



FCC Certification Report for the
LA3020 WLAN PC Card
Class II Permissive Change

EXHIBIT 2

TEST REPORT



**Class I Permissive Change Report
(FCC Part 15.247 (c) Radiated Emissions
in Restricted Bands)
for
Symbol Technologies
on the
Spread Spectrum Transmitter
Model: LA3020**

Test Report #: J20130352
Date of Report: May 12, 2000

Job #: J20013035-B
Date of Test: April 14, 2000

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<i>Call: Mr. J. for</i>	Barry E. Smith, Test Engineer
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1.0 Summary of Tests

Symbol Technologies Inc. - Model No.: LA3020

TEST	REFERENCE	RESULTS
Radiated Emission in Restricted Bands	15.247(c)	Pass

Test Engineer: *Barry E. Smith* Date: 5/18/00
Barry E. Smith
Test Engineer

EMC Site Mgr: *David Chernomordik* Date: 5/18/00
David Chernomordik
EMC Site Manager

2.0 General Description**2.1 Product Description**

The Symbol Technologies model LA3020 is 2.4 GHz Spread Spectrum radio in the form of a PCMCIA card that is used for wireless communication from a computer to a LAN.

Overview of the EUT

Trade Name & Model No.	Symbol Technologies, Model No. LA3020
Frequency Range (MHz)	2402 - 2480
Antenna(s)	4 antennas
Manufacturer name & address	Symbol Technologies 5480 Via Del Oro San Jose CA 95119

2.3 Test Methodology

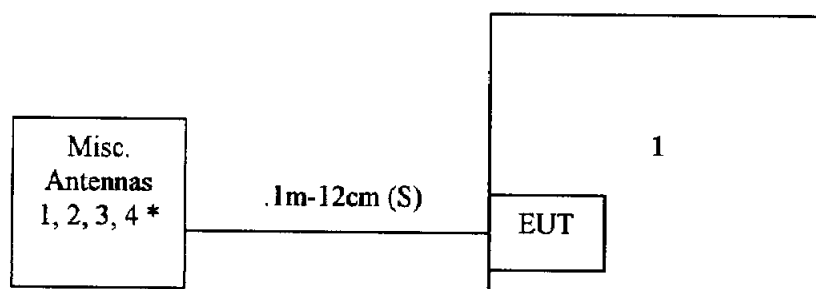
Radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Data Sheet" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The open area test site facility used to collect the radiated data is located at 1365 Adams Court, Menlo Park, CA 94025. This test facility and site measurement data have been fully placed on file with the FCC.

3.0 System Test Configuration**3.1 Support Equipment**

Item #	Description	Model No.	Serial No.	FCC ID
1	Compaq Notebook Computer	2860A	7448HJJ53R518	CNT75MB2CA

3.2 Block Diagram of Test Setup

- *: Antenna #1 = DASH 3000
Antenna #2 = Amity XPn
Antenna #3 = Amtrak Omni
Antenna #4 = Oniel S24-1

m: Length in meters
S: Shielded

3.3 Justification

Purpose of this testing was to add 4 additional antennas to the previously certified radios. Please refer to ITS report #J98017331. As these antennas only effect radiated emissions, only radiated emissions testing in restricted bands was performed.

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

3.5 Mode of Operation During Test

For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

3.6 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by Symbol Technologies Inc. prior to compliance testing):

No modifications were made to the EUT by Intertek Testing Services.

4.0 Measurement Results

4.1 Transmitter Radiated Emissions in Restricted Bands, *FCC Ref: 15.247(c)*

Radiated emission measurements were performed from 1000 MHz to 25000 MHz. Analyzer resolution is 100 kHz or greater for frequencies from 30 MHz to 1000 MHz and 1 MHz for frequencies above 1000 MHz.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection and average detection (above 1 GHz) unless otherwise specified.

On the following pages, the emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter is in full radiated power.

For the test results, refer to the attached radiated emission data.

