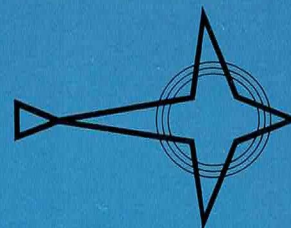
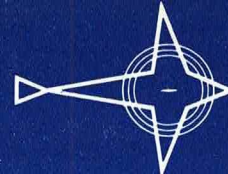


● 'towel rail'
capacitance
antennas
for Loran ADF
Decca Omega
etc.



'TOWEL RAILS'

●
●
●
CHELTON (ELECTROSTATICS) LIMITED

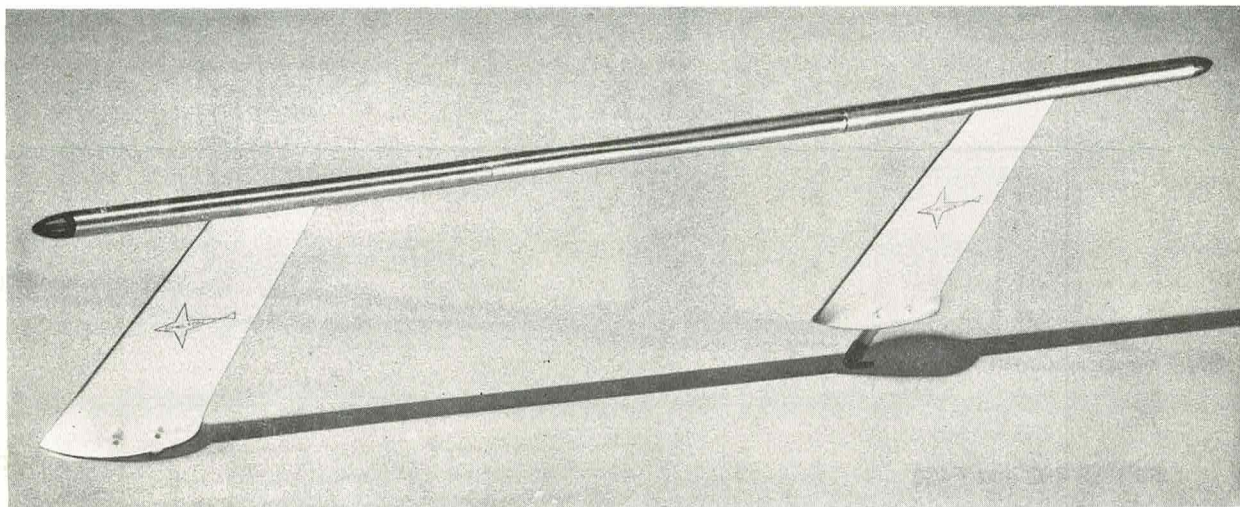


'TOWEL RAIL' CAPACITANCE ANTENNAS FOR ADF, LORAN, DECCA and OMEGA

Chelton manufacture 3 ranges of 'towel-rail' antenna, each of which can be tailored to suit particular aircraft installations.

A typical towel rail antenna will comprise either a 1,27 or 1,905 cm (0.5 or 0.75 inches) tube, supported by 2 or 3 masts, one of which provides the connection to the equipment. The length of tube, and stand-off height determine the capacitance and sensitivity of the antenna, and aero-dynamic and mechanical considerations also place constraints upon the tube length and number of masts used.

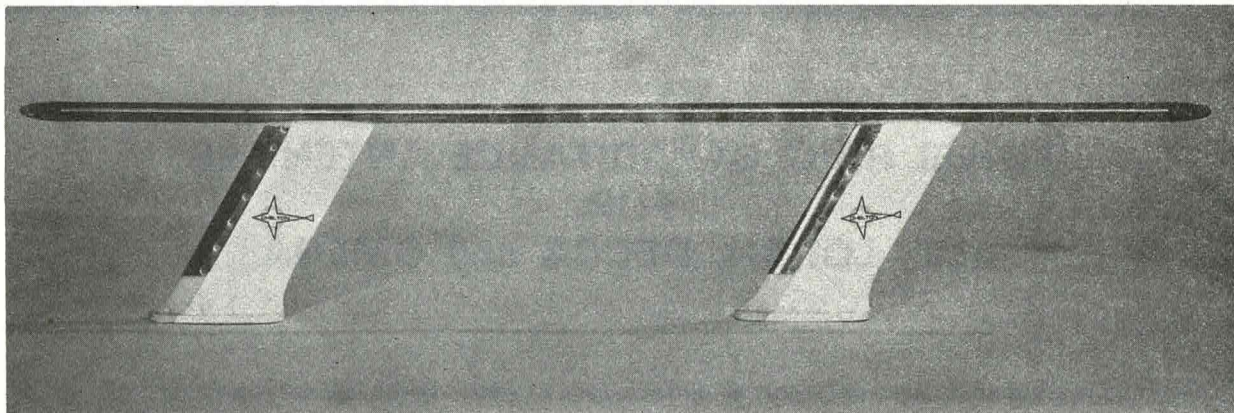
All Chelton towel-rail support masts can have metal leading edges (or fairings in the case of the Series F402) to minimise the effects of precipitation static.



