EMC Technologies (NZ) Ltd

Test Report No **71016.3**
Report date: 21st January 2008

TEST REPORT

Cabco Shopping Kart

tested to the

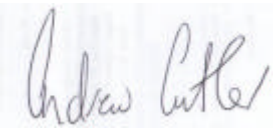
Code of Federal Regulations (CFR) 47

Part 15 – Radio Frequency Devices, Subpart C – Intentional Radiators

Section 15.249 – Operation in the band 2400 – 2483.5 MHz

for

Cabco Ltd



This Test Report is issued with the authority of:

Andrew Cutler - General Manager

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

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1. CLIENT INFORMATION

Company Name	Cabco Ltd
Address	D/18 Triton Drive Albany
City	Auckland
Country	New Zealand
Contact	Mr Brendon Haworth

2. DESCRIPTION OF TEST SAMPLE

Brand Name	Cabco
Model Number	Kart Generation 3
Product	Interactive shopping Kart
Manufacturer	Cabco Ltd
Country of Origin	New Zealand
Serial Number	Not serialised
FCC ID	SN9-2008-KART

3. COMPLIANCE STATEMENT

The Cabco Kart complies with 47 CFR Part 15 and in particular Sections, 15.205, 15.207, 15.209, 15.215 and 15.249 as detailed below.

CLAUSE	TEST PERFORMED	RESULT
15.109	Radiated emission limits	Complies
15.203	Antenna requirement	Complies
15.205	Operation in restricted bands	Complies
15.207	Conducted emissions	Not applicable
15.209	Radiated emissions	Complies
15.215	Additional provisions	Complies
15.249:		
(a)	Field strength of fundamental	Complies
(a)	Field strength of harmonics	Complies
(b)	Fixed, point to point operations	Not applicable
(c)	3 metre measurement distance	Noted
(d)	Spurious emission levels except harmonics	Complies
(e)	Detectors above 1000 MHz	Noted
(f)	Reference to section 15.37(d)	Noted

4. TEST SAMPLE DESCRIPTION

The device tested is a CABCO shopping Kart.

The Kart controller operates uses a Max Stream XB24 ZigBee Module that uses ZigBee IEEE 802.15.4 operating techniques.

The customer advises that this module is an FCC certified module however no further details have been provided

FCC Frequency Range:	2400.000 MHz – 2483.500 MHz
Transmit Frequency:	2405.000 MHz
Receive Frequencies:	2405.000 MHz
Rated RF Power (max):	1 mW (0 dBm)
Modulation Type:	Offset Quadrature PSK (OQPSK)
Operating Protocol:	ZigBee IEEE 802.15.4
Antenna Type:	2.4 GHz dipole
Power Supply:	Internal batteries
Nominal Voltage:	12 Vdc

The module used has the ability to operate on 16 channels with a 5 MHz channel spacing in the 2400 – 2483.5 MHz band.

The customer advises that this system is to have a fixed frequency of operation, 2405 MHz, with the other 15 channels not being utilised.

5. ATTESTATION

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

The client selected the test sample.

The report relates only to the sample tested.

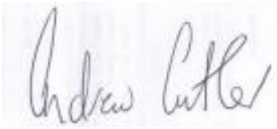
This report does not contain corrections or erasures.

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.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

6. TRANSMITTER TEST RESULTS

Section 15.203 – Antenna requirement

The transmitter in this receiver device uses a 2.4 GHz dipole antenna that is permanently attached to the transmitter inside the stand enclosure.

Section 15.205 – Restricted bands of operation

Refer to measurements made with reference to Section 15.249 (a).

Section 15.207 – Conducted emissions

Not applicable as this device is not connected to the AC mains either directly or indirectly for charging purposes.

The Kart is charged using a 35 kHz inductive charging mat system.

The Kart is positioned over the charging mat which is a separate system that has been verified in accordance with FCC part 18.

Result: Complies

Section 15.209 – Radiated emissions

In accordance with section 15.249 (d) the general emission limits specified in Section 15.209 (a) have been applied to all emissions except the transmitter harmonics.

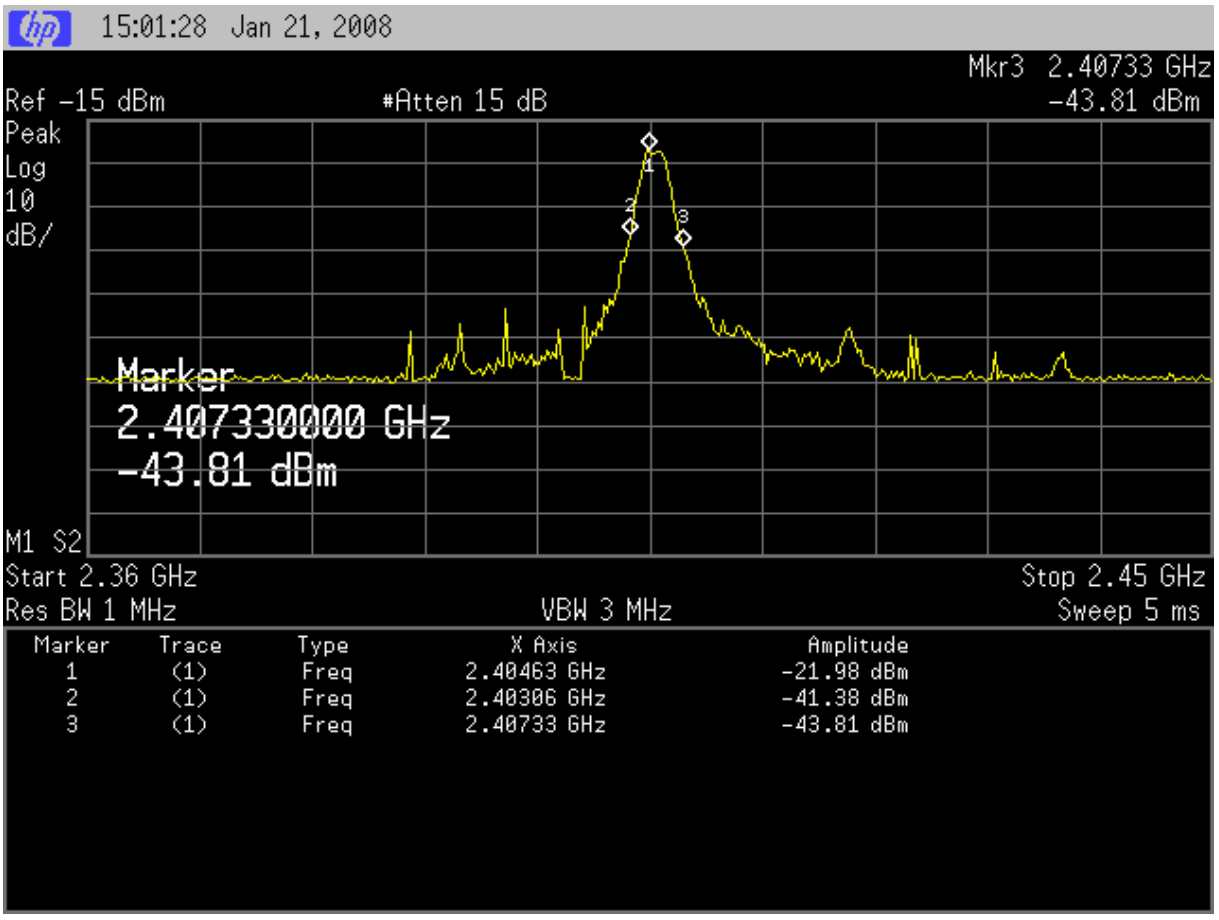
See Section 15.249 (a) for further details.

