

# Diploma of Audio Production

Name \_\_\_\_\_

## Analogue Fundamentals

### Module 2

**In this session we are going to look at “Multiples” and Sub multiples of the base unit.**

As an example we can refer to resistances as Kohms and some voltages as milli Volts as in microphone outputs.

In electronics we have quite a wide range of these multiples and sub multiples and these are referred to as “Engineering” format.

So here is a list of all the units that are used but don't panic, in the Diploma of Audio Production area we normally only use a couple of these.

Starting from the maximum to the minimum along with the multiplication factors:

1. Mega (or Meg) = 1 Million (1,000,000 or  $10^6$ ). Some examples of this would be 1 Meg Ohm, 1 Mega Hertz etc. That is 1 Million Ohms or  $1 \times 10^6$  Ohms and 1 Million Hertz or  $1 \times 10^6$  Hertz.
2. Kilo = 1 Thousand (1,000 or  $10^3$ ). Some examples of this would be 1 Kilo Ohms, 1 Kilo Hertz etc. That is 1 Thousand Ohms or  $1 \times 10^3$  Ohms and 1 Thousand Hertz or  $1 \times 10^3$  Hertz.
3. Base Unit (  $10^0$  ). Examples of this would be Ohms, Hertz Volts, Amps, Watts etc. Note  $10^0 = 1$
4. milli =  $1/1000$  or  $10^{-3}$ . Some examples of this would be 1 milli Volt, 1 milli Amp etc. That is  $1 \times 10^{-3}$  Volts or 0.001 Volts and  $1 \times 10^{-3}$  Amps or 0.001 Amps.
5. micro =  $1/1,000,000$  or  $10^{-6}$ . Examples would be 1 micro Volt, 1 micro Watt etc. That is  $1 \times 10^{-6}$  Volts or 0.000,001 Volts and  $1 \times 10^{-6}$  Watts or 0.000,001 Watts. (Note micro is normally represented by the symbol  $\mu$ )
6. nano =  $1/1,000,000,000$  or  $10^{-9}$ . Examples would be 1 nano Second, 1 nano Watt etc. That is  $1 \times 10^{-9}$  Seconds or 0.000,000,001 Seconds and  $1 \times 10^{-9}$  Watts or 0.000,000,001 Watts.
7. pico =  $1/1,000,000,000,000$  or  $10^{-12}$ . Examples would be 1 pico Watt, 1 pico Farad etc. That is  $1 \times 10^{-12}$  Watts or 0.000,000,000,001 Watts and  $1 \times 10^{-12}$  Farads or 0.000,000,000,001 Farads.

So we have in ascending order;

Units

Kilo  $(10^3)$

Mega  $(10^6)$

and descending order;

Units  $(10^0)$

milli  $(10^{-3})$

micro ( $\mu$ )  $(10^{-6})$

nano  $(10^{-9})$

pico.  $(10^{-12})$

Conversions

To Convert Amps to milliamps we multiply by 1000

Examples

0.5 Amps = 500 milliamps  $(0.5 \times 1000 = 500 \text{ mA})$

47K Ohms = 47000 Ohms  $(47 \times 1000 = 47000)$

**So when we are moving from large units to smaller units we multiply**

To convert 500 milli Volts to Volts we Divide by 1000

Examples

500 milli Volts = 0.5 Volts  $(500 / 1000 = 0.5 \text{ Volts})$

774000Hertz = 774 Kilo Hertz  $(774000 / 1000 = 774 \text{ Kilo Hertz})$

**So when we are moving from small units to Larger units we Divide**

**Note:** Sub multiples use lower case letters while the Base unit and Multiples use Capitals

So Summarizing:

To convert Mega to the Base Unit we multiply by 1 million.

To convert the Base Unit to Mega, we divide by 1 million.

Now have a go at completing the following;

1. Convert 1500  $\Omega$  to Kilo  $\Omega$  (K  $\Omega$ )

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2. Convert 47K $\Omega$  to Ohms ( $\Omega$ s)

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3. Convert 0.5 Amps to milli amps (mA)

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4. Convert 20,000 Hertz to Kilo Hertz (KHz)

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5. Convert 50 milli Volts to Volts

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6. Convert 0.2 Volts to milli Volts (mV)

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7. Convert 2000 Watts to Kilo Watts (KW)

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8. Convert 0.0004 Watts to micro Watts ( $\mu$ W)

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9. Convert 775 mV to Volts

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10. Convert 0.001 Watts to mWatts

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