ELECTROMAGNETIC INTERFERENCE TEST REPORT

FOR

SCOTTCARE CORP.

TELE-REHAB
TRANSMITTER

May 16, 2001

Prepared for: ScottCare Corp.
4791 W. 150th Street
Cleveland, OH 44135

Measurements made
and report prepared by: _____
James R. Pollock

SMITH ELECTRONICS, INC.
8200 SNOWVILLE RD.
CLEVELAND, OH 44141
440/526-4386

TABLE OF CONTENTS

CERTIFICATE OF COMPLIANCE

1. Applicant:	ScottCare Corp. 4791 W. 150th Street Cleveland, OH 44135
2. Manufacturer:	Above
3. Contact:	Luigi Musto ScottCare Corp. Tel. Fax. 216/267-6129
4. Regulation:	CFR47-Part 15C 15.242
5. Measurement Method:	ANSI C63.4-1992
6. Type:	Medical Telemetry Transmitter
7. Frequency:	608 - 614 MHz
8. Dates of Test:	Feb. 16 - May 1, 2001
9. Place of Test:	Smith Electronics, Inc. Test Lab, 8200 Snowville Rd., Brecksville, OH.

10. Statement of Compliance:

I hereby certify that measurements of radio frequency emissions from the ScottCare Corp. Tele-Rehab transmitters were performed by me between Feb. 16 & May 1, 2001, and that the results of the measurements confirmed that the units tested are capable of compliance with the above regulations.

_____ _____

Date Signature, Title

INTRODUCTION:

The devices tested are representative of the transmitter portion of a medical telemetry system designed for use in health care establishments under Part 15.242 of the FCC Rules. Each transmitter is factory tuned to one of 58 channels between 608.150 MHz and 613.850 MHz. The channels are spaced at 100 kHz intervals. FM modulation is used to transmit the input signals. Companion receivers are factory tuned to the appropriate channel.

The transmitters are battery powered and are activated by connecting a sensor harness to the external jack of the transmitter.

The transmitter is to be certified to the requirements of Part 15.242 of the FCC rules. As the system can be tuned over a range of 6 MHz, two samples of the transmitter were tested. One was tuned to the low end at 608.15 MHz while the second was tuned to the high end at 613.85 MHz.

RADIATED EMISSIONS BELOW 1000 MHZ:

An initial scan of the emissions profile of the transmitter was made in a shielded room between 30 MHz and 1000 MHz. Other than the fundamental frequency, only a few signals in the vicinity of the fundamental were observed. Along with the fundamental and its harmonics, these were measured and reported in Tables 1 & 2.

Measurements of the emissions below 1000 MHz were made on the Smith Electronics 3 m open field test site located at 8200 Snowville Road, Brecksville, OH. Data on this test site is on file with the FCC.

The transmitter, with its frequency set by the manufacturer, was activated and placed on its side on a rotatable, non- conductive platform at a 3 m test distance (See Pictorial 1). The NM 37/57 receiver was tuned to the fundamental frequency and the transmitter was then rotated and the horizontally polarized test antenna (tuned dipole) varied in height between 1 & 4 meters to obtain the maximum reading. The maximum level, using quasi-peak detection, was recorded. The transmitter was also examined with the test antenna oriented vertically. The transmitter was also positioned on its back and upright with the test antenna horizontal and vertical in each case. All measured values were recorded and the maximum values tabulated in Tables 1 & 2. The spurious signals mentioned above were also measured using the same procedure.

RADIATED EMISSIONS ABOVE 1000 MHZ:

The measurement of radiated emissions above 1000 MHz was performed in an open area at a test distance of 1 meter using a double ridge waveguide horn antenna. A manually operated rotating platform was used and the same procedure followed except for the variation in antenna height. Averaged readings were made using a HP 8593EM spectrum analyzer with a 1 MHz resolution band width and a 3 kHz average band width. Maximum measured levels are also recorded in Tables 1 & 2.