Section 15.215 (c) – Additional provisions to the general radiated emission limitations

Spectrum mask measurements have been made when the device was operating on 2405 MHz.

The 20 dB bandwidth has been determined to be 2403.060 MHz - 2407.330 MHz.

The device operates in the 2400 – 2483.5 MHz band.



Result: Complies

Section 15.249 (a) – Field strength of the Fundamental and Harmonics

Transmit mode

Measurements were made using peak detector with a 1 MHz resolution bandwidth with the average limit being applied.

Where the peak measurement exceeds the average limit, average and peak measurements have been carried out.

The peak limit is 20 dB above the average limit.

When an emission is located, it is positively identified and its maximum level is found by rotating the EUT, and by varying the antenna height manually to achieve the optimum readings.

The emission is measured in both vertical and horizontal antenna polarisations with no measurements were made above the 10^{th} harmonic.

Fundamental emission

Frequency (MHz)	Vert (dBuV/m)	Hor (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity	Detector
2405.000	82.5	83.0	94.0	11.0	Horizontal	Peak

Observations were made around the 2400 – 2483.5 MHz band edges but no spurious emissions were detected from the fundamental.

Spurious emissions

Frequency (MHz)	Vert (dBuV/m)	Hort (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity	Detector
4810.000	-		54.0	-	-	Peak
7215.000	-		54.0	-	-	Peak
9620.000	-		54.0	-	-	Peak
12025.000	-		54.0	-	-	Peak
14430.000	-		54.0	-	-	Peak
16835.000	-		54.0	-	-	Peak
19240.000	-		54.0	-	-	Peak
21645.000	-		54.0	-	-	Peak
24050.000	-		54.0	-	-	Peak

Other emissions observed

Frequency (MHz)	Vert (dBuV/m)	Hor (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity
36.450	21.2		40.0	18.8	Vertical
37.770	21.0		40.0	19.0	Vertical
40.600	31.0		40.0	9.0	Vertical
43.425	31.1		40.0	8.9	Vertical
42.550	35.5		40.0	4.5	Vertical
47.450	27.3		40.0	12.7	Vertical
70.940	31.0		40.0	9.0	Vertical
81.025	21.6		40.0	18.4	Vertical
115.100	35.5		43.5	8.0	Vertical
121.500	32.3	26.0	43.5	11.2	Vertical
129.500	29.2		43.5	14.3	Vertical
143.887	35.7		43.5	7.8	Vertical
152.412	28.0		43.5	15.5	Vertical
182.252	31.6		43.5	11.9	Vertical
220.150	30.0		46.0	16.0	Vertical
243.000	38.4	36.0	46.0	7.6	Vertical
264.050	29.9	23.1	46.0	16.1	Vertical
288.027	30.4	33.7	46.0	12.3	Horizontal
364.512	41.3	46.0	46.0	0.0	Horizontal
405.035	31.2	32.3	46.0	13.7	Horizontal
425.640	24.2		46.0	21.8	Vertical
486.000	33.8	33.2	46.0	12.2	Vertical
546.750	31.0		46.0	15.0	Vertical
567.000	34.5		46.0	11.5	Vertical
648.065	38.0	38.6	46.0	7.4	Horizontal
660.060	38.4	36.5	46.0	7.6	Vertical
744.000	40.6	37.7	46.0	5.4	Vertical
791.500	36.3		46.0	9.7	Vertical
820.250	36.2		46.0	9.8	Vertical
849.055	33.4	27.1	46.0	12.6	Vertical
924.095	37.8	38.7	46.0	7.3	Horizontal

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

Level (dBµV/m) = Receiver Reading (dBµV) + Antenna Factor (dB) + Coax Loss (dB) – Microwave Preamplifier Gain (dB)

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 18,000 MHz) ± 4.1 dB

Result: Complies

7. 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	VUSLP9111	9111-228	RFS 3702
Horn Antenna	EMCO	3115	9511-4629	E1526
Horn Antenna	EMCO	3116	2276	-
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Measurement Receiver	Rohde & Schwarz	ESHS 10	828404/005	RFS 3728
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
VHF Balun Antenna	Schwarzbeck	VHA 9103		RFS 3603
Thermal chamber	Contherm	M180F	86025	E1129
Thermometer	DSIR	RT200	35	E1409
Microwave Pre Amplifier	Hewlett Packard	8349B	2644A01659	-

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was updated on January 27th, 2007.

In addition testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025: 2005.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025: 2005.

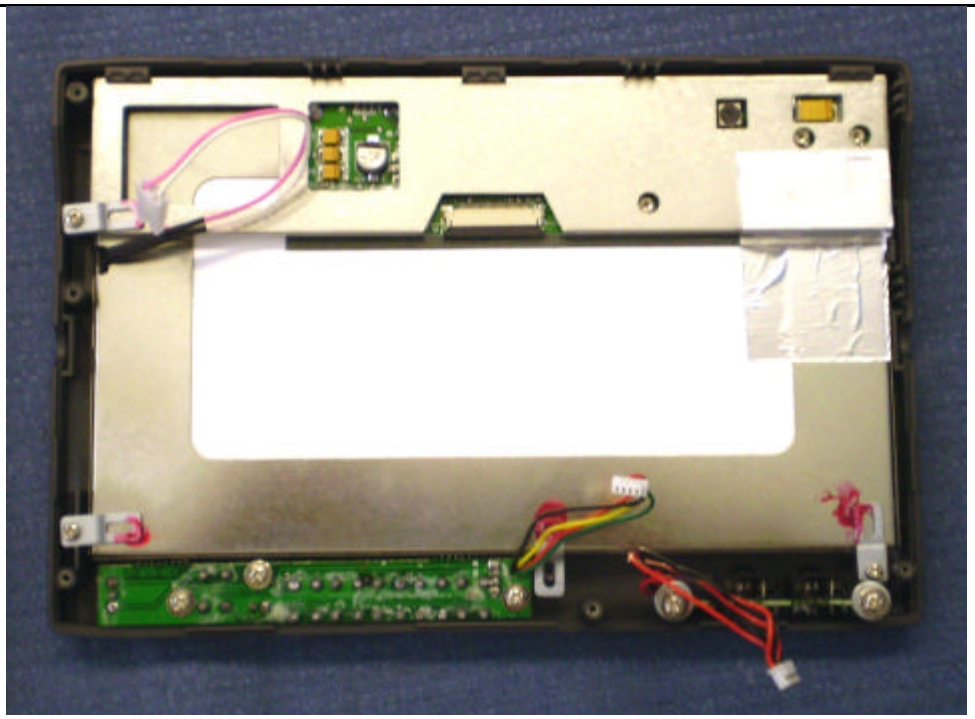
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

