						.00026%
35 to 50°						.00029

TABLE NO. 36

TBF Transmitter; Serial No. 32

(Averages of values shown on Table No. 32)

Average Temperature Coefficient at each frequency where measurements were taken.

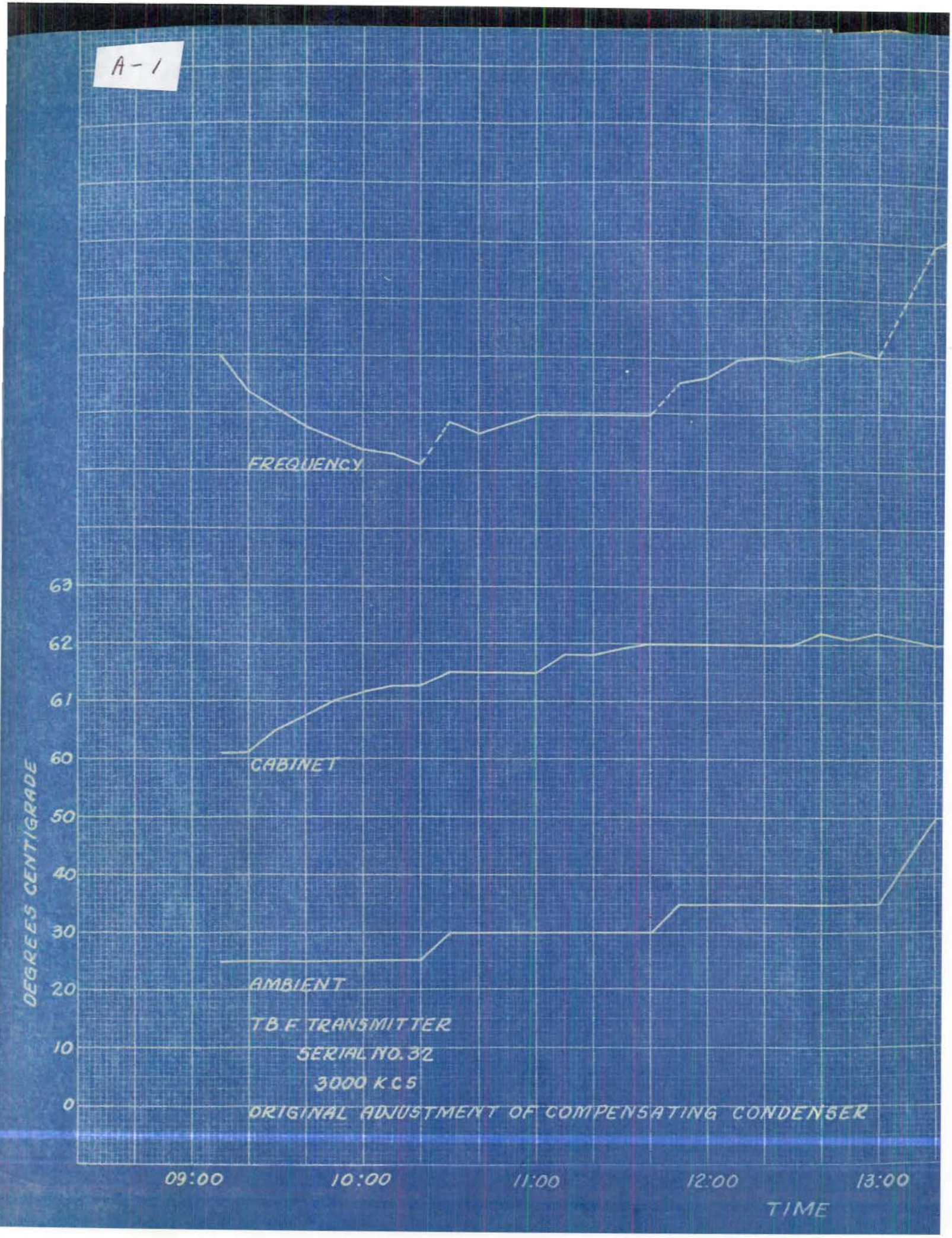
2000 KC - 0.00053%

3000 KC - 0.00082%

4500 KC - 0.00135%

Total average of all frequencies - 0.00094%.

A-1



TB F TRANSMITTER
SERIAL NO. 32
3000 KCS
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER

A-2

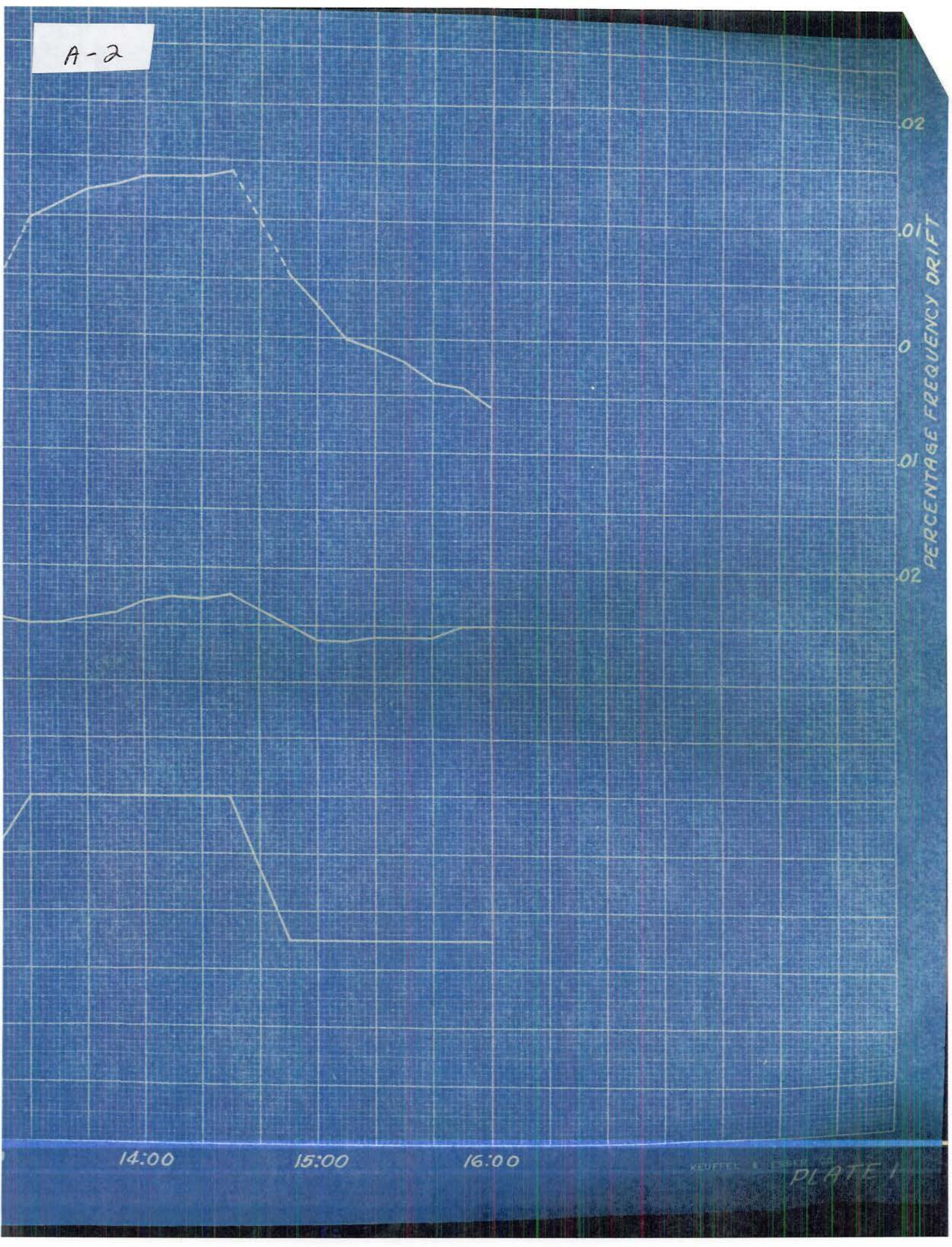
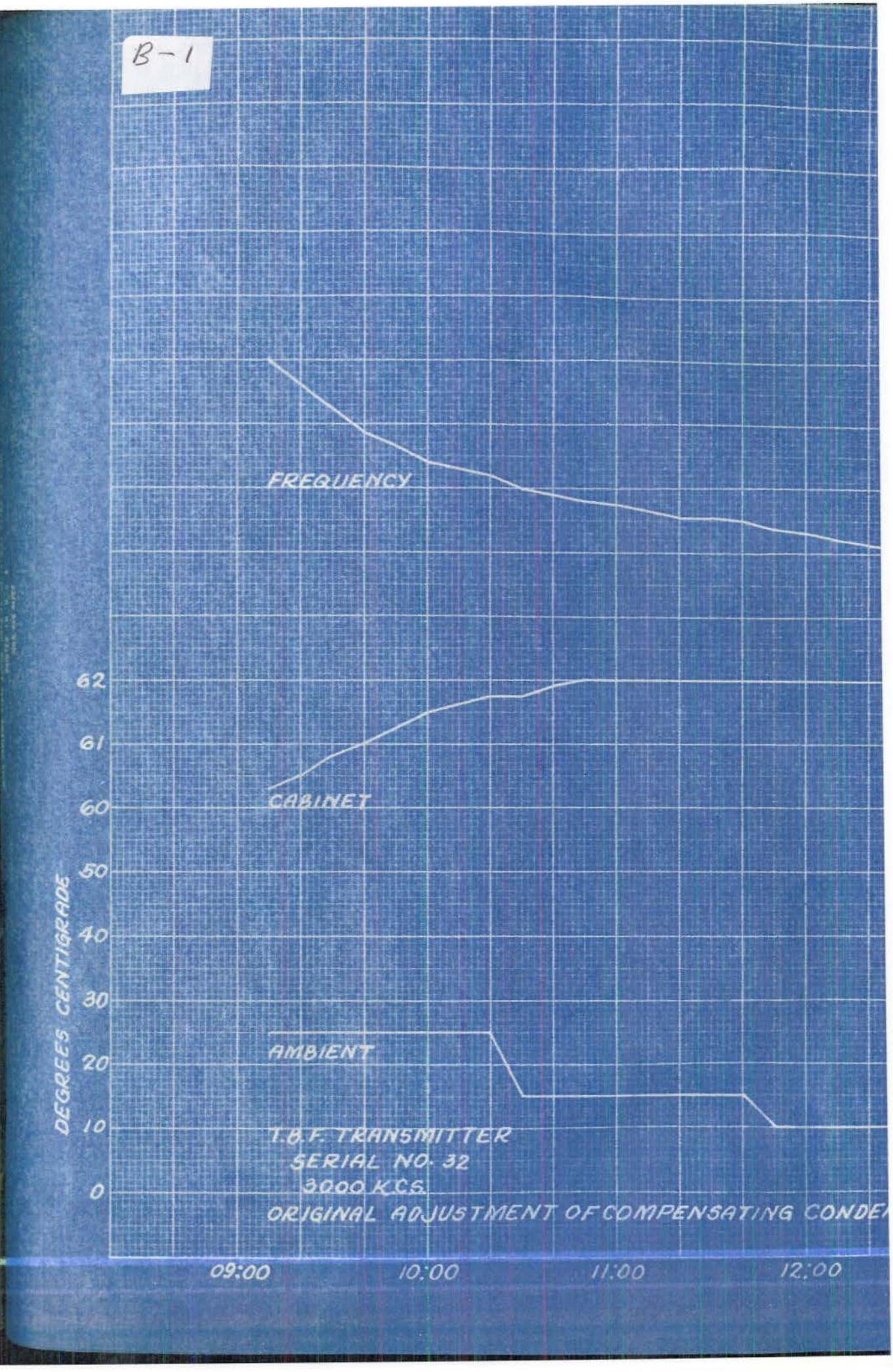


PLATE I

B-1


FREQUENCY
CABINET
AMBIENT
DEGREES CENTIGRADE
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
T.B.F. TRANSMITTER
SERIAL NO. 32
3000 K.C.S.
ORIGINAL ADJUSTMENT OF COMPENSATING CONDE