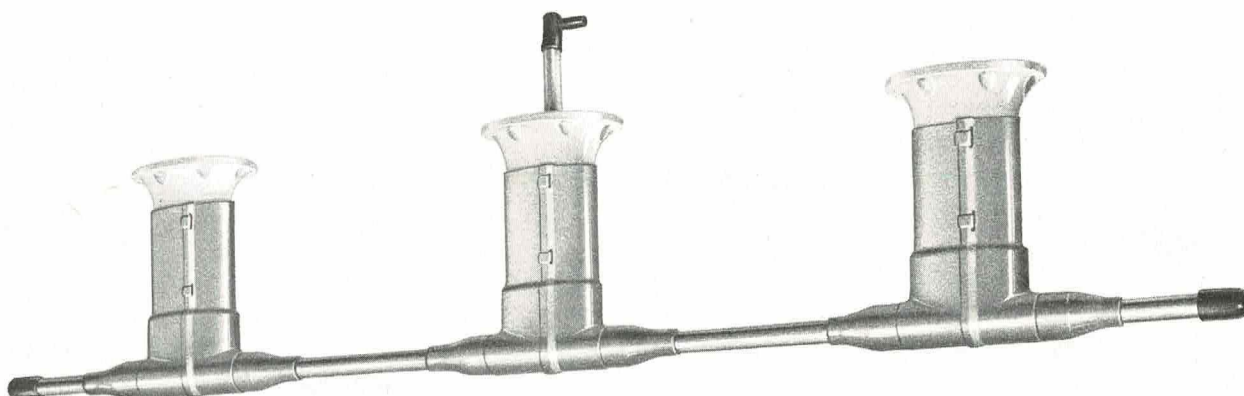
SERIES 415 Intended for aircraft up to Mach 1.0. All metal work is stainless steel, and masts are available in stand-off heights of 15,87 or 20,95 cm (6.25 or 8.25 inches); has 1.905 cm ($\frac{3}{4}$ inch) diameter tube.

CHELTON (ELECTROSTATICS) LIMITED
MARLOW BUCKINGHAMSHIRE SL7 1LR ENGLAND
Telephone: (Marlow) 062 84 72072 Telex: 849363

TOWEL RAIL CAPACITANCE ANTENNAS FOR ADF, LORAN, DECCA, ΩMEGA



SERIES 15 Similar to 415 but suitable for aircraft operating up to Mach 2.4. Stainless-steel leading edges standard and two styles of base footprint are available, together with a wide range of co-axial terminations on the lead-in mast.



SERIES 402 and F402

Very lightweight towel-rails for medium performance aircraft and helicopters.

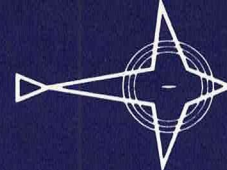
Uses ½ inch diameter aluminium tube and F402 have aluminium fairings fitted.

Stand-off heights of 10,16 15,24 20,32 and 25,4 cm (4, 6, 8, 10 inches) are available.

