DEPARTMENTAL SPECIFICATION
TO-4050
SPREAD SPECTRUM RADIO FOR TRAFFIC SIGNAL CLOSED LOOP SYSTEMS

1.0 SCOPE

1.1 This specification describes the minimum acceptable requirements for Spread Spectrum radios and power supply for use with traffic control systems.

2.0 GENERAL REQUIREMENTS

2.1 The spread spectrum radios shall have the following operating characteristics as a minimum:

FREQUENCY	902 - 928 MHZ	
RANGE	15 miles line of sight	
REPEAT CAPABILITIES	Store and Forward Repeater Capabilities	
POWER	1.0 Watt Transmitting Power	
COMPATIBILITY	Backward compatible	
ENVIRONMENT:	Temperature	-30C to 60C
FCC APPROVAL	No License Requirements Type acceptance under FCC Part 15.247	
DATA CHARACTERISTICS	Half or Full Duplex Operation RS232 Interface Selectable 1200 thru 19,200 bps	
REGULATED POWER SUPPLY	Voltage Amperage Operating Temp	12 DC 3 Amp -30C to 60C

2.2 The radios shall be supplied with diagnostic software which shall be used to test the link between the master radio and the remote radios. The software shall detect channels which are not adequate for the transmission of data, and program the exclusion of these frequencies in the selection of frequencies to be scanned.

2.3 Complete manufacturer specifications shall be supplied for the type of radio. Programming manual shall be supplied. Complete schematic and parts diagram shall be supplied.

3.0 Coaxial Cable.

Coaxial cable shall meet the following minimum specifications:

Nominal Impedance	50 Ohms
Max Attenuation	4.2 dB /100 ft at 900 MHZ

Low loss coaxial cable shall be used for the feed line (the coaxial cable that connects the antenna to the radio). The loss for each feed line shall be less than 3 dB with a total system loss 10 dB. Cable connectors shall be type "N" male connectors.

Complete manufacturer specifications shall be supplied for the type of cable used. Specifications shall include the amount of loss produced by different lengths (in feet) of cable.

4.0 Radio Antenna

The radio antenna(s) shall have the following characteristics as a minimum:

Remote Site(s)	Unidirectional (Yagi), Minimum 9 dB gain (dB referenced to half wave dipole)
Master Site	Omni-directional, Minimum 6 dB gain (dB referenced to half wave dipole)
Range	15 miles
Impedance	50 ohm
Wind Rating	125 miles per hour
Connectors	Type "N" Female

Complete manufacturer specifications shall be supplied for type of antenna. Specifications must include the exact gain for each antenna. Complete mounting hardware shall be included.

5.0 Measurement

Measurement shall be made of each spread spectrum system supplied per master intersection and per remote intersection. Measurement shall include the radio, power supply, cable, antenna, lightning protection, and any necessary mounting hardware.

6.0 Warranty

The spread spectrum radio and all associated components shall be fully warranted in accordance with the manufacturer's standard warranty, or for a minimum of one (1) year from the date of acceptance, whichever is greater.

7.0 Payment

The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit bid price for Spread Spectrum Radio Units. This price shall be full compensation for furnishing, mounting and installing, testing the radios, and adjusting the system as required under FCC Part 15,247; and for all labor, tools, equipment, and incidentals necessary to complete the work.