B-2

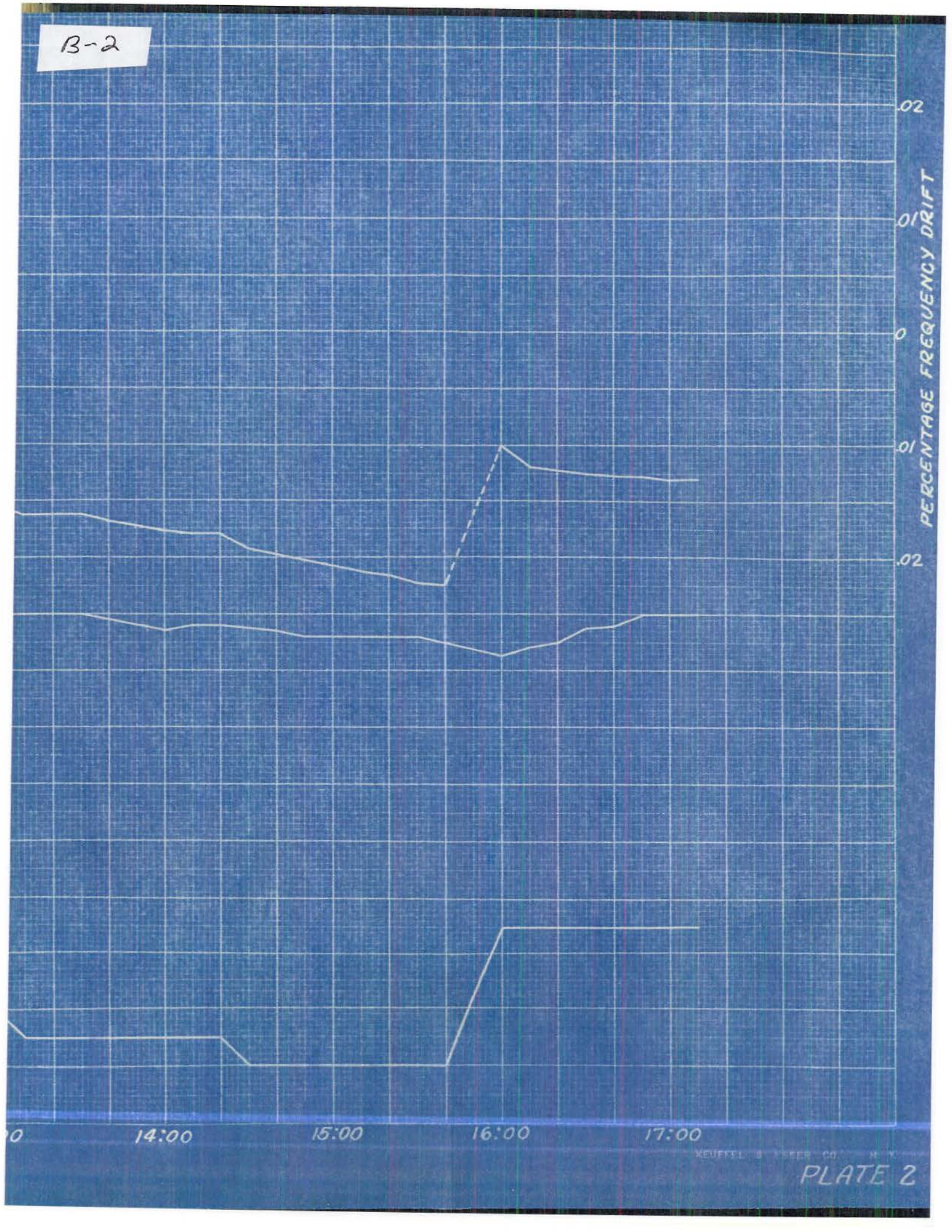
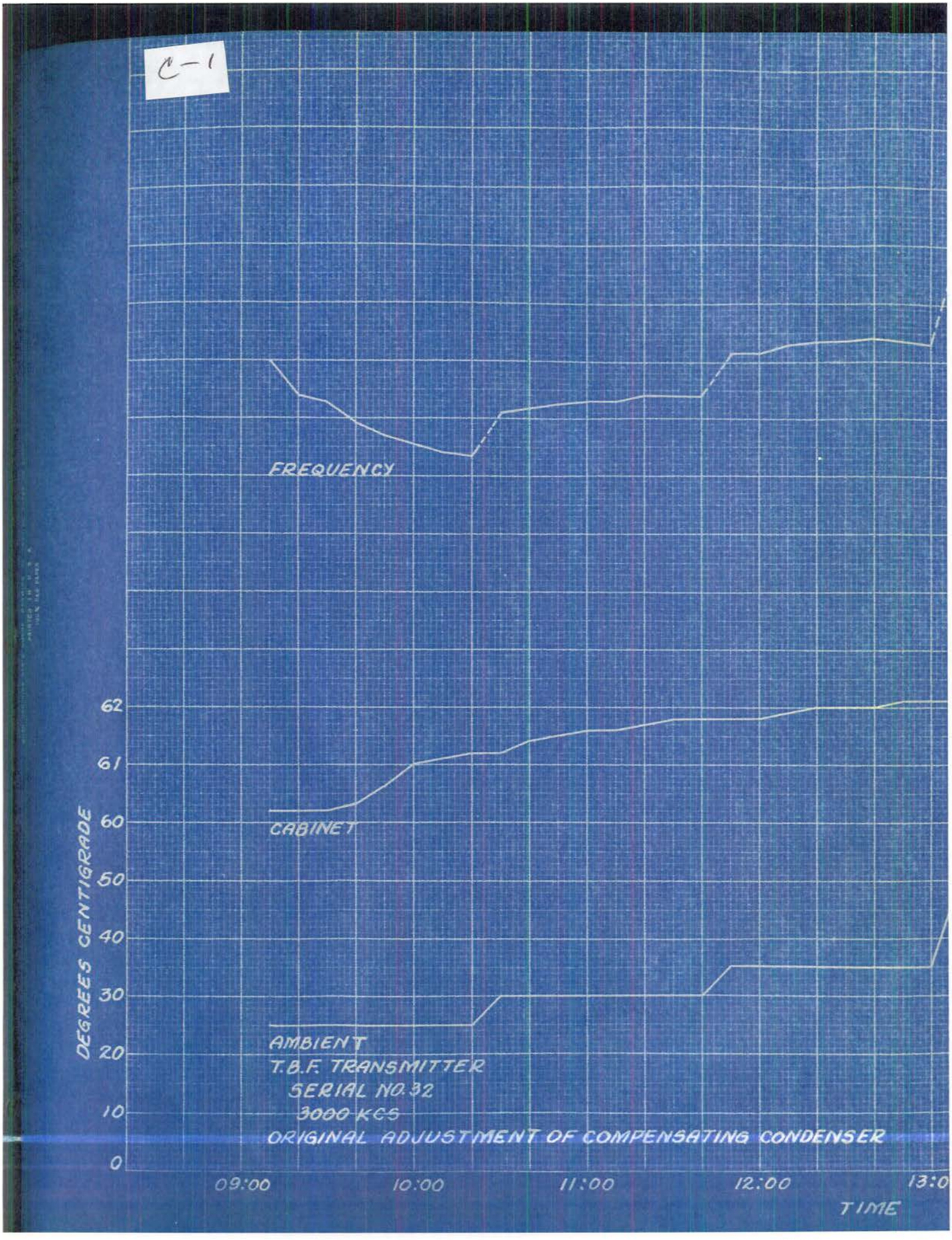
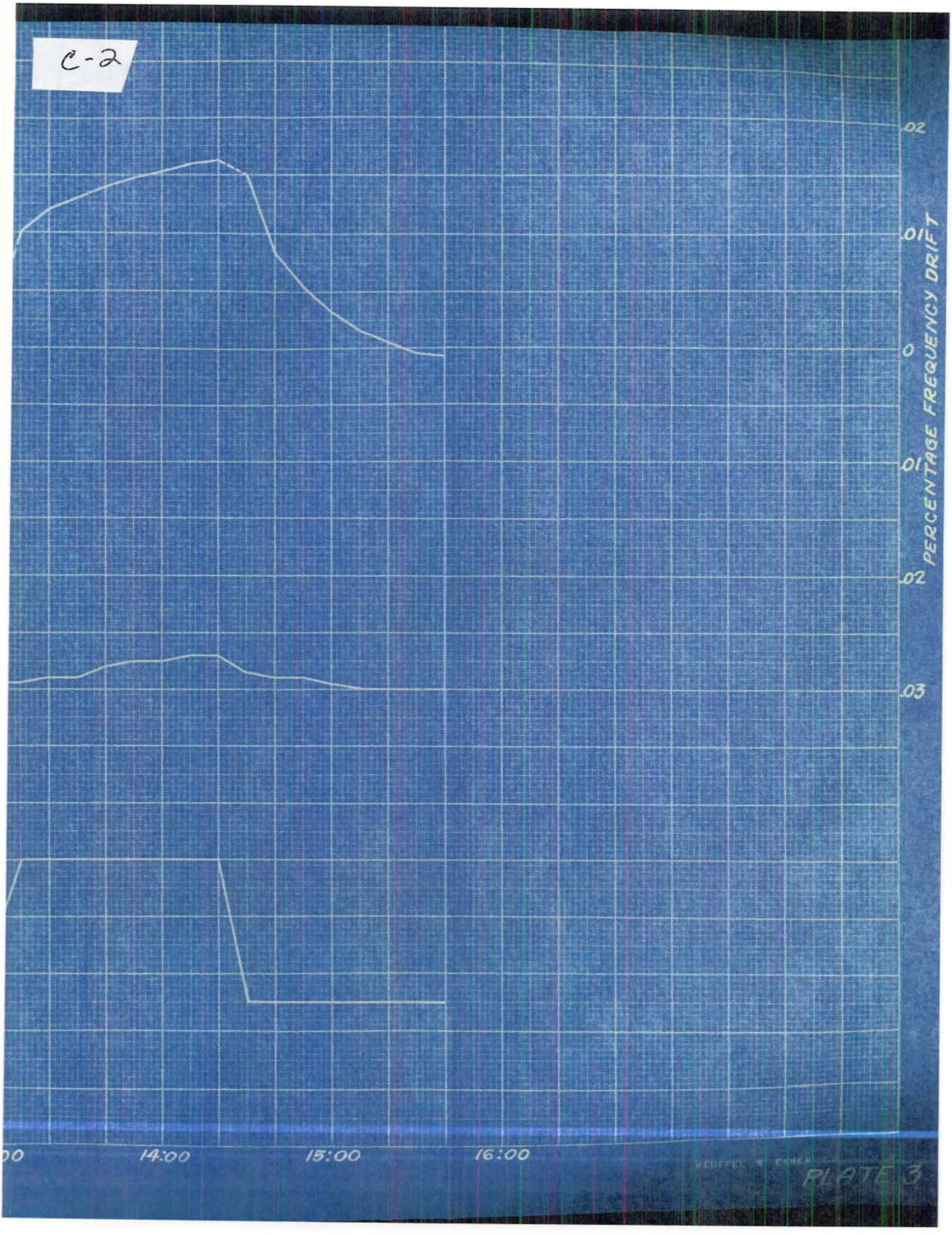
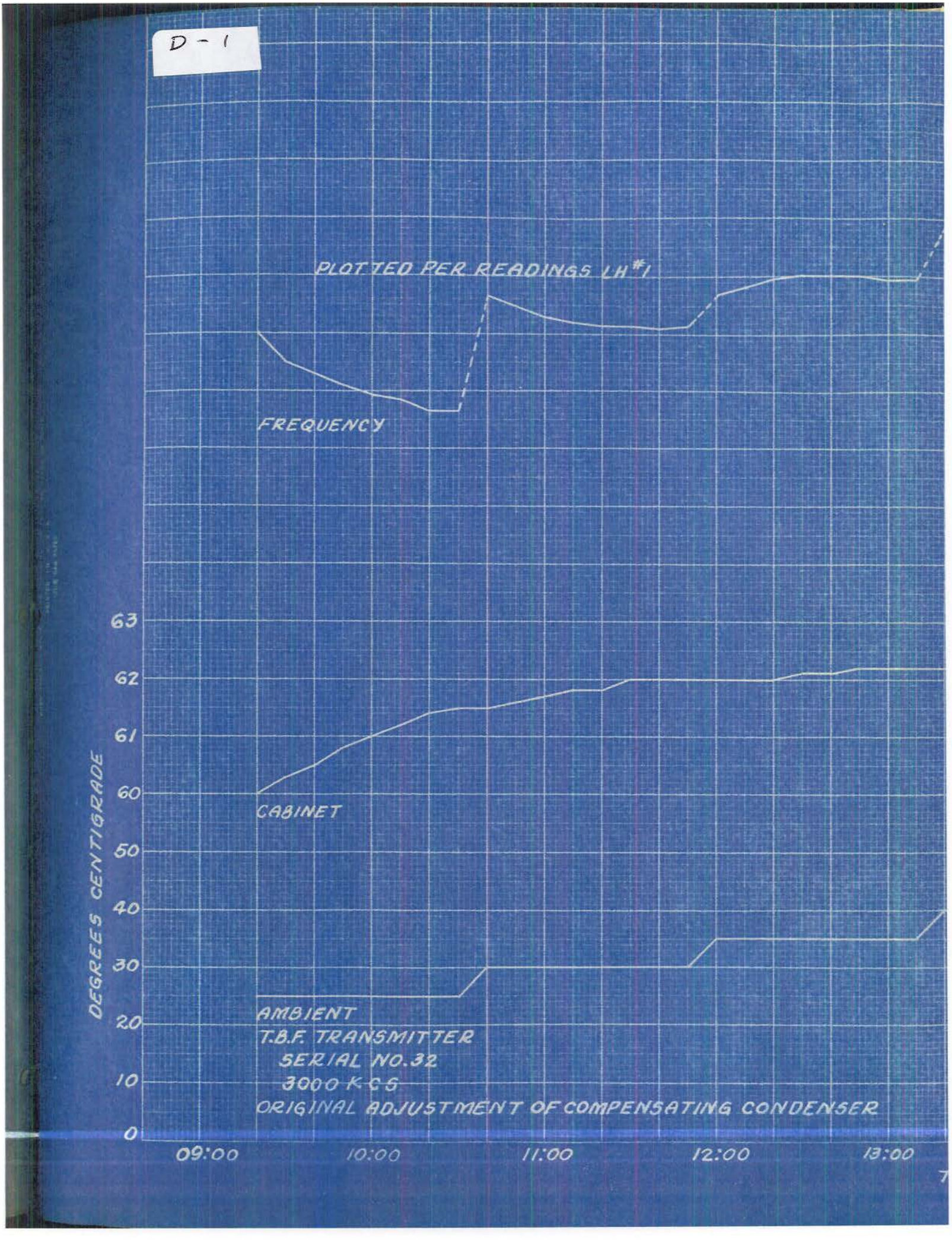


PLATE 2

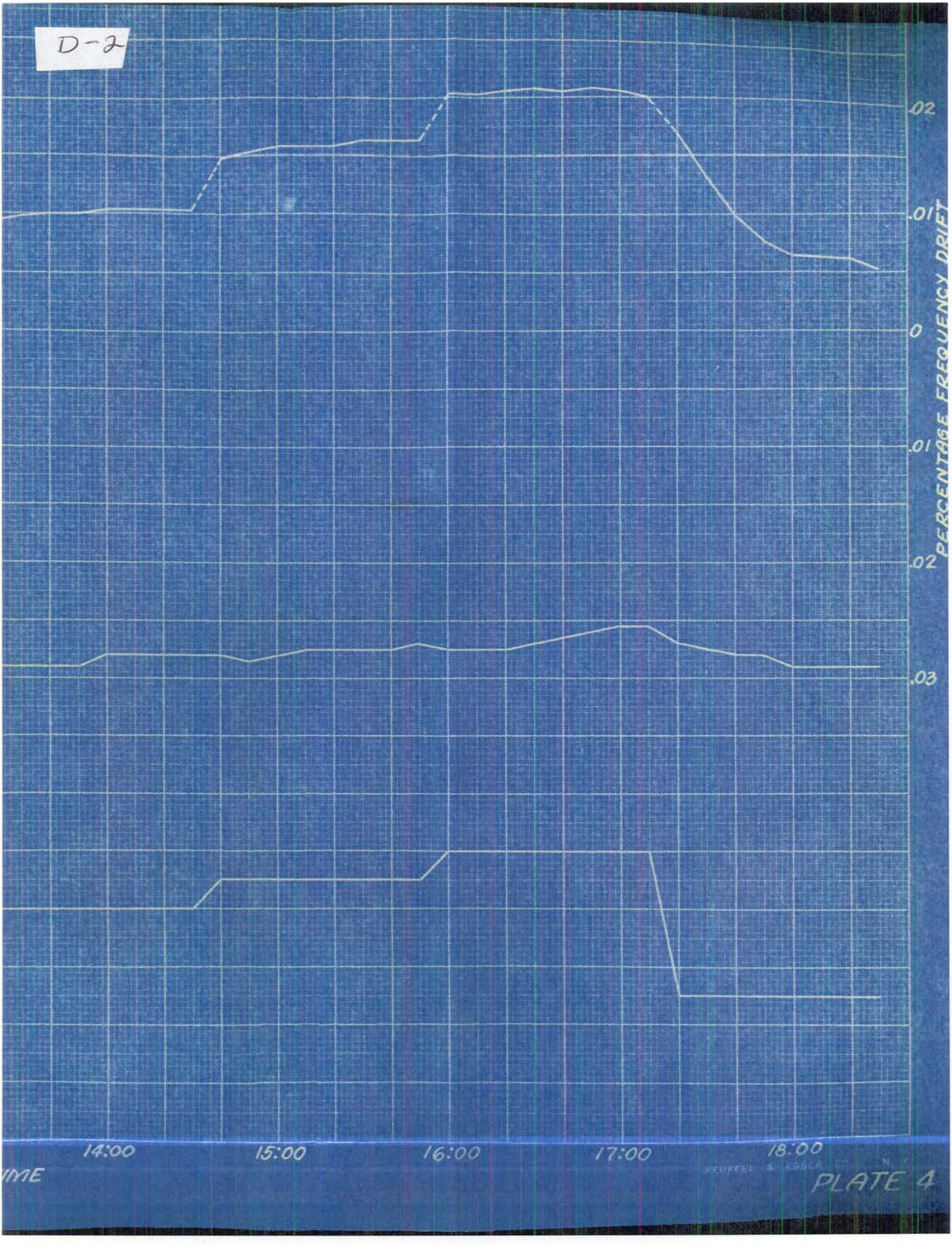
C-1


FREQUENCY
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 32
3000 KCS
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
13:0
TIME


C-2
.02
.01
0
.01
.02
.03
PERCENTAGE FREQUENCY DRIFT
14:00
15:00
16:00
PLATE 3


D - 1
PLOTTED PER READINGS LH #1
FREQUENCY
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 32
3000 K C S
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
13:00

