**RESPONSE TO REQUEST FOR**
**ADDITIONAL INFORMATION ON FCCID:NQ3RFT**

FCC Reference Number: 2062 July 8, 1998

The following are the responses to the request for additional information as described by Rich Fabina, FCC Application Processing Branch. The field strength measurements and corrections for range losses were performed by James Pollock of Smith Electronics, Inc. at the Smith Electronics Test Facility in Cleveland, Ohio on July 6, 1998. The resulting data is tabulated in this response.

1. The field strength of the fundamental was re-measured employing a quasi-peak detector function. In addition, the transmitter was configured for a continuous waveform (cw) output in order to eliminate any averaging effect. The 916.65 MHz fundamental peak field strength level is 93.8 dBμV/m or 48,978 μV/m, which is less than the specified 50,000 μV/m limit.

2. The calculated average field strength levels for the 2nd through the 10th harmonics are as follows;

| Freq. (MHz) | FS (dBuV/m) | Duty Cycle Factor (dB) | Fsadj (dBuV/m) | FSadj (uV/m) | FSlim (uV/m) |
|---|---|---|---|---|---|
| 1833.30 | 64.8 @1m | 12.4 | 52.4 | 417 | 1,500 |
| 2749.95 | 53.7 @1m | 12.4 | 41.3 | 116 | 1,500 |
| 3666.60 | 66.9 @1m | 12.4 | 54.5 | 531 | 1,500 |
| 4583.25 | 59.1 @1m | 12.4 | 46.7 | 216 | 1,500 |
| 5499.90 | 63.9 @1m | 12.4 | 51.5 | 376 | 1,500 |
| 6416.55 | 58.6 @1m | 12.4 | 46.2 | 204 | 1,500 |
| 7333.20 | <64.2@.5m | 12.4 | <51.8 | <389 | 3,000 |
| 8249.85 | <68.5@.5m | 12.4 | <56.1 | <638 | 3,000 |
| 9166.50 | <67.8@.5m | 12.4 | <55.4 | <589 | 3,000 |

**Note:** The Field Strength Limits have been adjusted to reflect measurements taken at 1 m and 0.5 m distances. Measurements were taken at these distances to provide observed signal strength greater than the noise floor of the HP8593EM spectrum analyzer.

3. A Duty Cycle Factor resulting from ON-OFF Keying and pulse train duration was calculated to be 12.4 dB. The receiver requires a dc balanced bit pattern in order to establish and maintain a threshold level for the bit slice detector. The data to transmit are ASCII characters from 0 to 255 decimal in value. These 256 characters have been mapped into 10 bit dc balanced bit patterns. Start and stop bits supplement the translated character into 12 bits in length. To establish a dc residue on the bit slice input an 8 character preamble is transmitted. The preamble character is 0665hex. The bit pattern for this character is dc balanced. DC balancing yields a duty cycle of 0.5.

**Preamble Character Breakdown**

| b1 | b2 | b3 | b4 | b5 | b6 | b7 | b8 | b9 | b10 | b11 | b12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 6 h | | | | 6 h | | | | 5 h | | | |
| start | d9 | d8 | d7 | d6 | d5 | d4 | d3 | d2 | d1 | d0 | stop |

**Character Map - 8 to 10 bit (start and stop bits included)**

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 06F | 077 | 07B | 0AF | 0B7 | 0BB | 0BD | 0CF | 0D7 | 0DB | 0DD | 0E7 | 0EB | 0ED | 0F3 | 0F5 |
| 1 | 12F | 137 | 13B | 13D | 14F | 157 | 15B | 15D | 167 | 16B | 16D | 173 | 175 | 179 | 18F | 197 |
| 2 | 19B | 19D | 1A7 | 1AB | 1AD | 1B3 | 1B5 | 1B9 | 1C7 | 1CB | 1CD | 1D3 | 1D5 | 1D9 | 1E3 | 1E5 |
| 3 | 1E9 | 22F | 237 | 23B | 23D | 24D | 24F | 257 | 25B | 25D | 267 | 26B | 26D | 273 | 275 | 279 |
| 4 | 28F | 295 | 297 | 29B | 29D | 2A5 | 2A7 | 2AB | 2AD | 2B3 | 2B5 | 2B9 | 2C7 | 2C9 | 2CB | 2CD |
| 5 | 2D3 | 2D5 | 2D9 | 2E3 | 2E5 | 2E9 | 2F1 | 30F | 317 | 31B | 31D | 325 | 327 | 32B | 32D | 333 |
| 6 | 335 | 339 | 347 | 349 | 34B | 34D | 353 | 355 | 359 | 363 | 365 | 369 | 371 | 387 | 38B | 38D |
| 7 | 393 | 395 | 399 | 3A3 | 3A5 | 4A9 | 3B1 | 3C3 | 3C5 | 2C9 | 3D1 | 42F | 437 | 43B | 43D | 44F |
| 8 | 457 | 45B | 45D | 467 | 46B | 46D | 473 | 475 | 479 | 48F | 497 | 499 | 49B | 49D | 4A5 | 4A7 |
| 9 | 4A9 | 4AB | 4AD | 4B3 | 4B5 | 4B9 | 4C7 | 4CB | 4CD | 4D3 | 4D5 | 4D9 | 4E3 | 4E5 | 4E9 | 4F1 |
| A | 50F | 517 | 51B | 51D | 527 | 52B | 52D | 533 | 535 | 539 | 547 | 54B | 54D | 553 | 555 | 559 |
| B | 55B | 563 | 565 | 569 | 56B | 56D | 571 | 587 | 58B | 58D | 593 | 595 | 599 | 5A3 | 5A5 | 5A9 |
| C | 5AD | 5B1 | 5B5 | 5C3 | 5C5 | 5C9 | 5D1 | 5E1 | 617 | 61B | 61D | 627 | 62B | 62D | 633 | 635 |
| D | 639 | 647 | 64B | 64D | 653 | 655 | 659 | 65B | 663 | 5B3 | 669 | 66B | 66D | 671 | 687 | 68B |
| E | 68D | 693 | 695 | 699 | 6A3 | 6A5 | 6A9 | 6B1 | 6C3 | 6C5 | 6C9 | 6D1 | 6D5 | 6E1 | 70B | 70D |
| F | 713 | 715 | 719 | 723 | 725 | 729 | 731 | 743 | 745 | 749 | 751 | 761 | 785 | 789 | 791 | 7A1 |

