The Frequency to DC Converter:

Connect a -. 1 volt source to Test Point F. This should cause Q13 to run at about 10 Kc. Now check for the wave forms of Figure 3. Make sure the flip-flop (Q1 and Q2) is working correctly.

If the Flip-flop is working properly, check Q3, Q4, CR3 and CR4. The waveforms should be as noted in Figure 3 for Test Points M, N, I.

SECTION VI
CALIBRATION PROCEDURE

Equipment:

1 10:1 probe

1 DP-150, DMS-3200 counter or equivalent

1 General Radio Standard Decade Capacitor 100 pf to 1. 111 uF ± . 05% or equivalent

1 Standard Capacitor 1 uF to 999 uF . 05%

1 DC Voltmeter (Hickok DP-100 or equivalent)

NOTE

DP-200 TO BE CALIBRATED SHOULD BE THOROUGHLY CLEANED AND DRIED PER CLEANING PROCEDURE, PARAGRAPH 20.

THIS PROCEDURE IS TO BE PERFORMED IN AN AMBIENT TEMPERATURE OF 25° C ± 2° C ONLY.

CALIBRATION

1. Plug the plug-in to be calibrated into an extender cable and plug the other end of the extender cable into the DMS-3200. With the top plate of the DP-200 removed, all test points and adjustments may be easily reached.
2. Turn on DMS-3200
3. Connect a counter such as the DP-150, via a 10:1 probe to Test Point H Adjust R48 for a frequency of 130 to 140 cps with 135 cps preferred.
4. Set DP-200 to the XXX. nano-farad range. Using a scope, check amplifier output bias level at Test Point G. The voltage level should be from 70 to 100 volts.
5. a. Connect a test lead to the can of Q26 and another test lead to the chassis of the DP-200 to be calibrated.

   b. Set the DP-200 range to picofarads. Connect a DP-150 via a 10:1 scope probe to pin 5 on the rear of the 3rd deck of the range switch. Set the DP-150 controls as follows:

Input	+
Function	XX. X "KC"
Sensitivity	adjust for minimum sensitivity for reliable reading
Display	comfortable rate

6. a. Connect one of the calibration resistors between the two test leads. Turn on the DP-200. Note the reading on the DP-150. Warm the can of Q26 with a soldering iron or other suitable tool. (Do not overheat.) Note the new DP-150 reading.

   b. If the DP-150 reading became greater, choose a larger resistor and repeat the procedure above. If the DP-150 reading became smaller, choose a smaller resistor and repeat the procedure above.

   c. Continue in this manner until a value of resistor is determined which minimizes the change.

   d. Place the resistor determined in Step C into the proper space on the P.C. board and solder it into place.

   e. Adjust R96 until a reading 5. 00 Kc is obtained on the DP-150. Secure R96.

7. Set the DP-200 to XX. X nano-farads.
8. a. Set R92 fully clockwise.

   b. Set the DP-150 function to XXX. "cps".

   c. Adjust R103 CCW until the DP-150 gives a reading of 500 cps. Do not turn R103 past this point.

   d. Measure the voltage from Point 0 to the + 20V supply. A DP-100 is good for this purpose (set to the -10 range). This voltage is the upper limit voltage.

   e. Now turn R103 further CCW. At some point, the reading will jump to 455 cps (approx.). From this point, adjust R103 slightly CW until the reading returns to a steady 500 cps.

   f. Again (as in Step d) measure the voltage from Point 0 to the + 20V supply. This is the Lower Limit Voltage.

   g. Subtract the lower limit voltage from the Upper Limit Voltage.

   h. Add now, 1/2 the difference found in Step g to the Lower Limit Voltage.

   i. Now adjust R103 until the voltage measured from Point 0 to the + 20V supply is exactly equal to the voltage calculated and written down in Step g.

   j. Finally, place a drop of fingernail polish on the pot so that the adjustment is secured.

9. a. Set the DP-200 to the XXX. nanofarads position.

   b. Set DP-150 as follows:

Function	XX. X "ms"
Sensitivity	Readjust if necessary

c. The procedure for finding Upper Limit Voltage and Lower Limit Voltage is essentially the same as Part 8 above. The measurements are made from Point P to the +20.0 ms.

d. The Lower Limit Voltage is found as in Step 8c above.