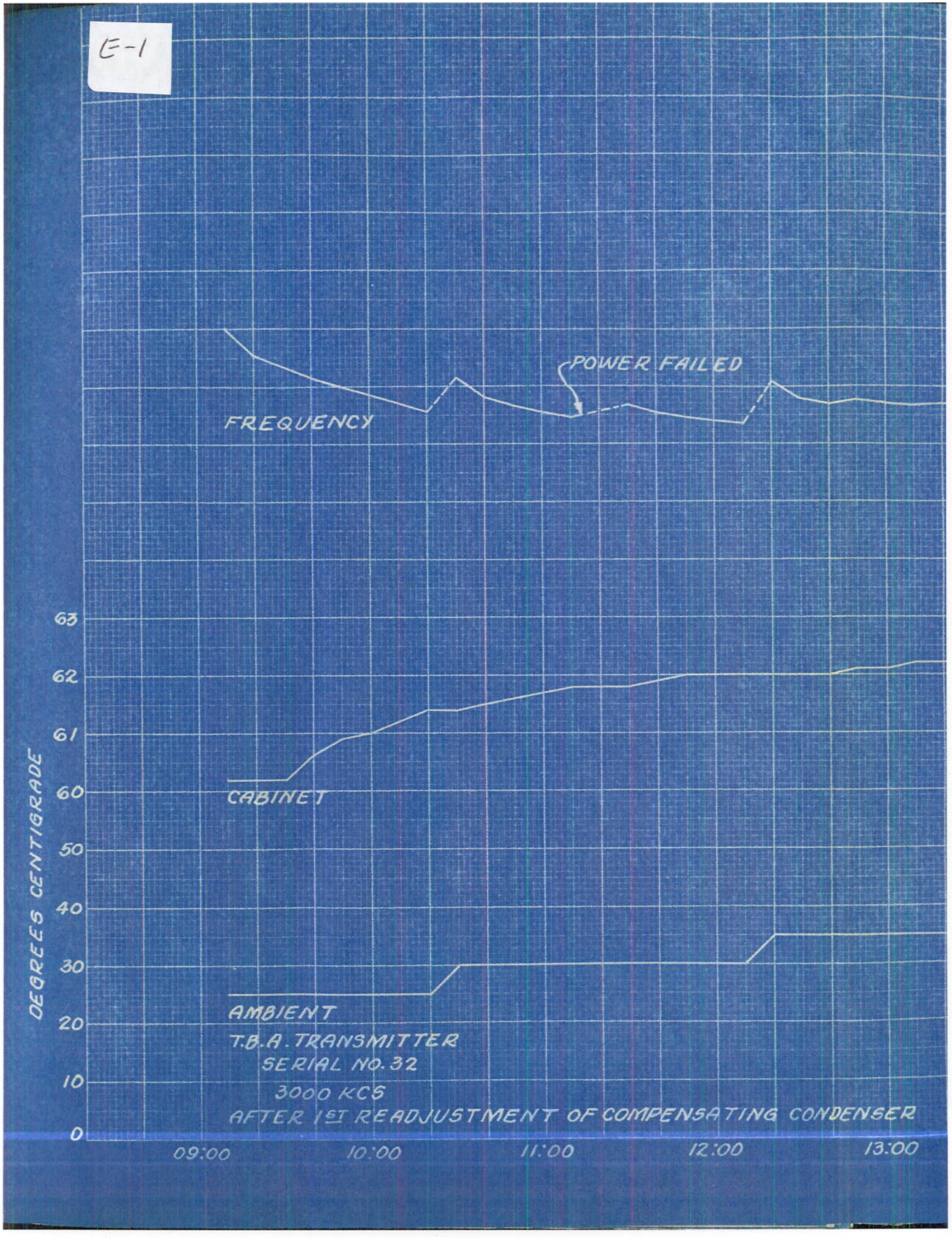
D-2



KEUFFEL & ESSER CO.

PLATE 4

E-1


POWER FAILED
FREQUENCY
63
62
61
60
50
40
30
20
10
0
DEGREES CENTIGRADE
CABINET
AMBIENT
T.B.A. TRANSMITTER
SERIAL NO. 32
3000 KCS
AFTER 1ST READJUSTMENT OF COMPENSATING CONDENSER
09:00
10:00
11:00
12:00
13:00

E-2

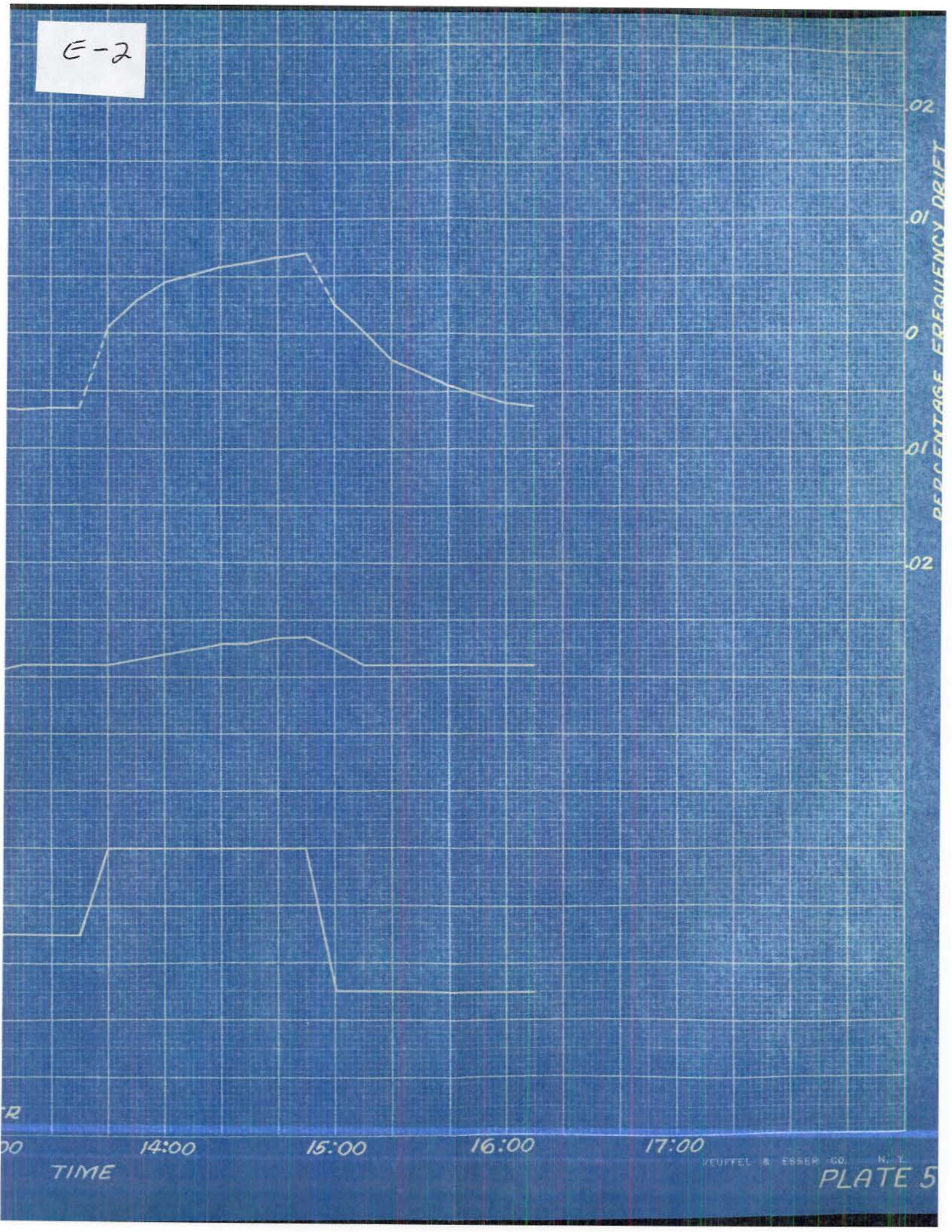
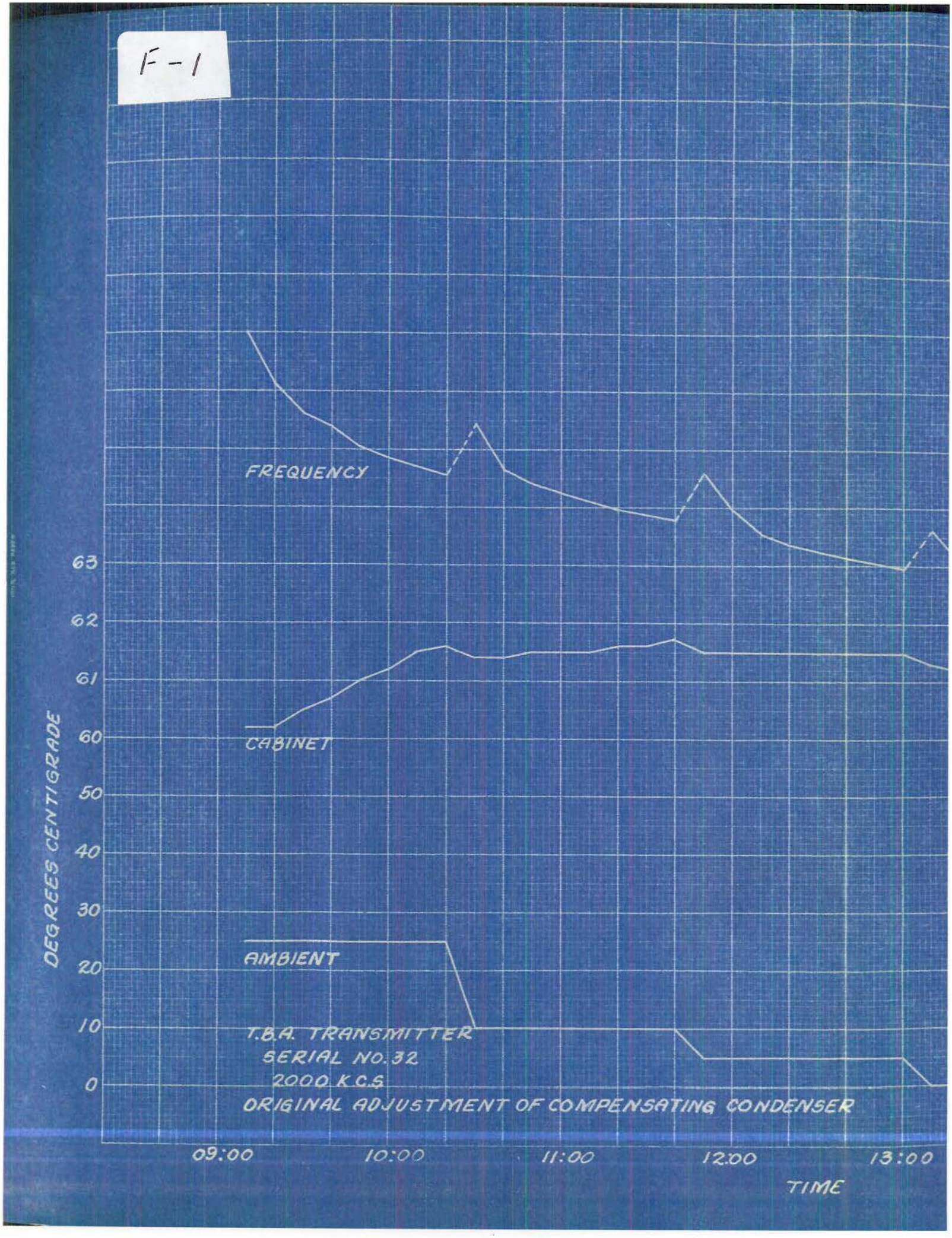

.02
.01
0
.01
.02
PERCENTAGE FREQUENCY DRIFT
14:00
15:00
16:00
17:00
TIME
KEUFFEL & ESSER CO. N. Y.

PLATE 5

F-1


FREQUENCY
CABINET
AMBIENT
63
62
61
60
50
40
30
20
10
0
DEGREES CENTIGRADE
09:00
10:00
11:00
12:00
13:00
TIME
T.B.A. TRANSMITTER
SERIAL NO. 32
2000 K.C.S.
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER

F-2

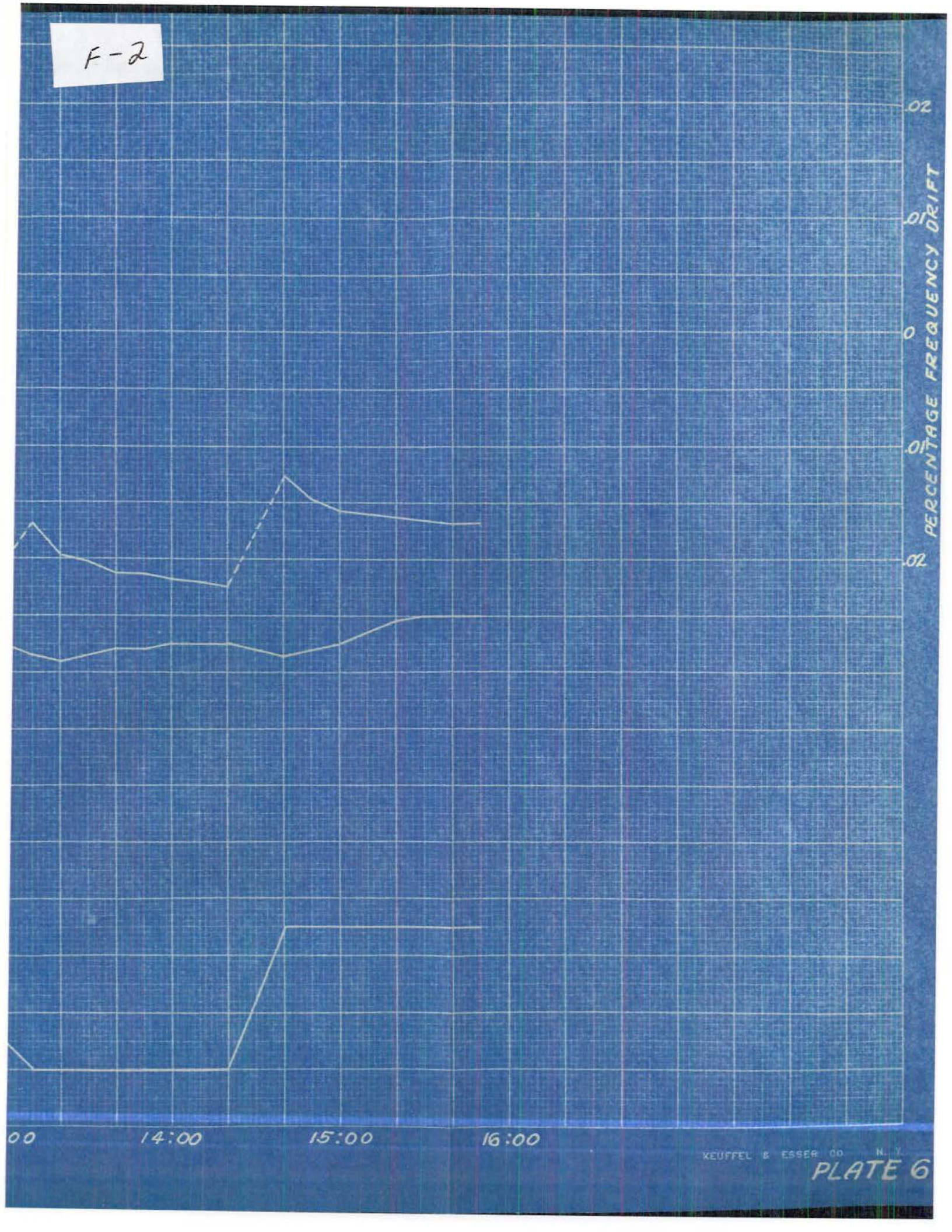
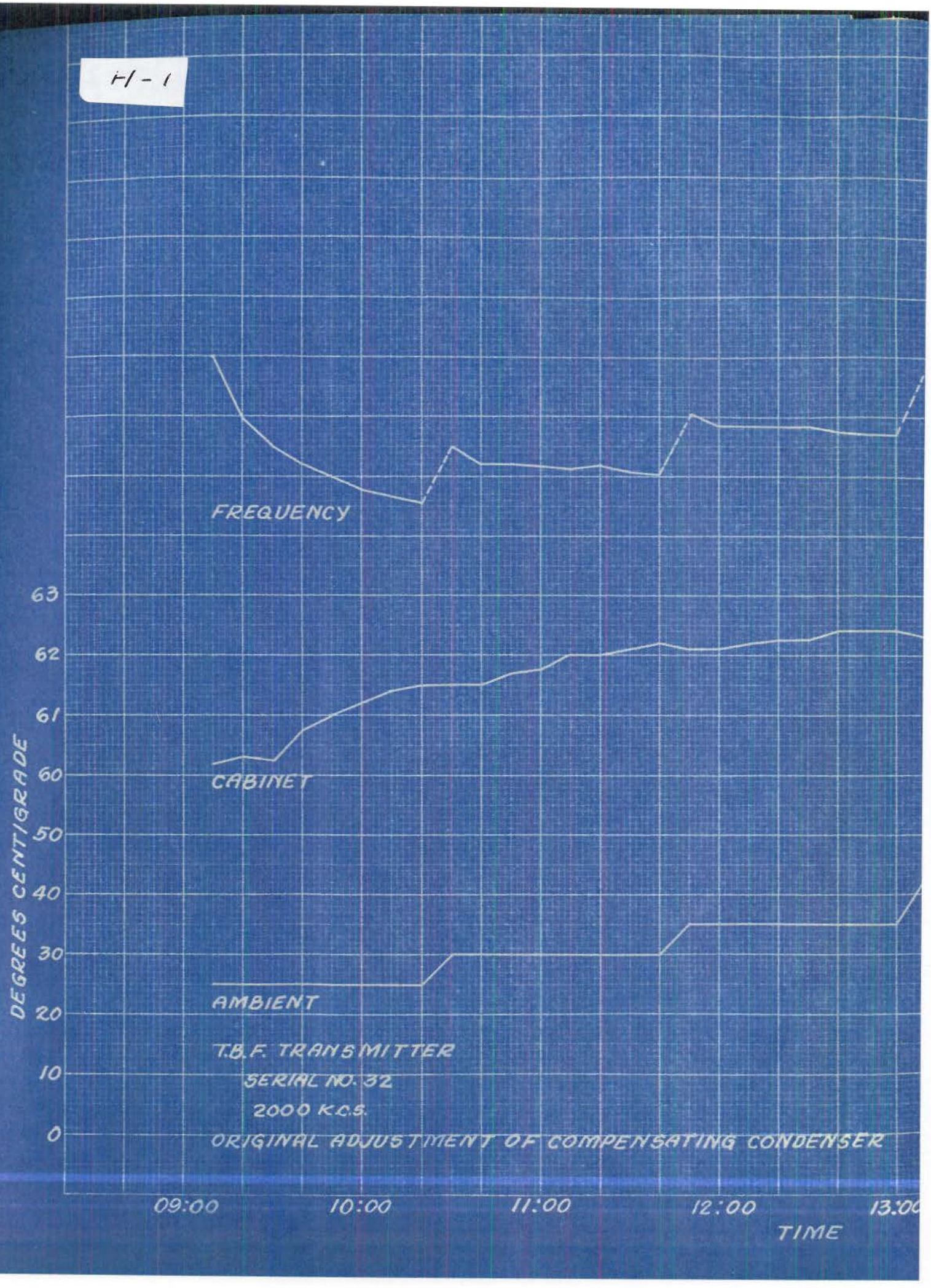

