

FREQUENCY STABILITY vs. AMBIENT TEMPERATURE VARIATION

With the transmitter installed on a typical electric meter assembly, the temperature stability of the frequency generating components was observed. The meter assembly was placed in a temperature chamber. The power supply powering the transmitter was outside the chamber along with the computer which signaled the transmitter to transmit. A small loop receiving antenna was also inside the chamber with its output going to the frequency measuring spectrum analyzer.

With the transmitter programmed to transmit at 460.00000 MHz, the chamber temperature was set to 20° C. After reaching the set temperature, the transmitter was allowed to stabilize for about 10 minutes or more. The transmitter was instructed to transmit, the signal was captured by the spectrum analyzer and the frequency was determined and compared to the expected 460.00000. The temperature in the chamber was then increased in 10° C increments. At each new temperature, time was allowed for stabilization of the transmitter, a transmission was made and the frequency determined. The temperature was increased at the 10° C increments to 70° C, and then reduced back to 20° C where another reading was taken. The temperature was then reduced in 10° C increments, checking the frequency at each point, until a temperature of -30° C was reached. The frequency at each temperature was recorded and is found in Table 1. It can be seen from the table that all readings are within the 2.5 ppm allowed.

Expected Frequency 460.000 MHz

Temperature ° C	Measured Frequency MHz	Dev. ppm
70	459.99966	-0.739
60	459.99971	-0.630
50	459.99978	-0.478
40	459.99976	-0.522
30	459.99988	-0.261
20	459.99972	-0.609
10	459.99961	-0.848
0	459.99971	-0.630
-10	459.99981	-0.413
-20	459.99977	-0.500
-30	459.99984	-0.348

Imbedded microcontroller disables MTU operation outside of this temperature range.

Measured and Recorded on December 19, 2002

SUMMARY

The Hexagram LLB 7330 Transmitting Unit (Electrical meter) has been shown to be capable of complying with those requirements of the Federal Communications Commission for a Part 90 transmitter that are covered by this report.

EQUIPMENT UNDER TEST

“Electric MTU” Transmitter, Model 7330

MANUFACTURER

Hexagram, Inc.
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TEST DATE

December 19, 2002

MEASUREMENT EQUIPMENT

Hewlett-Packard Spectrum Analyzer
Type 8560A with 8560A RF Section
85650A Quasi-Peak Adapter

ANTENNAS

½ WL Dipole Antenna

MISCELLANEOUS

7.5 m RG-213/U coaxial cable

Environmental Chamber,
Model VersaTenn II
Temp Range: -73C to +200C

Radio Shack 63-1011 Digital Thermometer

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