

QwikConnect

GLENAIR ■ JANUARY 2015 ■ VOLUME 19 ■ NUMBER 1

IN THIS ISSUE:

NEW INTERCONNECT
TECHNOLOGY
FOR MODERN SOLDIER SYSTEMS

Glencair®

Cover: Sgt. 1st Class, Maria Young
Photo Credit: Pfc Bryan Willis

NEW INTERCONNECT TECHNOLOGY FOR MODERN SOLDIER SYSTEMS

FUTURE SOLDIER SYSTEMS

When infantry soldiers went to war during the 20th century they typically carried a rifle, helmet, ammunition, food and some spare clothes. While their 21st century counterparts might look back and appreciate the simplicity of such an outfit, few of them would be happy to lose the equipment innovations that have so measurably advanced 21st century ground soldier effectiveness. Soldier equipment modernization efforts—such as have been implemented in the US, UK, France, Singapore, Germany and elsewhere—have gone by a variety of names: Future Soldier, Future Force Warrior, Land Warrior, NETT Warrior and so on. A common theme among these modernization programs has been their “systems of systems” approach, which emphasises the blending of individual components into a complete integrated system. More recently, other models have emphasized a versatile power and networking backbone with the flexibility to accommodate a wide range of available device types—particularly as soldier operational requirements vary so significantly from one battle geography to the next.

With serious conflicts continuing to simmer throughout the world, governments and industry remain actively engaged in research and development in soldier systems and discrete technologies. In this special issue of *QwikConnect*, we review the equipment that currently supports the 21st century warrior as well as some innovations still in the development phase—signs of what is to come in the ongoing effort to advance soldier effectiveness, lethality, mobility and survival.

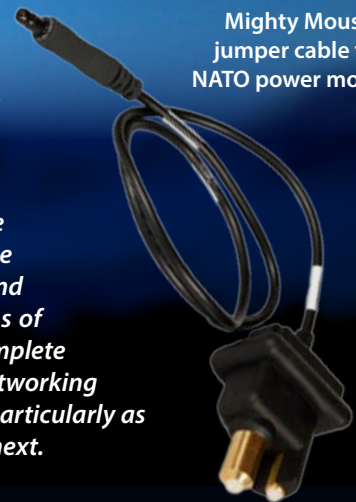
POWER MANAGEMENT AND WEIGHT SAVING

To anyone who hasn't carried a soldier's load of equipment, power management might not sound like the most important military technology topic. In fact, it is one of the most critical technology issues for future soldiers. Without efficient and sustainable electrical power, none of the electronic innovations detailed here would be possible. Simply put, soldiers do not have the luxury of mains power and are totally dependent on a mobile power sub-system to keep night vision goggles, thermal-imaging sights, electronic counter-measures, personal radios, GPS and other technologies working in the field. For many years this requirement has been served with high-performance batteries. But size and weight reduction efforts

have led to new power management systems and rechargeable cell technologies.

Throughout the history of modern soldier programs, and as the number of electronic soldier devices increased, battery power—a heavy and cumbersome resource—has had to expand. A soldier going out on a week-long patrol, for example, needs sustainable power for every device he uses. Command and control (situational awareness) capabilities are a major element of future soldier programs. But such technologies are power hungry and add significantly to pack weight and transportability. The lack of ready power can and will adversely impact soldier effectiveness across the broad range of their work: from disaster relief to counter-terrorism.

Possibly one of the biggest changes to soldier battery/power management technology has been the switch from primary batteries (non-rechargeable) to rechargeable. During the early stages of the Iraq War, most batteries in theater were still primary, which placed significant strains on military supply chains. To say soldiers have been burdened with batteries presents the problem too mildly. The Iraq and Afghanistan wars tested soldiers to their physical limits—with some carrying nearly 60% (around 50-60kg) of their body in gear and equipment. It should come as no surprise that musculoskeletal



Mighty Mouse jumper cable for NATO power module

medical conditions—caused by excessive loads—have become more common throughout the military services. Now in the aftermath of Afghanistan and Iraq, there is a renewed effort to reduce loads—particularly in the development and use of centralized battery packs, integrated, multiport power hubs and interconnect cabling that allow soldiers to run devices off one rechargeable lithium-ion cell. In addition, researchers have increasingly focused on improving lithium-ion technology itself.

Organizations like the US Army Research Laboratory have made significant gains in lithium-ion technology. One of the most important developments has been the improvement in power output. Current lithium-ion batteries operate around the 3.6V-4.2V range but an improved understanding of the interface between a battery's cathode and electrolyte means 5V may soon be possible. Ultimately, that means batteries will last much longer and fewer spares will be necessary.

Glenair has also been at the forefront of soldier power management and weight saving work. Small form factor connectors, such as Mighty Mouse and now SuperFly have enabled integrated power system manufacturers to reduce the footprint of power equipment below what would otherwise have been possible. Glenair innovations in wire and cabling—such as conductive materials woven directly into webbing—has also contributed to reductions in power management system size and weight.

TACTICAL COMMUNICATIONS AND NETWORKING

It is a universal motto among soldiers: “no comms, no bombs.” Those four words sum up the vital contribution communication systems play on the modern battlefield. After a decade of conflict in Iraq and Afghanistan, many Western armies are now focusing on upgrading their communication



and networking capabilities. The aim is not only to revolutionize how troops speak to each other but also how voice, location and data is transmitted through integrated warfighter information networks.

Iraq and Afghanistan have demonstrated soldiers must remain networked at all times to maintain tactical effectiveness and agility. The US military, for instance, is completely overhauling its information sharing capabilities for dismounted troops under a program called Nett Warrior. The aim is to mimic the simplicity and capacity of commercial networks, but retain the encryption needed for modern military operations.

This “network centric” approach emphasizes the need to connect, or network, different technologies to enable greater data sharing and battlefield awareness. It is the “digital backbone” for any 21st century soldier.

Nett Warrior will allow soldiers to securely share pictures, text messages and transmit location data across the network using an off-the-shelf (OTS) smartphone and software-defined radio. The core of this is the single channel AN/PRC-154 Rifleman Radio - made by General Dynamics C4 Systems and Thales - that transmits voice and data simultaneously using the Soldier Radio Waveform. Information from each device is also sent higher up the chain of command so commanders have a real-time picture of the battlefield.

Along with OTS smartphone hardware, military and industry are also focusing on developing soldier-focused software applications (or apps). It's not so much the future, but keeping up with the rapid pace of technological change in the commercial sector. Soldiers are often frustrated their military communications gear doesn't reflect the capabilities of their personal cellphones or tablets.

US agency DARPA is working to revolutionize acquisition and soldier capabilities through its Transformative Apps (TransApp) program. The idea is to create a military-style “App Store” where applications of all varieties



are available. These apps can evolve to reflect a changing operational environment. Apps already in use include: blue force tracking, training manuals, mission planning, ballistics calculator for snipers and IED detection and geo-tagging.

Although there are still concerns over security and robustness, expect to see more commercial devices in the hands of soldiers in the future. In our technology-driven world—where a new phone is released every few months—it is no longer viable for armies to spend thousands of dollars on a military-grade smartphone that will be obsolete as soon as it is operational.