.02
.01
0
.01
.02
PERCENTAGE FREQUENCY DRIFT
00
14:00
15:00
16:00
KEUFFEL & ESSER CO N. Y.

PLATE 6

H-1


FREQUENCY
CABINET
AMBIENT
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
13:00
TIME
T.B.F. TRANSMITTER
SERIAL NO. 32
2000 K.C.S.
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER

H-2

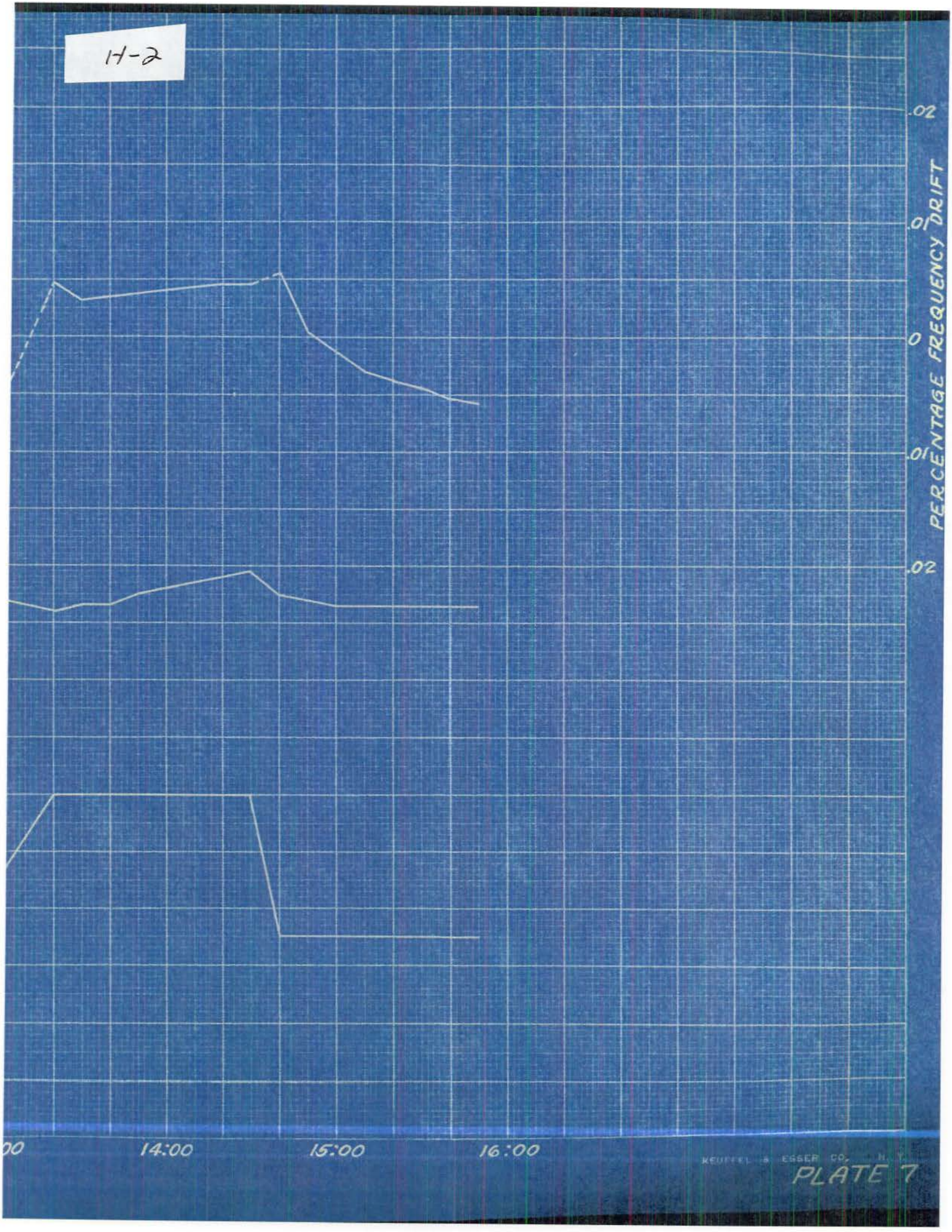
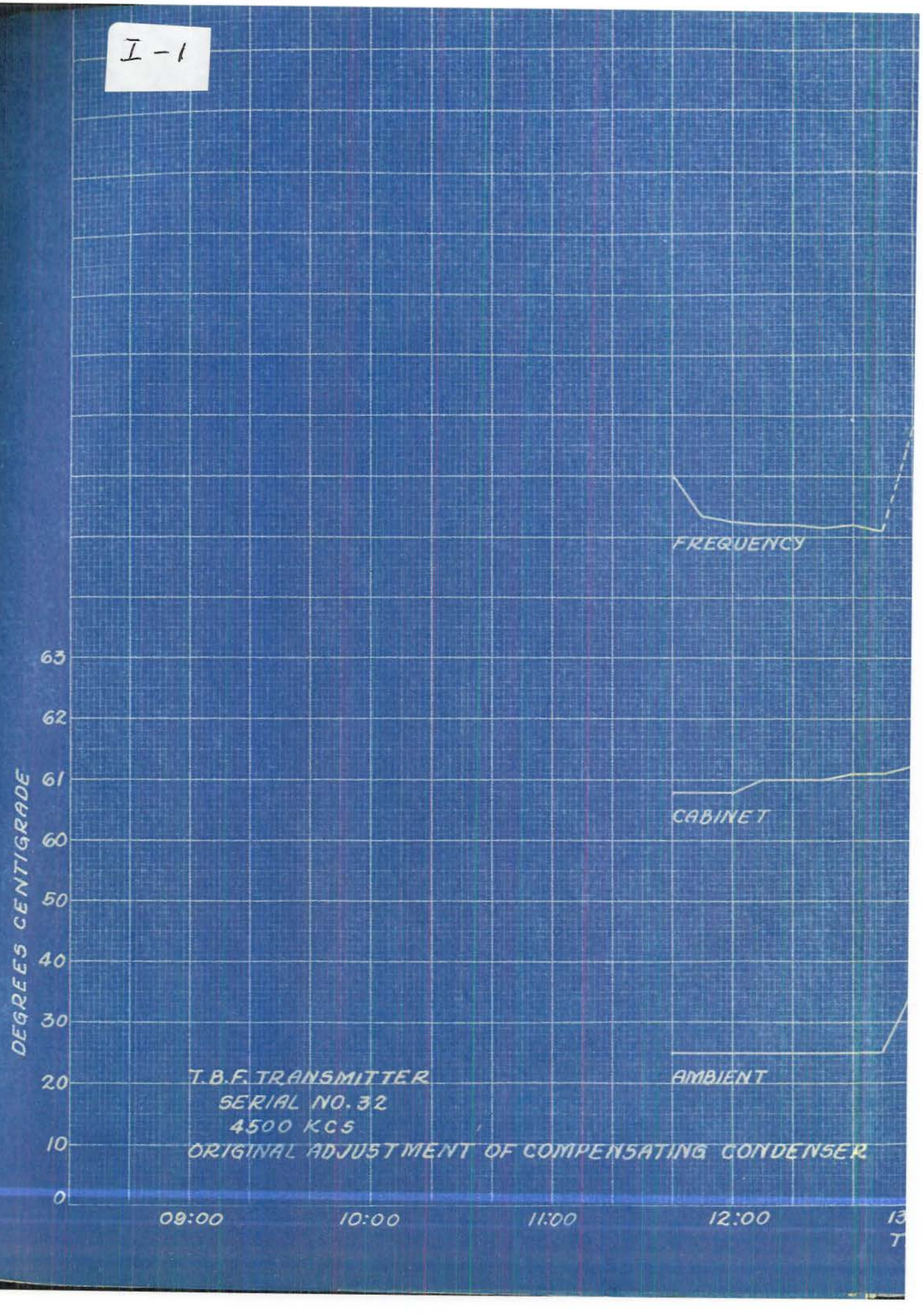

.02
.01
0
.01
.02
PERCENTAGE FREQUENCY DRIFT
00
14:00
15:00
16:00
KEUFFEL & ESSER CO.

PLATE 7

I - 1


FREQUENCY
CABINET
AMBIENT
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
T.B.F. TRANSMITTER
SERIAL NO. 32
4500 KCS
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER

