FREQUENCIES AND MODULATION/EMISSION TYPE

Frequency MHz	Maximum Deviation ± 5 KHz	Maximum Deviation ±2.5 KHz
928.0125 to 928.8375	25KOF1D,16KOF2D,20KOF3D	12K5F1D,11KOF2D,12K5F3D
952.0125 to 952.8375	25KOF1D,16KOF2D,20KOF3D	12K5F1D,11KOF2D,12K5F3D
928.8625 to 928.9875	25KOF1D,16KOF2D,20KOF3D	12K5F1D,11KOF2D,12K5F3D
959.8625 to 959.9875	25KOF1D,16KOF2D,20KOF3D	12K5F1D,11KOF2D,12K5F3D

Attachment to FCC Form 442

The following specific information is provided pursuant to Part 2, Subpart J, 2.975.

2.975 (a)(2)(v) Type of modulation employed and resulting emission.

The type of modulation employed is direct frequency modulation of the RF carrier. A variety of modulating signals are employed depending on the system in which the transmitter is used.

The modulating signal most commonly used is a frequency shifted audio tone such as that provided by an FSK telephone type modem (Bell 202). This consists of an audio tone that is shifted between 1200 Hz and 2200 Hz at a rate of 1200 Baud. 300 Baud or lower rate transmission is sometimes employed using a variety of tone frequencies between 1000 and 2900 Hz. The emission designator for this modulation is F2D.

The necessary bandwidth is calculated using the 2M +2DK equation using the normal K value of 1 and a maximum modulating frequency of 3000 Hz to cover the 300 Baud cases. The deviation to be used is 5 KHz in systems whose authorized bandwidth is 25 KHz or more and 2.5 KHz in systems whose authorized bandwidth is 12.5 KHz. This results in:

25 KHz AUTHORIZED BANDWIDTH	12.5 KHz AUTHORIZED BANDWIDTH
$B_n = 2M + 2DK$	$B_n = 2M + 2DK$
$B_n = 2(3000) + 2(5000)(1)$	$B_n = 2(3000) + 2(2500)(1)$
$B_n = 16$ KHz	$B_n = 11$ KHz

A second type of modulating signal that will be used with this transmitter is a filtered digital pulse stream at 10 kilobauds per second for 25 KHz authorized bandwidth systems and 5 kilobauds per second for 12.5 KHz authorized bandwidth systems. The data is passed through a raised cosine filter to minimize spectrum occupancy and is used to directly modulate the transmitter. The emission designator for this type of modulation is F1D.

The necessary bandwidth for this type of modulation may be calculated directly from the first equation in the Frequency Modulation section of the table given in 2.202(g). Per the table K is set at a value of 1.2 and:

25 KHz AUTHORIZED BANDWIDTH
B=10000, M=5000, D=6.25 KHz
$B_n = 2M + 2DK$
$B_n = 2(5000) + 2(6250)(1.2)$
$B_n = 25$ KHz

12.5KHz AUTHORIZED BANDWIDTH
B=5000, M=2500, D=3.125 KHz
$B_n = 2M + 2DK$
$B_n = 2(2500) + 2(3125)(1.2)$
$B_n = 12.5$ KHz

A third type of modulating signal consists of speech or of tones whose amplitude or frequency are used to signal the value of analog quantities in telemetry systems. These quantities change very slowly so that their rate of change makes no significant contribution to the modulating signal bandwidth. The emission designator is F3D.

The necessary bandwidth may be calculated using the equation from 2.202 (g) that is used for FM telephony:

25 KHz AUTHORIZED BANDWIDTH
M = 5 KHz and D = 5 KHz
$B_n = 2M + 2DK$
$B_n = 2(5000) + 2(5000)(1)$
$B_n = 20$ KHz

12.5 KHz AUTHORIZED BANDWIDTH
M = 3.75 KHz and D = 2.5 KHz
$B_n = 2M + 2DK$
$B_n = 2(3750) + 2(2500)(1)$
$B_n = 12.5$ KHz

The following chart summarizes the emission designators and corresponding necessary bandwidths to be used with this equipment:

Modulating Signal	Emission Designator	Necessary Bandwidth 25 KHz Auth BW	Necessary Bandwidth 12.5 KHz Auth BW
FSK Audio Tones	F2D	16K0	11K0
Shaped Binary Pulses	F1D	25K0	12K5
Speech or Audio Tones	F3D	20K0	12K5

2.975 (a)(3) Intended use of the device.

This transmitter is part of a transciever that is designed primarily for use as a remote station in point to multipoint data radio communication systems under rule part 94. It may also be used for point to point service under part 94.

EXHIBIT 2

The equipment to be used in the experimental program will be the standard line of data radio equipment from Microwave Data Systems authorized under FCC Rules, Part 94.

The program of Research and Experimentation will be to gain knowledge of path loss, propagation, and signal strength in various terrain situations in the United States. This data will be used to calibrate computerized transmission programs to make equipment recommendations more accurate.

There also exists certain situations where an actual site evaluation is needed to determine if a radio path is feasible or not.

The program would also be used as a demonstration tool for potential customers to evaluate equipment performance under actual field conditions.

The field survey equipment will operate at the frequencies shown in Exhibit 1 on a non-interference basis with existing systems per section 5.205 of the FCC Rules. Microwave Data Systems will conduct a frequency study of existing licensees in the area of proposed operations prior to transmitting to avoid potential interference.

The program will expand the knowledge of both manufacturer and user which will result in reduced system design costs and easier field implementation.

EXHIBIT 3

EXEMPTION FROM STATION IDENTIFICATION REQUIREMENT

The equipment to be used under the requested authorization is intended for use on the frequencies listed in FCC Rules Section 94.65, (a), (1). As per Section 94.105, station licensed under Section 94.65 need not fulfill the identification requirement of Section 5.152. In accordance with this, the equipment to be used will not be equipped with the hardware necessary to comply with Section 5.152. We request to be found to be "specifically exempted by the terms of the station authorization" and subsequently released from the requirement of Section 5.152 for the purposes of our development license. Thus, "no" has been checked on Item 14 of the attached application.

EXHIBIT 4

The mounting of the directional Yagi Antenna will vary for each field evaluation. The antenna height above ground generally will be no higher than existing buildings or structures. It is evident beyond all reasonable doubt that it would not adversely affect safety in air navigation.

If, however, an antenna is to be placed more than 6 meters above a building or structure, Microwave Data Systems will investigate the distance to the nearest aircraft landing area and will coordinate this study with each District Engineer in charge for each installation.