26 March 2003

Ref: 21127.1

Attn: Mr Mark Richards

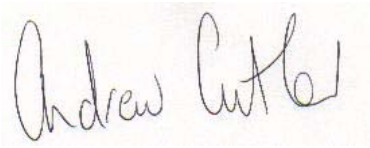
Fusion Electronics Ltd
PO Box 21-784
Henderson
Auckland
New Zealand

Dear Sir

Attached are the results of measurements made upon the **Fusion F-3500 Vehicle Security System** recently submitted to this Laboratory for testing.

The results show that this device **complies with FCC Part 15 Subpart C**.

Yours faithfully,



Andrew Cutler
General Manager

EMC Technologies (NZ) Ltd

Test Report No **21127.1**
Report date: 4 December 2002

TEST REPORT

Fusion F-3500 Vehicle Security System

tested to

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

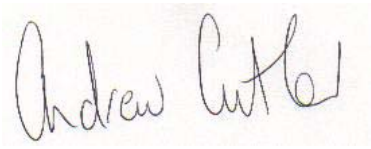
Subpart B – Unintentional Radiators

Subpart C – Intentional Radiators

for

Fusion Electronics Ltd

This Test Report is issued with the authority of:



Andrew Cutler - General Manager

Prepared By:

Karen Miller - Office Administrator

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

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1. STATEMENT OF COMPLIANCE

The **Fusion F-3500 Vehicle Security System** complies with FCC Part 15 Subpart B as an Unintentional Radiator and Subpart C as an Intentional Radiator when the methods, as described in ANSI C63.4 - 1992, are applied.

2. RESULTS SUMMARY

The results from testing are summarised in the following table:

Receiver

Clause	Parameter	Result
15.101	Equipment authorisation requirement.	Certification or Declaration of Conformity required for receivers.
15.103	Exempted devices.	Not applicable as the device is a receiver and is not a digital device.
15.107	Conducted limits	Not applicable as the device is powered from an stand alone external DC battery supply (car battery).
15.109	Radiated emission limits	Complies with a 2.0 dB margin at 314.480 MHz
15.111	Antenna power conduction limit for receivers.	Not applicable. Receiver does not have terminals for the connection of an external antenna

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Transmitter

Clause	Parameter	Result
15.201	Equipment authorisation requirement.	Certification required.
15.203	Antenna requirement	Complies. Antenna integral.
15.204	External PA and antenna modifications	Not applicable. No external devices.
15.205	Restricted bands of operation	Complies. Device transmits periodically on 315 MHz.
15.207	Conducted limits	Not applicable. Device is powered using an internal 12 Vdc alkaline battery.
15.209	Radiated emission limits.	Not applicable. All emissions from the device are related to the transmitter fundamental and the resulting harmonic emissions.
15.231(a)	General requirements	Transmitter is operated manually with a switch that deactivates the transmitter within 5 seconds of being released.
15.231(b)	Field strength of emissions	Complies with a 17.1 dB margin at 1574.688 MHz.
15.231(c)	Bandwidth	Complies

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3. INTRODUCTION

This report describes the tests and measurements for the purpose of determining compliance with the specification under the following conditions:

The test sample was selected by the client.

This report relates only to the sample tested.

This report contains no corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

4. CLIENT INFORMATION

Company Name	Fusion Electronics Ltd
Address	PO Box 21-784
City	Henderson
Country	New Zealand
Contact	Mr Mark Richards

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5. DESCRIPTION OF TEST SAMPLE

Brand Name	Fusion
Model Number	F-3500
Product	Vehicle Security System
Manufacturer	Portman Electronics Ltd
Country of Origin	China
Serial Number	Not serialised
FCC ID	QRNF3500

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6. METHODS AND PROCEDURES

Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart B and C.

Methods and Procedures

The measurement methods and procedures as described in ANSI C63.4 - 1992 were used.

7. RESULTS

Section 15.109 Radiated emission limits.

Radiated emissions testing was carried out over the frequency range of 30 MHz to 2000 MHz as the receiver operates on 314 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand

This site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 1992.

The device was placed on the test tabletop, which is a total of 0.8 m above the test site ground plane.

The device was tested receiving continuously while being powered by a 13.8 Vdc external power supply.

Testing was carried out over a distance of 3 metres.

Below 1000 MHz a Quasi Peak detector with a bandwidth of 120 kHz was utilised.

