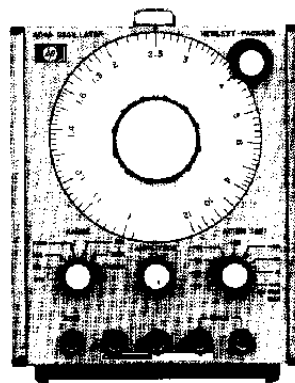
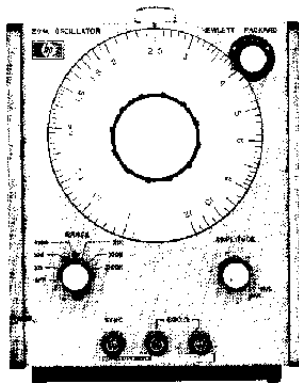


OSCILLATOR

204C/204D



SECTION IV

THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section contains a description of the basic principles of circuit operation for the Model 204C/D. The information is presented as a discussion of each block indicated on the Block Diagram, Figure 4-1, and detailed circuit descriptions which refer to Figures 7-1, 7-2, and 7-3.

4-3. The Model 204C/D is basically a Wien bridge oscillator. In the Model 204C the amplifier output is attenuated by a 600 ohm variable attenuator. In the Model 204D the amplifier output is attenuated by a step attenuator and a variable attenuator.

4-4. BLOCK DIAGRAM DESCRIPTION.

4-5. BRIDGE AND AMPLIFIER.

4-6. An overall loop gain of at least unity is a requirement for any amplifier to oscillate. The Model 204C/D satisfies this requirement with a combination of positive and negative feedback through the bridge.

4-7. The oscillator bridge is divided into two networks, the frequency selective network and the negative feedback network. Positive feedback is furnished through the frequency determining network of C1A, R8, C1B, and R16. At the frequency that the phase of the positive feedback is 0° , $X_C = R$ and the maximum ratio of output voltage is supplied to the amplifier (see Figure 4-2). The characteristics of the Wien bridge are such that the output voltage to the + input of the amplifier at F_O is one third the amplitude of the positive feedback voltage. Therefore, to maintain unity gain and oscillation, the negative feedback network (R28, R24 and AGC) was designed with a divider ratio of two to one, to give the amplifier a gain of three.

4-8. The amplifier itself is a solid-state, high gain amplifier with the output in phase with the input so that feedback will produce oscillations.

4-9. PEAK COMPARATOR AND AGC.

4-10. The voltage output from the Wien bridge to the input of the amplifier is not always one third of the

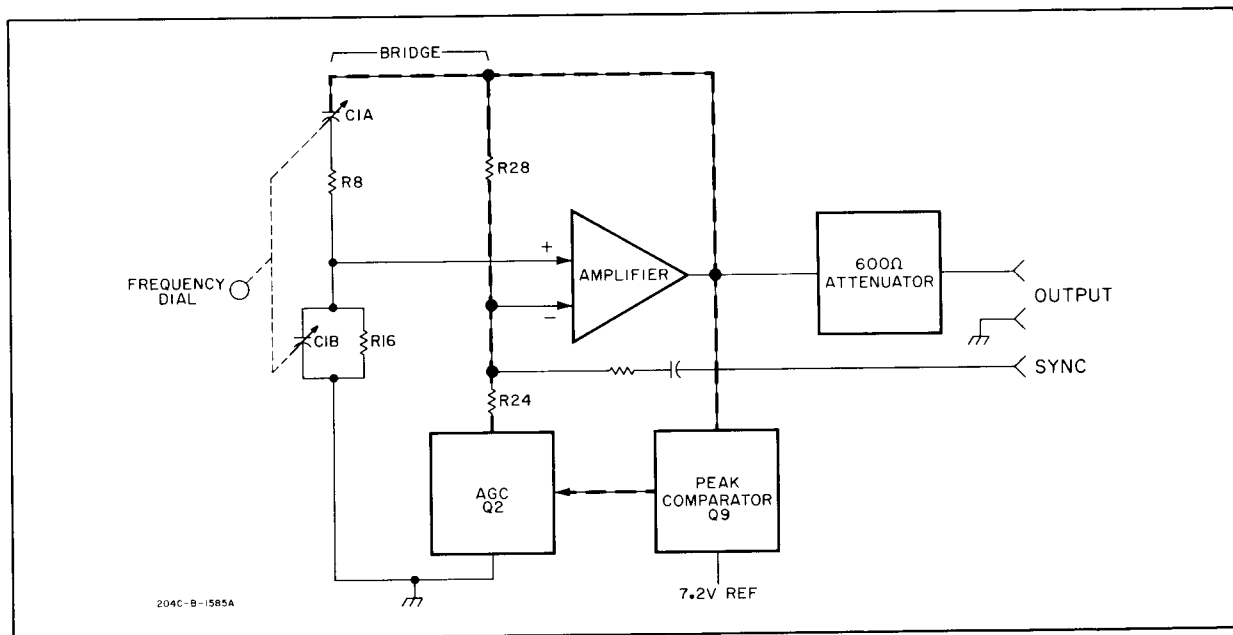


Figure 4-1. Model 204C Block Diagram

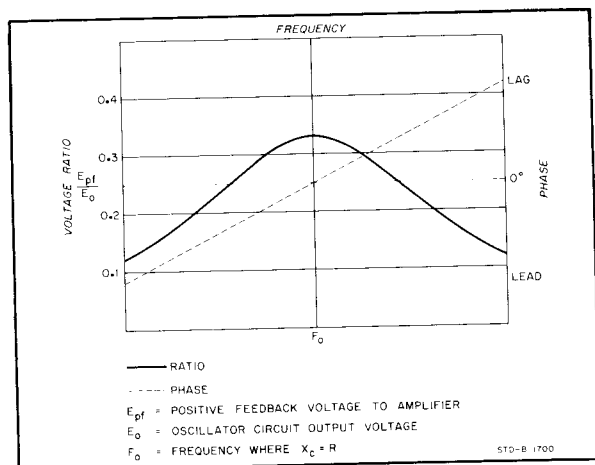


Figure 4-2. RC Network Characteristics

positive feedback voltage at all operating frequencies, nor is the amplifier gain constant for all operating frequencies. One technique used for maintaining unity gain in the oscillator circuit at all operating frequencies is to have a dynamic resistance, variable with changes in gain, in the negative feedback network. In the Model 204C/D this is accomplished with the combination of the peak comparator and AGC circuits.

4-11. The peak comparator compares the negative peak of the oscillator amplifier output to a 7.2 volt reference. If the output varies above or below the reference voltage, a difference voltage will be supplied to the AGC circuit. The "dynamic resistance" of the AGC circuit is a field-effect transistor with the gate controlled by the difference signal from the peak comparator. The oscillator amplifier output is held to 7.2 volts peak amplitude.

4-12. When the oscillator is first turned on, the AGC gives the amplifier a gain of greater than three. Noise in the amplifier is amplified greatly, and the frequency selective network in the Wien bridge selects the noise at the tuned frequency. The selected noise becomes positive feedback to the amplifier, and the amplifier starts oscillating at the tuned frequency. As the output amplitude approaches 7.2 volts peak, the AGC reduces the gain of the amplifier to three; and stable oscillation is achieved.

4-13. 600 OHM ATTENUATOR.

4-14. The Model 204C has a 600 ohm variable attenuator with a range of greater than 40 dB. The Specification H20-204C has greater than 20 dB attenuation.

4-15. The Model 204D has both step and

continuously variable attenuation. The step attenuator has a range of 80 dB in 10 dB steps. The continuously variable attenuator has a range of greater than 10 dB. The output impedance is 600 ohms regardless of attenuator setting.

4-16. DETAILED CIRCUIT DESCRIPTION.

4-17. For the following paragraphs, refer to the Oscillator Schematic Diagrams, Figure 7-1 and 7-2.

4-18. Transistors A1Q1 through A1Q8 make up the basic oscillator amplifier. A1Q1 is an N-channel FET. A1CR1 sets up proper dc bias for A1Q3. Diodes A1CR6, A1CR7, A1CR8 set up proper bias for A1Q5. Capacitor A1C9 is chosen to provide a stable roll off at high frequencies. A1Q6 is a current source for A1Q4 and A1Q5. A1CR4 and A1CR5 provide proper biasing for complementary output transistors A1Q7 and A1Q8.

4-19. The positive feedback arm of the Wien bridge consists of tuning capacitors A1C1A and A1C1B, and range switching resistors A1R1 through A1R17.

4-20. The negative feedback arm of the Wien bridge depends upon the ratio of the impedance of A1R28 to the total impedance of A1R23, A1R24, A1R25, and A1Q2. A1R25 reduces the effect of the FET A1Q2 to increase stability. A1Q2 provides AGC for this amplifier by varying impedance to obtain the proper negative feedback.

4-21. The conduction of FET A1Q2 is controlled by the peak detector circuit using A1Q9. A1Q9 conducts during the most negative portion of each negative half cycle, developing a negative charge in A1C16 and its parallel capacitors. As the amplifier output amplitude increases, A1Q9 conducts more and A1C16 becomes more negatively charged. This makes the FET input voltage more negative, increasing its impedance and increasing the negative feedback to reduce the output amplitude of the amplifier.

4-22. The Model 204C uses a 600 ohm bridged-tee attenuator with a range of greater than 40 dB. The Specification H20-204C uses a 600 ohm bridged-tee attenuator with a range of greater than 20 dB.