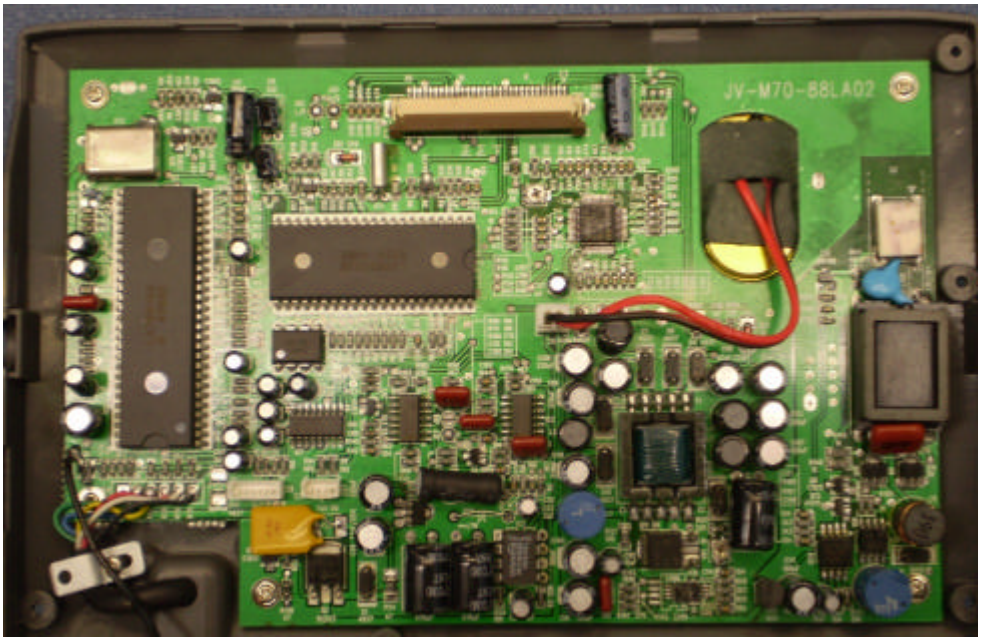
9. PHOTOGRAPHS

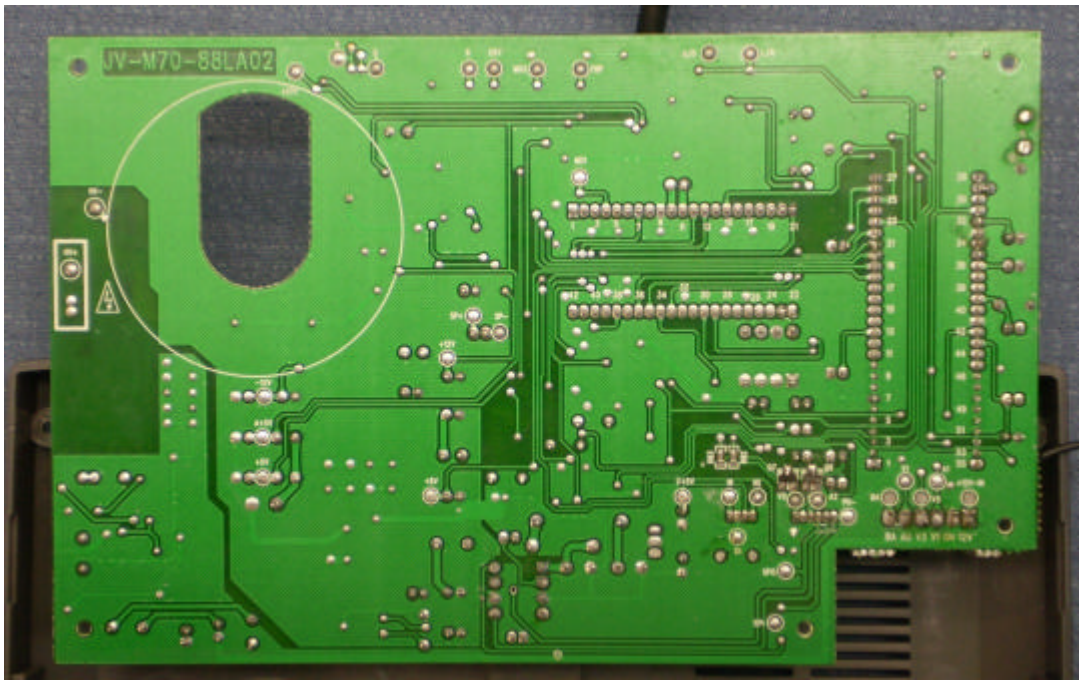
Radiated emissions

Internal Views

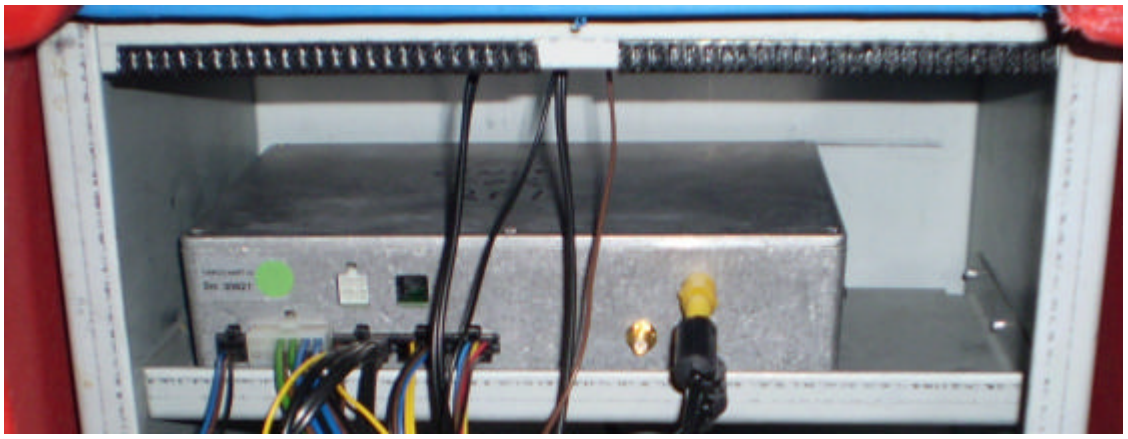
1/ Kart Cabin LCD Screen & Kart Handle LCD Screen



