

CHELTON

# Antenna Catalogue

Edition 2

November 2022

## Welcome to the era of zero defects

Through continuous improvement and innovation, Chelton designs for mission success, manufactures using zero defect procedures including automated manufacturing, and tests almost to destruction.



### Welcome.

First established in 1947, Chelton defined the avionic and defence industry with a number of world firsts.

From novel static discharger designs, radio silent tuneable antennas through to the first airborne LTE mission critical public safety radio. For 75 years Chelton has continued its founders' principles, to overcome immensely complex communication challenges and deliver failsafe, pioneering technology to some of the world's most formidable militaries and public safety agencies.

There are few more demanding environments than those faced by public safety and elite military personnel. Whether in the theatre of operations, on search and rescue missions or during emergency services incidents, the settings are uncertain, changeable and dangerous - requiring accurate, reliable and robust equipment to achieve mission success.

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We design and build our antennas with pedigree, functionality and precision so you get back what we put in.

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Chelton's series of Direction Finders (DF) provide a range of integrated DF solutions for bus-controlled and stand-alone direction finding systems.

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#### Link 16

Successful data links from Link 16 enable warfighters to understand location and identity of friend or foes, share points of interest over a secure network and optimise the decision-making process in an electromagnetically stressed environment.

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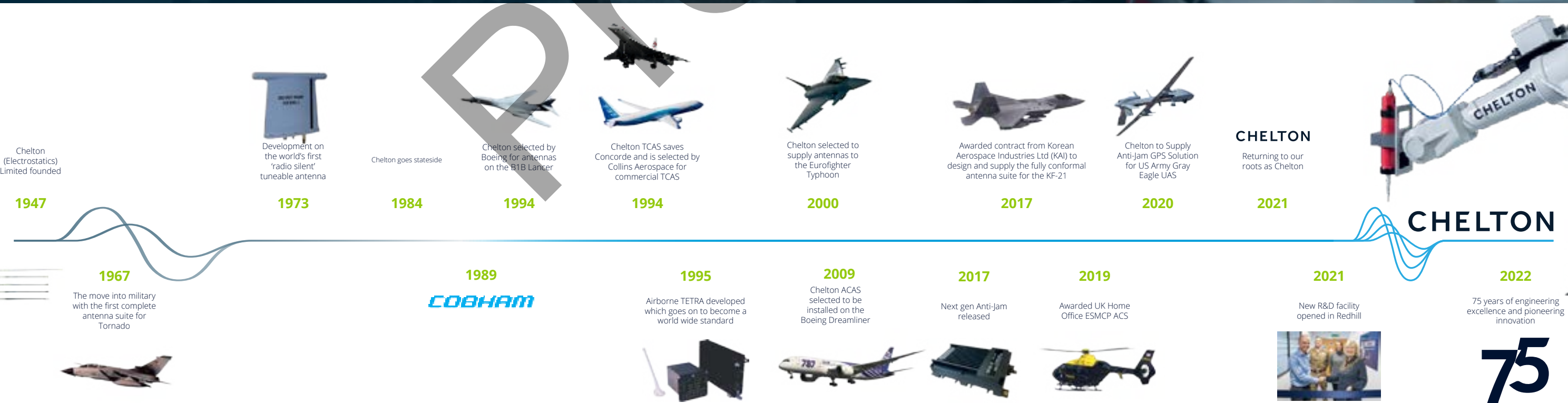


# 1 The Chelton Difference

Securing success in some of the world's most demanding environments isn't just down to Chelton's failsafe, pioneering technology. From aerospace and defence communications through to navigation and electronic warfare, it's all driven by the people behind it.

Top-level talent pushing boundaries from the moment we first explore your requirements. Always looking for new ways to meet tough challenges. And asking the right questions to find answers that redefine your capabilities.

At Chelton, we're proud to be on our customers' team. Bringing together smart thinking, technological excellence and future vision – whatever a system ambitions.







**CHELTON**

**EST. 1947**

75 years of Engineering Excellence and Pioneering innovation

# Tested (nearly) to destruction



## Environmental Test Laboratory Capabilities

There are few more demanding environments than those faced by public safety and elite military personnel. Whether in the theatre of operations, on search and rescue missions or during emergency services incidents, the settings are uncertain, changeable and dangerous – requiring accurate, reliable and robust equipment to achieve mission success.



### Temperature

- Programmable temperature testing of -70°C to +150°C
- Manual testing up to +300°C
- Simultaneous temperature and vibration testing between -70°C to +150°C
- Humidity testing at greater than 95% at +65°C
- Combined temperature/pressure of 80,000ft, -70°C to +140°C with humidity available

### Physical & Mechanical

- Acceleration Testing using a centrifuge to 20g continuous
- HALT capabilities of up to 70 gRMS vibration, -70°C to +200°C with a temperature ramp rate of 100°C/min
- Main vibration system maximum displacement of 3 inches and a maximum acceleration level of 105g with 6000 lbf
- Sine, Random, SOR, ROR, SRS, Classical Shock - half sine, sawtooth and trapezoidal pulse
- Packaged drop testing
- Side load testing of to 30 PSI
- Tension and compression testing up to 30 KN

### Altitude & Pressure

- Pressure of up to 80,000 ft attainable
- Combined temperature/pressure of 80,000 ft, -70°C to +140°C with humidity available
- Decompression rate of 3,360 ft/sec (average over full range of change) altitude ascending
- 2,381 ft/sec (average over full range of change) altitude descending
- Overpressure to 190 KPA

### Ingress

- Ingress: Waterproofness testing by drip, continuous stream and shower testing
- Solar radiation source capability of 1120W/m<sup>2</sup> and separate UV radiation source for the assessment of actinic effects
- Salt fog testing



# 2

## Communication High Frequency Towel Rail Antennas

### About.

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.

Chelton are able to assess an installation to ensure that it fits your platform's needs and requirements. Through our investigation and collaboration, we propose a bespoke solution.

Contact us at [info@chelton.com](mailto:info@chelton.com) with your query.

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A typical array comprises the following:

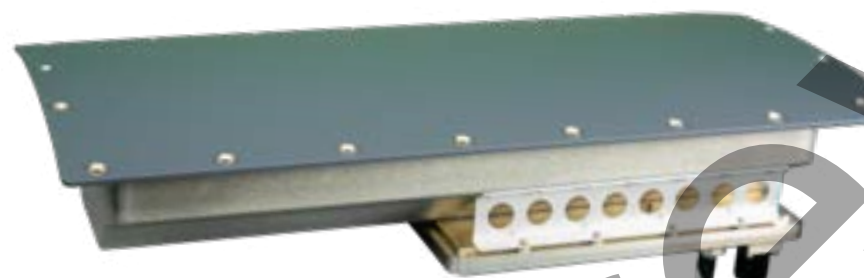
- A feed through or lead-in mast for direct connection to the antenna coupler
- A number of insulated "stand-offs" or support masts
- An aluminium alloy tubular element of 1" diameter, 20 SWG wall thickness to specification L114TF, such as the 435RA Series.





## 2 Communication Tuneable Antennas

Chelton are world leaders in the design and manufacture of tuneable antennas from 30MHz up to 1850MHz.



### About.

Chelton has been pushing the boundaries since the early days, and in the 1960s it was unrelenting in creating an 'all-singing, all-dancing' antenna. The result? The world's first radio-silent tuneable antenna. Up until Chelton's pioneering solution, tuneable antennas needed a burst of transmission to be able to re-tune, which in turn gave away an aircraft's position and left its communication system vulnerable to jamming attacks.

A tuneable antenna is a simple concept; it contains electronics that allow the antenna to be 'tuned' to a particular frequency range on demand. This provides up to 15dB better gain at the lower end of the Very High Frequency (VHF) band compared to a passive blade antenna of equivalent size.

Higher gain equals better communications range and so tuneable antennas are ideal for applications where good performance in the low VHF frequency band is required but there is limited space available on the platform.

## Developing antennas for the future battlefield

The KF-21 (Next-Generation Fighter) program is a full scale fighter development program, set to introduce an outstanding aircraft for future battlefields. Chelton is providing the full conformal tuneable antenna suite for the KF-21.

### What they can do for you.

#### Increased power handling

RF power rating increased from 23W to 50W

#### Broader frequency range coverage

To support Next Gen Radio technology compatibility with major manufacturers

#### High gain at low frequencies

Enables greater antenna gain in the tactical VHF band at the cost of reduced instantaneous bandwidth for a given aperture size.

#### Maximum gain, minimum height

Chelton's tuneable range provides up to 15dB better gain at the lower end of the VHF band compared to a passive blade antenna of equivalent size.