4-23. The Model 204D uses a 600 ohm bridged-tee attenuator followed by a 600 ohm 80 dB attenuator with 10 dB steps. The 80 dB of attenuation is accomplished by using two 10 dB attenuators (R60, R61, R62 and R69, R70, R71), one 20 dB attenuator (R66, R67, R68) and one 40 dB attenuator (R63,

R64, R65), in proper combinations to achieve the desired attenuation.

4-24. POWER SUPPLY.

4-25. The following paragraphs refer to the Power Supply Schematic, Figure 7-3.

4-26. The power supply in the standard Model 204C/D operates from 115 or 230 Vac. It furnishes B+ and B- voltages of +13 volts and -13 volts respectively. A2CR7 serves as a reference for the positive supply, and the negative supply follows the positive supply. A2R1 and A2R8 current limit their respective supplies. Transistors A2Q2 and A2Q5 serve as current sources for amplifier transistors A2Q3 and A2Q4.

4-27. The Model 204C/D Option 01 contains a mercury battery power pack using four 6.75V mercury batteries. These batteries are not rechargeable.

4-28. The Model 204C/D Option 02 contains a rechargeable battery supply which uses four 6.25V nickel-cadmium batteries. The batteries may be charged at a slow 6 mA rate or at a fast 20 mA rate, depending upon the positioning of A2S4. The charge rate is the same regardless of the charge condition of the batteries. The charge rate is also the same whether the instrument is on or off. When the instrument is switched off, A2R21 is switched into the circuit as a load replacing the oscillator.

SECTION V

MAINTENANCE

5-1. INTRODUCTION.

5-2. This section contains information necessary for the maintenance of the Model 204C/D Oscillator. Included are performance checks, adjustment and calibration procedures, and troubleshooting procedures.

5-3. The test equipment needed to properly maintain and service the Model 204C/D is listed in Table 5-1. If the recommended model is not available, other equipment may be substituted provided it meets the required specifications.

5-4. PERFORMANCE CHECKS.

5-5. The performance checks presented in this section are designed to compare the Model 204C/D with its published specifications. These checks can be used for incoming inspection, periodic maintenance checks, and to verify performance after adjustment or repair. A performance check test card appears at the end of this section which can be used to record the performance specifications.

Table 5-2. Dial Accuracy Check

RANGE SWITCH	FREQUENCY DIAL	COUNTER INDICATION
X5	1	5 Hz +/-0.15 Hz
X5	6	30 Hz +/-0.9 Hz
X5	12	60 Hz +/-1.8 Hz
X10	1	10 Hz +/-0.3 Hz
X10	6	60 Hz +/-1.8 Hz
X10	12	120 Hz +/-3.6 Hz
X100	1	100 Hz +/-3.0 Hz
X100	6	600 Hz +/-18 Hz
X100	12	1.2 kHz +/-36 Hz
X1K	1	1.0 kHz +/-30 Hz
X1K	6	6.0 kHz +/-180 Hz
X1K	12	12.0 kHz +/-360 Hz
X10K	1	10.0 kHz +/-300 Hz
X10K	6	60.0 kHz +/-1.8 kHz
X10K	12	120 kHz +/-3.6 kHz
X100K	1	100 kHz +/-3.0 kHz
X100K	6	600 kHz +/-18 kHz
X100K	12	1.2 MHz +/-36 kHz

5-6. DIAL ACCURACY CHECK.

- a. Connect the Model 204C/D and the Frequency Counter as shown in Figure 5-1. Set the counter to measure frequency and check the Model 204C/D at the frequencies listed in Table 5-2 for the tolerances indicated.
- b. If the above dial accuracy checks fail to meet the required specifications, refer to the Adjustment and Calibration Procedure in this section.

5-7. FLATNESS CHECK.

- a. Connect the equipment as shown in Figure 5-2.

NOTE

The BUCKING SUPPLY should be constructed from the components listed in Table 5-1. The 500 ohm control should be used as a coarse adjust and the 50 ohm control should be used as a fine adjust.

- b. Set the Model 204C/D RANGE switch to X100 and the frequency dial to 10. Set the AMPLITUDE control to maximum output.
- c. Adjust the BUCKING SUPPLY 50 ohm fine control for minimum resistance, and record the THERMAL CONVERTER output as indicated on the DC NULL VOLTMETER.
- d. Adjust the BUCKING SUPPLY coarse and fine controls for a 0V indication on the DC NULL VOLTMETER. Do not readjust the BUCKING SUPPLY controls for the remainder of this check.
- e. Check the Model 204C/D flatness at the frequencies listed in Table 5-3, recording the DC NULL VOLTMETER indication for each frequency.

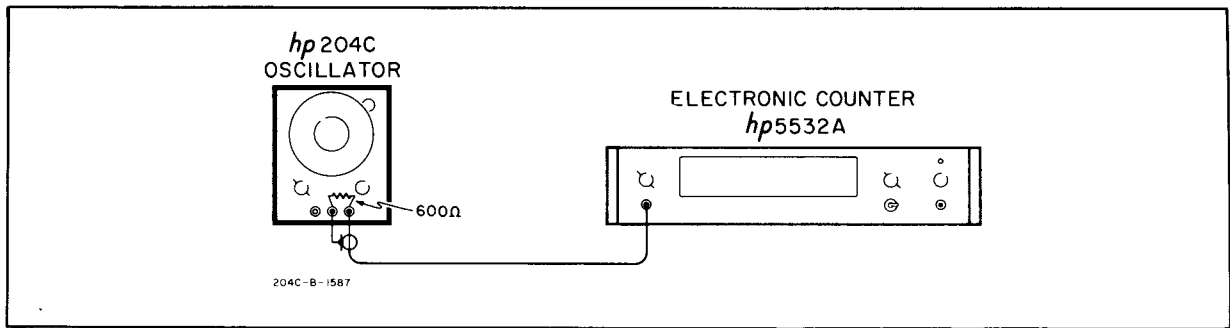


Figure 5-1. Dial Accuracy Check

NOTE

The THERMAL CONVERTER is considered a square-law device. Therefore, theoretically, the percent of change at the output of the THERMAL CONVERTER should be 2 times the percent of change at the input. Actually the value is not quite 2. The number is typically 1.7. Check the Calibration Report supplied with your THERMAL CONVERTER for the exact multiplier.

Example:

Frequency	100 kHz
THERMAL CONVERTER output	5 mV
DC NULL VOLTMETER reading	25 μV
Calibration Report multiplier	1.7
Table 5-3 tolerance	+/-0.5%

$$\frac{.025 \text{ mV} \times 100\%}{5 \text{ mV} \times 1.7} = 0.29\%$$

5-8. DISTORTION CHECK.

- f. Convert each reading on the DC NULL VOLTMETER to the percentages listed in Table 5-3 by the following procedure. Divide the DC NULL VOLTMETER indication by the THERMAL CONVERTER output voltage recorded in step c of this paragraph. Multiply this value by 100 to get percent of output change. Divide this percentage by the Calibration Report multiplier to obtain a percentage within the tolerances listed in Table 5-3.

- a. Connect the Model 204C/D output with a 600 ohm load to the Distortion Analyzer.

- b. Set the Model 204C/D controls as follows:

Dial10
 RANGE X100
 Amplitude Full CW
 NORM/LOW DIST NORM

- c. Set the Distortion Analyzer controls as follows:

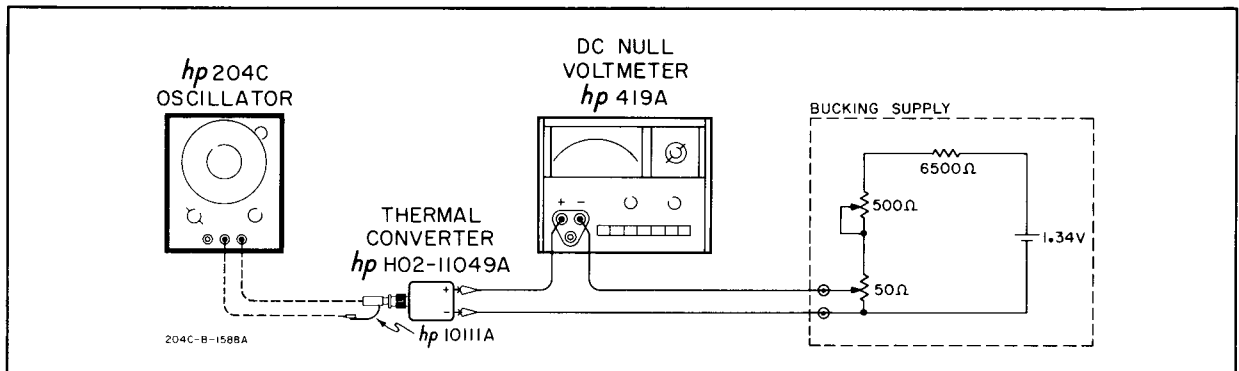


Figure 5-2. Flatness Check

Table 5-3. Flatness Check

Frequency		Tolerance	
Dial Setting	RANGE Setting	NORM	LOW DIST.
1	X5	+5%-1%	+/-1%
10	X5	+5%-1%	+/-1%
1	X10	+5%-1%	+/-1%
10	X10		+/-0.5%
1	X100		+/-0.5%
10	X100		SET
1	X1K		+/-0.5%
10	X1K		+/-0.5%
1	X10K		+/-0.5%
10	X10K		+/-0.5%
1	X100K		+/-0.5%
3	X100K		+/-0.5%
12	X100K		+/-1%

Dial10
 FREQUENCY RANGE X100
 METER RANGE 0 dB
 FUNCTIONSET LEVEL
 SENSITIVITYMIN
 MODEMANUAL

- d. Increase the Distortion Analyzer SENSITIVITY to obtain a 0 dB indication on the meter.
- e. Switch the Distortion Analyzer FUNCTION to DISTORTION, and adjust the Distortion Analyzer dial and BALANCE controls for a null indication on the meter.
- f. When an approximate null has been obtained

with the Distortion Analyzer dial and BALANCE controls, switch the MODE to AUTOMATIC for minimum meter indication.