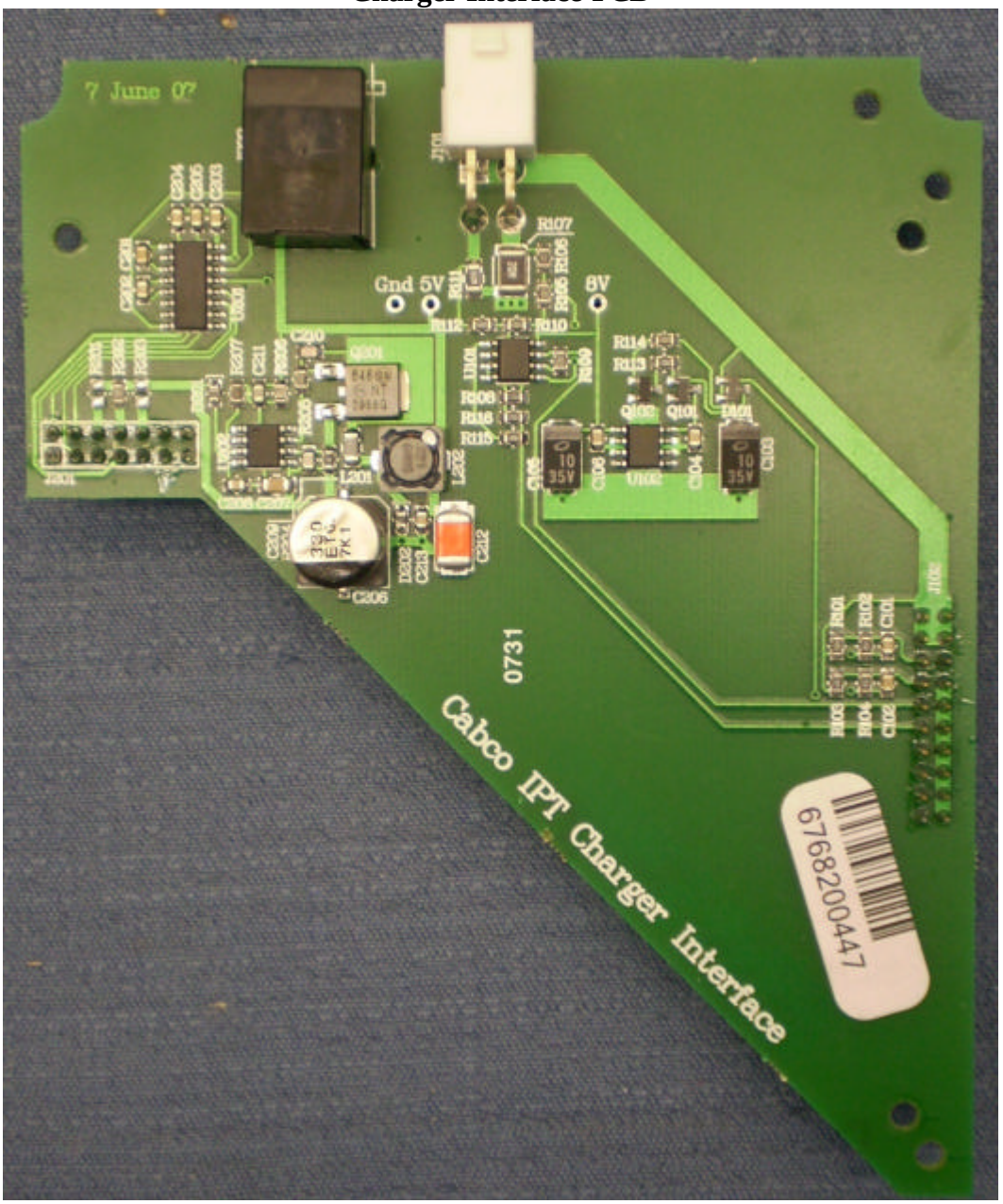


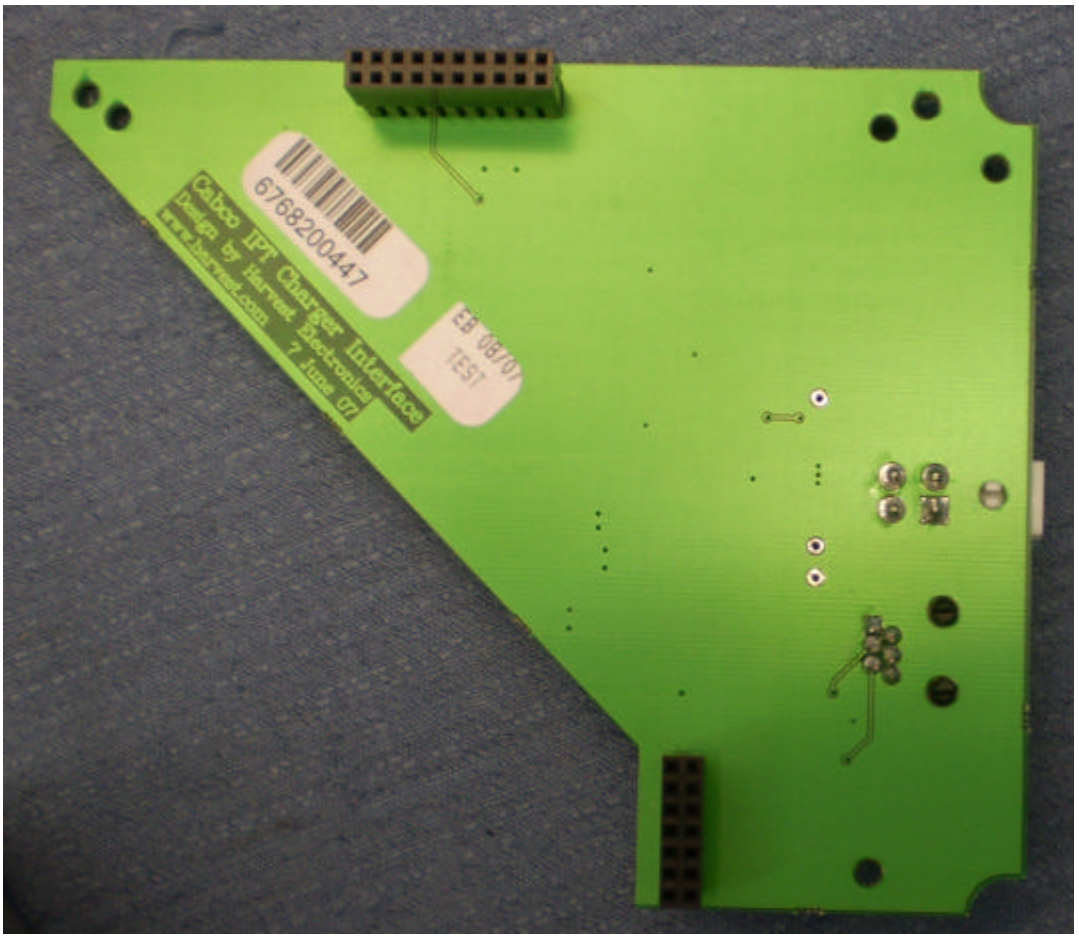


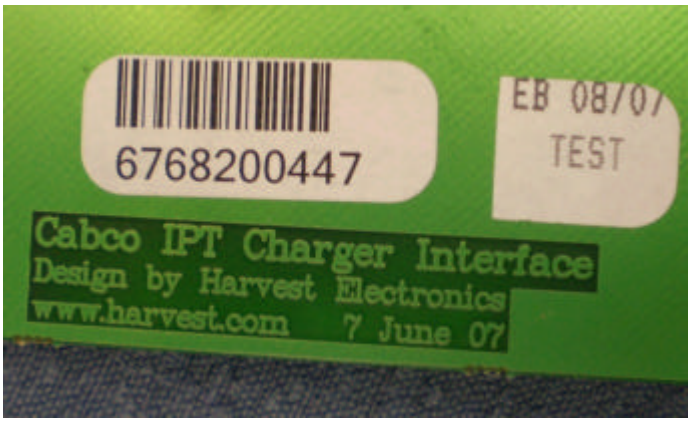
2/ Kart Controller



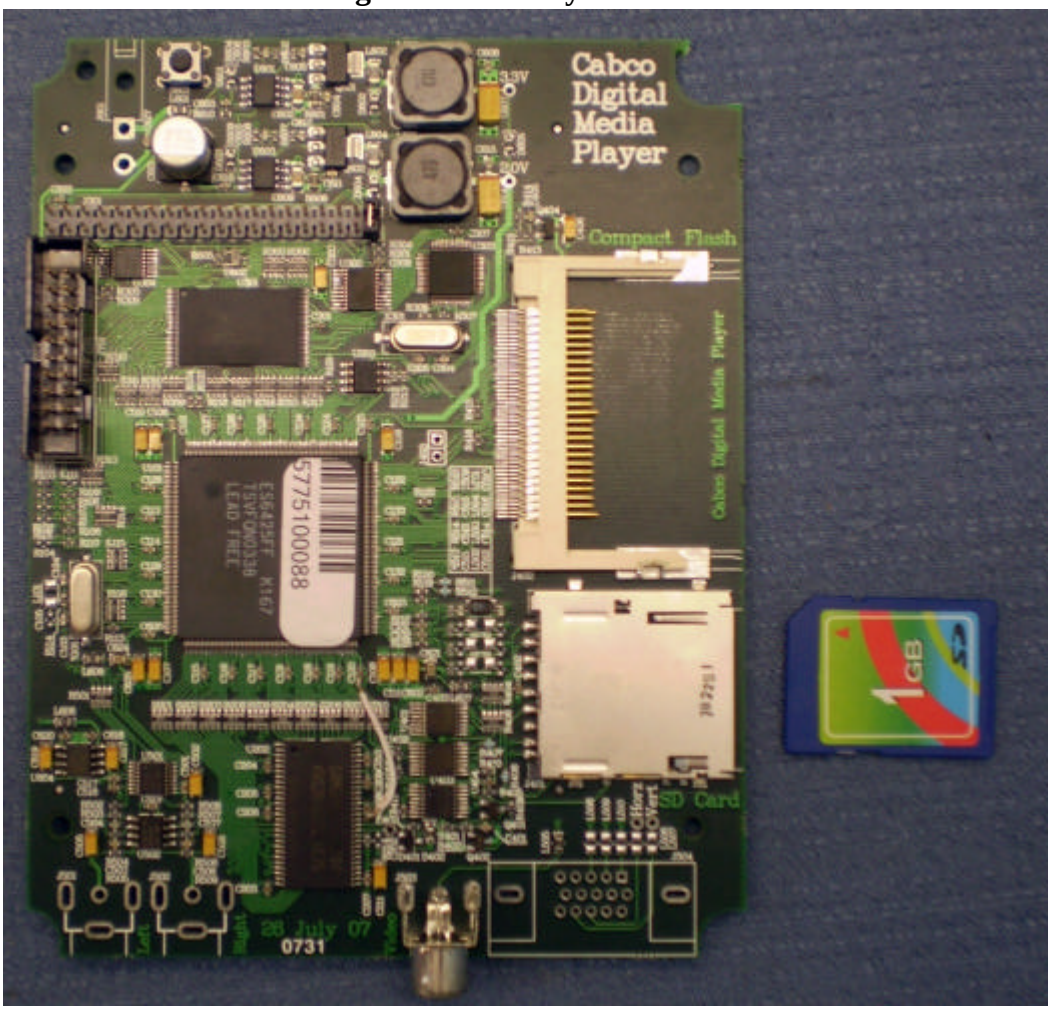