Communication capabilities and situational awareness on the battlefield is also being improved through enhanced networking capabilities. This means soldiers are no longer limited to traditional line of sight communications, which can have limited range in built-up areas or under cover. Take for example the Exelis SpearNet radio, it is a mobile ad-hoc networking (MANET) device, which means the signal “hops” from one radio user to the next and therefore extends the range of the network.

Radio such as SpearNet can provide voice, integrated GPS with SA reporting, and data transfer (100-1500 Kbps) across dismounted networks spanning 6 km. The Spanish Army has chosen the SpearNet for its Combatiente de Futuro (COMFUT) modernization efforts.

The backbone for future US soldier communications is the Warfighter Information Network-Tactical (WIN-T) which delivers voice and data services to soldiers without the need for fixed infrastructure. WIN-T utilizes satellite communications (SATCOM) to extend the network in maneuver Brigade Combat Teams (BCTs). WIN-T is also self-healing, which means devices can re-route bandwidth if a node breaks down.



▲ Army Signal Corps patch and HiPer 55116 radio connectors

The latest WIN-T, Increment 2, allows soldiers to use voice and data communications on the move using mobile, self-forming networks - meaning it creates its own transmission paths based on terrain and environment - a first for the US military. WIN-T systems were deployed to West Africa in 2014 as US troops tackled the Ebola outbreak in the region. The equipment improved communications between US Africa Command, troops on the ground and NGOs.

The US Army is also upgrading its battle-proven Force XXI Battle Command Brigade and Below/Blue Force Tracking (FBCB2/BFT) system to prepare for the new network. FBCB2/BFT, a system which resembles a large ruggedized tablet, is fitted to most infantry vehicles like MRAPs or Stryker vehicles.

The software upgrade means any changes inputted on a vehicle’s FBCB2/BFT will be seen by a dismounted soldier on his Nett Warrior device.

The French Army is also placing a significant emphasis on networked communications and data sharing as part of its FELIN (Fantassin à Équipements et Liaisons Intégrés) soldier modernisation. French vehicles are fitted with Sagem’s Spider terminal, a touch-screen display system that resembles the US Army’s FBCB2/BFT. Dismounted squad leaders also have a portable terminal information system designated the SIT COMDE (Offboard Soldier Terminal Information System), which will improve blue force tracking and overall situational awareness.



◀ Air Force Capt. Bryony Veater, Space Liaison Officer and Space Weapons Officer with the 807th Expeditionary Air Support Operations Squadron, using a Defense Advanced GPS Receiver. Captain Veater trains U.S. and coalition forces how to utilize space weapons into ground warfare. (U.S. Air Force photo by Staff Sgt. David Carbajal)

Unit location, video and images are currently shared over the network. In the future, soldiers could be fitted with physiological sensors that can detect dehydration, elevated blood pressure or cognitive delays from lack of sleep. That information would then be shared over the battlefield network where commanders could assess unit effectiveness and readiness in real time. Smart weapons will also be able to transmit information such as shots fired and remaining ammunition.



War, could amplify light several thousand times but were almost useless without some form of ambient light. This "Generation 1" equipment was also bulky and had a voracious appetite for batteries.

Today's "Generation 3" I2 devices—like the US Army's helmet-mounted AN/PVS-14 monocular night vision device—amplifies a wider spectrum of available light and even some infrared energy, thanks to advances in photocathode technology. Importantly, newer I2 devices can keep functioning for more than 20 hours on a single AA battery which has benefits for both logistics and soldier loads.

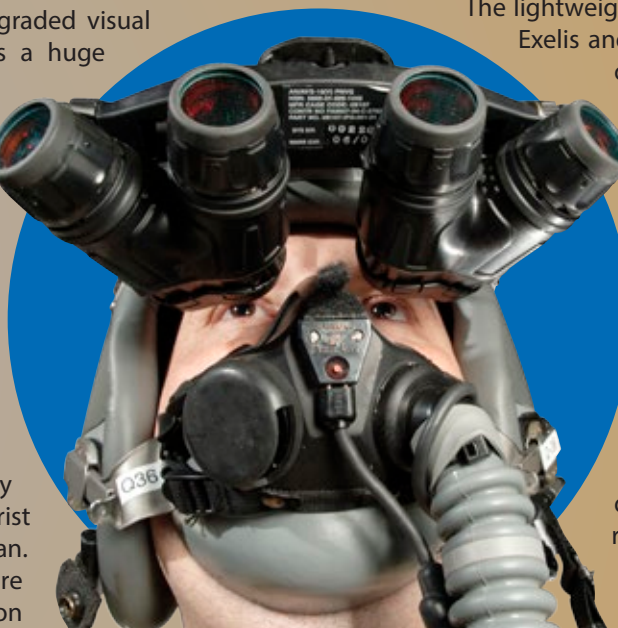
NIGHT VISION EQUIPMENT

The ability to see at night or in degraded visual conditions, such as fog or haze, is a huge tactical advantage on today's battlefield, and at times can mean the difference between life and death. Soldiers equipped with night vision capabilities are able to see, and engage, the enemy far quicker than if they were relying on their naked eye. In addition, they can navigate obstacles and identify possible booby traps which are obscured under normal conditions.

Night vision equipment is becoming cheaper and more available, potentially finding its way into the hands of terrorist groups like Islamic State or the Taliban. So, militaries are keen to procure newer and more capable night vision equipment to retain their technological edge. The US Army in particular - which saw the massive benefits gained from using night vision gear in Iraq and Afghanistan - is investing in new technologies which will achieve this end.

Militaries currently use two types of night vision technology; the first is known as image intensification (I2), which amplifies existing light. The second is thermal vision, also known as infrared, which forms an image using infrared radiation.

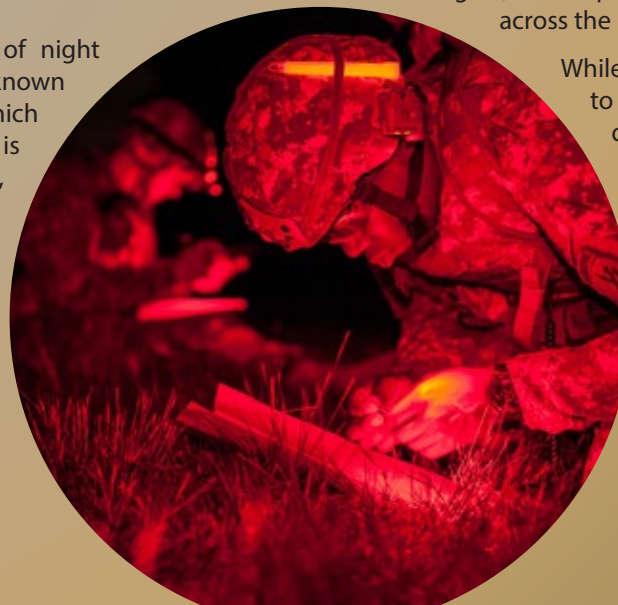
Traditional night vision goggles (NVGs) and night weapon sights use image intensification (I2). Early I2 devices, such as the US Army's revolutionary AN/PVS-2 introduced during the Vietnam



The lightweight AN/PVS-14 - manufactured by ITT Exelis and L-3 Warrior Systems - remains one of the most popular NVG devices in the world. In 2012, the UK placed a \$33m contract with ITT Exelis to provide AN/PVS-14 equipment as part of British Army modernisation efforts. Elsewhere, Israeli company Elbit Systems introduced the ZACT-NV32 micro monocular I2 sight in 2012, which is thought to be the lightest product on the market at just 180 grams.