- g. Meter indication should be greater than 60 dB down from the 0 dB reference.
- h. Repeat steps a through f of this paragraph for all frequencies listed in Table 5-4.
- i. Connect the equipment as shown in Figure 5-3.
- j. Set the Model 204C/D frequency dial to 10 and the RANGE switch to X1K. Adjust the amplitude control for a 0 dB indication on the AC Voltmeter.

Table 5-4. Distortion Check

Frequency		Tolerance	
Dial Setting	RANGE Setting	NORM	LOW DIST.
1	X5	-40 dB	-44 dB
2	X5	-40 dB	-50 dB
3	X10	-44 dB	-60 dB
10	X10	-54 dB	-60 dB
1	X100		-60 dB
10	X100		-60 dB
1	X1K		-60 dB
10	X1K		-60 dB
1	X10K		-60 dB
10	X10K		-60 dB
1	X100K		-60 dB
6	X100K		-45 dB

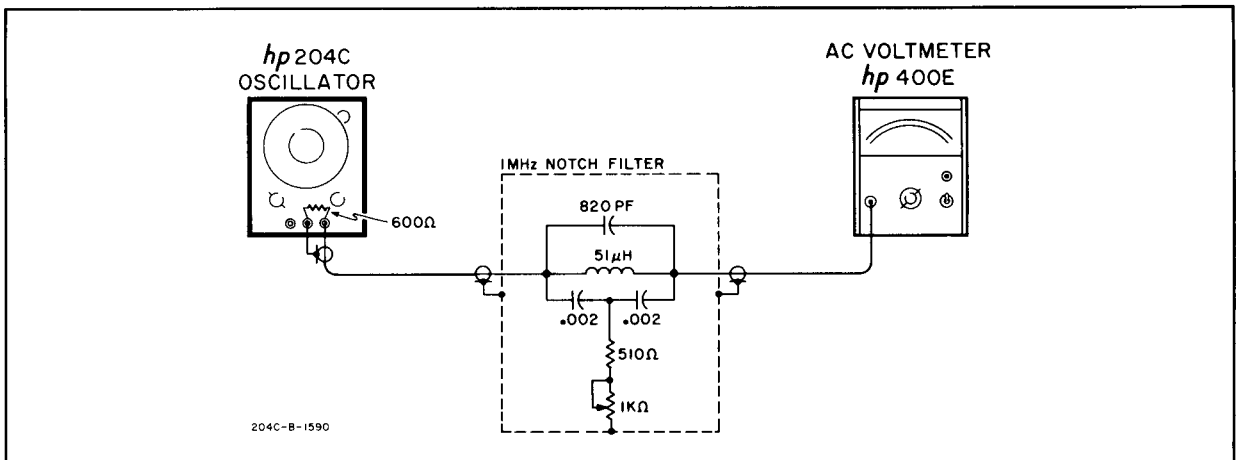


Figure 5-3. 1 MHz Distortion Check

- k. Switch to the X100K RANGE, and adjust the frequency dial and notch filter control for a minimum indication on the AC Voltmeter.
- l. The meter indication should be greater than 40 dB down from the 0 dB reference.

5-9. OUTPUT VOLTAGE AND IMPEDANCE CHECK.

- a. Connect the Model 204C/D output without a 600 ohm load to the AC Voltmeter.
- b. Set the AC Voltmeter to the 10V RANGE, and the Model 204C/D amplitude to maximum at a frequency setting of 20 kHz.
- c. The meter should indicate at least 5 V rms.
- d. Reduce the 204C/D output to 5 V rms.
- e. Connect a 600 ohm load to the Model 204C/D.
- f. The AC Voltmeter should indicate 2.5 volts rms, verifying the output voltage specification and an output impedance of 600 ohms.

5-10. OUTPUT CONTROL CHECK (MODEL 204C).

- a. Connect the Model 204C output without a 600 ohm load to the AC Voltmeter.

- b. Adjust the Model 204C sine wave amplitude to minimum.
- c. The meter indication should be less than 50 mV rms.

5-11. OUTPUT CONTROL CHECK (MODEL 204D).

- a. Connect the Model 204D output without a 600 ohm load to an AC Voltmeter at a frequency of 1 kHz.
- b. Set the ATTEN switch to +10 dB.
- c. Set the AMPLITUDE control fully CW and record the voltmeter indication.
- d. Turn AMPLITUDE control fully CCW. Voltmeter indication should be down more than 10 dB.
- e. Connect the Model 204D with a 600 ohm load to an external attenuator with known accuracy.
- f. Set the Model 204D ATTEN switch to the +10 dB and the external attenuator to -70 dB.
- g. Connect the external attenuator output to an AC Voltmeter set on the 1 mV range.
- h. Adjust the Model 204D AMPLITUDE

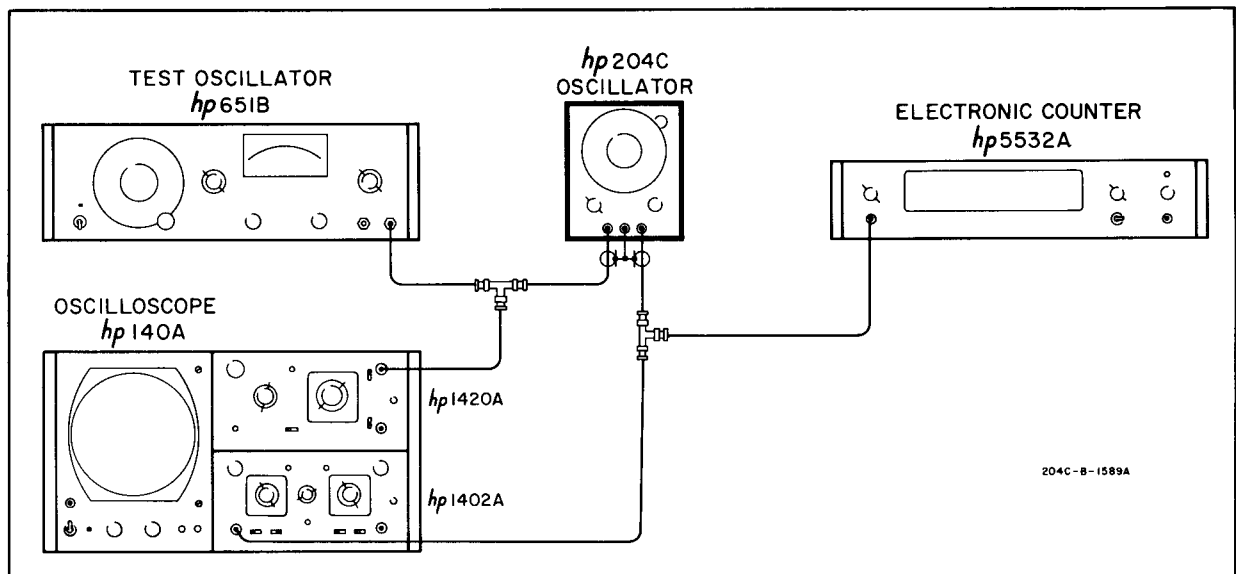


Figure 5-4. Balance Check

Table 5-5. Attenuator Check

Model 204D ATTEN.	External Attenuator	Specified Indication
+10 dB	-70 dB	SET
0 dB	-60 dB	0 +/-0.26 dB
-10 dB	-50 dB	0 +/-0.26 dB
-20 dB	-40 dB	0 +/-0.26 dB
-30 dB	-30 dB	0 +/-0.26 dB
-40 dB	-20 dB	0 +/-0.26 dB
-50 dB	-10 dB	0 +/-0.26 dB
-60 dB	0 dB	0 +/-0.26 dB
-70 dB	0 dB	-10 +/-0.45 dB

control for a 0 dB indication on the voltmeter.

- i. Check the dB indication for each attenuator setting in Table 5-5. All levels are referenced to the +10 dB level +/-3%; except the -70 dB level, which is referenced to the +10 dB level +/-5%.

5-12. BALANCE CHECK.

- a. Connect the Model 204C/D output with a 600 ohm load to the AC Voltmeter.
- b. Set controls as follows:

Model 204C:
 Dial2
 RANGEX10K

AC Voltmeter:
 RANGE0 DB

- c. Adjust the Model 204C/D amplitude for a meter indication of 0 dB.
- d. Remove the 600 ohm load and connect the equipment as shown in Figure 5-4.
- e. Meter indication should be greater than 40 dB down from 0 dB reference.

5-13. SYNC OUTPUT CHECK.

- a. Connect a 100 pF capacitor across the Model 204C/D SYNC output.
- b. Connect the Model 204C/D SYNC output to the AC Voltmeter, using a low capacitance 10:1 divider probe.
- c. The SYNC output should be at least 0.1 V at 1.2 MHz.

