Application

When the 635mm "W" loop and *Q* amplifier are used together, tuned *Q* rises and amplifier gain falls with increasing frequency to form a constant bandwidth, constant sensitivity medium wave antenna. The 4kHz setting is useful for weak or interchannel signals degraded by noise and sideband splatter, while 8 and 16kHz bandwidths allow broader response for speech and music listening. Balanced design ensures electrostatic interference rejection and an axial nulling capability that, by virtue of dual axis rotation, can be accurately aligned with any unwanted signal without recourse to zero cleaning methods. Note however, the total cancellation of an unwanted signal is not always possible because cyclically varying ionospheric reflection components can not be matched by stable receiving apparatus.

With the output attenuator switched OFF amplified signal may be fed to any receiver that has 75Ω input termination. If strong signals overload receiver circuitry the potentiometer may be turned ON and advanced for increasing attenuation. Sets that use internal ferrite rods; casseivers, radiograms etc., may be fed via 75Ω coaxial cable to a ten turn winding on the rod or to twenty turns of thick wire wound over the cabinet as if around the rod. The potentiometer should be rotated fully clockwise then turned back as little as necessary, loop adjustment being made to compensate for any direct pick up that results from incomplete rod screening. For valve sets, car radios and other receivers that have higher impedance inputs, the circuit of Fig. 4 may be used. Keep this toroidal transformer close to the receiver, feed via coaxial cable and adjust the potentiometer as necessary. Do not connect the low impedance output directly to a medium or high impedance input as front end blocking is likely to occur.

This "W-Q" loop tunes more sharply and produces higher output than other loop plus differential matching amplifier set ups, even though both types of amplifier have similar gain. For example here in Gland, using the narrow bandwidth setting and a 75Ω load resistor, RTL on 1440kHz has produced oscilloscope traces up to 1V r.m.s. Local stations produce greater outputs, hence the three position switch and output attenuator, and, with DX signals coming out about 100μV r.m.s. many insensitive receivers can give equitable performance.

Notes

The limiting factor for any good receiving system should be distant electromagnetic noise, and since this antenna is quiet down to rural levels then little improvement in useable sensitivity will result from larger wound area.

If the low-loss "W" loop is used with conventional matching amplifier circuits it will work less well than outlined above. Similarly the *Q* amplifier will perform little better than a d.m.a. when connected to square shaped or conventionally wound loops. Each design relies upon the efficiency of the other for good performance, and only then can improved capabilities be realised.

Without winding or amplifier changes 1·6 to 1·8MHz may be tuned using a metal 25 + 25pF dual-gang, or 1·8 to 1·9MHz with a 5pF ceramic trimmer. For 1·6 to 2·0MHz Top Band cover an 8 + 8 turn winding (as "W" loop but with both outer turns omitted) may be tuned using a 30 + 30pF ceramic dual-gang capacitor. Try changing the value of L1,2 from 33 to 47μH to increase loop feedback and give this 16 turn version a tuning characteristic commensurate with s.s.b. transmission. Both "W" loops have winding lengths of 0·2 times their natural resonant wavelength—unusually high for a compact design.

Although very satisfied with this antenna I am not about to hang up my soldering iron. Medium wave work continues with development of a phase amplitude mixer (p.a.m.) which simplifies generation of the cardiod directional response and allows alternative use of null patterns by shifting them relative to loop position. This project is approaching completion and should be finished very soon—although my XYL says she'll put a &!?* loop on my headstone when I pass on.

My thanks go to Brian Russel and Janis Ziedainis for information, suggestions and encouragement. The following list of reference publications should be of interest to other broadcast band DXers.

Further Reading

1. Interference Prevention, *Practical Wireless* March 1945
2. DXers MW Loop Aerial, S. A. Mooney G3FZX. *PW* April 1973
3. The Loop Aerial Revived, R. E. Schemel, *Wireless World* July 1979
4. MW/LW Loop Aerials, Charles Molloy G8BUS, *PW* November 1979
5. Q-Multiplier and Spiral Loop Antenna, G. S. Maynard, *PW* March 1981
6. MW Loop Differential Amplifer, S. Whitt, *PW* February 1983
7. *The ARRL Antenna Handbook*
8. *Dial Search*, G. Wilcox, 9 Thurrock Close, Eastbourne BN20 9NF

★COMPONENTS

Resistors

¼W 5% Carbon Film

1·2Ω	1	R1
4·7Ω	1	R2
10Ω	1	R17
82Ω	2	R11,13
150Ω	1	R14
330Ω	1	R16
1kΩ	4	R3,4,5,6
1·2kΩ	1	R15

1W 5% Carbon Film

150Ω	2	R7,8

Potentiometers

Min. Vertical Preset

220Ω	2	R9,10

Carbon Track with Switch

5kΩ log	1	R12+S2

Capacitors

Ceramic disc

22nF	2	C3,4
0·1μF	2	C1,2

Polyester Layer

0·68μF	4	C8,9,10,11

Electrolytic p.c.b. type

100μF 25V	2	C5,6

Electrolytic, Axial Leads

1μF 25V	2	C7,12

Airspaced Variable (Jackson 4507/H/2/518)

518 + 518pF	1	C13,14

Semiconductors

Diodes

1A bridge	1	D1

Transistors

BD136	2	Tr3,4
40673	2	Tr1,2

Wound Components

Choke 250mW 10%

33μH 0·92Ω	2	L1,2 (Siemens)

Ferrite Ring Core

N30 25·3mm	2	T1,2 (Siemens K0618X830)

Mains Transformer

17V 1A	1	T3

Miscellaneous

Enamelled copper wire 32 s.w.g. 455g; 20 s.w.g. 1·5m; Dial drive 36:6:1 Jackson 4103/A; Toggle switch 1p3w (Electrovalue S7211); Coaxial connectors; Printed circuit board; Perspex sheet 3mm thick; Timber, screws, etc.

How Much? & How Difficult? £35 Intermediate