HR Smith
Group of
Companies

TSO
APPROVED

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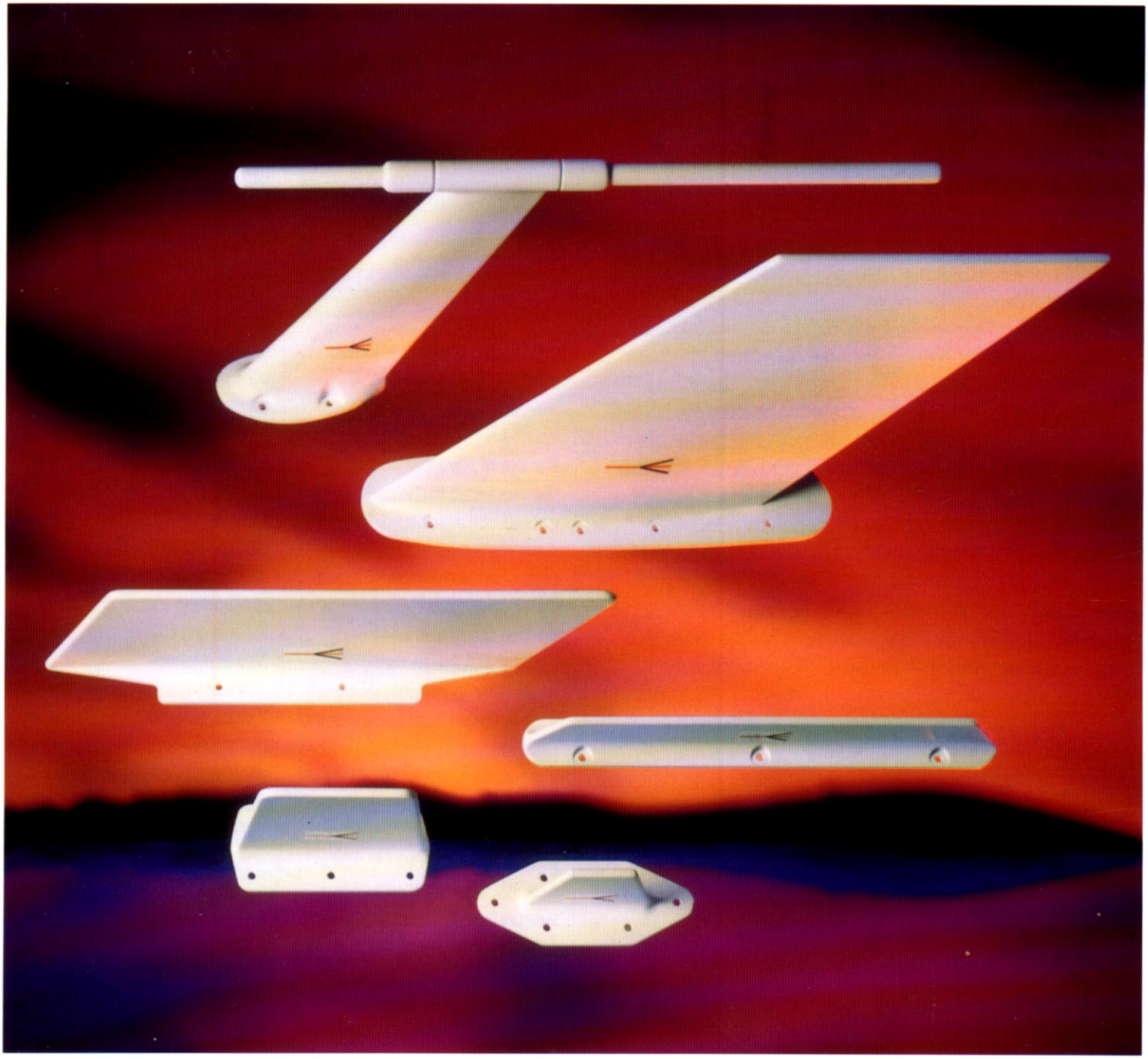
Advanced
airborne
antenna
systems

Shaping the future of Airborne Antenna

HR Smith
Technical Developments Limited



Shaping the future of Airborne Antennas

The HR Smith Group's unique combination of RF design and advanced thermoplastic composite technology places it at an unparalleled advantage over the majority of existing other antenna manufacturers.

A new generation of advanced engineering thermoplastics has enabled HR Smith (Technical Developments) to create antennas which have unique rain erosion qualities allied to improved impact resistance, high temperature capability and thermal stability. Additionally, superior electrical and mechanical properties and enhanced chemical resistance are combined with on-time delivery, and a lower cost compared to conventional antennas.

The new thermoplastic antennas are the latest state-of-the-art products to be offered by the HR Smith Group and are designed to meet the needs of the aircraft industry into the twenty first century.

The antennas are produced to give optimum electrical performance that is maintainable throughout the life of the antenna, together with a mechanical integrity hitherto not achieved with thermoset composite antennas.

HR Smith can offer direct replacements for the majority of in-service antennas with, in most cases, off the shelf delivery.

Mechanical integrity

The antennas are constructed from advanced thermoplastic resins which have many advantages over their old technology thermosetting counterparts:

The advantages include:

- Improved rain erosion and impact resistance
- High temperature capability and thermal stability
- Void and adhesive free structures
- High degree of product reproducibility
- Enhanced environmental performance
- Corrosion resistant assembly
- Freedom from delamination

The use of advanced thermoplastics in the construction of currently available HR Smith products has given proven performance enhancement, with over fifteen years in-service use on high speed military aircraft.

The traditional methods of assembly with component parts such as connectors, baseplate and radiating element being housed in a pre-formed thermoset shell with resultant cavity, have been replaced by revolutionary, patented, manufacturing design features. These features substantially eliminate the current failure modes of traditional antennas.

A new molding technique forms the radiating element as part of the process and encapsulates the baseplate and connectors. The resultant antenna does not have any voids, printed circuit board radiating elements or unsupported radiating elements which can give rise to failures on current antennas. These antennas will not delaminate as some fibreglass antennas have done in the past. Combining this with our dry fit conductive anti-corrosion RF gaskets gives users fit-and-forget antenna systems at a reduced cost.

Electrical performance

The elimination of a separate radiating element and cavity in the advanced molding process ensures that the original performance is maintained throughout the life of the antenna.

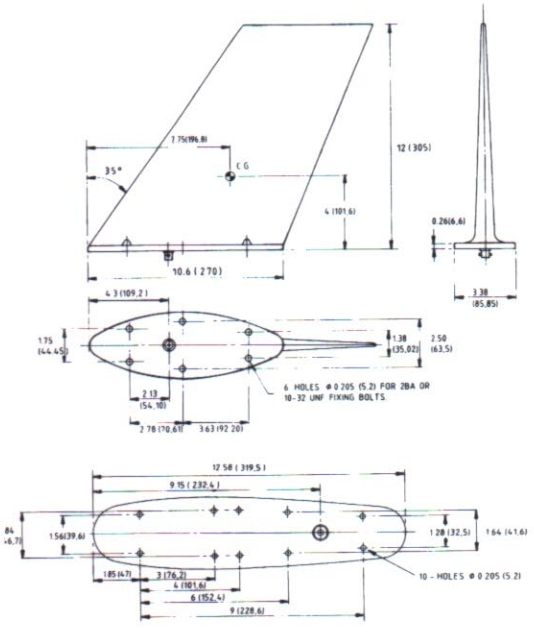
Thermoplastics offer void and adhesive free assembly which provides the high quality electrical properties required for antennas to give optimum performance.

