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## ***TECHNICAL NOTE #13 – AM TIS SYSTEM INSTALLATION GUIDE***

### **◆ General Information**

A Travelers' Information Station (TIS) is a highway information radio facility authorized in Part 90.242 of the Rules and Regulations for the Federal Communications Commission (FCC). These stations are normally licensed to operate on 530kHz or 1610kHz (outside of the previously standard AM broadcast band) to provide motorists with information regarding the weather, traffic conditions, etc. along their route of travel. Changes in Part 90.242 effective April 19, 1992 permit TIS operation at any frequency within the 530-1700kHz AM band. For several reasons, 530 and 1610kHz are still favored.

Vertical antenna TIS systems operate at a maximum of 10 watts transmitter power and have specified field strength limitations, which restrict their area of coverage to a few miles in radius from the antenna location. The antenna systems are restricted in height to a maximum of 15m (approx. 49ft) and are generally a simple vertical monopole style. A sketch of the antenna site is attached.

### **◆ Licensing (FCC and FAA)**

LPB Communications can perform all licensing and filing in accordance with FCC and FAA regulations.

### **◆ Ground Plane**

AM and other low frequency antennas require a ground plane around their base for proper radiating efficiency. This may be thought of as an electrical mirror, which increases the apparent electrical length of the antenna for greater efficiency. With a short antenna, as used in the TIS system, any additional efficiency available is beneficial. The preferred minimum ground plane is twelve 100ft copper radials radially installed at the base of the antenna pole. Typical LPB antenna systems with these ground planes and the LPB ATU-30 tuning unit achieve a 4-5 mile radius of coverage.

### **◆ Antenna Tuning Unit**

In order to maximize efficiency in a TIS system it is HIGHLY recommended that an antenna tuning unit be utilized to match the impedance of the antenna to the transmitter. This reduces the Voltage Standing Wave Ratio (VSWR) and allows almost all of the transmitter output power through the antenna.

### **◆ Electrical Installation**

The antenna is approximately 25ft in length at 530kHz, and about 11ft in length at 1610kHz. For the top to reach the maximum permitted 49ft above ground level requires that it be mounted on a non-metallic wooden utility pole or fiberglass pole which projects about 30ft (at 530kHz or 40ft at 1610kHz) above ground level to provide height and antenna mounting room. The antenna is supplied with mounting hardware.

The installation will require the antenna mounting pole and trenching for the ground plane prior to other installation work. The Antenna Tuning Unit (ATU-30) in a weatherproof enclosure is mounted to the pole just below the base of the antenna mast. The enclosure is supplied with mounting brackets for this purpose.

A transmission line of RG-8/U (90% shield) 50 $\Omega$  coaxial cable (supplied) is used between the ATU housing and the Main Housing. For added protection, this cable should be placed in a flexible PVC pipe (not included).

The Main Housing, consisting of the transmitter, isolation transformer, surge arrestor, digital repeater, site control unit, thermostat and fan, is also to be supplied with mounting hardware to install it on the mounting pole, at a lower height than the ATU, facing in the opposing direction. For access, it is preferred that neither housing be over 5ft maximum height from the base of the pole.

The Main Housing will require 120VAC 60Hz, 15 amp service. This should be independent service on a breaker carrying no other loads.

### ◆ Antenna Tuning

Final tuning of the antenna, after installation, is a trial and error procedure of adjusting the tip of the antenna and the controls of the Antenna Tuning Unit. A bucket truck is required to reach the top of the antenna, which is 49ft above the ground. The bucket truck is normally required for 1-2 hours.

Begin by setting the decades on the ATU to "OUT" and the Tap Selection at 70 $\Omega$ . If the VSWR is reading high, lengthen the antenna tip by one inch and check for a dip in the VSWR. It will be necessary to lower the bucket truck to check the ATU readings. Continue to move the tip in one inch intervals until the VSWR begins to rise again. Go back to antenna length that provided the lowest point for VSWR. This will probably be found near 40 $\Omega$ . Set the decade switch "IN" and adjust the capacitance taps to optimum VSWR. Tip tuning should be able to achieve a setting of nearly 1:1 on the VSWR meter.

Note that there are detailed instructions on the inside lid of the ATU enclosure.