BAND EDGES:

The band edges were examined on the open field range at a three meter distance using the 8593EM analyzer. Using the same procedure as for measuring the signal strength, the transmitter and receive antenna were positioned for maximum signal strength. The analyzer was tuned to the signal using a 10 kHz bandwidth as would be used for an occupied bandwidth measurement.

With the signal closest to the band edge centered on the display and a 400 kHz frequency span shown, the marker was placed at the band edge and the value read. Plots of the two band edge signals are shown in Fig. 3. The calculated field strength values at the edge are also found in Tables 1 & 2.

CALCULATIONS:

A.) Field Strength.

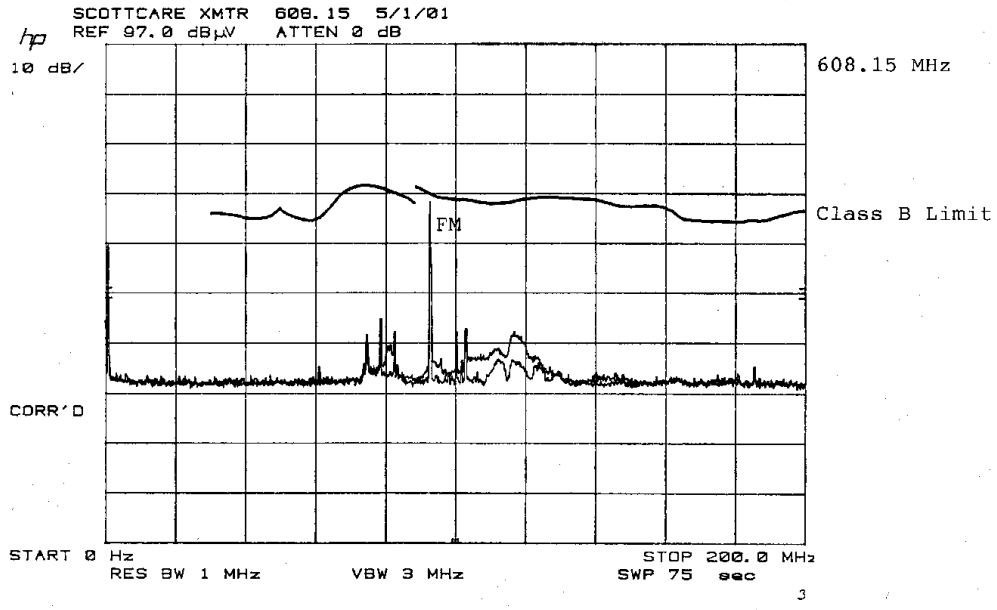
Readings were made at all frequencies in dBuV. To these values were added the antenna factor and a coax loss factor in dB to arrive at field strength in dBuV/m. This value was then converted to microvolts per meter by dividing dBuV/m by 20 and finding the anti-log of the quotient. For the fundamental frequencies, this value was divided by 1000 to obtain mV/m.

For the measurements above 1000 MHz which were made at a 1 m distance, the field strength in uV/m was divided by 3 (-9.5 dB) to allow for an inverse distance correction.

CONCLUSIONS:

The transmitter portion of the ScottCare, Tele-Rehab Medical Telemetry System, when tested as described, has been shown to be capable of compliance with the FCC Rules and Regulations under Part 15.242 for biomedical telemetry transmitters.