Above 1000 MHz a Peak detector with a bandwidth of 1 MHz was utilised.

As the measurements above 1000 MHz were significantly below the limit an Average detector was not utilised.

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When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations, where appropriate.

The emission level was determined in field strength by taking the following into consideration:

Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB) + Coax Loss (dB)

The limits as described in Section 15.109 have been applied as follows:

30 – 88 MHz	100 uV/m	40.0 dBuV/m
88 – 216 MHz	150 uV/m	43.5 dBuV/m
216 – 960 MHz	200 uV/m	46.0 dBuV/m

Result: Complies. Measurements fall within the window of uncertainty.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 4000 MHz) ± 4.1 dB

Frequency MHz	dBuV/m	Recheck dBuV/m	Limit dBuV/m	Margin dB	Result	Antenna
314.700	41.7		46.0	4.3	Pass	Vertical
314.480	44.0		46.0	2.0	Uncert	Horizontal

Section 15.205: Restricted bands of operation.

The transmitter transmits on 315 (314.9380) MHz.

This falls between the restricted bands of 240 – 285 MHz and 322 – 335.4 MHz.

Result: Complies.

Section 15.231(a) + (b) General requirements and field strength of emissions.

The transmitter tested is a hand held remote control that is mainly used for arming and disarming alarm systems in motor vehicles and is powered using an internal 12 Vdc Alkaline battery.

The transmitter is activated manually. The transmitter deactivates automatically once the control switch is no longer being pressed.

This activation takes less than 1 second.

Radiated emissions testing was carried out over the frequency range of 30 MHz to 3150 MHz as the transmitter operates on 315 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand

This site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 1992.

The device was placed on the test tabletop, which is a total of 0.8 m above the test site ground plane and was remotely activated.

Testing was carried out over a distance of 3 metres.

Below 1000 MHz a Quasi Peak detector with a bandwidth of 120 kHz was utilised.

Above 1000 MHz a Peak detector with a bandwidth of 1 MHz was utilised.

As the measurements above 1000 MHz were significantly below the limit an Average detector was not utilised.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations, where appropriate.

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The emission level was determined in field strength by taking the following into consideration:

Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB) + Coax Loss (dB)

The limits as described in Section 15.231 have been applied as follows:

Fundamental 260 – 470 MHz = 41.6667 x 315 MHz – 7083.3333 = 6041.6772 uV/m.

This is then convert to dBuV/m using 20*log(6041.6772) = 75.6 dBuV/m

Spurious emission limit is 20 dB below the fundamental emission level.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 - 4000 MHz) ± 4.1 dB

Fundamental emission.

Frequency MHz	dBuV/m	Recheck dBuV/m	Limit dBuV/m	Margin dB	Result	Antenna
314.9380	58.2		75.6	17.4	Pass	Vertical

Spurious emissions

Frequency MHz	dBuV/m	Recheck dBuV/m	Limit dBuV/m	Margin dB	Result	Antenna
629.875	33.8		55.6	21.8	Pass	Vertical
944.813	30.2		55.6	25.4	Pass	Vertical
1259.750	34.7		55.6	20.9	Pass	Vertical
1574.688	38.5		55.6	17.1	Pass	Vertical
1889.625	-		55.6	-	Pass	Vertical
2204.563	-		55.6	-	Pass	Vertical
2519.500	-		55.6	-	Pass	Vertical
2834.438	-		55.6	-	Pass	Vertical
3149.375	-		55.6	-	Pass	Vertical

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Section 15.231(c) Bandwidth.