Radiated Emissions Test Data

Company: Symbol						Model #: Ant 1 Tag # 32			Standard		FCC § 18.247 (R.B.)	
EUT: LA3020 Spread Spectrum Radio						S/N #:			Limits		11	
Project #: J20008658F						Test Date: April 14, 2000			Test Distance		3 meters	
Test Mode: Transmitting on Dash 3000 Dipole						Engineer: Barry S.			Duty Relaxation		0 dB	
Frequency	Reading	Detector	Ant. #	Amp. #	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/O	#	#	HY	dB(1m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
2402												
4804	24.2	Peak	14	8	V	33.9	28.1	3.2	0.0	33.2	74.0	-40.8
4804	19.2	Ave.	14	8	V	33.9	28.1	3.2	0.0	28.2	54.0	-25.8
7206	37.6	Peak	14	8	V	38.0	28.0	4.3	0.0	51.9	74.0	-22.1
7206	32.0	Ave.	14	8	V	38.0	28.0	4.3	0.0	46.3	54.0	-7.7
12010	41.4	Peak	14	10	V	42.3	39.1	5.9	0.0	50.5	74.0	-23.6
12010	34.2	Ave.	14	10	V	42.3	39.1	5.9	0.0	43.3	54.0	-10.8
19216	33.0	Peak	21	13	V	40.2	23.3	7.7	-9.5	48.1	74.0	-25.9
19216	25.7	Ave.	21	13	V	40.2	23.3	7.7	-9.5	40.8	54.0	-13.2
2440												
4880	25.6	Peak	14	8	V	33.9	28.1	3.2	0.0	34.6	74.0	-39.4
4880	18.8	Ave.	14	8	V	33.9	28.1	3.2	0.0	27.8	54.0	-26.2
7320	33.8	Peak	14	8	V	38.0	28.0	4.3	0.0	48.1	74.0	-25.9
7320	26.7	Ave.	14	8	V	38.0	28.0	4.3	0.0	41.0	54.0	-13.0
12200	39.9	Peak	14	10	V	42.3	39.1	5.9	0.0	49.0	74.0	-25.1
12200	32.7	Ave.	14	10	V	42.3	39.1	5.9	0.0	41.8	54.0	-12.3
19520	34.1	Peak	21	13	V	40.3	23.3	7.7	-9.5	49.3	74.0	-24.7
19520	23.9	Ave.	21	13	V	40.3	23.3	7.7	-9.5	39.1	54.0	-14.9
2480												
4960	26.7	Peak	14	8	V	33.9	28.1	3.2	0.0	35.7	74.0	-38.3
4960	18.6	Ave.	14	8	V	33.9	28.1	3.2	0.0	27.6	54.0	-26.4
7440	33.8	Peak	14	8	V	38.0	28.0	4.3	0.0	48.1	74.0	-25.9
7440	25.7	Ave.	14	8	V	38.0	28.0	4.3	0.0	40.0	54.0	-14.0
12400	39.7	Peak	14	10	V	42.3	39.1	5.9	0.0	48.8	74.0	-25.3
12400	32.4	Ave.	14	10	V	42.3	39.1	5.9	0.0	41.5	54.0	-12.6
19840	40.1	Peak	21	13	V	40.3	23.3	7.7	-9.5	55.3	74.0	-18.7
19840	32.2	Ave.	21	13	V	40.3	23.3	7.7	-9.5	47.4	54.0	-6.6
22320	40.0	Peak	21	13	V	40.3	23.3	0.0	-9.5	47.5	74.0	-26.5
22320	31	Ave.	21	13	V	40.3	23.3	0.0	-9.5	38.5	54.0	-15.5

Notes:	a) D.C.F.: Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
	d) Negative signs (-) in Margin column signify levels below the limits.
	e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
	f) DCF -9.5 were taken at 1 meter with RBW 300 kHz