PICTORIAL 1
RADIATED EMISSIONS
SCOTTCARE TELE-REHAB TRANSMITTER
TEST SET UP



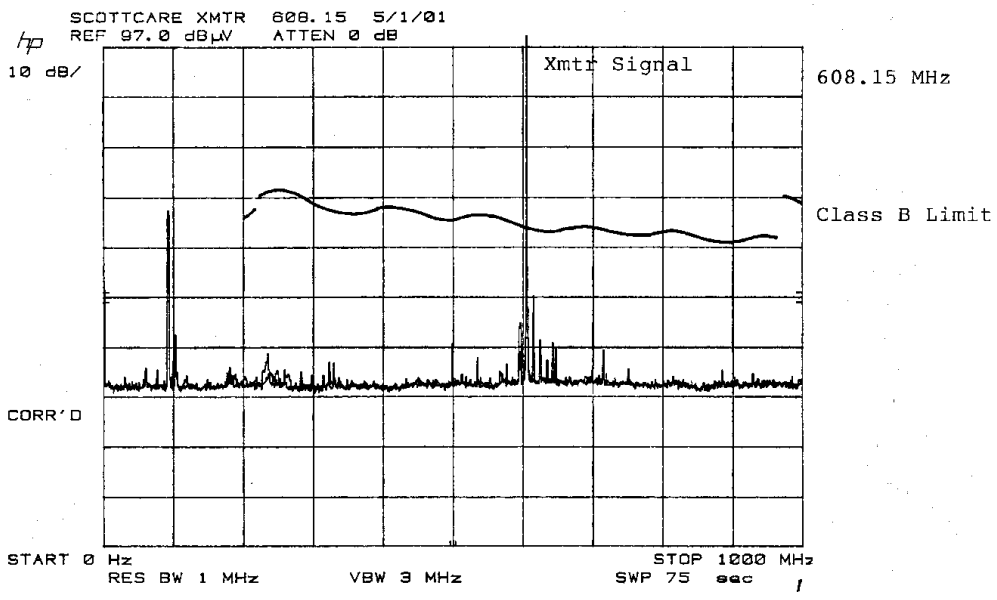
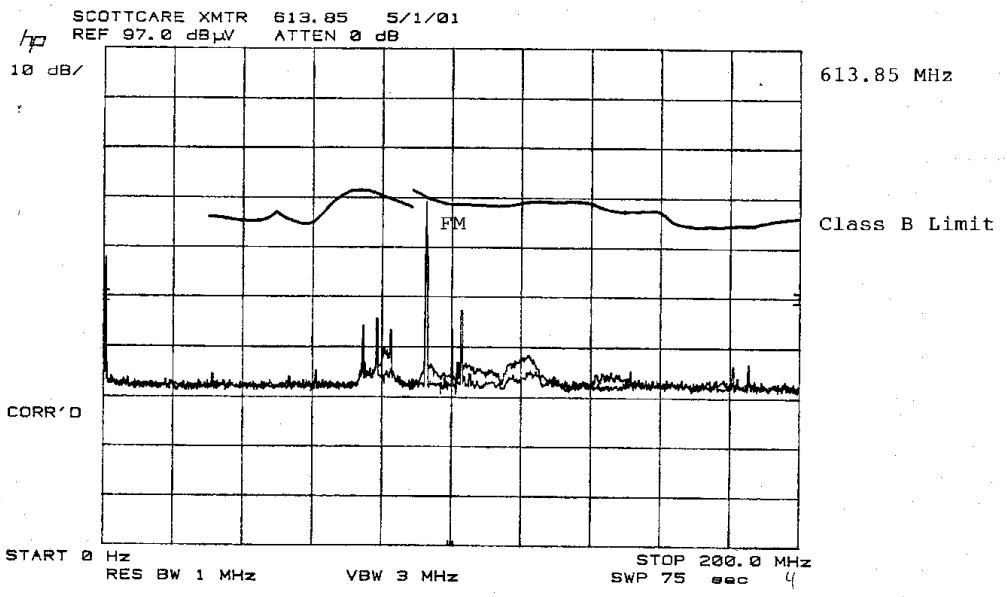