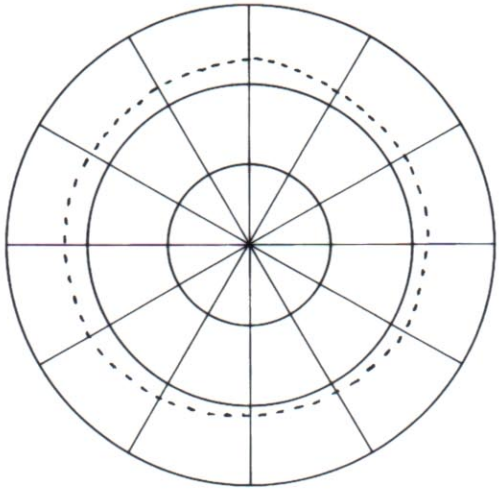
For the first time, the new range of thermoplastic antennas offers a quality product that can have a mean time between failure approaching that of the aircraft's life and can provide a fit-and-forget solution.

The standard range of antennas is manufactured to be direct replacements for the range of antennas as detailed in the Antenna Cross Reference List at the end of this brochure.

VHF Communications Antenna Type Ten 105

The broadband VHF Antenna Type Ten 105 has been manufactured from durable high impact resistant thermoplastic which has unrivalled resistance to rain erosion and yet is one of the lightest antenna for its size. The radiation pattern is omni-directional and the antenna is extremely efficient with a VSWR of less than 2.0:1 across the frequency band. Bolt patterns exist for compatibility to most airframes worldwide.





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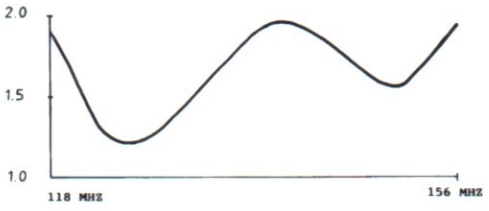


V.S.W.R. PLOT

Electrical Specification

Frequency Range	118 MHz-156 MHz
VSWR	2.0:1
Polarisation	Vertical
Impedance	500hms (nominal)

Mechanical Specification

Altitude	50,000ft (15,250m)
Speed	Cleared for all sub sonic commercial aircraft
Temperature Range	-75° to +180°C
Weight	Less than 2lbs (0.9Kg nominal)

Antenna	10-205-112P
Connector	Type BNC
Mating Connector	UG88(-)/U
Gasket Pt No	10-500-11-3

Antenna	10-205-24P
Connector	Type C
Mating Connector	UG8573£(-)/U
Gasket Pt No	10-500-11-115

Equivalents	
Dorne & Margolin	DMC50-1
	DMC50-2
	DMC50-17
	DMC25-2B
Sensor	S65-8282-Series
Collins	37R-2

CAA Approval
WR00700

VHF Low Profile Antenna Type Ten 118

The Antenna has been designed specifically for mounting on the underside of aircraft where clearance is a problem. Manufactured from durable, high impact resistant thermoplastic, these antennas have unrivalled resistance to rain erosion and rough field operating conditions. With a height of less than 10 inches (25.4cms) and a top loading element, it is ideally suited for helicopters or other aircraft with low ground clearance.

Electrical Specification

Frequency Range	118 MHz-1137 MHz
VSWR	2.5:1
Polarisation	Vertical
Impedance	500hms (nominal)

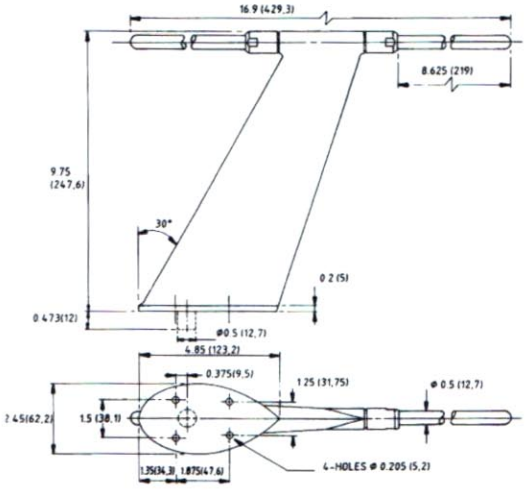
Mechanical Specification

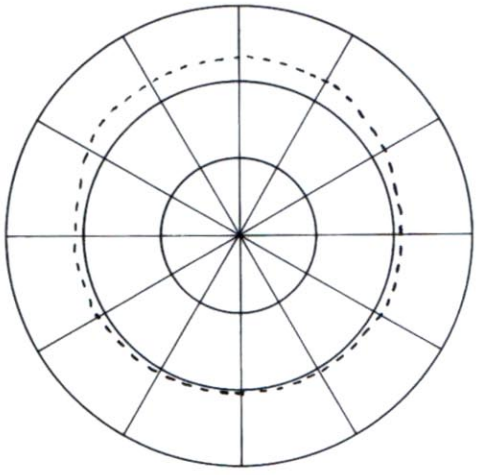
Altitude	50,000ft (15,250m)
Speed	High sub sonic
Temperature Range	-75° to +180°C
Weight	1.0lb (0.45Kg)

Antenna	10-118-1P
Connector	Type BNC
Mating Connector	UG88(-)/U
Gasket Pt No	10-500-11-11

Antenna	10-205-2P
Connector	Type TNC
Mating Connector	31-2367 Amphenol
Gasket Pt No	10-500-11-11

Equivalents	
Dayton Granger	VF10-347
Chelton	16-21





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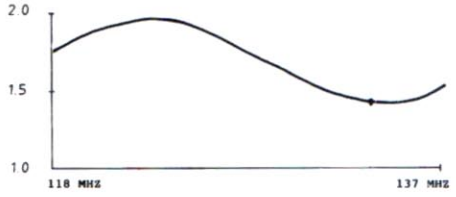
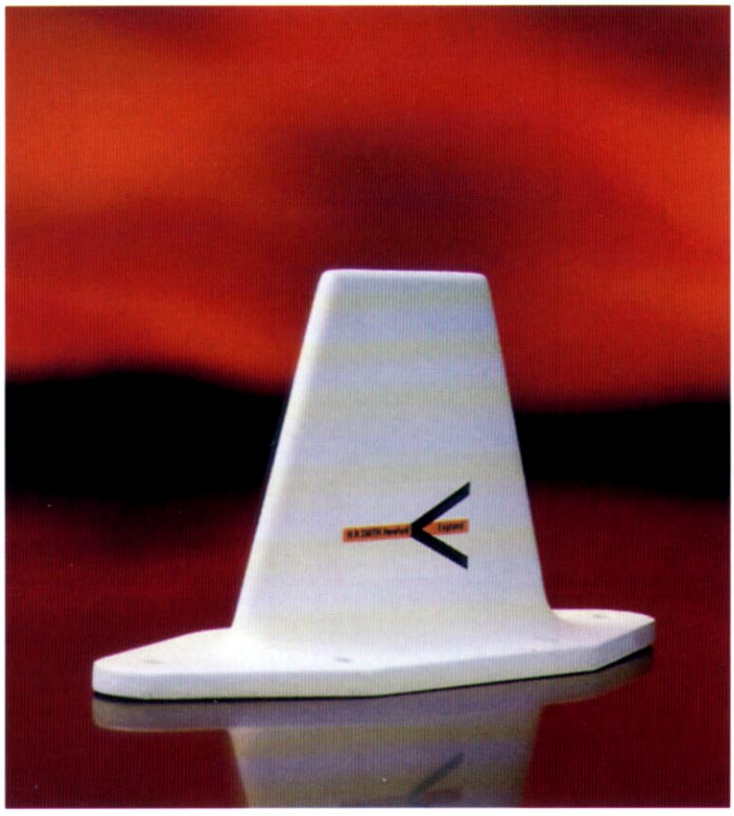