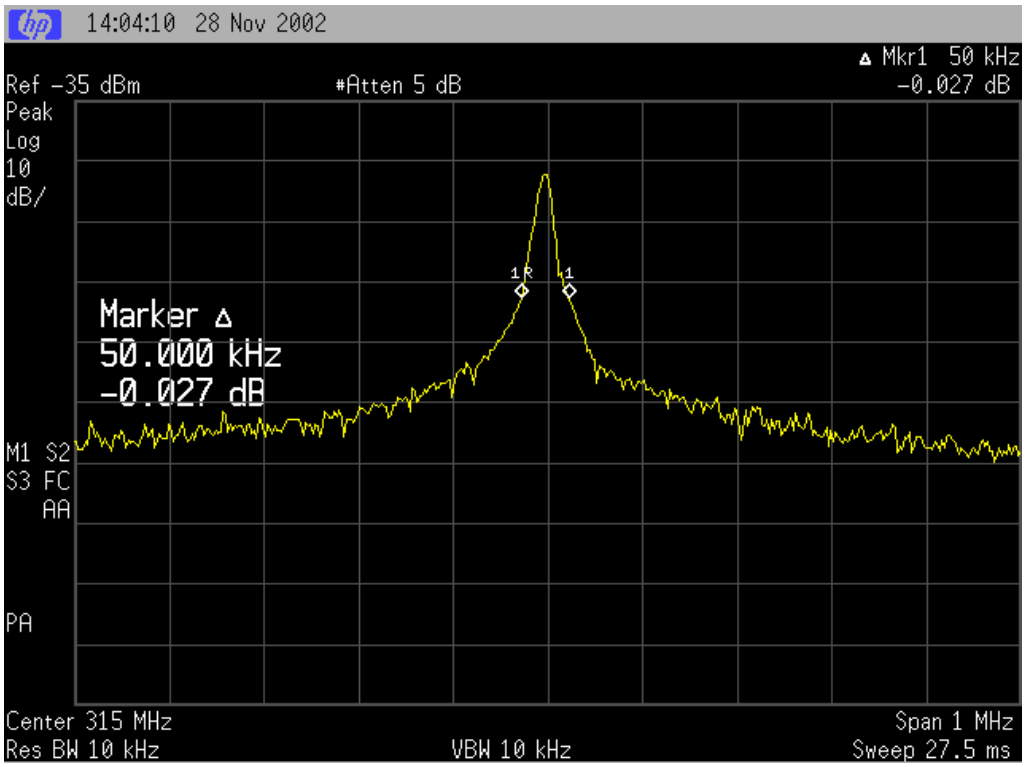
The bandwidth of the emission should not be greater than 0.25% of the centre frequency at the –20 dB points.

Centre frequency = 315 MHz.

0.25% of 315 MHz is 787.5 kHz.

The plot below shows a bandwidth of 50 kHz at the –20 dB points.

Result: Complies.



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8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612
Log Periodic Antenna	Schwarzbeck	UHALP 9107	-	RFS 3702
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776
Horn Antenna	EMCO	3115	9511-4629	E1526
Coax Cable	Sucoflex	104PA	2545/4PA	-
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
VHF Balun Antenna	Schwarzbeck	VHA 9103		RFS 3603

9. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was updated on March 25th, 2002.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.1999.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.1999.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