I2 technology has several drawbacks, however, including its reliance on ambient light and being limited only to night operations. Thermal imaging - which creates a picture based on infrared radiation - offers a step up in capability and can "see through" adverse weather or battlefield obscurants like smoke, even during the day. Because thermal sights are digital, it also opens up the possibility for video output across the network.

While the technology has been fitted to aircraft and vehicles for several decades, IR systems for the dismounted soldier were rare up until the late '90s. They were often too cumbersome and costly to be viable for every frontline soldier, and so were often reserved for reconnaissance or special forces units. That has changed over recent years with thermal sights now becoming a regular addition to the soldier's loadout.



SuperJack™
the new industry standard interconnect
for thermal weapons sights



The US Army is currently fielding the latest generation of thermal sights, designated the AN/PAS-13 Thermal Weapon Sight (TWS). The latest TWS uses uncooled, forward-looking infrared technology with 17 micron sensors that offer significant weight and power savings over previous models using 25 micron sensors. Many thermal sights, like the AN/PAS-13, also feature standard video output for training, image transfer or remote viewing.

Modernization programs, like the French Army's FELIN system, want to integrate the TWS with a head-mounted display (HMD) to allow observation, and firing, around corners or obstacles. The US Army's current effort is called the Family of Weapon Sights which will wirelessly link weapon-mounted thermal sights to NVGs, allowing soldiers to rapidly engage targets without switching between devices.



Yet like I2 technology, thermal sights can also have several downsides especially when it comes to seeing detail. Developers are trying to bring together both worlds with fused systems, blending I2 and thermal images into one. One of the best examples of fused technology is the AN/PSQ-20 Enhanced Night Vision Goggle - made by ITT Exelis and L-3 Warrior Systems - which is currently being fielded with the US military.

In Europe, Thales has introduced the Minie-Dir fused system, an adaptation of the Minie-D which has already been selected for modernization programs in France, Germany and Spain. The 490g Minie-D can also work as a HMD receiving video from unmanned systems, or send video to command posts.



ISTAR - TARGETING EQUIPMENT AND OPTICS

It is one of the great constants in warfare, you must know more about your enemy than they know about you. Gaining the upper hand will keep you alive. That's why advanced intelligence, surveillance, target acquisition and reconnaissance equipment is some of the most valued equipment for militaries. These are the technologies used by fire support teams or dismounted reconnaissance troops to locate, and then eliminate, enemy forces in a warzone.

Today's surveillance and reconnaissance devices are also connected to the battlefield network, meaning they can send video and data across the 21st century digital battlespace, giving greater situational awareness for commanders at all levels.

Several militaries are currently in the process of upgrading or replacing their legacy dismounted ISTAR equipment. The US Army is fielding the latest version of the Northrop Grumman-built Lightweight Laser Designator Rangefinder (LLDR-2H) system. Nicknamed the "Eye of God," LLDR-2H offers extremely accurate target designation for GPS-guided munitions like the JDAM or Excalibur.

The LLDR incorporates a thermal imager, day camera, laser designator and digital magnetic compass. A built-in GPS calculates coordinates and a Laser Designator Module (LDM) emits coded laser pulses, which are compatible with US and NATO guided munitions.

Equipped with the LLDR, soldiers are able to designate stationary targets from over 5km and identify vehicle-sized targets at more than 7km during the day. At 31.5 pounds (14.2kg) it is lighter than previous models, though certainly not lightweight. Lighter systems with embedded GPS receivers are also available including BAE Systems' TRIGR and Northrop's Mark VIIIE which both weigh just over 5 pounds.

SuperFly night-vision goggle I/O to board jumper ▶



Thales also has a successful family of lightweight surveillance and target acquisition systems named Sophie. The Sophie range, used extensively by French armed forces, features a high-resolution thermal imager, color daylight camera or optics, laser pointer and integrated GPS. In 2012, the Australian Army selected the Sophie MF system for its LAND 17 1B program in a full-scale effort to modernize indirect fire support.

With its latest product, the Sophie Lite, Thales has shaved 2kg off the Sophie range with a product that weighs just 1.6kg, yet delivers comparable performance to earlier models.

For Joint Terminal Attack Controllers (JTAC) - whose job it is to direct air strikes against the enemy - accurate target acquisition is particularly important. Being a JTAC is an incredibly skilled job and one wrong move could lead to ineffective fire or, much worse, a friendly fire incident. Pilots and JTACs must work closely to locate the enemy, choose the type of munition and then engage - often only using paper maps and a radio.

L-3 Communications has developed the Remote Operations Video Enhanced Receiver (Rover) to improve coordination and target acquisition between air and ground units. The early Rover system included a receiver, antenna and rugged laptop that displayed sensor data from airborne platforms. The latest version is a pocket-sized edition called the Tactical Rover (e), which is interoperable with laptops or tablets, and is a fraction of the weight of original Rover devices.

Similar technology is being developed under DARPA's Persistent Close Air Support programme, which digitally links pilots and JTACs. Contractor Raytheon is currently flight testing the technology, with live fire tests expected in 2015 using an A-10 attack aircraft. DARPA claims the system could potentially reduce the time for calling in airstrikes from one hour to just six minutes.

SOLDIER HEAD-UP DISPLAYS

For years aircrews have been able to use the head-up display (HUD), a transparent screen which projects data and allows a pilot to fly without looking down at the instruments - hence the "head-up" moniker. A further enhancement of this technology has been the HMD, used by AH-64 Apache pilots among others, which projects information directly onto the pilot's eye from a reticule attached to the helmet.

Dismounted soldiers can also benefit from the greater situational awareness and information superiority afforded by HMD systems. The US, Spain, Malaysia, Singapore and Germany have all experimented with soldier HMD systems as part of

Civilian Applications

The clarion call has been, "reduce weight" when it comes to advanced soldier systems, but an alternative approach might be to develop technology that helps soldiers manage larger and heavier loads. Lockheed Martin has developed a hydraulic-



powered anthropomorphic exoskeleton called the Human Universal Load Carrier (HULC) designed to help users carry up to 200 pounds of equipment for extended periods. DARPA, in collaboration with Boston Dynamics, has also developed a four-legged robot called the LS3 which helps US Marines carry ordnance and equipment over rough terrain.



But the applications for load carrying technology is not strictly limited to the military. Firefighters for example, are actively pursuing civilian applications for exoskeleton technology. A wearable robot exoskeleton of this type would enable users to travel further, reduce fatigue and risk of injury.

Heads up display technology, such as has been developed by the Osterhout Design Group may be used to assist police, TSA and other security services implement facial recognition software crucial to protecting civilian populations from terrorist attacks.

Perhaps the most familiar and immediately useful military technology already used on a daily basis by civilian populations, the Global Positioning System (GPS), is a US Department of Defense network of satellites, ground stations, and software interfaces.



In addition to its role enhancing soldier situational awareness, the GPS has become a ubiquitous navigation tool now used by lost and confused husbands on a worldwide basis.