5-14. SYNC INPUT CHECK.

- a. Connect the Test Oscillator to the AC Voltmeter and adjust the controls for 5 V rms at 20 kHz.
- b. Connect the Model 204C/D output to the Electronic Counter and adjust controls for a frequency of 20 kHz.
- c. Without changing the controls set in steps a and b, connect the equipment as shown in Figure 5-5.
- d. Adjust the oscilloscope to synchronize externally on the Test Oscillator signal.

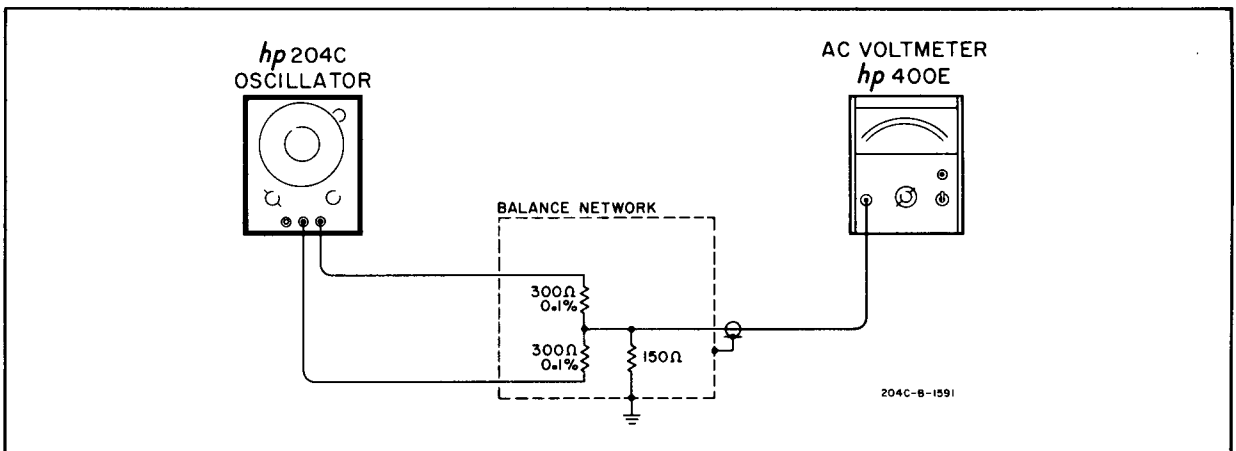


Figure 5-5. Sync Input Check

- e. Rotate the Test Oscillator dial above and below 20 kHz while watching the indication on the oscilloscope. When the waveform begins to lose synchronization, note the frequency indication on the Electronic Counter.
- f. The waveform should remain synchronized to less than 19.0 kHz and greater than 21.0 kHz, indicating a sync range of $\pm 5\%$ at 5 V rms.

5-15. COVER REMOVAL.

5-16. To perform the Adjustment and Calibration Procedure, it is necessary to remove the two side covers, each of which is held in place by four screws.

5-17. To perform internal troubleshooting or repair procedures, the side covers and top and bottom covers must be removed. Remove the two front and two rear screws in each side casting and remove the side castings.

————— NOTE —————

Do not remove any screws on the rear panel.

Remove the rear panel, pulling out the bottom edge first. Remove one screw from the top and each side of the chassis shield and slide the chassis off.

5-18. To operate the Model 204C/D with the chassis shield removed, connect the power supply in the rear panel to the pc board.

————— NOTE —————

To operate the instrument with shield removed, the jumper must be connected as explained below.

Connect a *short* clip lead between the chassis section on which the tuning capacitor is mounted and the sheet metal tab immediately below it containing the tapped screw hole.

5-19. The chassis shield should be in place when doing the Performance Checks.

5-20. ADJUSTMENT AND CALIBRATION PROCEDURE.

5-21. INTRODUCTION.

5-22. The following Adjustment and Calibration Procedures should be used only if it has been

determined through the Performance Checks that the Model 204C/D is not performing within its specifications.

5-23. If proper performance cannot be achieved with the Adjustment and Calibration Procedure, refer to the Troubleshooting Procedures.

5-24. POWER SUPPLY.

5-25. Before making any adjustments, check the power supply voltages at test points 2 and 3. These test points may be reached through the shield cut-out labeled B+ and B-. They should indicate +12V and -12V respectively, with reference to the shield. If the voltages are off greater than $\pm 1V$, troubleshoot the power supply.

5-26. BIAS ADJUSTMENT.

- a. Set the Model 204C/D RANGE Switch to X1K.
- b. Connect the DC Voltmeter to TP4 (BIAS).
- c. Adjust R20 (BIAS) for 0 V indication on the meter.

5-27. AGC ADJUSTMENT.

- a. Set the Model 204C/D RANGE switch to X1K and the Dial to 1.
- b. Connect the DC Voltmeter to TP1 (AGC).
- c. Adjust R24 (AGC) for -1.5 V at TP1.

5-28. AGC AND FREQUENCY ADJUSTMENT.

- a. Leave the DC Voltmeter connected to TP1 and connect the Model 204C/D output to the Frequency Counter.
- b. Set the Model 204C/D RANGE to X1K and the Dial to 10.
- c. Adjust C3 and C8 (AGC and FREQ CAL) for 10 kHz and -1.5 V, respectively.

————— NOTE —————

C3 and C8 are interacting controls. Make one half the apparent needed correction in each adjustment. Several adjustments will be necessary.

- d. Repeat Paragraphs 5-27 and 5-28 a through c if the voltage at 1 kHz has changed from -1.5V.
- e. With the RANGE switch set on X1K, adjust the Dial for 10 kHz +/-10 Hz on the counter.
- f. Without moving the Dial, check the frequency on ranges X5 through X10K and record the error in percent.
- g. Calculate the average between the most positive and the most negative error.
- h. Readjust C2 and C8 for the following readings on the X1K range:

Frequency10 kHz minus average
 found above +/-10 Hz
 AGC-1.5 V +/-0.1 V

Example:

X5 +5%
 X10 +1%
 X100 -1%
 X1K 0
 X10K +2%

Most positive error +5%
 Most negative error -1%
 Average error $\frac{(+5\%) + (-1\%)}{2}$ +2%

Adjust frequency for 9,800 Hz +/-10 Hz.

5-29. HIGH FREQUENCY ADJUSTMENT.

- a. Set the Model 204C/D RANGE switch to X100K and set the Dial to exactly 10.
- b. With the Model 204C/D output connected to the Frequency Counter, adjust C5 (HIGH FREQ CAL) to indicate 1 MHz +/-1 kHz on the Frequency Counter.

5-30. DISTORTION ADJUSTMENT.

- a. Connect the Model 204C/D output to the Distortion Analyzer.
- b. Set the Model 204C/D RANGE switch to X1K and the Dial to 10.
- c. Set the Distortion Analyzer FUNCTION to SET LEVEL, MODE to MANUAL, and FREQUENCY RANGE to X1K.

- d. Adjust the Model 204C/D amplitude and Distortion Analyzer SENSITIVITY for 0 dB meter indication.
- e. Set the Distortion Analyzer Dial and Balance controls for minimum indication.
- f. Set the Distortion Analyzer MODE to AUTOMATIC and adjust R30 (DIST) for a meter indication of greater than 60 dB down from 0 dB reference.

5-31. FACTORY SELECTED COMPONENTS.

5-32. Table 5-6 shows the components that are factory selected, and how to select the component.

Table 5-6. Factory Selected Components

Component	Selection
A1C9	Use larger value if high frequency oscillations occur at lower frequencies.
A1C15	Choose for lowest distortion.
A1C22	Use larger value for increased high frequency amplifier response.
A1R7,9,15,17	Chosen for proper oscillator frequencies.

5-33. TROUBLESHOOTING PROCEDURES.

5-34. FRONT PANEL PROCEDURE.

- 5-35. Use an oscilloscope to monitor the 204C/D output.
- a. Set the Model 204C frequency to 1 x 100K, turn the amplitude fully CW, and monitor the output. If the sine wave is clipped, check B+ and B- voltages for greater than +/-11V.
 - b. If the sine wave is clipped and the B+ and B- voltages are good, check AGC and BIAS adjustments.

5-36. DETAILED CIRCUIT TROUBLESHOOTING.

5-37. The Oscillator Schematic Diagrams, Figure 7-1, and 7-2 show dc voltages normally found throughout

the instrument. These voltages were taken with the AGC ADJUST R24 turned fully CCW. This disables the oscillator. The voltages were taken with a battery operated dc voltmeter, -hp- Model 427A. When making these measurements, be sure to connect the jumper between the chassis section where the tuning capacitor is mounted and the tab just below it.

5-38. The Oscillator Amplifier may be disabled by turning AGC ADJUST R24 fully counter-clockwise. A one volt rms sine wave from an external source may now be injected into the gate of A1Q1. The various stages of the amplifier may now be monitored with an oscilloscope for proper operation. The amplifier should have a gain of three for all frequencies up to 100 kHz.

5-39. For detailed circuit theory of operation, refer to Section IV of this manual.

5-40. BATTERY REPLACEMENT.

5-41. The rear panel must be removed to replace either type of batteries. To remove the rear panel, perform the following steps.

————— NOTE —————

Do not remove any screws on the rear panel.

- a. Remove the side panels.
- b. Remove the top and bottom panels.
- c. Remove the two rear screws from each side casting.
- d. Remove the rear panel, pulling out the bottom first.

