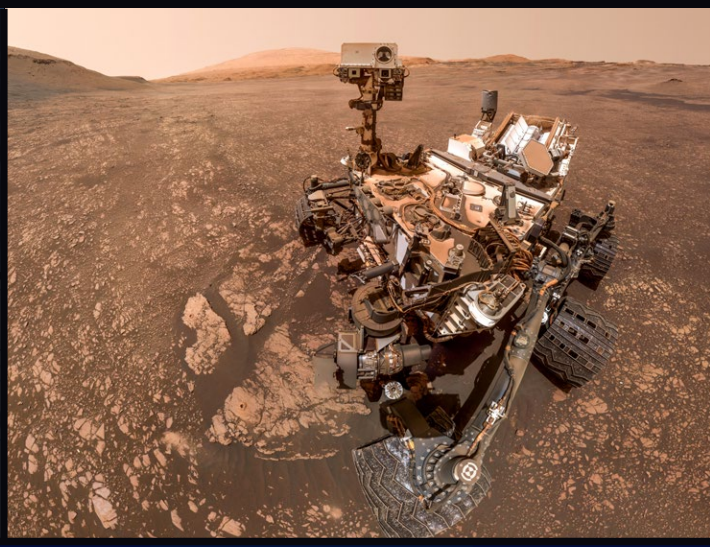
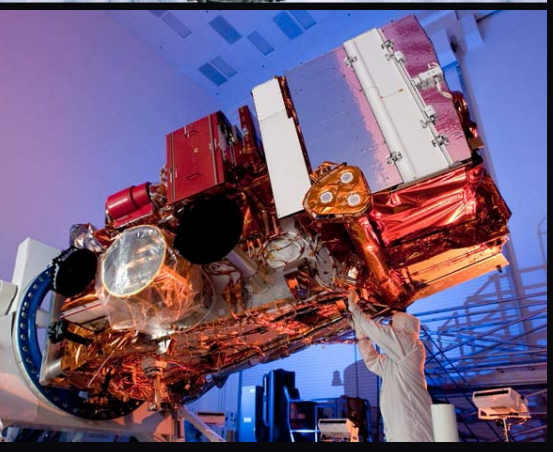
MISSION-CRITICAL
INTERCONNECT SOLUTIONS

Glenair®




Glenair
SIGNATURE SERIES

Space-Grade Harness Assemblies

Proven, Rugged, Flight-Heritage Technologies

Glenair®

SPACE-GRADE

Complex Cable and Harness Assemblies

Commander Ed White on the first American spacewalk, 1965 with Glenair-manufactured "Golden Umbilical" cable

We like to begin our presentation of Glenair's proven-performance space-grade products with the golden umbilical life support cable used by Commander Ed White in the first American space walk in 1965. This was a complex cable assembly with an exacting set of performance requirements. Even though this application is now over 50 years old, it still reflects Glenair's design and fabrication expertise and that we have been a go-to supplier for the space industry for over 5 decades. Today we continue to fabricate high-performance cables for space, from rugged Viton® overmolded designs to ultra-lightweight SpaceWire jumpers for the high-speed space data transmission protocol. Other notable space cable applications include:

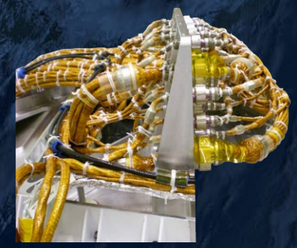
- Dozens of robotic spacecraft, including orbiters, landers, and rovers, have been launched to Mars since the 1960s. Glenair cables have ridden along on several, helping to fulfill navigation, data and communication requirements.
- Complex interconnect cable assemblies made by Glenair have also traveled to and from orbit dozens of times on the Space Shuttle, as well as numerous space-launch vehicles. Glenair-made interconnect harnesses also served on all twelve manned Gemini capsules.

PROVEN PERFORMANCE IN SPACE

- The "Golden Umbilical" life-support cable
- JPL Mars probes (orbiters, landers, and the Curiosity rover)
- AIRS satellite
- Gravity Probe mission
- Space Shuttle
- Titan II launch vehicles
- ESA-certified engineering and production staff (Glenair Space Systems, Salem)