Charger Interface PCB

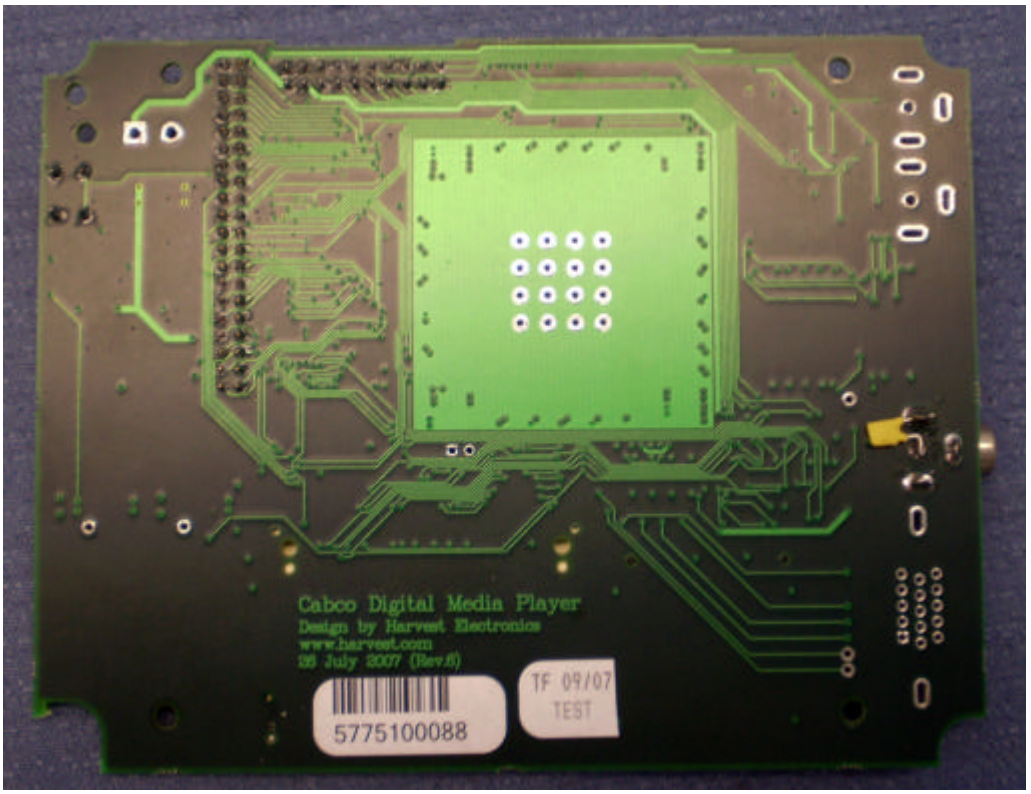




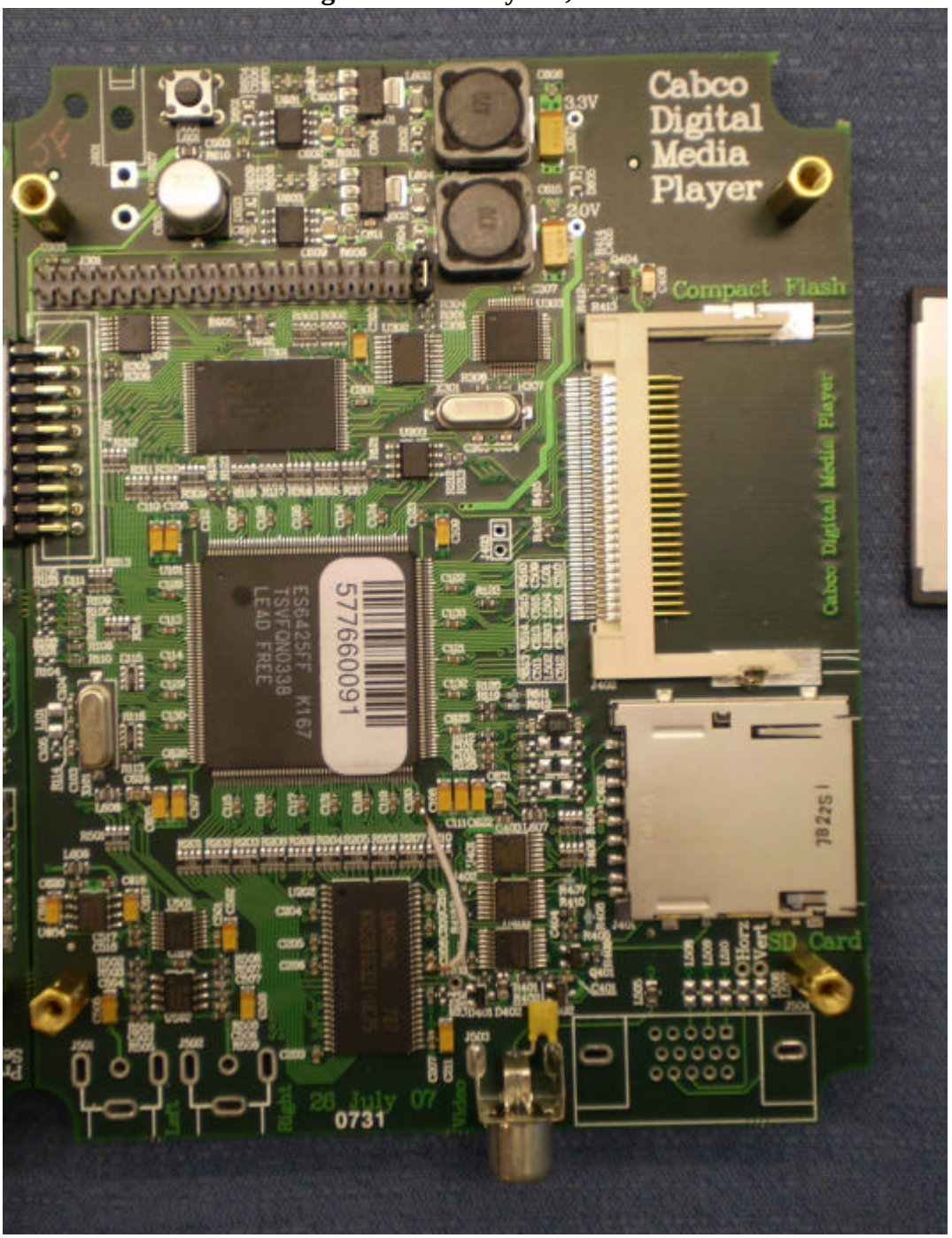


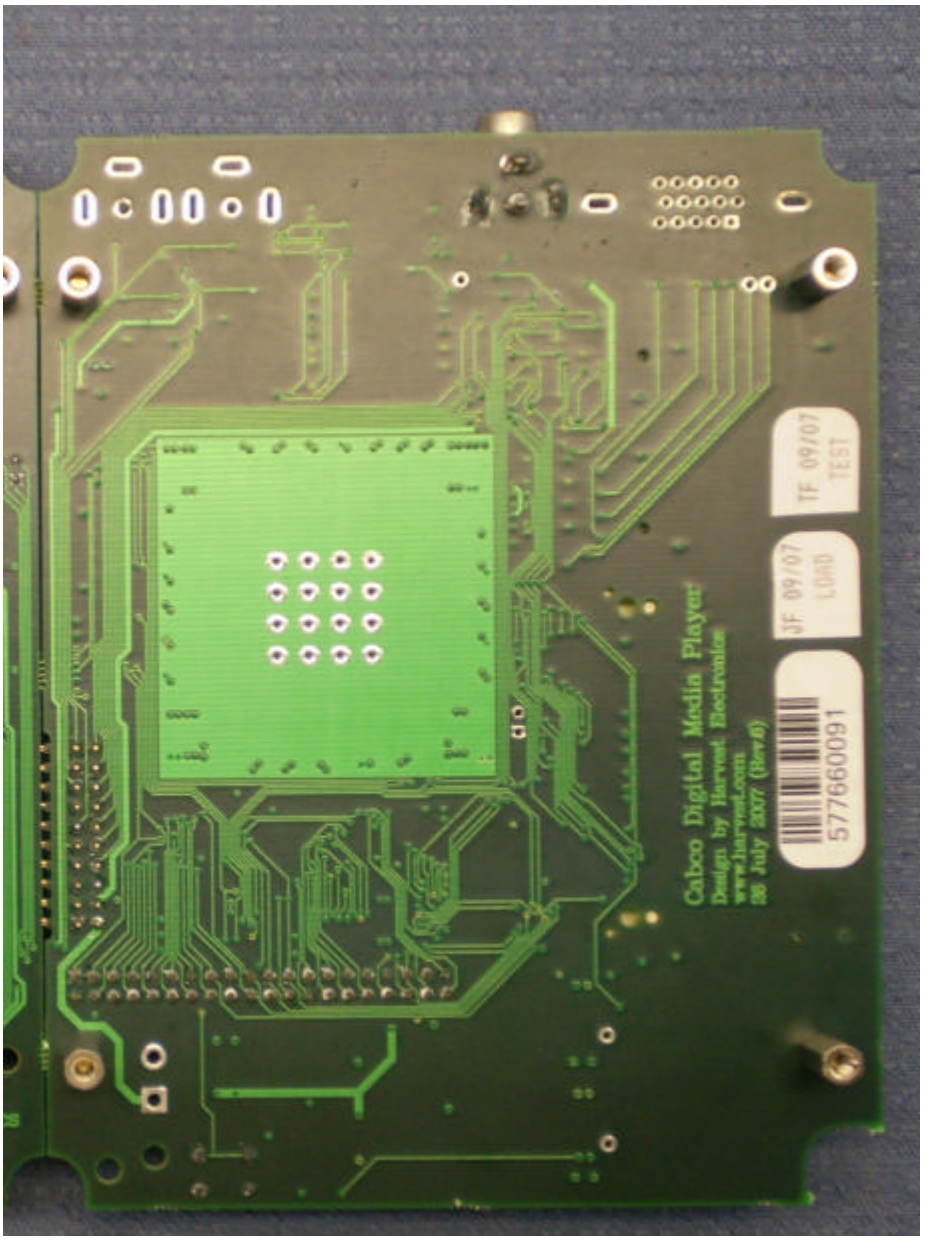