The baud rate of the communications is 19.2 kbaud resulting in a bit time of 50 μs. The maximum data characters in a packet is 64. The data is preceded with STX, FROM, TO, and NUM characters then followed by a four character checksum (refer to TCP-CO External Communications Specification for exact protocol format). Along with the 8 preamble characters, a total of 80 characters may be in the packet. With 12 bits per character, 80 characters results in 960 bit times or 48 ms. DC balancing reduces the cumulative pulse duration by 50% to a value of 24 ms. This 24 ms 'ON' time over a 100 ms period results in a duty cycle factor of 12.40 dB. This device uses only 32 of the maximum 64 characters in its largest packet. This increases the duty cycle factor by 6 dB to 18.4 dB. The calculation in #2 above demonstrates that the device complies even when evaluated at its theoretical maximum packet size.

4. A JPEG image file of the radio board without the shield is attached to this document as NQ3TCP.JPG.

If there are any further questions or discrepancies, please contact Richard Miller via e-mail (millerr%smitherie@mcimail.com).

FUNDAMENTAL AND SPURIOUS EMISSIONS
RFT TRANSMITTER
July 6, 1998

| Freq. (MHz) | Value (dBμV) | AF (dB) | CL (dB) | FS (dBμV/m) | FS (μV/m) | Limit (μV/m) |
|---|---|---|---|---|---|---|
| *916.65 | 63.0 @3m | 29.1 | 1.7 | 93.8 | 48.978 | 50,000 |
| 1833.30 | 36.5@1m | 28.0 | 0.3 | 64.8 | 1.738 | 1,500 |
| 2749.95 | 23.3@1m | 30.0 | 0.4 | 53.7 | 484 | 1,500 |
| 3666.60 | 33.5@1m | 33.0 | 0.4 | 66.9 | 2.213 | 1,500 |
| 4583.25 | 25.6@1m | 33.0 | 0.5 | 59.1 | 902 | 1,500 |
| 5499.90 | 27.4@1m | 36.0 | 0.5 | 63.9 | 1.566 | 1,500 |
| 6416.55 | 21.9@1m | 36.0 | 0.7 | 58.6 | 851 | 1,500 |
| 7333.20 | <26.4@.5m | 37.0 | 0.8 | 64.2 | <1,622 | 3,000 |
| 8249.85 | <29.7@.5m | 38.0 | 0.8 | 68.5 | <2,660 | 3,000 |
| 9166.50 | <28.8@.5m | 38.0 | 1.0 | 67.8 | <2,455 | 3,000 |

* = Fundamental Frequency
AF = Antenna Factor
CL = Coax Loss Factor
FS = Field Strength

For measurement purposes, the transmitter was fixed to emit a non-modulated carrier signal. For this signal, peak, quasi-peak and average measurements should produce the same readings on the meter. This was verified with both the receiver and the spectrum analyzer used.

The fundamental frequency was measured using a tuned dipole antenna and a receiver with a quasi-peak detector. The harmonics were measured with a double ridged guide horn antenna and the HP8593EM spectrum analyzer. Peak measurements were made using a 1 MHz resolution bandwidth and a 100 kHz video bandwidth to reduce the instrument noise level to permit the low-level signals to be observed. As previously noted, the reduced video bandwidth has no effect on the measurement of a cw signal other than to reduce the effects of instrument noise.

NOTE: The above emissions table and text were generated by James Pollock with Smith Electronics Inc, Cleveland Ohio. They were re-entered here for uploading to the FCC.