Weights of typical 2-mast, 15,24 cm (6 inch) 45pf antenna:—

Series		kg	lb
Series 415	1,02	2.25	
Series 15	1,43	3.15	
Series 402	0,57	1.25	
Series F402	1,14	2.50	

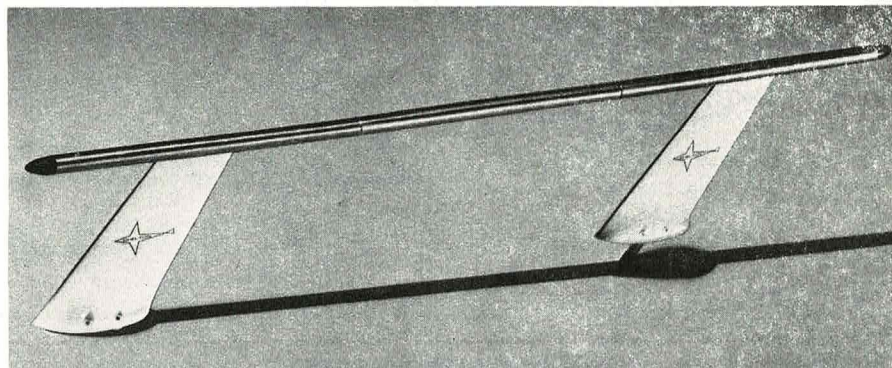
Chelton will be happy to advise customers on the best antenna installation to suit their particular requirements.



SERIES 415 'TOWEL RAIL' CAPACITANCE ANTENNAS FOR ADF SENSE and LORAN

Lightweight, low cost and high reliability were the design objectives for these towel-rails intended for use with LF/MF systems requiring 'capacity' type antennas.

Equally suitable for helicopters and aircraft operating up to Mach 1.0, Series 415 antennas incorporate stainless steel metalwork throughout to provide maintenance free operation in world-wide conditions of service.



Mast construction is from a pressure-moulded, hollow, fibre glass structure using advanced techniques to prevent formation of any moisture-trapping cavities. The raked aerofoil section has a 10:1 fineness ratio for low drag, whilst internal stiffening ribs ensure high strength/weight ratio for high side-loading acceptance.

Stand-off heights of 8.25 in. (210 mm) and 6.25 in. (159 mm) are available, and masts can be supplied with stainless steel leading edge strips, if required, to minimise damage from runway debris (for antennas mounted underneath the aircraft) and reduce the effects of precipitation static under certain operating conditions.

Each complete antenna normally comprises 2 or 3 stand-off masts—one of which is a lead-in—and 1 or 2 insert tubes. Maximum capacitance for a given stand-off height is achieved by using $\frac{3}{4}$ in. (19 mm) diameter tubing for the receiving element.

Simplest possible installation is achieved by making the insert-tubes a push-fit into the masts, which have 13.5 in. of top-tube moulded-on. The push-fit assembly means there are no collets or nuts to tighten, and installation time is cut to the minimum.

SPECIFICATION

Active capacitance:
(No end-effect allowance)

Element capacitance:- 4.5 pF per foot
(16 pF per metre)
Mast capacitance:- See table below.

Connectors:

10.32 UNF threaded terminal,
BNC or TNC coaxial connector.

Weights:

6.25 in. stand-off:
Support mast:- 0.75 lb. (340 g)
Lead-in mast:- 0.81 lb. (370 g)
8.25 in. stand-off:
Support mast:- 0.86 lb. (397 g)
Lead-in mast:- 0.94 lb. (425 g)

Fixing:

Four No. 10 UNF screws or equivalent.

Capacitance (with allowance for end-effect) and sensitivity product values for typical arrays

