435, 455, 465, 475 & 485

CHELTON

Towel Rail Antenna Arrays

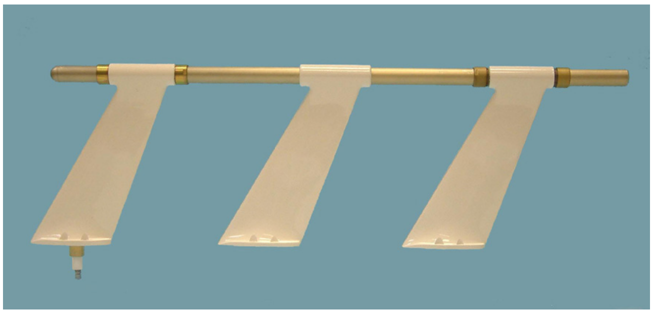
Key features:

- **435, 475 and 485 Series**
  Streamline, Low Drag, Raked
- **455 Series**
  High Strength
- **465 Series**
  Quick Release Clamping Heads

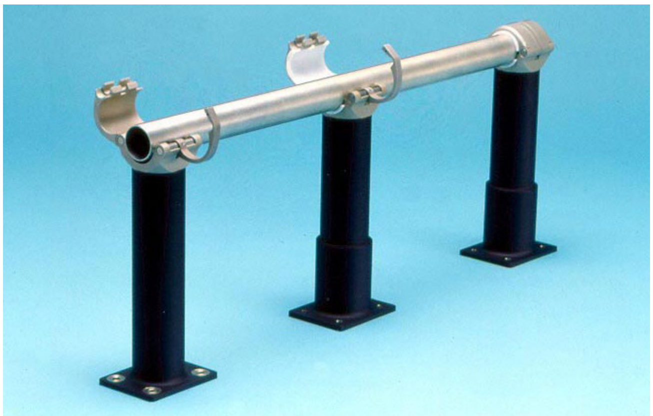
Chelton series of HF (High Frequency) antenna arrays are designed primarily to enable towel rail transmit/receive HF antennas to be installed on fixed and rotary wing aircraft in such a way as to optimise efficiency within the constraints of minimal drag, weight and size.

A range of individual components and masts is available to cater for the widely differing electrical requirements of currently available HF radios, tuners and couplers, and also to provide for the multitude of different mechanical installation problems that can be encountered, particularly on “electrically small” airframes.

As with all airborne HF antennas, the effect of the airframe upon which the antenna is mounted is an essential determinant in the overall efficiency of the system. In general, the greater the conductivity of the aircraft skin in areas adjacent to the HF antenna, the better will be the efficiency.

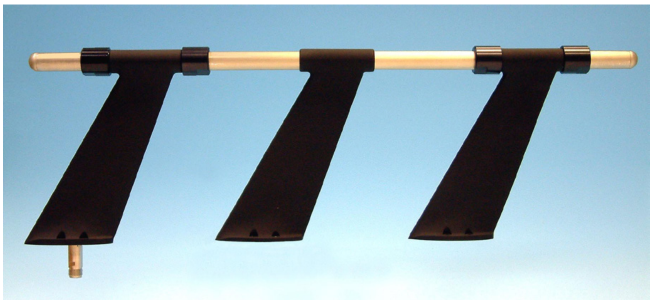


435



405

455



485

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A typical array comprises the following:

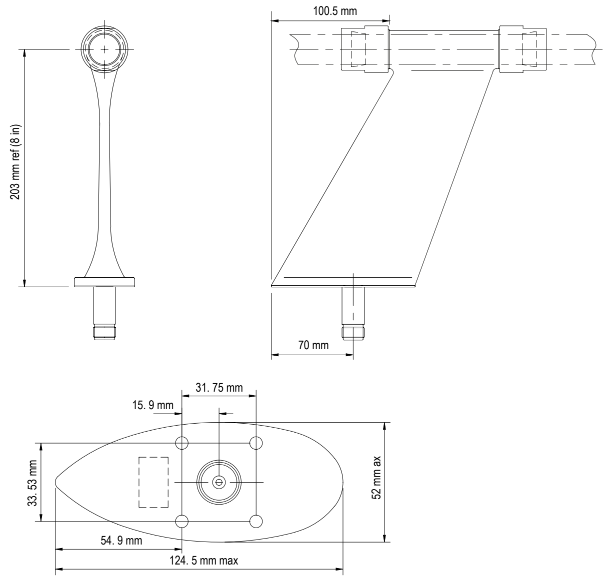
- A feed through or lead-in mast for direct connection to the antenna coupler
- A number of insulated “stand-offs” or support masts
- An aluminium alloy tubular element of 1” diameter, 20 SWG wall thickness to specification L114TF, such as the **435RA Series**.