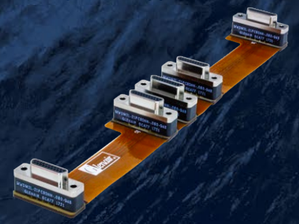
COMPLEX MULTIBRANCH AND OVERMOLDED CABLE AND FLEX CIRCUIT ASSEMBLIES

Multibranch wire harness for a space lab application

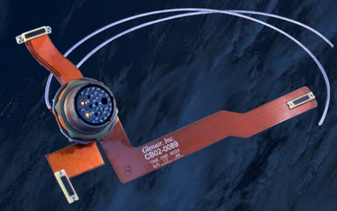


Complex Mighty Mouse cable harness for a Mars rover application

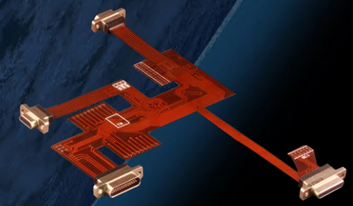
ESA and NASA screened Micro-D/Nano cable assembly



Space-grade Micro-D flex assemby with NASA EEE-INST-002 screening



Hybrid flex/rigid flex multibranch Micro-D flex assembly with discrete RF circuits



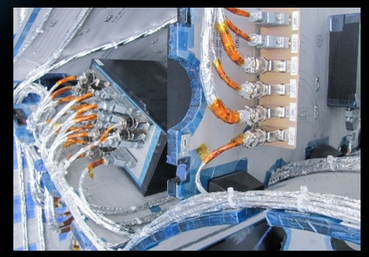
Micro-D subminiature multibranch flex assembly

SPACE-GRADE HARNESS FABRICATION AND CLEAN-ROOM INTEGRATION (GSS - SALEM, GERMANY)

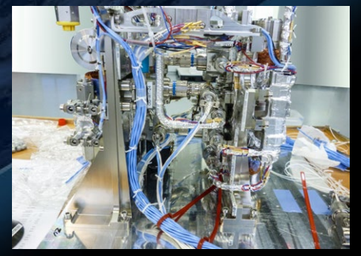
Glenair Space Systems, Salem Germany: a turnkey cable harness design and fabrication operation, from documentation to harness prototypes, production, precision machining, and clean-room based satellite integration. ESA-certified assembly staff.

Hand assembly work performed by ESA-certified assembly staff

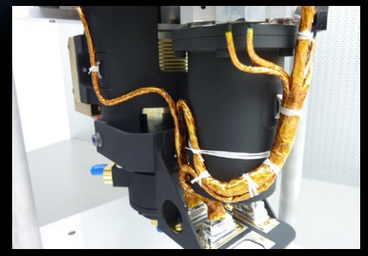
Form, fit, and function of prototype harnesses using GSS-produced fixtures



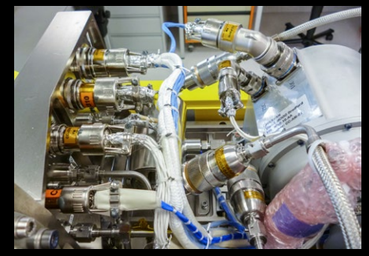
Cleanroom integration of flat set harnesses into satellite test racks



Complex integration and assembly of flight-grade wire harnesses



Harness integration into space payload electromechanical devices



EMI shielded and open-wire bundle assemblies ready for flight

Physical layer SpaceWire router aboard the James Webb Space Telescope (NASA)

SpaceWire Cable Assemblies

Flight- and lab-grade SpaceWire qualified cable assemblies for IEEE 1355 space network node interconnection of routers, switches, recorders, transceivers, and other physical layer devices

The success of any space mission begins with reliable data transmission and Glenair Spacewire cables, built to meet the strict standards set forth by ECSS-E-ST-50-12C make this a reality. Our Spacewire cables offer bidirectional, high speed data transmission rates up to 400 Mbits/s while significantly reducing cross talk, skew, and signal attenuation. By incorporating a serial, point-to-point cable, with low voltage differential signaling (LVDS) reduced costs are realized through an easily integrated data transmission cable. These features allow Spacewire cables to be incorporated across various satellite data transmission programs without the expense of costly design customization.

Glenair Spacewire assemblies begin with a high performance cable built with expanded polytetraflouroethylene (ePTFE) insulation. This material allows for low-loss transmission of LVDS signals, maximizing data-rates while allowing for the implementation of standard hardware protocols, thus eliminating the need for design customization and long lead time cable projects.