◀ The snap-lock, trigger-release MouseBud connector is ideally suited for HUD-equipped helmet technology

their modernization programs. A soldier HMD works in a similar way to a pilot's HUD, displaying vital information without the soldier having to look down at maps or devices.

In 2009, Rockwell Collins was awarded a contract to provide 1,500 of its ProView S035A HMD systems—originally developed for tank crews—to the US military under its Land Warrior program. The S035A features a high-resolution display module with a 35-degree diagonal field of view, allowing soldiers to view C2 data and video feeds. The display is connected to a control module which is powered by three AA batteries lasting around eight hours.

In 2014, BAE Systems unveiled its own version of HMD technology for soldiers called Q-Warrior. The system has been designed and developed at its Electronic Systems business in Kent, England. Q-Warrior uses a holographic waveguide display so it resembles traditional HUD systems both in form and function. The display module clips on a standard helmet rail and doesn't require modification to existing kit.

Unlike previous HMD technology for soldiers, BAE Systems' technology allows data to blend intuitively with the soldier's view of the real world. This is popularly known as augmented reality in the commercial world and offers several advantages over previous HMD systems.

Q-Warrior overlays full-color graphical iconography—including friendly/hostile positions, navigation waypoints and close air support data—directly onto the real world. Soldiers can access live video feed from unmanned aircraft and other surveillance assets, improving situational awareness. BAE Systems says the technology will be best suited for JTACs or with Special Forces.

Much of the technology found in Q-Warrior has been developed as part of DARPA's Urban Leader Tactical Response, Awareness and Visualization (ULTRA-Vis) programme. One of the key challenges that remains for the soldier HMD is size, weight and price. Today's systems can be unwieldy and cost thousands of dollars which ultimately means widespread adoption is unlikely, but as technology advances we can expect to see much wider use.

And you don't have to look far to see what the future might look like. In 2014, San Francisco-based company Osterhout Design Group unveiled its smart glasses concept which has the potential to revolutionize wearable tech for soldiers. The innovative X-6 glasses feature a dual-core processor, 64GB storage and two see-through HD displays. A tiny 5 megapixel

camera can also enable augmented reality features such as facial recognition or, like Q-Warrior, battlefield data. Most importantly, ODG's smart glasses do not require a separate battery pack or any specialist equipment.

CONCLUSION

Soldiers at the squad level now enjoy more real-time data and situational awareness than staff officers did just one generation ago. They can communicate in the most inhospitable regions on earth utilizing communications gear super-charged with audio, visual and data networking. Enhanced vision technology enables new clarity—even in the fog of war—and new targeting technology delivers pin-point accuracy even in the dead of night. Better power management and battery technology enables multiple devices to be powered simultaneously—in ever smaller and lighter packages.

These advances have made modern militaries extremely agile, flexible and potent. "System of Systems" development models as well as R and D approaches that leverage the speed and innovation of commercial solutions, such as network-based software distribution, have both yielded important technology successes. The ongoing application of these technologies is of vital concern to the world's democracies as we pursue our shared military goals, manage civil unrest, counter terrorism, protect vulnerable populations, and deliver disaster relief—noble goals indeed for the future soldier.

The remaining pages of this special edition of *QwikConnect* outline the world's most comprehensive and innovative line of interconnect solutions for soldier applications—from small form-factor connectors to lightweight EMI cable shielding—all designed and manufactured by Glenair.

▼ Q-Warrior lightweight, full-color see-thru display for day and night applications.
Photo: BAE Systems





SMALL, LIGHTWEIGHT CONNECTORS AND CABLES

Don't see it in our catalog?
Just ask. Unusual small-quantity requests are our specialty. Plus, popular part numbers are available for immediate, same-day shipment with no dollar or quantity minimums.

Mission-critical interconnect technologies with proven defense industry pedigree and performance

Field and factory tested, Glenair's range of ultraminiature connectors and cables have become the gold standard for warfighter applications. Today's combat environment demands total reliability from every electronic component—from soldier-wearable devices to eye-in-the-sky UAV payloads. Interconnect technologies—contacts, connectors, shields, jackets, cables and more—are no exception. Our warfighters deserve highly-engineered, reliable systems that contribute to mission success without adding burdensome size and weight.



SuperFly™

The ultimate nanominiature tactical connector for high-speed applications



MouseBud™

The low-profile, snap-lock, trigger-release connector for wearable soldier systems



Mighty Mouse

The industry standard ultraminiature push-pull soldier interconnect



SuperJack™

The ultra harsh-environment unipole connector for audio, data, and power



SuperSeal™

RJ45 and USB connectors for harsh environmental applications



Mighty Mouse 824

The high-performance locking push-pull connector for tactical soldier applications



HiPer 55116

Advanced-performance audio frequency JTRS radio connectors and cables



Mighty Mouse Cobra

The compact EMI/RFI plug assembly for low-profile, reduced space applications



Turnkey Cable Assemblies

All Glenair connector technologies are available wired, tested and ready for immediate use

SuperFly® is ideally suited for the interconnection of wearable soldier equipment such as communications, situational awareness and other C4ISR technologies that depend on small size and high-speed performance.



Rear-panel mount push-pull and threaded PCB receptacles, and AlphaLink flex jumpers now available

SERIES 88

SuperFly®: the ultimate nanominiature tactical connector

Ready for the toughest, smallest, and highest-speed applications you've got

Glenair Series 88 *SuperFly*® represents a perfect storm of high-performance contacts, shells, wires, termination and mating technologies. *SuperFly*® is the only connector series in existence that combines the weight-saving and performance advantages of nanominiature, microminiature and AS39029 type (size #23) contacts in a precision package for battlefield communications, computing, and other high-performance applications. Available in factory-terminated cordsets, single-ended pigtails, and discrete PCB termination receptacles for complete flexibility in cable and box configurations. QDC and threaded *SuperFly* cordsets can ship with a variety of cabling options, including ultra-flexible GhostWire or impedance-controlled twisted pairs for high-speed applications.

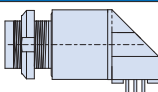
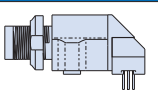
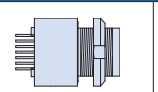
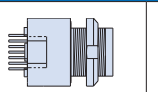
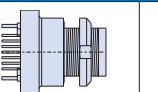
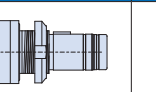
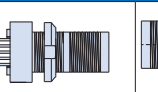
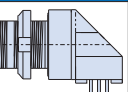
SUPPORTED CONTACTS


#23 AS39029 Type
5 Amp Crimp Contact


#24 Micro
3 Amp TwistPin Contact


#30 Nano
1 Amp TwistPin Contact

PRINTED CIRCUIT BOARD PLUG AND RECEPTACLES

Quick-Disconnect						Threaded	
							
Right Angle, Rear Panel Mount	Right Angle, Rear Panel Mount, PCB Mounting Holes	Vertical, Rear Panel Mount	Vertical, Rear Panel Mount, PCB Mounting Holes	Vertical, Rear Panel Mount, Ground Pins	Vertical Plug, Rear Panel Mount	Vertical, Rear Panel Mount	Right Angle, Rear Panel Mount

