

Exhibit C. Transmitter Technical Parameters

Each of the three (3) transmitters that comprise the System Validation Single Frequency Network (SV-SFN) will be identical. The prototype design incorporated into each transmitter will not only verify the basic design but will also allow Stanford Telecom to investigate various components.

Table C-1 summarizes the technical parameters of the transmitters. They will be capable of transmitting three (3) different types of waveforms to help characterize the environment and the performance of the broadcast waveform. The types of waveforms (i.e., modulations) are listed in Table C-1.

Table C-1. Transmitter Characteristics

Component/Parameter	Value	Notes
Transmit Frequency	2332.5 - 2345 MHz (tentative frequency: 2336.335 MHz)	- One frequency will be used in the frequency range (TBD pending final system design) - Transmitter is capable of adjusting center frequency within range
EIRP Maximum Nominal	1.2 kW 800 W	- Measured at antenna boresight - Referenced to isotropic antenna - Power will be adjustable (nominal EIRP = 800 W $\pm$ 200 W)
Signal & Modulation		Three different types of signals will be transmitted during the field trials
1. Multi Carrier Modulation Emission designator	2M50P7D	- Waveform is a multiplex of numerous phase modulated carriers - A 2.5 MHz wide RF signal, consisting of a series of discrete carrier tones, with the modulation of each consisting of phase modulation from a sequence of digital data pulses
2. Digital Waveform (BPSK & QPSK) Emission designator	4M00G1D	- Multiplexed channels or a direct sequence PN code stream on a single phase modulated (2- or 4-PSK) carrier - Symbol rates from 1.0 Msps to 2.0 Msps (bandwidth up to 4 MHz)
3. CW Tone Emission designator	N0N	This signal will be used for propagation measurements.

Table C-2 and the following specification sheets provide details on the equipment used in the transmitters.

Table C-2. Transmitter Equipment

Component/Parameter	Value	Notes
RF High Power Amplifiers: S-Band HPAs		Manufacturer: Unique Systems Part Number: DAB-200S-UTX OPA & associated power supplies, controllers, etc.
Rated output power	100 W	
Spectral shoulder regrowth	< -30 dBc	
Back-off	>6 dB	Measured from 1 dB compression point
Antenna: L-Band		Manufacturer: TIL-TEK
Model number	TA-2350	See data sheets later in this section for complete antenna pattern and other details
Gain at boresight	10 dBi	
Polarization	Vertical	
Electronic downtilt	0°	

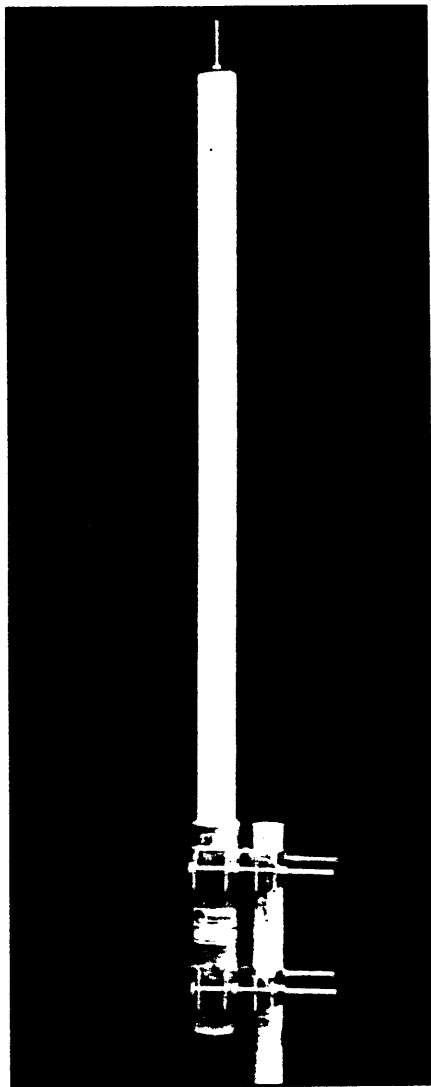
Enclosed Product Sheets:

- TIL-TEK TA-2350



TIL-TEK

TA-2350 **OMNIDIRECTIONAL ANTENNA**



The TA-2350 is a broadband, vertically polarized omnidirectional antenna consisting of a centre fed collinear array of dipoles enclosed in a tubular radome. The antenna was designed for operation under severe weather conditions (icing, salt air, acid rain, etc.) and is at DC ground for lightning protection.