Fig. 1
RADIATED EMISSIONS
SCOTTCARE TELE-REHAB TRANSMITTER
608.15 MHz SHIELDED ROOM SCAN
30 MHz – 1000 MHz



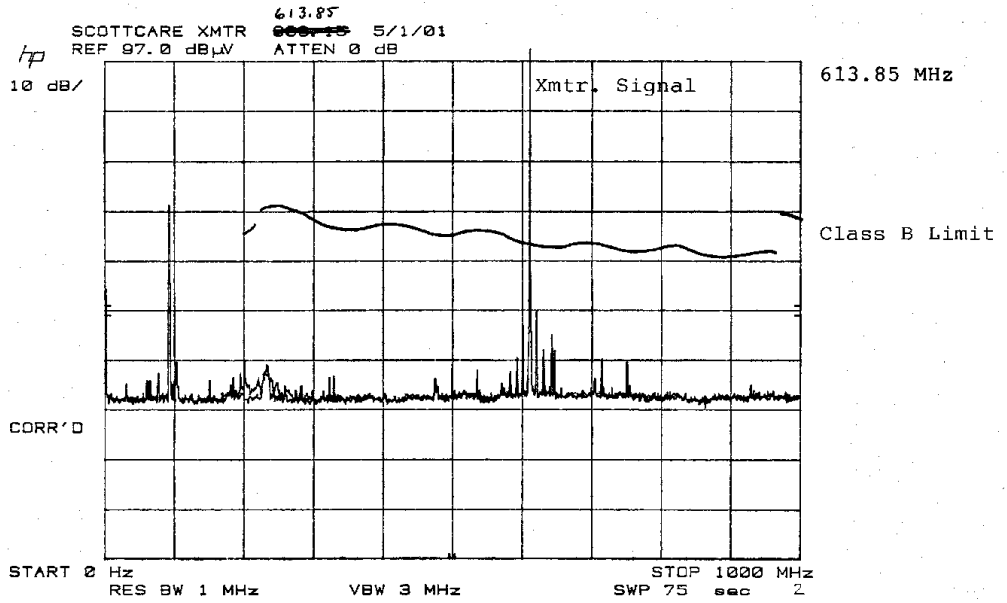
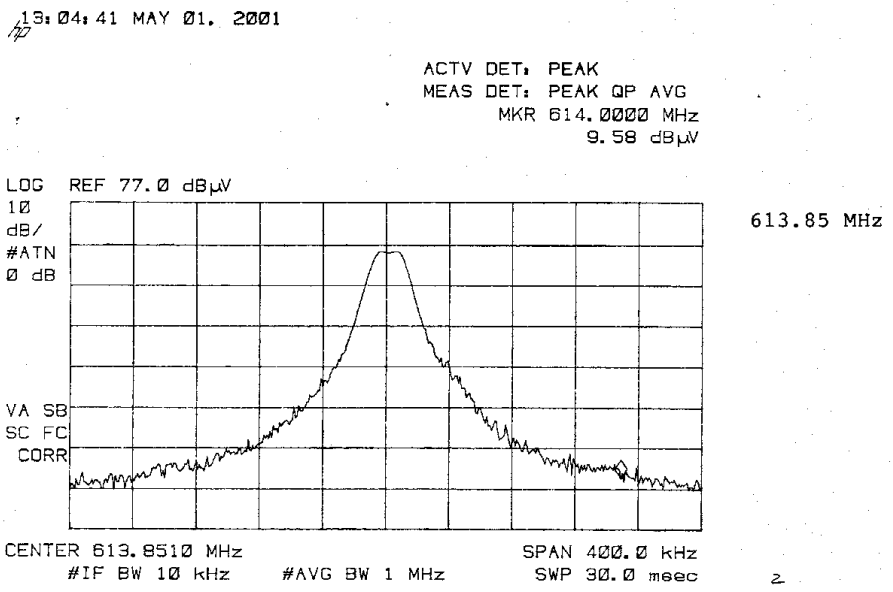