SERIES 88 SuperFly® Ultraminiature Soldier System Connectors and Cordsets



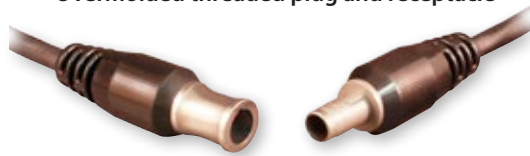
ULTRAMINIATURE SUPERFLY® CORDSETS AND PIGTAILS



Overmolded threaded plug and receptacle



Threaded pigtail plug and receptacle



Quick-disconnect overmolded cordset



Quick-disconnect pigtail plug and jam nut receptacle

- IP67 immersion rated
- High-reliability contacts: 5 Amp, 3 Amp, and 1 Amp
- High shock and vibration
- Robust EMI shielding
- Designed for high speed data applications
- Pre-wired, epoxy-sealed cordsets
- Straight and 90° PC tail receptacles
- 27 Contact arrangements
- Front or rear panel mounting
- Aluminum or stainless steel
- Accepts #22 to #32 AWG wire

CONTACT ARRANGEMENTS

Series 88 SuperFly connectors are available in 27 contact arrangements with 1 Amp, 3 Amp, 5 Amp contacts, and mixed-contact hybrid arrangements

1 Amp						
B7N (7) 1A	C10N (10) 1A	E19N (19) 1A	F22N (22) 1A	G31N (31) 1A	H37N (37) 1A	J44N (44) 1A

3 Amp					
D3M (3) 3A	E4M (4) 3A	F7M (7) 3A	G10M (10) 3A	K19M (19) 3A	L22M (22) 3A

Combo 1 Amp & 5 Amp			
D2W2N (2) 1A, (2) 5A	F4W4N (4) 1A, (4) 5A	H6W14N (14) 1A, (6) 5A	J7W19N (19) 1A, (7) 5A

5 Amp Contacts			
E3W (3) 5A	F4W (4) 5A	G7W (7) 5A	H10W (10) 5A

Combo 1 Amp & 3 Amp					
C2M2N (2) 1A, (2) 3A	E4M4N (4) 1A, (4) 3A	F4M8N (8) 1A, (4) 3A	G6M10N (10) 1A, (6) 3A	G6M12N (12) 1A, (6) 3A	K13M19N (19) 1A, (13) 3A



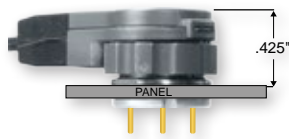
The Series 860 MouseBud™ is designed for vest-wearable and helmet-mounted cable-to-tactical equipment interconnections. The ultra low-profile spring contact equipped MouseBud™ mated connector stack is less than 1/2 inch, making it the lowest-profile right-angle solution available today.

SERIES 860 MouseBud™

The snap-lock, trigger-release connector

Ultra low-profile MouseBud™ connectors are lightweight, shielded and designed for use in hostile environments. Mating is a snap—simply push to mate and lock. To release, actuate the thumb trigger on the coupling ring (small and large triggers available). Plugs feature spring-loaded gold plated contacts, stainless steel shells and self-actuating bayonet coupling rings. Cable mount versions are fully assembled, shielded, overmolded and 100% tested. MouseBud is fully protected from sand and dust, moisture ingress, electromagnetic interference and a multitude of other environmental stresses. The spring-loaded contact system is rated for 2000 mating cycles. Series 860 connectors are suitable for high-speed data, power, video and audio.

Panel mount MouseBud receptacles with “hot shoe” type contacts are suitable for hostile environments including soldier wearable electronics and tactical gear. Contacts are easy to clean and damage-resistant. These receptacle connectors meet MIL-STD-810G requirements for reliable performance in hostile environments—both mated and unmated. Connector attaches to panel with a stainless steel jam nut. A fluorosilicone O-ring provides panel sealing. Terminate to flex circuits with pc tail terminals, or choose solder cup terminals for wire attachment.



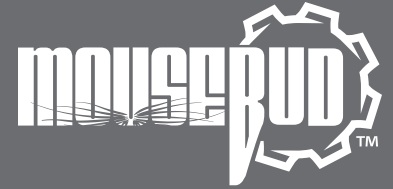
The MouseBud right angle plug features a single piece “cobra style” connector shell and a tightly fitting lid. A rubber gasket is sandwiched between the shell and lid to prevent moisture intrusion. The total height when mated to a rear panel mounted receptacle is well under 1/2 inch.

Overmolded MouseBud cordsets are available in two standard versions. Style 1 cordsets feature thermoplastic polyurethane cable jackets and polyamide overmolding. Style 2 cordsets with thermoplastic rubber (TPV) cable jackets and overmolding offer excellent cold bend performance down to -55° C.



- Self-locking auto-coupling, trigger-release mechanism
- Spring-loaded pins for extended durability and easy cleaning
- One meter, one hour water immersion
- 2000 cycles mechanical life
- High-speed data, power, video, and audio applications
- Meets MIL-STD-810G shock, vibration, immersion
- EMI protected with integral backshell and ground spring
- Ultra low-profile and lightweight

SERIES 860 MouseBud™



The snap-lock, trigger-release connector for helmets, vests, and other low-profile applications

MouseBud™ Plugs



Plug Cordsets

Overmolded cordsets with rugged tactical-grade shielded cable.

860-001P Overmolded Plug Cordset

860-002P Plug Cordset for USB+BAT (IAW US Army Personal Area Network, PAN protocol)

Plug Connector Construction

- Shell: stainless steel
- Bayonet pins, retainer ring and torsion spring: stainless steel
- Coupling ring: aluminum, 2 trigger sizes
- Lid: aluminum
- Contacts: copper alloy, gold plated
- Insert: glass-filled thermoplastic
- Ground spring: gold-plated stainless steel
- Gasket: fluorosilicone
- Potting compound: RTV silicone

MouseBud™ Receptacles



Panel Mount Receptacles

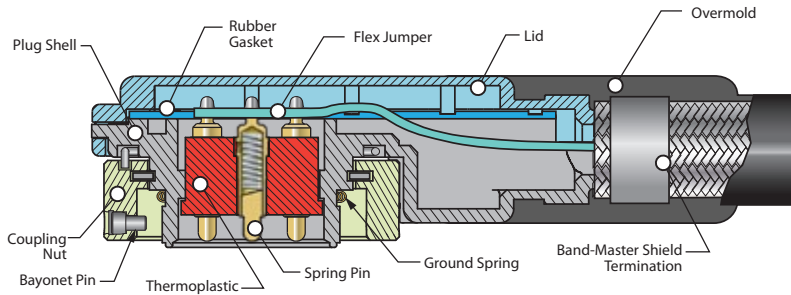
Jam nut mounting. Solder cup or printed circuit tails.

860-004R Panel Receptacle with PC Tails

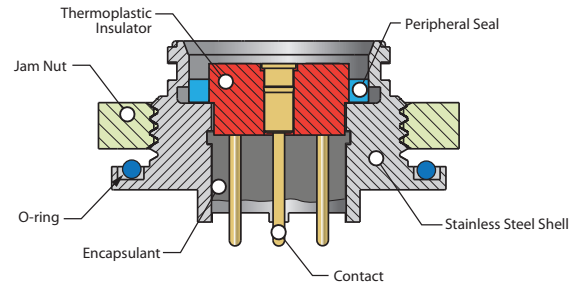
860-005R Panel Receptacle, Solder Cups

Panel Receptacle Construction

- Shell: stainless steel
- Jam nut: stainless steel
- Contacts: copper alloy, gold plated
- Insert: glass-filled thermoplastic
- O-ring: fluorosilicone
- Peripheral seal: fluorosilicone
- Potting compound: RTV silicone



Overmolded Plug Cordset



Panel Receptacle



Glenair MouseBud snap-lock, trigger-release connectors feature a spring-loaded contact system for excellent resistance to damage and debris entrapment. The biased plunger is machined from solid copper alloy for improved strength, durability, and electrical performance compared to plungers drawn from sheet metal.