Digital Media Player 1 PCB's



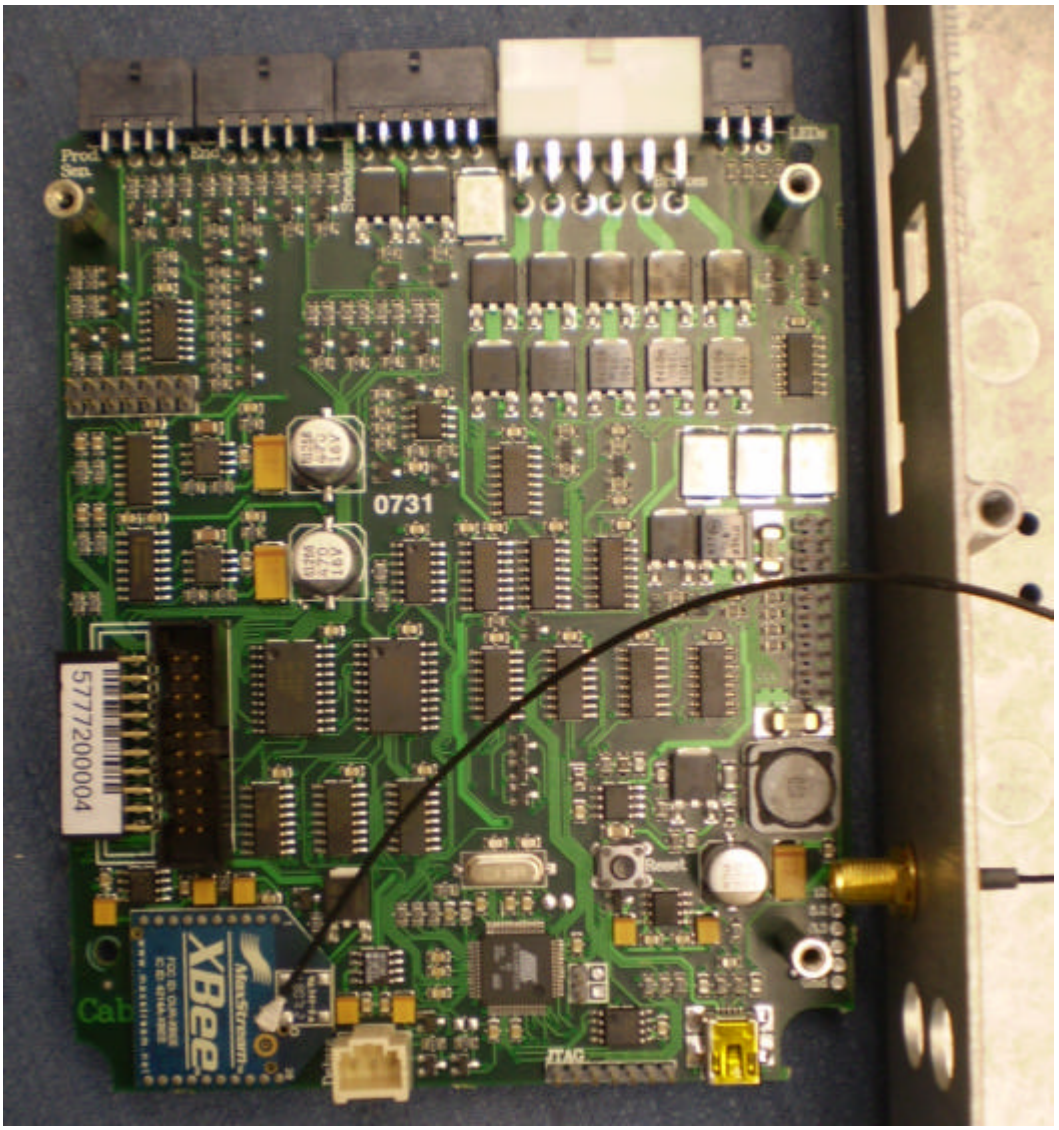


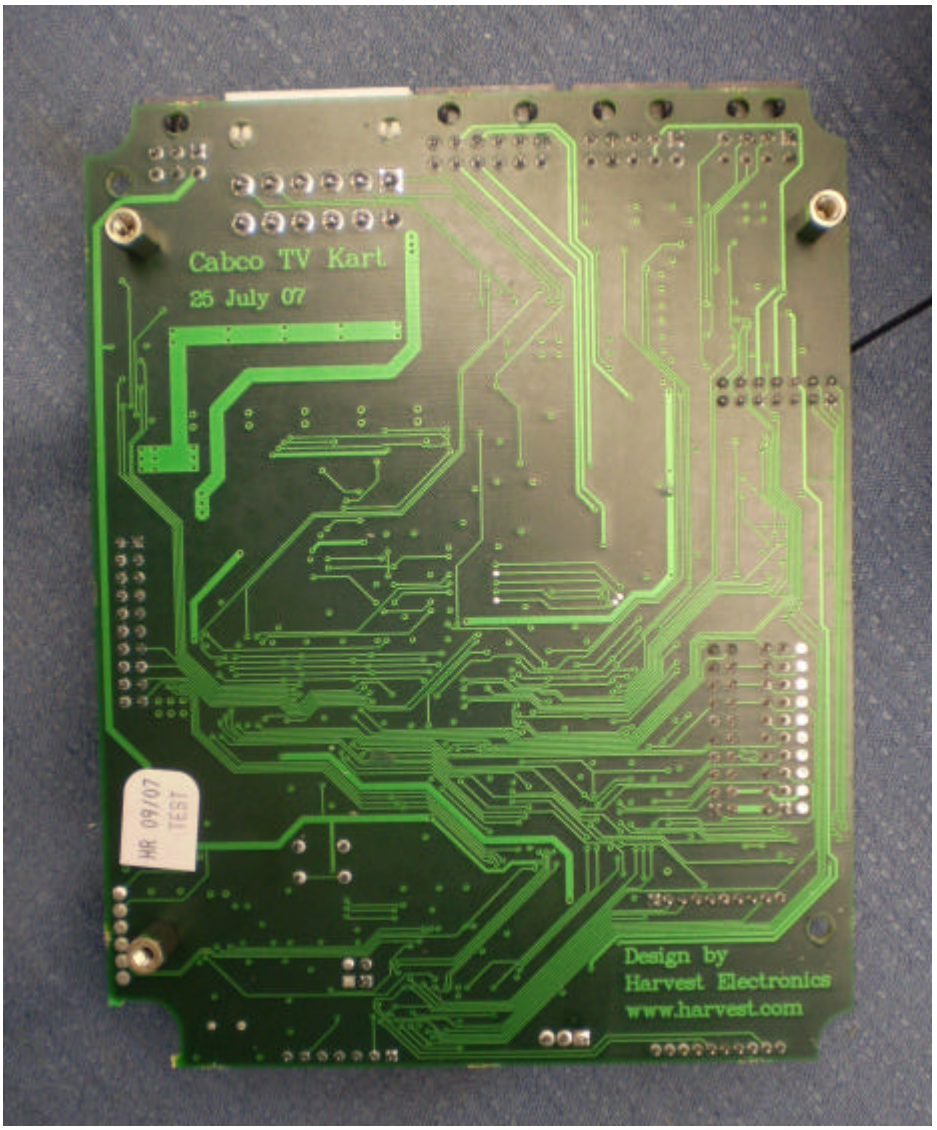
Digital Media Player 2, PCB's



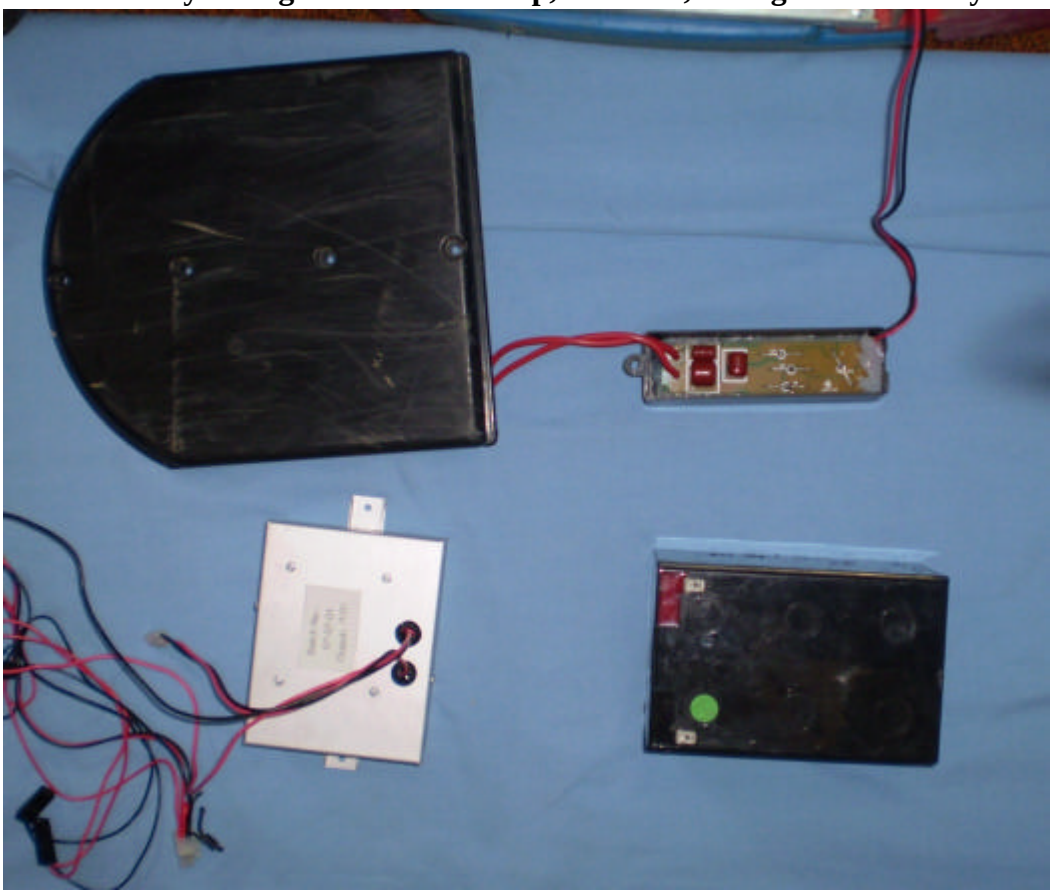


