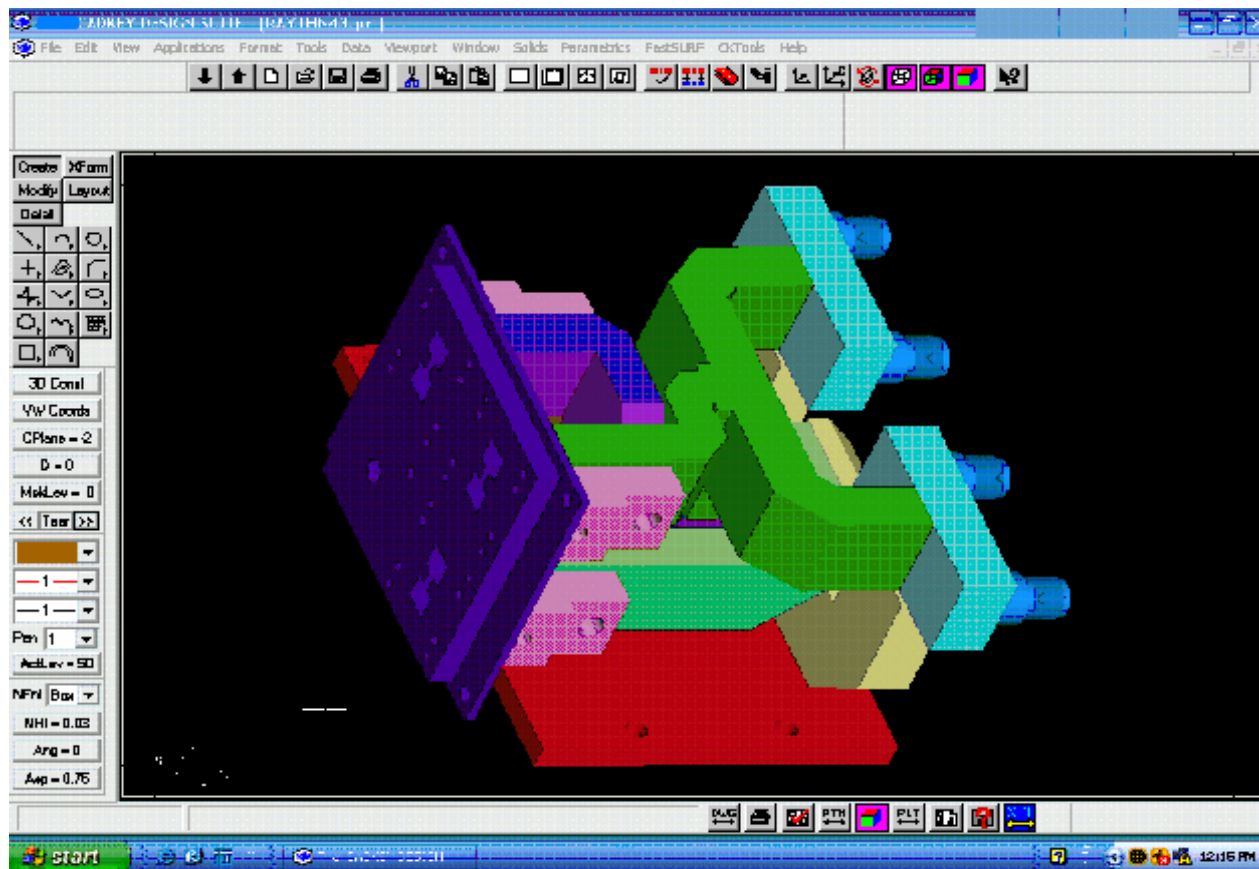


38 YEARS OF SERVICE



GENERAL PRESENTATION MICROWAVE ENGINEERING CORPORATION



Microwave Engineering Corporation
1551 Osgood St. North Andover, MA 01845



COMPANY HISTORY



- **Founded in 1968 originally named Microwave Research Corporation (MRC)**
- **Based in North Andover, Massachusetts, USA with over 55,000 sq. ft. of floor space**
- **90+ Employees**
- **Name change to MICROWAVE ENGINEERING CORPORATION (MEC) IN 1984**
- **Acquired Tech Systems (previously Technicraft) in 1992**
Flex Waveguide (Seamless, Twistable, Sideseam)
All products continued to be supported by MEC
- **Acquired SierraCom (previously Neico) in 2002**
High Power Components & Antenna Products
All products continued to be supported by MEC



MARKETS

- **MILITARY/DEFENSE**
- **HOMELAND SECURITY**
- **SPACE SATELLITE COMMUNICATION & DEEP SPACE PROBES**
- **REPAIR/REFURBISHMENT WITH GOVERNMENT DIRECT**
- **RADAR-AVIONIC/GROUND BASE/SHIPBOARD**
- **ELECTRONIC WARFARE – BROADBAND & HIGH POWER**
- **COMMERCIAL**



BUSINESS FOCUS IN PASSIVE MICROWAVE COMPONENTS & SUBSYSTEMS

- **MILITARY DEFENSE RADAR & COMMUNICATION SYSTEMS**
- **MILITARY ELECTRONIC WARFARE SYSTEMS**
- **SPACE WAVEGUIDE / FLEX & COMPONENTS**
- **GOVERNMENT REPAIR / REFURBISHMENT SERVICE**

PROGRAMS



- **AVIONICS SYSTEMS**
 - B-1B, B52, E2C, EA6B, EF111, F4, RF4-B, F8,
 - F14, F15, F16, F/A18, F104, KC135, P2J, & P3C
 - E3 (AWACS) Airborne Warning and Control System
 - AN/ALQ-99 Tactical Jamming System (TJS)
- **SHIPBOARD SYSTEMS**
 - MK 86, MK 92, SLQ32, SPG 55, SPS-48/SPS-49, AEGIS,
- **MISSILE SYSTEMS**
 - AMRAAM, COMPASS TIE, CONDOR, FIREBRAND,
 - HAWK, ADVANCED HAWK, & TOW
- **GROUND BASED SYSTEMS**
 - AIR ROUTE SURVEILLANCE RADARS (ARSR-4)
 - VARIOUS-COMMUNICATION SYSTEMS FOR HARRIS & L3-COM
- **SPACE SYSTEMS**
 - LOCKHEED ATLAS
 - VARIOUS- RADIOMETER ON WEATHER SATELLITE
 - PROGRAMS FOR JPL/NASA, BOEING (PREVIOUSLY HUGHES S4C0 & AEROJET)



ISO 9001-2000 CERTIFIED



Certificate of Registration



This is to certify that the Quality Management System of:

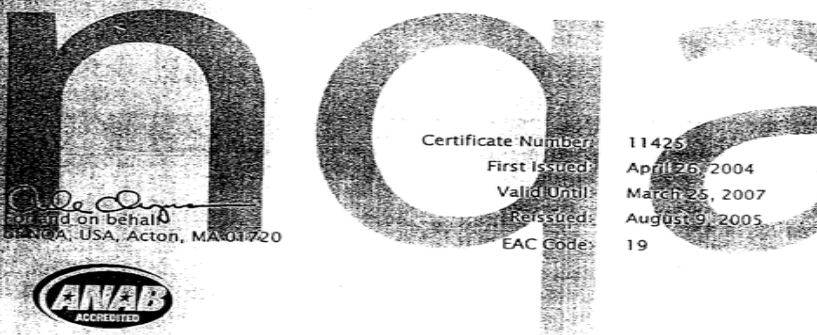
Microwave Engineering
1551 Osgood Street
N. Andover, MA 01845

applicable to:

Design and Manufacture radar equipment

has been assessed and approved by
National Quality Assurance, U.S.A., against the provisions of:

ISO 9001-2000



Certificate Number: 11425
First Issued: April 26, 2004
Valid Until: March 25, 2007
Reissued: August 9, 2005
EAC Code: 19

For and on behalf of
NQA, USA, Acton, MA 01720



This approval is subject to the company maintaining its system to the required standard, which will be monitored by NQA, USA, an accredited organization under the ANSI-ASQ National Accreditation Board.

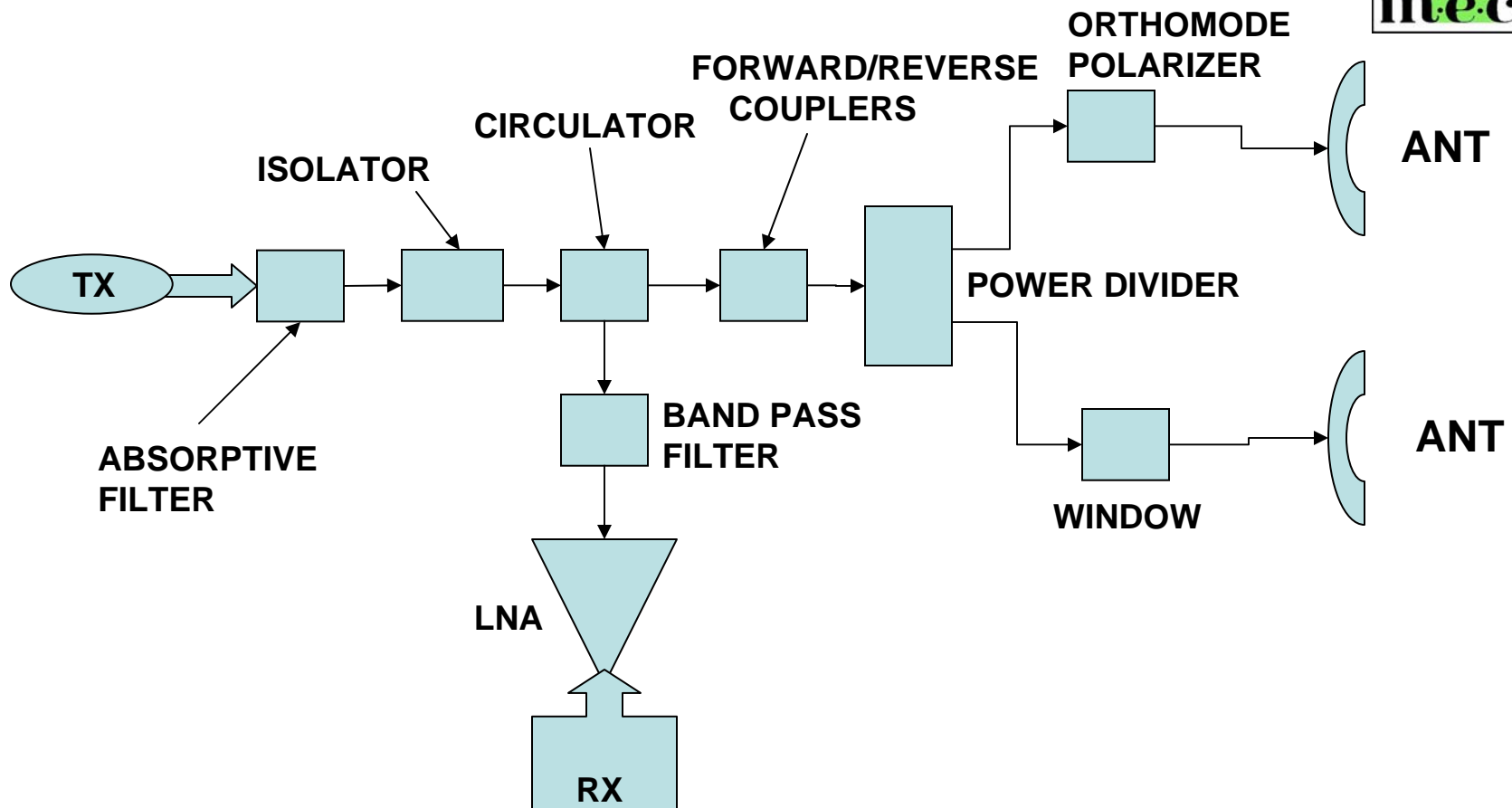
Microwave Engineering Corporation
1551 Osgood St. North Andover, MA 01845



GOVERNMENT SECURITY

- **FACILITY CLEARANCE TO SECRET LEVEL**
- **SEVERAL KEY EMPLOYEES WITH ACTIVE SECURITY CLEARANCES FOR DESIGN & TESTING PURPOSES**

INTEGRATED SOLUTION



BLOCK DIAGRAM OF RADAR OR COMMUNICATION FRONT END

ADVANTAGES OF INTEGRATION



- **MINIMIZES ELECTRICAL INTERACTION BETWEEN COMPONENTS TO GIVE THE BEST OVERALL ELECTRICAL PERFORMANCE INCLUDING MINIMUM LOSSES**
- **MINIMIZES SIZE OF OVERALL PACKAGE ELIMINATING UNNECESSARY INTERFACING. THIS WILL MINIMIZE THE WEIGHT WHICH IS A CRITICAL PARAMETER**
- **COST SAVINGS FOR CUSTOMER WHEN THEY BUY COMPLETE ASSEMBLY INSTEAD OF SEVERAL INDIVIDUAL COMPONENTS. THIS HELPS WITH REDUCED SUPPLIER BASE**