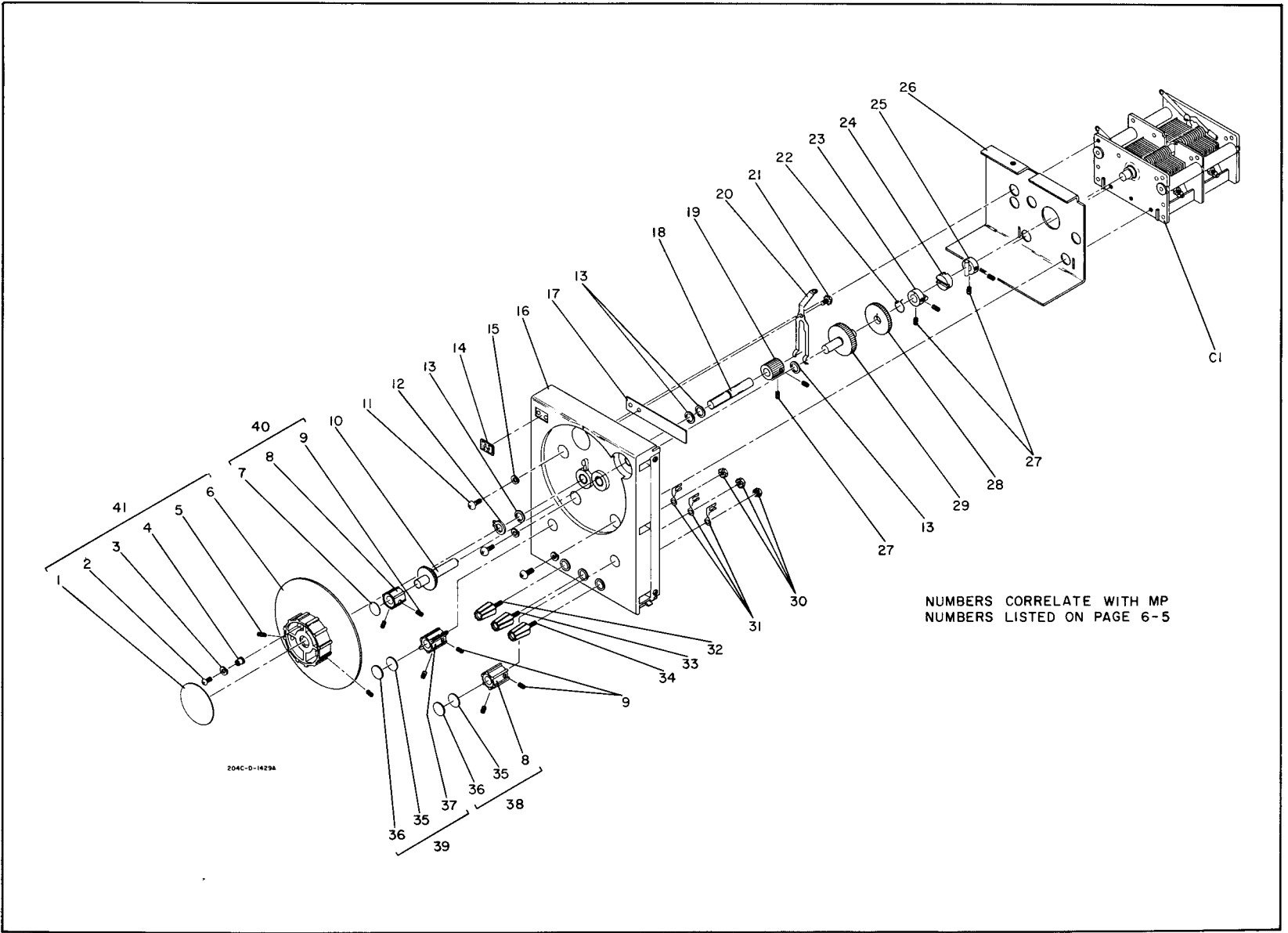


Figure 6-1. Model 204C Exploded View

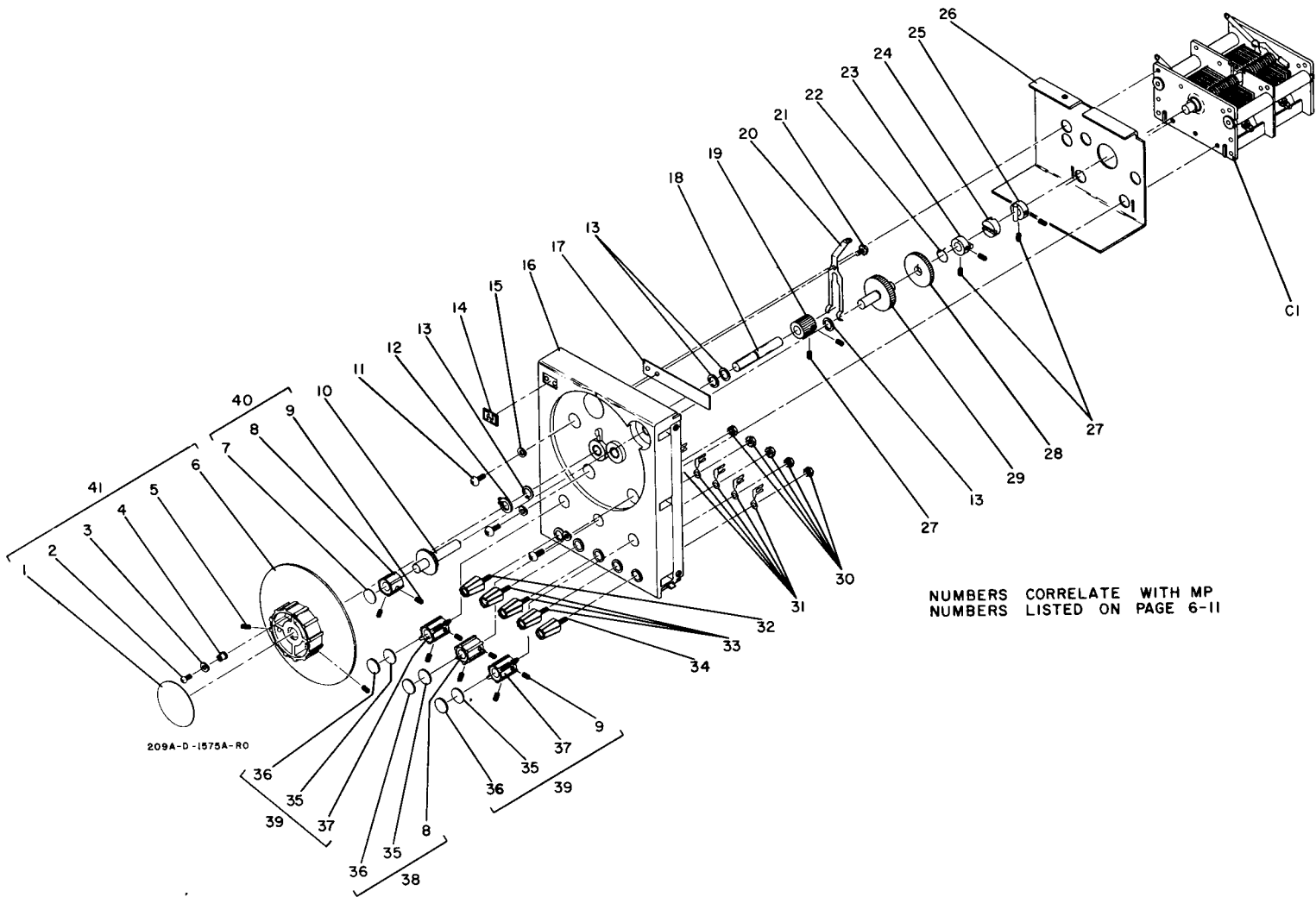
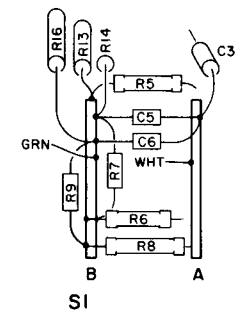
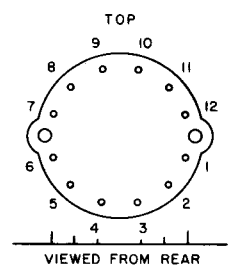
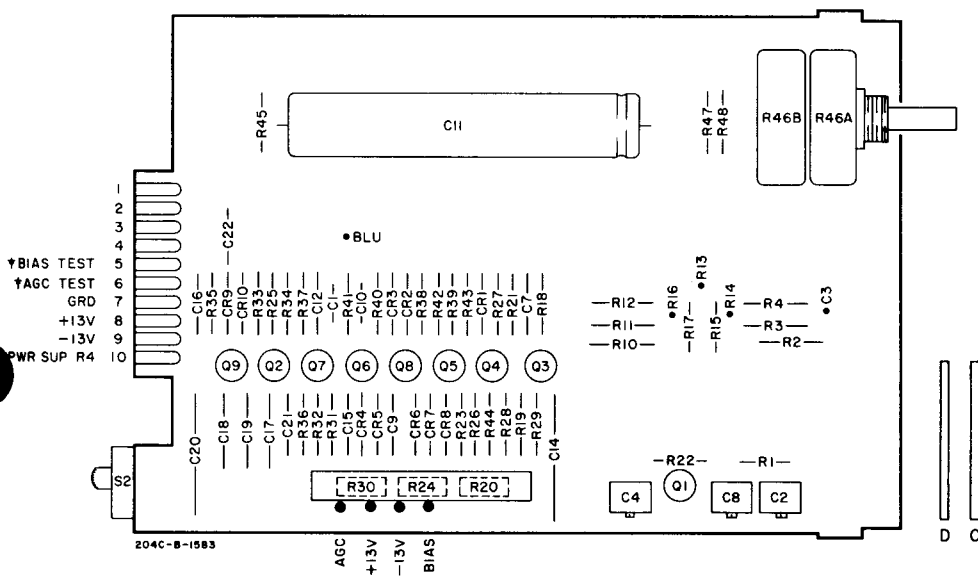


