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	<b>EMERGENCY MEASURES RADIO GROUP</b>
	<b>OTTAWA ARES</b>

Two Names - One Group - One Purpose

## Technical Reference EMRG-213

Version: 0.31 Mar 20,2007

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**Table Of Contents**

**1 REVISION SUMMARY**

**2 PURPOSE OF THIS DOCUMENT**

**3 1/4 WAVE ANTENNA LENGTHS**

**4 RF COAXIAL CABLE LOSS**

**FOR A GIVEN SITUATION CHOOSE THE CABLE THAT WILL GIVE YOU THE LOWEST LOSS. FOR EXAMPLE, IF YOU HAVE A 100 FT PIECE OF RG 213 AND A 50 FT PIECE OF RG 58, USE THE LONGER PIECE OF COAX.**

**SIMILARLY IF YOU NEED TO SET UP ON BOTH 2M AND 70 CM, CHOOSE FROM AMONG THE AVAILABLE CABLES TO GIVE AN ACCEPTABLE LOSS ON BOTH BANDS.**

**REMEMBER THAT 3DB LOSS MEANS YOU ARE LOSING 1/2 OF YOUR POWER,**

**6DB LOSS MEANS YOU ARE LOSING 3/4 OF YOUR POWER AND 10 DB LOSS MEANS YOU ARE LOSING 9/10 OF EVERY WATT FROM THE TRANSMITTER (OR MICROWATT FROM THE ANTENNA).**

**5 GENERATORS ETC.**

**6 WIRES**

**7 BATTERY INFO**

**8 FORMULAE, ETC.**

**9 PHONETIC ALPHABET**

**10 MESSAGE PRECEDENCE**

**11 WHAT DID I FORGET TO INCLUDE?**

**10 MESSAGE PRECEDENCE.....8**

**11 WHAT DID I FORGET TO INCLUDE.....8**

## 1 REVISION SUMMARY

Date of Change	Revision Number	Summary of Changes (Section #, type of change)
July 17, 2003	0.1	Initial document –DRAFT
2004-05-23	0.2	Re-number as EMRG-206 and add classification
2007-Mar-4	0.3	Changed doc #, removed frequencies, added other data
2007-03-20	0.31	added more data, corrected battery capacity