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10. PHOTOGRAPHS

Transmitter external view

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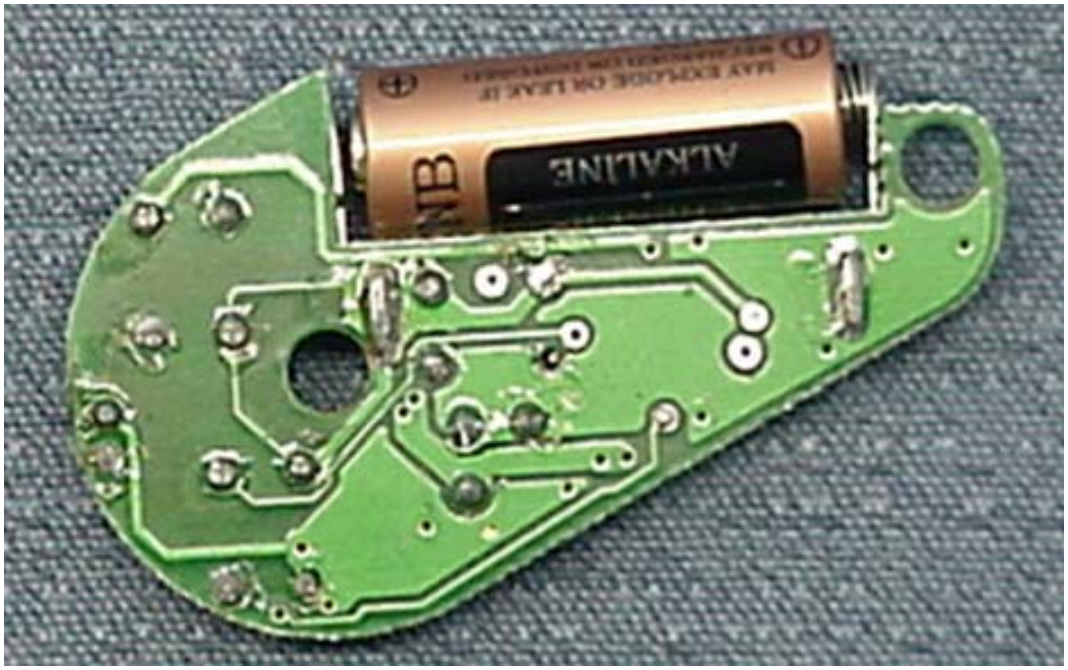
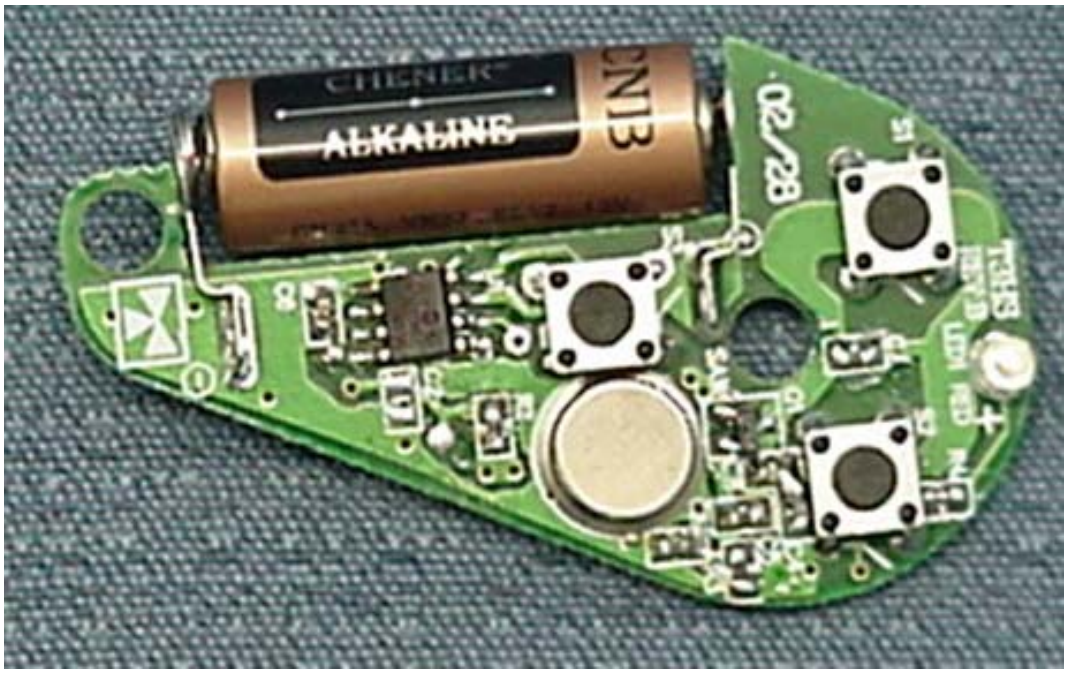
Transmitter internal view