MEC PRODUCTS COAXIAL & WAVEGUIDE



CUSTOM PRODUCTS

INTEGRATION OF COMPONENTS INTO A COMPLETE ASSEMBLY

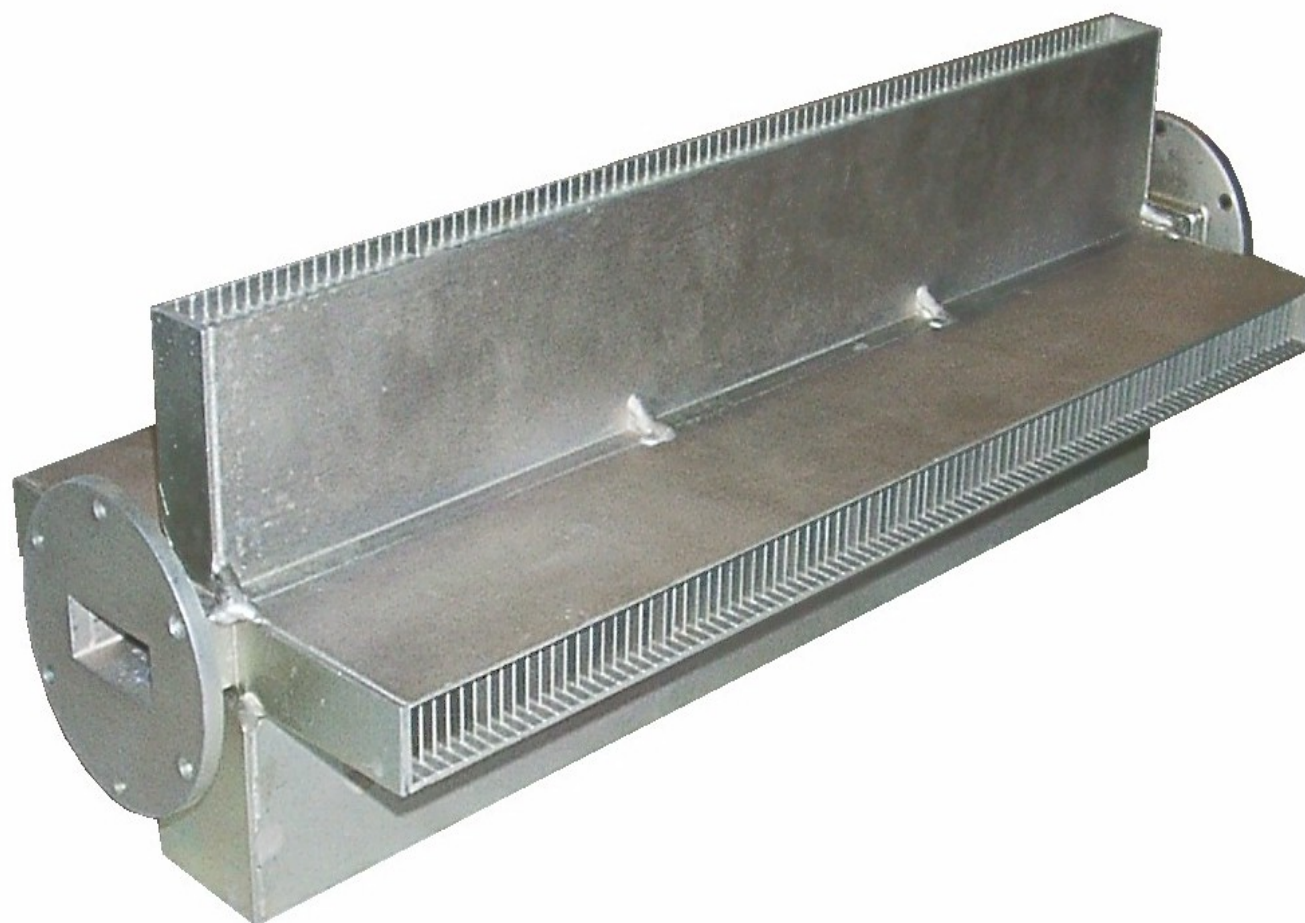
ANTENNAS: Spiral_Horn_Bicone_Blade_Flush Mount_Dipole_Monopole_Single or Double Polarizations in Linear and Circular available_Radome_Lens_Feed_Multi-Frequency Feeds (500Mhz-60 Ghz+)

COMPONENTS: Magic Tees Hybrids, Monopulse Comparators, Directional Couplers, Circulators & Isolators, Transitions Tapers_WG to Coax, Terminations (Low_Med_High Power), Pressure Windows, Power Dividers/Combiners, Arrays and Feed Networks, OMT's (Orthomode Transducers), Septum Polarizers, Rectangular, Double Ridge, QUAD-Ridge, Coax and Custom waveguides available. DC-60 GHz+

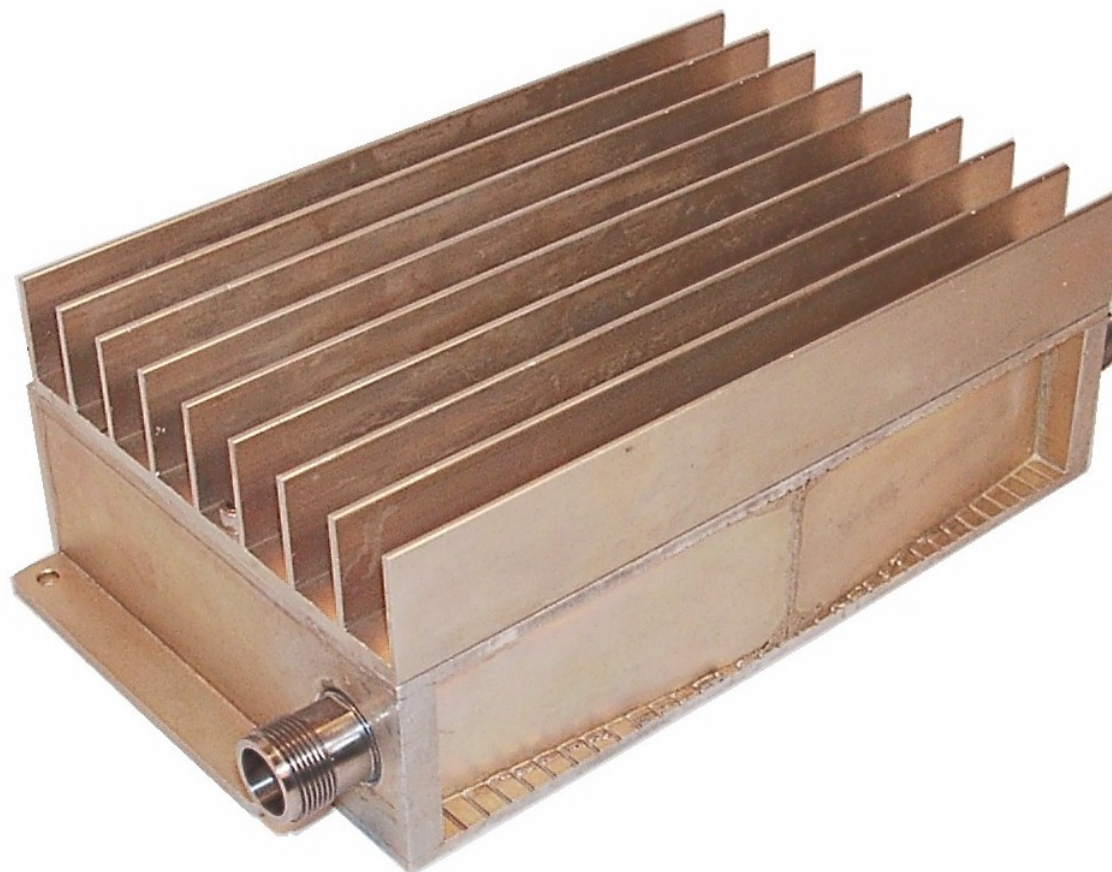
FILTERS/DIPLEXERS: High Power Absorptive Harmonic, Reflective, Waffle, Low Pass, Band Pass, High Pass, Waveguide and Coaxial.

Waveguide Inventory:

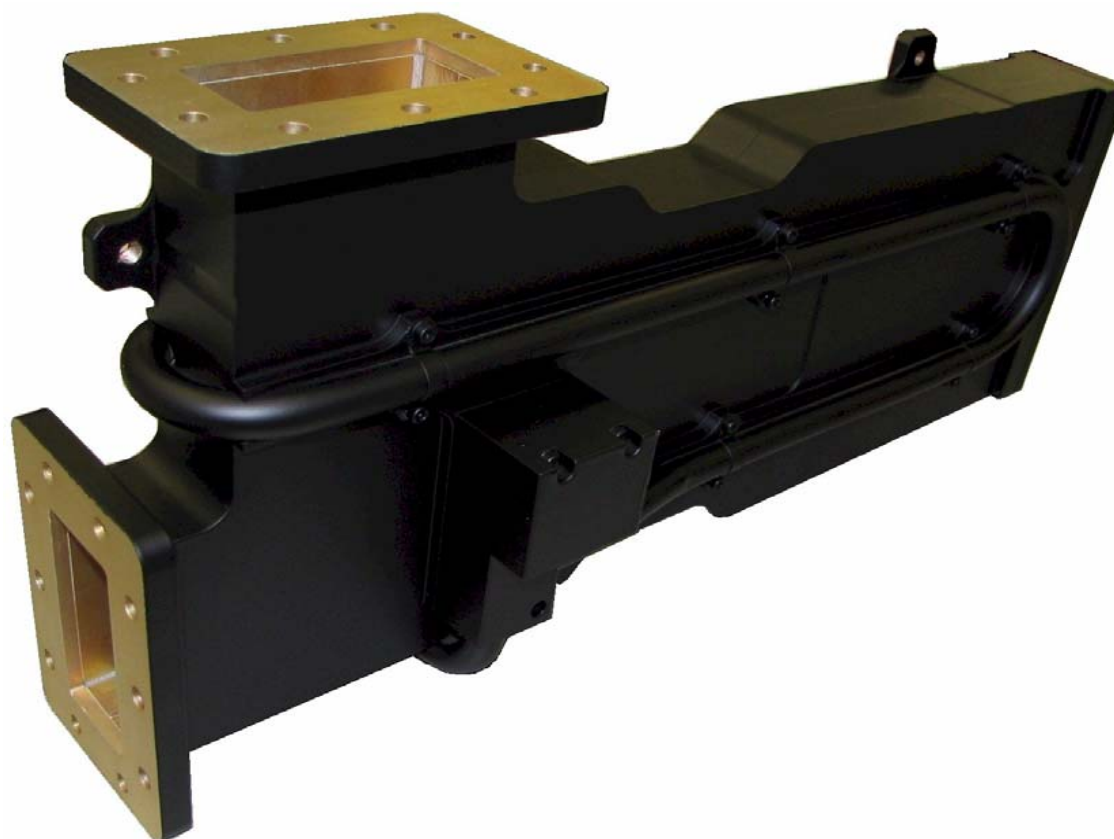
MEC stocks and Supplies a large selection of Double Ridge, Rectangular, Flexible and Quad-Ridge waveguides. Aluminums (6061,6063...), OFHC Copper, Coin Silver, Thin walls, half heights, and Special Custom Waveguide Sizes and other materials are available. Mil-W-85 compliant.