In some installations, particularly when Near Vertical Incident Skywave (NVIS) operation is required, the tubular element is grounded to the airframe at some point along its length. This is, typically, at the end furthest from the feed through mast, but in some cases additionally at some intermediate position. This optimises radiation patterns and efficiency, and a switched grounded/support mast is available for such applications.

All lead in masts and clamping head masts have a double collet head cap assembly to secure the tubular element. All metalwork is selected for electrochemical compatibility ensuring minimal RF resistance. A PTFE sleeve is fitted within the head cap of sliding head support masts.

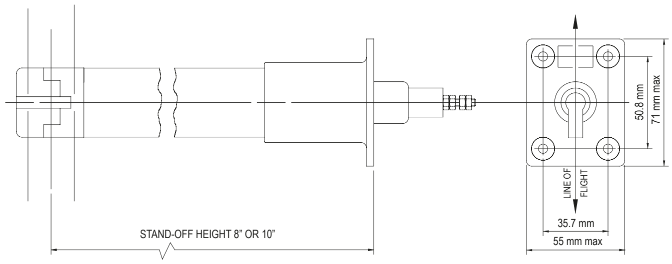
A vital consideration when installing any long rail type of antenna on an airframe is the avoidance of stress and strain to both the airframe and the antenna, such as can be imposed during airframe flexing and vibration.

To cater for this, a complete array will normally have a minimum number of rigid anchor points and movement will then be permitted by incorporation of support masts, which allow the element tube to slide within the mast itself. In addition, specially shaped grounding elements are available which permit, and are tolerant of, lateral and longitudinal movement.



8 inch 485 Series lead in mast with Type HN RF connector

465 Series lead in mast with 10-32 UNF Thread RF connector



The dimensioned drawings above are for illustrative purposes. Information on the full range of variants is available upon request.

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ELECTRICAL

Frequency	2 MHz - 30 MHz (typical, dependent on coupler)
RF Voltage Rating	5 kV peak at 2 MHz
Mast Insulation	≥ 40 MΩ at 1000 V dc
Resistance Through Conducting Paths	≤ 2.5 mΩfor lead-in, grounded masts and across captive head couplers
Radiation Diagram and Polarisation	Dependent upon configuration and airframe
Connectors	Typically HN or 10-32 UNF Thread

ENVIRONMENTAL 435, 475 and 485

Temperature	MIL-STD-810C, Meth 504.1, Proc I, Cat 4 Normal Operation: -54°C to +71°C Occasional: -54°C to +95°C Storage: -62°C to +95°C
Altitude	9144 m (30000 ft)
Vibration	**435** MIL-STD-810C, Meth 514.2, Proc I, Cat C, Table 514.2-III, Fig. 514.2-3, Curve M **485** BS 3G 100, Part 2, Sect 3:3.1, Proc I, Cats 4 and 5
Shock	MIL-STD-810C, Meth 516.2, Procs I and II
Rain	MIL-STD-810C, Meth 506.1, Proc I
Humidity	MIL-STD-810C, Meth 507.1, Proc I
Fungus	MIL-STD-810C, Meth 508.1, Proc I
Salt Fog	MIL-STD-810C, Meth 509.1, Proc I
Dust (Fine Sand)	MIL-STD-810C, Meth 510.1, Proc I
Magnetic Effect	RTCA DO-160B, Sect 15, Class Z

ENVIRONMENTAL 455 and 465

Temperature	RTCA DO-160C, Sect 4, Cat C2 Normal Operation: -55°C to +70°C Occasional: -55°C to +70°C Storage: -55°C to +85°C
Altitude	10668 m (35000 ft)
Temperature Variation	RTCA DO-160C, Sect 5, Cat A
Operational Shocks and Crash Safety	RTCA DO-160C, Sect 7, Paras 7.2.1 and 7.3.1
Vibration	RTCA DO-160C, Sect 8, Curves L, Y and V MIL-STD-810E, Meth 514.4, Cat 6, Fig. 514.4-9
Humidity	RTCA DO-160C, Sect 6, Cat C
Fluids Susceptibility	BS 3G100, Part 2, Sect 3:3.12, Class A
Fungus Resistance	BS 3G100, Part 2, Sect 3:3.3, Para 2.1
Salt Fog	MIL-STD-810E, Meth 509.3, Proc I
Magnetic Effect	RTCA DO-160C, Sect 15, Class Z

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