#### Bespoke for your platform

Blade, Integral, Conformal - we have a solution for you

- Narrower individual bandwidth improves Q factor
- Conformal and integrated tunables available
- Suitable for installation in higher temperature locations
- Radio Agnostic
- Enhanced environmental qualifications
- Qualified to MIL-STD-810

# Tuneable Antennas

## Quick Reference Table

Part Number	Description	Frequency MHz	Gain dBi @30MHz	Compatible Radios	Configuration	Antenna Height (inches)	Compatible Logic Units
12-190-160	Low Profile Tuneable V/ UHF Blade Antenna	30 - 512	-15	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 R&S 6000 series BAE Systems ARC-222 L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios	Blade	6.5	Compatible with 7-163PIN161
12-190-530LP	V/UHF L-Band Tuneable Blade Antenna	30 - 512 960 - 1220	-14.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 R&S 6000 series BAE Systems ARC-222 L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios	Blade	9.22	Compatible with 7-163PIN161
12-190-6/1	Low Profile V/ UHF L-Band Tuned Antenna	30 - 400 960 - 1220	-14.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 R&S 6000 series BAE Systems ARC-222 L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios	Blade	9.22	Compatible with 7-163PIN161, 7-1500
12-190-60	V/UHF Tuneable Blade Antenna	30 - 400	-14.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 R&S 6000 series BAE Systems ARC-222 L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios	Blade	9.25	Compatible with 7-163PIN161, 7-1500
12-190-61	V/UHF Tuneable Blade Antenna	30 - 400	-14.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 R&S 6000 series BAE Systems ARC-222 L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios	Blade	9.22	Compatible with 7-163PIN161, 7-1500
12-4004	Multiband Tuneable	30 - 600		Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 Collins ARC-186 BAE Systems ARC-222 Canyon Aerospace RT5000/ RT7000 R&S 6000 series L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios CNR 9000	Blade	16.1	Compatible with 7-1600

12-224	Very Low Profile Tuneable V/ UHF Blade Antenna	30 - 960	-15	Canyon Aerospace RT5000/ RT7000	Blade	5.5	Compatible with 7-119PIN9
12-5002	Multiband Tuneable Blade	30 - 960	-14	Canyon Aerospace RT5000/ RT7000	Blade	9.5	Compatible with 7-1351
12-5005	V/UHF Tuneable Blade Antenna	30 - 600	-15.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 Collins ARC-186 BAE Systems ARC-222 Canyon Aerospace RT5000/ RT7000 R&S 6000 series L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios CNR 9000	Blade	9.22	Please enquire info@chelton.com
12-5006	V/UHF Tuneable Blade Antenna	30 - 600	-15.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 Collins ARC-186 BAE Systems ARC-222 Canyon Aerospace RT5000/ RT7000 R&S 6000 series L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios CNR 9000	Blade	9.21	Please enquire info@chelton.com
12-5008	V/UHF Tuneable Blade Antenna	30 - 960	-14	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 Collins ARC-186 BAE Systems ARC-222 Canyon Aerospace RT5000/ RT7000 R&S 6000 series L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios CNR 9000	Blade	9.21	Please enquire info@chelton.com
12-5009	V/UHF Tuneable Blade Antenna	30 - 960	-15.5	Collins ARC-210 (Gen 3, 4, 5 and 6) Collins ARC-182 Collins ARC-186 BAE Systems ARC-222 Canyon Aerospace RT5000/ RT7000 R&S 6000 series L3Harris ARC201D BAE Systems ARC-231 / ARC-232 Leonardo SRT651 / SRT700 / SRT800 Thales TRA6XXX series radios CNR 9000	Blade	9.21	Please enquire info@chelton.com
10-3003-1	Conformal Tuneable U/ VHF	30 - 400	-29	Collins ARC-210 (Gen 3, 4, 5 and 6) BAE Systems ARC-231 / ARC-232	Conformal	0	Please enquire info@chelton.com
10-3003-2	Conformal Tuneable U/ VHF	30 - 400	-26	Collins ARC-210 BAE Systems ARC-231 / ARC-232	Conformal	0	Please enquire info@chelton.com





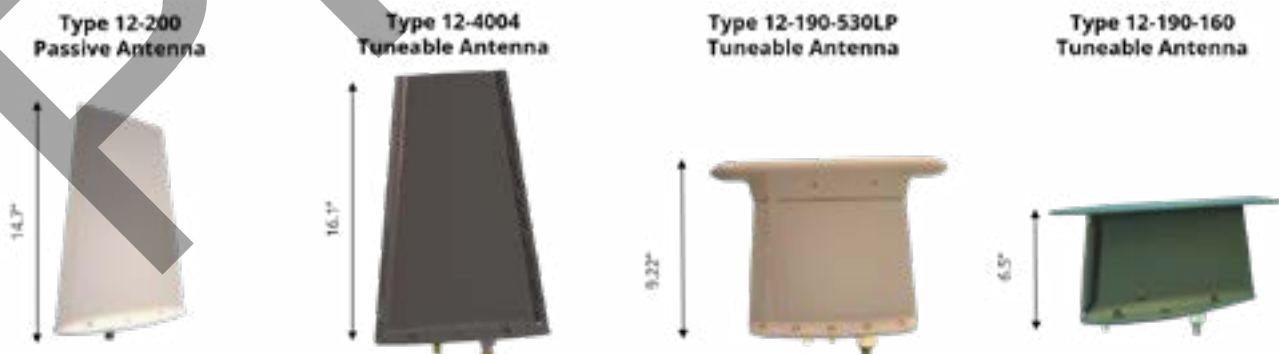
## How can your aircraft benefit from a tuneable antenna?

Tuneable Blade antennas provide the best performance to size ratio, and are readily available in different shapes, heights and frequencies to satisfy different customers' needs.

The below provides a comparison between three main tuneable blade antenna types against a typical passive antenna, showing the extent to which the antenna performance is linked to the antenna dimensions. It clearly demonstrates that all three tuneables perform considerably better than the comparative passive within the frequency bands 30 MHz and 88 MHz, despite the substantial shorter height of both the 12-190-530LP and the 12-190-160.

Some of Chelton's tuneable antennas also include an L-band element in addition to VHF and UHF, essentially having the option of reducing the number of antennas needed.

Contact [info@chelton.com](mailto:info@chelton.com) to request Chelton's Whitepaper for more analysis!



Product	Type	Height	Gain @ 30MHz	Gain @ 88MHz
12-200 V/UHF Antenna	Passive	14.7" max	≥ -24 dBi	≥ -12 dBi
12-4004 V/UHF Antenna	Tunable	16.1" max	≥ -9 dBi	≥ -3 dBi
12-190-530LP V/UHF L-Band Tuned Antenna	Tunable	9.22" max	≥ -14.5 dBi	≥ -4.5 dBi
12-190-160 V/UHF Tunable Antenna	Tunable	6.5" max	≥ -15 dBi	≥ -7 dBi

Chelton has a wide portfolio of airborne communication antennas for a variety of applications including Defence, Security and Commercial.



## Passive Antennas Quick Reference Table

Frequency Category	Part Number	Description	Frequency Range (MHz)	Configuration	Height (inches)
VHF	19-415	Passive   VHF array	30 - 88	Towel Antenna Array	5.25
VHF	16-21 Series	Passive   Lightweight low profile VHF antenna	118 - 136	Top Loaded Blade	Various
UHF	16-1	Passive   Comm/Nav UHF antenna	225 - 400	Blade	9.13
UHF	16-3	Passive   UHF antenna	225 - 450	Blade	9.13
UHF	16-11	Passive   UHF antenna	225 - 400	Raked Blade	8.2
UHF	16-16	Passive   UHF antenna	320 - 670	Raked Blade	6.7
UHF	16-39	Passive   Upper UHF antenna	400 - 1000	Blade	5.25
UHF	21-174	Passive   TETRA antenna	380 - 400 410 - 430	Whip	8.13
UHF	16-13	Passive   UHF Blade antenna	325 - 500MHz	Blade	6.7
UHF SATCOM/MUOS	19-4001	Passive   UHF SATCOM antenna	Communications and Low Angle UHF SATCOM: 30 - 512 High Angle UHF SATCOM: 240 - 400	Satellite	8.2
UHF SATCOM/MUOS	19-430-10	Passive   UHF SATCOM antenna	Communications and Low Angle UHF SATCOM: 30 - 400 High Angle UHF SATCOM: 225 - 400	Satellite	8.25
UHF SATCOM/MUOS	19-440	Passive   V/UHF comms and UHF SATCOM antenna	Communications and Low Angle UHF SATCOM: 30 - 400	Satellite	8.2
UHF SATCOM/MUOS	19-440-10	Passive   V/UHF comms and UHF SATCOM antenna	High Angle UHF SATCOM: 240 - 400	Satellite	8.25
UHF SATCOM/MUOS	19-450-10	Passive   UHF SATCOM and GPS antenna	UHF Low and High Angle SATCOM: 225 - 400 GPS: 1565 - 158 (L1) and 1217 - 123 (L2)	Satellite	9
UHF SATCOM/MUOS	19-470-10	Passive   V/UHF SATCOM and GPS antenna	Communications and Low Angle UHF SATCOM: 30 - 400 High Angle UHF SATCOM: 240 - 400 GPS: 1565 - 1586 (L1) and 1217 - 1238 (L2)	Satellite	9
Wideband/Multiband	20-200-20	Passive   VHF/L-BAND antenna	118 - 156 960 - 1220	Raked Blade	12.25
Wideband/Multiband	16-113	Passive   UHF/L-BAND antenna	225 - 400 960 - 1220	Blade	7.95
Wideband/Multiband	9-33-30	Passive   V/UHF, L BAND antenna	30 - 512 950 - 1250	Blade	13
Wideband/Multiband	12-512	Passive   V/UHF antenna	30 - 512	Blade	16.2
Wideband/Multiband	12-231	Passive   V/UHF antenna	30 - 512	Blade	14.7
Wideband/Multiband	9-33-26	Passive   V/UHF antenna	30 - 512	Blade	13.03
Wideband/Multiband	12-59	Passive   V/UHF antenna	30 - 400	Blade	9.05
Wideband/Multiband	16-4000	Passive   Band 20 and Band 3 antenna	Band 20: 791 - 821MHz Down-Link, 832 - 862MHz Up-Link Band 3: 1805 - 1880MHz Down-Link, 1710 - 1785MHz Up-Link	Blade	7.24
Wideband/Multiband	20-200-45	Passive   VHF/UHF/L-Band antenna	30 - 400 MHz 960 - 1220 MHz	Raked Blade	12.3
ELT	25-1000	Passive   Tri-band ELT antenna	121.5/243/406	Whip	17.08