Kart Controller PCB

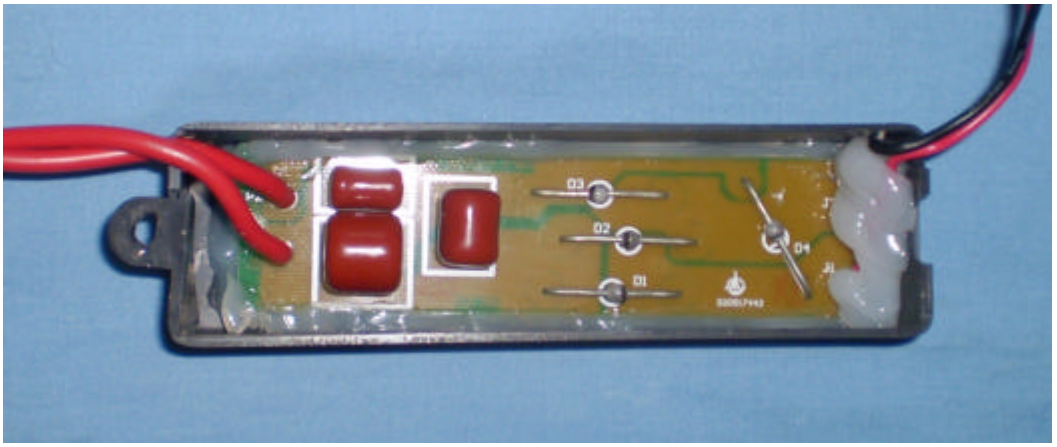




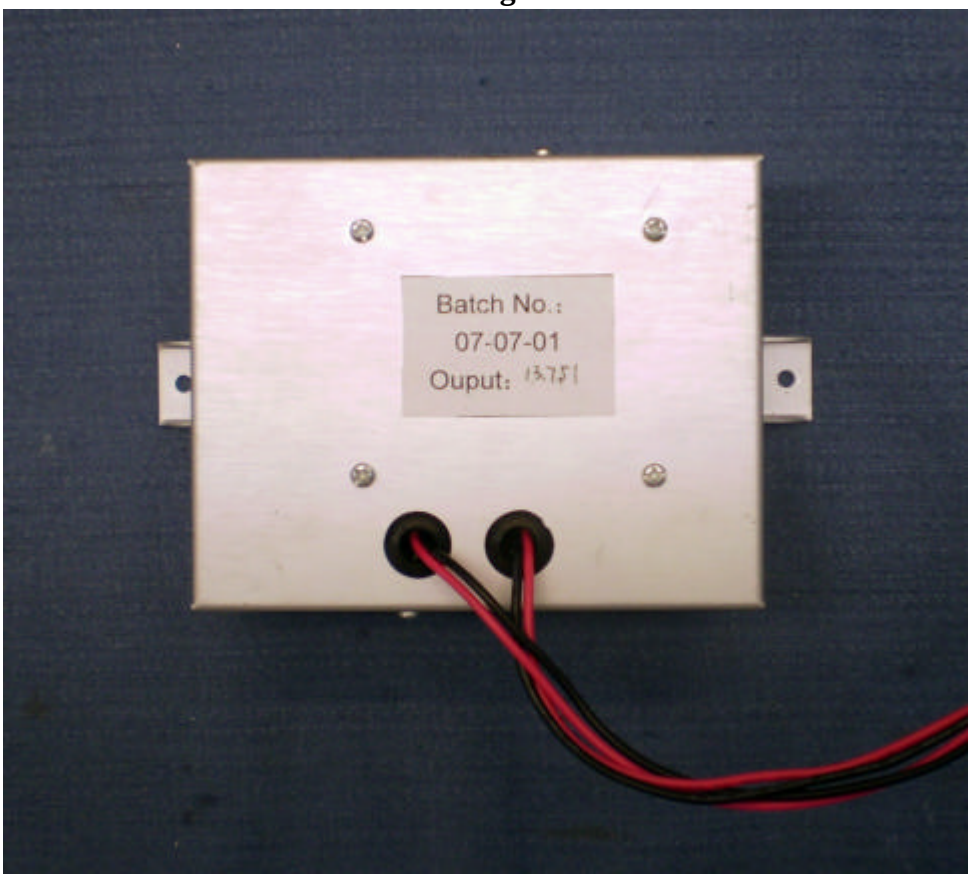
3/ Battery Charger: Inductive Loop, Rectifier, Charger and Battery