•S BAND HARMONIC ABSORPTIVE FILTER TE10 & TE01



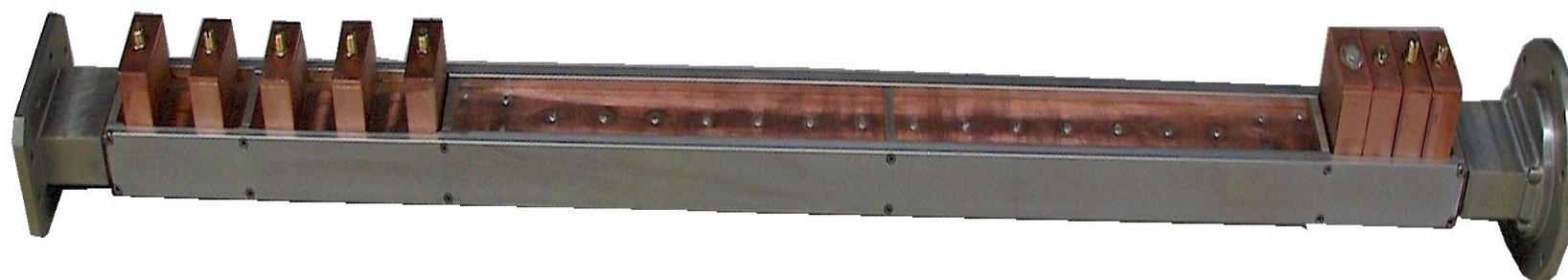
- **COAXIAL ABSORPTIVE FILTER**



- **HIGH POWER WATER COOLED S BAND
HARMONIC FILTER**



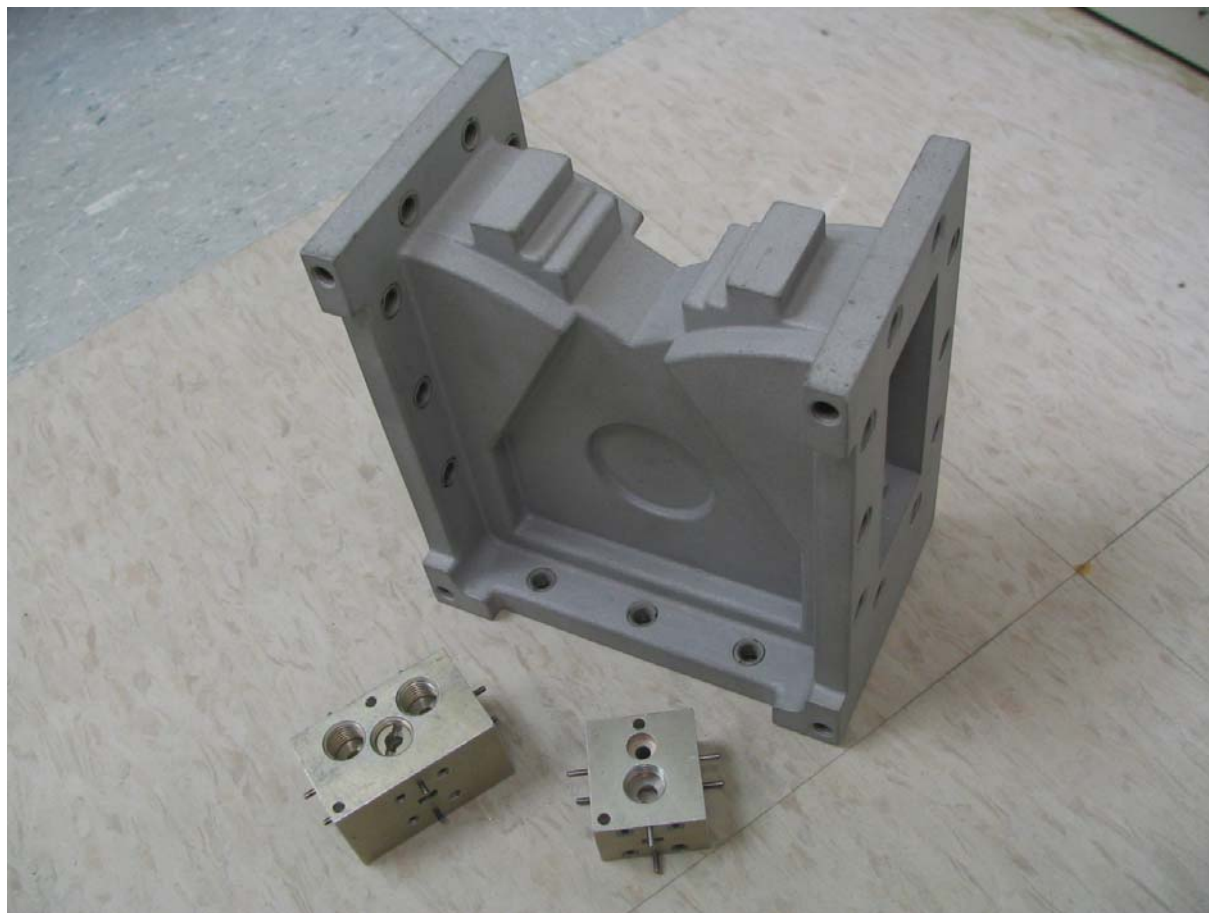
- **HIGH POWER WAVEGUIDE
AIR COOLED DIPLEXER**



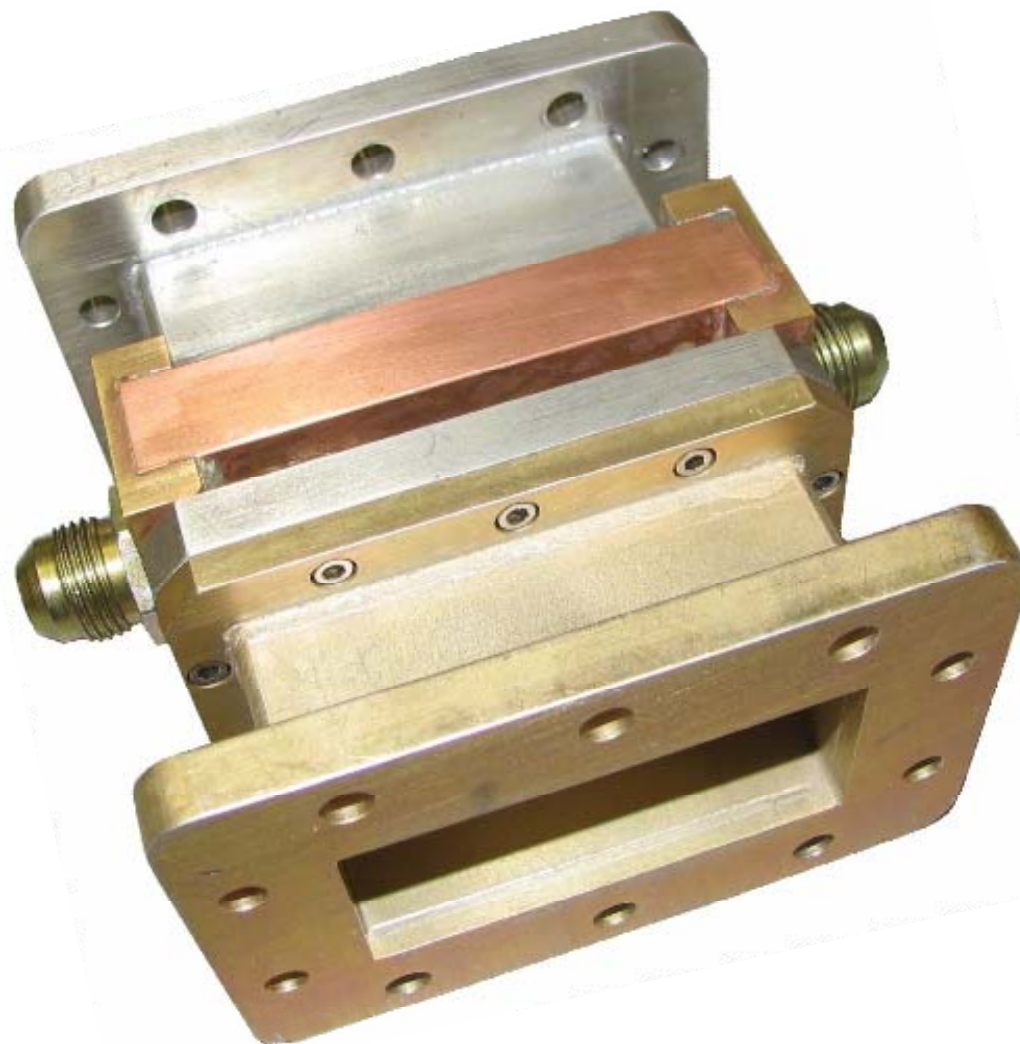
C-BAND HIGH REJECTION BANDPASS/ STOP FILTER