Figure 6-2. Model 204D Exploded View



AI
 hp Part No. 00204-66505
 REV C

1. TO OPERATE THE INSTRUMENT WITH THE CHASSIS SHIELD OFF, A SHORT JUMPER MUST BE CONNECTED BETWEEN THE CHASSIS SECTION ON WHICH THE TUNING CAPACITOR IS MOUNTED AND THE SHEET METAL TAB JUST BELOW IT.
2. DC VOLTAGES SHOWN WERE MEASURED WITH AGC ADJUST R24 FULLY CCW (OSCILLATOR DISABLED) AND FREQUENCY RANGE SET TO X10K.
3. SWITCH S1 IS SHOWN IN X5 POSITION. IN THE TABLE BELOW, DOTS DENOTE CAPACITORS IN USE.

	C17	C18	C19
2	•	•	•
3		•	•
4		•	•
5			•
6			•
7			

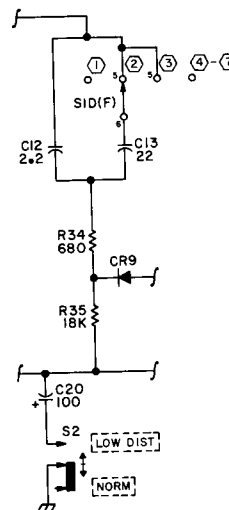
BACKDATING CHANGES

Model 204C Instrument Serial Numbers:
 808-01095 and lower – See Note 1
 808-01096 through 808-01245 – See Note 2

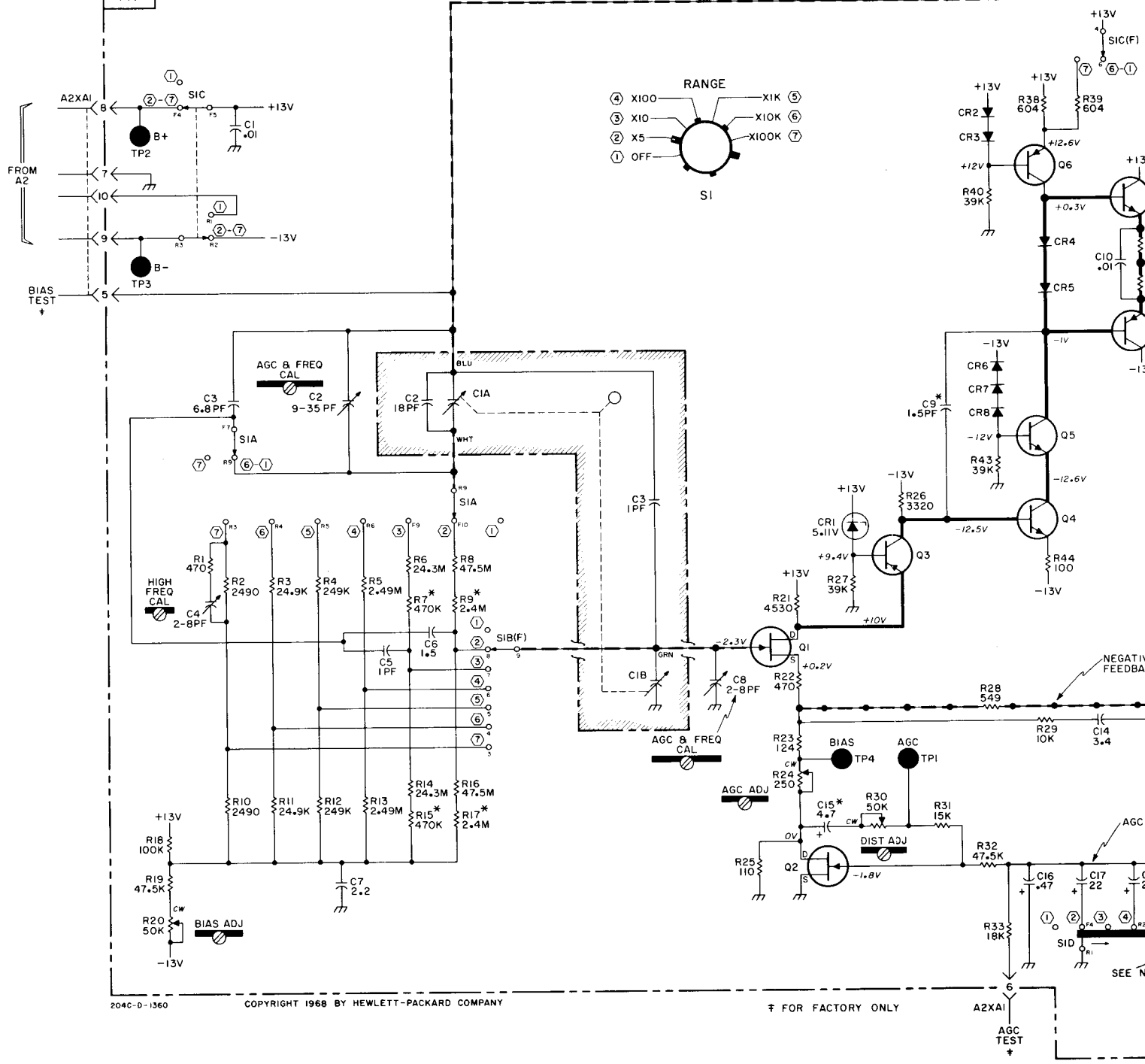
Model H20-204C Instrument Serial Numbers:
 808-00795 and lower – See Note 1
 808-00796 through 808-00845 – See Note 2

Note 1: All of these instruments have the AGC circuit shown below as CHANGE No. 1.

Note 2: Some of these instruments have the AGC circuit shown below as CHANGE No. 1.



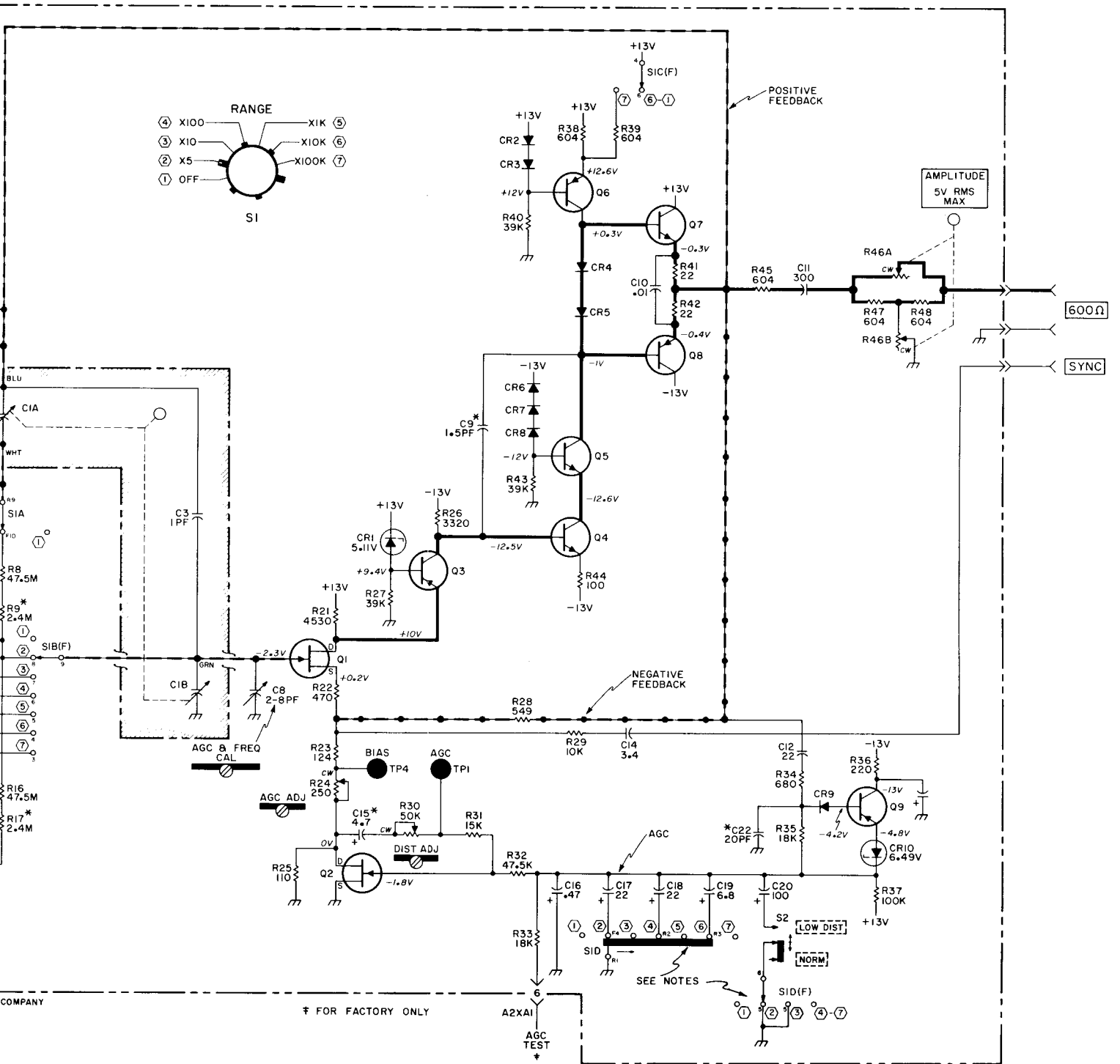
AI OSCILLATOR ASSEMBLY (00204-66505)