Radiated Emissions Test Data

Company: Symbol						Model #: Ant 2 Tag 25			Standard		FCC § 15.247 (R.F.)	
EUT: LA3020 Spread Spectrum Radio						S/N #:			Limits		11	
Project #: J20008658F						Test Date: April 14, 2000			Test Distance		3 meters	
Test Mode: Transmitting on 703611 antenna						Engineer: Barry S.			Duty Relaxation		0 dB	
Frequency	Reading	Detector	Ant. #	Amp. #	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D.C.F.	Net	Limit	Margin
MHz	dB(µV)	PK/A	#	#	H/V	dB(1m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
2402		Ave.	14		V	30.1	0.0	2.3	0.0		54.0	-54.0
4804	38.0	Peak	14	8	V	33.9	28.1	3.2	0.0	47.0	74.0	-27.0
4804	35.0	Ave.	14	8	V	33.9	28.1	3.2	0.0	44.0	54.0	-10.0
7206	39.4	Peak	14	8	V	38.0	28.0	4.3	0.0	53.7	74.0	-20.3
7206	34.7	Ave.	14	8	V	38.0	28.0	4.3	0.0	49.0	54.0	-5.0
12010	39.8	Peak	14	10	V	42.3	39.1	5.9	0.0	48.9	74.0	-25.2
12010	32.7	Ave.	14	10	V	42.3	39.1	5.9	0.0	41.8	54.0	-12.3
19216	43.5	Peak	21	13	V	40.2	23.3	7.7	-9.5	58.6	74.0	-15.4
19216	30.8	Ave.	21	13	V	40.2	23.3	7.7	-9.5	45.9	54.0	-8.1
2440												
4880	36.3	Peak	14	8	V	33.9	28.1	3.2	0.0	45.3	74.0	-28.7
4880	33.0	Ave.	14	8	V	33.9	28.1	3.2	0.0	42.0	54.0	-12.0
7320	37.0	Peak	14	8	V	38.0	28.0	4.3	0.0	51.3	74.0	-22.7
7320	31.5	Ave.	14	8	V	38.0	28.0	4.3	0.0	45.8	54.0	-8.2
12200	39.8	Peak	14	10	V	42.3	39.1	5.9	0.0	48.9	74.0	-25.2
12200	32.3	Ave.	14	10	V	42.3	39.1	5.9	0.0	41.4	54.0	-12.7
19520	41.8	Peak	21	13	V	40.3	23.3	7.7	-9.5	57.0	74.0	-17.0
19520	31.4	Ave.	21	13	V	40.3	23.3	7.7	-9.5	46.6	54.0	-7.4
2480												
4960	31.0	Peak	14	8	V	33.9	28.1	3.2	0.0	40.0	74.0	-34.0
4960	24.5	Ave.	14	8	V	33.9	28.1	3.2	0.0	33.5	54.0	-20.5
7440	33.6	Peak	14	8	V	38.0	28.0	4.3	0.0	47.9	74.0	-26.1
7440	26.0	Ave.	14	8	V	38.0	28.0	4.3	0.0	40.3	54.0	-13.7
12400	39.8	Peak	14	10	V	42.3	39.1	5.9	0.0	48.9	74.0	-25.2
12400	32.2	Ave.	14	10	V	42.3	39.1	5.9	0.0	41.3	54.0	-12.8
19840	40.5	Peak	14	10	V	42.3	39.1	8.8	0.0	52.5	74.0	-21.5
19840	29.8	Ave.	14	10	V	42.3	39.1	8.8	0.0	41.8	54.0	-12.2
22320	45.9	Peak	21	13	V	40.3	23.3	0.0	-9.5	53.4	74.0	-20.6
22320	35.0	Ave.	21	10	V	40.3	36.1	0.0	-9.5	29.7	54.0	-24.3

Notes:	a) D.C.F.: Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
	d) Negative signs (-) in Margin column signify levels below the limits.
	e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
	f) DCF of -9.5 were taken at 1 meter with RBW 300kHz