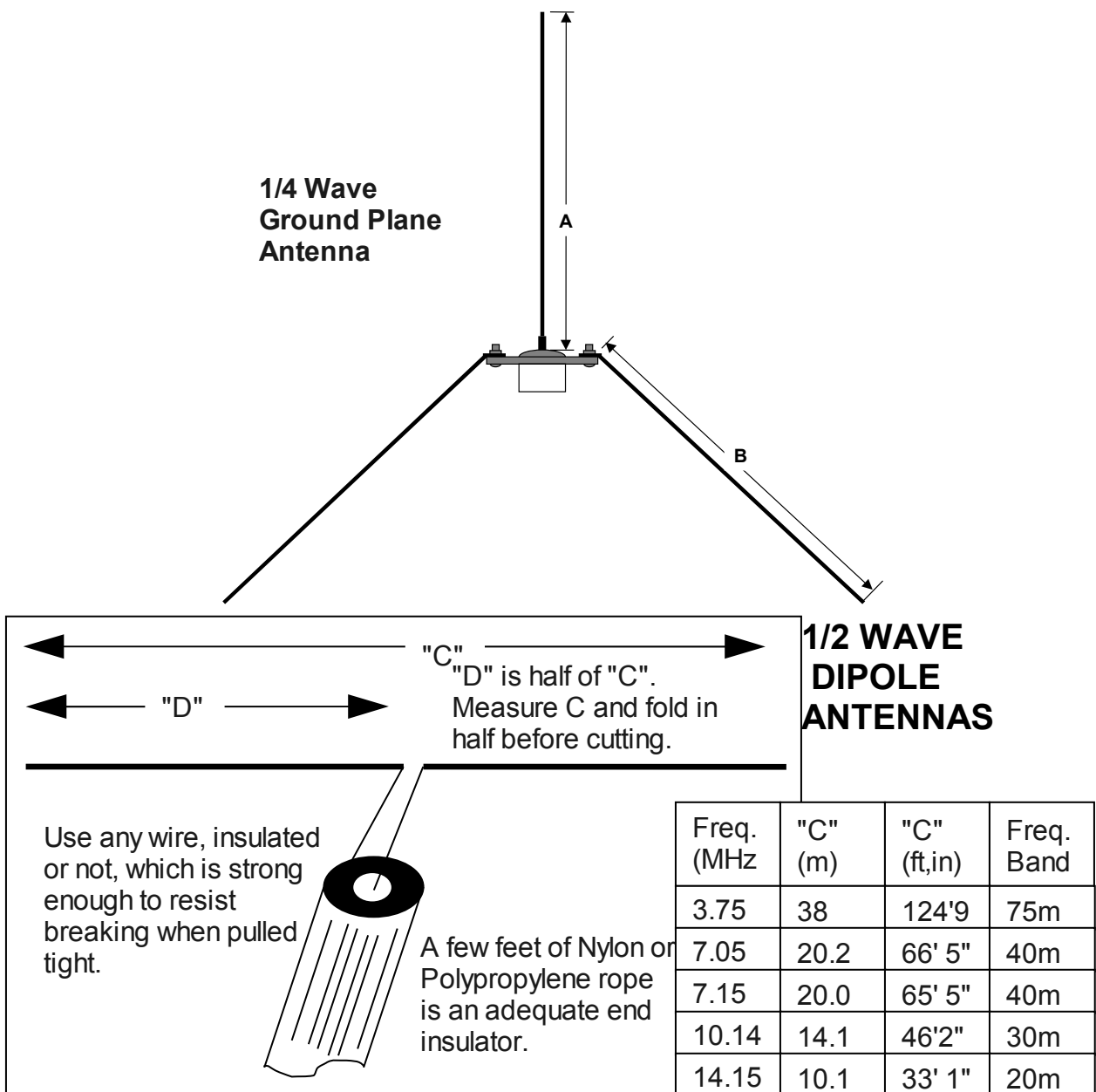
## 2 PURPOSE OF THIS DOCUMENT

The document is a collection of charts, tables, rules of thumb and drawings for technical information that could be useful in the field.

### 3 1/4 Wave Antenna Lengths

Centre Frequency (MHz)	A (cm)	A (in)	Description
146	48.9	19 4/16	Amateur 2M
158	45.1	17 12/16	Marine Band
225	31.8	12 1/2	Amateur 1.35M
445	16	6 5/16	Amateur 70cm
464.5	15.4	6 1/16	FRS

Elements can be brass rod (3/32 or 1/16) or #12 solid copper wire.



## 4 RF Coaxial Cable Loss

146 MHz	50 ft	100 ft	150 ft	250 ft
RG 58	3.75 dB	7.5 dB	11.3 dB	18.8 dB
RG 8x	1.8 dB	3.7 dB	5.6 dB	9.3 dB
RG 213	1.5 dB	3.0 dB	4.5 dB	7.5 dB

446 MHz	50 ft	100 ft	150 ft	250 ft
RG 58	6.3 dB	12.5 dB	18.8 dB	31.3 dB
RG 8x	3.3 dB	6.5 dB	9.8 dB	16.3 dB
RG 213	3.0 dB	5.9 dB	8.9 dB	14.8 dB

For a given situation choose the cable that will give you the lowest loss. For example, if you have a 100 ft piece of RG 213 and a 50 ft piece of RG 58, use the longer piece of coax.

Similarly if you need to set up on both 2m and 70 cm, choose from among the available cables to give an acceptable loss on both bands.

Remember that 3dB loss means you are losing 1/2 of your power, 6dB loss means you are losing 3/4 of your power and 10 dB loss means you are losing 9/10 of every watt from the transmitter (or microwatt from the antenna).

## 5 Generators Etc.

### 5.1 Engine size vs Power out.

Remember that 1 horsepower = 746 Watts, so don't expect more out than in.

### 5.2 Fuel Consumption rate

Generator fuel consumption is about 1 gal /hr for each 10HP. This is only approximate, so it doesn't much matter whether it is US or CDN gallons.

### 5.3 Fuel Weight

Gasoline weighs about 6.1 pounds per gallon.

Diesel fuel is slightly more dense, at about 7.1 lb/gal.

For comparison, water weighs 8.3 lb/ gal (US) or 62.5lb / cubic foot (Of course in the metric system, it's a kilogram per litre, or a ton per cubic metre)

### 5.4 Wiring Connection Diagrams for Power



With Power Pole connectors it doesn't matter whether the device is a source or load, the connectors go on the same way, as shown.

## 6 Wires

### 6.1 Wire sizes for 12V

For a cable run, (out and back) what is the minimum guage for a 1v (8% !) drop?

MAX CURRENT	LENGTH FT (M)			
	10 (3m)	25 (7.5m)	50 (15m)	100 (30m)
5 A (60W)	16 ga will do	16 ga will do	16 ga will do	16 ga will do
10 A (120W)	16 ga	14 ga	10 ga	6ga
15 A (180W)	14 ga	10 ga	8 ga	4 ga
20 A (240W)	14 ga	10 ga	6 ga	4 ga
25 A (300W)	12 ga	8 ga	6 ga	2ga
30 A (360W)	12 ga	8 ga	4 ga	2 ga
83A (1000W)	8 ga	4 ga	2 ga	000 ga

(If you try to maintain a 2% drop, the wires get real big, real fast)

### 6.2 Wire sizes for 120V

For a given extension cord, what is the max current for a 2% (2.4V) drop?