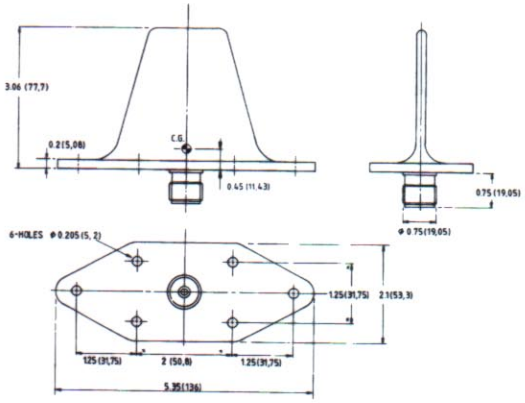
V.S.W.R. PLOT

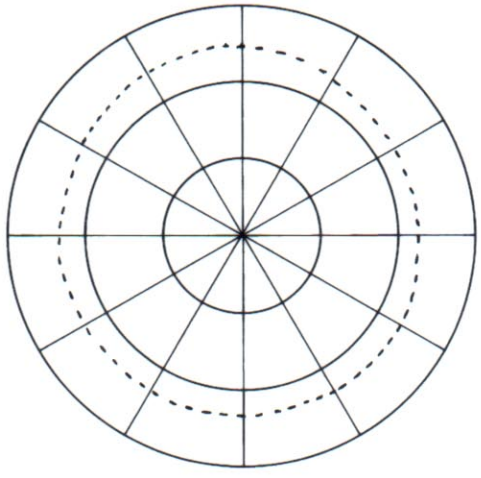
CAA Approval
WR00700

ATC/DME Blade Antenna Type Ten 203

The ATC/DME Blade Antennas, included in the Ten 208 Series, are equally suitable for use in ATC/IFF/TACAN and TCAS systems within the frequency band 950 to 1250 MHz. Manufactured from lightweight durable thermoplastic, with low drag characteristics, the antenna are suitable for aircraft operating at speeds up to Mach 1.







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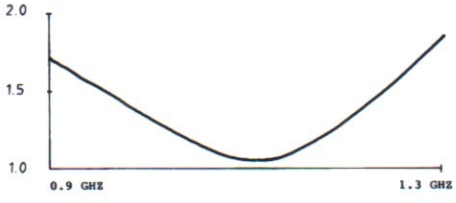


V.S.W.R. PLOT

Electrical Specification

Frequency Range	950 - 1250 MHz
VSWR	1.3:1 (1000 - 1100 MHz)
	1.7:1 (950 - 1250 MHz)
Polarisation	Vertical
Impedance	500hms (nominal)

Mechanical Specification

Altitude	50,000ft (15,250m)
Speed	Mach 1
Temperature Range	-75° to +180°C
Weight	Less than 0.188 lbs (85gms)

Antenna	10-203-1P
Connector	Type N
Mating Connector	UG-21(-)/U
Gasket Pt No	10-500-11-2

Antenna	10-203-3P
Connector	Type C
Mating Connector	UG573(-)/U
Gasket Pt No	10-500-11-2

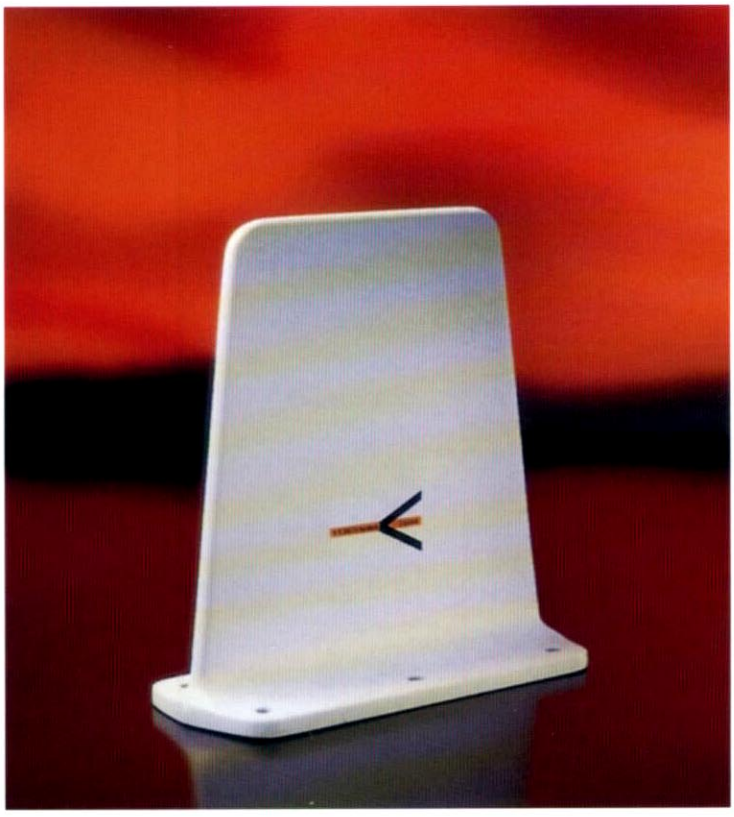
Antenna	10-203-4P
Connector	Type HN
Mating Connector	UG-59(-)/U
Gasket Pt No	10-500-11-2

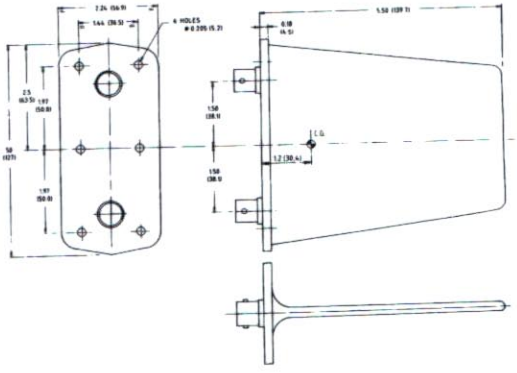
Equivalents	
Dorne & Margolin	DMN 50 Series
Sensor	S65-5366 Series

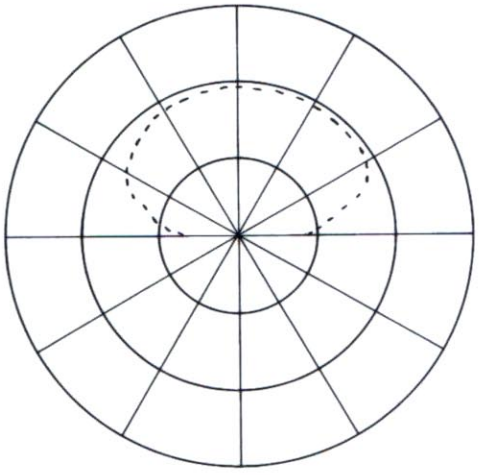
CAA Approval
WR00700

Glide Slope Antenna Type Ten 204

The Glide Slope Antenna Type 204 is designed for use with dual receiver installations. The antenna is designed for bulkhead mounting and can be installed either inside a radome or externally on low speed aircraft. Manufactured from durable lightweight thermoplastic, this antenna offers unrivalled performance at low cost for any aircraft installation.