Sensitivity values
assume Form Factor of 1.5

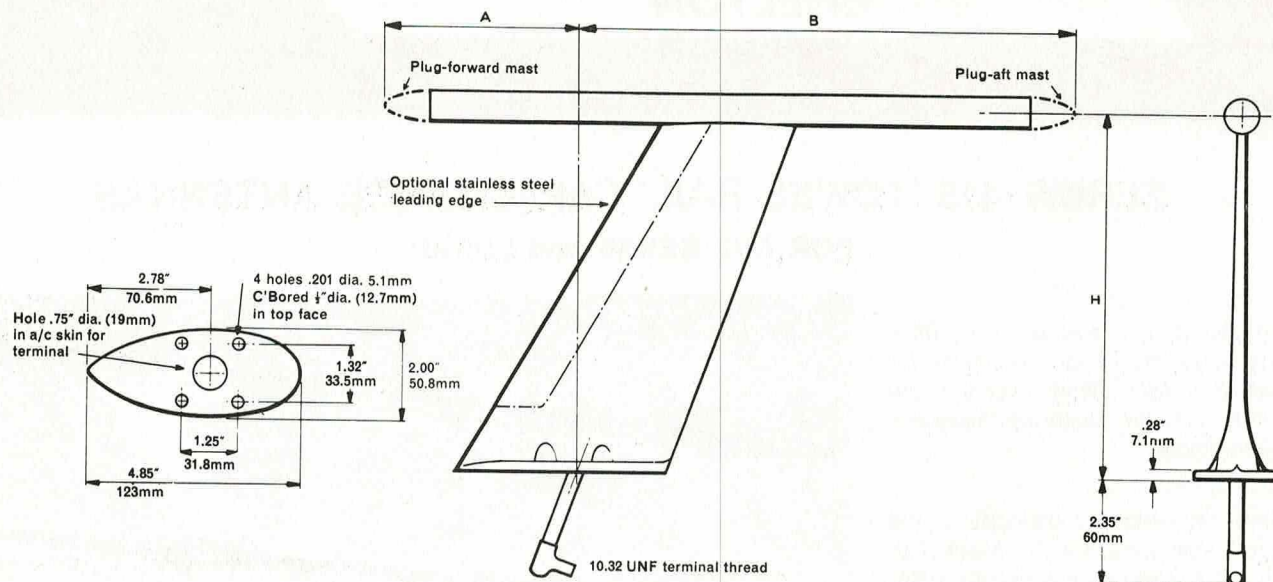
Total element length(in)		Insert tube P.No. 6470/XX	Mast centre spacing	2 mast array (1 lead-in)				3 mast array (1 lead-in with 2 tubes of equal length)					
2 mast	3 mast			Standard masts		With stainless LE		Standard masts		With stainless LE			
				8.25" SO	6.25" SO	8.25" SO	6.25" SO	8.25" SO	6.25" SO	8.25" SO	6.25" SO		
				pF	H√C	pF	H√C	pF	H√C	pF	H√C	pF	H√C
39	62.5	/18	24	30	1.7	30	1.3	34	1.8	34	1.4	43	2.1
45	74.5	/24	30	33	1.8	33	1.4	37	1.9	37	1.5	47	2.2
51	86.5	/30	36	35	1.9	35	1.4	39	1.9	39	1.5	52	2.3
57	98.5	/36	42	37	1.9	37	1.5	41	2.0	41	1.5	56	2.4
63	110.5	/42	48	39	2.0	39	1.5	43	2.1	43	1.6	61	2.5
69	122.5	/48	54	42	2.0	42	1.6	46	2.1	46	1.6	66	2.5
75	134.5	/54	60	44	2.1	44	1.6	48	2.2	48	1.7	71	2.6

CHELTON (ELECTROSTATICS) LIMITED
MARLOW BUCKINGHAMSHIRE SL7 1LR ENGLAND
Telephone: (Marlow) 062 84 72072 Telex: 849363

Associate Member of the SBAC

DGOA (DEF STAN 05-21) and CAA Design and Inspection Approved

**DATA SHEET
'TOWEL RAIL'
415**



ORDERING INFORMATION

Part No.	Description	H		A		B		Cap pF
		in.	mm	in.	mm	in.	mm	
415-10	Forward support	8.25	210	4.5	114	10	254	1
415-11	Intermediate lead-in	8.25	210	3.5	89	10	254	6
415-12	Aft support	8.25	210	3.5	89	11	280	1
415-13	Forward lead-in	8.25	210	4.5	114	10	254	6
415-14	Intermediate support	8.25	210	3.5	89	10	254	1
415-15	Aft lead-in	8.25	210	3.5	89	11	280	6
415-30	Forward support	6.25	159	6	152	8.5	216	1
415-31	Intermediate lead-in	6.25	159	5	127	8.5	216	6
415-32	Aft support	6.25	159	5	127	9.5	241	1
415-33	Forward lead-in	6.25	159	6	152	8.5	216	6
415-34	Intermediate support	6.25	159	5	127	8.5	216	1
415-35	Aft lead-in	6.25	159	5	127	9.5	241	6

Masts

Where stainless steel leading edge is required add suffix 'S' to Part No. and 2 pF per mast to capacitance figures.