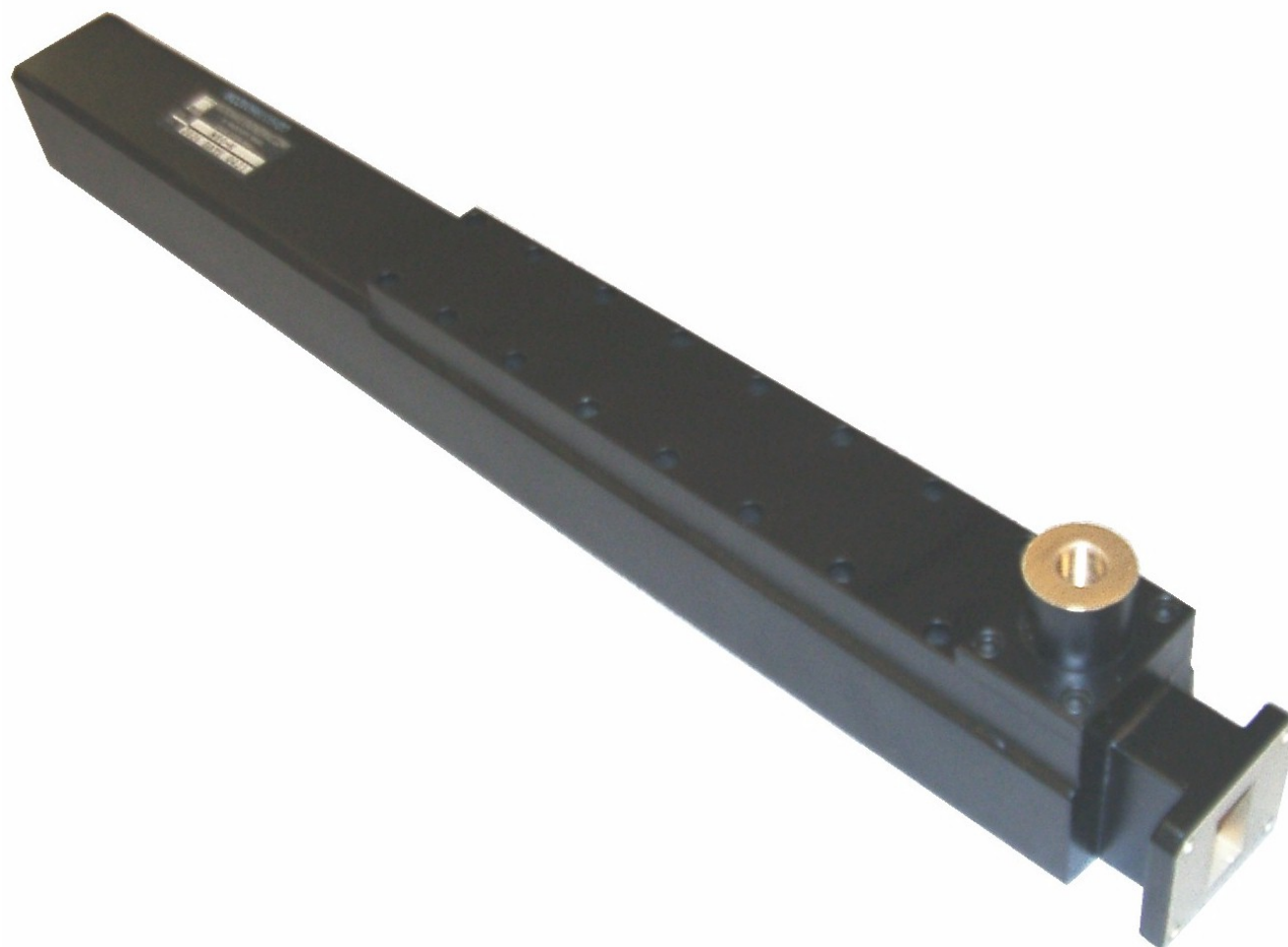
- **DOUBLE RIDGE JUNCTION CIRCULATOR**



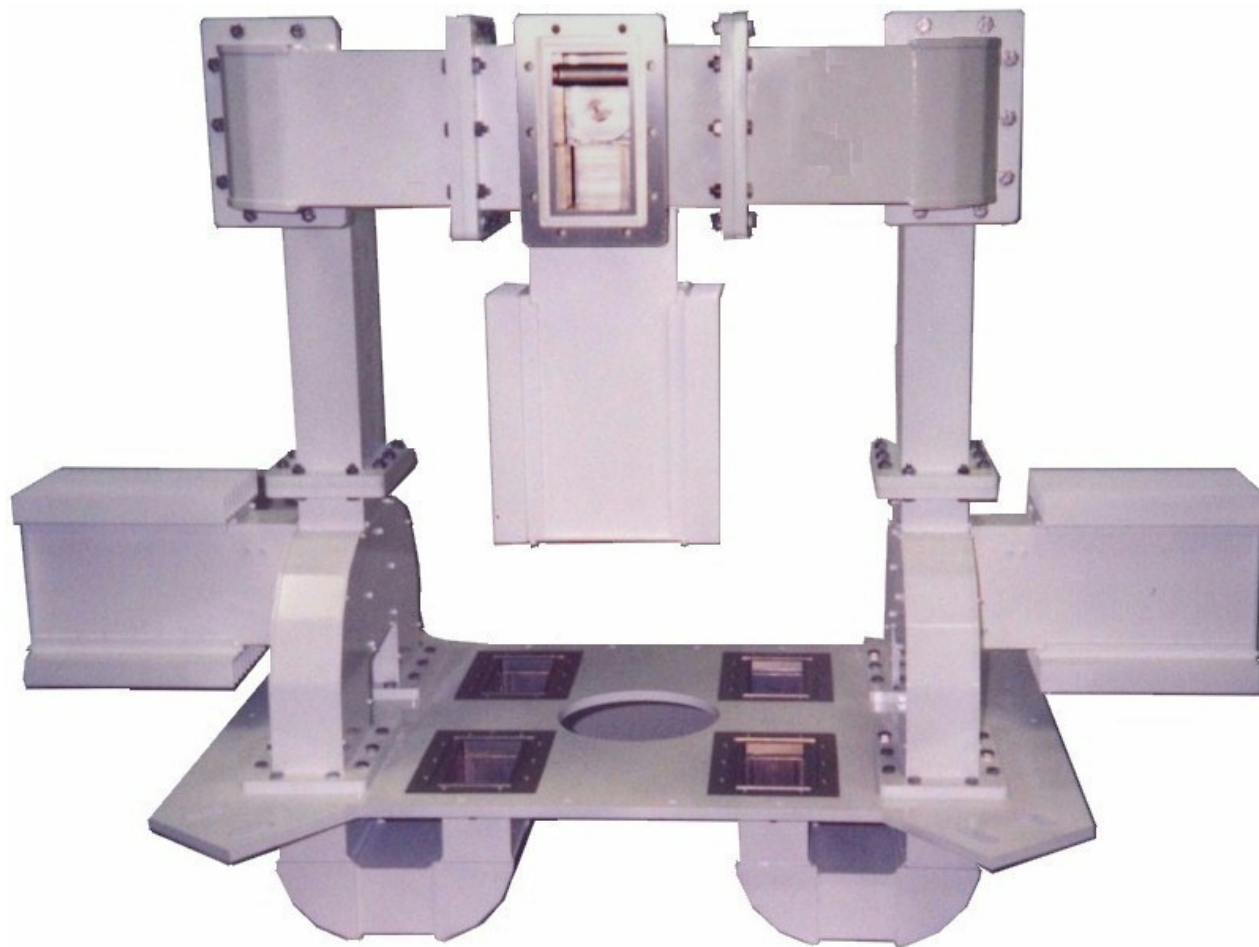
FERRITE CIRCULATORS FROM 1 – 50 Ghz



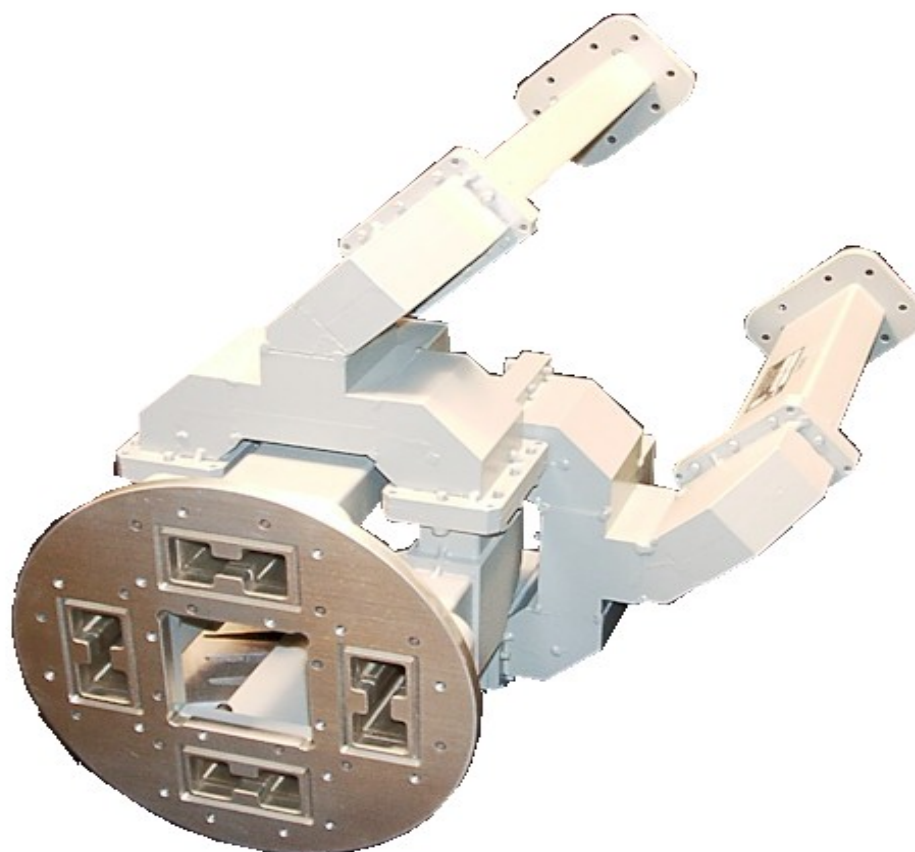
- **WATER COOLED CERAMIC WINDOW AT S BAND**



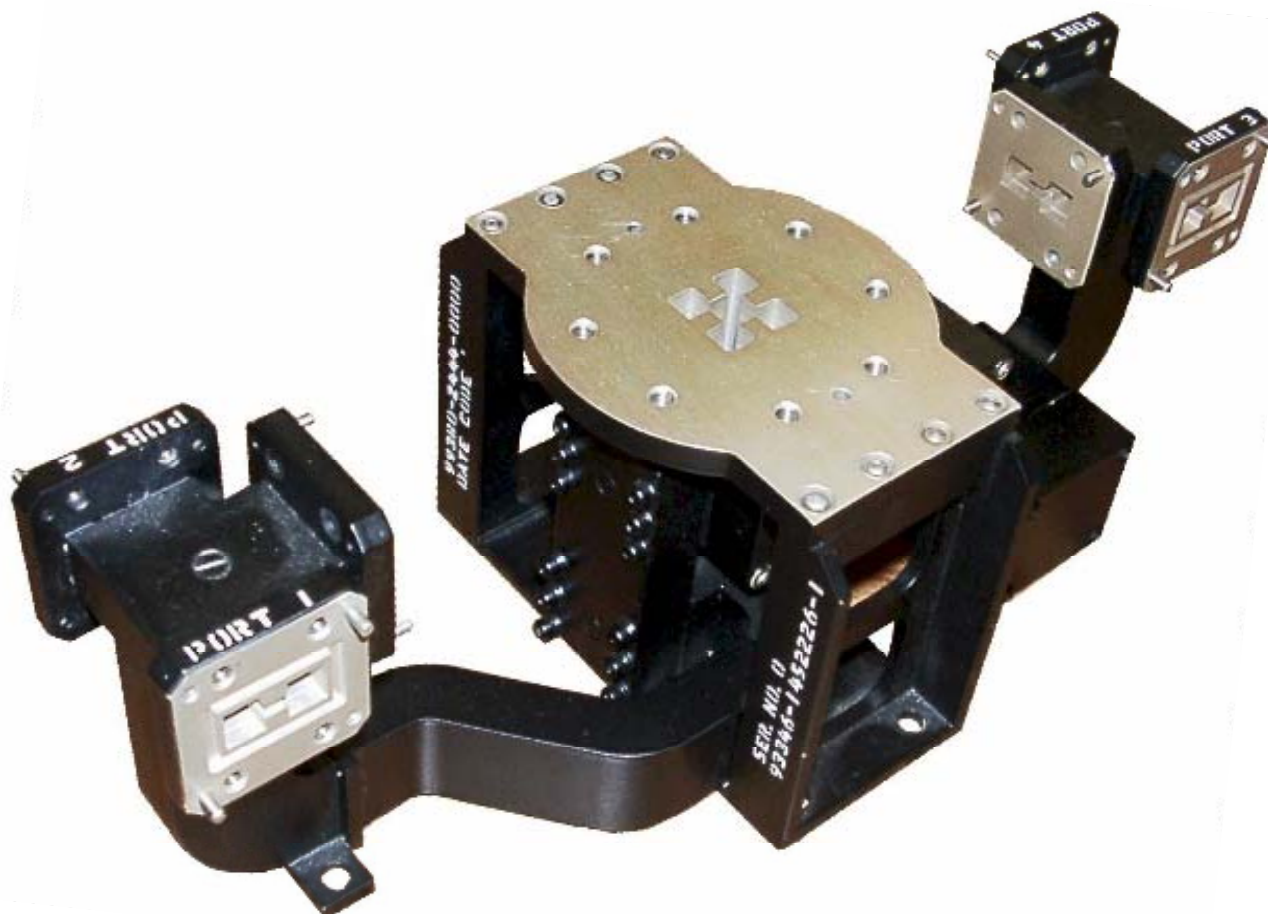
- **WATER CALORIMETER LOAD**



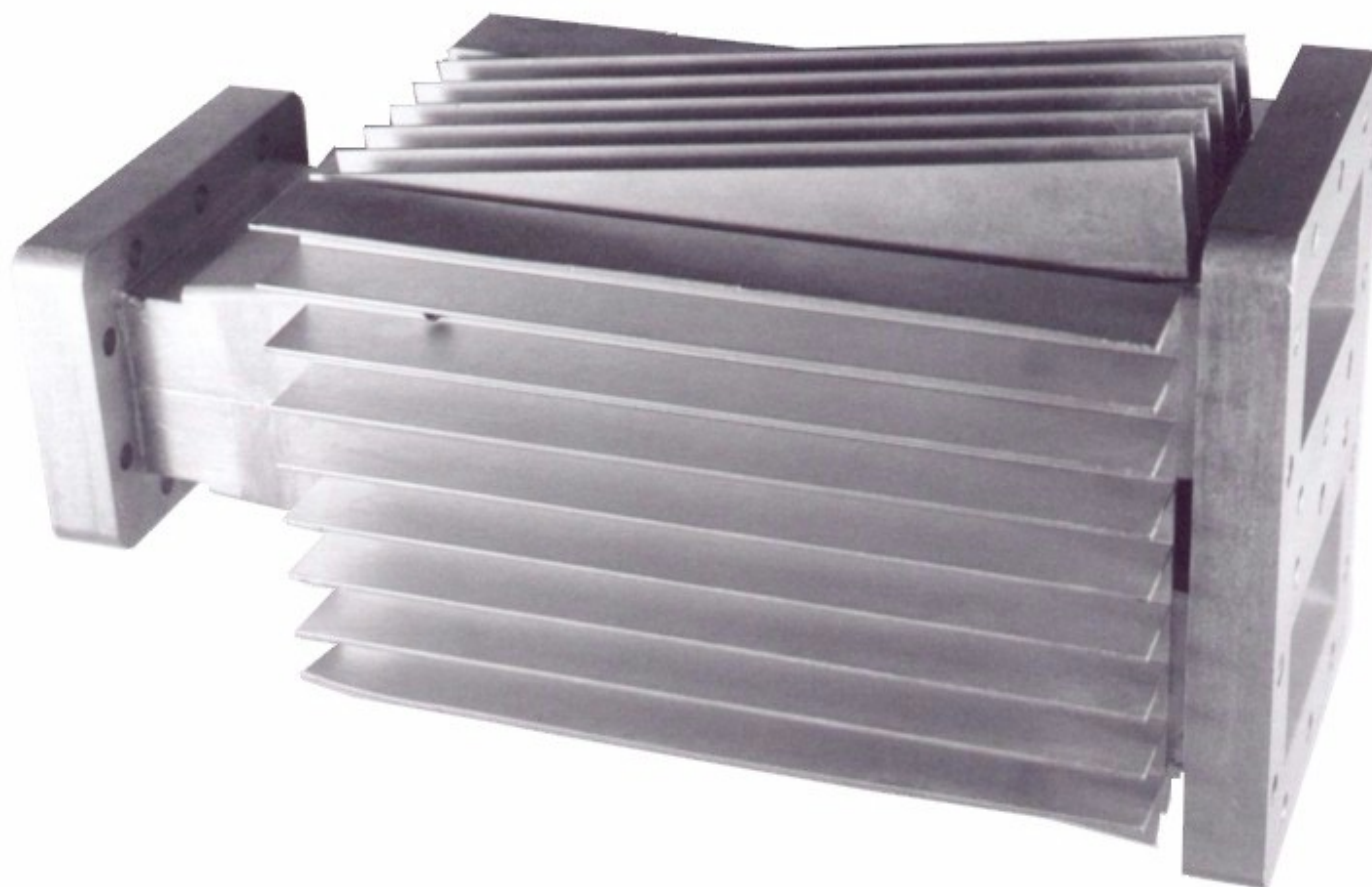
4 WAY COMBINER IN WR430



MONOPULSE COMPARATOR FEEDS



4 WAY DOUBLE RIDGE COMBINER WITH OUTPUT IN QUAD RIDGE



ULTRA HIGH POWER 2:1 DIVIDER S BAND

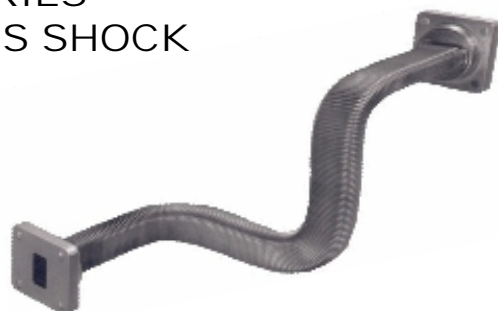
FLEXIBLE WAVEGUIDE

170FT 170S R170FT R170S SERIES

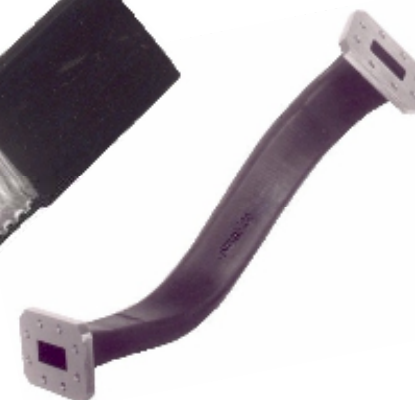
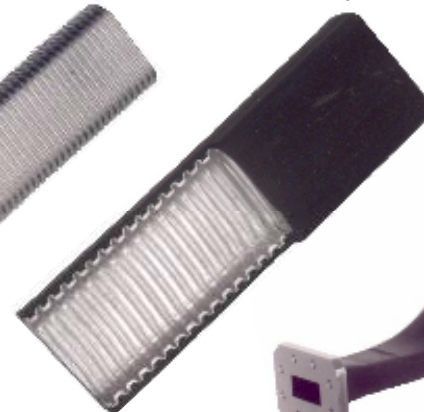