Radiated Emissions Test Data

Company: Symbol						Model #: Ant 3 Tag 36			Standard		FCC 47 CFR 15.247 (R.B.)	
EUT: LA3020 Spread Spectrum Radio						S/N #:			Limits		11	
Project #: J20008658F						Test Date: April 17, 2000			Test Distance		3 meters	
Test Mode: Transmitting on SQ2403PSNF						Engineer: Barry S.			Duty Relaxation		0 dB	
Frequency	Reading	Detector	Ant #	Amp #	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/V	#	#	H/V	dB(1m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
2402												
4804	26.3	Peak	14	8	V	33.9	28.1	3.2	0.0	35.3	74.0	-38.7
4804	19.4	Ave.	14	8	V	33.9	28.1	3.2	0.0	28.4	54.0	-25.6
7206	33.0	Peak	14	8	V	38.0	28.0	4.3	0.0	47.3	74.0	-26.7
7206	26.6	Ave.	14	8	V	38.0	28.0	4.3	0.0	40.9	54.0	-13.1
12010	40.2	Peak	14	10	V	42.3	39.1	5.9	0.0	49.3	74.0	-24.8
12010	33.2	Ave.	14	10	V	42.3	39.1	5.9	0.0	42.3	54.0	-11.8
19216	41.9	Peak	21	13	V	40.2	23.3	7.7	-9.5	57.0	74.0	-17.0
19216	30.7	Ave.	21	13	V	40.2	23.3	7.7	-9.5	45.8	54.0	-8.2
2440												
4880	28.4	Peak	14	8	V	33.9	28.1	3.2	0.0	37.4	74.0	-36.6
4880	23.2	Ave.	14	8	V	33.9	28.1	3.2	0.0	32.2	54.0	-21.8
7320	41.4	Peak	14	8	V	38.0	28.0	4.3	0.0	55.7	74.0	-18.3
7320	37.0	Ave.	14	8	V	38.0	28.0	4.3	0.0	51.3	54.0	-2.7
12200	39.7	Peak	14	10	V	42.3	39.1	5.9	0.0	48.8	74.0	-25.3
12200	33.3	Ave.	14	10	V	42.3	39.1	5.9	0.0	42.4	54.0	-11.7
19520	42.0	Peak	21	13	V	40.3	23.3	7.7	-9.5	57.2	74.0	-16.8
19520	31.5	Ave.	21	13	V	40.3	23.3	7.7	-9.5	46.7	54.0	-7.3
2480												
4960	36.5	Peak	14	8	V	33.9	28.1	3.2	0.0	45.5	74.0	-28.5
4960	30.3	Ave.	14	8	V	33.9	28.1	3.2	0.0	39.3	54.0	-14.7
7440	42.7	Peak	14	8	V	38.0	28.0	4.3	0.0	57.0	74.0	-17.0
7440	26.4	Ave.	14	8	V	38.0	28.0	4.3	0.0	40.7	54.0	-13.3
12400	40.1	Peak	14	10	V	42.3	39.1	5.9	0.0	49.2	74.0	-24.9
12400	32.4	Ave.	14	10	V	42.3	39.1	5.9	0.0	41.5	54.0	-12.6
19840	40.3	Peak	14	10	V	42.3	39.1	8.8	0.0	52.3	74.0	-21.7
19840	30.2	Ave.	14	10	V	42.3	39.1	8.8	0.0	42.2	54.0	-11.8
22320	44.3	Peak	21	13	V	40.3	23.3	0.0	-9.5	51.8	74.0	-22.2
22320	31.5	Ave.	21	13	V	40.3	23.3	0.0	-9.5	39.0	54.0	-15.0

- a) D.C.F.: Distance Correction Factor
- b) Insert. Loss (dB) = Cable A + Cable B + Cable C
- c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
- d) Negative signs (-) in Margin column signify levels below the limits.
- e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
- f) DCF of -9.5 were taken at 1 meter with RBW 300kHz

