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April 25, 2000

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**STATEMENT THAT TSUNAMI (UNII) RADIOS MUST BE PROFESSIONALLY
INSTALLED AND SO IS EXEMPT FROM THE ANTENNA RESTRICTIONS OF FCC PART
15.203, INCLUDING INFORMATION ON ANTENNAS USED FOR TESTING**

This letter is submitted with regards to professional installation of the Tsunami (UNII) radio and the antennas used for testing. The Tsunami (UNII) radios must be professionally installed and so is exempt from the antenna restrictions of FCC Part 15.203. The Tsunami (UNII) radio is a product manufactured by Western Multiplex in Sunnyvale, California.

The Tsunami (UNII) radio is to be certified for operation under Part 15.407 of the FCC Rules in the 5.25-5.35 GHz and 5.725-5.825 GHz band. This equipment is designed for point-to-point communications and will only carry data signals using a 100BaseT interface. Due to the unique requirements of installation and integration of these systems, typical consumers or businesses will not have the proper training required for successful implementation of these systems.

The Tsunami (UNII) is not designed for use by the general public, and will be sold as follows:

- either through the Western Multiplex sales force to professional communications users in the following categories : electric power utilities, cellular telephone operating companies, personal communication service operating companies, regional Bell operating companies, oil and gas exploration and transmission companies, railroad companies, federal, state and local government agencies, or
- through designated and professionally trained Western Multiplex Value Added Resellers (VARs) to business users under individual reseller agreements.

These companies will either use their professional telecommunications engineering staff to carry out the installation or will subcontract to professional installation firms. On occasion, a professional installation firm will purchase the Tsunami (UNII) radios directly.

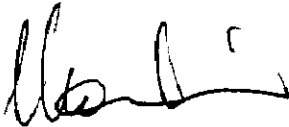
The Tsunami (UNII) radio will be used for fixed, permanent or temporary, outdoor links requiring the use of directional antennas at 5.2-5.8 GHz or 5.8GHz which tend to be mounted on towers. These antennas will have narrow beamwidths and require professional installers to align them.

In addition, the Tsunami (UNII) radio must be set up for the specific line interface required during installation. This procedure must be carried out by a qualified professional installer for the equipment to operate properly.

The output power of the Tsunami (UNII) radio will be adjusted to meet any applicable EIRP limits by the professional installer during installation. The method of adjusting the output power is described in the manual written for use by professional trained installers.

The Tsunami (UNII) radio is a full duplex device with a common transmit and receive port. The addition of an external amplifier to boost the transmit power would disable the receive signal, thus rendering the Tsunami (UNII) radio inoperable. In addition, high power amplifiers (not generally available at 5.2-5.8 GHz) cannot be used without ensuring that signal saturation does not occur (because this would produce unrecoverable deterioration of the receive signal). Thus, the addition of an amplifier could not be accomplished by a non-professional installer.

The Tsunami (UNII) radio is typically sold without an antenna, and the customer and/or installation engineer chooses from commercially available antennas. From time to time, Western Multiplex may sell a commercially available antenna along with the Tsunami (UNII) radio upon customer request.

A handwritten signature in black ink, appearing to read 'Caroline Yu', with a stylized, flowing script.

Caroline Yu

International Product Manager
Western Multiplex Corporation

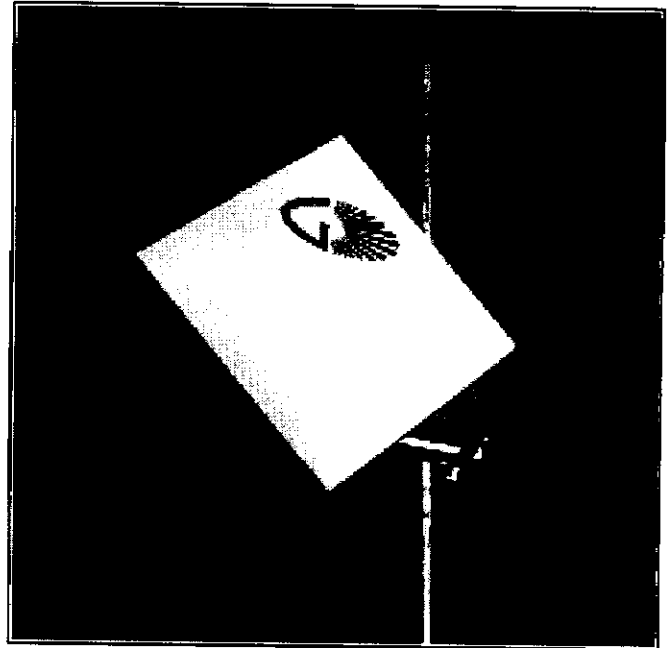
Directional Flat Panel Microwave Antenna