ELECTRICAL SPECIFICATIONS

Frequency Range: 2300 - 2500 MHz

Gain: 10 dBi

VSWR: 1.5:1 maximum

Polarization: Vertical

Power Rating: 25 watts

Electrical Downtilt: Factory adjusted to 0, 2 or 4 degrees

E-Plane Beamwidth (-3 dB): 8 degrees

Cross-Polarization Discrimination: 20 dB minimum

Impedance: 50 ohms nominal

Termination: Type N female (7/16 jack optional)

MECHANICAL SPECIFICATIONS

Overall Length: 48 in. (1219 mm)

Radome Diameter: 2.25 in. (57.2 mm)

Weight Including Clamps: 15 lb. (6.8 kg)

Rated Wind Velocity: 125 mph (200 km/hr)

Horizontal Thrust at Rated Wind: 29.3 lb. (13.3 kg)

Mounting: Mounts to a 1.75 - 4.0 in. O.D. (44.5 - 102 mm) pipe using the two TMC-103 clamps supplied

MATERIALS

Radiating Elements: Copper

Radome: Gray fiberglass

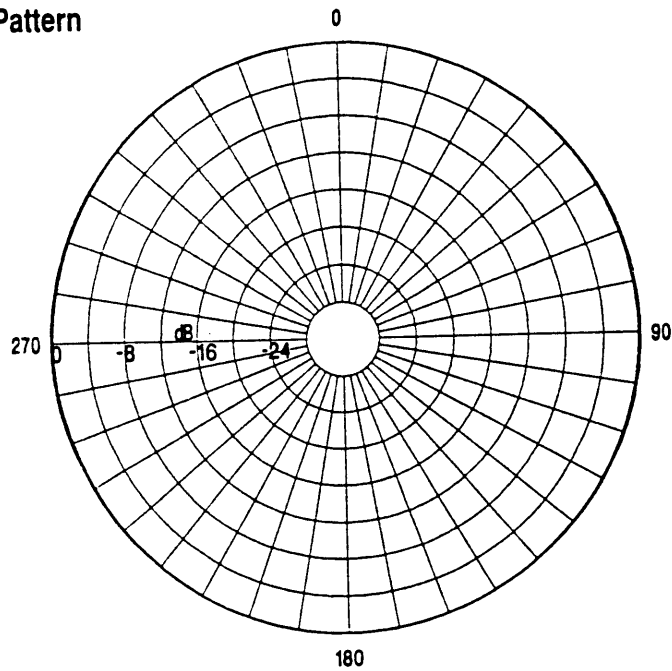
Base: Irridited aluminum

Clamps: Hot dip galvanized steel

TIL-TEK LTD., P.O. Box 550, 500 Van Buren St., Kemptville, Ontario, Canada, K0G 1J0
Tel: (613) 258-5928 • Fax (613) 258-7418