SEAMLESS & SIDESEAM CORRUGATED FLEXIBLE WAVEGUIDE

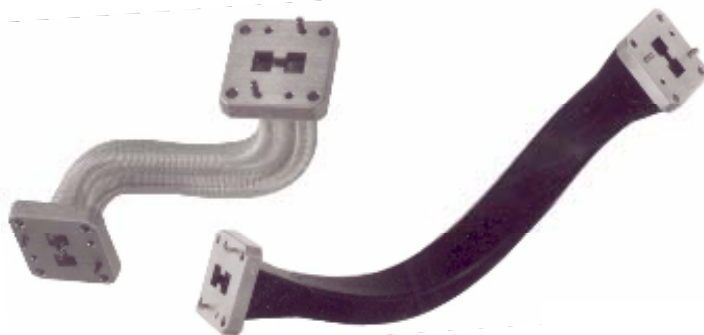
- 170S SERIES
- ISOLATES SHOCK



170S



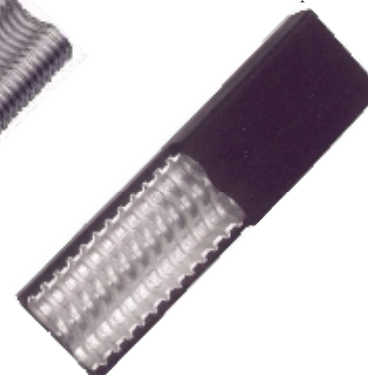
DOUBLE-RIDGE SEAMLESS, SIDESEAM, FLEX/TWIST
CORRUGATED FLEXIBLE WAVEGUIDE



R170S

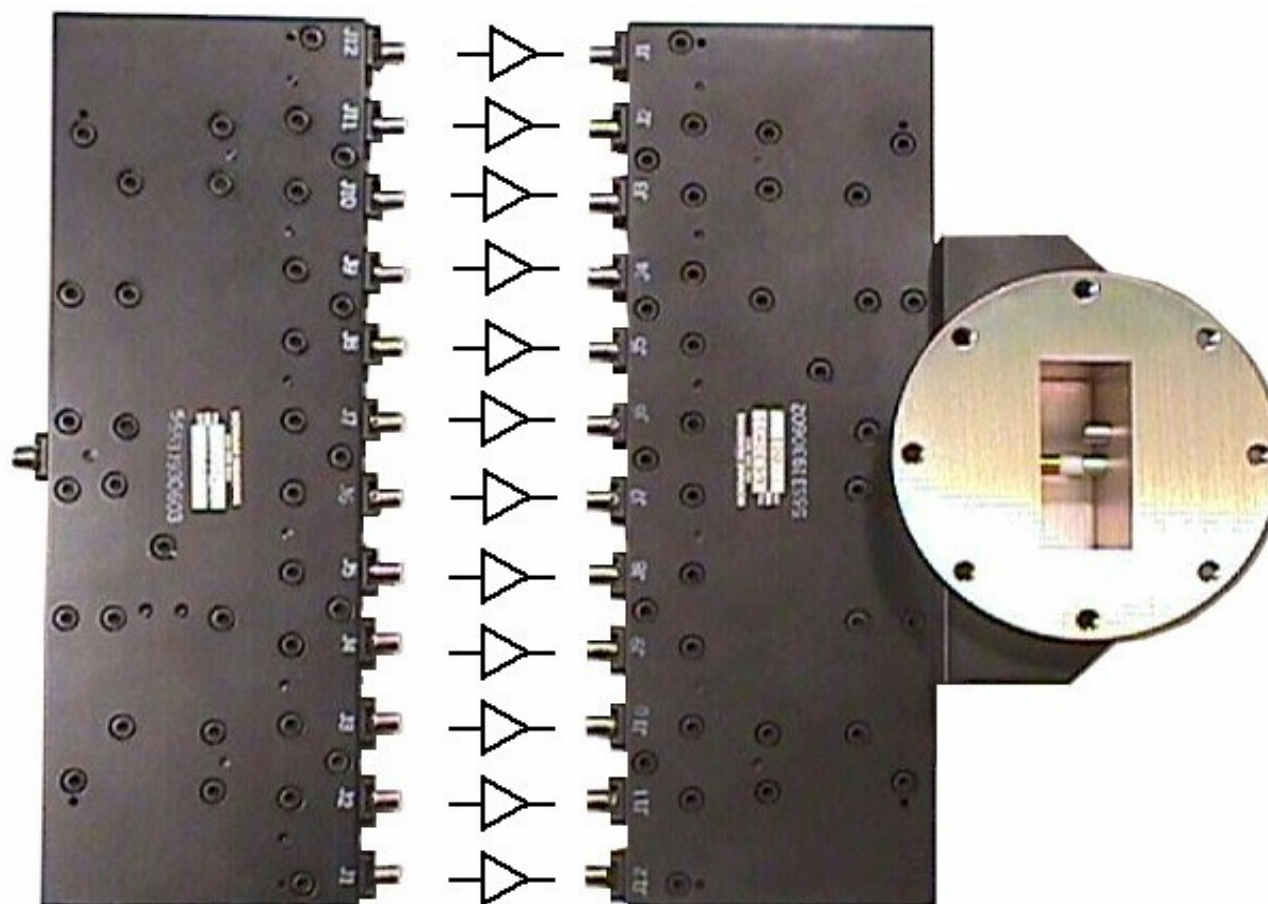


R170FT

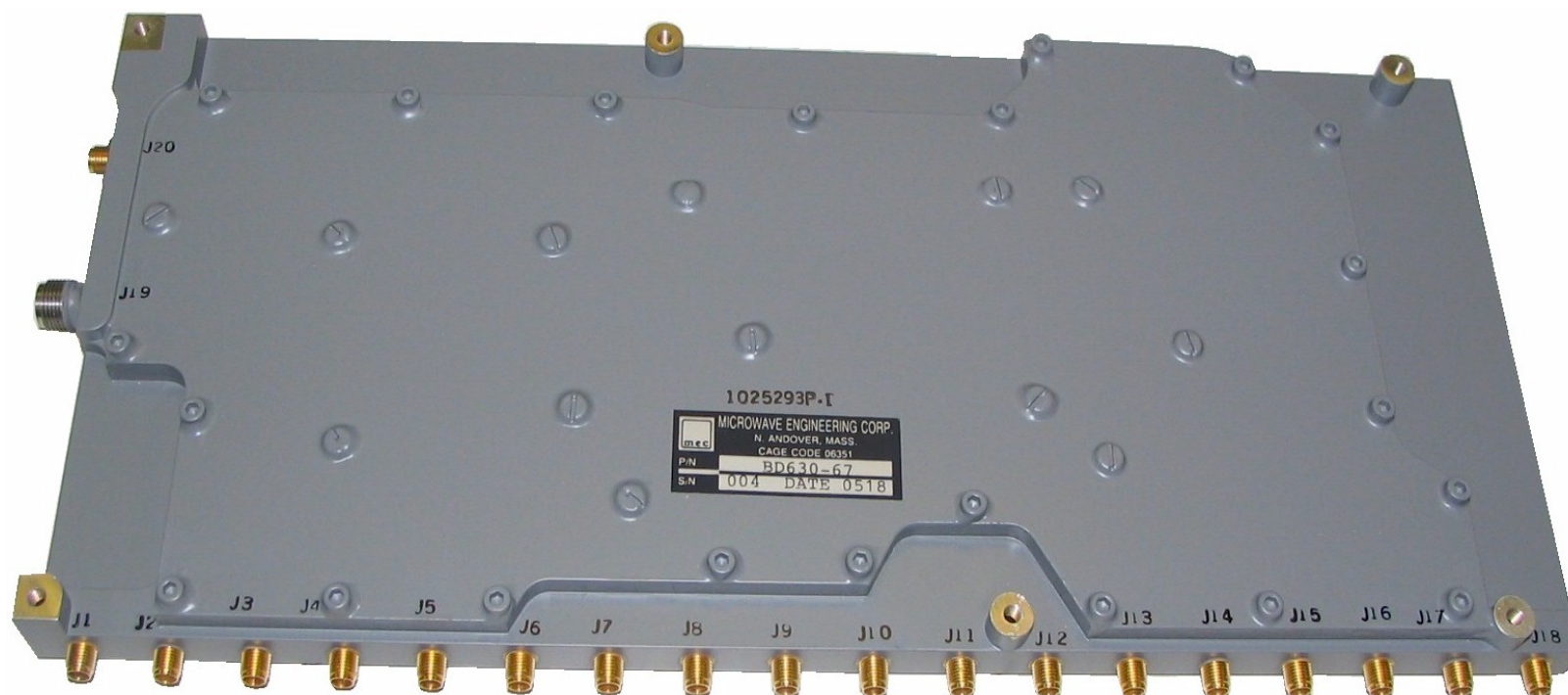




“LOW STRESS FLEX”
S BAND, 4 MW PEAK, 40 kW AVERAGE



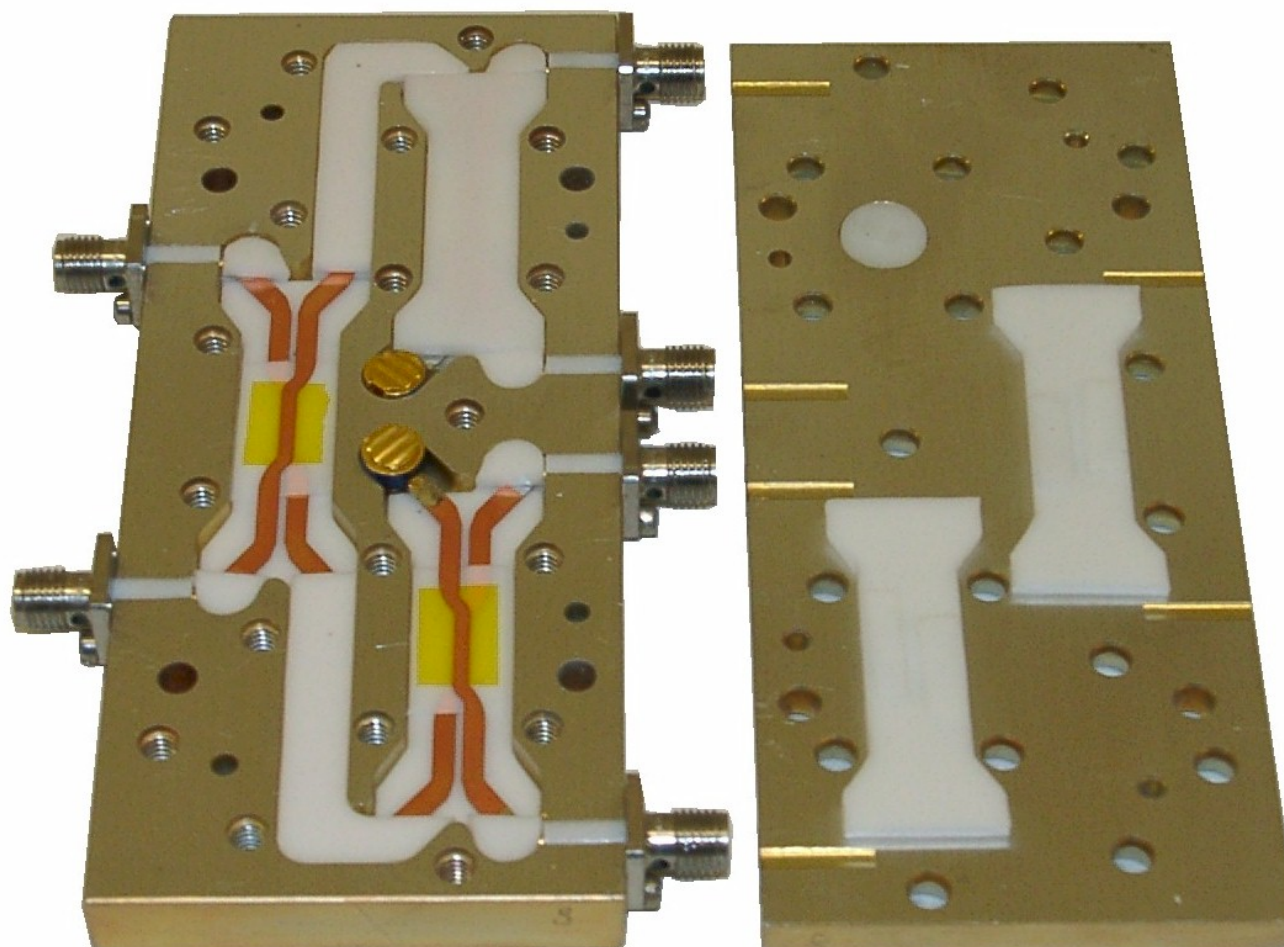
12 WAY STRIPLINE POWER DIVIDER & COMBINER AT S BAND