## 2 Communication Passive Antennas

### About.

Once established as a leader in static dischargers, Chelton set its sights on conquering the world of antenna aircrafts.

After learning British army helicopters were experiencing failure rates with their Ultra High Frequency blade antennas, Chelton saw a market niche and acted quickly designing its first self-complete communications antenna for military use. These pilot-proof antennas exceeded expectations and performed where their predecessors couldn't.

Time and time again, Chelton's antennas continued to outperform its competition thanks to its low drag, high strength-to-weight ratio and excellent signal sensitivity.

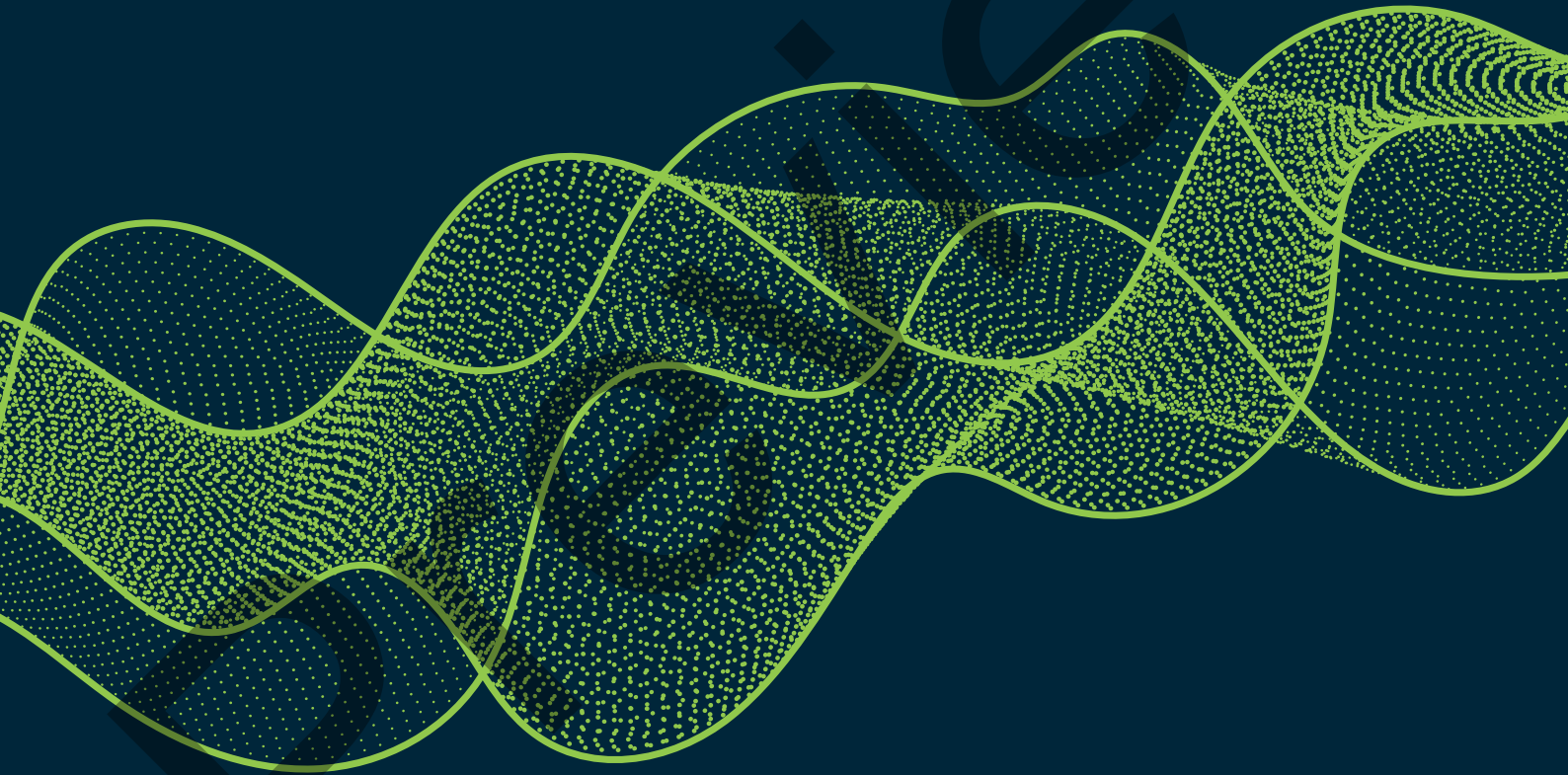
Today, its portfolio of Passive Antennas continues to expand with aircraft solutions across a number of different frequencies.