Fig. 2
RADIATED EMISSIONS
SCOTTCARE TELE-REHAB TRANSMITTER
613.85 MHz SHIELDED ROOM SCAN
30 MHz – 1000 MHz



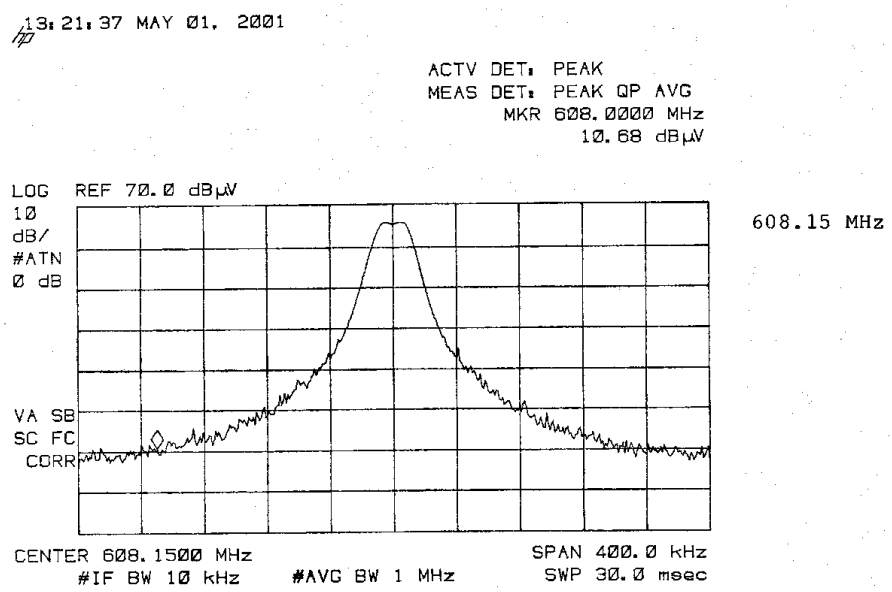


Fig. 3
RADIATED EMISSIONS
SCOTTCARE TELE-REHAB TRANSMITTER
BAND EDGE PLOTS

TABLE 1
SCOTTCARE, INC.
TELE-REHAB
BIOMEDICAL TELEMETRY TRANSMITTER

608.15 MHz

Freq. (MHz)	Meter dBuV	AF dB	Coax dB	Field Strength @ Dist.		@3m	Limit uV/m	Diff. dB
				@ 3 m				
				dBuV/m	mV/m	mV/m	mV/m	
608.15	65.0	25.3	1.3	91.6	38.0	38.0	200	-14.4
				dBuV/m	uV/m	uV/m	uV/m	
[1]608.00	10.7	25.3	1.3	37.3	37.3	73.3	200	- 8.7
[2]617.65	9.0	25.3	1.3	35.6	60.3	60.3	200	-19.5
[2]627.15	2.0	25.3	1.3	28.6	26.9	26.9	200	-17.4
				@1 m				
1216.30	29.1	25.0	0.4	54.5	531	177	500	- 9.0
1824.45	29.3	27.5	0.5	57.3	733	244	500	- 6.2
2432.60	23.7	29.0	0.5	53.2	457	152	500	-10.3
3040.75	28.9	31.0	0.6	60.5	1059	353	500	- 3.0
3648.90	20.4	32.5	0.7	53.6	478	160	500	- 9.9
4257.05	21.8	33.5	0.8	56.1	638	213	500	- 7.4
4865.20	<16.5	34.0	0.9	<51.4	<372	<124	500	>-12.2
5473.35	<16.5	36.0	1.0	<53.5	<473	<158	500	>-10.0
6081.50	<16.5	35.5	1.0	<53.0	<447	<149	500	>-10.5