MouseBud Specifications

MouseBud Specifications	
Voltage rating	500 VAC
Current rating	5 amps
Contact resistance	20 milliohms maximum
Plug-to-receptacle ground resistance	<5 milliohm
Maximum wire size	#24 AWG
Insulation resistance	5000 megohms min.
Water immersion	MIL-STD-810 Method 512, one meter for one hour
Durability	2000 mating cycles
Corrosion resistance	1000 hours
Sine vibration	EIA-364-28 condition IV, 20g peak
Random vibration	EIA-364-28 condition V letter H, 29g rms
Shock	EIA-364-27 condition D, 300g peak
EMI shielding effectiveness	40 dB minimum to 10 GHz



Wearable soldier electronics—from power supplies to PDAs—depend on environmentally sealed connectors and cables that meet soldier requirements for durability, handling, and reduced size. The Series 80 Mighty Mouse has become the de facto worldwide interconnect standard for future soldier systems.

- 6 coupling styles and 67 contact arrangements from 1 – 130 contacts
- MIL-DTL-38999 caliber environmental, mechanical, and electrical performance
- Ultraminiature #23 contacts set on .076" centers
- Size #20, #20HD, #16, #12, #8 signal, power, fiber optic and shielded contacts
- Discrete connectors and turnkey cable assemblies

SERIES 80 Mighty Mouse Connectors and Cables

The industry standard—used on virtually every future soldier platform

The Series 80 Mighty Mouse Connector is designed for use in high-reliability, mission-critical applications—from commercial aerospace to soldier systems—that require robust environmental and EMC performance as well as reduced size and weight. The Series 80 Mighty Mouse connector offers comparable performance to MIL-DTL-38999 interconnects with up to 71% weight and 52% size savings for similar contact layouts. The industry-standard Mighty Mouse is a mature connector series with a proven range of catalog and custom configurations.

Series 80 Mighty Mouse Connectors: Available in Environmental, Filtered, and Hermetic Versions					
Series 800	Series 801	Series 802	Series 803	Series 804	Series 805
Light-Duty UNF Thread	Rugged Double-Start ACME Thread	3500 PSI AquaMouse	Fast-Mate Bayonet Coupling	Quick-Disconnect Push-Pull	Ratcheted Triple-Start

SERIES 80 Ultraminiature Mighty Mouse Connectors and Cables



Series 80 Mighty Mouse Contact Arrangements														
Contact Size and Current Rating		Contact Quantity						Contact Arrangement*						
		#23	#20	#20HD	#16	#12	#8	Series 800	Series 801	Series 802	Series 803	Series 804	Series 805	
Size #23 Contacts 5 Amp Max. Current #22-#28 AWG 750 VAC DWV		3						5-3	5-3	5-3	5-3	5-3	N/A	
		4						6-4	6-4	6-4	6-4	6-4	8-4	
		6						6-6	6-6	6-6	6-6	6-6	8-6	
		7						6-7	6-7	6-7	6-7	6-7	8-7	
		10						7-10	7-10	7-10	7-10	7-10	9-10	
		13						8-13	8-13	8-13	8-13	8-13	10-13	
		19						9-19	9-19	9-19	9-19	9-19	11-19	
		26						10-26	10-26	10-26	10-26	10-26	12-26	
		31						N/A	11-31	N/A	N/A	11-31	13-31	
		37						12-37	13-37	12-37	12-37	12-37	15-37	
		55						N/A	16-55	14-55	14-55	14-55	18-55	
		85						N/A	17-85	15-85	N/A	N/A	19-85	
		100						N/A	19-100	N/A	N/A	N/A	21-100	
130						N/A	21-130	21-130	N/A	N/A	23-130			
Size #20HD Contacts 7.5 Amp Max. Current #20-#24 AWG 1000 VAC DWV				3				6-23	6-23	6-23	6-23	6-23	8-23	
				5				7-25	7-25	7-25	7-25	7-25	9-25	
				8				8-28	8-28	8-28	8-28	8-28	10-28	
				10				9-210	9-210	9-210	9-210	9-210	11-210	
				20				12-220	13-220	12-220	12-220	12-220	15-220	
				35				N/A	16-235	14-235	14-235	14-235	18-235	
				41				N/A	17-241	15-241	N/A	N/A	19-241	
				55				N/A	19-255	N/A	N/A	N/A	21-255	
Size #16 Contacts 13 Amp Max. Current #16-#20 AWG 1800 VAC DWV					1			6-1	6-1	6-1	6-1	6-1	8-1	
					2			8-2	8-2	8-2	8-2	8-2	10-2	
					4			9-4	9-4	9-4	9-4	9-4	11-4	
					5			10-5	10-5	10-5	10-5	10-5	12-5	
					7			12-7	13-7	12-7	12-7	12-7	15-7	
					12			N/A	16-12	14-12	14-12	14-12	18-12	
					14			N/A	17-14	15-14	N/A	N/A	19-14	
					19			N/A	19-19	N/A	N/A	N/A	21-19	
Size #12 Contacts 23 Amp Max. Current #12-#14 AWG 1800 VAC DWV						1		7-1	7-1	7-1	7-1	7-1	9-1	
						2		10-2	10-2	10-2	10-2	10-2	10-2	12-2
						2		12-2	13-2	12-2	12-2	12-2	12-2	15-2
						3		12-3	13-3	12-3	12-3	12-3	12-3	15-3
						5		N/A	16-5	14-5	14-5	14-5	14-5	18-5
						7		N/A	17-7	15-7	N/A	N/A	N/A	19-7
						12		N/A	21-12	21-12	N/A	N/A	N/A	23-12
Size #8 Contacts 46 Amp Max. Current #8 AWG 1800 VAC DWV						1		N/A	8-1	N/A	N/A	N/A	10-1	
						2		N/A	16-2	N/A	N/A	N/A	N/A	18-2
						3		N/A	17-3	N/A	N/A	N/A	N/A	19-3
						4		N/A	19-4	N/A	N/A	N/A	N/A	21-4
						5		N/A	21-5	N/A	N/A	N/A	N/A	23-5
Combo Arrangements 750 VAC DWV	Size #23 and #12 Contacts	12				1		10-200	10-200	10-200	10-200	10-200	12-200	
		4				2		10-201	10-201	10-201	10-201	10-201	12-201	
		6					2		12-200	13-200	12-200	12-200	12-200	15-200
		10					2		12-201	13-201	12-201	12-201	12-201	15-201
	Size #23 and #16 Contacts	4			2			9-200	9-200	9-200	9-200	9-200	11-200	
		8			2			10-202	10-202	10-202	10-202	10-202	12-202	
		4	2					8-200	8-200	8-200	8-200	8-200	10-200	
		8	2					9-201	9-201	9-201	9-201	9-201	11-201	
	Combo Arrangements 1300 VAC DWV	Size #23 and #16 Contacts	20			2			12-202	13-202	12-202	12-202	12-202	15-202
			12			4			12-203	13-203	12-203	12-203	12-203	15-203
40					2			N/A	16-204	14-204	14-204	14-204	18-204	
32					4			N/A	16-205	14-205	14-205	14-205	18-205	
Size #23 and #12 Contacts		40			4			N/A	17-203	15-203	N/A	N/A	19-203	
		12				2		12-204	13-204	12-204	12-204	12-204	15-204	
		4				4		12-205	13-205	12-205	12-205	12-205	15-205	
		34				2		N/A	16-206	14-206	14-206	14-206	18-206	
Size #23 and #8 Contacts		20				4		N/A	16-207	14-207	14-207	14-207	18-207	
		28				4		N/A	17-204	15-204	15-204	15-204	19-204	
	32					1	N/A	16-208	N/A	N/A	N/A	18-208		
	40					1	N/A	17-205	N/A	N/A	N/A	19-205		
						2	N/A	19-201	N/A	N/A	N/A	21-201		
						4	N/A	19-202	N/A	N/A	N/A	21-202		
						4	N/A	21-200	N/A	N/A	N/A	23-200		