# 2

## Communication

### Passive VHF Antennas

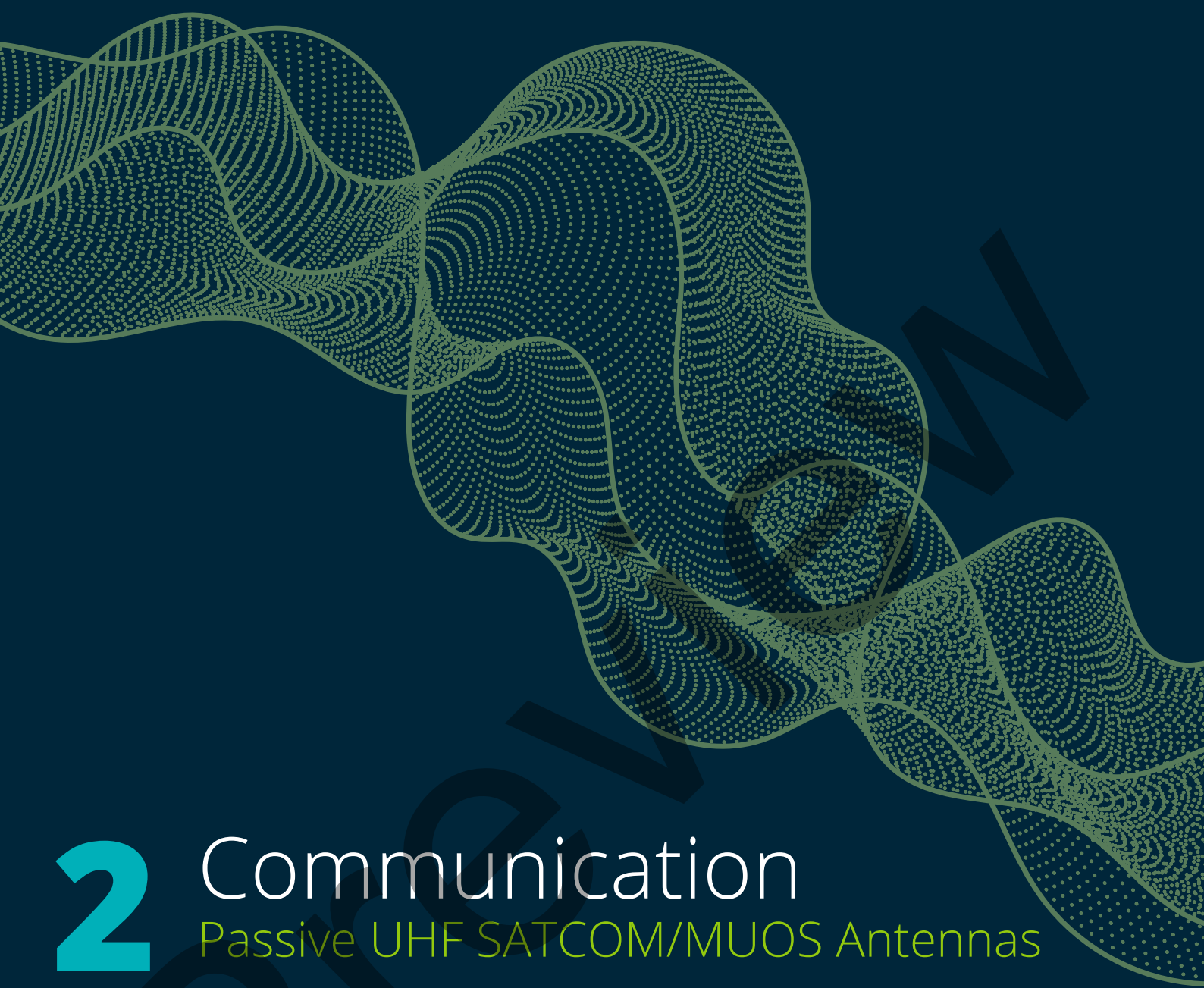




# 2 Communication

## Passive UHF Antennas

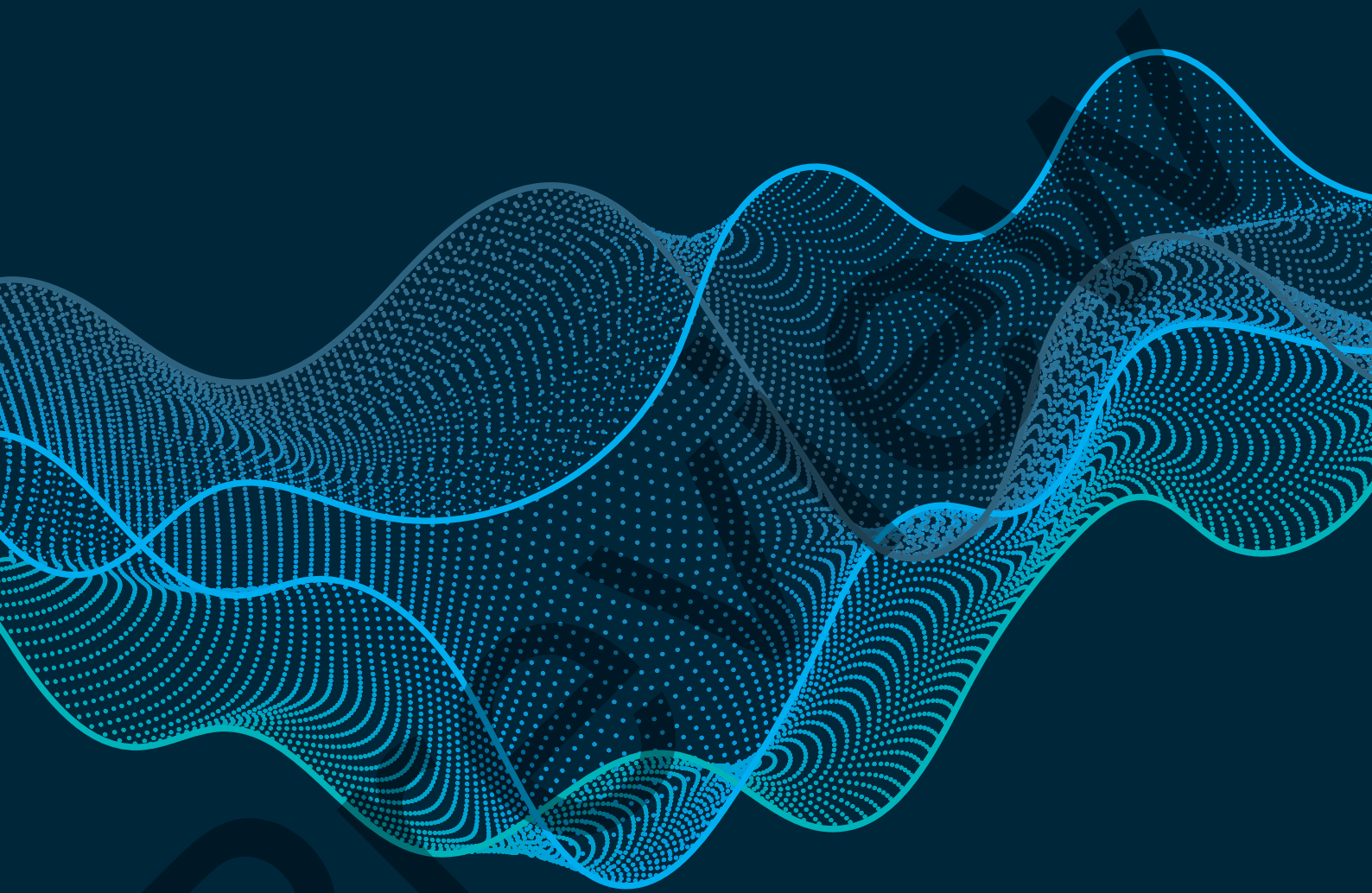




# 2

## Communication

Passive UHF SATCOM/MUOS Antennas



# 2

## Communication

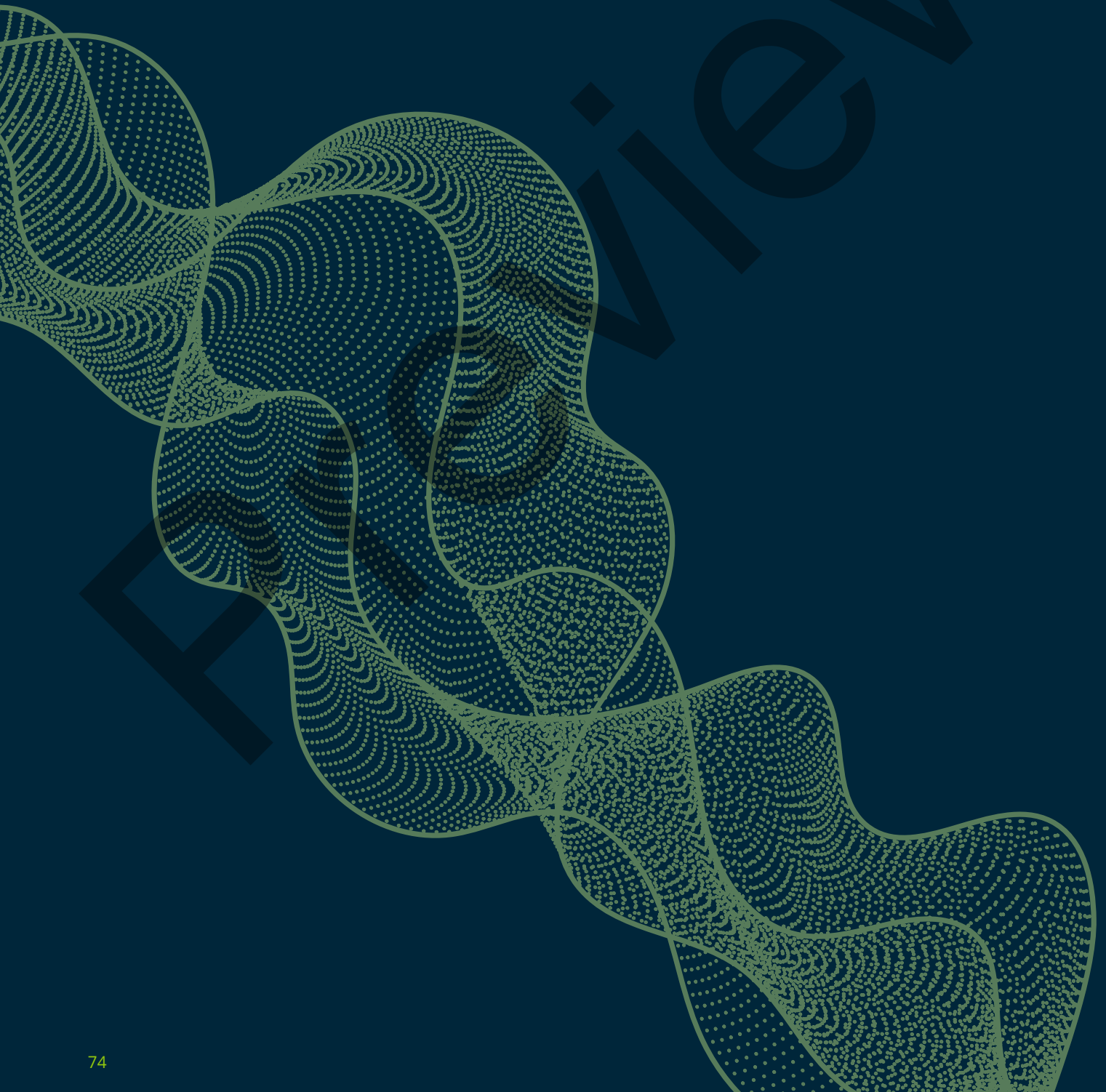
Passive Wideband and Multiband Antennas



# 2

## Communication

### Passive ELT Antennas



# 2 Communication & Navigation

## Passive Datalink Antennas

### Tested to the extreme on Collins Tactical Combat Training System Increment II (TCTS II)

Chelton 32-1000 Wideband Communications antennas are used as part of the Collins Tactical Combat Training System pod, seen here fitted to the wing of an Air Test and Evaluation Squadron (VX) 23, F/A-18E/F Super Hornet.