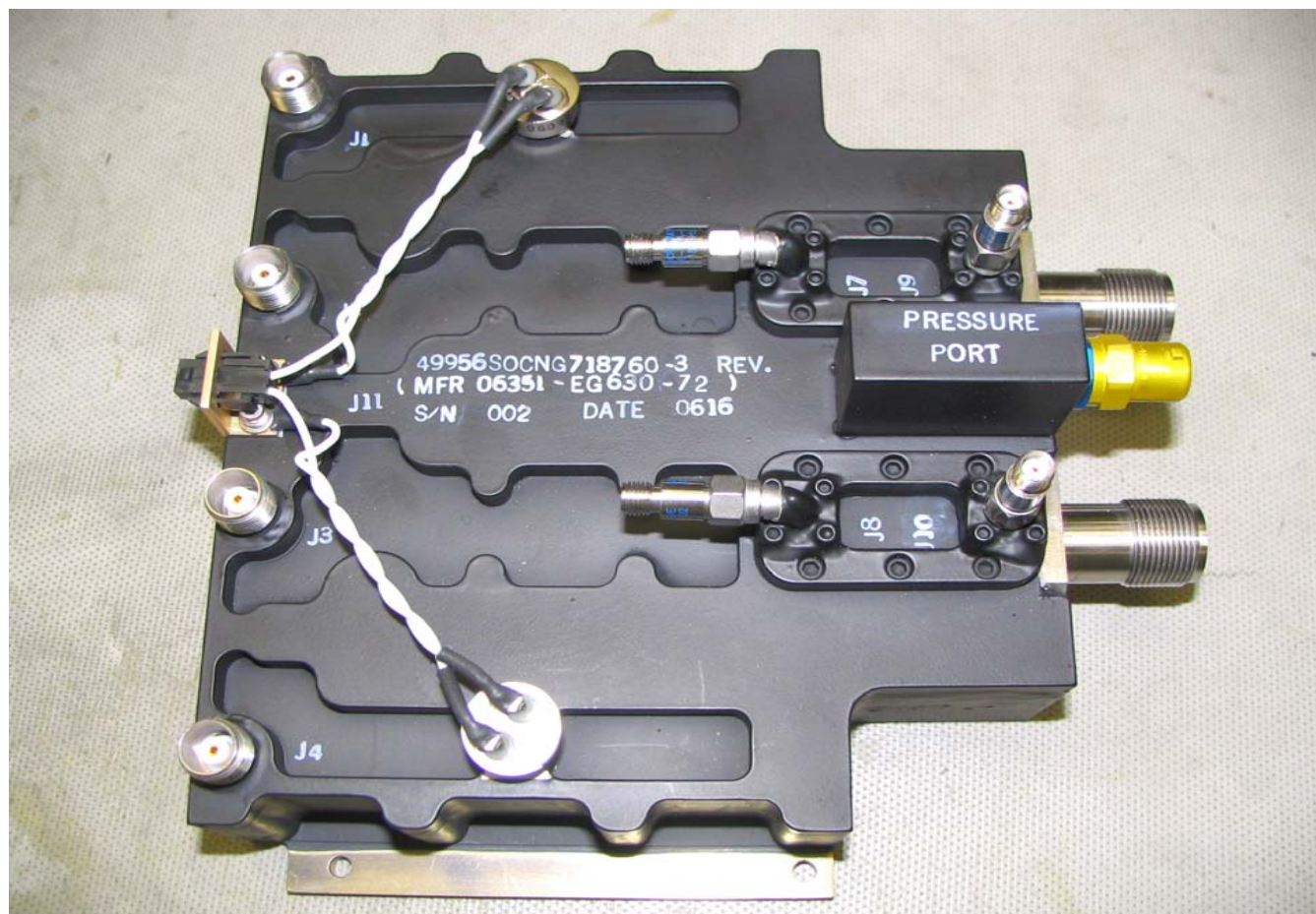
18 WAY STRIPLINE POWER COMBINER

Microwave Engineering Corporation
1551 Osgood St. North Andover, MA 01845

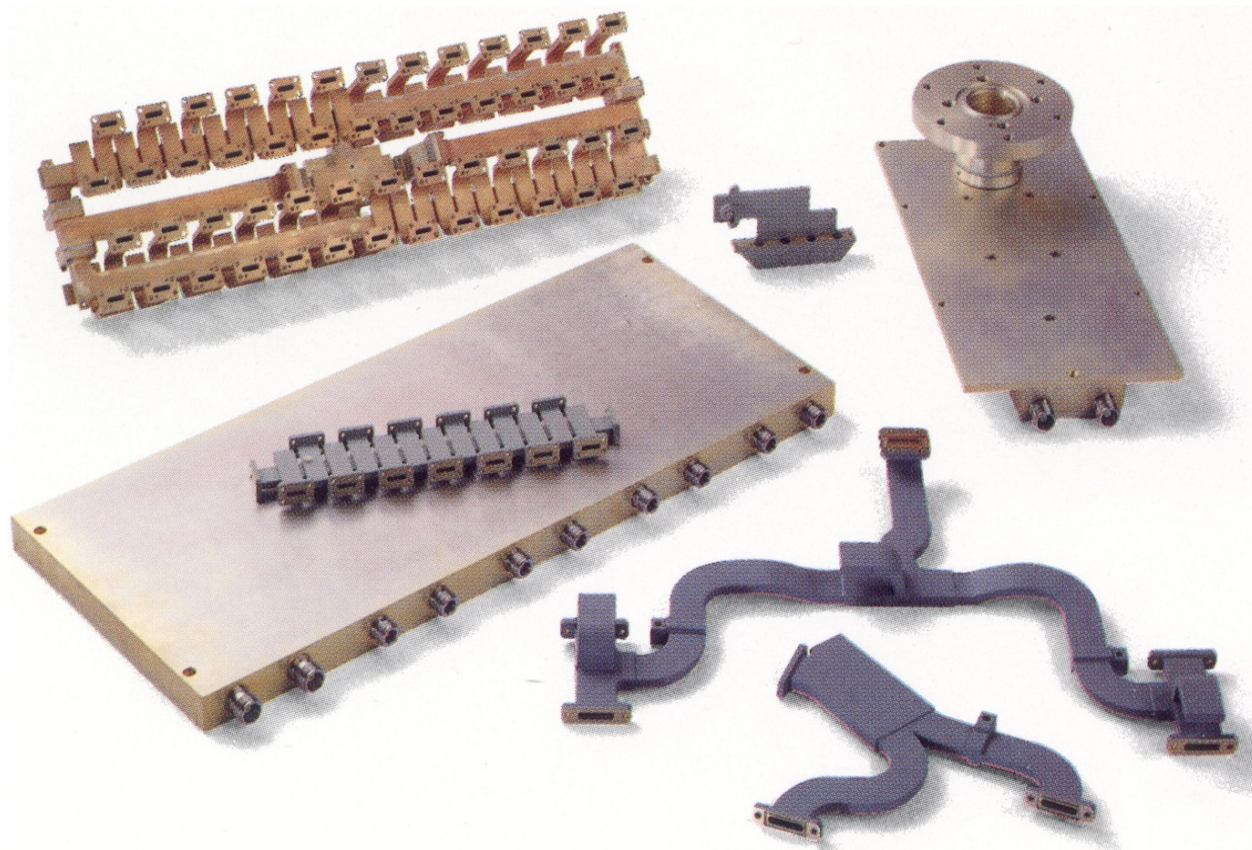
•BD630-67



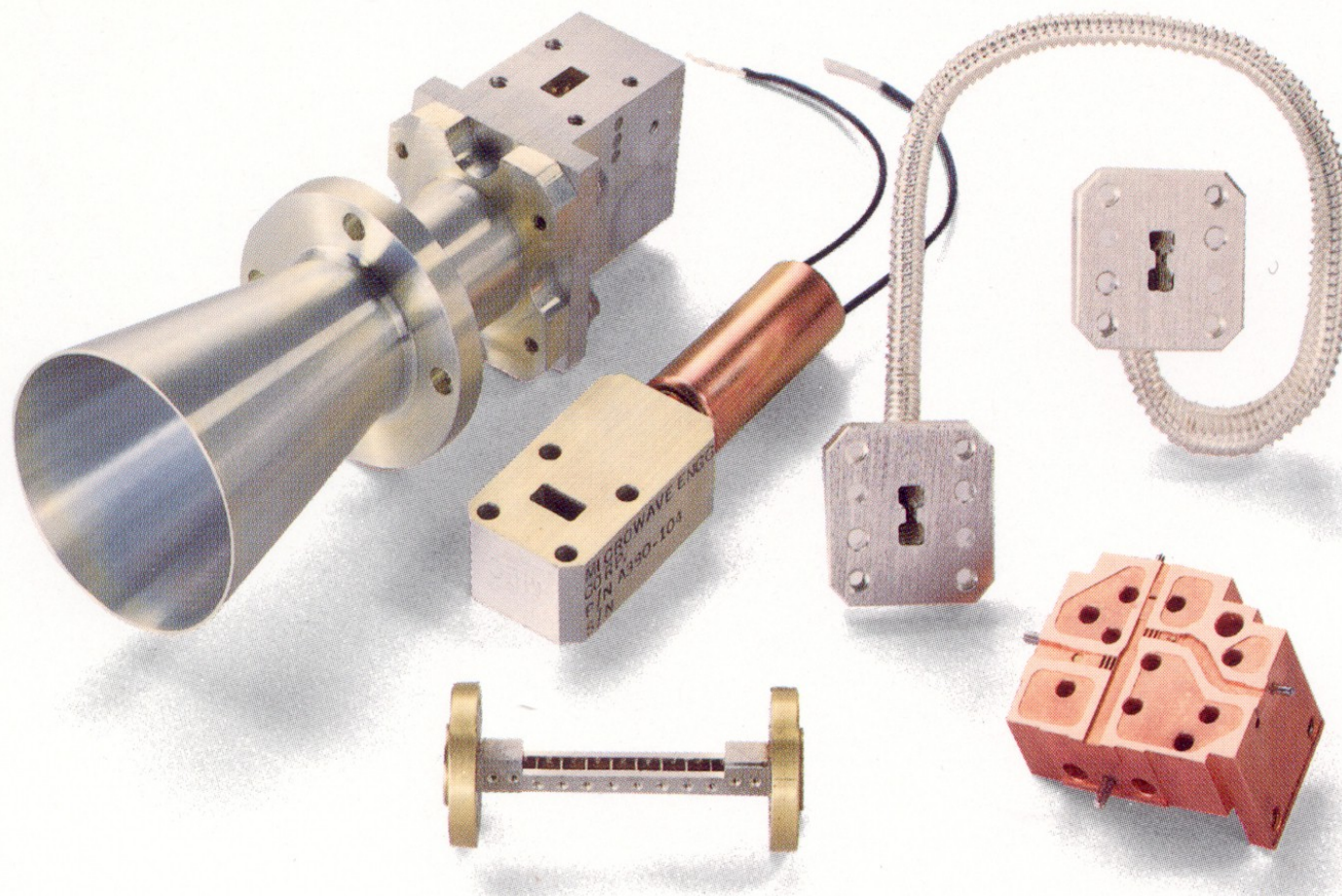
HIGH POWER STRIPLINE QUADRATURE HYBRID



4:2 HIGH POWER COMBINER W/ DUAL LPF & BIT COUPLERS



VARIOUS WAVEGUIDE, COAXIAL, & STRIPLINE ARRAY FEED NETWORKS



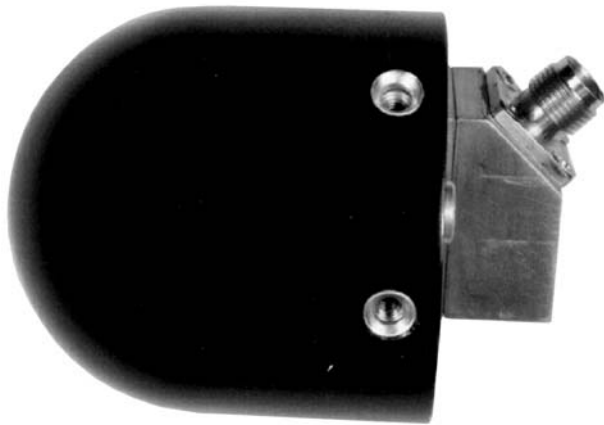
MILLIMETER WAVE COMPONENTS

30 Ghz THRU 110 Ghz

ANTENNAS



SPIRAL



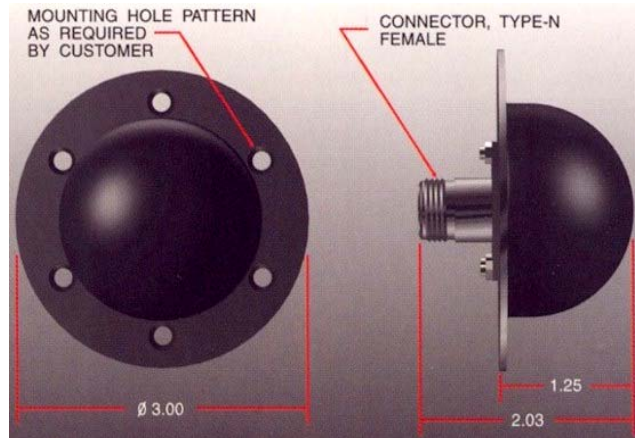
BLADE



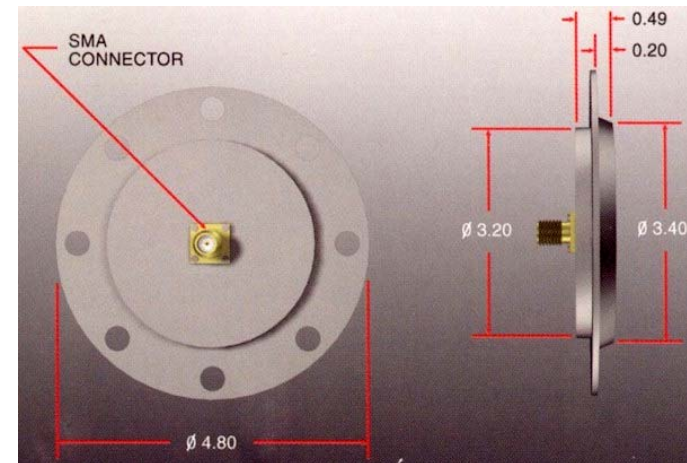
BICONICAL



STUB



GPS



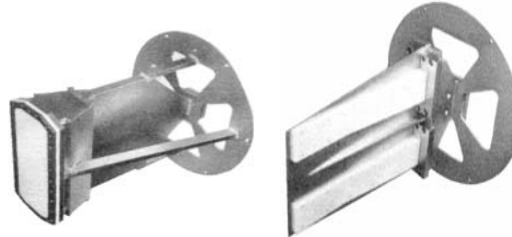
HORN ANTENNAS



LOW VSWR

- **PRESSURIZABLE**
- **RUGGED CONSTRUCTION**
- **HIGH POWER**

LINEARLY POLARIZED

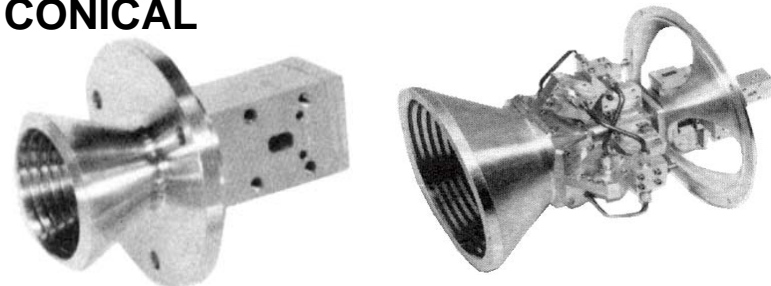


CIRCULARLY POLARIZED



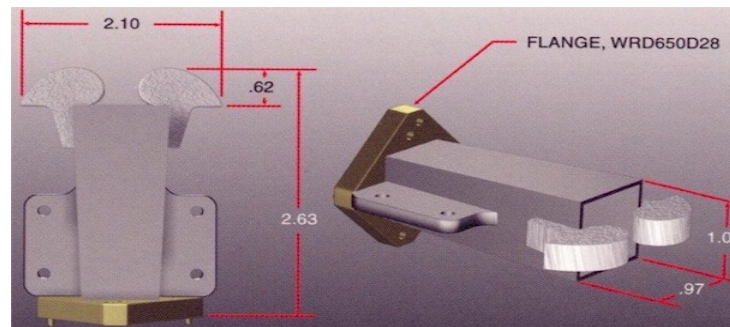
CORRUGATED CONICAL

- **BROAD BAND/MULTI-FREQUENCY**
- **SYMMETRICAL CONSTANT WIDTH BEAMS**
- **POLARIZATION FLEXIBILITY-
INDEPENDENT DUAL FEEDS**