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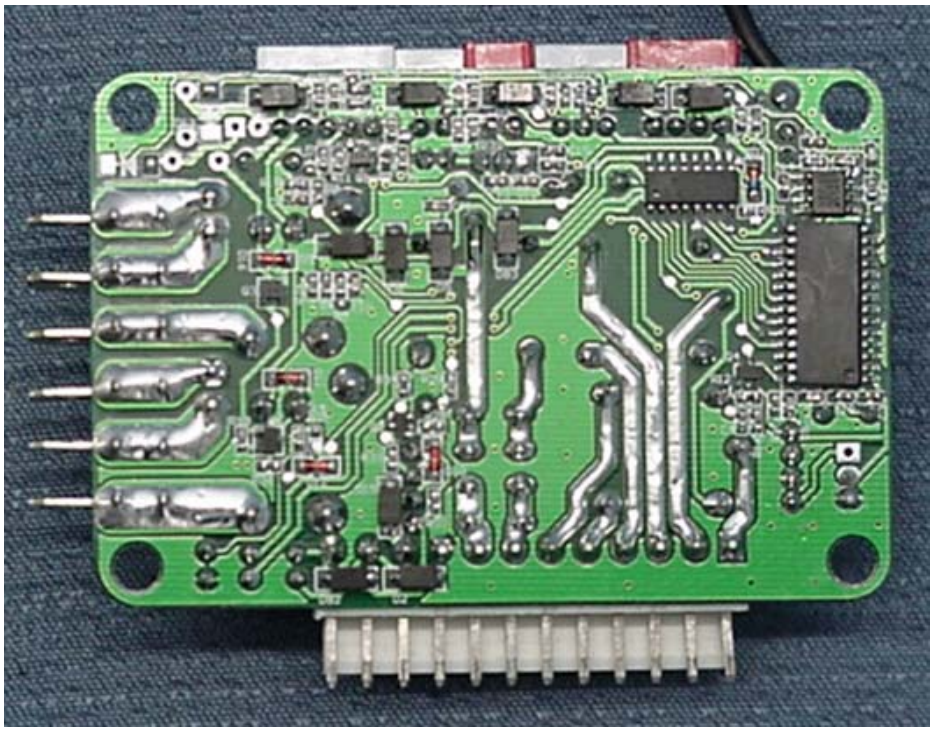
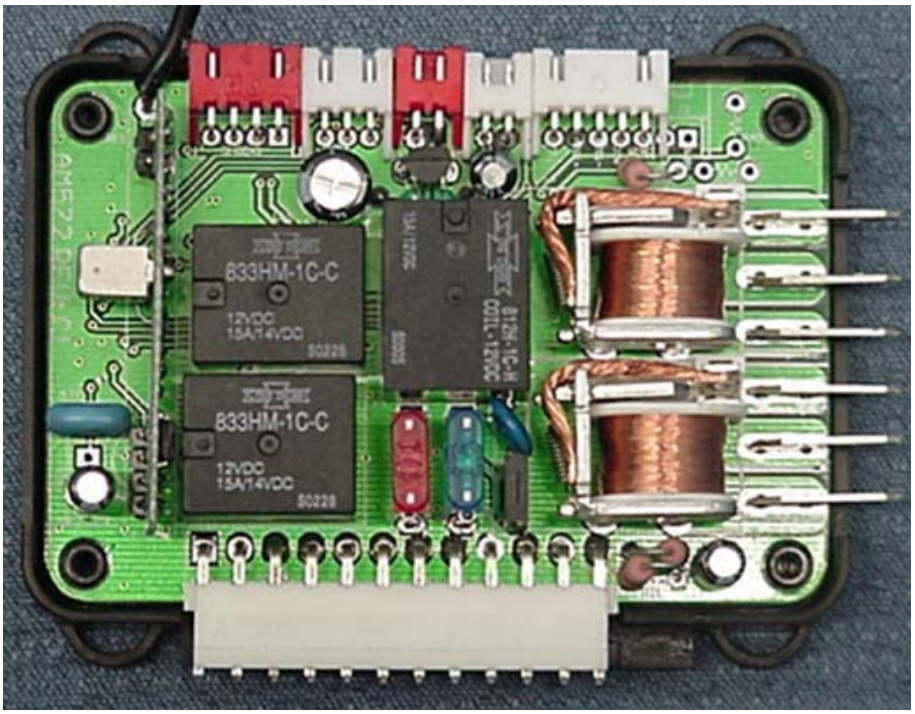
Receiver Internal View





