SECTION 688

REMOTE DATA RADIO COMMUNICATION SYSTEM

DESCRIPTION

688.01.01 GENERAL

A. The data radio unit for installation at remote intersection traffic signal control shall be of solid state design.

1. The data radio unit shall provide the capability of receiving digital signal transmissions from a master station data radio unit and returning transmissions to the master station data radio unit as required by the Freeway and Arterial System of Transportation (FAST) data radio system.

2. The remote station data radio unit shall be Microwave Data System (MDS) Model MDS-9710A or approved equal and shall meet the requirements below.

B. The remote data radio unit shall be configurable as a master station or remote radio.

1. The unit shall be capable of operating as a half-duplex or simplex radio and shall support all splits in duplex frequencies.

2. Full network diagnosis shall be available when operating as a master station.

3. The unit shall provide high system performance and data integrity through digital signal processing.

4. The data radio unit shall have the ability to communicate with any asynchronous protocol without extra software or programming.

MATERIALS / EQUIPMENT

688.02.01 FUNCTIONAL REQUIREMENTS

A. The remote data radio units shall conform to the following general requirements:

1. Supply Voltage: 10.5 VDC to 16.5 VDC.

2. Tx Current: 2 amps typical at 5 watts.

3. Rx Current: Less than 125 milliamps.

4. Sleep Mode: 15 milliamps nominal humidity, 95 percent at 104 degrees F, non-condensing.

5. Temperature Range: -22 degrees F to 140 degrees F.

6. Data Rate: 9,600 bps (rf).

7. Port Speed: 300 bps to 9,600 bps (rf and data) at 12.5 kHz channel spacing.

8. Bit error rate: BER x .000001.

9. Casing: Die cast aluminum.

10. Dimensions: 2-inch by 6-inch by 8-inch maximum.

11. Weight: 2.5 pounds maximum.

12. Operational Modes: Asynchronous; simplex, half-duplex.

13. Data Interface: RS-232, DB-25 Female connector supports: TXD, RXD, RTS, CTS, DCD, RUS, AUX 14, POWER, DSR, and GND.
14. Synthesizer Range: 400 kHz sliding window, manually tunable.
15. Current Consumption:
    a. RF Unit Rx/Standby: 70 milliamps maximum.
    b. RF Unit Tx: 1.6 amps nominal.
16. TX to RX Transition Time: 3 milliseconds RSSI Squelch.

B. Modem/Diagnostics: The remote data radio units shall conform to the following:
1. Modulation: Digital/CPFSK.
2. CTS Delay: 0 to 255 millisecond, programmable in 1-millisecond increments.
3. PTT Delay: 0 to 255 millisecond, programmable in 1-millisecond increments.

C. Radio Receiver: The radio receiver shall conform to the following:
1. Type: Double conversion superheterodyne.
2. Frequency Stability: ±0.00015 percent (1.5 ppm).
3. Adjacent Channel: 60 dB nominal.
4. Sensitivity 12 dB Sinad: -117 dBm nominal.
5. Spurious Rejection: 80 dB.
6. Desensitization: 65 dB at 12.5 kHz and 70 dB at 25 kHz nominal.
7. IF Selectivity: 100 dB at adjacent channel.
8. Electronic Industry Association (EIA) Intermodulation: 65 dB.
9. RSSI: Negative -112 dBm to -54 dBm.
10. Squelch Opening Time: 1.5 milliseconds.
11. Audio Outputs:
    a. Filtered: -10 dB, 600 ohm unbalanced, adjustable.
    b. Unfiltered: 40 mV RMS at 2 kHz Dev.
12. Harmonic Distortion: 3 percent maximum.

D. Radio Transmitter: The radio transmitter shall conform to the following:
1. RF Power: Adjustable between 0.5 w and 5 w at 13.6 VDC.
2. Duty Cycle: Continuous.
3. Time Out Timer: Programmable between 1 second and 255 seconds, or OFF.
4. Spurious and Harmonics: -55 dBc maximum.
5. Hum and Noise: -40 dB between 300 Hz and 3,000 Hz.
6. Audio Inputs:
    a. Filtered: -10 dBm, 600 ohms unbalanced, adjusted, at 2 kHz Dev.
    b. Unfiltered: 245 mV RMS at 2.5 kHz Dev.
7. Audio Response:

a. Filtered: Between 1 dB and -3 dB from 5 Hz to 3,000 Hz.

b. Unfiltered: 1 dB and -3 dB from 5 Hz to 4,000 Hz.

8. Frequency Stability: ±0.00015 percent (1.5 ppm).

9. Transmitter Attack Time: Less than 1 millisecond to within 100 Hz.

10. Carrier Power: Programmable from 0.1 watts to 5 watts.

11. Carrier Power Accuracy: Normal plus or minus 1.5 dB.

12. Output Impedance: 50 ohms.

E. Connectors and Harnesses:

1. All connectors and harnesses shall be furnished with each data radio unit. It is the supplier's responsibility to contact FAST to determine the type of connectors required.

2. The remote data radio unit is for use with the FAST system.

F. Power Requirements: The remote data radio units shall meet all specified requirements when the input power is 120 VAC plus or minus 10 VAC, and 55 Hz plus or minus 5 Hz.

G. Antennae Requirements:

1. A Yagi-type antennae with 9 dB gain shall be provided with each unit.

2. The antennae shall be capable of operation within the 940 MHz to 960 MHz bandwidth.

H. Software Requirements: All software necessary for the units to be fully functional shall be downloaded into the devices at the factory before shipment.

I. Compliance to FAST: All equipment supplied shall conform to the requirements of FAST.

CONSTRUCTION

688.03.01 INSTALLATION

A. The radio unit shall be installed as shown on the Drawings.

METHOD OF MEASUREMENT

688.04.01 MEASUREMENT

A. The quantity of Remote Data Radio Unit shall be measured per each.

BASIS OF PAYMENT

688.05.01 PAYMENT

A. The accepted quantity of Remote Data Radio Unit will be paid for at the contract unit price bid per each which shall be full compensation for providing and installing the radio unit and appurtenant equipment, measured as provided under ***Subsection 688.04.01, "Measurement,"*** as specified, and shown on the drawings.

B. Payment will be made under:

PAY ITEM:	**PAY UNIT**
Remote Data Radio Unit	Each