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| TRANSMATION Products Group | 941/942 Field Calibration Procedure | DOCUMENT NO. 1-877 | REV. C |
| | Created by: D.NEFF | Date: 3JUN94 | Sheet 1 of 5 |

| Rev | Date | Appd | DCN | | | | | | | | |
|-----|---------|------|-------|--|--|--|--|--|--|--|--|
| A | 2JUN94 | RPC | ---- | | | | | | | | |
| B | 17JUL96 | RPC | --- | | | | | | | | |
| C | 30APR01 | DW | 11553 | | | | | | | | |

Suggested Equipment

- 1) Frequency Counter with timebase accurate to ± 2.5 PPM
- 2) Function Generator
- 3) Oscilloscope

Precautions

- 1) Observe antistatic procedures.
- 2) Before any adjustments are made to the Model 941 or 942, six fresh "AA" batteries (Alkaline are recommended) should be placed in the unit.

CALIBRATION

Refer to the following table whenever a particular frequency range is referenced.

| RANGE | FREQUENCY |
|--------------|-------------|
| 1 | XXX.XX kHz |
| 2 | XX.XXX kHz |
| 3 | XXXX.X kHz |
| 4 | XXX.XX Hz |
| 5 | XXXX.X CPM |
| 6 | XXXXX CPH |
| 7 (942 ONLY) | XXXXX TOTAL |

Please refer to figure 1 for the location of switches, test points and adjustment potentiometers.

CALIBRATION:

- a) Turn off the 941/942. Place all DIP Switches up.
- b) Connect the positive lead of the frequency counter to the ECLOCK TEST PIN on the digital (top) board of the 941/942 and the negative lead to the negative output of the 941/942. (Refer to Figure 1)
- c) Set the counter for a one second gate time.
- d) Turn the 941/942 on to SOURCE mode and press the scroll push-button until the Zero Crossing Square Wave is selected.
- e) Move the mode select switch to RANGE and press the scroll push-button until Range 1 is selected.
- f) Move the mode select switch to FREQ and dial the 941/942 to a frequency of 100.00kHz.
- g) Move the mode select switch to LEVEL and dial the 941/942 to full output. When the 941/942 output is at full amplitude, the >12 segment on the bar graph will light up.
- h) Adjust C-TRIM until the frequency Counter is reading 2MHz ± 5 Hz. (Refer to Figure 1)
- l) Remove the positive lead of the counter from the ECLOCK TEST PIN and connect it to the positive output of the 941/942.

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- j) Check the output of each range (Range 1-6) according to the chart below. To switch between the 6 ranges, move the mode select switch to RANGE and then press the scroll push-button. To change the frequency in any range, move the mode select switch to FREQ and dial to the desired frequency.

| RANGE | 941/942 | COUNTER |
|-------|------------|---------|
| 1 | 100.00 kHz | 100.000 |
| 2 | 10.000 kHz | 10.000 |
| 3 | 1000.0 Hz | 1.000 |
| 4 | 100.00 Hz | .100 |
| 5 | 1000.0 CPM | .017 |
| 6 | 10000 CPH | .003 |

- NOTES:** It may be desirable to switch the counter to a 10 second gate time for more resolution on the readings.
- To convert from CPM to Hz, divide by 60
 - To convert from CPH to Hz, divide by 3600

AMPLITUDE MATCHING:

- a) Disconnect the counter from the 941/942 and connect an oscilloscope to the output of the 941/942. The scope should be set for DC coupling.
- b) Select Range 1 again by moving the mode select switch to RANGE and pressing the scroll push-button until Range 1 is selected. Move the mode select switch to FREQ and dial the 941/942 to 10.00kHz.
- c) Move the mode select switch to LEVEL and dial the 941/942 to 6Vpp.
- d) Turn the unit OFF and back on to SOURCE mode selecting the Sine Wave.
- e) Adjust POT #2 (Amplitude Matching Pot) until the Sine Wave is 6Vpp. (Refer to Figure 1)
- f) Turn the 941/942 OFF.