5.250 - 5.850 GHz

5 GHz - Spread Spectrum / NII
Directional Flat Panel Antenna
(for Point-to-Point applications)

Facts & Features

- Gabriel Quality and Dependability.
- Lightweight and durable construction.
- Quick and easy installation.
- Feed input, Type N Female connector. (Other types available on request.)
- Input connector positioned on back of antenna assembly.
- Antenna supplied with paintable rigid radome.
- All Gabriel antennas meet or exceed Standards EIA-195-C and EIA-222-F.
- Antenna accommodates +/-20° elevation adjustment. (specific installation limitations may apply)
- Mini-Mounts accommodate a 1.9 in. to 4.5 in. (48 to 114 mm) O.D. mast pipe. Quick-Align Mounts mount to a 2.375 in. (60 mm) O.D. mast pipe. An optional 1.9 in. (48 mm) to 4.5 in. (114 mm) Mast Clamp Kit is available on request for the Quick-Align Mount.
- To adapt the Quick Align Mount for use on a 1.9 in. to 4.5 in. O.D. mast pipe order Mast Clamp Kit MCKQ-19-45
- Special colors and / or logos available on request.
- Radio mount kits available.



Gabriel 5 GHz Diagonal Directional
Flat Panel Antenna

Electrical Specifications

5.250 - 5.850 GHz

Frequency GHz	Model Number	Size ft. (m)	Mount Type	Low	Gain at Mid dBi	High	Nominal Mid-Band Beamwidth degrees	XPD dB	F/B ratio dB	VSWR max	(R.L. dB)
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Square - Directional Flat Panel - Plane Polarized

5.250 - 5.850	DFPS.5-52	0.5 (0.15)	MM	17.5	18.0	18.4	19.0	30	35	1.50	(14.0)
	DFPS1-52	1 (0.3)	MM	23.0	23.5	23.9	9.4	30	41	1.50	(14.0)
	DFPS1-52 (M1)	1 (0.3)	QAM	23.0	23.5	23.9	9.4	30	41	1.50	(14.0)
	DFPS2-52	2 (0.6)	QAM	28.0	28.5	28.9	4.7	30	45	1.50	(14.0)

Diagonal - Directional Flat Panel - Plane Polarized

5.250 - 5.850	DFPD.5-52	0.5 (0.15)	MM	17.5	18.0	18.4	19.0	30	37	1.50	(14.0)
	DFPD1-52	1 (0.3)	MM	23.0	23.5	23.9	9.4	30	43	1.50	(14.0)
	DFPD1-52 (M1)	1 (0.3)	QAM	23.0	23.5	23.9	9.4	30	43	1.50	(14.0)
	DFPD2-52	2 (0.6)	QAM	27.5	28.0	28.4	4.6	30	46	1.50	(14.0)

MM	=	Mini - Mount
QAM	=	Quick Align Mount

NOTE:

Product information subject to change without notice.
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DFP-52B - 012699

Plane - Dual Polarized Unlicensed "NII" and Spread Spectrum / "ISM" Bands

(National Information Infrastructure) (Industrial, Scientific & Medical)

Facts & Features

- Gabriel Quality and Dependability.
- Innovative Feed Design.
- Feed input is Type N Female, 50 ohm.
- Isolation is 35 dB on Dual Polarized models.
- Optional radomes available.
- 2 ft. (0.6) model feeds are installed from the front of the antenna. 4 ft. (1.2) and 6 ft. (1.8) model feeds are installed from the rear of the antenna, and allow for inspection or replacement from the rear.
- These models allow for smooth polarization adjustment from the back of the antenna.
- Gabriel's Quick Align Mount comes standard on the SSP2 and the SSD2 models. This mount allows for quick installation and easy alignment of the antenna with two hand tools. The Quick Align Mount will mount to a 1.9 - 4.5 in OD mast pipe.
- New environmentally pleasing neutral colors.
- Dual band models are available.