**Radiated Emissions
Test Data**

Company:		Symbol				Model #:			Ant 4 Tag 30		Standard		FCC § 15.247 (R.F.)	
EUT:		LA3020 Spread Spectrum Radio				S/N #:			Limits		11			
Project #:		J20008658F				Test Date:			April 14, 2000		Test Distance		3 meters	
Test Mode:		Transmitting on 50-21900-023 antenna				Engineer:			Barry S.		Duty Relaxation		0 dB	
Frequency	Reading	Detector	Ant. Amp.	Ant. Pos.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit	Margin			
MHz	dBµV	Peak/Ave	#	#	dB(1m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB			
2402														
4804	26.1	Peak	14	8	H	35.4	28.1	3.2	0.0	36.6	74.0	-37.4		
4804	20.0	Ave.	14	8	H	35.4	28.1	3.2	0.0	30.5	54.0	-23.5		
7206	35.1	Peak	14	8	H	37.8	28.0	4.3	0.0	49.2	74.0	-24.8		
7206	28.7	Ave.	14	8	H	37.8	28.0	4.3	0.0	42.8	54.0	-11.2		
12010	40.0	Peak	14	10	H	42.0	39.1	5.9	0.0	48.8	74.0	-25.3		
12010	32.4	Ave.	14	10	H	42.0	39.1	5.9	0.0	41.2	54.0	-12.9		
19216	43.1	Peak	21	13	H	40.2	23.3	0.0	-9.5	50.5	74.0	-23.5		
19216	27.2	Ave.	21	13	H	40.2	23.3	0.0	-9.5	34.6	54.0	-19.4		
2440														
4880	27.8	Peak	14	8	H	35.4	28.1	3.2	0.0	38.3	74.0	-35.7		
4880	21.8	Ave.	14	8	H	35.4	28.1	3.2	0.0	32.3	54.0	-21.7		
7320	37.6	Peak	14	8	H	37.8	28.0	4.3	0.0	51.7	74.0	-22.3		
7320	31.6	Ave.	14	8	H	37.8	28.0	4.3	0.0	45.7	54.0	-8.3		
12200	39.7	Peak	14	10	H	42.0	39.1	5.9	0.0	48.5	74.0	-25.6		
12200	32.0	Ave.	14	10	H	42.0	39.1	5.9	0.0	40.8	54.0	-13.3		
19520	38.2	Peak	21	13	H	40.3	23.3	0.0	-9.5	45.7	74.0	-28.3		
19520	29.8	Ave.	21	13	H	40.3	23.3	0.0	-9.5	37.3	54.0	-16.7		
2480														
4960	27.8	Peak	14	8	H	35.4	28.1	3.2	0.0	38.3	74.0	-35.7		
4960	21.7	Ave.	14	8	H	35.4	28.1	3.2	0.0	32.2	54.0	-21.8		
7440	33.7	Peak	14	8	H	37.8	28.0	4.3	0.0	47.8	74.0	-26.2		
7440	26.3	Ave.	14	8	H	37.8	28.0	4.3	0.0	40.4	54.0	-13.6		
12400	40.8	Peak	14	10	H	42.0	39.1	5.9	0.0	49.6	74.0	-24.5		
12400	33.0	Ave.	14	10	H	42.0	39.1	5.9	0.0	41.8	54.0	-12.3		
19840	41.3	Peak	21	13	H	40.3	23.3	0.0	-9.5	48.8	74.0	-25.2		
19840	31.4	Ave.	21	13	H	40.3	23.3	0.0	-9.5	38.9	54.0	-15.1		
22320	43.0	Peak	21	13	H	40.3	23.3	0.0	-9.5	50.5	74.0	-23.5		
22320	35.5	Ave.	21	13	H	40.3	23.3	0.0	-9.5	43.0	54.0	-11.0		

Notes:	a) D.C.F.: Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C.
	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
	d) Negative signs (-) in Margin column signify levels below the limits.
	e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.
	f) DCF of -9.5 were taken at 1 meter with RBW 300kHz