I - 2

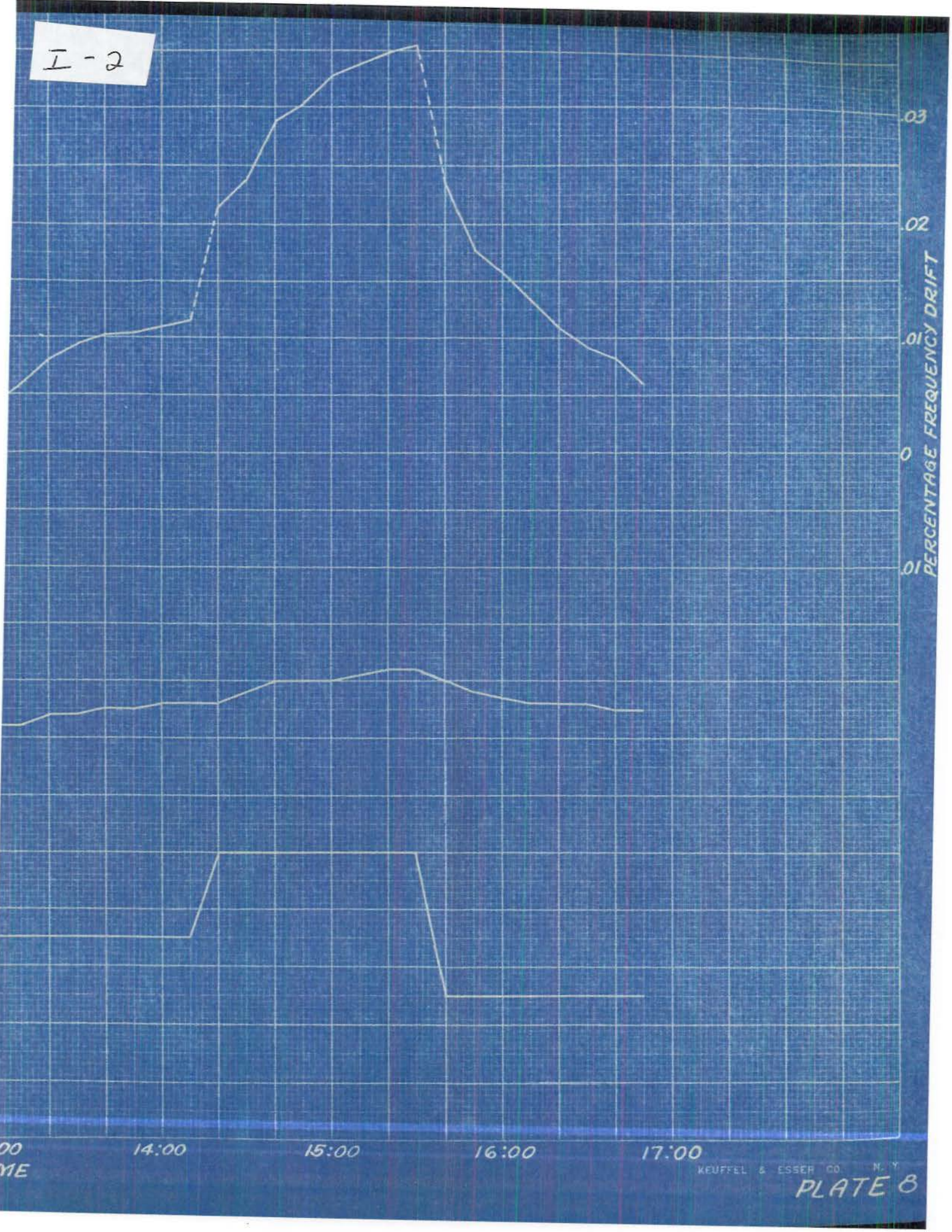
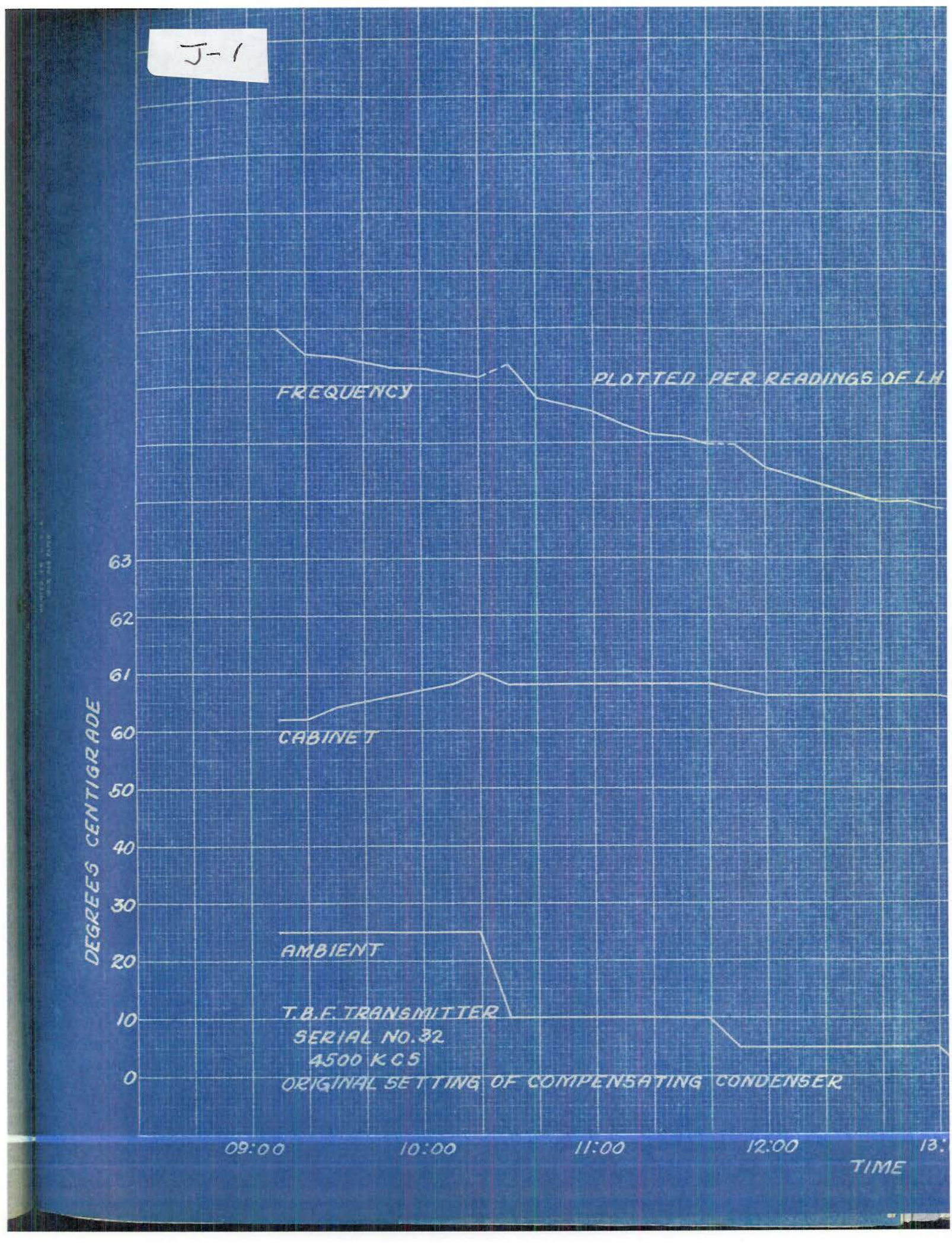
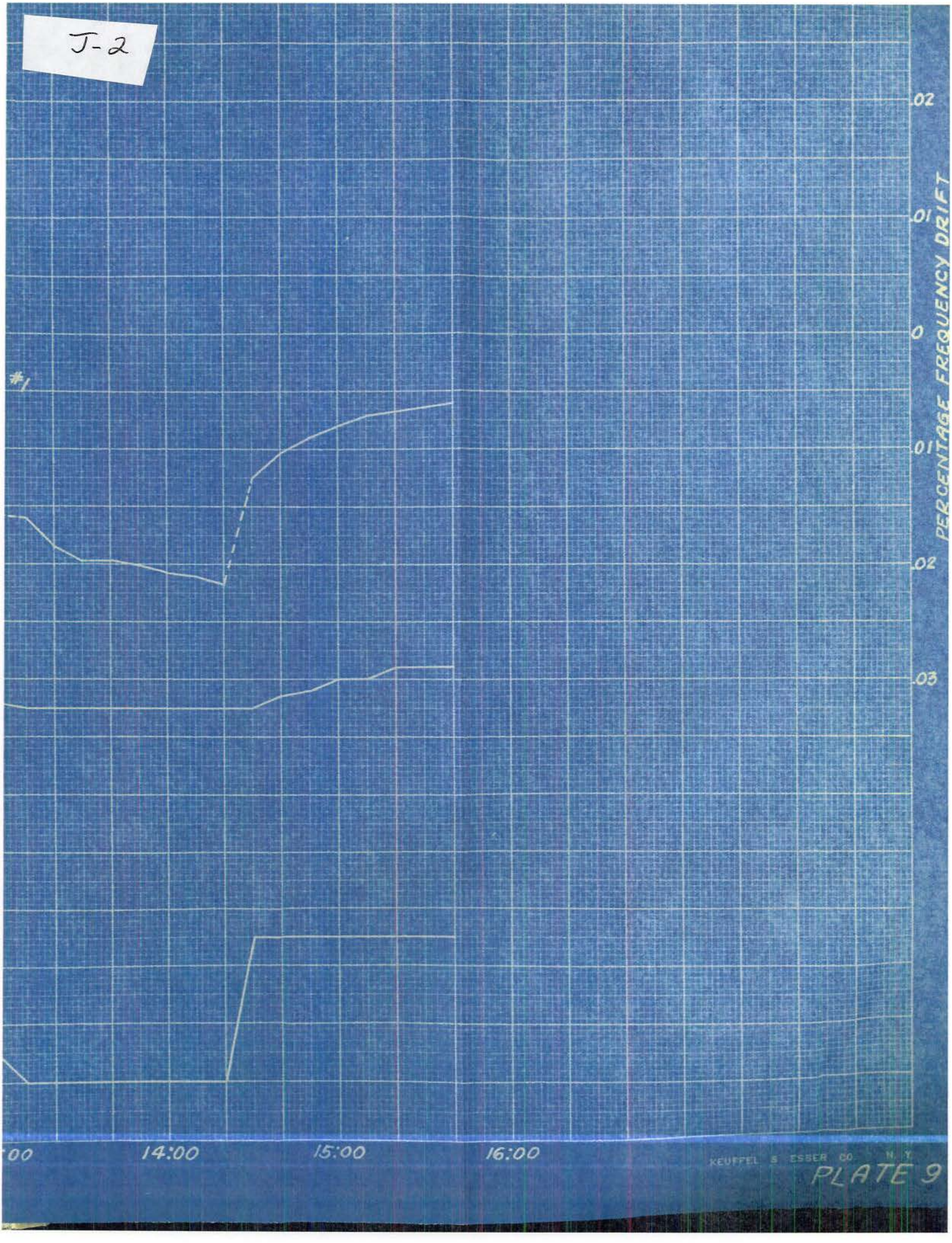
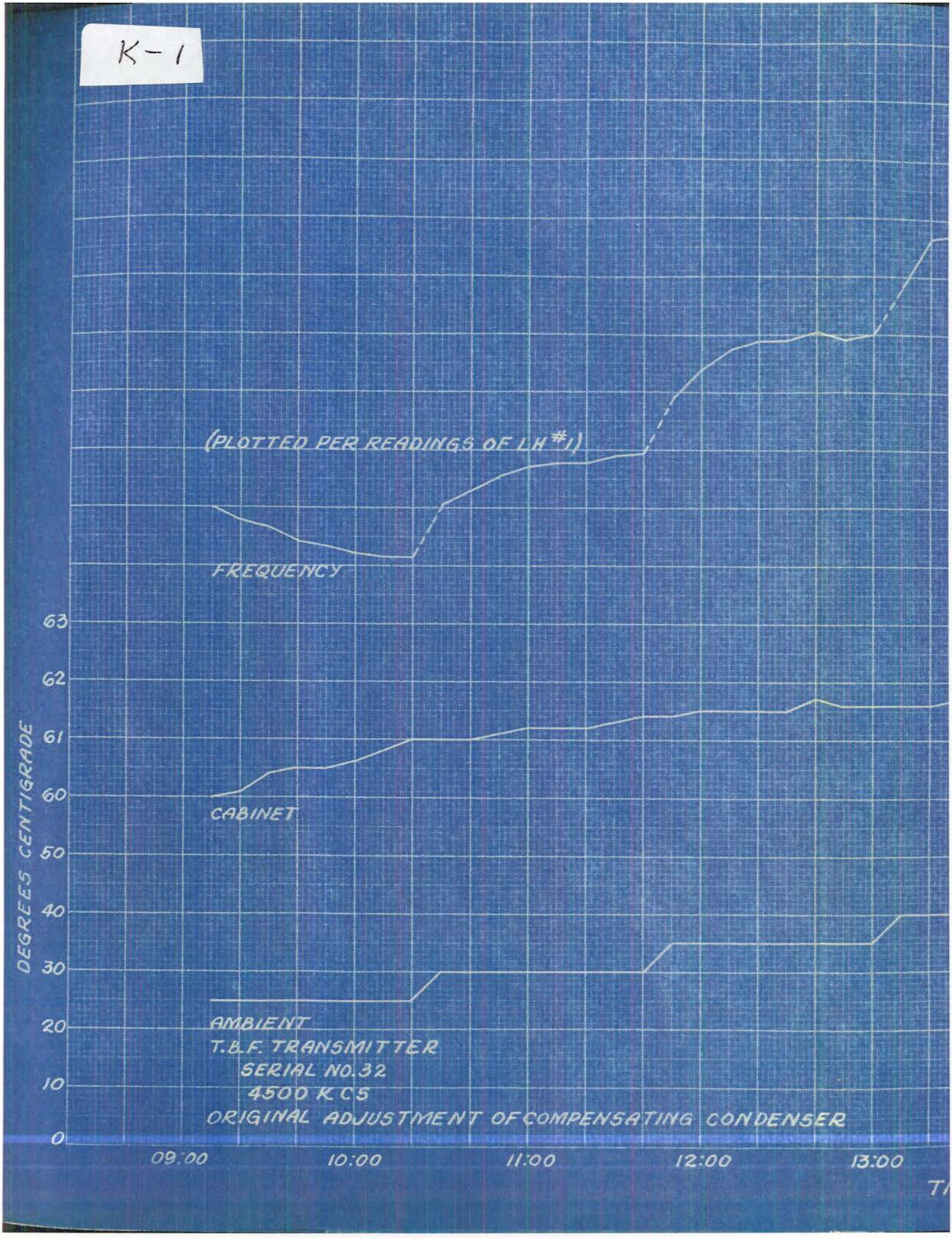

.03
.02
.01
0
.01
PERCENTAGE FREQUENCY DRIFT
00
14:00
15:00
16:00
17:00
ME
KEUFFEL & ESSER CO N. Y.