### Datalink

A range of low size, weight and power antennas designed to support line-of-sight Tactical Military Communications, Telemetry, Datalinks and Electronic Countermeasures (ECM)

Frequency Category	Part Number	Description	Frequency Range (MHz)	Configuration	Height (inches)
Datalink	10A2	Passive   L-band antenna	960-1220	Blade	2.23
Datalink	10A14-4	Passive   L-band antenna	950-1220	Blade	2.32
Datalink	10A21	Passive   L-band antenna	960-1215	Blade	3.05
Datalink	10A29-22	Passive   L-band antenna	960-1220	Blade	2.36
Datalink	10A5-1	Passive   L-band antenna	950-1220	Blade	2.22
Datalink	32-2002	Passive   L/S-band antenna	1250-2600	Blade	2.50
Datalink	10-31	Passive   ECM	1-10 GHz	Stub	1.53
Datalink	36-1010	Passive   L/S/C-band antenna	3.3-3.33GHz	Blade	4.11
Datalink	36-1011	Passive   L/S/C-band antenna	2.3-2.4 GHz	Blade	3.62





# 3 Navigation & Identification

## ILS/VOR Antennas

### ILS/VOR

The ILS (Instrument Landing System) requires three antenna functions: Localiser (LOC), Glideslope (GS) and Marker Beacon (MB).

Chelton half loop antennas combine the LOC and GS functionality with the VOR (VHF Omni Directional Range) navigation function. Two antennas are mounted on either side of the fuselage. A typical installation is shown on the tail of the M-346.



The antennas are fed in one of two ways;

- Cable harness (equal phase feed): Two opposite handed antennas are needed (e.g 19-85A and 19-85B or 27-3002 and 27-3003). Example part number: 37640
- Coupler (two halves fed with opposite phase). Some combine diplexers to separate the LOC/VOR and GS signals.

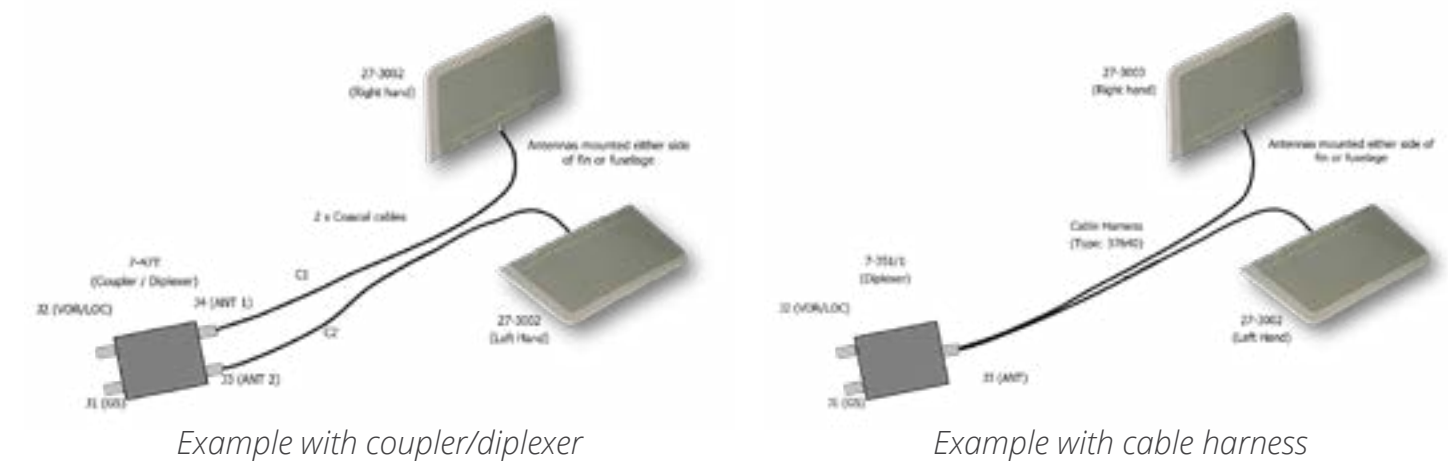
Couplers:

7-47: 180 degree splitter with diplexer

7-78: 180 degree splitter with diplexer and dual outputs

Diplexer:

7-351/1: LOC/GS Diplexer without splitter (cable harness needed)





# Navigation & Identification Antennas

## Quick Reference Table

Part Number	Description	Frequency MHz	Height (inches)	Configuration
27-3002/3	VOR/LOC/GS	108 - 118 328 - 336	5.94	Blade used with coupler
19-85A/B	VOR/LOC/GS	108 - 118 328 - 336	5.94	Blade used with coupler
19-28	VOR/LOC/GS	108 - 118 328 - 336	5.90	Blade used with coupler
21-48L	VOR/LOC/GS	108 - 118 328 - 336	5.90	Half Loop used with coupler
17-210	Glideslope	328 - 336	1.35	Dipole
17-20/1	Glideslope	328 - 336	6.05	Blade
17-9	Marker Beacon	75	1.90	Blade
17-4D/1	Marker Beacon	75	N/A	Conformal
17-10	Marker Beacon	75	1.35	Blade
17-11	Marker Beacon	75	2.28	Blade
10A2	L-band	960 - 1220	2.23	Blade
10A14-2	IFF/L-band	1020 - 1040 1080 - 1100	2.32	Blade
10A14-3	IFF/L-band	1020 - 1040 1080 - 1100	2.46	Blade
10A14-4	L-band	950 - 1220	2.32	Blade
10A21	L-band	960 - 1215	3.05	Blade
10A29-22	L-band	960 - 1220	2.36	Blade
10A5-1	L-band	950 - 1220	2.22	Blade







# 3

## Navigation & Identification

Marker Beacons

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PREVIEW



3

# Navigation & Identification

DME & IFF

Preview



# 3 Navigation & Identification GPS

Preview

## About.

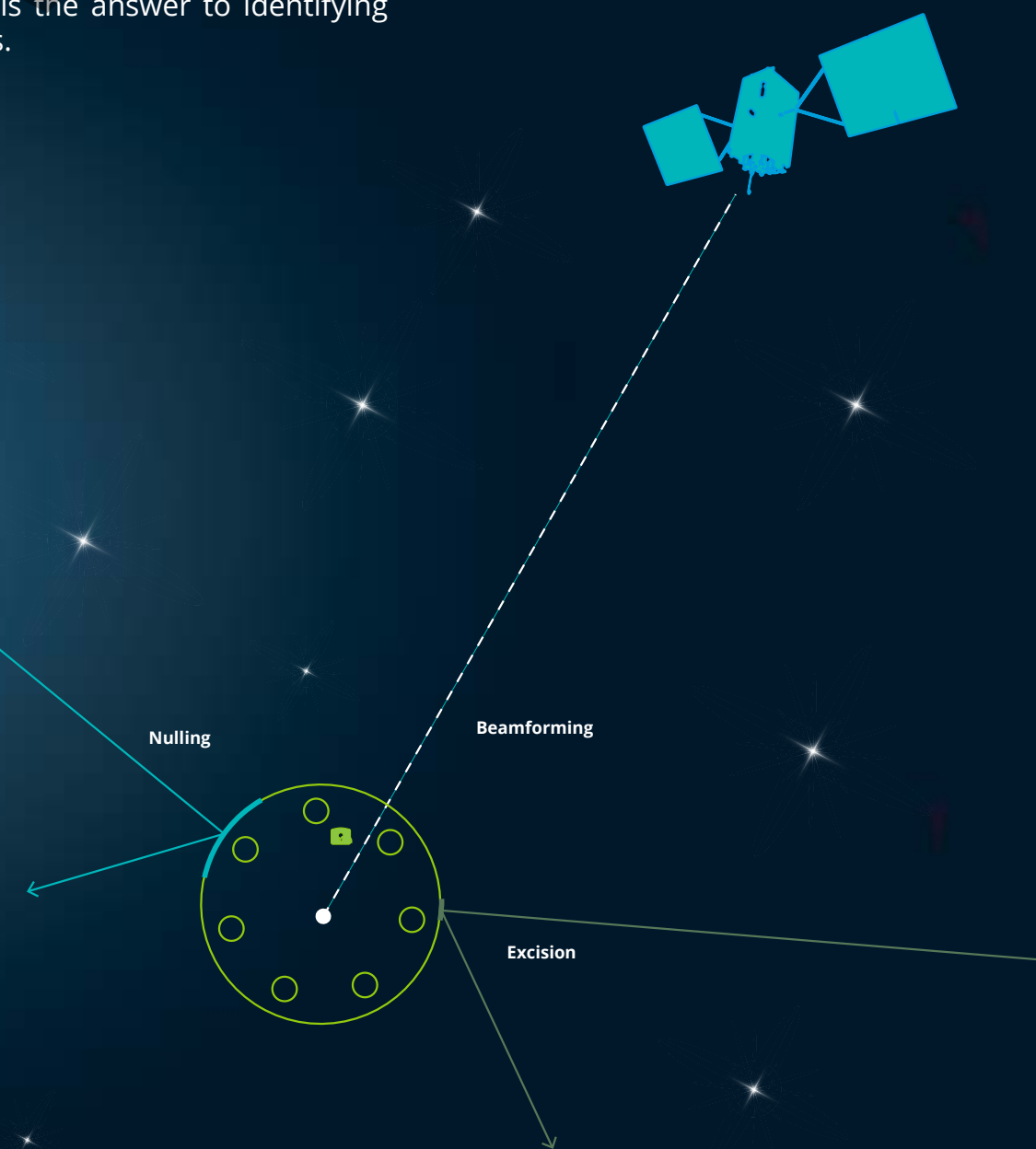
Chelton offer a wide range of L1, L2 and combined L1 & L2 band GPS FRPA (Fixed Reception Pattern Antenna) and GPS amplifier products. These can be used in conjunction with amplified splitters with up to 7 ports.