4.2 Radiated Emission Configuration Photograph



Antenna 2

4.2 Radiated Emission Configuration Photograph



Antenna 2

4.2 Radiated Emission Configuration Photograph



Antenna 4

4.2 Radiated Emission Configuration Photograph



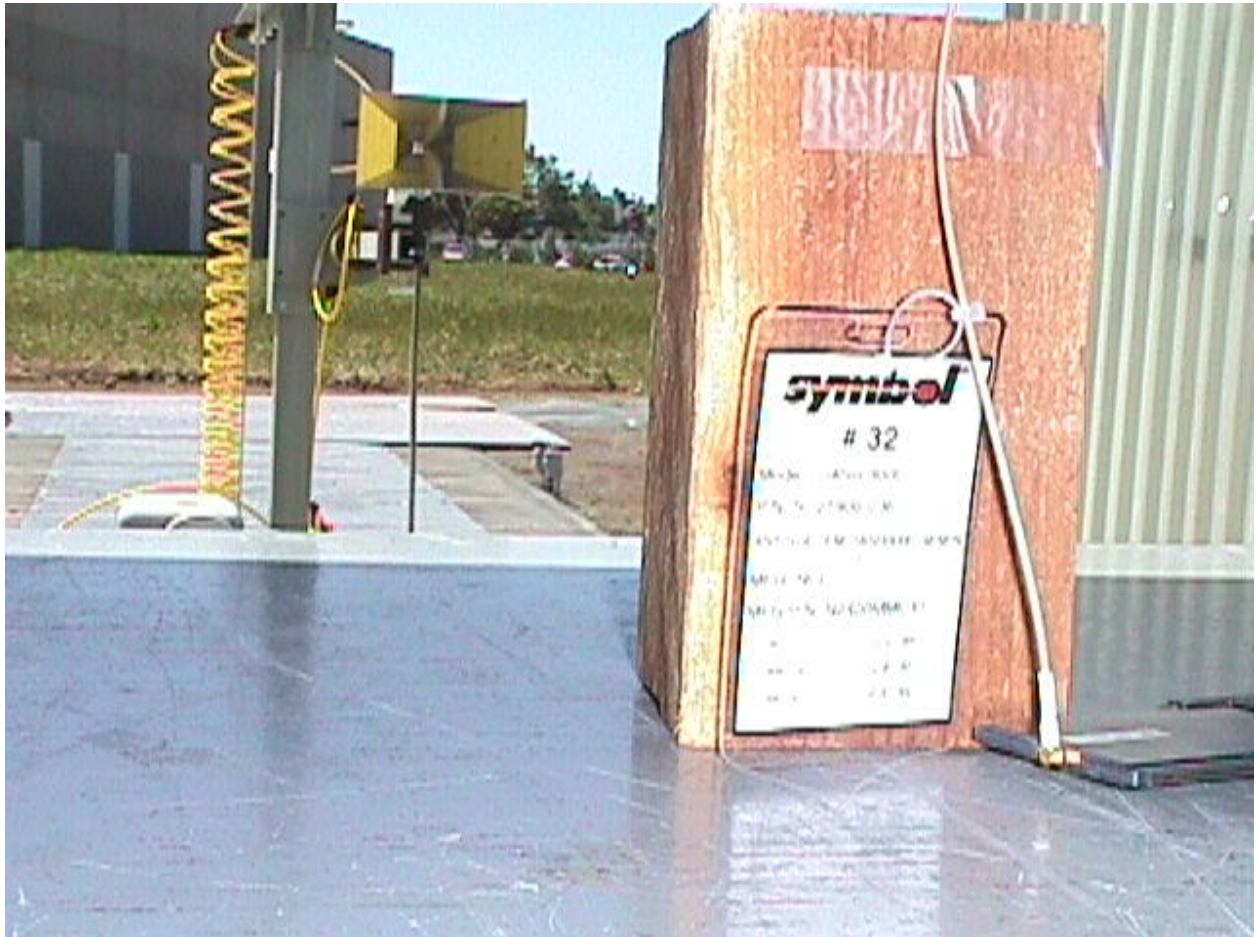
Antenna 4

4.2 Radiated Emission Configuration Photograph



Antenna 1

4.2 Radiated Emission Configuration Photograph



Antenna 1

4.2 Radiated Emission Configuration Photograph



Antenna 3

4.2 Radiated Emission Configuration Photograph



Antenna 3

5.0 Document History

Revision/Job Number	Date	Change
1.0 / J20013035	May 12, 2000	Original document