MAX CURRENT	LENGTH FT (M)				
	10' (3m)	25' (7.5m)	50' (15m)	100' (30m)	House wiring typically fused at:
16 ga	29 A	11 A	5 A	3 A	n/a
14 ga	46 A	18 A	9 A	4 A	15 A (1.8 KW )
12 ga	74 A	29 A	14 A	7 A	20 A (2.4 KW )
10 ga	117 A	47 A	23 A	11 A	25 A (3 KW )
8 ga	187 A	74 A	37 A	18 A	30 A (3.6 KW )

(If you try to maintain a 1V drop (0.8%) the wires get bigger fast)

## 7 Battery info

### 7.1 Alkaline

AAA	37.5mA for 25 hr
AA	20 mA for 107 hr
C	37.5 mA for 160 hr
D	50 mA for 270 hr
"9V"	18mA for 33 hr

I didn't make these numbers up. They are from "Pocket Ref, 2nd Ed., Thomas J Glover, 1995" -mk

Does anybody have better info on Alkaline batteries than this? -mk

**7.2 Lead Acid:** What is the current vs time for a battery? **10AH isn't 10A for 1H**

4 Ah	7 Ah	10 Ah	20 Ah	Assume a <b>car battery</b> is <i>about</i> 40 Ah. (double the amounts for the 20Ah column). <b>"Reserve Capacity"</b> is about twice the AH rating of a battery.
4 A for 20 min	7 A for 20 min	10A for 20 min	20 A for 20 min	
3 A for 0.5h	5 A for 0.5 h	7.5 A for 0.5 h	15 A for 0.5 h	
2 A for 1h	3.5 A for 1h	5 A for 1h	10 A for 1h	
.9 A for 3h	1.5 A for 3 h	2.2 A for 3 h	4.5 A for 3 h	
.36 A for 10 h	.6 A for 10 h	.9 A for 10 h	1.8 A for 10 h	
.2A for 20 h	.35A for 20 h	.5A for 20 h	1 A for 20 h	

**8 Formulae, Etc.**

$E = I \times R$      $P = E \times I$      $P = I^2 R$      $R_t = (R_1 \times R_2) / (R_1 + R_2)$  [if equal & parallel]  
 $I = E / R$      $I = P / E$      $I = \sqrt{P / R}$      $R_t = R_1 + R_2$  [ if in series]  
 $R = E / I$      $E = P / I$      $V = \sqrt{P R}$      $1/R_t = 1 / (1/R_1 + 1/R_2 + 1/R_n)$  [R in parallel]

**Colour Code**

SIGNIFICANT DIGIT	COLOUR	MULTIPLIER	TOLERANCE
0	BLACK	X1	
1	BROWN	X10	1%
2	RED	X100	2%
3	ORANGE	X1000	
4	YELLOW	X10 000	
5	GREEN	X100 000	0.5%
6	BLUE	X1000 000	0.25%
7	VIOLET	X10 000 000	0.1%
8	GRAY	Not applicable	
9	WHITE	Not applicable	
	SILVER	x.01	10%
	GOLD	x.1	5%
	NONE		20%

example: red black orange gold is 2 : 0 : x1000 : 5% or 20K, 5%  
 red brown green red orange is 2 : 1 : 5 : x1000 : 2% or 215K, 2%

A sixth band would indicate a temperature coefficient or reliability

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10% Standard values: from 0.1 Ohm to 9.1 Megohm

1	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2	9.1
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5% Standard values: add the following to the above row:

1.1	1.3	1.6	2.0	2.4	3.0	3.6	4.3	5.1	6.2	7.5
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## 9 PHONETIC ALPHABET

LTR	WORD	Pronounced as	Emphasized syllables in <b>BOLD</b>					
A	Alfa	<b>AL</b> FAH	J	Juliett	<b>JEW</b> LEE <b>ETT</b>	S	Sierra	SEE <b>AIR</b> RAH
B	Bravo	<b>BRAH</b> VOH	K	Kilo	<b>KEY</b> LOH	T	Tango	<b>TANG</b> GO
C	Charlie	<b>CHAR</b> LEE	L	Lima	<b>LEE</b> MAH	U	Uniform	<b>YOU</b> NEE FORM
D	Delta	<b>DELL</b> TAH	M	Mike	<b>MIKE</b>	V	Victor	<b>VIK</b> TAH
E	Echo	<b>ECK</b> OH	N	November	NO <b>VEM</b> BER	W	Whiskey	<b>WISS</b> KEY
F	Foxtrot	<b>FOKS</b> TROT	O	Oscar	<b>OSS</b> CAH	X	X-ray	<b>ECKS</b> RAY
G	Golf	<b>GOLF</b>	P	Papa	<b>PAH PAH</b>	Y	Yankee	<b>YANG</b> KEY
H	Hotel	<b>HOH</b> TELL	Q	Quebec	KEH <b>BECK</b>	Z	Zulu	<b>ZOO</b> LOO
I	India	<b>IN</b> DEE AH	R	Romeo	<b>ROW</b> ME OH			

## 10 Message Precedence

Emergency (somboddy will die if this message is lost or delayed)

Priority (This message should go out right away)

Routine (Everything Else)

## 11 What did I forget to include?

Write it here for your own reference, and tell me about it, so I can put it in the next version of this document -mk, ve3ffk AT rac DOT ca