ECM ANTENNAS

- **BROADBAND**
- **LOW VSWR/ HIGH POWER**
- **COMPACT SIZE**





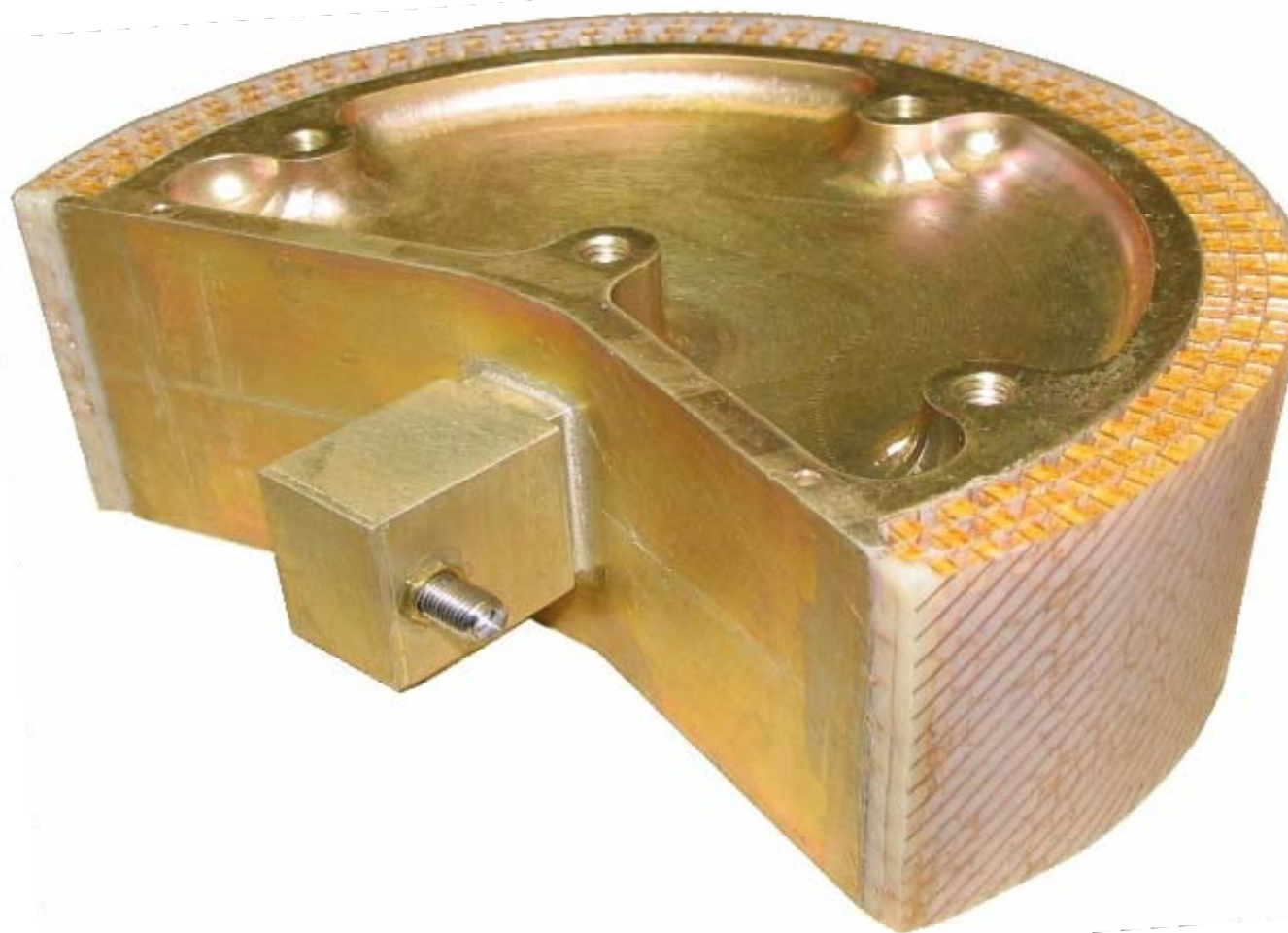
X BAND HORN WITH QUARTZ WINDOW



MULTI-OCTAVE QUAD RIDGE ANTENNA SINGLE & DUAL FEED



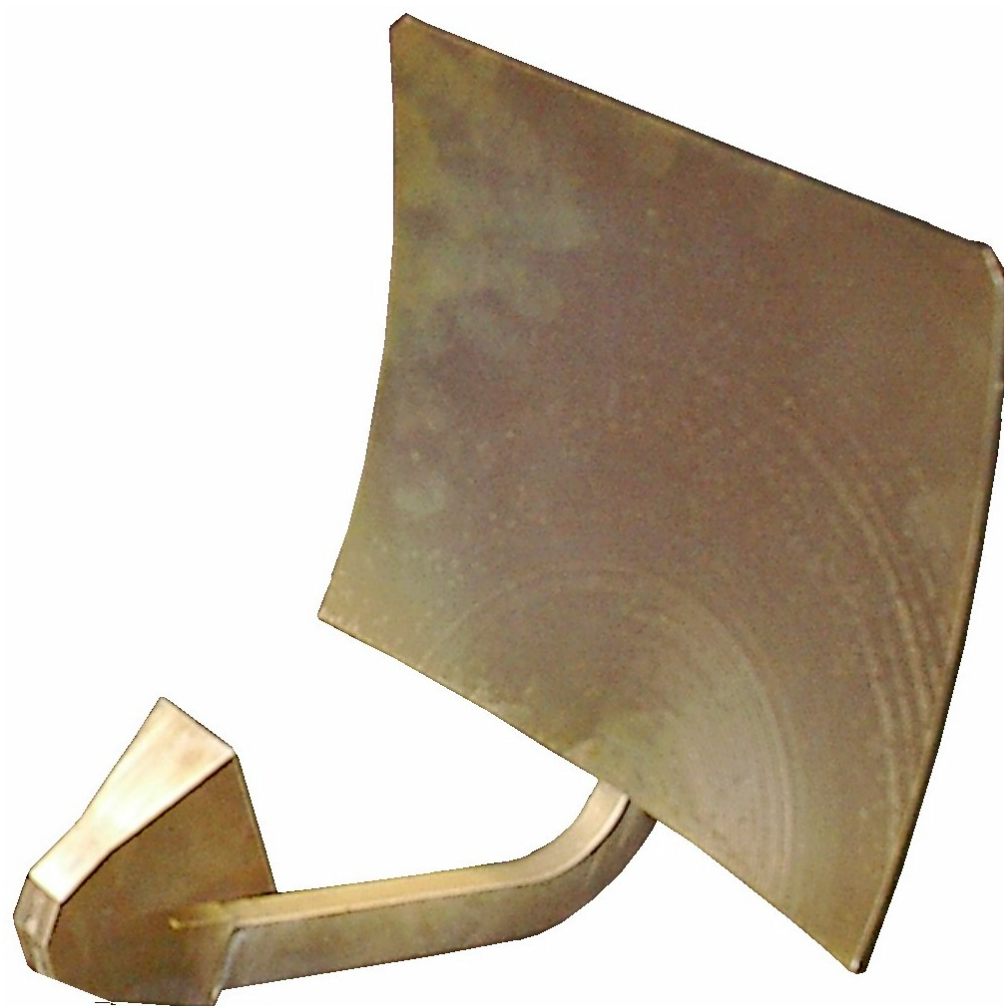
VHF TO X- BAND BROADBAND BLADES



WIDE ANGLE BICONE ANTENNA SLANT 45 DEGREES



FULL 360 DEGREE AZIMUTH 45 SLANT ANGLE ANTENNA



HORN ANTENNA & INTEGRATED PARABOLIC REFLECTOR



BROADBAND SPIRAL ANTENNA



CALIBRATION KIT QUAD RIDGE

Microwave Engineering Corporation
1551 Osgood St. North Andover, MA 01845



SPACE BUSINESS

- COMPONENTS INTEREST

HORN ANTENNAS

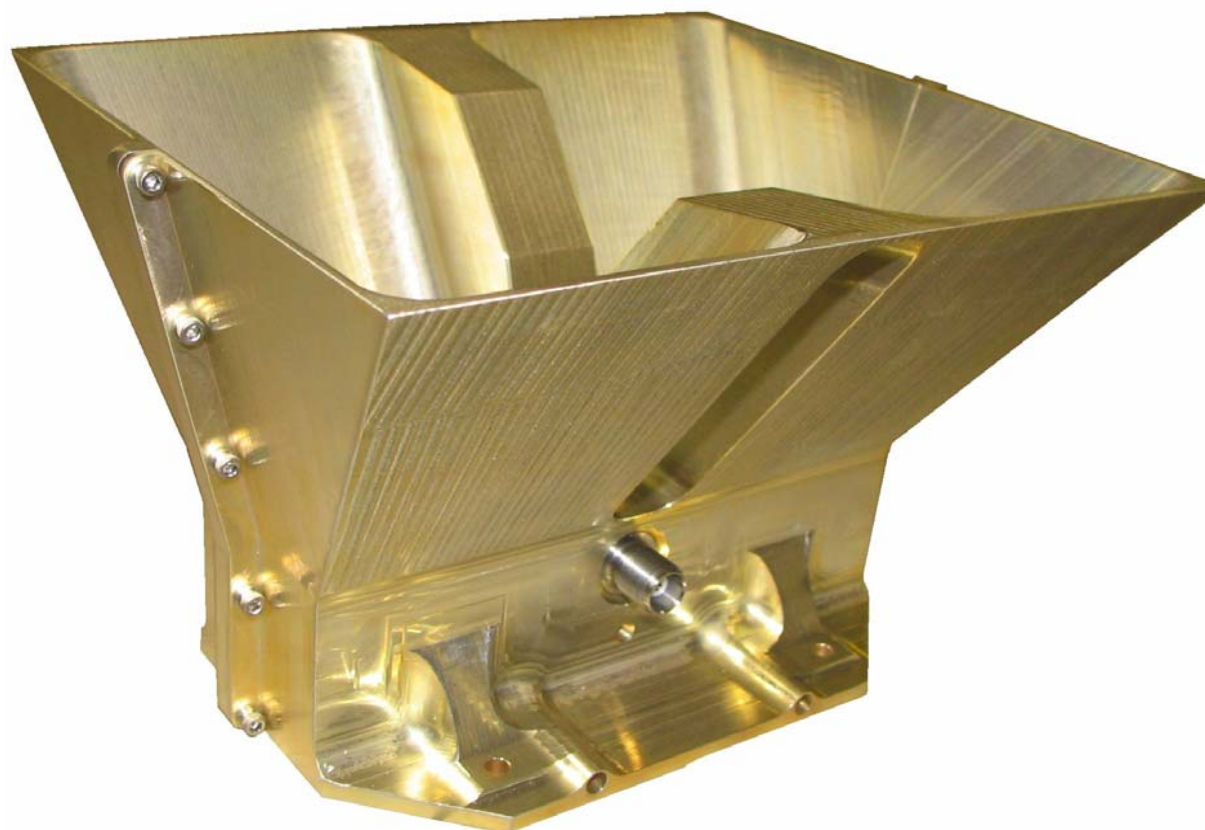
FILTERS

FERRITE CIRCULATORS

SEPTUM POLARIZER FEEDS

- PRIOR HISTORY

<u>CUSTOMER</u>	<u>PRODUCT</u>	<u>PROGRAM</u>
•JPL/OSTM Antenna, JPL (Jet Propulsion Lab, Microwave Radiometer, JASON II		
•LOCKHEED Atlas Re-Rad Antenna Horn, S band_MEC D3HN		
•LOCKHEED Atlas Re-Rad Antenna Horn, C band_MEC GH3HN		
•MDA SPACE CANADA, Waveguide Flex/Rigid, WR51 & WR34 (MacDonald, Dettwiler and Associates)		



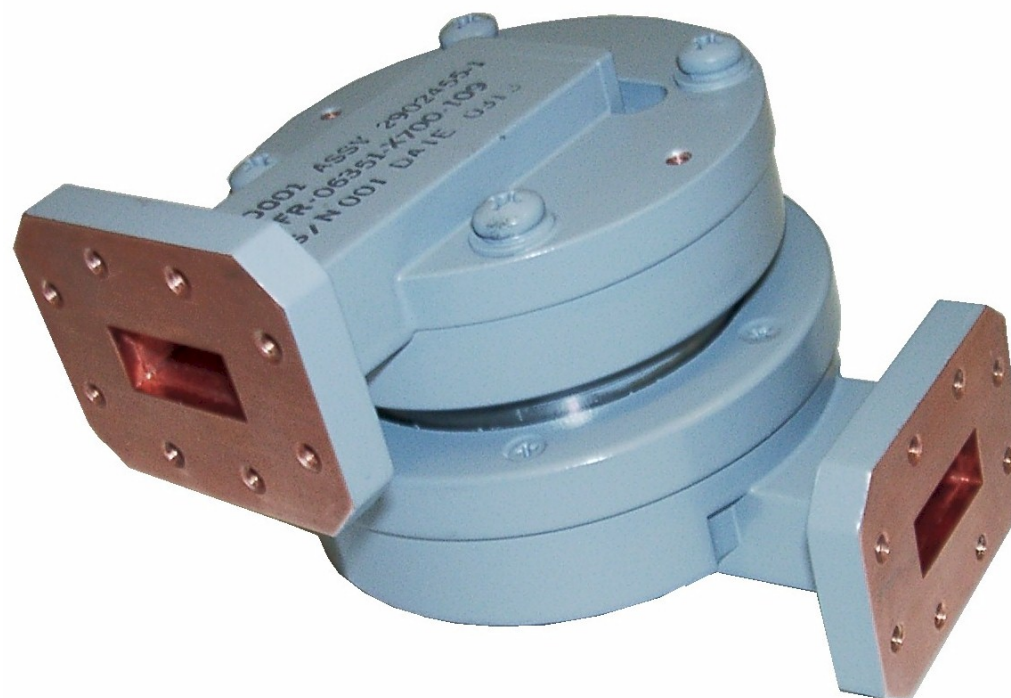
- S BAND
- LINEAR POLARIZATION
- SURVIVES PYROTECHNIC SHOCK

SPACE QUALIFIED HORN ANTENNA

REPAIR / REFURBISHMENT CENTER



- **PRODUCTS**
PASSIVE MICROWAVE COMPONENTS
INCLUDING:
ANTENNAS, ROTARY JOINTS, FILTERS,
FERRITE CIRCULATORS, WINDOWS, & LOADS
- **QUICK TURNAROUND CAPABILITY**
- **IN-HOUSE PROCESSES & SUPPORT**
- **BONDED STORE FOR CUSTOMER PARTS**
- **ENGINEERING SUPPORT & EXPERTISE**
- **DEDICATED PERSONNEL**

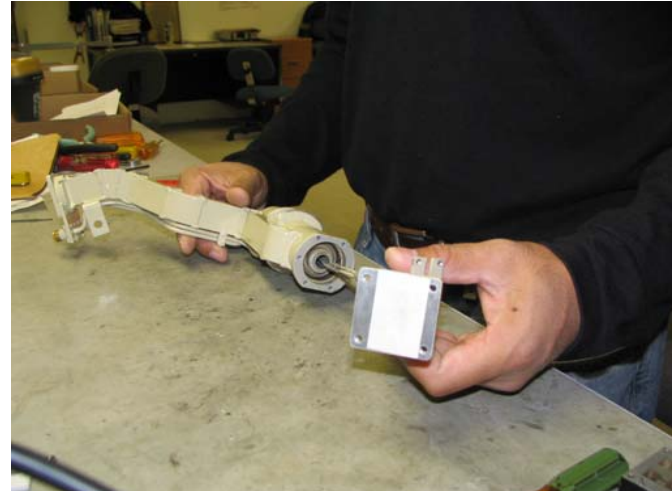


X-BAND ROTARY JOINT / REBUILD

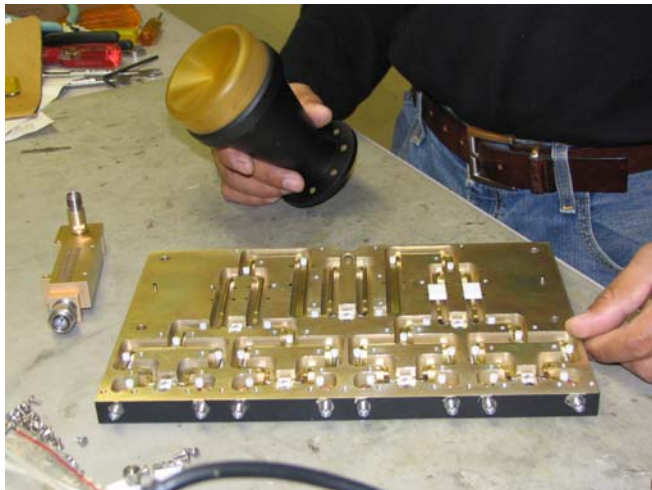
ANTENNA REPAIR



ROTARY JOINT REPAIR



STRIPLINE REPAIR



WAVEGUIDE REPAIR





IN-HOUSE CAPABILITIES

MICROWAVE ENGINEERING

DESIGN TOOLS



ELECTRICAL DESIGN (CAE)