10. a. Set the DP-200 Range to the millifarads position.

b. The DP-150 settings remain the same.

c. The procedure for finding the Upper Limit Voltage and Lower Limit Voltage is essentially the same as in Step 8 above. The readings are taken from Point Q to the +20V supply. The Upper Limit Voltage is obtained when the reading changes to 100.0 ms.

d. The Lower Limit Voltage is found as in Step 8c above.

11. a. Set the DP-200 to the XXX. nano-farad range.

b. Connect the S.D.C. to the input. Set the S.D.C. to .X001.

c. Connect the DP-100 to Test Point T.

d. Adjust R136 until the DP-200 reads between 001 "overrange on" to 075 "overrange on".

e. Following a similar procedure to the countdown setting adjust the pot CW to a point where the reading will switch about 100 digits. Adjust back until the reading is stable, and within the limits stated above. Note the reading of the DP-100.

f. Adjust the pot CCW to a point where the reading switches about 100 digits. Adjust back until the reading is stable, as above. Note the DP-100 reading. Take the difference of the two readings, divide by 2, and add this number to the lower reading.

g. Adjust R136 until the DP-100 reads the voltage just determined. Secure R136. This completes setting of the frequency countdowns. Remove all test equipment from the DP-200.

12. a. Set the DP-200 as follows:

RANGE - XX.X nano-farads
DISPLAY - comfortable rate

b. Connect the General Radio SDC to the input. Set the SDC to .1401 uF.

c. Set R70 to the center of its range.

d. Select one or a combination of three of the available calibration capacitors which set the reading of the DP-200 closest to 401 "overrange on". The calibration capacitors are placed in the holes provided in the board for C5, C6 and C7. Place selected capacitors in board properly and solder in place.

13. a. Disconnect the DP-200 input from everything.

b. Set the DP-200 to the XXX. picofarad range.

c. Set the Picofarad Cancel maximum CCW.

d. Adjust R53 for a reading of 008 ± 1 digit.

14. a. Set the SDC to .0001 uF. and connect it to the DP-200 input.

b. Set the DP-200 to the XXX. picofarad range.

c. Adjust the Picofarad Cancel for a reading of 100 on the DP-200.

d. Set the SDC to .0014 uF.

e. Adjust R69 for a reading of 400 "overrange on" on the DP-200.

f. Set the SDC to .0001 uF. If necessary readjust the Picofarad Cancel to a reading of 100 and repeat Steps d and e above.

15. a. Set the DP-200 to the XX.X nanofarad position.

b. Set the SDC to .1401 uF.

c. Adjust R70 for a reading of 401 "overrange on".

16. a. Set the SDC to .0141 uF.

b. Set the DP-200 to the X.XX nanofarad position.

c. The reading should be 410 ± 1 digit "overrange on" (If it is not, check R70 setting or the countdown).

17. a. Set the DP-200 to XXX. nanofarad position.

b. Set the SDC to .XXX uF position.

c. The reading should be 111 ± 1 digit "overrange on". (If it is not, check countdown or R70 setting.)

18. a. Set the DP-200 to the X.XX microfarad position.

b. Connect the DP-200 input to the 1 uF to 999 uF standard.

c. Set the 1 uF to 999 uF standard to 14.00 uF.

d. Adjust R71 until the DP-200 reads 4.00 uF "overrange on".

19. a. Set the DP-200 to the XX.X microfarad position.

b. Set the 1 uF to 999 uF standard to 140.0 uF.

c. Adjust R72 until the DP-200 reads 40.0 uF "overrange on".

20. a. Set the DP-200 to the XXX. microfarad position.

b. Set the 1-999 uF standard to 999 uF.

c. Adjust R73 until the DP-200 reads 999. "Over-range" off.

21. a. Set the DP-200 to the X. XX millifarad position.

b. The reading should be 100 ±1 digit.

22. Remove light rods from DP-200 chopper. Dip DP-200 in clean Printed Circuit Cleaner, manufactured by the John B. Moore Company, up to but not including switch detents. Shake excess solvent from unit and allow the unit to dry in free air. Then dip the unit in Freon TF with DC-200 added. Allow the unit to air dry. As soon as it is dry, install the light rods, taking care to keep fingers and tools from touching board surface or components or switches. Immediately install the top and bottom covers and secure the unit.

