



DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Telephone: (0532) 552461

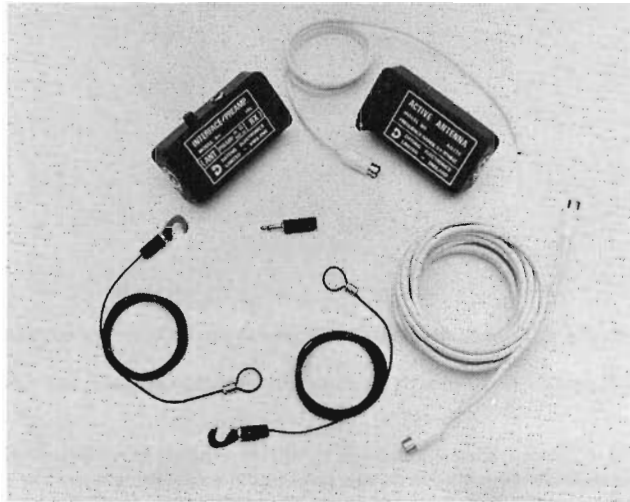
ACTIVE ANTENNA Model AD170

A COMPACT INDOOR RECEIVING ANTENNA SYSTEM WITH WIDEBAND COVERAGE FROM 60 KHZ TO 70 MHZ



EXTRA GAIN

The Interface Unit is now fitted with a switchable amplifier with 12db's broad-band gain. In the 'Amplifier Out' position of the push-button the additional amplifier is by-passed.



Active broadband receiving antennas are being increasingly used in professional communications because they give similar signal-to-noise to conventional passive antennas yet require only a fraction of the space to erect.

The Datong Active Dipole brings these same benefits at low cost to the short wave listener or radio amateur for whom space is usually even more at a premium than for the professional.

FEATURES

- * Ideal for remote mounting in loft or attic since no tuning or other adjustments are required to cover the full frequency range.
- * Overall length only 3 metres yet gives signal-to-noise ratios comparable to much larger conventional antennas in the 60 kHz to 30 MHz range.
- * Flat frequency response minimises receiver intermodulation effects.
- * Dipole configuration gives choice of polarisation plus useful directivity and eliminates dependence on ground plane or earth connection.
- * Excellent balance and constant output impedance minimise interference pick-up by feeder.
- * No need for expensive accessories such as antenna tuner units or matching units.

DESCRIPTION

Model AD170 consists of a 3 metre long dipole connected to the input terminals of a differential amplifier with high input impedance and 50 ohm output impedance. The dipole is short compared to half a wavelength at frequencies below 30 MHz and appears to the amplifier as a small capacitor (about 15 pF) in series with the picked up signal voltages. The amplifier serves to convert these balanced voltages at high impedance into signals of equal amplitude but with a source impedance of 50 ohms suitable for feeding an unbalanced coaxial cable. Thus the amplifier acts as a very wideband impedance transformer and balun and the overall sensitivity is almost independent of frequency over the full range. As with all active antennas the amplifier is an integral and essential part of the complete system.

When only passive matching techniques are used as in conventional resonant antennas, wide bandwidth can only be achieved with physically large and inconvenient structures. Moreover their large size means that unnecessarily large signal voltages are delivered to the receiver (especially near the resonance frequencies) and usually attenuators have to be used to avoid overload.

Provided the antenna sensitivity is such that noise *picked up* by the antenna masks noise *generated* in the antenna and the receiver, no further improvement in reception will occur by making the antenna more sensitive. Model AD170 is designed so that these conditions are met in most environments in the frequency range below 30 MHz and when used with normal receivers having good sensitivity (e.g. the Datong Model UC/1 Up-Converter).

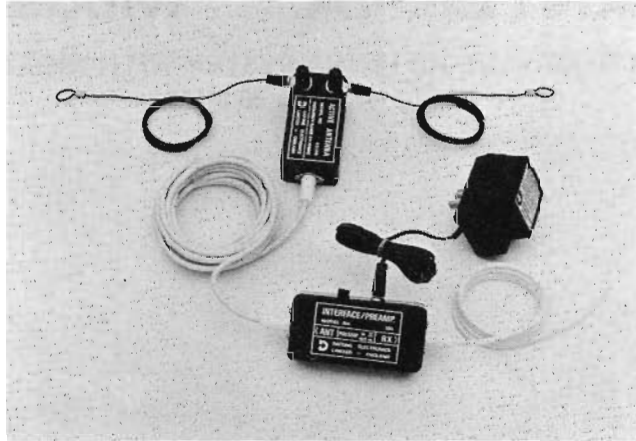
Active antennas are subjected to very many strong and weak signals simultaneously and the performance requirements for the amplifier are consequently severe. Both low internal noise and low intermodulation distortion are essential and must be combined with high impedance differential inputs, a 50 ohm unbalanced output, and the ability to reject large common-mode input signals.

Model AD170 achieves excellent performance in these areas by using a combination of field-effect and bipolar transistors operated at fairly high currents in a circuit with heavy negative feedback. Intermodulation performance is optimised by active bias circuitry without the need for preset adjustments.

DC power for the active circuitry is mixed with the r.f. output signal in the Interface Unit and fed via the coaxial feeder to the antenna. The power input socket is filtered to avoid interference pick-up and protected against accidental polarity reversal.