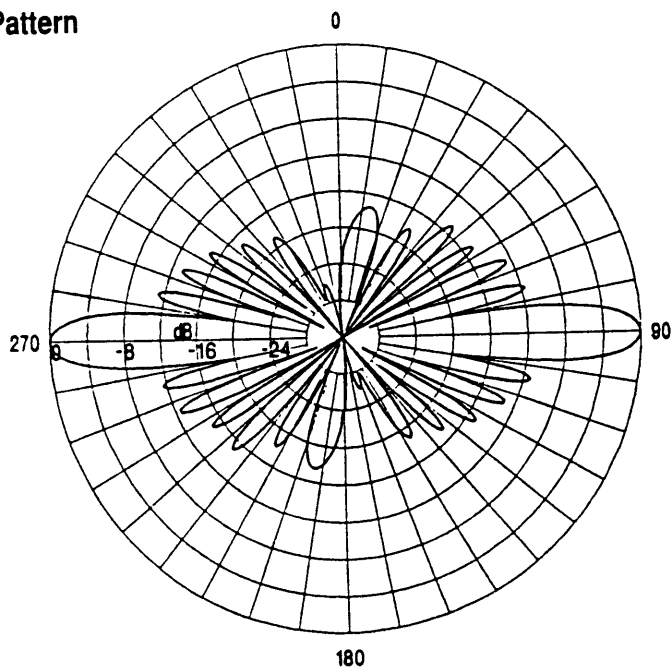
TA-2350

H-Plane Pattern



TIL-TEK

E-Plane Pattern



TIL-TEK

Summary Notes on the experimental license application histories of Satellite CD Radio, Inc. and XM Radio

Satellite CD Radio, Inc.

1. 6259-EX-PL-1998 Testing repeater stations. Seeking information regarding power levels required to ensure reception in "urban canyons". Also, will measure out-of-band emissions. Maximum of 1000 watts transmitter power.
2. 6305-EX-PL-1998 Begin testing of terrestrial repeater ground stations. Determine power levels needed for "urban canyons". Measure out-of-band emissions
3. 0252-EX-ML-1999 Install temporary equipment to locate, verify and evaluate predicted coverage areas in major urban cities. Not the same equipment as terrestrial repeater locations. Equipment will be de-installed upon completion of testing. Applicant asked for 20 watts output power (640 W ERP). Was granted 50 kW ERP.
4. 0037-EX-ML-2000 Construct operational repeater sites in major urban cities and begin testing of a terrestrial repeater network. Only requested 24.4kW max ERP. Was granted 50 kW ERP.

XM Radio

1. (0308-0328)-EX-ST-2000 **Applicant only requested a six-month STA for 313 watts in all of these applications. These were all granted and scheduled to expire on February 26, 2001. All these were combined into 0160 and given 30.5 kW ERP with nationwide authority for 5 years.**
2. 0160-EX-ML-2000 This application was on file two days prior to all of the above applications. **Application requested only four fixed locations in Ft. Lauderdale, Fl. High power (30.5kW ERP) was requested for one of the locations.** The other three needed only 1.2 kW EIRP. Purpose of the test was to examine terrestrial signal propagation in urban situations where satellite signal blockage may occur due to high buildings.

SATELLITE CD RADIO

DATES			File Number	LOCATION	FREQUENCY	POWER	CLEARED	NOTE
Filed	Effective	Expiration						
10/20/1992	02/25/1993	09/01/1994	3481-EX-PL-1992	27 Locations see attachment	2310-2360 14000-14500	800 mW 250 W	SYB 2/26/98	Incomplete record
09/13/1994	10/11/1994	10/01/1996	3481-EX-RR-1994	Ditto	Ditto	Ditto	Ditto	Incomplete record
12/02/1996	10/01/1996	10/01/1998	3481-EX-RR-1996	Ditto	Ditto	Ditto	Ditto	Incomplete record
09/04/1998	10/13/1998	10/01/2000	6259-EX-PL-1998	Berkley, Ca. San Francisco, Ca Woodside, Ca. San Leandro, Ca. Brisbane, Ca.	2326.1	1000 W 50 kW ERP	IB OK 10/13/98 E-mail from Anne Bisese Ron Repasi	See note 1
11/03/1998	02/25/1999	03/01/2001	6305-EX-PL-1998	Houston, Tx.	2326.1 MHz	1000 W 25 kW ERP	OK via E-mail AB/RR 2/25/99	See note 2
09/21/1999	10/14/1999	10/01/2001	0252-EX-ML-1999	US	2320-2345 MHz	20 W max 50 kW ERP see note 3	Note in ELS Verbal OK, RR E-mail from Shahnaz Ghavami 10/13/99	See note 3
06/13/2000	07/05/2000	07/01/2005	0037-EX-ML-2000	US	2320-2345 MHz	350 W 650 W 1000 W max 50 kW ERP see note 4	Note in ELS IB, OK/SS E-mail from Shahnaz Ghavami 6/28/00	See note 4