Also available is Chelton's Anti-Jam GPS Systems which offer up to 100 times more immunity to jammers than a conventional GPS antenna.

With our anti-jam GPS Systems and Anti Jamming technology, there is no compromise. Our end-to-end Assured PNT solution is the answer to identifying and eliminating threats.



Chelton selected to supply Anti-Jam GPS Solution for US Army Gray Eagle UAS



## Research Contract To Protect Satellite Signals From Interference

Chelton has been awarded a contract by the UK MOD's Defence Equipment and Support (DE&S) to research Advanced Anti-Jam techniques for the protection of navigation signals received from the Global Navigation Satellite Systems (GNSS).

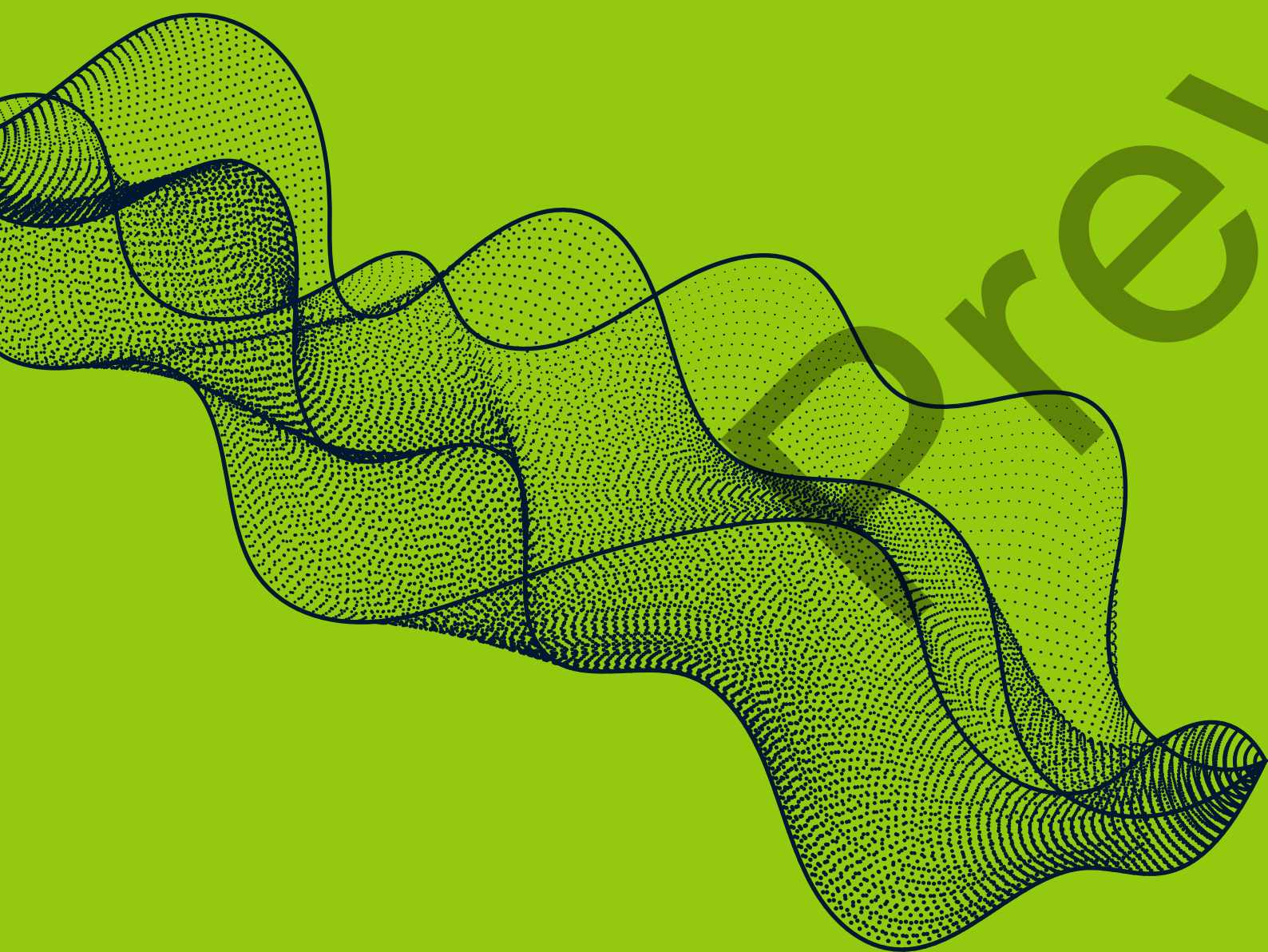
## GPS Antennas Quick Reference Table

Part Number	Description	Protection	Protected Bands	Complementary Part Number
7-6005	4-Channel Nulling Anti-Jam System	Excision & STAP (nulling)	GPS L1 and/or L2 C/A, P(Y) and M Code	20-7009
7-6008	8-Channel Nulling Anti-Jam System	Excision & STAP (nulling) Direction Finding	GPS L1 and/or L2 C/A, P(Y) and M Code	20-7009
7-6010	8-Channel Beamforming & Nulling Anti-Jam System	STAP (beamforming & nulling)	GPS L1 & L2 C/A and P(Y)	20-8000
20-7009	Active GPS Patch Antenna	Excision & STAP (nulling)	GPS L1, L2, P, M-Code	7-6005 7-6008
20-8000	Conformal Anti-Jam GPS CRPAs	STAP (beamforming & nulling)	GPS L1 & L2 C/A and P(Y)	7-6010
20-2041	Active GPS Patch Antenna	N/A	GPS L1 and/or L2	N/A



# 4 Navigation & Identification

## Direction Finding



# 4 Direction Finder

## for SAR and C-SAR

Our Direction Finders include five Guard Receivers to monitor pre-defined distress frequencies and an additional tuneable receiver, which can be used for frequencies from 30MHz to 470MHz (935 series) or 88MHz to 470MHz (938 series).

The receivers operate in parallel such that if the tuneable receiver is dedicated to a custom Electronic Tracking System (ETS) frequency, the other receivers continue to monitor the international SAR frequencies in parallel, as well as provide decoded information in the case of Marine DSC and COSPAS/SARSAT.

### Direction Finding Quick Reference Table

Part Number	Description	Frequency (MHz)	Complementary Part Number
938	Tactical Direction Finder	30 - 470	715-40
715-40	Direction Finding Controller	N/A	938
938	Civil Direction Finder	88 - 470	718-40
718-40	Direction Finding Controller	N/A	935



# CHELTON

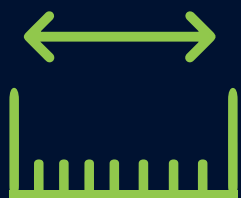
Agencies around the world rely on our Direction Finding Systems.

Shouldn't yours?

- Frequency Range 
- Receivers 
- Monitoring Mode 
- COSPAS SARSAT 

On land, when the emergency services are called, the despatcher is able to determine a location in just a few seconds thanks to internal GPS within phones. But what happens when you're called to an emergency at sea, in the middle of the desert or in the height of the mountains where a GPS location cannot easily be determined or may not exist at all?

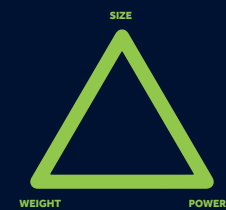
This is where Chelton DF family comes to the rescue...



**Extended Range**  
Proven in customer trials to have 3X the range detection compared to competitor systems.

**9 Frequency Bands**

**Broader Frequency Coverage**  
Covers up to 9 SAR frequency bands depending on the applications of your aircraft and is configurable for both SAR and C-SAR.



**Optimal SWaP**  
Meticulously designed to maximise range while not compromising on size, weight and power characteristics.



**Trusted by many**  
From the lightest utility helicopters to the largest military transport jets, Chelton's DF is used across the world by a diverse set of agencies.



**Platform Tailored**  
We decode your requirements and our in-house support team can advise you on the best DF configuration to maintain optimal RF performance.



**Multiple Beacon Finding Capability**  
With a unique ability to both continuously and simultaneously monitor separate frequencies using 6 receivers, beacons can be found quicker.



Chelton's Direction Finding family provides the perfect peace of mind with a combination of superior proven performance, establishment and heritage and flexibility.