* DWV rating is applicable to contact arrangements shown.

SuperJack™ is designed for small-footprint, multi-circuit blind-mate applications such as picatinny rail mounted weapons sights, night vision scopes, and laser targeting

SERIES 153

SuperJack™ Connectors

The ultra harsh-environment unipole connector system for audio, data, and power

The SuperJack connector is a rugged, lightweight, miniaturized connector featuring watertight sealing, 3 to 7 poles, EMI protection and heavy gold plating. The jack (receptacle) has spring-loaded contacts for low resistance and high durability. Plugs are available in two styles. Overmolded cordsets feature high strength lightweight jacketed cable. Blind mate chassis-mounted plugs feature solder cup or printed circuit board contacts. Jacks feature gold-plated canted springs for electrical grounding and mechanical retention of plug.

SuperJack is ideally suited for ultra harsh-environment interconnect applications such as are found on soldier communications gear, electronic weapons sights, noise-cancelling headsets, and vision systems. Panel-mounted SuperJack plugs are ideal for module-to-module connection. Chassis jacks are available with solder terminals or PC tails for easy termination to wire or flex circuits.



- 5 Amp current rating
- 5000 mating cycles
- 500 VDC
- EMI Shielded
- IP67 ingress protection
- Optional spring-loaded sealing flap in jack
- 3 – 7 circuit configurations
- Suitable for blind-mate applications
- Hardened for temperature extremes from -45° to +125° C

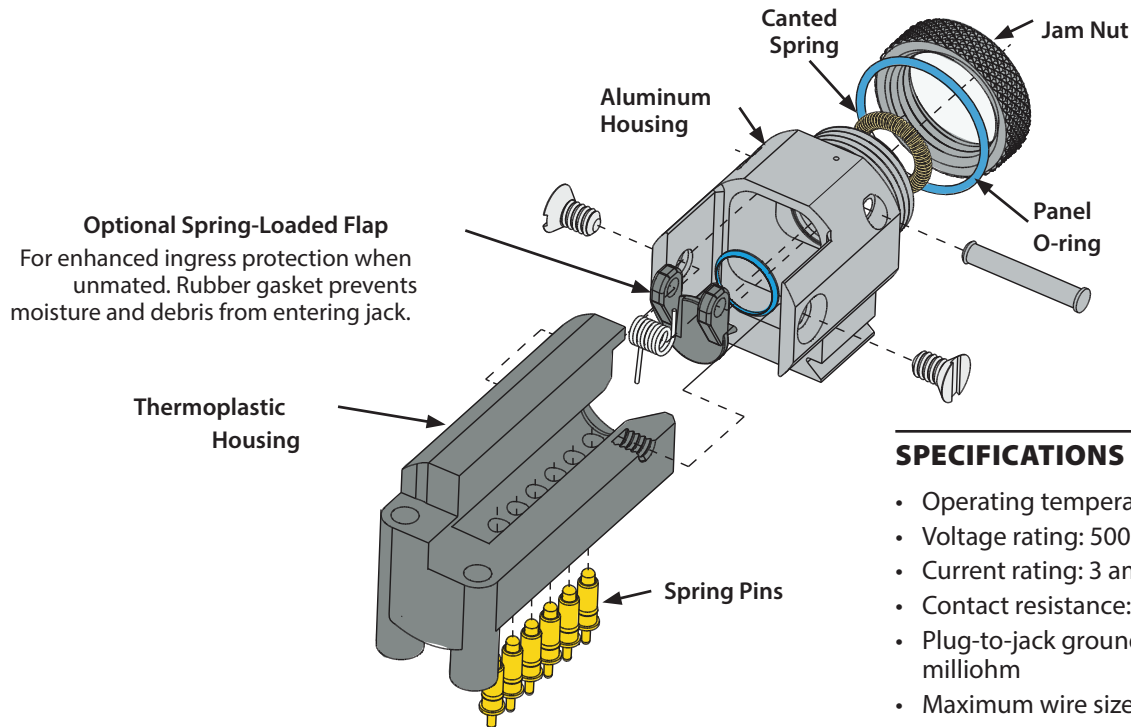
SERIES 153

SuperJack™ Connectors

The ultra harsh-environment unipole connector for audio, data, and power



TECHNICAL OVERVIEW



SPECIFICATIONS

- Operating temperature: -55°C. to +125°C.
- Voltage rating: 500 Vac
- Current rating: 3 amps
- Contact resistance: 20 milliohms max.
- Plug-to-jack ground resistance: <5 milliohm
- Maximum wire size: #24 AWG
- Insulation resistance: 200 megohms min.
- Water immersion: MIL-STD-810 Method 512, 1 meter water immersion for 1 hour
- Durability: 5000 mating cycles
- Corrosion resistance: 500 hours
- Sine vibration: EIA-364-28 condition IV, 20g peak
- Random vibration: EIA-364-28 condition V letter H, 29g rms
- Shock: EIA-364-27 condition D, 300g peak
- EMI shielding effectiveness: 40 dB min.

AVAILABLE STYLES



Plug and Jack Cordsets



Right-Angle Plug Cordset



Chassis Plug



Chassis Jack

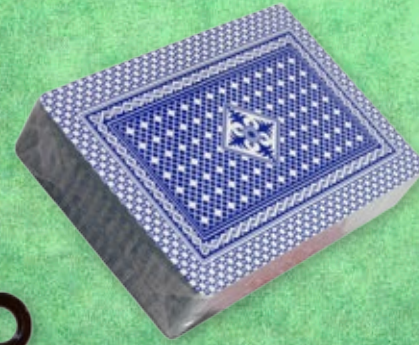


For more information
contact Glenair at
818-247-6000 or
visit our website at
www.glenair.com
U.S. CAGE code 06324

SOLVE THE EQUATIONS

Example: "A the W in 80 D"
 Equals "Around the World in 80 Days."
 The pictures might be clues!