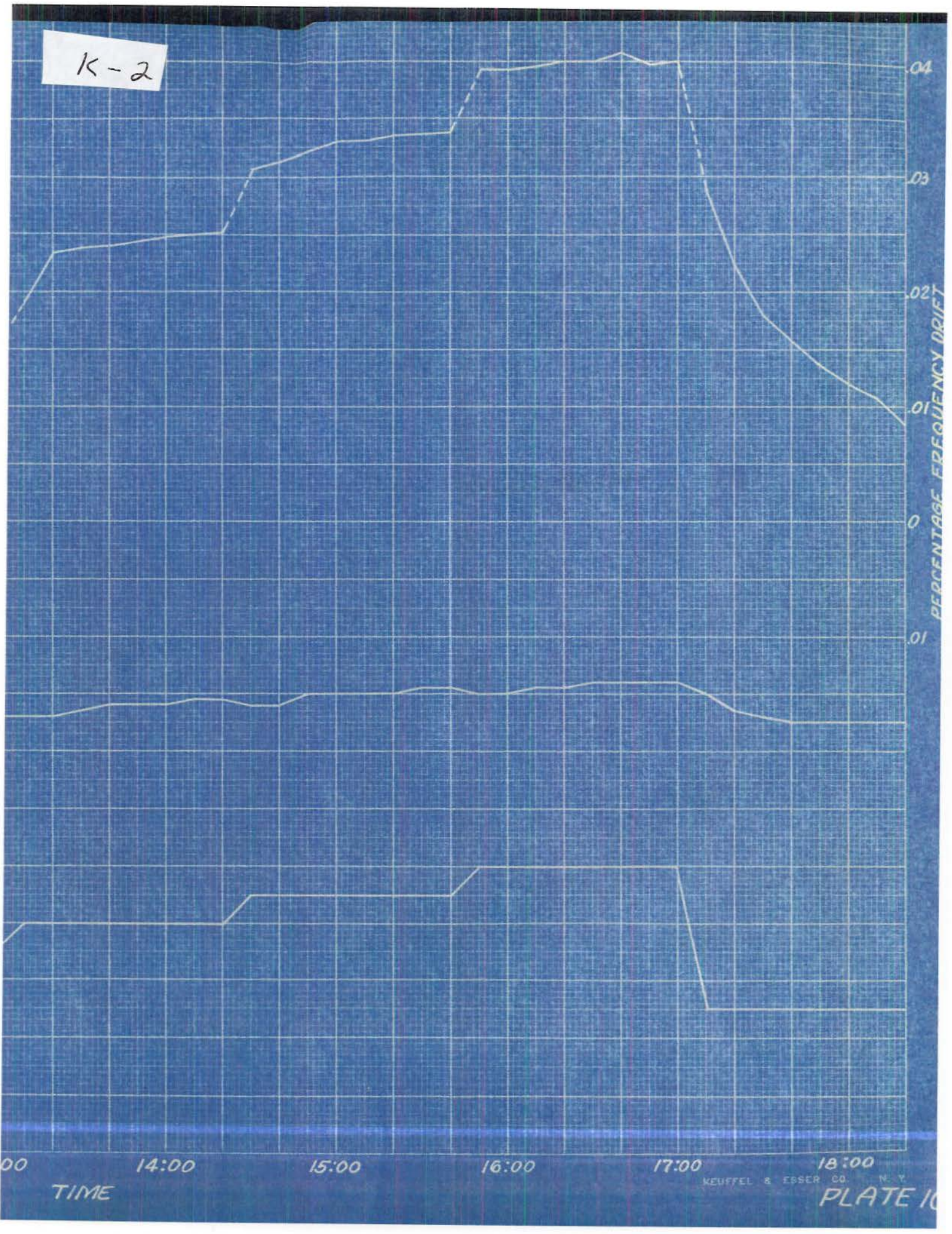
PLATE 8

J-1

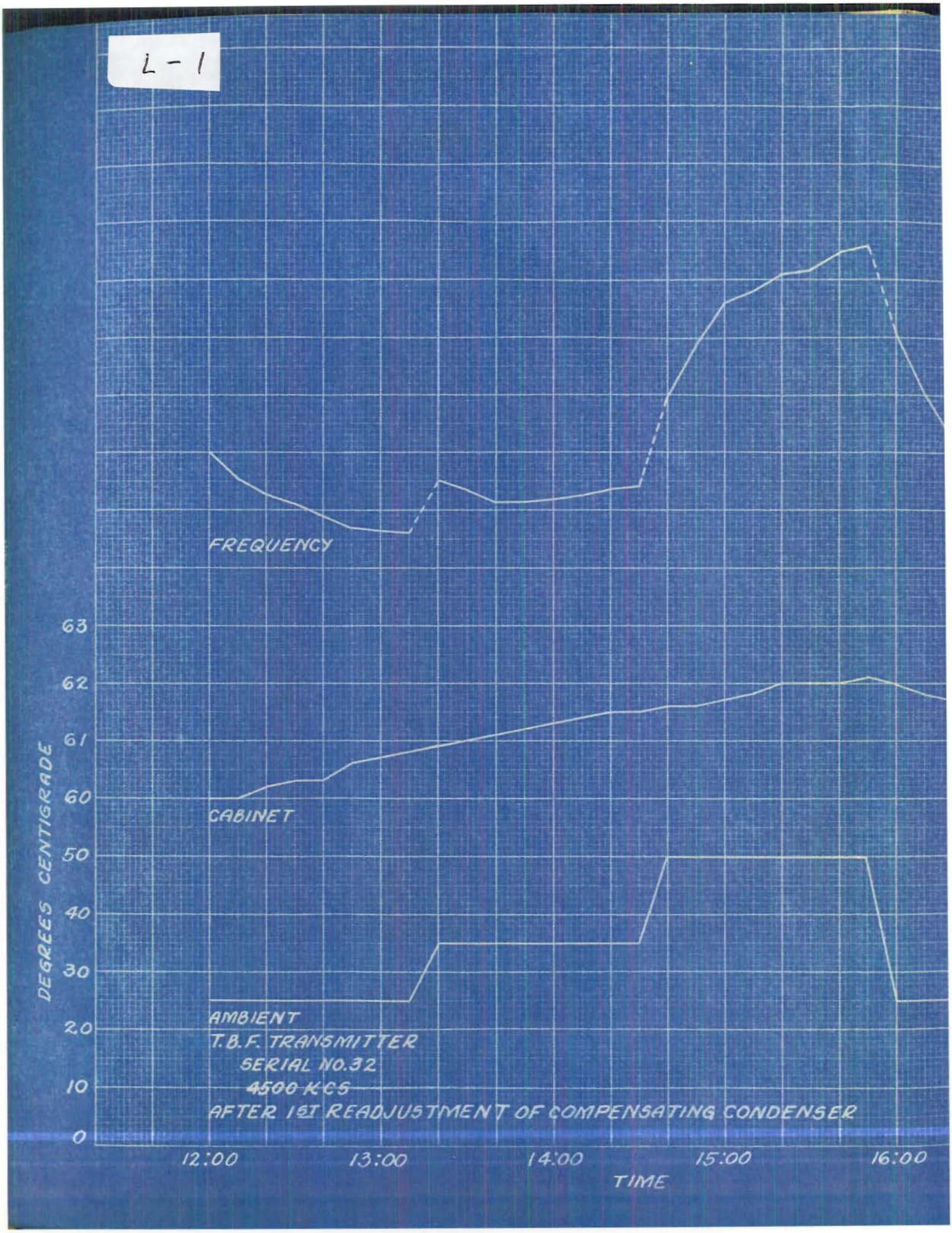

FREQUENCY
PLOTTED PER READINGS OF LH
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 32
4500 KCS
ORIGINAL SETTING OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
TIME


J-2
.02
.01
0
.01
.02
.03
PERCENTAGE FREQUENCY DRIFT
#1
00
14:00
15:00
16:00
KEUFFEL & ESSER CO N.Y.
PLATE 9

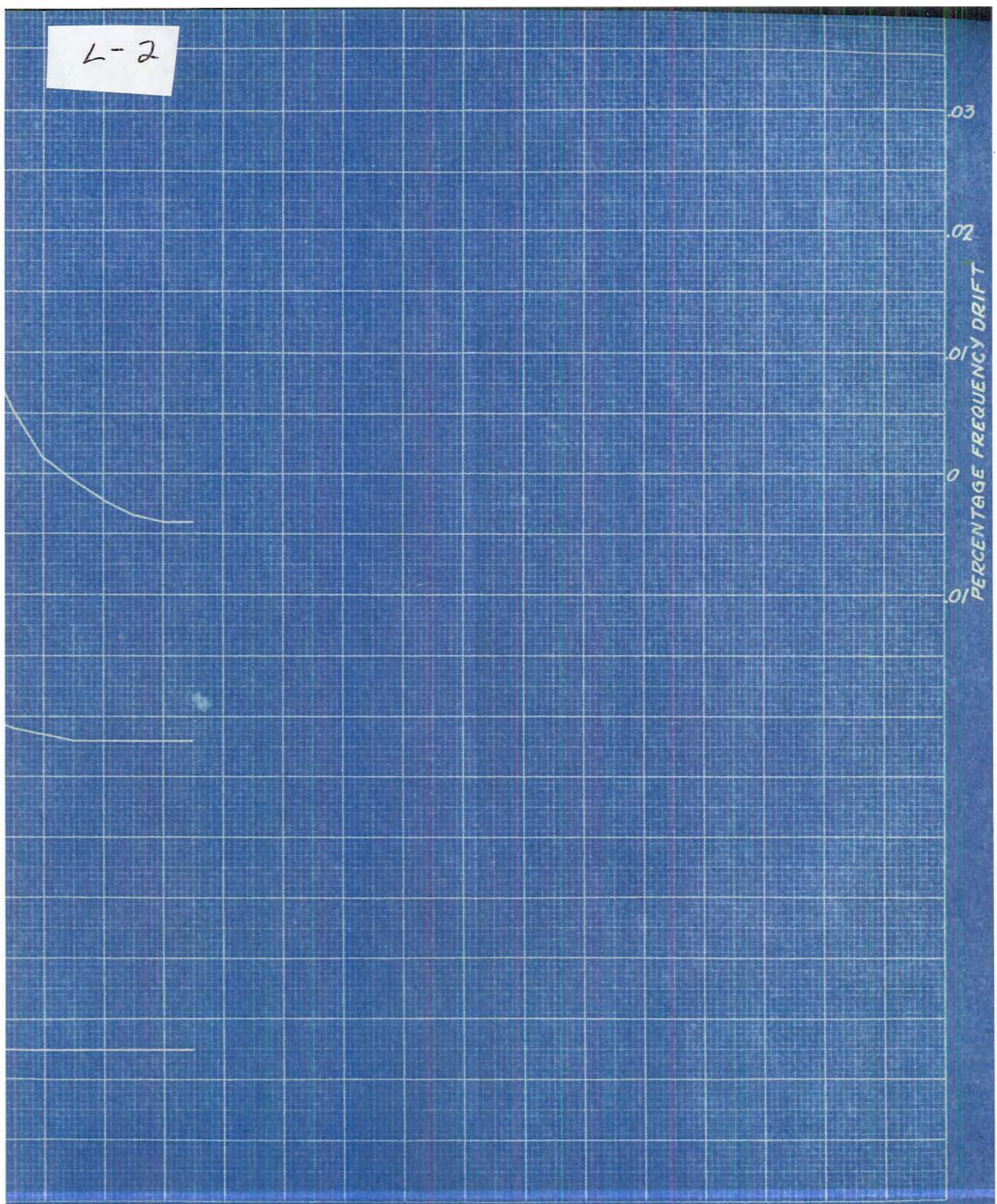

K-1
(PLOTTED PER READINGS OF LH #1)
FREQUENCY
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 32
4500 K C S
ORIGINAL ADJUSTMENT OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
13:00


K-2
.04
.03
.02
.01
0
.01
PERCENTAGE FREQUENCY DRIFT
00
14:00
15:00
16:00
17:00
18:00
TIME
KEUFFEL & ESSER CO. N. Y.
PLATE 1(

L - 1


FREQUENCY
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 32
4500 KCS
AFTER 1ST READJUSTMENT OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
12:00
13:00
14:00
15:00
16:00
TIME

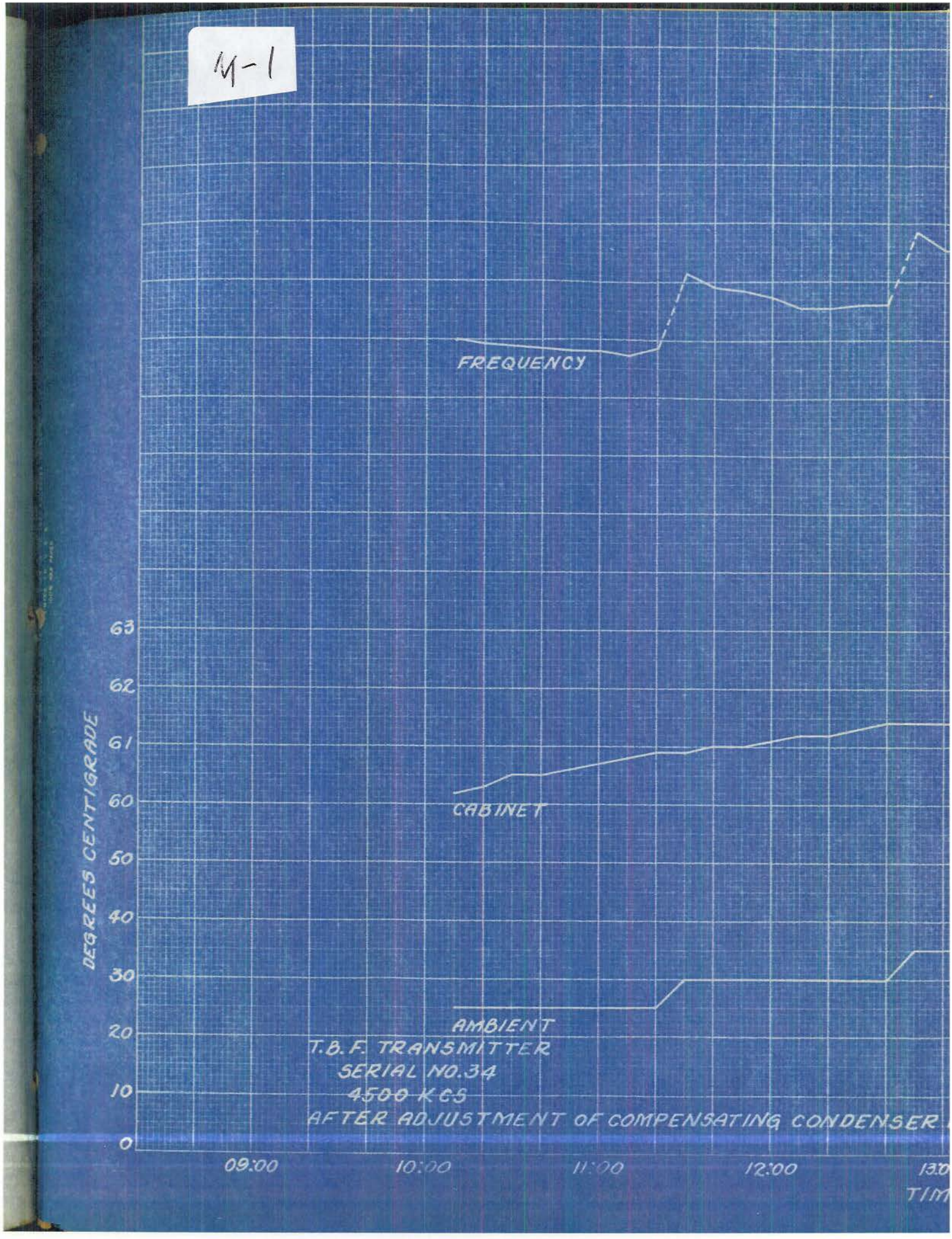
L-2



KEUFFEL & ESSER CO. N. Y.