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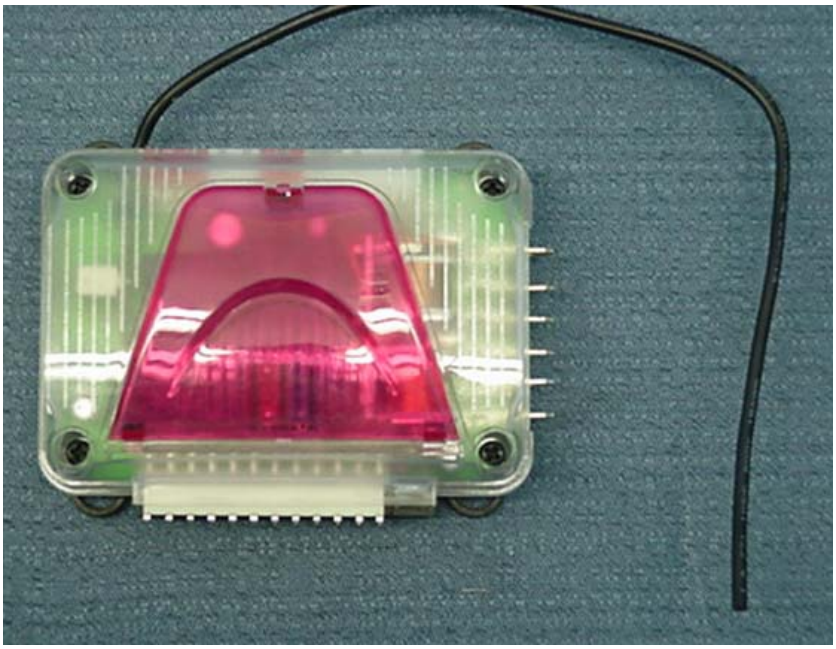
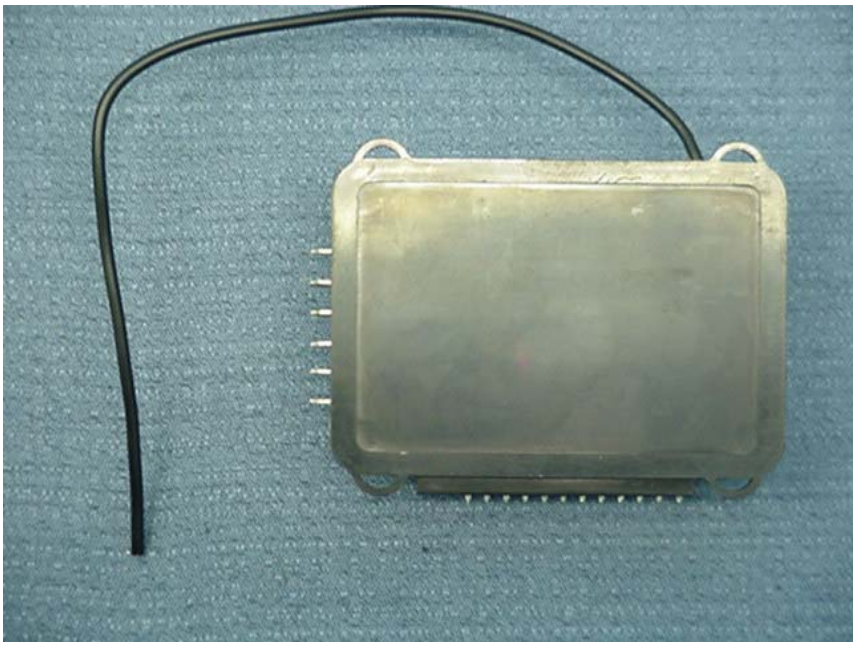
Receiver External View





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Transmitter under test

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Receiver under test

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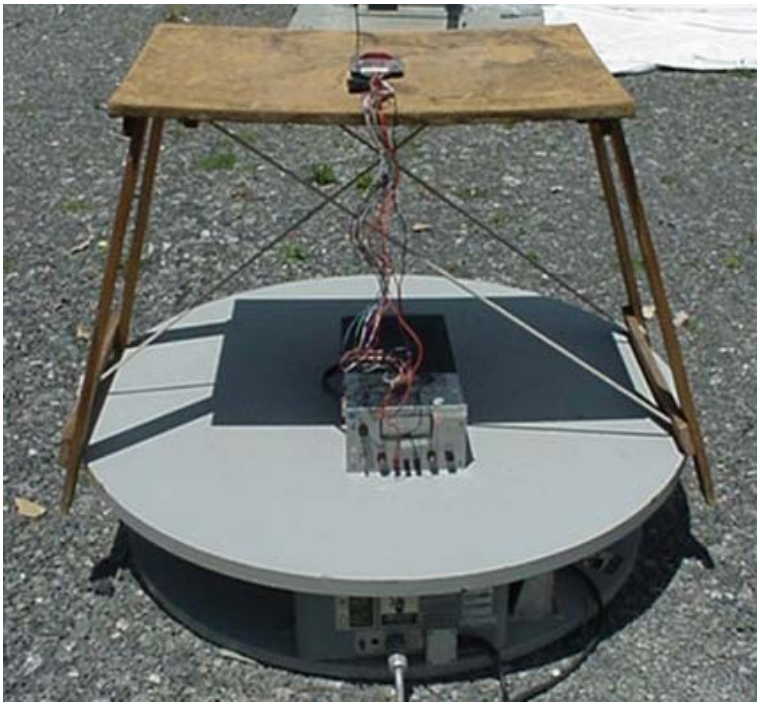

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