TRIGGER LEVEL:

- a) Switch the 941/942 to READ mode.
- b) Move the mode select switch to RANGE and press the scroll push-button to select Range 1.
- c) Move the mode select switch to X1/X10 and press the scroll push-button to select X1 attenuation.
- d) Short the inputs and connect the ground of the scope to the short. Connect the scope probe to the TRIGGER TEST PIN on the analog (middle) board of the 941/942. (Refer to Figure 1)
- e) Set the scope to 20mV/div or the most sensitive voltage setting.
- f) Ground the scope and make sure the ground line is on the zero axis of the scope.
- g) Set the scope for DC coupling and adjust POT #1 (Trigger Pot) until the horizontal line is on the ground line of the scope. (Refer to Figure 1)
- h) Place the mode select switch to TRIG and dial the trigger level all the way down. Open the inputs and the 941/942 should be triggering (GATE flashing) from random noise.

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READ MODE:

- a) Connect a function generator to the 941/942 inputs and to the counter. Connect an oscilloscope to the input of the 941/942. Set the function generator for a zero crossing square wave at a frequency of 100kHz and an amplitude of 8Vpp.
- b) Move the mode select switch to TRIG and dial the 941/942 to a trigger level of approximately 0.3V peak according to the bar graph. This is the point where the 0.3 segment is lit and just about ready to click down to 0.1.

NOTE: When the 0.3 segment is lit on the 941/942 bar graph, the trigger level is between 0.3V peak and 0.6V peak. When the 0.1 segment is lit, the trigger level is between 0.1V peak and 0.3V peak.

- c) The 941/942 LCD should now read the same frequency as the counter, ± 1 count. Also, the GATE annunciator should be flashing.
- d) Move the mode select switch to RANGE and press the scroll push-button to select Range 3. The 941/942 LCD should now be displaying OVER and reading 9999.9Hz. Also, the GATE annunciator should stop flashing.
- e) The following table can be used as a guide for checking the accuracy of read mode for each range.

| RANGE | GENERATOR | 941/942 |
|-------|-----------|------------|
| 1 | 100 kHz | 100.00 kHz |
| 2 | 10 kHz | 10.000 kHz |
| 3 | 1000 Hz | 1000.0 Hz |
| 4 | 100 Hz | 100.00 Hz |
| 5 | 16.667 Hz | 1000.0 CPM |
| 6 | 2.778 Hz | 10000 CPH |

- NOTES:**
- 941/942 reading should be the same as counter reading.
 - Ranges 1 & 2 are reading the frequency based on Gate time.
 - Ranges 3 - 6 are reading the frequency based over 1 period.
 - The GATE annunciator should appear to be flashing while in Ranges 1 and 2.
 - The GATE annunciator should not appear to be flashing while in Ranges 3-6 when the frequency is above 10Hz. The GATE annunciator can be seen flashing in Ranges 3-6 when the frequency is below 10Hz.
 - To convert from Hz to CPM, multiply by 60
 - To convert from Hz to CPM, multiply by 3600

FUNCTIONAL TESTING

SOURCE MODE:

QUIK-CHEK'S:

- a) Disconnect the scope and function generator from the 941/942 and switch the unit to SOURCE mode. Press the scroll push-button during turn on to select the Zero Crossing Square Wave.
- b) Move the mode select switch to RANGE and select RANGE 2.
- c) Move the mode select switch to FREQ and then switch the QUIK-CHEK switch to HI and dial the 941/942 to

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20.000KHz. Press the store push-button to store the value in HI QUIK-CHEK memory. The display will flash to indicate that the value has been stored. Now switch to the LO QUIK-CHEK position and store 5.000KHz in the LO QUIK-CHEK memory.

- d) Turn the unit OFF and back on to SOURCE mode and verify that the previously stored values are still in the QUIK-CHEK memories.

RESET:

- a) - Turn the unit OFF.
- Press and hold the SCROLL push-button while turning the unit back ON to SOURCE mode.
- Keep pressing the SCROLL push-button for 10 seconds.
- All segments on the LCD will remain displayed until the 941/942 has been reset.
- When the unit comes on, verify that the display trigger level was reset to 1.00Vpp and that the frequency was reset to 100.00KHz.
- Turn the unit OFF

READ MODE:

MAX/MIN:

- a) Set the function generator for a zero crossing square wave at a frequency of 100kHz and an amplitude of 8Vpp. Connect the function generator to the 941/942 inputs and turn the unit on to READ mode
- b) RESET: Place the QUIK-CHEK switch to the READ position and press the RESET push-button. The display will flash to indicate that the unit has been reset.
- c) Adjust the frequency of the generator to 200KHz, 50KHz and back to 100KHz.
- d) Flip the Quik-Chek switch to MAX and verify that a frequency of 200KHz was stored. Flip the Quik-Chek switch to MIN and verify that a frequency of 50KHz was stored.
- e) RESET: Place the QUIK-CHEK switch to READ and press the RESET push-button. Verify that both the MAX and MIN QUIK-CHEK'S now have a value of 100KHz (the same as what the generator is sourcing).