INSTALLATION

Interconnection of the various components is shown in the photograph. Although the photograph also shows the mains power unit Model MPU, this is not part of the basic system but is available as an optional accessory.



Often the power required by the antenna (12 V, 120mA, negative chassis, positive to jack tip) can be taken from the associated receiver.

The 4 metre coaxial feeder supplied with Model AD170 may be extended as necessary using standard television-type coaxial extension leads.

The antenna is designed to be suspended in the desired orientation using lengths of string or other non-conducting material tied to the loops on the ends of the antenna wires. Both wires should be stretched out in a straight line and the coaxial feeder should run perpendicular to the line of the wires for a distance of at least one metre. Symmetry helps to maintain the excellent balance of the dipole. The weight of heavy lengths of feeder should be separately supported.

Optimum orientation for the dipole depends on many factors such as distance from transmitter, mode of propagation, transmitter polarisation, time of day, and operating frequency, and some initial experimentation is strongly advised.

In general for long distance and general purpose reception, especially at frequencies above about 10 MHz, vertical or near-vertical mounting is recommended. Vertical mounting will give omnidirectional reception of ground waves (e.g. from LF stations) and of low angle sky waves (e.g. from far distant or 'DX' stations). Reception of high angle sky waves from medium distant stations will however be relatively poor.

Horizontal mounting gives almost omnidirectional reception of high angle sky waves and directional reception of low angle sky waves. For the latter maximum response will be obtained when the line of the dipole wires is perpendicular to the line between antenna and transmitter. Null responses occur in directions along the line of the wires and can be used for reducing local interference. In all cases the antenna wires should be located as far as possible from interference sources such as mains wiring, fluorescent light fittings, and television sets.

TECHNICAL INFORMATION

Frequency range: 60 kHz to 70 MHz.

Output impedance: 50 ohms.

Differential voltage gain of amplifier: unity, or 12db.

Recommended dipole length: 3 metres overall.

Third order intermodulation products: typically -90db relative to two output signals of 100 mV EMF (equivalent to 100 mV PD at the differential inputs).

Second order intermodulation products: typically -80db relative to two output signals of 50 mV EMF (equivalent to 50 mV PD at the differential inputs).

Current consumption: 120mA

Supply voltage: 12 volts nominal (minimum 11 V, maximum 14 V). Supply voltages above 14 may be used if a suitable dropper resistor is connected in series with the positive supply line.

Weight of AD170 plus accessories except power unit: 325 grams (11.6 ounces).

Weight of optional power unit, Model MPU: 270 grams (9.6 ounces).

NOTES

1. Model AD170 is supplied as a package comprising: 1 off Model AD170 Active Antenna, 1 off Model IB2 Interface Unit, 2 off 1.5 metre antenna wires, 1 off 4 metre jumper cable, 1 off 3.5 mm jack plug. The mains power unit shown in the photograph (Model MPU) is available as an optional accessory and is not included in the basic price of Model AD170.
2. The right is reserved to alter these details in the light of continuing development.
3. Intermodulation figures refer to performance with Interface Unit switched to "PREAMP OUT".

ACTIVE ANTENNA

Model AD170

TWO CHANGES TO MODEL AD 170 - ACTIVE RECEIVING ANTENNA

Switchable extra gain

The Datong Active Receiving Antenna Model AD170 is now being supplied with a new interface unit, type IB5. This replaces type IB2 previously supplied.

Model AD170 with IB5 is now equally suitable for use with receivers having only moderate sensitivity. Some receivers suffer from reduced sensitivity especially at the high frequency end of the short wave bands. The new interface unit contains an additional broad-band amplifier of similar high performance to the one in the head unit, but which can be switched in or out of circuit by operating a push-button switch. When the amplifier is switched OUT the overall performance of the active antenna is the same as before, but when the amplifier is switched IN the overall gain of the antenna system is increased by 12dbs.

The total current drain of AD170 used with IB5 is 120mA and independent of the IN/OUT switch.

Changed output lead

The second change to the antenna involves the coaxial output lead which feeds the receiver antenna terminal. The captive lead bearing a PL259 coaxial plug is no longer fitted. Instead a detachable coaxial lead, one metre long, is supplied. This is fitted with a coaxial plug at one end to plug into the interface unit (IB5); the other end is unterminated so that the user can fit an appropriate plug to match the particular receiver in use.

Comparison with full-size dipoles

With the extra amplifier switched "IN" and when used with the dipole wires supplied (3 metres overall length), the AD170/IB5 will give signal amplitudes equal to those from a full-size resonant half-wave dipole at about 16 MHz. Above 16 MHz the active antenna gain relative to that of a full size half-wave dipole increases by 6dbs per octave. Below 16 MHz the gain reduces relative to a full-size half-wave at 6dbs per octave. For example at 2 MHz the 3 metre long active dipole despite its small dimensions is only 18dbs down in signal strength relative to a 75 metre long passive dipole.

To put this figure of 18dbs at 2 MHz in perspective note that:

1. A half-wave dipole at 2 MHz would be very hard to achieve and would in any case give signal strengths too great for most receivers.
2. The noise received by both active and passive antennas at 2 MHz will be far above receiver noise levels so that the all-important signal-to-noise ratio will be the same with either.

Pricing

The price of Model AD170 remains unchanged. Accessory output leads fitted with PL259 plugs can be supplied at extra cost.



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