23. Plug the unit into a DMS-3200 and allow a 2-hour warmup.

24. Repeat steps 12, 13, 14, 15, 16, 17, 18 and 19 to check calibration. Readjust, if necessary, being careful to keep fingers, etc., from inside unit, and re-secure all pots.

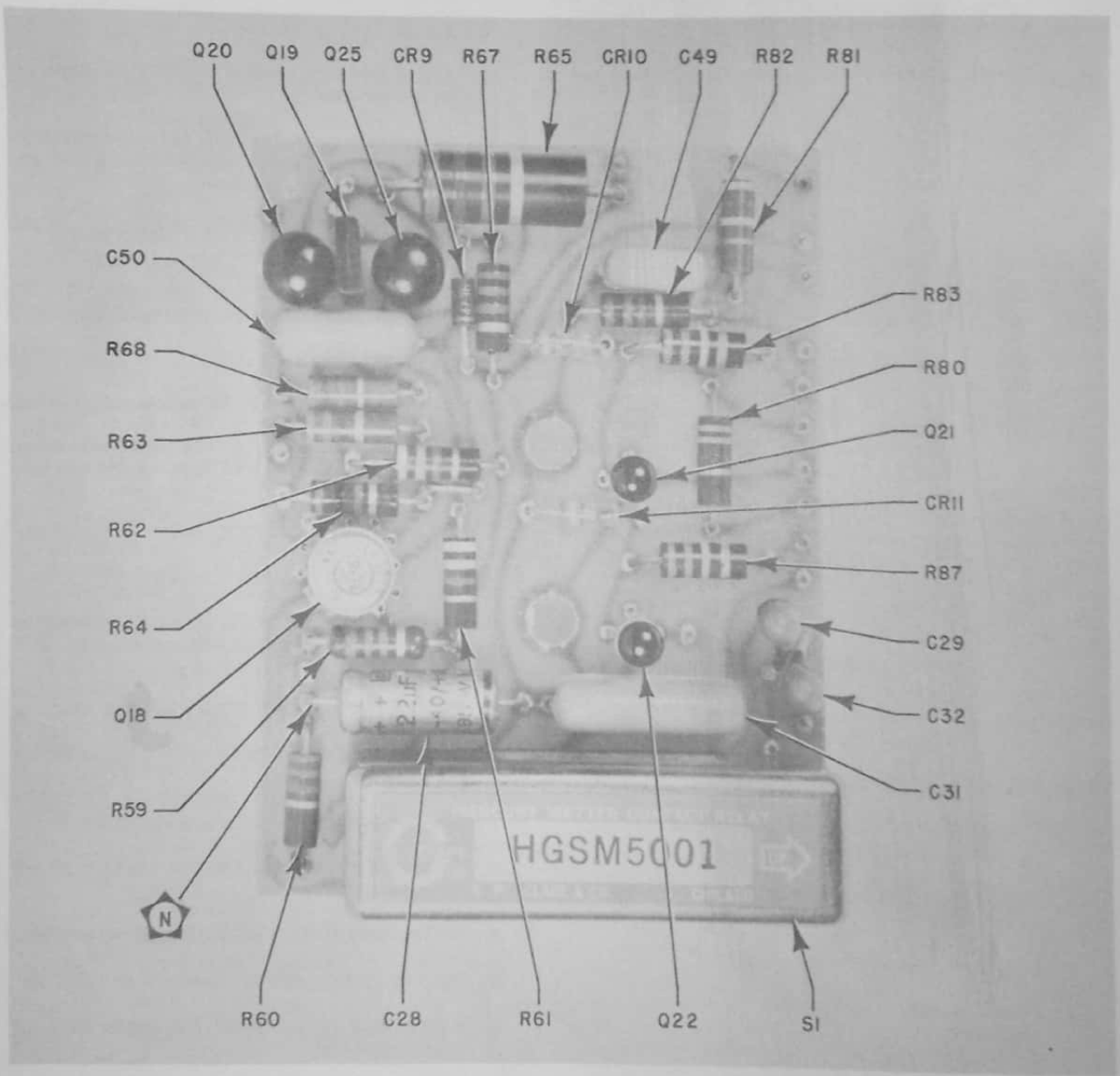

Figure 5. Component Locations - Unknown Capacitor Board