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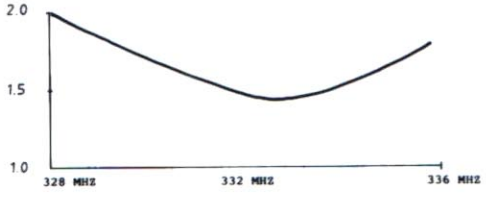


V.S.W.R PLOT

Electrical Specification

Frequency Range	328 - 326 MHz
VSWR	2.0:1
Polarisation	Horizontal
Impedance	500hms (nominal)

Mechanical Specification

Altitude	50,000ft (15,250m)
Speed	Can be used externally mounted on low speed aircraft
Temperature Range	-75° to +180°C
Weight	5.25oz (150gms) (nominal)

Antenna	10-204-1P
Connector	Type C
Mating Connector	UG537(-)/U
Gasket Pt No	10-500-11-7

Antenna	10-204-3P
Connector	Type N
Mating Connector	UG-21(-)/U
Gasket Pt No	10-500-11-7

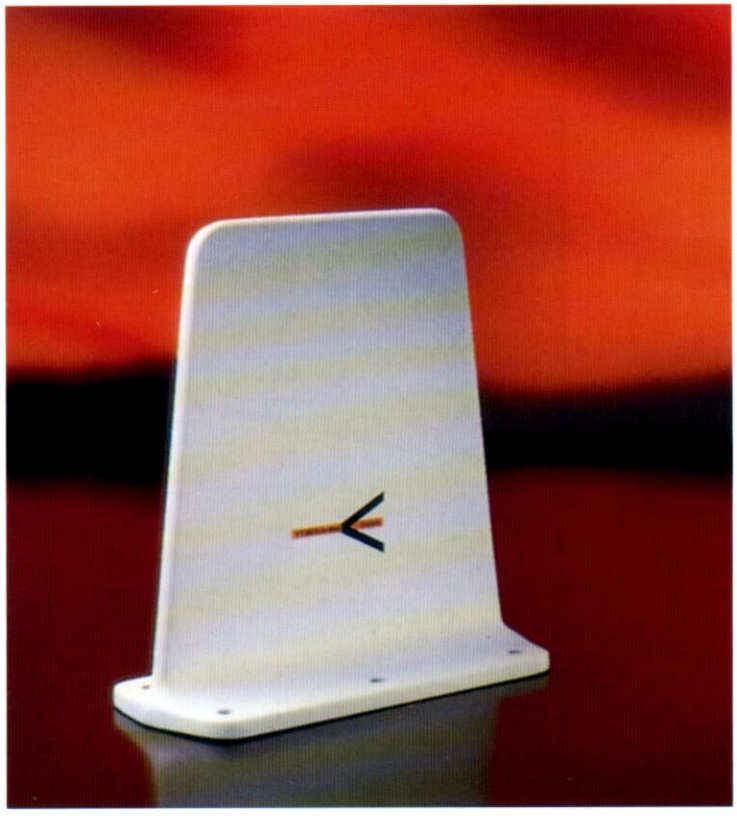
Antenna	10-204-5P
Connector	Type TNC
Mating Connector	31-2367 Amphenol
Gasket Pt No	10-500-11-7

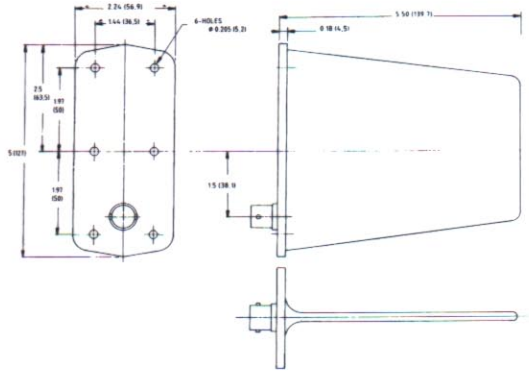
Equivalents	
Dorne & Margolin	DM25-2
Collins	37-P5
Sensor	S41422 Series

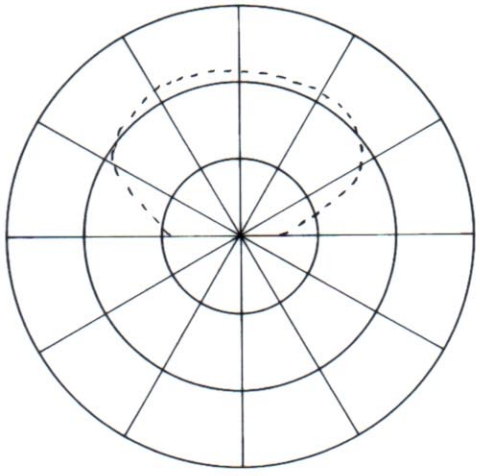
CAA Approval
WR00700

Glide Slope Antenna Type Ten 205

The Glide Slope Antenna Type 205 is designed for use with dual receiver installations. The antenna is designed for bulkhead mounting and can be installed either inside a radome or externally on low speed aircraft. Manufactured from durable lightweight thermoplastic, this antenna offers unrivalled performance at low cost for any aircraft installation.







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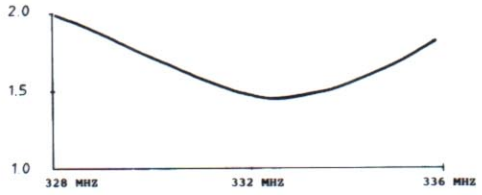


V.S.W.R. PLOT

Electrical Specification

Frequency Range	328 - 326 MHz
VSWR	2.0:1
Polarisation	Horizontal
Impedance	500hms (nominal)

Mechanical Specification

Altitude	50,000ft (15,250m)
Speed	Can be used externally mounted on low speed aircraft
Temperature Range	-75° to +180°C
Weight	5.25oz (150gms) (nominal)

Antenna	10-205-1P
Connector	Type N
Mating Connector	UG-21(-)/U
Gasket Pt No	10-500-11-7

Antenna	10-205-3P
Connector	Type C
Mating Connector	UG-88(-)/U
Gasket Pt No	10-500-11-7

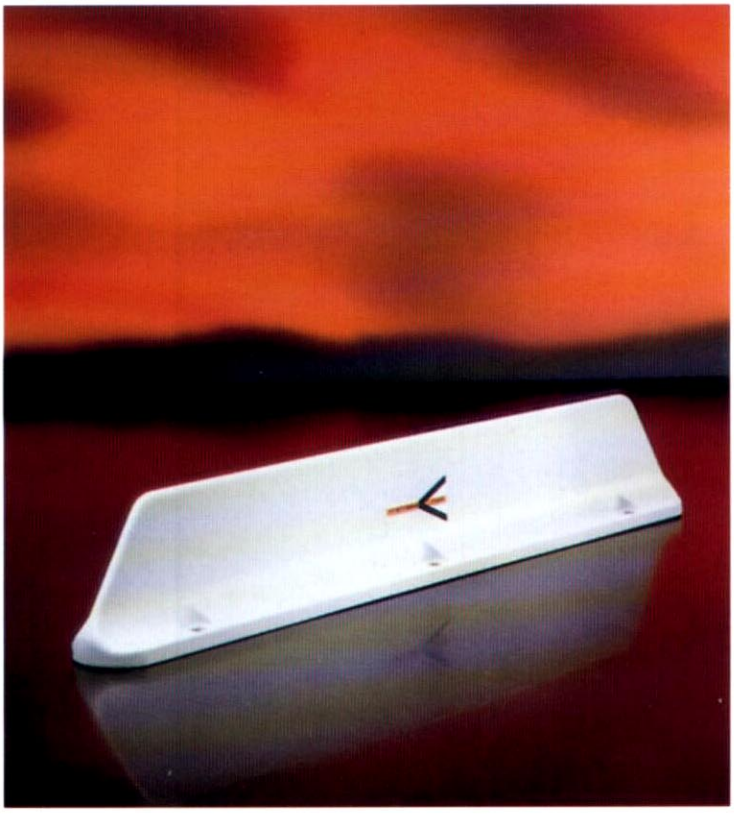
Antenna	10-205-4P
Connector	Type TNC
Mating Connector	31-2367 Amphenol
Gasket Pt No	10-500-11-7