[1] Lower Band Edge

[2] Spurious/Non-Harmonic

TABLE 2
SCOTTCARE, INC.
TELE-REHAB
BIOMEDICAL TELEMETRY TRANSMITTER

613.85 MHz

Freq. (MHz)	Meter dBuV	AF dB	Coax dB	Field Strength @ Dist.		@3m	Limit uV/m	Diff. dB
				@ 3 m				
				dBuV/m	mV/m	mV/m	mV/m	
613.85	66.0	25.3	1.3	92.6	42.7	42.7	200	-13.4
				dBuV/m	uV/m	uV/m	uV/m	
[1]614.00	9.6	25.3	1.3	36.2	36.2	64.6	200	- 9.8
[2]604.35	6.0	25.3	1.3	32.6	42.7	42.7	200	-13.4
[2]623.35	9.0	25.3	1.3	35.6	60.3	60.3	200	-10.4
[2]632.85	1.0	25.3	1.3	27.6	24.0	24.0	200	-18.4
				@ 1 m				
1227.70	27.6	25.0	0.4	53.0	447	149	500	-10.5
1841.55	27.5	27.5	0.5	55.5	596	199	500	- 8.0
2455.40	23.7	29.0	0.5	53.2	457	152	500	-10.3
3069.25	28.1	31.0	0.6	59.7	966	322	500	- 3.8
3683.10	18.3	32.5	0.7	51.5	376	125	500	-12.0
4296.95	21.5	33.5	0.8	55.8	617	206	500	- 7.7
4910.80	<16.5	34.0	0.9	<51.4	<372	<124	500	>-12.2
5524.65	<16.5	36.0	1.0	<53.5	<473	<158	500	>-10.0
6138.50	<16.5	35.5	1.0	<53.0	<447	<149	500	>-10.5

[1] Lower Band Edge

[2] Spurious/Non-Harmonic

EQUATIONS USED IN CALCULATIONS

$$E = R + A + C \qquad \text{EQ. 1}$$

Where: E = Field strength in dBuV/m
R = Meter reading in dBuV
A = Antenna factor in dB
C = Coax loss in dB

$$FS = 10^{(E/20)} \qquad \text{EQ. 2}$$

Where: FS = Field strength in uV/m
E = Field strength in dBuV/m

$$E_3 = E_1/3 \qquad \text{EQ. 3}$$

Where E_3 = Field Strength at 3 meters (uV/m)
E_1 = Field Strength at 1 meter (uV/m)

SAMPLE CALCULATION:

At 613.85 MHz, using EQ. 1 and data from Table 2,

$$E = 66.0(\text{dBuV}) + 25.3(A) + 1.3(C) = 92.6 \text{ dBuV/m}$$

Using EQ. 2, $FS = 10^{(92.6/20)}$

$$= 10^{4.63}$$

$$FS = 42658 \text{ uV/m} \quad \text{or } 42.7 \text{ mV/m}$$

Also from Table 2 at 1227.7 MHz and using EQ. 1,

$$E = 27.6(\text{dBuV}) + 25.0(A) + 0.4(C) = 53 \text{ dBuV/m}$$

From EQ. 2, $FS = 10^{(53/20)} = 10^{2.65} = 447$ uV/m @ 1m

From EQ. 3, 447/3 = 149 uV/m @ 3m

Compared to Limit 149/500 = 0.298 = -10.5 dB

LIST OF TEST EQUIPMENT

RECEIVERS:	Hewlett-Packard Spectrum Analyzer Type 8568B with 8560A RF Section S/N 2216A02120 85662A Display Section S/N 2152A03686 85650A Quasi-Peak Adapter S/N 2043A00350 Calibrated 6/00
	Singer Stoddart EMI Field Intensity Meter Model NM 37/57 S/N 0366-06068 Calibrated 6/00
	Hewlett-Packard Spectrum Analyzer Model 8593EM, S/N 3536A00147 Calibrated 6/00
ANTENNAS;	EMCO Biconical Antenna Model 3104 Freq. Range 20 - 200 MHz
	EMCO Log-Periodic Antenna Model 3146 Freq. Range 200 - 1000 MHz
	Stoddart Tuned Dipole Antenna Model 91598-2 Freq. Range 400 - 1000 MHz
	EMCO Double Ridged Guide Horn Model 3115 Freq. Range 1 - 18 GHz
MISCELLANEOUS:	Hewlett-Packard Preamplifier Model 8447D S/N 1725A01282
	12.2 m RG-214/U coaxial cable 1.0 m RG-214/U coaxial cable 1.2 m RG-9/U coaxial cable