Electrical Specifications

Frequency GHz	Model Number	Size ft. (m)	Standard	Low	Gain at Mid Band dBi	Mid Band Beamwidth degrees	Nominal Mid Band Beamwidth degrees	XPD dB	F/B ratio dB	VSWR max	(R.L. dB)
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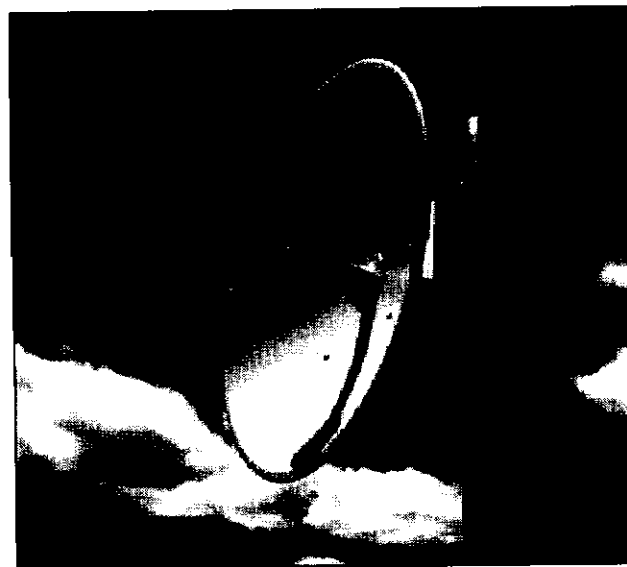
Standard - Plane Polarized

5.250 - 5.850	SSP2-52B	2 (0.6)	-	28.1	28.5	29.0	6.1	25	38	1.50	(14.0)†
	SSP4-52A	4 (1.2)	-	33.6	34.2	34.6	3.1	30	46	1.50	(14.0)†
	SSP6-52A	6 (1.8)	-	37.0	37.5	38.0	2.1	30	49	1.50	(14.0)†

Standard - Dual Polarized

5.250 - 5.850	SSD2-52A	2 (0.6)	-	28.0	28.4	28.9	6.1	30	38	1.50	(14.0)†
	SSD4-52	4 (1.2)	-	33.5	34.1	34.5	3.1	30	46	1.50	(14.0)†
	SSD6-52	6 (1.8)	-	36.9	37.4	37.9	2.1	30	49	1.50	(14.0)†

See the Special Application section of this catalog for Gabriel's Directional Flat Panel antennas for Spread Spectrum operation.



Gabriel "NII" and "ISM" Band
2-ft. (0.6 m) - Plane Polarized - Standard Parabolic Antenna

Associated Equipment Information	Pages
Point-to-Point Antenna Specifications	14 - 111
Special Application Antennas	135 - 145
Antenna Mounts & Reference Dimensions	112 - 134
Radomes	122 - 124
Tower Accessories	146 - 154
Transmission Lines	155 - 243
Dry Air Pressurizers	244 - 253

NOTE:

- Improved VSWR available.
- Product information subject to change without notice.



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Ken Ruppel
Glenayre Western Multiplex.
1196 Borregas Ave.
Sunnyvale, CA 94089-1302

Ken,

The omnidirectional antennas, model OMN-H-5-8, sent to you earlier this month for your FCC UNII testing were measured in accordance to your request. At 5.3 GHz they each measured 2.9 dB return loss. 2.9 dB return loss equates to a 6:1 VSWR, which indicates a 3.1 dB reduction in gain at this frequency (compared to operation at 5.8 GHz). Our specified performance at 5.8 GHz is 8 dBi gain, therefore, the gain of these antennas is just below 5 dBi at 5.3 GHz.

Sincerely,

Craig Collins
Sales Manager

PARABOLIC ANTENNA P-57 SERIES 5.725-5.850 GHz



Antenna
used for
Testing

	P-57B24	P-57B48	P-57A72	P-57A96	P-57A120
SIZE (ft)	2	4	6	8	10
GAIN (midband)	29.0	34.7	38.2	40.8	42.5
HPBW (midband)	5.8	2.8	2.0	1.45	1.2
F/B RATIO	39	41	46	52	52
1ST SIDE LOBE	18	20	22	22	22
CROSS POL	30	30	30	30	30
VSWR	1.15	1.15	1.10	1.08	1.06
POLARIZATION	Linear	Linear	Linear	Linear	Linear
CONNECTOR	CPR-137G	CPR-137G	CPR-137G	CPR-137G	CPR-137G
MOUNT O.D. (-1)	1.9-3.5	1.9-3.5	1.9-3.5	N/A	N/A
MOUNT O.D. (-2)	4.5	4.5	4.5	4.5	4.5

	P-57C24N	P-57B24N	P-57B48N	P-57A72N	P-57A96N
SIZE (ft)	2	2	4	6	8
GAIN (midband)	29.0	27.0	34.7	38.2	40.8
HPBW (midband)	5.8	5.5	2.8	2.0	1.45
F/B RATIO	39	41	41	46	52
1ST SIDE LOBE	18	10	20	22	22
CROSS POL	30	30	30	30	30
VSWR	1.3	1.3	1.3	1.3	1.3
POLARIZATION	Linear	Linear	Linear	Linear	Linear
CONNECTOR	N	N	N	N	N
MOUNT O.D. (-1)	1.9-3.5	1.9-3.5	1.9-3.5	1.9-3.5	N/A
MOUNT O.D. (-2)	4.5	4.5	4.5	4.5	4.5