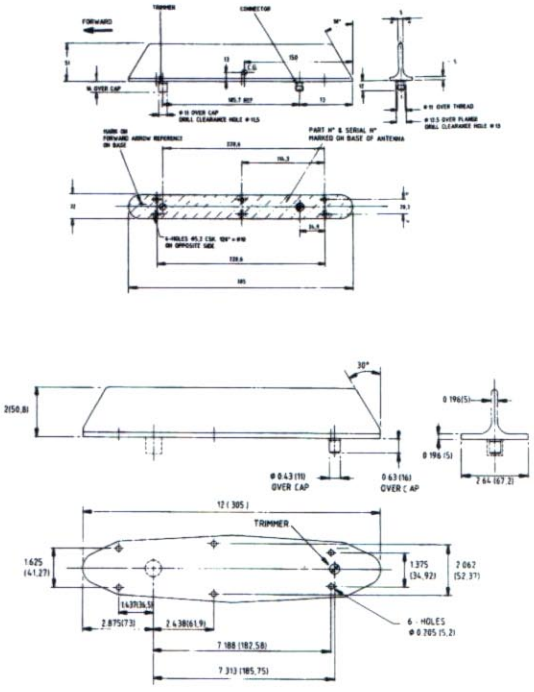
Equivalents	
Collins	37-P4
Sensor	S41422 Series

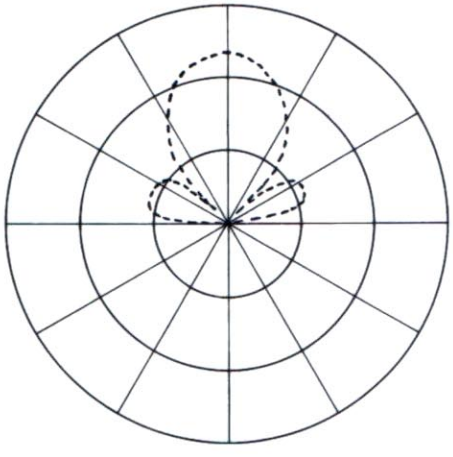
CAA Approval
WR00700

External Marker Beacon Antenna Type Ten 208

The antennas, for external mounting, have been designed for the reception of 75MHz marker beacon signals. They are of lightweight, low profile construction and are suitable for use on aircraft operating at supersonic speeds. The unique design of the antenna ensures that the attachment flange can be profiled and drilled to suit any installation.







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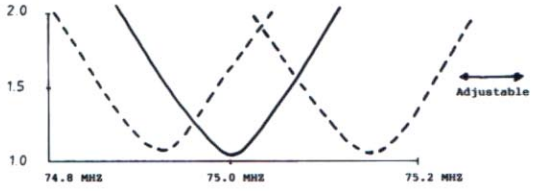


V.S.W.R PLOT

Electrical Specification

Frequency Range	75 MHz +/-0.25 MHz
VSWR	Less than 1.5:1
Polarisation	Horizontal
Impedance	500hms (nominal)

Mechanical Specification

Altitude	50,000ft (15,250m)
Speed	Supersonic
Temperature Range	-75° to +180°C
Weight*	Less than 0.55 lbs (0.25Kg)

*Dependant upon type, typically 0.46 lbs (0.20Kg) type 10-208-3FP

Antenna	10-208-1FP
Connector	Type C
Mating Connector	UG537(-)/U
Gasket Pt No	10-500-11-385

Antenna	10-208-2FP
Connector	Type BNC
Mating Connector	UG88(-)/U
Gasket Pt No	10-500-11-385

Antenna	10-208-3FP
Connector	Type C
Mating Connector	UG573(-)/U
Gasket Pt No	10-500-11-385

Antenna	10-208-4F
Connector	Type TNC
Mating Connector	31-2367 Amphenol
Gasket Pt No	10-500-11-330

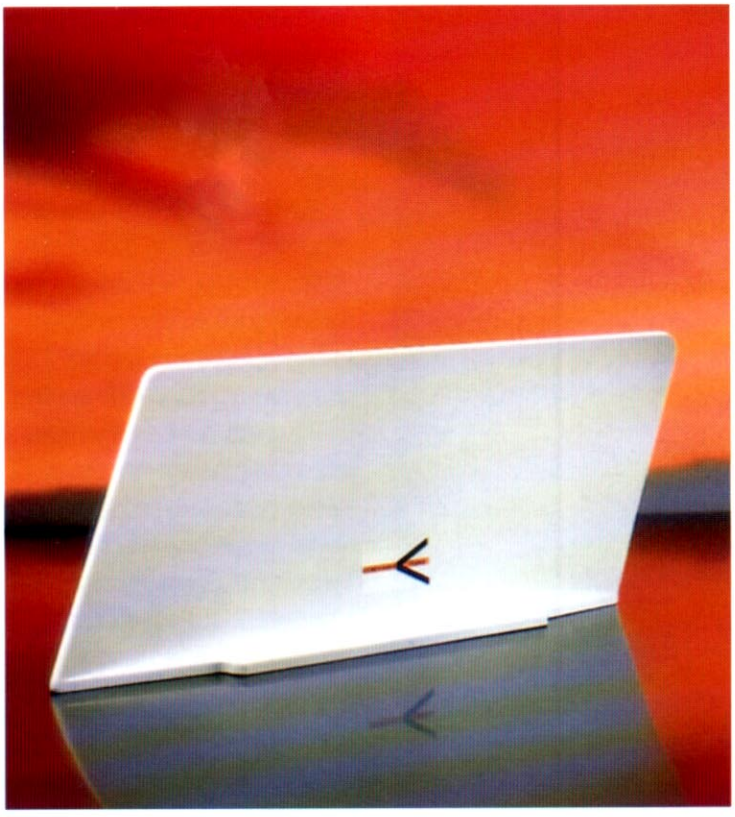
Equivalents	
Dorne & Margolin	DMN-50
Collins	37 x 2
Comant	C1-118-1
Chelton	17-9

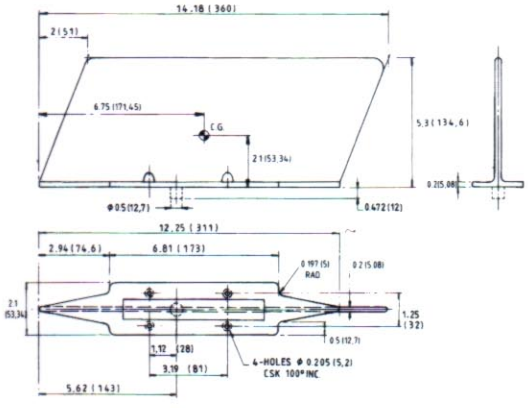
CAA Approval
WR00700

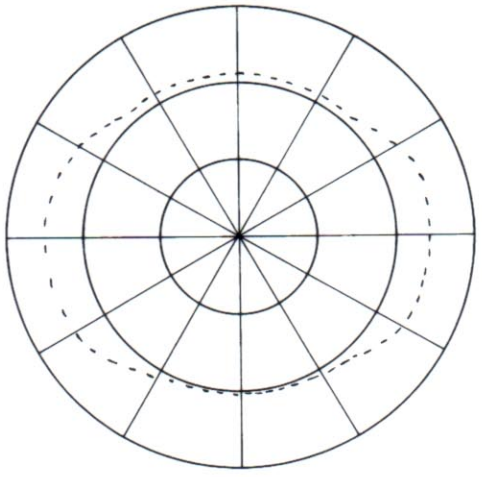
VOR ILS Blade Antenna Type Ten 250

One of the world's lightest, low drag VOR/ILS antennas, with an unrivalled mechanical integrity, offering users a very cost-effective solution to VOR/ILS on all types of commercial aircraft.

Manufactured from extremely durable, lightweight thermoplastic, with fully integrated electrical elements, the unit is suitable for any VOR or VOR/ILS aircraft installation.