Connectors

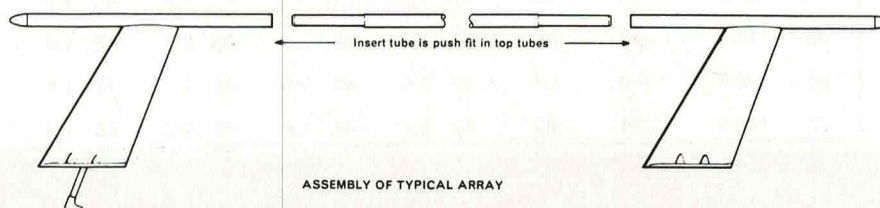
Add prefix 'B' to Part No. of Lead-in mast for BNC or 'T' for TNC connector. E.g. T415-11 denotes Intermediate Lead-in with TNC connector.

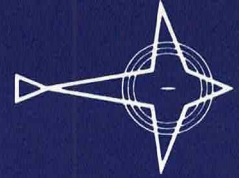
Insert tubes

Insert tubes can be supplied in any length up to 54 in. (1371 mm). Order as 6470/XX, where XX is length in inches. Insert tube length = Distance between mast centres less 6 in. (152 mm). E.g. Part No. 6470/36 is an insert tube length of 36 in. (914 mm) to suit an array with masts spaced 42 in. (1068 mm) apart; the table above details complete arrays using various insert tube lengths.

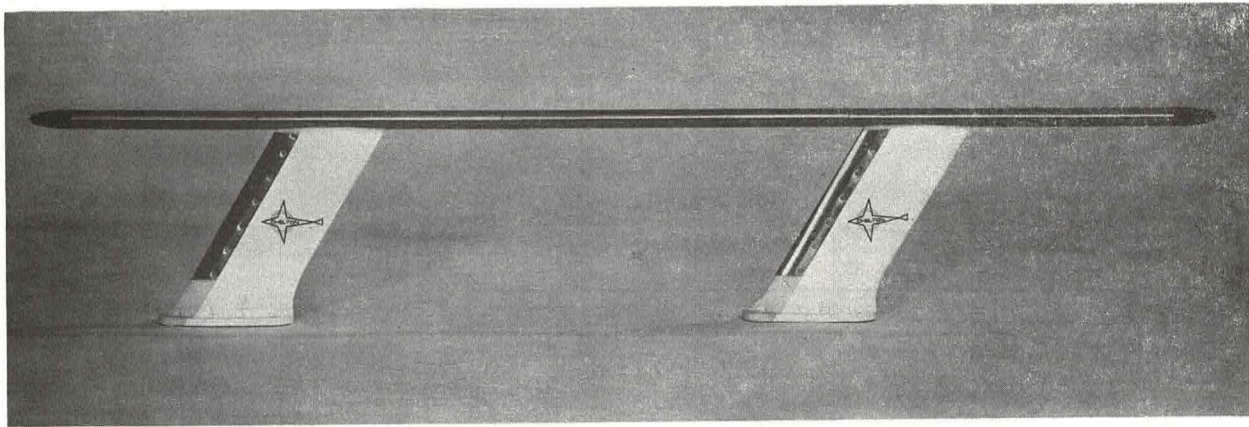
Assembly of typical array:-

- (1) Loosely fit lead-in mast.
- (2) Push insert tube(s) into lead-in mast.
- (3) Push support mast(s) onto insert tube.
- (4) Loosely fit support mast(s) in place.
- (5) Ensure no strain will be introduced by any misalignment, and tighten down masts.





ADF SENSE ANTENNAS - SERIES 15



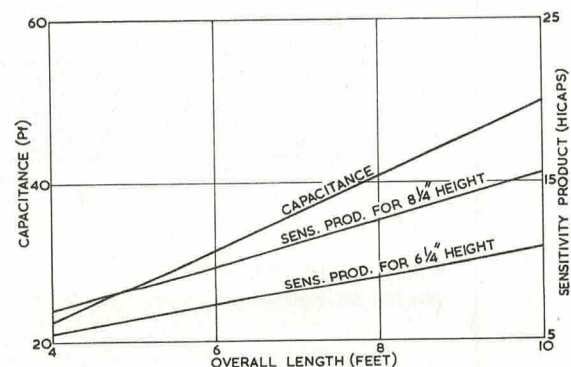
EQUALLY SUITABLE for ADF, LORAN C and similar navigation systems, the Series 15 capacitance antennas utilise the latest design and construction techniques to provide low drag and high sensitivity.