RETURN ALL DIP SWITCHES TO THE DOWN POSITION

If the unit should fail to meet any of its stated specifications after recalibration, it should be returned to the factory for repair.

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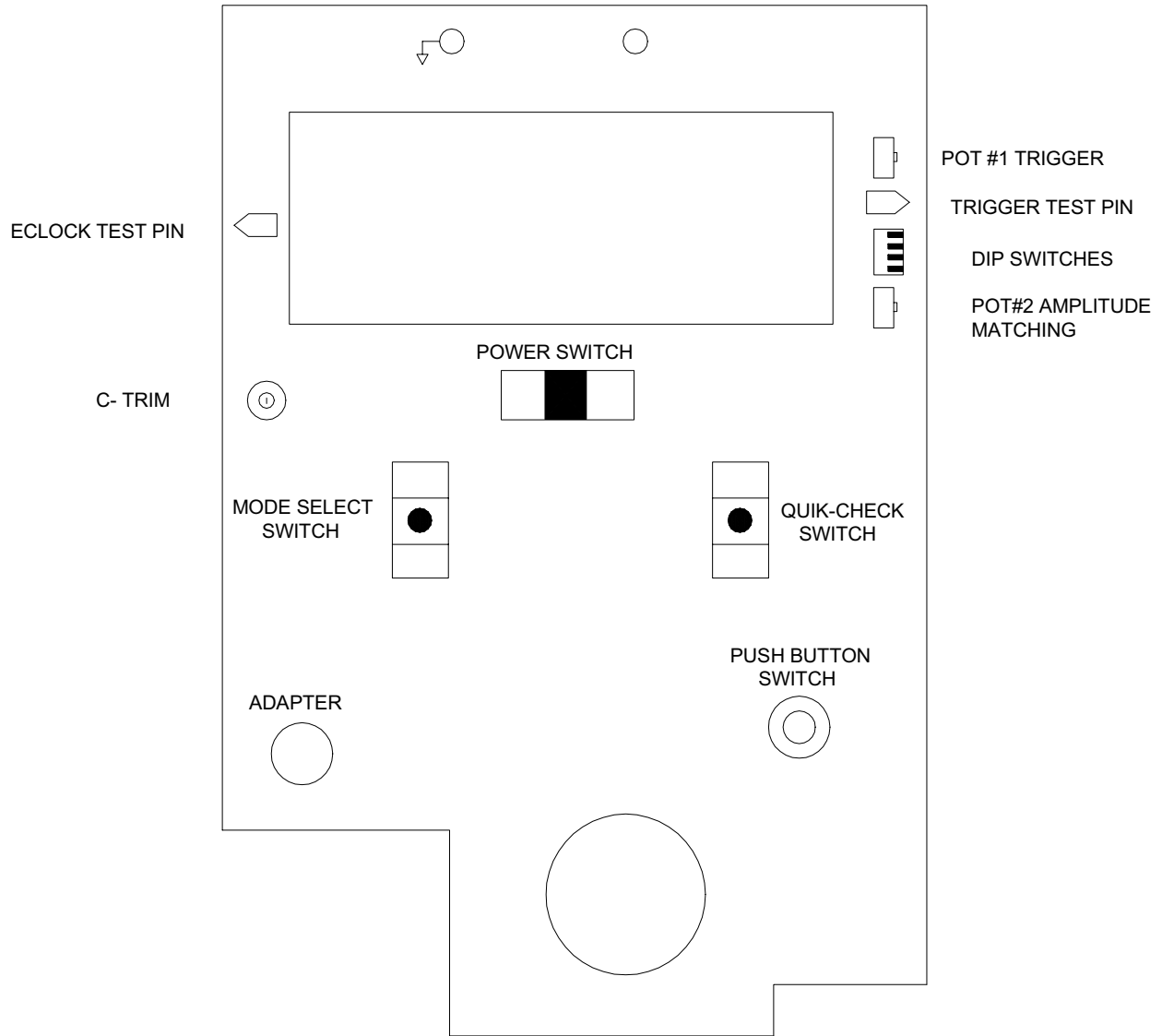


FIGURE 1