	P-57A48D	P-57A48DN	P-57A72D	P-57A72DN	P-57A96D	P-57A96DN	P-57A120D
SIZE (ft)	4	4	6	6	8	8	10
GAIN (midband)	34.7	34.7	38.2	38.2	40.8	40.8	42.5
HPBW (midband)	2.8	2.8	2.0	2.0	1.45	1.45	1.2
F/B RATIO	41	41	46	46	52	52	52
1ST SIDE LOBE	20	20	22	22	22	22	22
CROSS POL	30	30	30	30	30	30	30
VSWR	1.15	1.3	1.10	1.3	1.08	1.3	1.06
POLARIZATION	Dual	Dual	Dual	Dual	Dual	Dual	Dual
CONNECTOR	CPR-137G	N	CPR-137G	N	CPR-137G	N	CPR-137G
MOUNT O.D. (-1)	1.9-3.5	1.9-3.5	1.9-3.5	1.9-3.5	N/A	N/A	N/A
MOUNT O.D. (-2)	4.5	4.5	4.5	4.5	4.5	4.5	4.5



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Federal Communications Commission
Authorization and Evaluation Division
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Columbia, MD 21046

Attention: Reviewing Engineer

Please find in the following page information regarding some typical antennas, feeder losses of some typical cables and waveguides at 5.8GHz, and formula for determining maximum output power. The information is provided to ensure the installers of the equipment will correctly set up the radio so that the 30dBm EIRP limit for 5.25-5.35 GHz band will not be exceeded. This instruction has been integrated into the Installation and Maintenance manual of our products.

Sincerely yours

A handwritten signature in black ink, appearing to read "Caroline Yu". The signature is fluid and cursive, with a large initial 'C' and 'Y'.

Caroline Yu
International Product Manager
Western Multiplex Corporation

Antenna Type	Manufacturer	Model Number	Mid-band Gain (dBi)	Notes
1 Foot Flat Panel	Gabriel	DFPD1-52	23.5	
2 Foot Flat Panel	Gabriel	DFPD2-52	28	
	RSI	A57A24-U	26.5	Not rated @ 5.2 GHz
2 Foot Parabolic	Gabriel	SSP2-52B	28.5	
	RSI	P-57C24	29	Not rated @ 5.2 GHz
	Radio Waves	SP2-5.2	28.3	
3 Foot Parabolic	Radio Waves	SP3-5.2	31.4	
4 Foot Parabolic	Gabriel	SSP4-52A	34.2	
	RSI	P-57B48	34.7	Not rated @ 5.2 GHz
	Radio Waves	SP4-5.2	34.6	
6 Foot Parabolic	Gabriel	SSP6-52A	37.5	
	RSI	P-57A72	38.2	Not rated @ 5.2 GHz
	Radio Waves	SP6-5.2	37.7	
8 Foot Parabolic	Gabriel	DRFB8-55ASE	40.7	Not rated @ 5.2 GHz
	RSI	P-57A96	40.8	Not rated @ 5.2 GHz

Feeder Loss Type	Manufacturer	Model Number	Loss/100'	Notes
1/2" foam coax	Andrew	LDF 4-50	6.6 dB	add ~0.25 dB per connector
5/8" foam coax	Andrew	LDF 4.5-50	4.7 dB	add ~0.25 dB per connector
Waveguide	Andrew	EW-52	1.2 dB	does not include transitions

Formula for determining maximum output power setting for 5.2 GHz U-NII (LE-LAN) Transmitters (@ EIRP=30dBm):

$$\text{Max Tx (dBm)} = 30 - G + \text{FL}$$

where: G = Antenna Gain

FL = Feeder Loss including connectors

Formula for determining maximum output power setting for 5.7 GHz U-NII (LE-LAN) Transmitters (@ EIRP=53dBm):

$$\text{Max Tx (dBm)} = 53 - G + \text{FL}$$

where: G = Antenna Gain

FL = Feeder Loss including connectors

Note: All Western Multiplex radios require professional installation.

Note: Western Multiplex U-NII devices have a built-in calibrated Tx Power Output Voltage port to aid in setting the output power correctly, without the use of an RF power meter. The measurement in Volts is multiplied by 10 for a measurement in dBm. e.g. 1.0 V = 10 dBm; 2.0 V = 20 dBm, 1.5 V = 15 dBm; 0.5 V = 5 dBm; etc.