AVAILABLE with stand-off heights of either 8.25 ins. or 6.25 ins., the masts can be used in a variety of configurations, in particular a twin array is possible using only three masts in-line, by means of a tubular insulation insert. An additional lead-in mast can be incorporated in an array and used as a convenient test probe.

STAINLESS-STEEL tube having an outside diameter of 0.75 ins. is used for the receiving elements, and can be supplied in almost any length to provide the required sensitivity.

SPECIFICATION

FREQUENCY RANGE	: 150 to 2,000 KHz
ACTIVE CAPACITANCE	: 5.0 pF per foot (16 pF per metre)
CONNECTOR	: SPECIAL FLANGE ALLOWING EITHER AERIAL OR CONNECTOR TO BE REMOVED WITHOUT LOSS OF PRESSURISATION.
FIXING BASE	: EITHER FLANGED FOR SURFACE MOUNTING, OR BLOCK BASE FOR FLUSH MOUNTING.
WEIGHT	: 6ins. Mast — 1lb. (0.5kg) 8ins. Mast — 1½ lbs. (0.6kg) TUBE—2.5ozs. per foot (230g per metre)



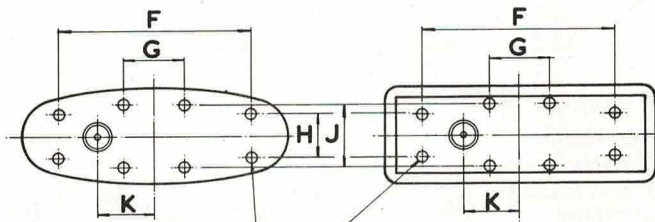
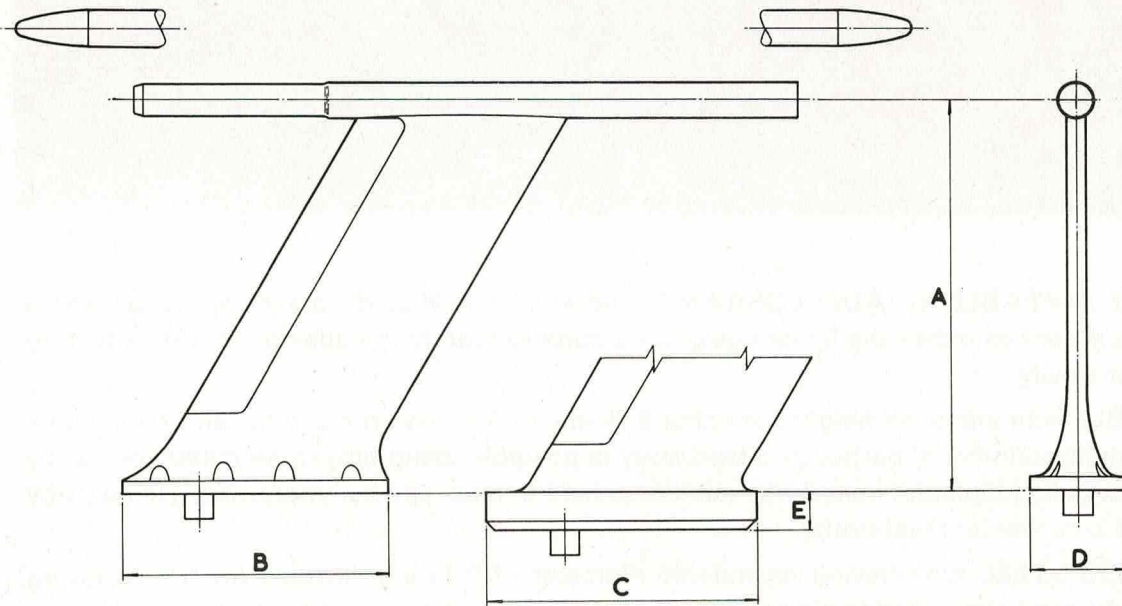
CHELTON (ELECTROSTATICS) LIMITED
 MARLOW BUCKINGHAMSHIRE SL7 1LR ENGLAND
 Telephone: (Marlow) 062 84 72072 Telex: 849363