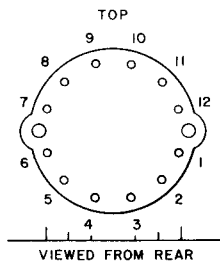
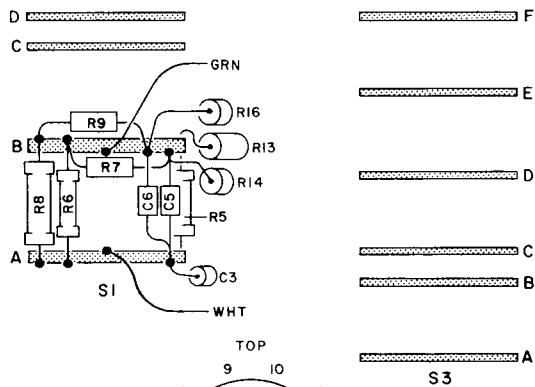
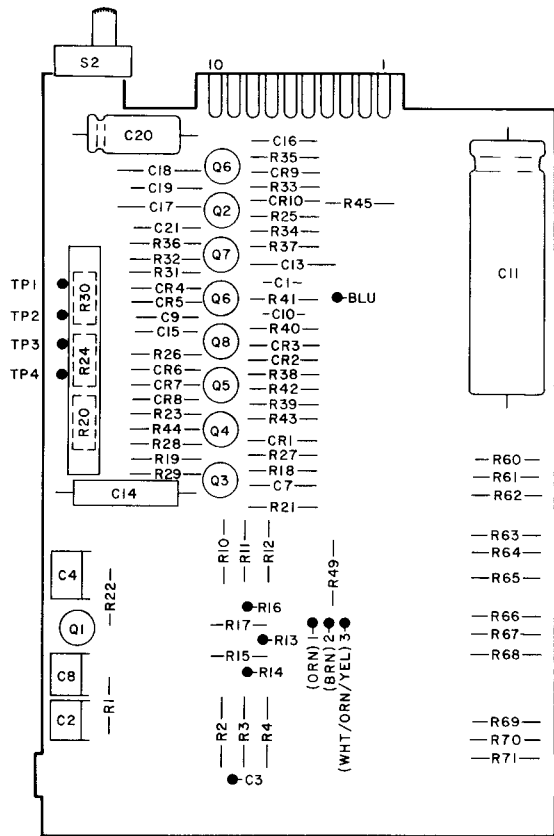
204C-D-1360

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Model 204C Oscillator Schematic

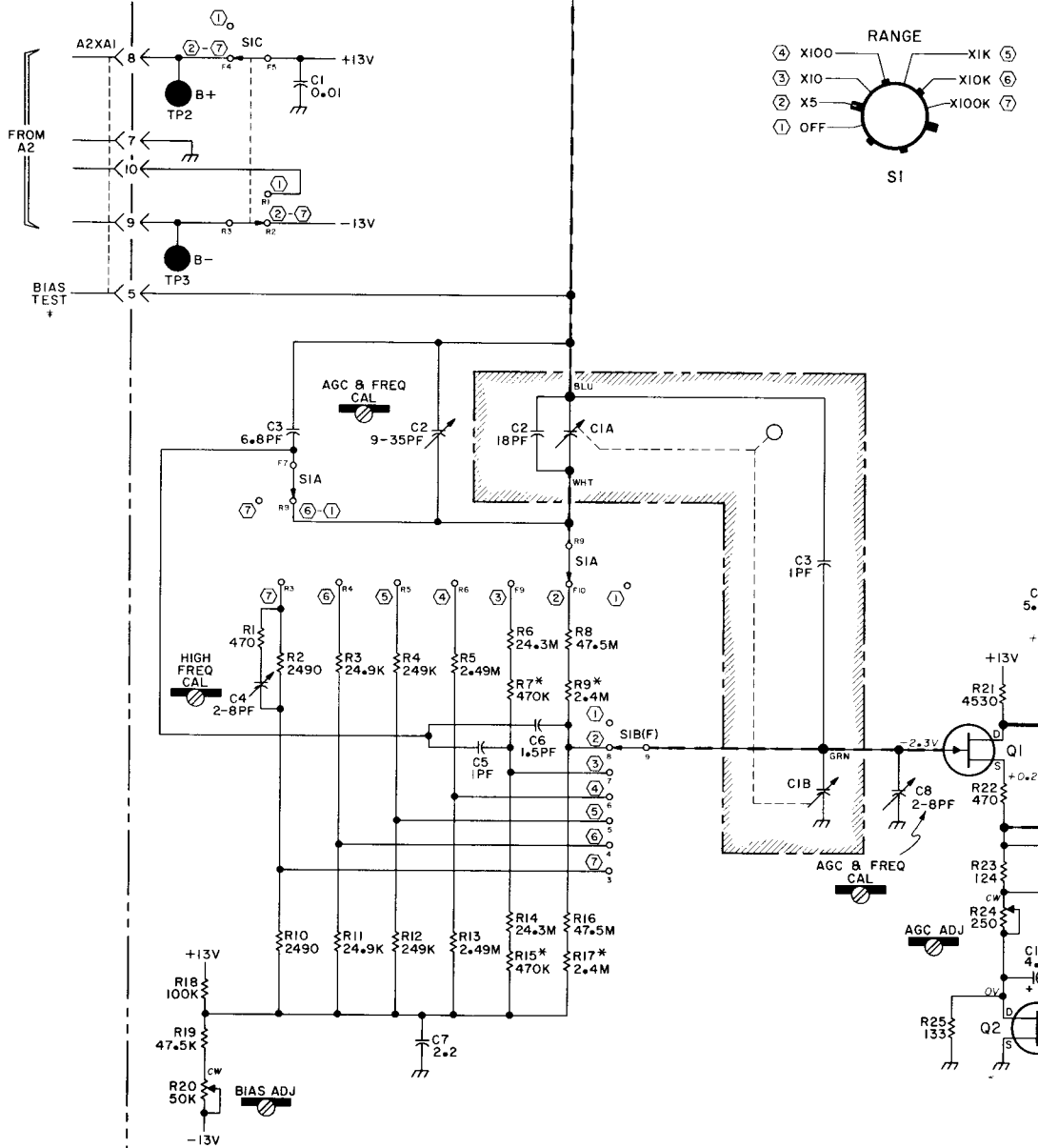


2040-B-1880

A1
hp Part No. 00204-66510

1. TO C
THE
JUM
BETW
WHIC
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TAB
2. DC
MEA
FUL
AND
X10K
3. SWIT
IN T
CAP

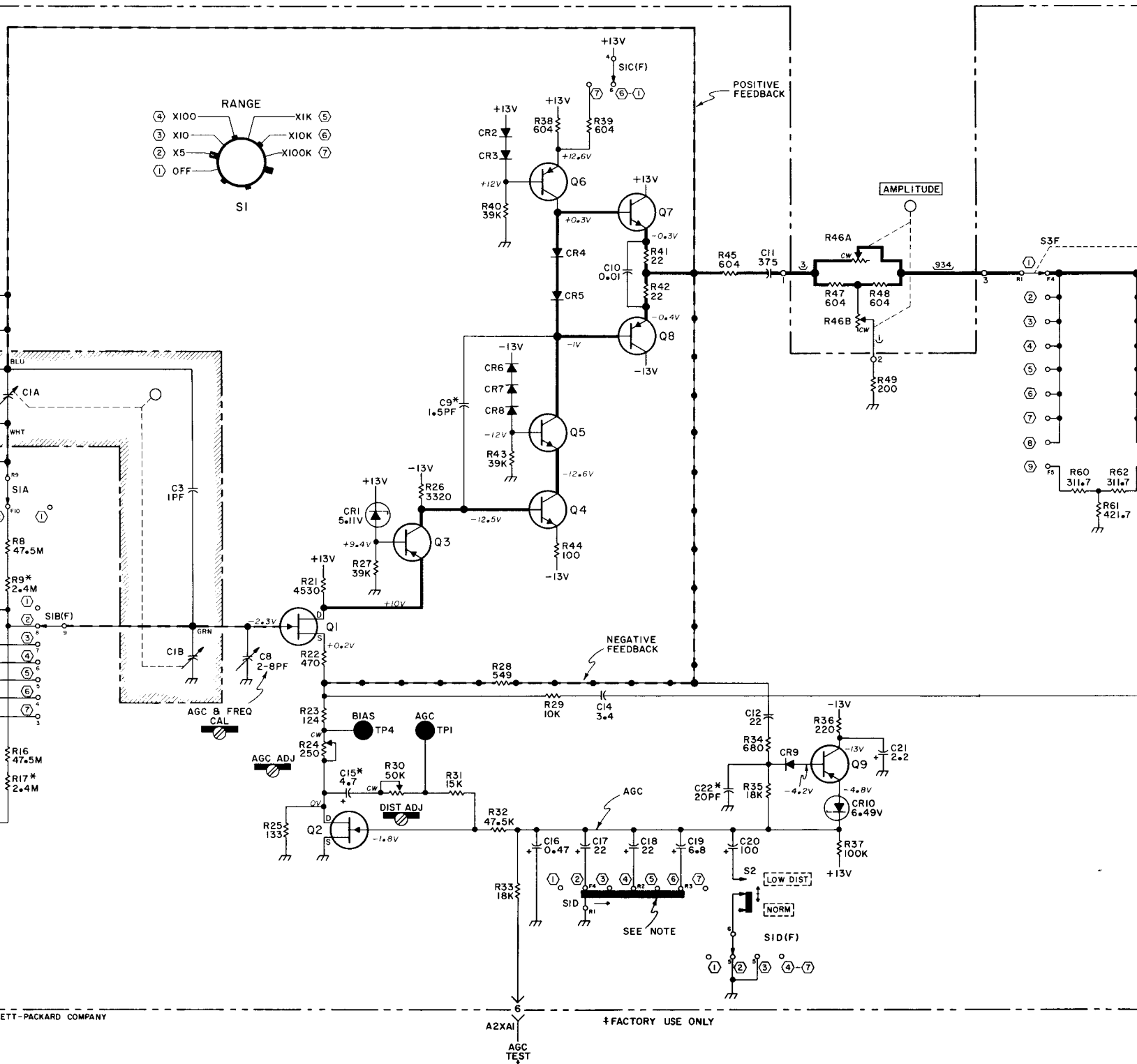
A1 OSCILLATOR ASSEMBLY (00204-66510)