When you call the emergency services on land, the despatcher is able to determine your location in just a few seconds thanks to your phone's internal GPS and the location information available on the cellular network. However, what happens when there is an emergency at sea, in the middle of the desert or in the height of the mountains where a GPS position cannot be determined?

For many years, GPS has been labelled as the answer to many Search and Rescue (SAR) needs however, it's no longer enough to simply rely on GPS for these missions. There are multiple beacons still in service across the world working on a variety of legacy frequencies. If SAR equipment doesn't

cater for all instances or frequencies, then some emergencies could take longer to get to or even missed altogether - giving no peace of mind for the rescuer.

Instead, Direction Finding (DF) which operates on and is certified for use on both legacy and modern beacons, is the only system which can provide true peace of mind for search and rescue crews. Future-proofed so that newer beacons are detectable; not forgetting the legacy ones still in use.

Chelton has heritage in DF; delivering equipment for over 60 years to guide both civil and combat Search and Rescue crews. With Chelton DF on your team, searches are more efficient, more accurate and faster; all critical when you are up against the clock in harsh environments.

Here's why agencies around the world rely on and select their essential equipment from Chelton's DF family.

**Extended range minus the SWaP sacrifice**

Chelton's antenna experts focus designs on optimal RF performance without sacrificing on size, weight and power; that's why our DF family offers the best performance to drag ratio with the lowest amount of airframe protrusion combined with largest frequency range. The design of Chelton's 935 Direction Finding Antenna has been proven in a customer trial to have had 3x the range detection when compared to competitor systems.

Conformal options are available in the market but the reality is that this is only ever a reasonable solution for platforms at the beginning of the design and not for existing helis in operation.

**Broader Frequency Coverage**  
Chelton's DF family can cover up to 9 different frequencies with the ability to monitor 6 simultaneously giving you confidence in your aircraft's ability to locate beacons. This includes Tactical VHF, Marine Distress and COSPAS-SARSAT depending on the application and requirements of your platform.

**Flexibility**  
The Chelton DF family offers flexibility in both operation and installation. The DF family is configurable for both SAR and C-SAR and because of the broader frequency coverage making it easy to use for however your agency needs to; whether that's marine bands for coastguard rescue or tactical VHF for mountainous terrain.

So why should your Search and Rescue team switch to Chelton's DF systems? Thanks to its large install base, Chelton know exactly how best to install a DF system based on your platform and your requirements. Our rich antenna expertise and advanced modelling techniques ensures we can offer different plinth options to ensure protrusion is as low as possible while still functional at lower altitudes.

Agencies around the world rely on Chelton's DF for lifesaving missions; from the lightest utility helicopters to the largest military transport jets, Chelton's DF family is certified for both civil and combat SAR use by a large number of commercial and military platforms across a diverse set of agencies including coastguard, emergency services and military agencies. Why not add yourself to that distinguished list? Find out more at [chelton.com/DF](http://chelton.com/DF).

	935 Tactical DF 	938 Civil DF 
Frequency Range	30MHz - 470MHz	88MHz - 470MHz
# Receivers	6, all internal <ul style="list-style-type: none"> <li>✓ Space saving</li> <li>✓ Simultaneous monitoring of 5 distress frequencies</li> <li>✓ Two separate receivers specific to Maritime applications are embedded</li> </ul>	6, all internal <ul style="list-style-type: none"> <li>✓ Space saving</li> <li>✓ Simultaneous monitoring of 5 distress frequencies</li> <li>✓ Two separate receivers specific to Maritime applications are embedded</li> </ul>
COSPAS/SARSAT	All variants <ul style="list-style-type: none"> <li>✓ Full COSPAS/SARSAT data decoding over 406.025MHz to 406.076MHz without the need for operator re-tuning</li> </ul>	All variants <ul style="list-style-type: none"> <li>✓ Full COSPAS/SARSAT data decoding over 406.025MHz to 406.076MHz without the need for operator re-tuning</li> </ul>
Operation	Fully solid state	Fully solid state
Interface Outputs	ARINC 407 and ARINC 429 <ul style="list-style-type: none"> <li>✓ RS 422 Control</li> <li>✓ Cubic interrogator compatible for CSAR capability</li> </ul>	ARINC 429 <ul style="list-style-type: none"> <li>✓ RS 422 Control</li> </ul>



# 5 Navigation & Identification

Link16

| Increased situational awareness

| Jam resistant

| Increased data throughput

| Relative navigation capability

| Precise participant location and identification

# 5 Link 16

## Building the resilience of your tactical network

Credited by the US Air Force as a key factor for saving lives in multiple theatres due to increased situational awareness, Link 16 is a military inter-computer data exchange format enabling military aircraft, ships, Army and Marine Corps units to exchange tactical information securely and in near real time.

Successful data links from Link 16 enable warfighters to understand location and identity of friend or foes, share points of interest over a secure network and optimise the decision-making process in an electromagnetically stressed environment.

## Survival in the digital battlefield

In the heat of battle, an already stressed environment can be exacerbated by poor communication and planning which may lead to friendly fire, fratricide or other cases of mistaken identity.

Situational awareness is imperative. Commanders and warfighters need to know friendly and enemy locations as well as the location of aircraft, ground support or naval support that can enhance knowledge of the situation. But locations change dynamically in combat, so having real-time situational awareness is a clear advantage.

Communication between troops is also key. Your air-to-air communications may be secure but what if your troops on the ground had no way to communicate with air support? What if they had to reply on radios with delayed relay?

To avoid these problems, Link 16 was created. To ensure warfighters all had real-time awareness of the situation with the ability to communicate with each other.



## Link 16 Quick Reference Table

Reference	Frequency GHz	Gain dBi	AZ°	EI	Polarisation	Power	Dimensions (mm)
<b>Omni Antennas</b>							
OA2-0.5-1.3V/1989	0.50 - 1.30	1 to 2	360	80	Vertical	200w at 50% duty	334x130 Ø
XPO3V-500-1300/034	0.50 - 1.30	1 to 2	360	80	Vertical	200w at 50% duty	333x108 Ø
EVD2-960-1215/628	0.96 - 1.215	2	360	80	Vertical	20	292x25 Ø
EVD2-960-1215/004	0.96 - 1.215	2	360	80	Vertical	20	281x26 Ø
OA4-0.96-1.22V/1990	0.96 - 1.215	4.5	360	33	Vertical	200w at 50% duty	603x130 Ø
OA7-1090V/1328	0.96 - 1.215	7	360	16	Vertical	200w at 50% duty	1040x180 Ø
OA-1.4H-2.3H/2586	1.35 - 1.39	6	360	40	Horizontal	10w	1176x50.1 Ø
XVO7-960-1215/1120	0.96 - 1.215	7	360	16	Vertical	200w at 50% duty	1029x79 Ø
XPO4-960-1215/1425	0.96 - 1.215	4.5	360	33	Vertical	200w at 50% duty	620x79 Ø
XVO7-960-1215/2374	0.96 - 1.215	6.5	360	18	Vertical	200w at 50% duty	1039x140 Ø
XVO7-960-1215/2486	0.96 - 1.215	6.5	360	18	Vertical	200w at 50% duty	1029x79.4 Ø
<b>Sector Antennas</b>							
SA9-180-0.96-1.22V/1814	0.96 - 1.215	9	180	20	Vertical	200w at 50% duty	1055x247 Ø
SA13-120-0.96-1.22V/1694	0.96 - 1.22	13	110	9	Vertical	200w at 50% duty	1650x155 Ø
SA5-120-0.96-1.22V/1969	0.96 - 1.22	5	120	60	Vertical	200w at 50% duty	330x162 Ø
<b>Sector Antennas</b>							
SA9-180-0.96-1.22V/1814	0.96 - 1.215	9	180	20	Vertical	200w at 50% duty	1055x247 Ø
SA13-120-0.96-1.22V/1694	0.96 - 1.22	13	110	9	Vertical	200w at 50% duty	1650x155 Ø
SA5-120-0.96-1.22V/1969	0.96 - 1.22	5	120	60	Vertical	200w at 50% duty	330x162 Ø
<b>Blade Antennas</b>							
OA2-960-1215/2640	0.96 - 1.215	3	360	60	Vertical	20	85x77x38
<b>Filters</b>							
Band Pass Filter: BPF-0.96-1.22/1911	0.962 - 1.213						175x75x25
Band Stop Filter: BSF-1030-1090/1347	Notches at 1.030GHz and 1.090GHz						210x100x85

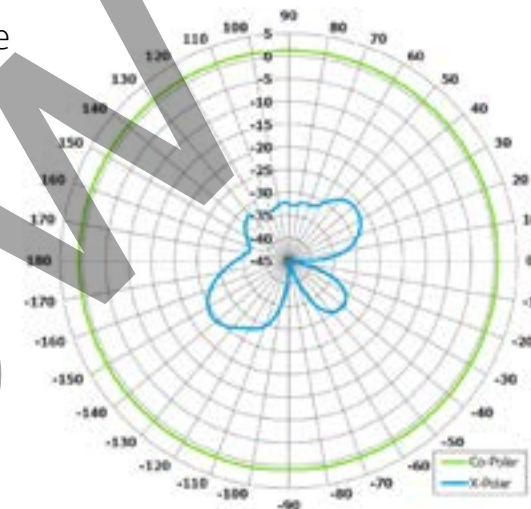




### Omni Antennas

Omni directional antennas transmit and receive uniform signals in a 360° pattern. The circular polarisation optimises performance particularly in ground to airborne applications.