Associate Member of the SBAC DGQA (DEF STAN 05-21) and CAA Design and Inspection Approved

15/7/68

OVERALL DIMENSIONS

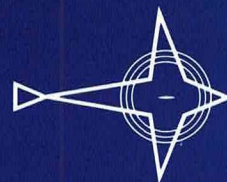
	IN.	CM.
A	6.25 OR 8.25	15.9 OR 21.0
B	5.5	14.0
C	5.6	14.25
D	2.0	5.08



FIXING HOLES
No. 10 CLEARANCE

FIXING DIMENSIONS

	IN.	CM.
F	4.0	10.15
G	1.25	3.15
H	.90	2.29
J	1.32	3.35
K	1.19	3.0



A.D.F. SENSE AERIAL ARRAYS

SERIES "F402"

Series "F402" sense aerial arrays use rod elements which give a signal pick-up some 50% greater than comparable wire aerals, and are less subject to capacity variations with movement.

The simplest aerial is of the "L" type with one lead-in and one dead-end support mast; this will carry rods up to five or six feet in length. For longer aerals a "T" type array is used with a central lead-in mast and a dead-end both fore and aft. An additional dead-end mast can be used to extend the aerial still further in either direction.

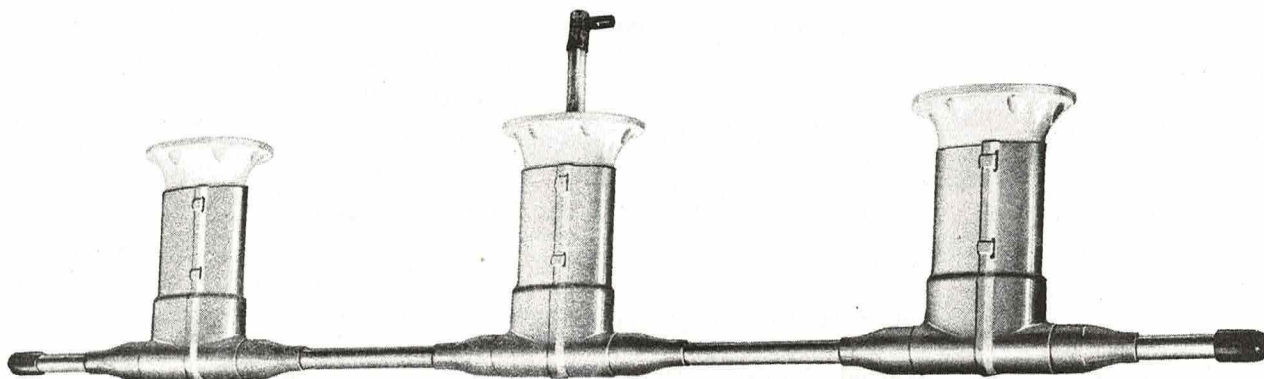
The array should be mounted as nearly as possible above or below the electrical centre of the aircraft. The type should be chosen to meet the set manufacturer's sensitivity and capacity requirements. As a guide, the sensitivity product in hicaps is very roughly a quarter of the stand-off height in inches multiplied by the rod length in feet; the capacity 8 pfd per mast plus 4 pfd per foot of rod. Actual values vary with siting and size of the aircraft.

"F402" masts have a flanged glass fibre shell for easy external fitting and are made in a range of stand-off heights between 4 and 10 inches.

A polythene head cap is moulded to the shell and contains the rod guide tube to which the lead-in conductor is welded; this conductor is omitted in the case of dead-end masts. The rod is held in each guide tube by a pair of collets and locking rings, and is fitted with red polythene end caps to make it immediately noticeable and so avoid damage to the rod or injury to personnel.

"F402" masts are distinguished from the earlier "402" type by being fitted with aluminium fairings which cover all but the base of the mast and are electrically connected to the rod by tight fitting aluminium caps. These fairings not only increase the sensitivity of the array but also minimise the static which is produced when atmospheric particles brush at high speed past an insulating surface. In comparative tests it has been found that the use of fairings under noisy conditions increases the effective range of A.D.F. equipment by some 50%.

The mast shells are protected with white epoxy paint but it is essential that the fairings are left unpainted.



This is a typical Series "F402" A.D.F. sense aerial "T" array with central lead-in mast. An "L" array, having only two masts, has the configuration as shown in leaflet ADF. 2.