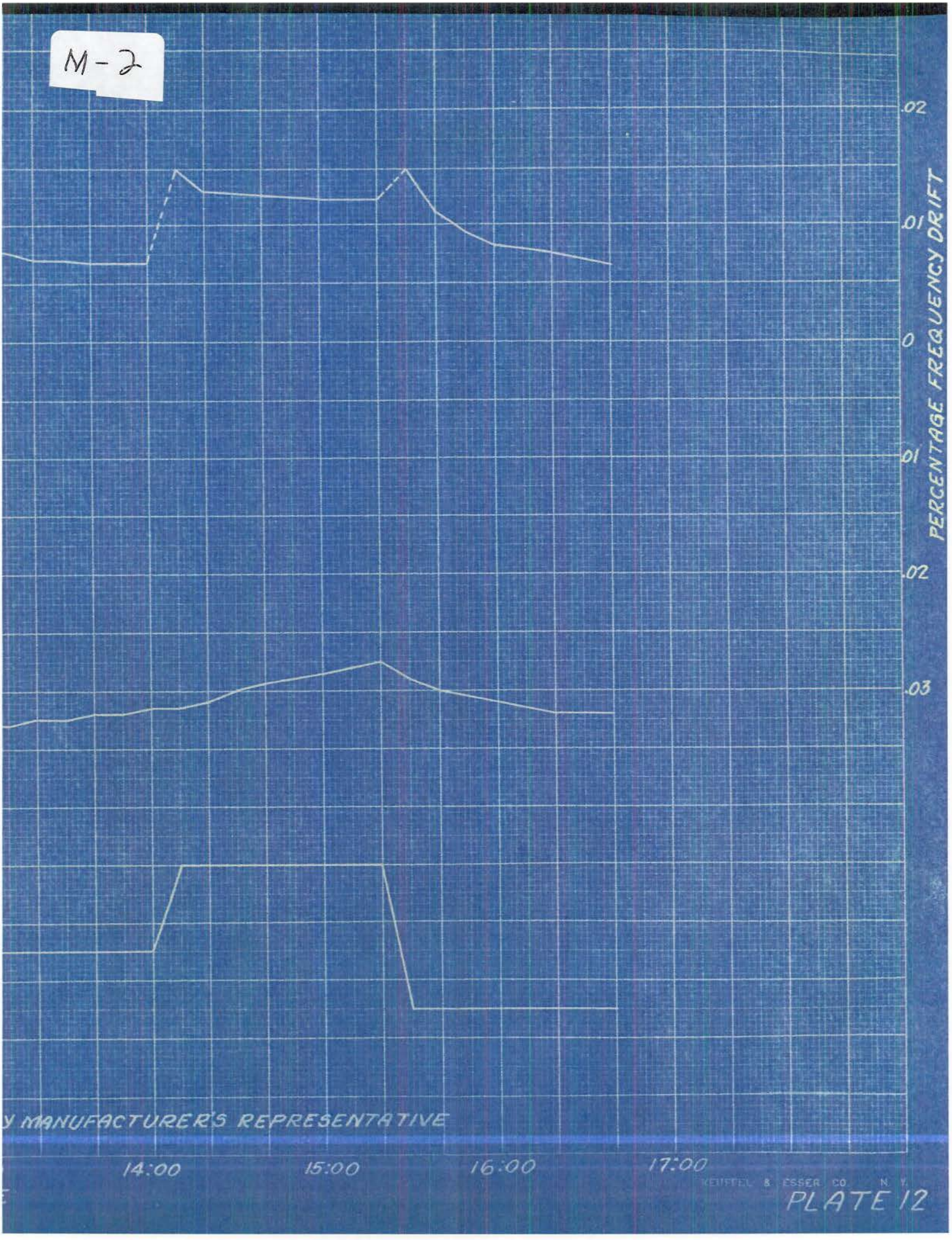
PLATE 11

4-1



T.B.F. TRANSMITTER
SERIAL NO. 34
4500 KCS
AFTER ADJUSTMENT OF COMPENSATING CONDENSER

M-2

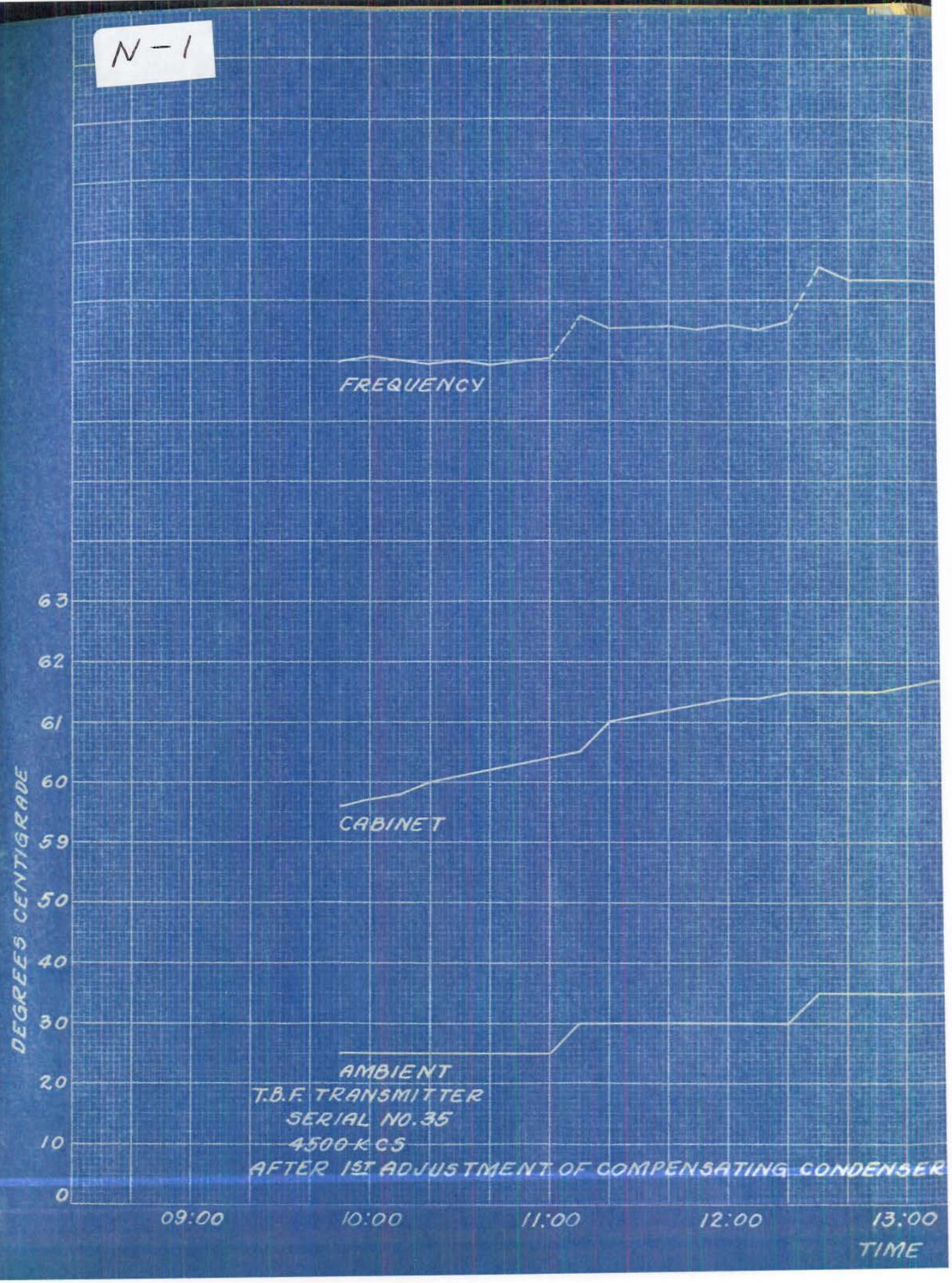


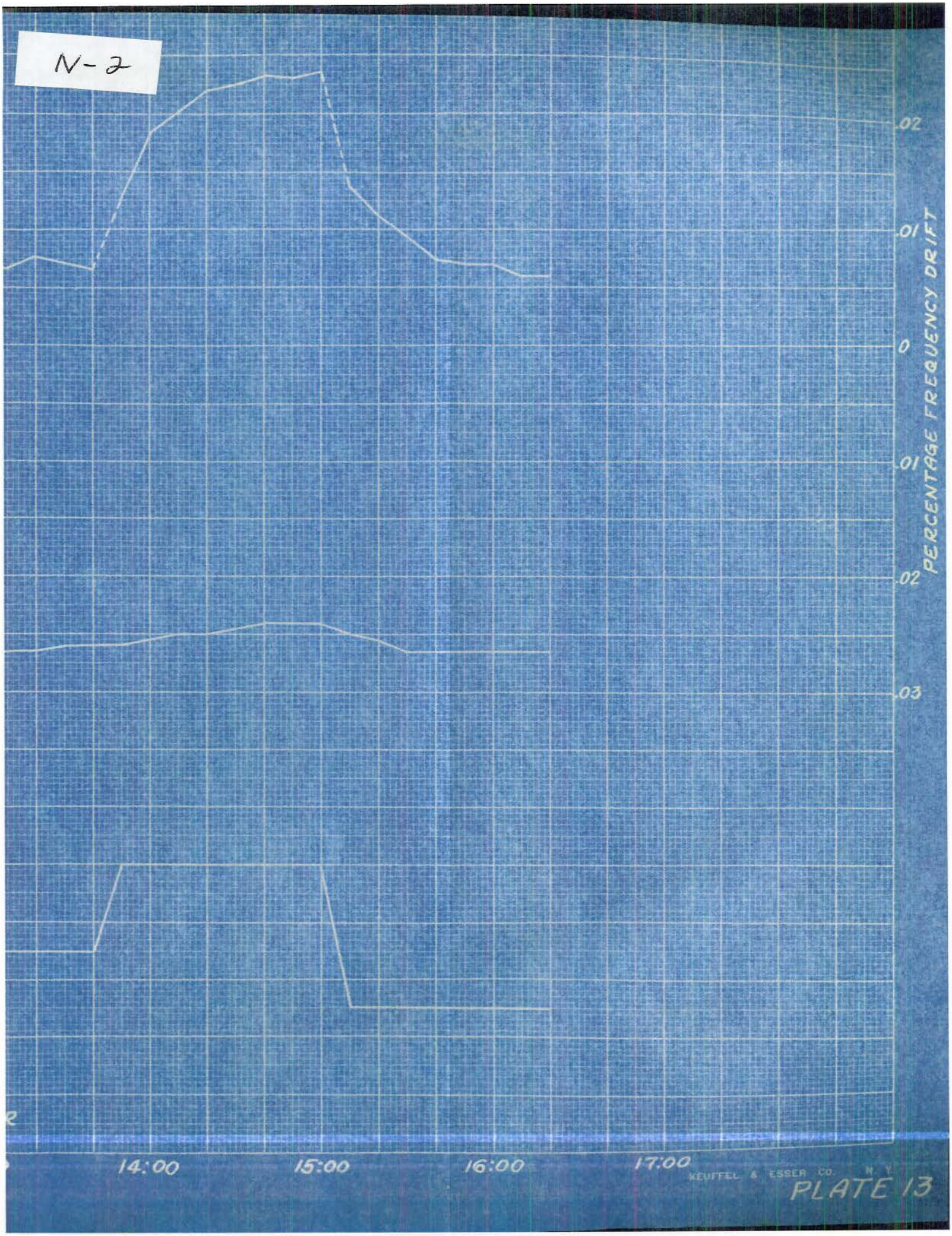
y MANUFACTURER'S REPRESENTATIVE

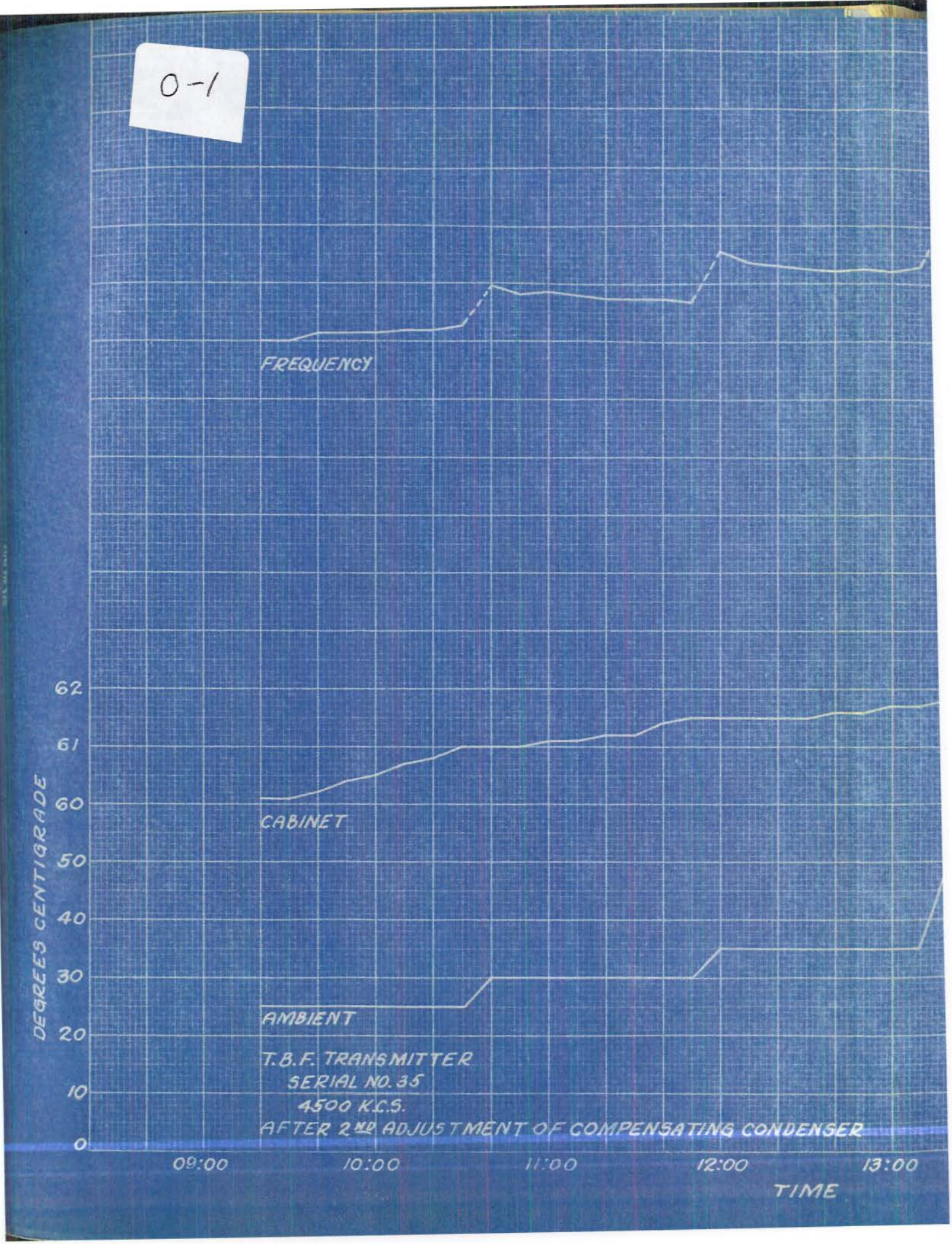
KEUFFEL & ESSER CO N. Y.