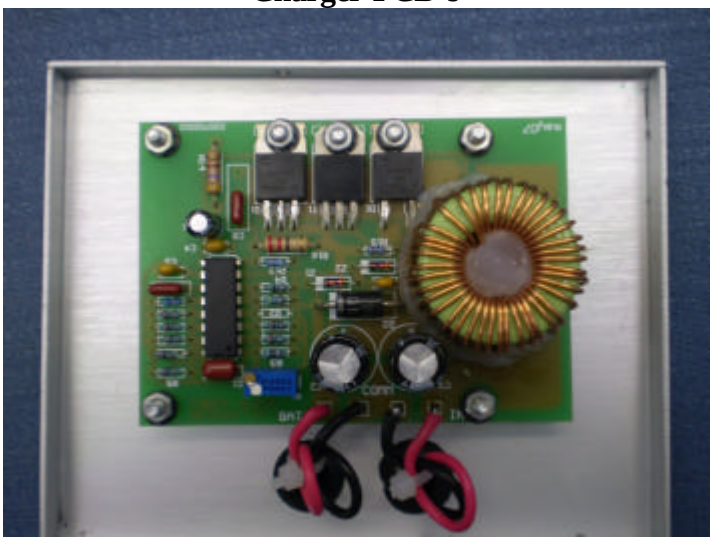
Rectifier

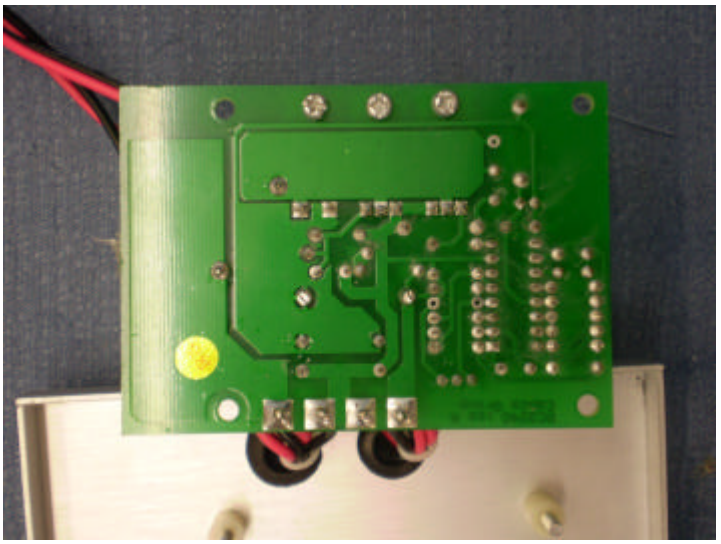


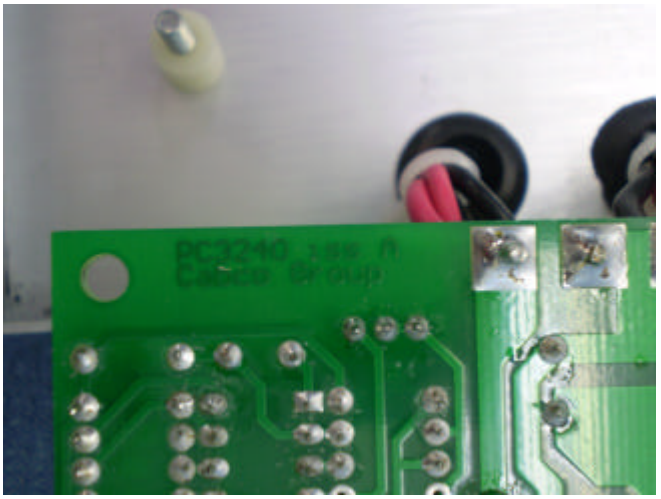
Charger



Charger PCB's







4/ Sensor