TYPICAL USES INCLUDE

- EGSE applications
- Radar sensor systems
- Hi-resolution camera equipment
- Sensor, mass-memory unit, and telemetry subsystem interconnections

APPROVED FOR USE BY:

- ESA
- NASA
- JAXA
- RKA

CONNECTOR/CABLE

- **Laboratory and space-grade versions available**
- **Qualified MIL-DTL-83513 Micro-D connectors**
- **Gold-plated copper alloy TwistPin contacts**
- **Basic cable, 4 twisted pair cables and a ground**
- **Epoxy resin potting**
- **EMI banding backshell**

PERFORMANCE

- **3 Amps**
- **Temperature tolerance -200° to 180° C**
- **100 Ω impedance shielded signal pair**
- **Very low skew, signal attenuation and crosstalk**
- **65dB minimum attenuation shielding effectiveness**
- **Low magnetic permeability IAW EIA-364-54**

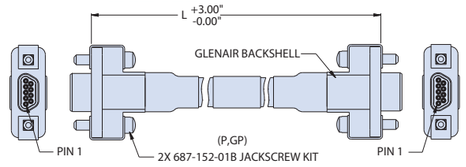
POINT-TO-POINT AND SINGLE-ENDED

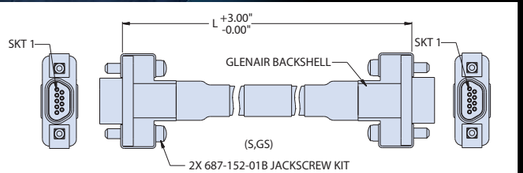
SpaceWire cable assemblies

Technical specifications / how-to-order

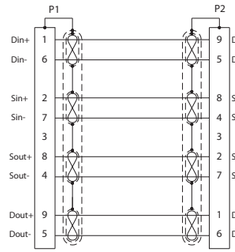
How To Order SpaceWire Cable Assembly

Sample Part Number	GSWM	2	L	-9	GP	-6	F	B	-16	S	-A	G
Product Series	**GSWM** Glenair SpaceWire Micro-D											
Shell Plating	**2** - Electroless Nickel **5** - Gold											
Insulator Material	**L** - LCP											
Shell Size	**9**											
Connector Type	**P** - Single-Ended Pin (Plug) **S** - Single-Ended Socket (Receptacle) **GP** - Pin (Plug) Connector Both Ends **GS** - Socket (Receptacle) Both Ends											
Wire Gauge	**6** - 26 AWG **8** - 28 AWG **0** - 30 AWG (30 AWG–Lab Only)											
Cable Type	**F** - Flight Grade **L** - Lab Grade											
Termination Option	**B** - Backshell											
Cable Length In Inches	**16** - 16 inches (12 inches minimum)											
Hardware	**S** - Male Slotted Jackscrew **P** - Female Jackpost											
Wiring Schedule Type	**-A** - as per ECSS-E-ST-50-12C Rev 1 figure 5-4 **-AL** - as per ECSS-E-ST-50-12C Rev 1 figure 5-5											
Ground Spring Option	**N** - No Ground Spring **G** - Ground Spring Installed											

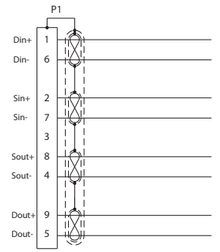




BACK TO BACK WIRING
CABLE ASSY TYPE **-A**
ECSS-E-ST-50-12C REV 1, FIGURE 5-4

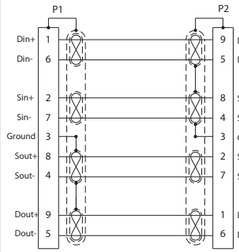


SINGLE ENDED WIRING
CABLE ASSY TYPE **-A**
ECSS-E-ST-50-12C REV 1, FIGURE 5-4

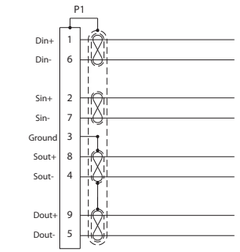


NOTE: Inner shields are tied to one another and connector shell.

BACK TO BACK WIRING
CABLE ASSY TYPE **-AL**
ECSS-E-ST-50-12C REV 1, FIGURE 5-5



SINGLE ENDED WIRING
CABLE ASSY TYPE **-AL**
ECSS-E-ST-50-12C REV 1, FIGURE 5-5



NOTE: Inner shields of Din and Sin pairs are Isolated from one another.
Inner shileds of Sout and Dout are connected and tied to pin 3.

NOTES:

1. Flight grade (cable Type F) assemblies to be screened IAW NASA EEE-INST-002, Table 2. Level 1 with 100% thermal vacuum outgassing (24 hours/+125°C/10^{-6} torr). Reference Glenair Mod Code 429C.
2. Operating temperature -55°C to +125°C
3. Electrical performance:
   Dielectric withstanding voltage: 600 VAC.
   Insulation resistance: 5000 megohms @500 VDC.

MATERIALS/FINISH:

- Shells/backshells - aluminum alloy/electroless nickel.
- Insulators - high grade rigid dielectric/N.A.
- Contacts - copper alloy, gold plated.
- Hardware - stainless steel/passivated.

MISSION-CRITICAL

INTERCONNECT SOLUTIONS

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