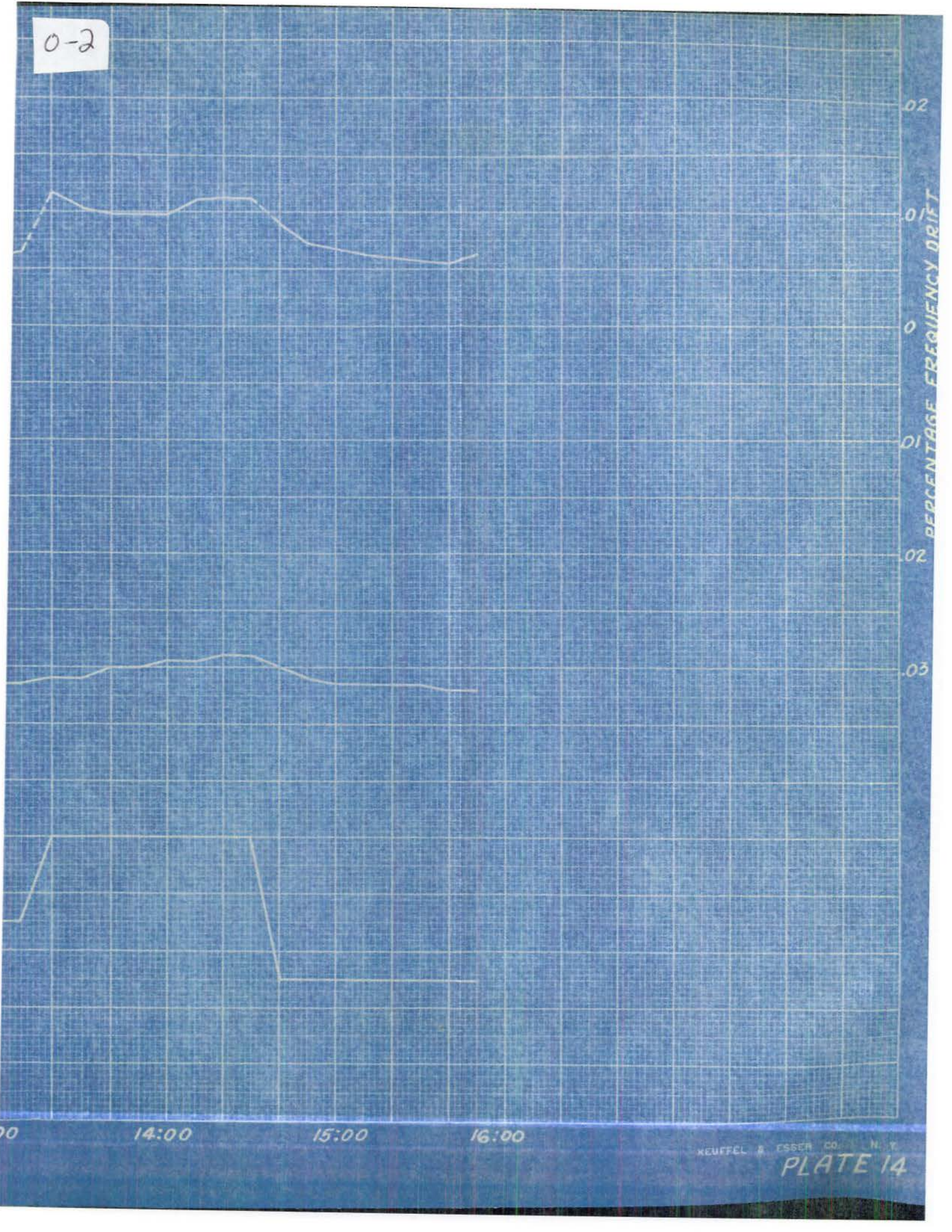
PLATE 12

N-1

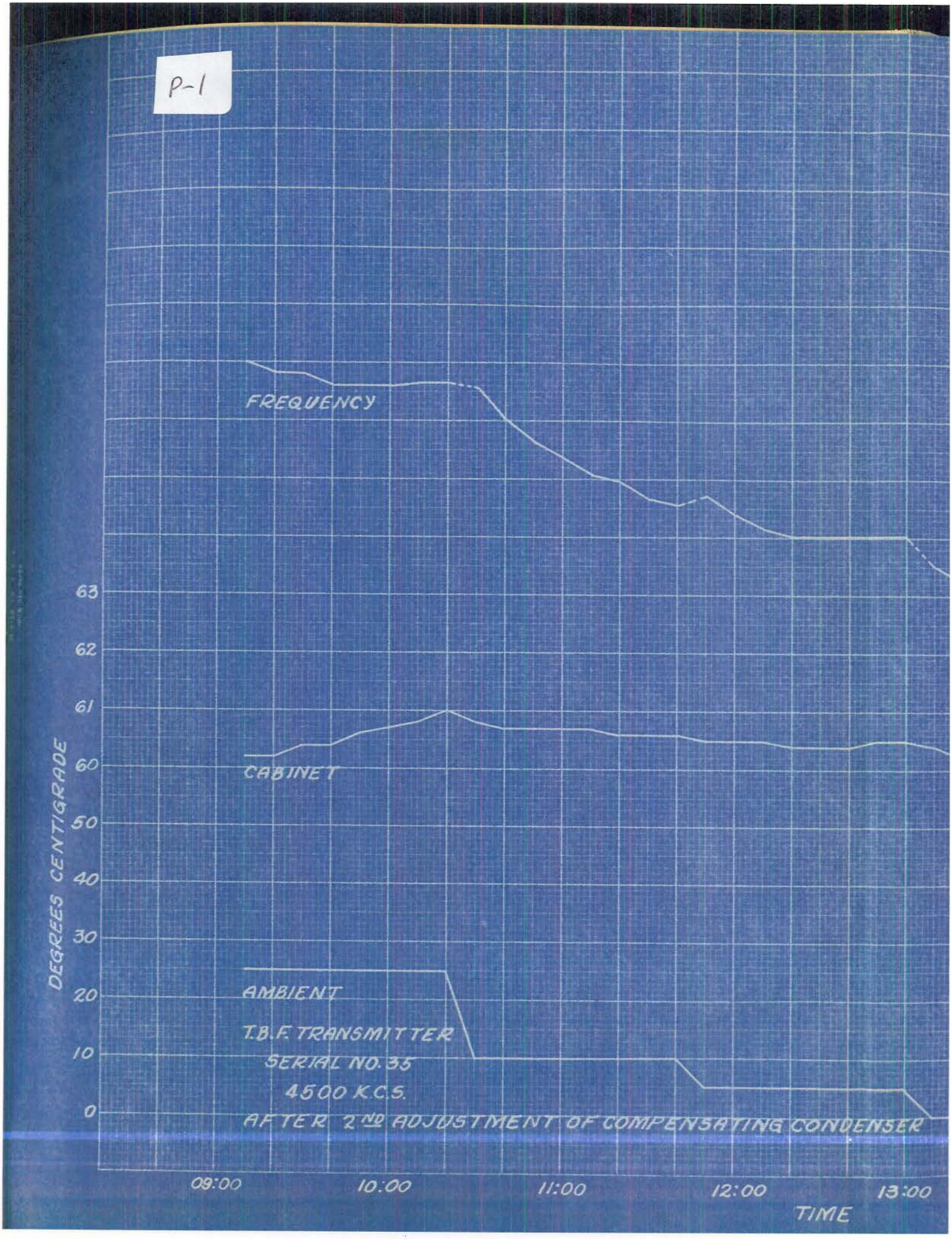

FREQUENCY
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 35
4500 K C S
AFTER 1ST ADJUSTMENT OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
63
62
61
60
59
50
40
30
20
10
0
09:00
10:00
11:00
12:00
13:00
TIME


N-2
.02
.01
0
.01
.02
.03
PERCENTAGE FREQUENCY DRIFT
14:00
15:00
16:00
17:00
KEUFFEL & ESSER CO. N.Y.
PLATE 13

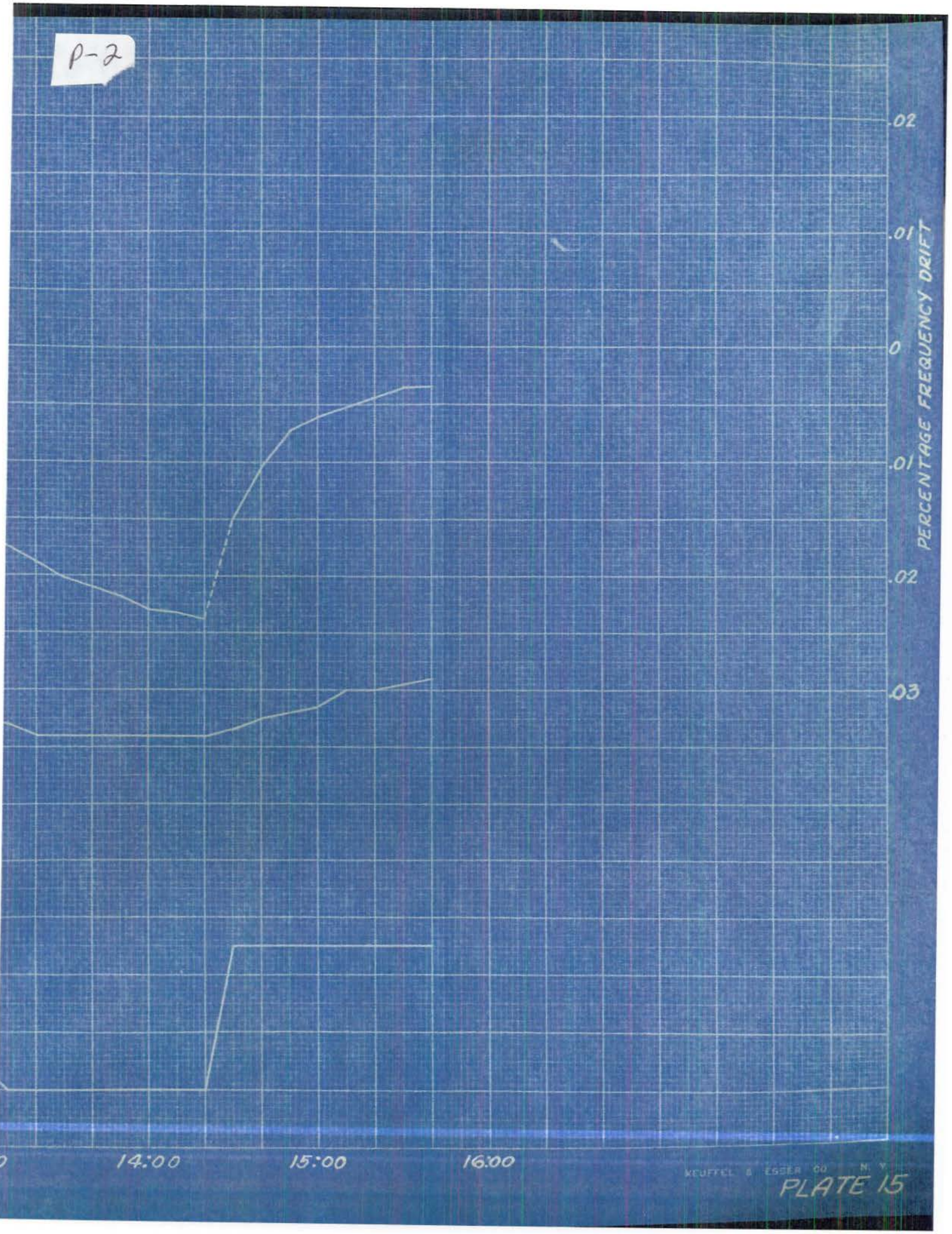

0-1
FREQUENCY
CABINET
AMBIENT
62
61
60
50
40
30
20
10
0
DEGREES CENTIGRADE
09:00
10:00
11:00
12:00
13:00
TIME
T.B.F. TRANSMITTER
SERIAL NO. 35
4500 K.C.S.
AFTER 2ND ADJUSTMENT OF COMPENSATING CONDENSER


0-2
.02
.01
0
.01
.02
.03
PERCENTAGE FREQUENCY DRIFT
14:00
15:00
16:00
KEUFFEL & ESSER CO. N. Y.
PLATE 14

P-1

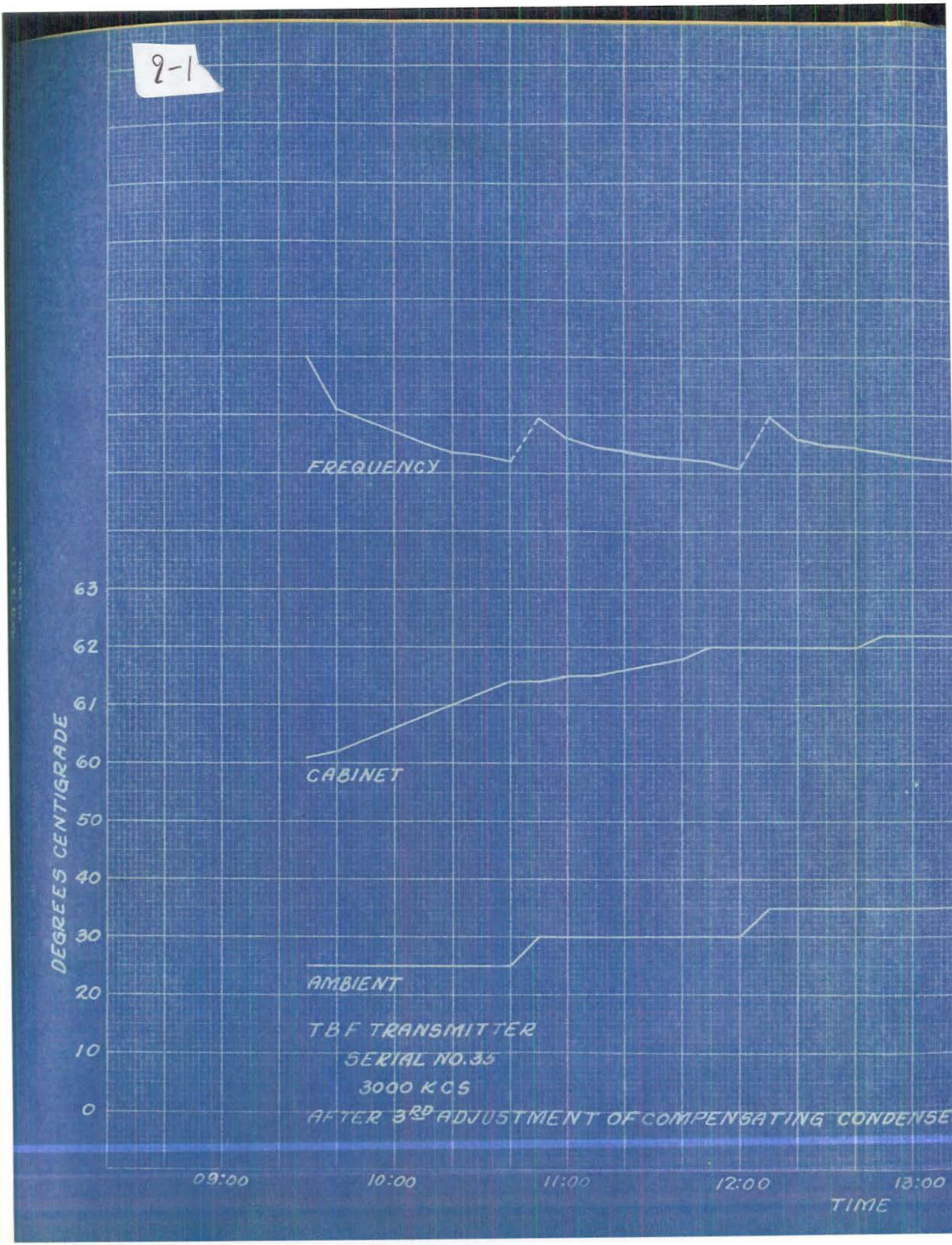

FREQUENCY
CABINET
AMBIENT
T.B.F. TRANSMITTER
SERIAL NO. 35
4500 K.C.S.
AFTER 2ND ADJUSTMENT OF COMPENSATING CONDENSER
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
09:00
10:00
11:00
12:00
13:00
TIME

P-2



KEUFFEL & ESSER CO N.Y.

PLATE 15


9-1
FREQUENCY
CABINET
AMBIENT
DEGREES CENTIGRADE
63
62
61
60
50
40
30
20
10
0
TBF TRANSMITTER
SERIAL NO. 33
3000 KCS
AFTER 3RD ADJUSTMENT OF COMPENSATING CONDENSER
09:00
10:00
11:00
12:00
13:00
TIME

9-2

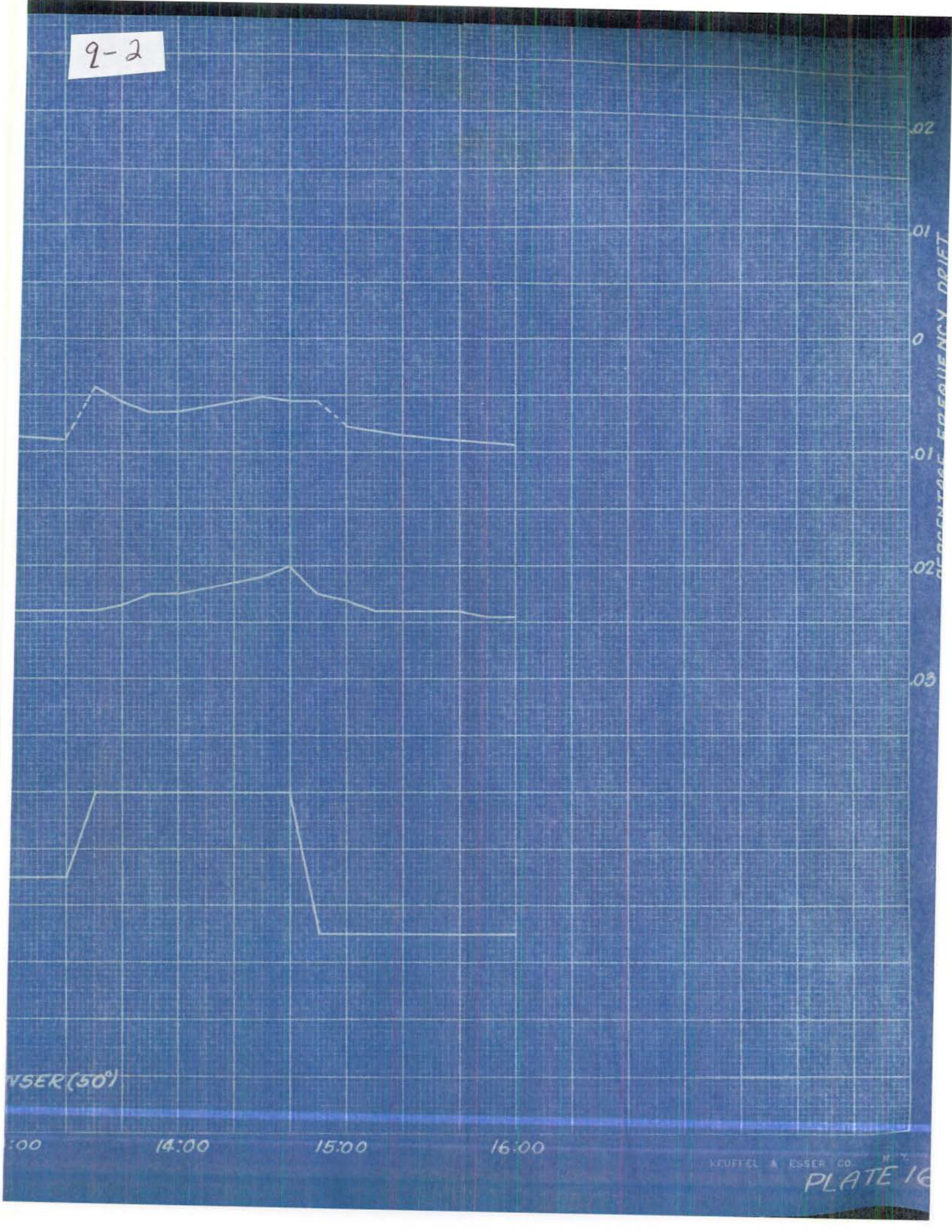

.02
.01
0
.01
.02
.03
PERCENTAGE FREQUENCY DRIFT
NSER (50°)
:00
14:00
15:00
16:00
KEUFFEL & ESSER CO. N. Y.

PLATE 16