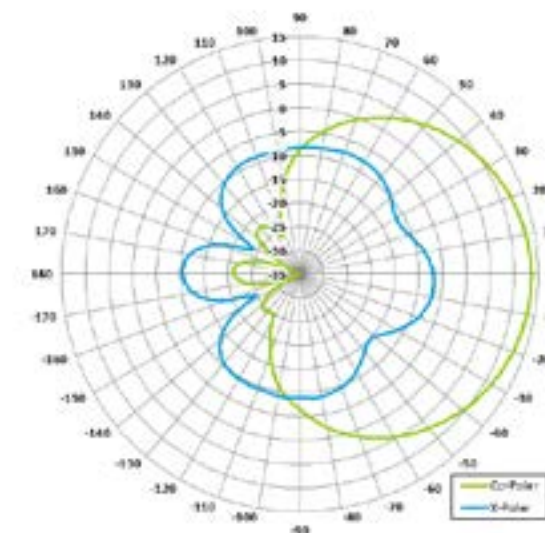
- ✓ Easy to install
- ✓ Various mounting options
- ✓ Various form factors available
- ✓ Delivers long communication distances



### Sector Antennas

Sector antennas are normally used as part of a base station and has a narrow elevation with a clearly defined azimuth coverage.

- ✓ Low profile
- ✓ Azimuth coverage from 30° to 210°
- ✓ Various mounting options
- ✓ High gain
- ✓ High power



Link 16 can be incorporated into the following systems:

## MIDS

Multifunctional Information Distribution System

## JTIDS

Joint Tactical Information Distribution System

## JTRS

Joint Tactical Radio System

## TTNT

Tactical Targeting Network Technology

## TCTS

Tactical Combat Training System

The Link 16 protocol uses frequency bands that cover 960-1215MHz and all antennas in this range are rugged, designed for extreme weather and temperature and have been used in battlefield conditions without affecting the performance or inhibiting mission requirements.

Link 16 systems can be incorporated into MIDS, JTRS and JTIDS systems for high data rate transmission where multiple bands will be in use.

Chelton offer the following in our Link 16 suite:

- ✓ Omni Antennas for Ground, Vehicle and Marine applications
- ✓ Sector Antennas
- ✓ Blade Antennas
- ✓ Bandpass and Bandstop Filters
- ✓ Accessories including mast deployment kits, bespoke vehicle mounts, bags and cases.



# Link 16 Band Filters

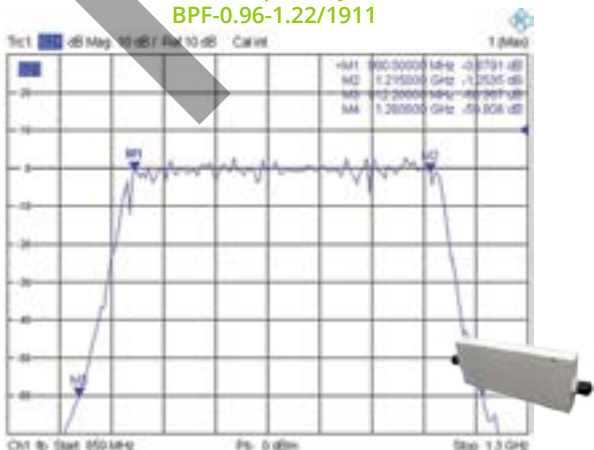
## Band Pass, Band Stop and Notch Filters

Chelton produce a range of filters for use in the Link 16 frequency band. These filters allow signals to be passed between the specified frequency ranges or rejected outside the specified frequency ranges.

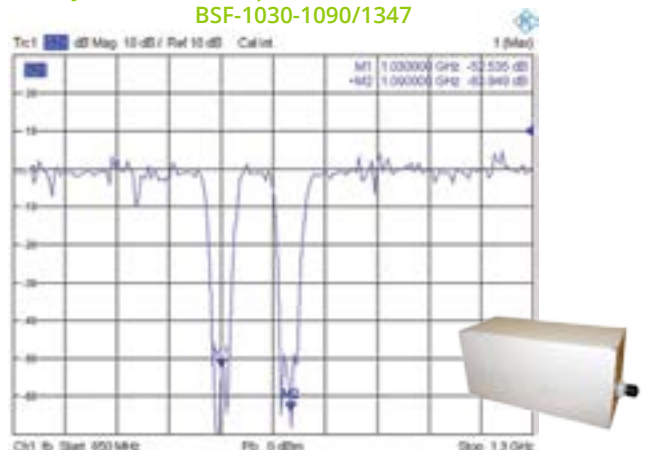
The below shows the common filters required for the Link 16 frequency band. If you require a different product or frequency range, we are happy to discuss your requirements.

	<b>Band Stop Filter</b> <b>BSF-1030-1090/1347</b>	<b>Band Pass Filter</b> <b>BPF-0.96-1.22/1911</b>	<b>Band Notch Filter</b> <b>BNF-960-1220/2362</b> <b>(Airborne MIL-STD-810F)</b>
Passband	DC to 1008 MHz 1053 - 1065MHz 1113 - 1900MHz	0.962 - 1.213GHz	960 - 1000MHz 1055 - 1065MHz 1120 - 1215MHz
Insertion loss (Max)	1.0 dB	0.9dB	2dB
VSWR	1.6:1 max	1.3:1 max	2:1 min
Rejection from (Min)	@ 1060MHz: 65dB @ 1090MHz: 55dB 1900 - 4000MHz: 30dB	DC - 750MHz: 60dB 1265 - 4000MHz: 60dB	DC - 900MHz: 60dB @ 1030MHz: 60dB @ 1090MHz: 60dB 1300 - 3000MHz: 60dB
Max Power Handling	200W	1000W	50W
Mass	3.7kg	0.675kg	0.7kg
Operating Temperature	-20°C to +50°C	-20°C to +50°C	-40°C to +85°C
Connectors	N(F)	N(F)	SMA Female
Dimensions	210x100x85mm	175x75x25mm	170 x 80 x 30mm
Finish	White	White	Black

Pass-band characteristics showing -60dB rejection 50MHz outside the primary Link16 band.  
BPF-0.96-1.22/1911



Rejection characteristics of Notch Filter showing over 50dB rejection at IFF frequencies, 1030MHz and 1090MHz.  
BSF-1030-1090/1347





## Airborne Antennas Frequency Table

Communication		
Frequency MHz	Part No.	Page
<b>HF</b>		
2 - 30	435	12
	455	12
	465	12
	475	12
	485	12
<b>V/UHF</b>		
30 - 600 960 - 1220	12-190-160	19
	12-190-530LP	21
	12-190-6/1	23
	12-190-60	24
	12-190-61	25
	12-4004	26
	12-224	27
	12-5002	28
	12-5005	29
	12-5006	30
	12-5008	31
	12-5009	32
	10-3003-1	33
	10-3003-2	33
	<b>VHF Only</b>	
30 - 300	19-415	43
	16-21	45
<b>UHF Only</b>		
225 - 512	16-1	47
	16-3	48
	16-11	49
	16-16	50
	16-39	51
	21-174	52
	16-13	53
<b>UHF SATCOM/MUOS</b>		
225 - 400	19-4001	55
	19-430-10	56
	19-440	58
	19-440-10	58
	19-450-10	60
	19-470-10	62

Wideband & Multiband		
	20-200-20	64
	16-113	65
	9-33-30	66
	12-512	68
	12-231	69
	9-33-26	70
	12-59	71
	16-4000	72
	20-200-45	73
	<b>ELT</b>	
121.5 243 406	25-1000	75
<b>Datalinks</b>		
950 - 1220	10A2	78
	10A14-4	79
	10A21	80
	10A29-22	81
	10A5-1	82
1250 - 2600	32-2002	83
1 - 10	10-30 / 10-31	84
	36-1010	85
	36-10-11	86
<b>Navigation</b>		
Frequency MHz	Part No.	
<b>VOR/LOC/GS</b>		
108 - 336	27-3002	90
	27-3003	90
	19-85A	91
	19-85B	91
	19-28	92
	21-48L	93
	17-210	94
	17-20	95
	17-21	95
	<b>Marker Beacon</b>	
75	17-9	97
	17-4D/1	98
	17-10	99
	17-11	100

DME / IFF		
950 - 1220	10A2	102
	10A14-2	103
	10A14-3	104
	10A14-4	105
	10A21	106
	10A29-22	107
	10A5-1	108
<b>GPS Anti-Jam</b>		
L1, L2, P, M-Code	20-7009	117
	20-8000	118
	20-2041	119
<b>Direction Finder</b>		
Frequency MHz	Part No.	
<b>DF</b>		
30-470	935	126
88 - 470	938	131

Preview