- **ANSOFT HFSS ELECTROMAGNETIC SIMULATION SOFTWARE**
- **OPTIMETRICS & PARAMETERIZATION**
- **ANSOFT DESIGNER**

MEC (CAE) IN-HOUSE CIRCUIT ANALYSIS TOOLS FOR MODELLING FILTERS, COUPLERS, ANTENNAS

MECHANICAL DESIGN (CAD)

- **CADKEY 3D AND SOLIDS**
- **COMPATIBLE FILE EXCHANGE THRU
.iges, .dxf, .dwg, autocad, step, etc.**

MACHINING CNC (CAM)

- **MASTER CAM**
- **COMPATIBLE EXCHANGE TO MILLING CENTERS**

HFSS MODELING STATIONS



CADKEY MODELING STATIONS



COMPLETE IN HOUSE CAPABILITIES



MACHINING

- CNC Machining
- Bridgeport Millers
- Lathes (Turning Centers)
- Tooling Center

BRAZING

- Brazing Aluminum Dip (30" X 30" X 28"):
- Induction & Torch Brazing

FINISHING

- Chemical Film (Mil-C-5541) Iridite
- Finishing Paint
- Diamond Wheel Grinding

ENVIRONMENTAL TESTING

- Environmental Temperature & Humidity
- High Power Testing

ELECTRICAL TESTING

- Complete Electrical Testing (DC-110 GHz)
- ANA (Automatic Network Analyzers 8510)
- Vector & Scalar Network Analyzers
- Antenna Ranges (Orbit/FR Spectrum 759)
400 MHZ – 60 GHz



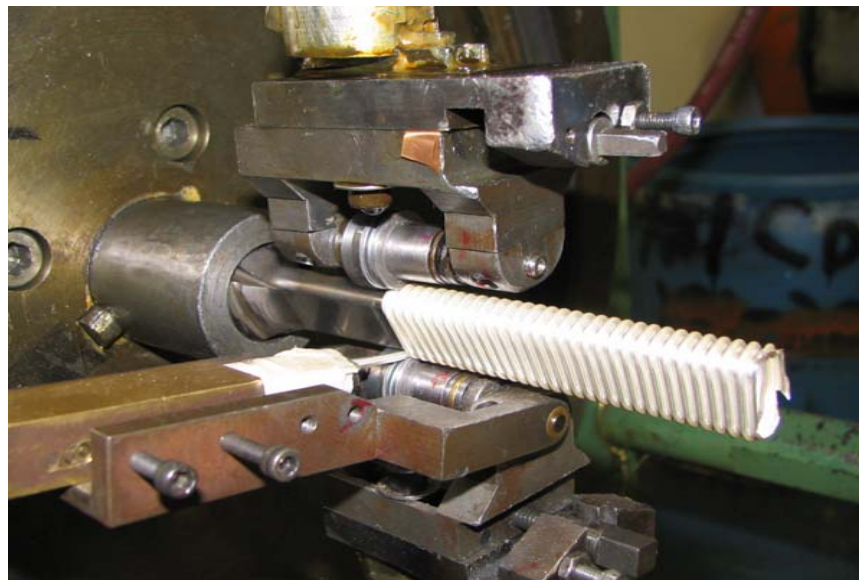
CNC MILLING CENTERS



CNC LATHES / TURNING CENTERS



TWISTABLE FLEX WAVEGUIDE MACHINE



NEOPRENE JACKET PRESSES



CERROBEND EQUIPMENT



ALUMINUM BRAZING TANK



MIL-STD 5541 IRIDITE



INDUCTION BRAZING



POST BRAZING CLEANING SALTS



QA INSPECTION



HUMIDITY CHAMBER



HELIUM LEAK DETECTOR



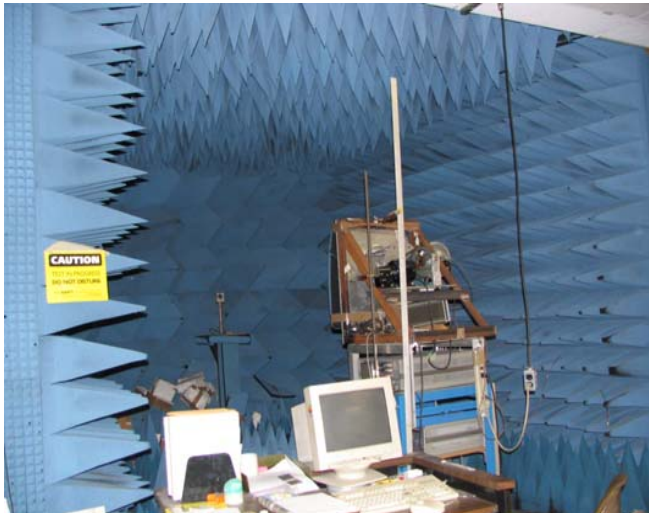
LARGE THERMAL CYCLE OVEN



8510 ANA AUTOMATED TESTING TO 50 GHz



ANECHOIC CHAMBER RANGE TO 60 GHz



HIGH POWER TEST EQUIPMENT



CONCLUSION



**MICROWAVE ENGINEERING CORPORATION WANTS TO BE
YOUR # 1 SUPPLIER FOR PASSIVE MICROWAVE COMPONENTS
AND SUBSYSTEMS. WE WANT TO EXCEED YOUR EXPECTATION
FOR SERVICE AND SOLVE YOUR TECHNICAL PROBLEMS.**

•Applause

