Understanding Trapped Antennas
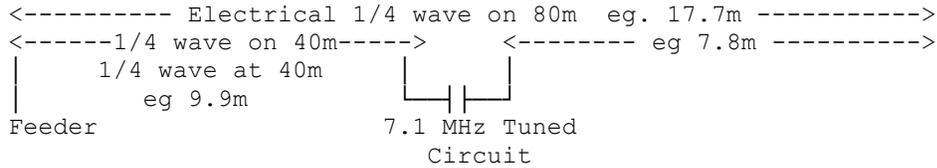
By G8MNY   (Updated Feb 06)
(8 Bit ASCII Graphics use code page 473 or 850)
BASIC TRAP
Here is a simple 40m trap used in each side of an 80m dipole.

1/2 of the Dipole or a 1/4 wave wire

```
<---------- Electrical 1/4 wave on 80m  eg. 17.7m ----------->
<------1/4 wave on 40m-----> 	    <-------- eg 7.8m ---------->
│       1/4 wave at 40m            │   │
│          eg 9.9m                 └─┤ ├─┘
│                                    │ │
Feeder                        7.1 MHz Tuned
                                   Circuit
```

Note the 80m length is slightly shorter due to the added coil wire.

HOW IT WORKS
The L & C have to make a high impedance Z at 40m to isolate the hot end
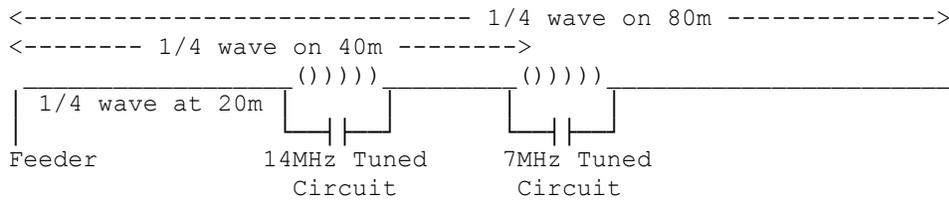(high Z) of the 40m dipole.

$$Z = Q * X_c$$

This means the L must be quite large & C small to get the tuned circuit Q
multiplied by the capacitance reactance X_c (= X_l at resonance) to make the Z
very high.

The Voltage & Current rating is quite high, e.g. 2kV AC for 100W.

MULTIPLE BANDS
It is possible to add a series traps 1 per band, isolating the resonant aerial
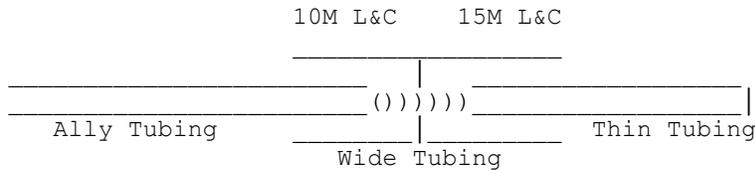length from the rest.

1/2 of the Dipole or a 1/4 wave.

```
<---------------------------- 1/4 wave on 80m -------------->
<-------- 1/4 wave on 40m -------->
_____ ()))))_____ ()))))_____
│ 1/4 wave at 20m    │   │          │   │
│                    └─┤ ├─┘        └─┤ ├─┘
│                       │ │            │ │
Feeder             14MHz Tuned    7MHz Tuned
                      Circuit        Circuit
```

SOLID AERIALS
With solid aerials & beams the traps for say 10m & 15m are often combined. The
outer sleeve forming both capacitors & also becoming the middle conductor, it
is connected to a tapping on the coil.

1/2 Dipole or 1/4 wave vertical.

```
                  10M L&C     15M L&C
                    _____|_____
_____   |    _____
_____  _____|
_____()))))) _____|
     Ally Tubing      _____|_____   Thin Tubing
                   Wide Tubing
<-- 1/4 wave @ 10m -->
<--------- 1/4 wave @ 15m ---------->
<------- Electrical 1/4 wave @ 20m -------------->
```

With this design water is a major problem, & drain holes are needed on the
underside of the wide tubing.

Each length can sometimes be adjusted, so that the low SWR sweet spot can be
set up per band, starting with the highest frequency.

POWER HANDLING
At resonance the trap voltage & current can be very high depending on the power.
eg. @ 50W on half of a dipole @ say a Z of 10kÛ, means the trap has to isolate
a voltage of :-

```
        _____
```

At 400W into say a vertical rod aerial the trap voltage could be:-

```
        _____
```
$V = \sqrt{400 * 10{,}000}$ = 2 kV or ± 2.8 kV peak

As the traps are not used (resonant) for the lowest band, generally they will
not be power limited. e.g. a limit of 100W on 10m & 15m, but 400W on 20m is OK
on a 10/15/20m tribander.

Why don't U send an interesting bul?

73 de John G8MNY @ GB7CIP