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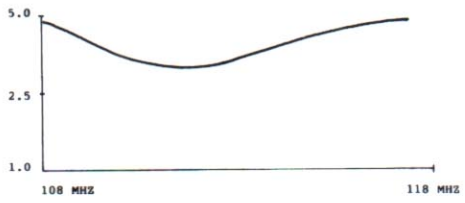


V.S.W.R. PLOT

Electrical Specification

Frequency Range	108 MHz-118 MHz 328-336 MHz
VSWR	Less than 5.0:1
Polarisation	Horizontal (When horizontally positioned)
Impedance	500hms (nominal)
Coupler	Type 10-500-2 VOR/ILS Type 10-500-3 Dual VOR/ILS

Mechanical Specification

Altitude	50,000ft (15,250m)
Speed	Cleared for all sub sonic commercial aircraft
Temperature Range	-75° to +180°C
Weight	1.1 lbs (500gms)

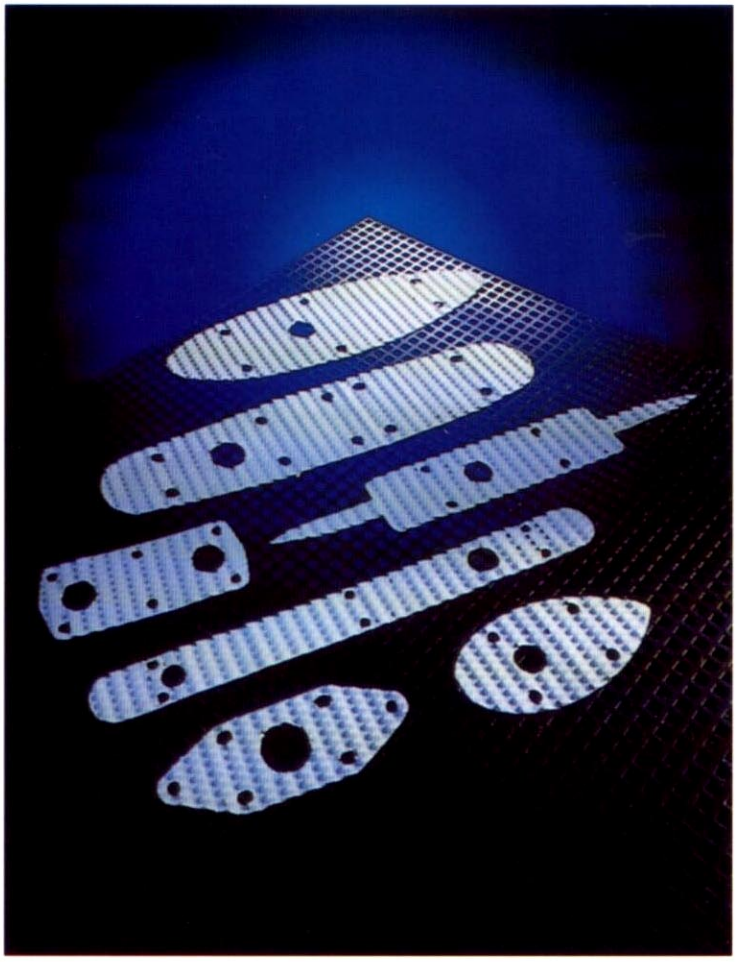
Antenna	**10-250-9B**
Connector	Type BNC
Mating Connector	UG88(-)/U
Gasket Pt No	10-500-11-347

Antenna	**10-250-9T**
Connector	Type TNC
Mating Connector	31-2367 Amphenol
Gasket Pt No	10-500-11-347

Equivalents	
Dorne & Margolin	DMN4-17
Sensor	S65-247-Series

CAA Approval
WR00700

Dry Fit Conductive Anti-Corrosion Gaskets Series 10-500-11A



The 10-500-11A series of Dry Fit Conductive Anti-Corrosion Gaskets is a patented development of the highly successful 10-500-11 Series. Designed for use where quick fit and fast turnaround are required, the dry fit series of gaskets maintains both unrivalled RF continuity with good moisture seal to combat corrosion.

Modern electrical and RF systems require that joints between metallic surfaces remain in good electrical contact and free from corrosion.

The 10-500-11A Series provides the most simple and cost-effective means of producing the reliable, good quality electrical, corrosion free joints that are essential for advanced RF systems.

The gasket consists of a highly conductive metallic film specially contoured to provide multi-point metal to metal contact, thus reducing RF circulatory currents.

A state-of-the-art, pre-formed aerospace approved sealant provides a moisture free joint during installation.

The pressure exerted during installation also gives a unique self-contouring feature to the gasket. The gasket precisely forms itself to the two metallic surfaces ensuring consistent distribution of conducting contacts over non parallel surfaces. The resulting moisture free, contoured RF seal need no maintenance.

The 10-500-11A Series has been subjected to extensive testing and with 15 years of successful operational service in the most severe, naval, land-based and airborne environments has proven market leading performance and stability.

Features

- Documented operational reliability
- Proven corrosion resistant performance
- Unrivalled DC and RF conductivity
- Light weight
- Easy installation
- Low life cycle cost

Frequent areas of use

- Antenna mounting
- Avionic racking
- Airframe access panels
- Microwave waveguides
- EMI suppression on aircraft and missile systems
- Avionic packaging

Technical advice can be provided on the suitability of 10-500-11A Series Conductive Sealing Gaskets for particular application.

Antenna Cross Reference

HR Smith Part Number	Cross Reference
VHF Communications	
10-50-112	Dayton Granger 720044 Dayton Granger VF10-222 Dayton Granger VC10-126 Dorne & Margoli n DMC 50-2 Dorne & Margolin DMC 60-1 Comant C108 Collins 37-R2 Chelton 12-1 Sensor System S65-8280 Sensor System S65-8282
10-105-24	Dorne & Margolin DMC 50-1 Sensor Systems S65-8262-2
10-105-20	Dorne & Margolin DMC 50-17
10-118-20	Dayton Granger VF10-347 Chelton 16-21
ATC/DME	
10-203-1P	Dorne & Margolin DMN 50-6 Dayton Granger L10-16 Commant C100-5 Chelton 10A9 Sensor Systems S65-5366-10L
10-203-2P	Commant C-100-2
10-203-3P	Commant 100-3 Dorne & Margolin DMN 50-3 Sensor Systems S65-5366-10LC
10-203-4P	Collins 2377-1 Commant C100-4 Dorne & Margolin DMN 50-4 Sensor Systems S65-5366-2L Dayton Granger 750147 Chelton 10A1
Glide Slope	
10-204-1P	Dayton Granger 720036 Dorne & Margolin DMN 25-2 Chelton 17-21 Collins 37-P5 Sensor Systems S41422-2
10-204-3P	Sensor Systems S41422-2
10-205-1P	Chelton 17-20N Collins 37-P4 Sensor Systems S41422-6
10-205-3P	Chelton 17-20 Sensor Systems S41422-5
10-205-4P	Dayton & Granger 720036-1 Dorne & Margolin DMN25-1
Marker	
10-208-2 10-208-2FP 10-208-7FP 10-208-8FP 10-208-9FP	Dayton Granger MB10-12B-1 Collins 37X-2 Commant C1 118-1 Trivec Avant 31-10-01 Dorne & Margolin DMN-50
VOR/ILS	
10-250-9	Dayton Granger VT10-56-6 Dorne & Margolin DMN4-17 Commant C1 120 GS Sensor Systems S65-247-Series

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Advanced airborne antenna systems

Specmat Technologies Inc.

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A New Generation of Fast Tuned Antennas

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A New Generation of Fast Tuned Antennas

- **Multi band operation**
- **Unique flash memory**
- **Compatible with Frequency Hopping Secure Speech Systems**
- **Fast radio silent tuning**
- **Proven service reliability**
- **Low weight**

Designed for use on high performance military aircraft or where antenna siting is a problem, the 10-150 series of PIN diode tuned antennas offer unrivalled electrical performance from structures of this size.

A unique flash memory device ensures optimum tuning codes, maximising antenna gain and ensuring full interchangeability of antenna and logic converter.