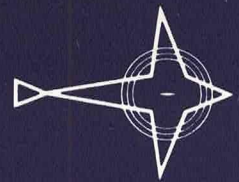
CHELTON (ELECTROSTATICS) LIMITED
MARLOW BUCKINGHAMSHIRE SL7 1LR ENGLAND
Telephone: (Marlow) 062 84 72072 Telex: 849363

DATA

Fixing: Six 2 BA or 10-32UNF bolts.

Stand-off height (inches)	4	5	6	8	10
Weight: Lead-in mast (lb.)	0.48	0.53	0.60	0.71	0.83
Weight: Dead-end mast (lb.)	0.39	0.43	0.49	0.58	0.68

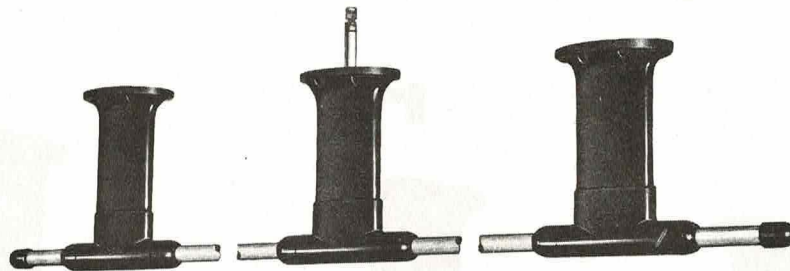
ADF.1 August 1964



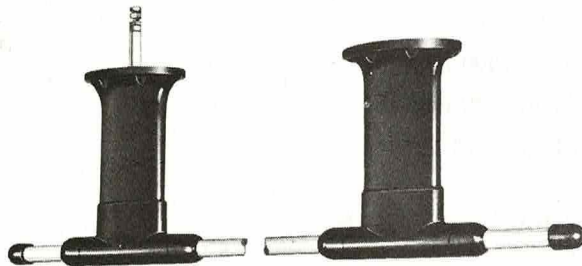
A.D.F. SENSE AERIAL ARRAYS

SERIES "402"

These arrays are similar to the Series "F402" but are not fitted with fairings. The glass fibre shells are protected against rain erosion by twenty coats of neoprene and should not, therefore, be mounted in positions where they are likely to be contaminated by fuels or detergent oils.



This is a Series "402" A.D.F. sense aerial "T" array with a central lead-in mast.



This view shows two "402" masts arranged to form an "L" type array.

DATA

Mean Breaking Moment
(at 20°C):

Fore/aft: 1800 inch lb.

Side load: 800 inch lb.

Temperature range:

—75°C to +75°C

Fixing:

Six 2 BA or 10-32UNF bolts.

Stand-off height/weight table:

Stand-off height (inches)	4	5	6	8	10
Weight: Lead-in mast (lb.)	0.40	0.44	0.49	0.57	0.66
Weight: Dead-end mast (lb.)	0.31	0.34	0.38	0.44	0.51

Weight—aerial rod: 0.10 lb. per ft.

CHELTON (ELECTROSTATICS) LIMITED
MARLOW BUCKINGHAMSHIRE SL7 1LR ENGLAND
Telephone: (Marlow) 062 84 72072 Telex: 849363

A.D.F. SENSE AERIAL ARRAYS

SERIES "400"

Type "400" masts use the same shell as the type "402" but with a slightly smaller head cap designed to take single-core insulated wire aerals. The type 400/A is a lead-in mast for a "T" type aerial with two chucks (facing fore and aft). The type 400/B is a dead-end mast embodying a spring-loaded chuck unit which is adequate to tension aerals up to some 10 to 15 feet in length.



DATA

Mean Breaking Moment (at 20°C):	Fore/aft: 1800 inch lb.
	Side load: 800 inch lb.
Temperature range:	-75°C to +75°C
Fixing:	Six 2 BA or 10-32UNF bolts.

Stand-off height/weight table:

Stand-off height (inches)	4	5	6	8	10
Weight: Lead-in mast (lb.)	0.40	0.44	0.49	0.57	0.66
Weight: Dead-end mast (lb.)	0.31	0.34	0.38	0.44	0.51

Weight—aerial wire: 0.017 lb. per ft.