STANFORD TELECOM FOR XM RADIO								
	DATES							
FILED	EFFECTIVE	EXPIRATION	File Number	LOCATION	FREQUENCY	POWER	CLEARED	NOTE
	08/15/1998		S-3431-EX-1998	Washington D.C.	2332.5-2345 MHz	1.2 kW	No record	
	01/05/1999		0089-EX-ST-1998	Washington D.C. Arlington, Va.	2332.5-2345 MHz	732 W		EXTENSION OF 3431 ABOVE
XM RADIO								
	DATES							
FILED	EFFECTIVE	EXPIRATION	File Number	LOCATION	FREQUENCY	POWER	CLEARED	NOTE
04/06/1999	04/06/1999	10/06/1999	0110-EX-ST-1999	Washington D.C. Arlington, Va.	2332.5-2345 MHz	732 W ERP	No record	
07/14/1999	08/17/1999	09/01/2004	0199-EX-PL-1999	61 Locations listed in exhibit 2	2332.5-2345 MHz	31 W ERP	to SG-OK per 8-17 E-mail	See exhibit 2
01/07/2000	02/01/2000	08/01/2000	0019-EX-ST-2000	Ft. Lauderdale	2332.5-2345 MHz	732 W	No record	
04/07/2000	05/01/2000	11/01/2000	0138-EX-ST-2000	Pittsburgh, Pa.	2332.5-2345 MHz	31 W	No record	
07/17/2000	08/01/2000	02/01/2001	0271-EX-ST-2000	Ft. Lauderdale	2332.5-2345 MHz	732 W	No record	
07/17/2000	08/23/2000	09/01/2005	0160-EX-ML-2000	Nationwide, US	2332.5-2345 MHz	1400 W Transmitter power 30.5 kW ERP	IB No objections 8/17/99	See note 2
07/25/2000	08/25/2000	02/26/2001	0308-EX-ST-2000	San Francisco, Ca.	2332.5-2345 MHz	313 W	No record	Merged into 0160- EX-ST-2000 See note 1
07/25/2000	08/25/2000	02/26/2001	0309-EX-ST-2000	Dallas, Tx.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0310-EX-ST-2000	Hartford, Ct.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0311-EX-ST-2000	Los Angeles, Ca.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0312-EX-ST-2000	Harrisburg, Pa.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0313-EX-ST-2000	Milwaukee, Wi.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0314-EX-ST-2000	Miami, Fl.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0315-EX-ST-2000	Chicago, Il.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0316-EX-ST-2000	Philadelphia, Pa.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0317-EX-ST-2000	Boston, Ma.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0318-EX-ST-2000	Pittsburgh, Pa.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0319-EX-ST-2000	Atlanta, Ga.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0320-EX-ST-2000	Minneapolis, Mn.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0321-EX-ST-2000	Toledo, Oh.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0322-EX-ST-2000	Tampa, Fl.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0323-EX-ST-2000	St. Louis, Mo.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0324-EX-ST-2000	New York, Ny.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0325-EX-ST-2000	Seattle, Wa.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0326-EX-ST-2000	Birmingham, Al.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0327-EX-ST-2000	Portland, Or.	2332.5-2345 MHz	313 W	No record	
07/25/2000	08/25/2000	02/26/2001	0328-EX-ST-2000	Washington, DC	2332.5-2345 MHz	313 W	No record	