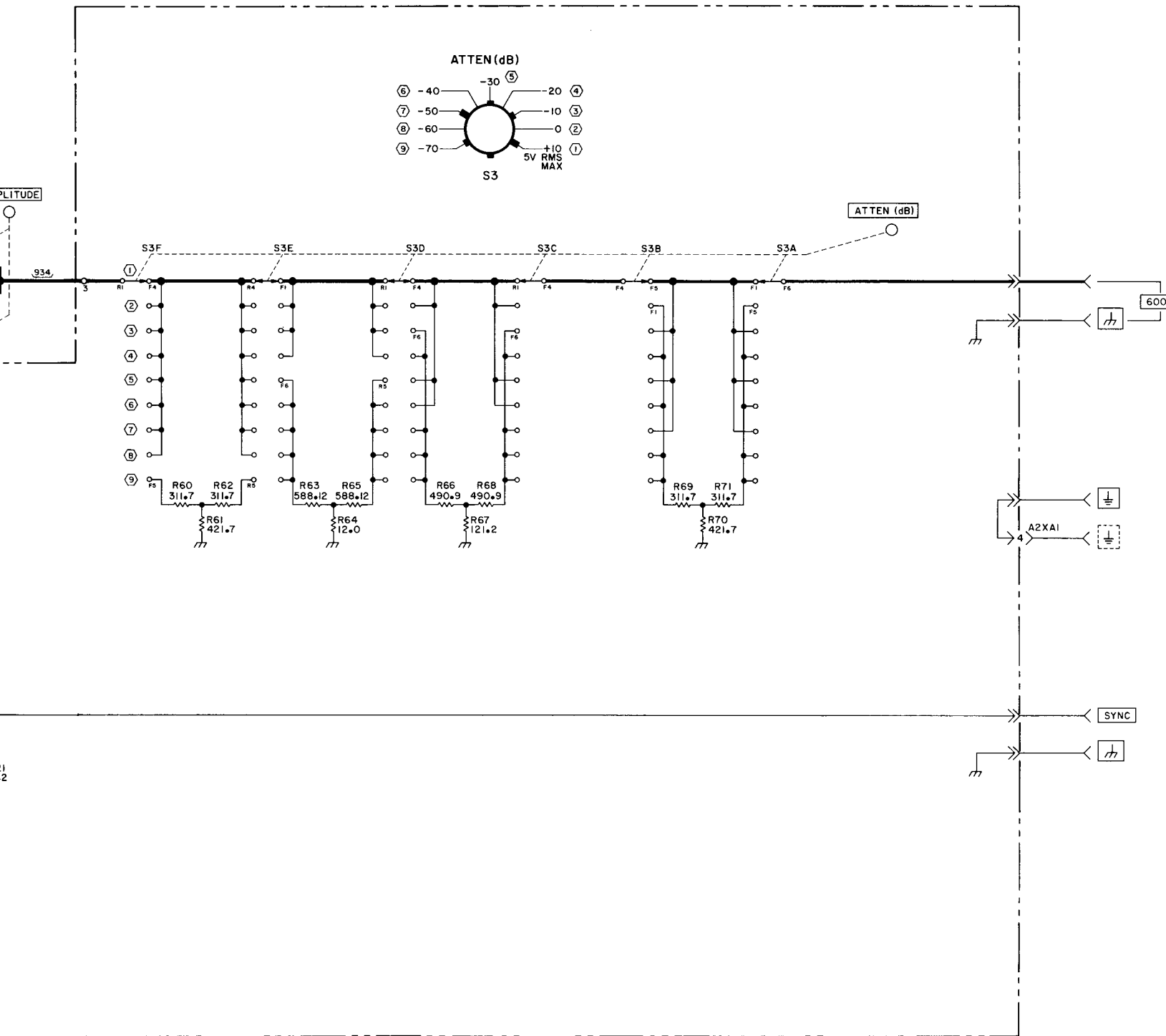


1. TO OPERATE THE INSTRUMENT WITH THE CHASSIS SHIELD OFF, A SHORT JUMPER MUST BE CONNECTED BETWEEN THE CHASSIS SECTION ON WHICH THE TUNING CAPACITOR IS MOUNTED AND THE SHEET METAL TAB JUST BELOW IT.
2. DC VOLTAGES SHOWN WERE MEASURED WITH AGC ADJUST R24 FULLY CCW (OSCILLATOR DISABLED) AND FREQUENCY RANGE SET TO X10K.
3. SWITCH S1 IS SHOWN IN X5 POSITION. IN THE TABLE BELOW, DOTS DENOTE FREQUENCY CAPACITORS IN USE.

	C17	C18	C19
2	•	•	•
3		•	•
4		•	•
5			•
6			•
7			

204D-J-1798





ERRATA

Table 5-1 and Figure 5-3: Change the .002 μ F capacitors to 300 pF (0140-0225). Change the 51 μ H inductor to 22 μ H (9140-0179).

Figures 5-4 and 5-5: Exchange the figure numbers and titles of Figures 5-4 and 5-5.

Paragraphs 5-27 and 5-28: Change AGC voltage adjustments to -2.0V.

Paragraph 5-28: In step c and note, change C3 to C2.

Paragraph 5-29: In step b, change C5 to C4.

Tables 6-1 and 6-2: Change A1C19 to 2.2 μ F (0180-0197).

Change A1R1 and A1R22 Part No. to 0684-4711.

Change A1R25 to A1R25* 140 ohms $\pm 1\%$ 1/8 W 0698-4411.

▶ Delete "600 Ω " from A1R46 description.

Change A1CR9 to Part No. 1910-0016.

Change A2R7 to read 402 ohms.

Change A2R8 to read 23.7 ohms.

Change MP38 to Part No. 0370-0844.

Change MP39 to Part No. 0370-0845.

Change MP40 to Part No. 0370-0846.

Table 6-1: Change the A1 Assembly Part No. to 00204-66515.

Table 6-2: Change the A1 Assembly Part No. to 00204-66510.

Page 7-3/7-4: Change the A1 Assembly Part No. to 00204-66515.

Label this schematic Figure 7-1.

Label the capacitor connected to A1Q9 as C21, 2.2 μ F.

Change A1R25 to 140 Ω *.

Page 7-5/7-6: Change A1R25 to 140 Ω *.

Label this schematic Figure 7-2.

On the Component Location Diagram, change C13 to read C12 and change the Q6 at the top of the diagram to read Q9.

Change the A1 Assembly outline to include A1R46, A1R47, and A1R48.

Page 7-7/7-8: Label this schematic Figure 7-3.

CHANGE #1

Figure 3-1: Remove ground strap (10) .

Table 6-1: Change A2 Assembly (Standard) Part No. from 00204-66506 to 00204-66516.

Change A1R32 to A1R32*.

CHANGE #2

Tables 6-1 and 6-2: Change A1Q2 Part No. to 1855-0318.

CHANGE #3

Table 6-1: Change A1Q3, A1Q6, A1Q8, A1Q9 Part No. to 1853-0007 and delete "2N3906" from the description of each.

CHANGE #4

Table 6-2: Change A1Q3, A1Q6, A1Q8, A1Q9 Part No. to 1853-0007 and delete "2N3906" from the description of each.

CHANGE #5

Table 6-1: Change A1R32*

Page 7-3/7-4: Change A1R32 to A1R32*

ERRATA

Page 7-3/7-4: Voltage readings on base and emitter A1Q9 should read:

Oscillator disabled: base +1.4v, emitter 0v.

Oscillator on : base -8.0v, emitter -7.5v.

CHANGE #6

Table 6-1: Change A1(H20 only) Assembly Part No. to 00204-66519.

Change A2(opt. 02) Assembly Part No. to 00204-66518.