Used in conjunction with the 10-562 series of logic converter (pictured on back page) which accepts frequency data directly from the designated transceiver and translates the data virtually simultaneously to correct the antenna tuning code. The antenna system can be used with any transceiver where adequate frequency setting information is available.

All tuning is fast, radio silent and compatible with state of the art frequency hopping secure speech systems. This together with better siting selectivity to improve collocation siting of antennas, makes the 10-150 series most suitable for current ECCM communications.

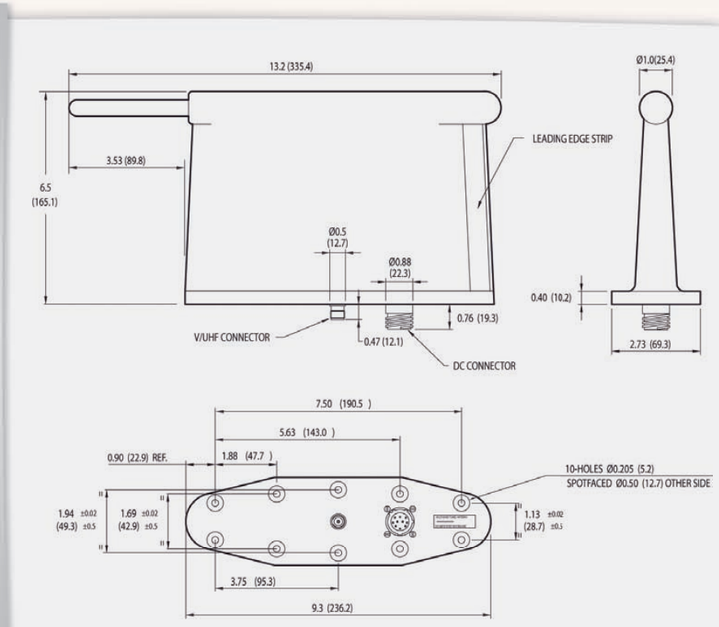
10-150-21

Multi Band Antenna
30-600MHz + Guard

Specification

Frequency	30 – 88MHz	(Tuned)
	108 – 174MHz	(Tuned)
	225 – 600MHz	(Tuned)
Impedance	50 Ω	
V.S.W.R.	30 – 88MHz	< 2.5:1
	108 – 174MHz	2.5:1
	225 – 600Mhz	2.0:1
Polarisation	Vertical	
Radiation	Omni-directional	
Gain	-13/-7dBi 30/88MHz	
R.F. Connector	TNC Female	
DC Connector	D38999/20WC98PN	
Weight	1.5lbs (0.7kgs)	(Nominal)

Use of DRY FIT conductive gasket 10-500-11A-466 or WET FIT conductive gasket kit 10-500-11-466K is specified.



10-150-08

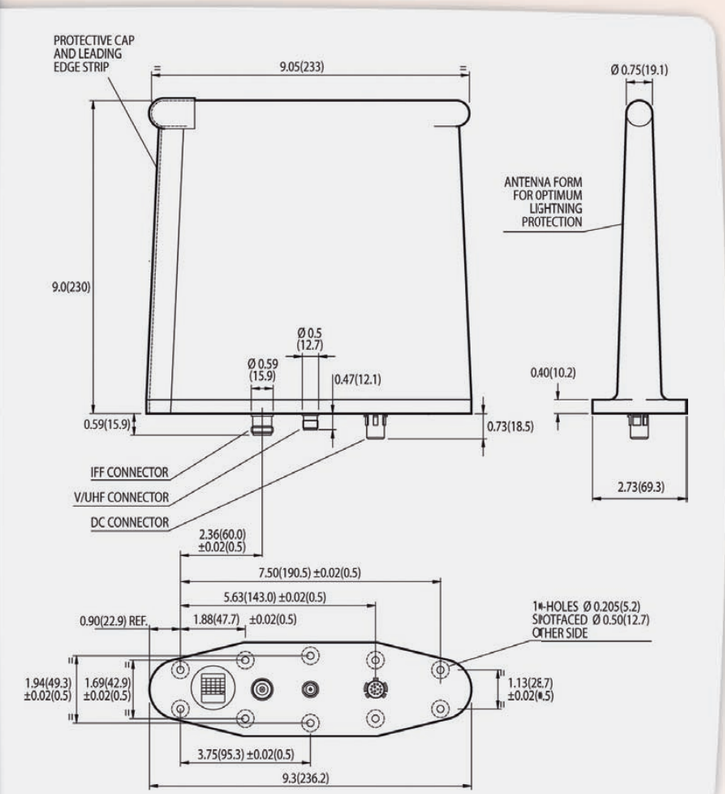
Multi Band Antenna
30-600MHz + Guard + IFF

Specification

Frequency	30 – 88MHz	(Tuned)
	108 – 174MHz	(Tuned)
	225 – 600MHz	(Tuned)
	1030 – 1090MHz IFF	(Passive)
Impedance	50 Ω	
V.S.W.R.	30 – 88MHz	< 2.5:1
	108 – 174MHz	< 2.5:1
	225 – 600MHz	< 2.0:1
	1030 – 1090MHz	1.5:1
Polarisation	Vertical	
Radiation	Omni-directional	
Gain	-12.5/-5dBi 30/88MHz	
R.F Connector	TNC Female	
IFF Connector	N Female	
DC Connector	D38999/49WB35PN	
Weight	2.2lbs (1.0kgs)	(Nominal)

NOTE: 10-150-08-S4-1 Rockwell Collins equivalent 013-1980-040. Other Mil series connectors available on request.

Use of DRY FIT conductive gasket 10-500-11A-466 or WET FIT conductive gasket kit 10-500-11-466K is specified.



Dimensions are nominal. INCHES (MILLIMETRES)

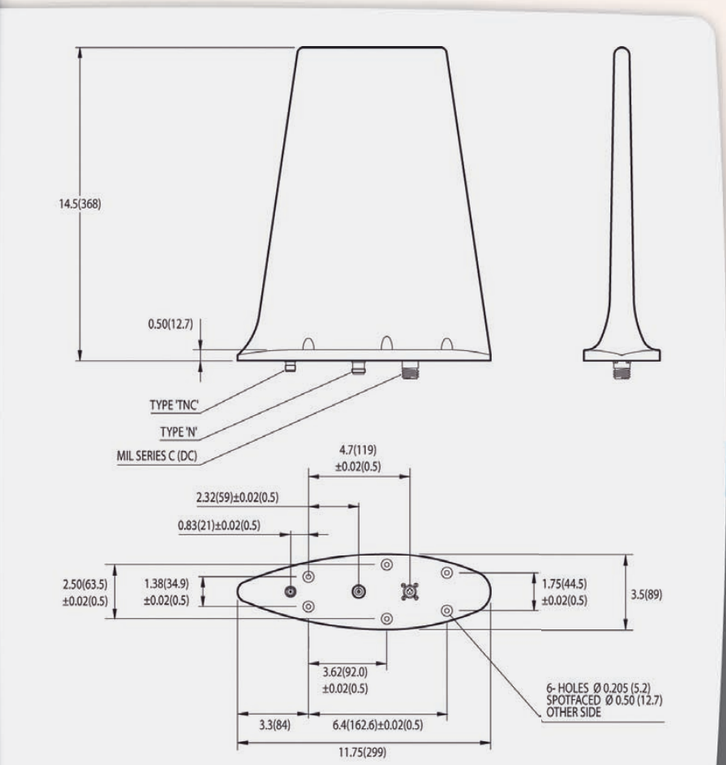
10-150-15

Pin Diode Tuned VHF/UHF
Comms Antenna + IFF

Specification

Frequency	30 – 88MHz	(Tuned)
	108 – 420MHZ	(Passive)
	1030 – 1090MHz	(Passive)
Impedance	50 Ω	
V.S.W.R.	30 – 88MHz	2.5:1
	108 – 116MHz	3.5:1
	116 – 174MHz	2.5:1
	225 – 420MHz	2.0:1
	1030 - 1090MHz	1.5:1
Gain	-13/-7dBi 30/88MHz	
Connectors	Type N Female	
	Type TNC Female	
	Type D38999/20WC 98PN	
Weight	3.75lbs (1.7kgs)	(Nominal)

Use of WET FIT conductive gasket kit 10-500-11-567K or DRY FIT conductive gasket 10-500-11A-567 is specified.



Radio Interface

Elmer	SRT 651
Raytheon	ARC 231
	ARC 232
RDI	ACR 500
Rohde & Schwarz	M3AR
Rockwell Collins	ARC 182
	ARC 210
Thales	TRA 5400

Installation

Good electrical contact must be maintained between the antenna base and the airframe.

Logic Converter

Refer to HR Smith for advice.

Colour Codes

-1 MATT BLACK
-2 GLOSS WHITE
-3 NATO GREEN MATT
-4 GLOSS GREY

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Vendor code K6543

Ground Plane Independent SATCOM Antennas

HR Smith
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Limited

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www.hr-smith.com

Ground Plane Independent SATCOM Antennas

Features

- Ground plane independent
- Versions for Inmarsat and Thuraya systems
- Electronically "steerable"
- Optional switching matrix

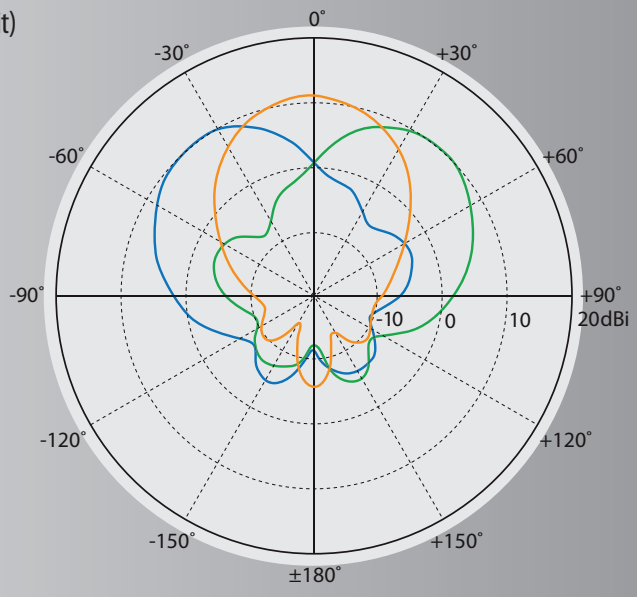
HR Smith Technical Developments have developed a range of Ground Plane Independent SATCOM/GPS antennas based on their successful series of civil airborne antennas. The antennas have been initially developed for use on smaller aircraft and helicopters and come with the additional benefit that the antenna can potentially replace existing GPS antennas, which reduces the amount of mechanical modification to the aircraft.

The antennas are available with either right hand or left hand polarisation suitable for the Inmarsat or Thuraya satellite system, in addition to the GPS capability.

To improve the antenna gain, these high performance antennas use a number of patches and can electronically "steer" nine individually selectable scanning segments for optimal performance dependent on the satellite position. The position of the aircraft is taken from the Flight Management System into the Satellite Transceiver which already has the satellite positions stored in its memory. HR Smith can also offer a Switching Matrix Unit to perform this function, if required. This unit can also perform an automatic scan of the scanning segments to detect the strongest signal and hence "steer" the antenna accordingly.

Specification

Frequency	1530 MHz to 1559 MHz (SATCOM receive) 1626.5 MHz to 1660.5 MHz (SATCOM transmit) 1575.42 MHz (GPS)	
Gain	>+8dBic at BW±50° (SATCOM) >-3dBic (GPS) excluding 10dB pre-amplifier	
	SATCOM	**GPS**
Polarisation	LHCP/RHCP	RHCP
VSWR	≤2:1	≤2:1
Current	1A (max.)	25mA (max.)
Voltage	+5V, -15V	+5 V DC THRU RF
Connectors	TNC (female) SMA (female) 62GB 12E 12 10P	
Weight	1.5Kg (max.)	



Example elevation beam patterns

Designed in accordance with RTCA/DO-210D, "Minimum Operational Performance Standards (MOPS) for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics"

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SATCOM Antenna Series 10-253-11

HR Smith
(Technical Developments)
Limited

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www.hr-smith.com

SATCOM Antenna Series - 10-253-11

Features

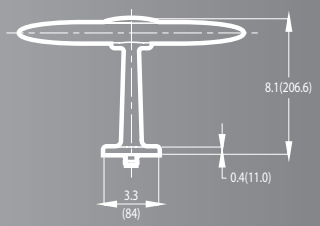
- Light weigth less than 6lb (2.7kg)
- Low profile
- Includes separate L1/L2 GPS antenna
- Ruggedised for military use

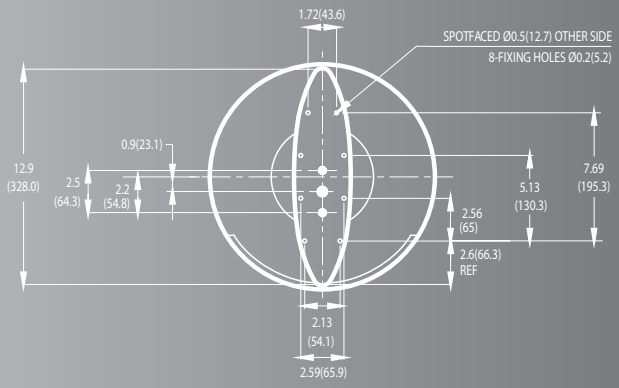
The 10-253-11 series of UHF Satcom/GPS antennas are low profile, lightweight antennas designed for high performance UHF satellite communications with the inclusion of a stand alone L1/L2 GPS antenna. This rugged series of Satcom antennas are most suited where space is at a premium and are an excellent choice for military helicopters. Utilising dual elements for Satcom Hi and Lo functions the antennas give very good performance coverage across the hemisphere. In addition the antennas have dual frequency GPS for both civil and military systems.

Weighing less than six pounds (2.7kg) and only 8.1 inches (207mm) high the 10-253-11 is the ideal choice for both fixed wing and rotary aircraft platforms.

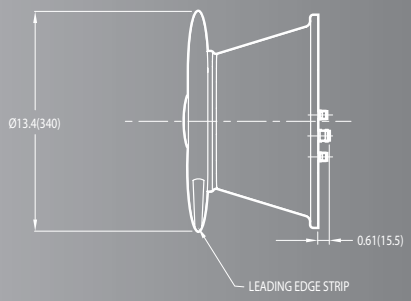
Specification

GPS		
Frequency	1565 MHz to 1586 MHz (L1)	
	1217 MHz to 1238 MHz (L2)	
Gain	4dBiC (nominal, at zenith)	
Polarisation	RHCP	
VSWR	≤2:1	
Connectors	TNC (female)	
SATCOM		
Frequency	High angle:	240 to 320 MHz
	Low angle:	225 to 400 MHz
Gain	>3dBiL (low angle)	
	4.5BiC minimum (nominal, at zentith, high angle)	
Polarisation	Vertical on low angle element	
	RHCP on high angle element	
VSWR	≤2:1	
Isolation	>15dB between low and high angle	
	>30dB between low angle and GPS	
	>30dB between high angle and GPS	
Connectors	N (female) - high angle	
	TNC (female) - low angle	
Weight	6lb (2.7kg) nominal	





DO NOT SCALE
ALL DIMENSIONS IN INCHES (MM)



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