1. 26 L of the A
2. 12 S of the Z
3. 8 S on a S S
4. 9 P in the SS
5. 88 K on the P K
6. 13 S on the A F
7. W F at 32 D F
8. 200 D for P G in M
9. 54 C in a D (with the J)
10. 90 D in a R A
11. 4 Q in a G
12. 1 W on a U
13. 5 D in a Z C
14. 29 D in F in a L Y
15. 11 P on a F T
16. 64 S on a C
17. It T 2 to T
18. 101 D
19. 57 H V
20. 24 H in a D



Answers posted February 15th
www.glenair.com/qwikconnect

Field data communications and networking rely on commercial standard RJ45 Ethernet and Universal Serial Bus (USB) technologies. SuperSeal™ ruggedized field connectors ensure these networks deliver reliable environmental and electromechanical performance



Series 801 Mighty Mouse Plug and Receptacle with SuperSeal® Micro-B USB

RJ45/USB

SuperSeal™ RJ45 and USB field connectors

Smallest form-factor high-performance solution for integration of the commercial USB interface, plus environmentally-sealed RJ45 and USB connectors in industry-standard MIL-DTL-38999 Series III packaging

- Superior sealing, IP67 in unmated condition compared to other available environmental circulars with RJ45 or USB
- Superior grounding for electrostatic discharge and EMC
- Superior cable shield termination with integrated banding platform
- Optional spring-loaded protective covers for environmental protection of junction boxes and switches
- Wide range of high speed Ethernet/network protocols supported, including USB 2.0

SUPERSEAL™ INNOVATIONS



Crimp contact termination
MIL-DTL-38999 Series III RJ45



PC tail and solder cup
termination



IP67 sealed and EMC grounded
RJ45 and USB inserts

Ruggedized SuperSeal™ Field Connectors and Cables



SUPERSEAL™ MIGHTY MOUSE MICRO-B USB CONNECTOR SELECTOR



Series 801 Plug Connector
with Micro-B USB



Series 801 In-Line Receptacle



Series 801
Square Flange Mount Receptacle



Series 801 Rear Panel
Jam Nut Mount Receptacle



Series 804 Plug Connector
with Micro-B USB



Series 804 In-Line Receptacle



Series 804
Rear Panel Jam Nut Mount
Receptacle



Series 804
Front Panel Jam Nut Mount
Receptacle



Plug-and-Play Micro-USB
Plug and Receptacle

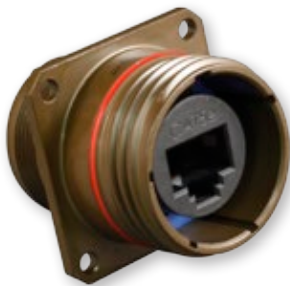


Plug-and-Play Micro-USB
Booted Cordset



Spring-Loaded cover for Series 804 Jam Nut Receptacles

SUPERSEAL™ MIL-DTL-38999 SERIES III TYPE RJ45 AND USB



MIL-DTL-38999 Series III with
sealed RJ45



MIL-DTL-38999 Series III with
USB jack and jumper



High-capacity, high-speed
USB data stick



Quadrax to RJ45
connector adapters



Quick disconnect (push-pull) cable-to-cable and cable-to-equipment interconnects frequently require locking mechanisms to prevent accidental demating. The Series 824 is the highest performance locking push-pull connector available today for soldier applications.

SERIES 824

Locking Push-Pull

Tactical Mighty Mouse connectors

Introducing the new Mighty Mouse Series 824 Locking Push-Pull Connector: all the familiar size, weight and performance advantages of the industry-standard Mighty Mouse 804 push-pull connector with a revolutionary low-profile locking coupling mechanism. Glenair's primary design goal in the development of the locking 824 was to bring mil-spec caliber connector performance to locking push-pull applications. The Series 824 Locking Push-Pull provides superior sealing, excellent EMI protection, low-profile ergonomic mating and demating, and easy crimp-contact termination. The locking push-pull mechanism delivers tactile and audible mating confirmation under even the most extreme field conditions. Built for long-term durability and reduced size and weight, the high-density Series 824 Locking Push-Pull connector far surpasses commercial caliber push-pull connectors in environmental sealing and EMC performance.

Specifications	
Current Rating	#23 5 AMPS, #16 13 AMPS, #12 23 AMPS
Dielectric Withstanding Voltage	#23 500 VAC RMS, #12 and #16 1800 VAC RMS
Insulation Resistance	5000 megohms minimum
Operating Temperature	-65° C to +150° C
Shock / Vibration	100 g / 16 g
Shell-to-Shell Resistance, Nickel Plated	2 milliohms maximum
Durability	2000 mating cycles
Breakaway Force	50 pounds minimum

Gold plated crimp contacts for #12 to #30 AWG wire



- **Fast mating, quick-release coupling mechanism**
- **31 insert arrangements**
- **Integrated cable shield termination platform**
- **Plug, in-line receptacle, and front- and rear-panel jam nut configurations**
- **Tactile and audible mating confirmation**
- **Tactical black zinc-nickel plating option**
- **Five alternate 3-key polarizations**

SERIES 824

Mighty Mouse Locking Push-Pull Connectors



How To Order Series 824 Locking Push-Pull Plug	
Sample Part Number	824-001 -06 M 8-1 P A
Product Series	824-001 Mighty Mouse Locking Push-Pull cable plug with integrated shield termination platform
Shell Style	-06 - Plug
Shell Material/Finish	See Table II
Shell Size/Contact Arrangement	See Table I
Contact Type	Connector supplied with contacts: P - Pin S - Socket Connector supplied without contacts: A - Pin B - Socket
Shell Key Position	Omit for single polarizing key. A (normal), B, C, D, E, F polarizing options per Table III

How To Order Series 824 Locking Push-Pull Receptacle	
Sample Part Number	824-003 -01 M 8-1 P A
Product Series	824-003 Mighty Mouse Locking Push-Pull cable receptacle with integrated shield termination platform
Shell Style	-01 - In-Line -07 - Rear-Panel Jam Nut Mount -00 - Front-Panel Jam Nut Mount
Shell Material/Finish	See Table II
Shell Size/Contact Arrangement	See Table I
Contact Type	Connector supplied with contacts: P - Pin S - Socket Connector supplied without contacts: A - Pin B - Socket
Shell Key Position	Omit for single polarizing key. A (normal), B, C, D, E, F polarizing options per Table III

Table I: Contact Arrangements					
Contact Arr.	No. of Contacts				
	#23	#20	#20HD	#16	#12
5-3	3				
6-1				1	
6-23			3		
6-4	4				
6-6	6				
6-7	7				
7-1					1
7-25			5		
7-10	10				
8-2				2	
8-28			8		
8-13	13				
8-200	4	2			
9-4				4	
9-210			10		
9-19	19				
9-200	4			2	
9-201	8	2			
10-2					2
10-5				5	
10-26	26				
10-200	12				1
10-201	4				2
10-202	8			2	
12-2					2
12-3					3
12-7				7	
12-220			20		
12-37	37				
12-200	6				2
12-201	10				2

Table III: Alternate Key Positions		
Position	A°	B°
A	150°	210°
B	45°	210°
C	45°	230°
D	140°	315°
E	150°	315°

Table II: Material and Finish	
M	Aluminum/Electroless Nickel RoHS Compliant
NF	Aluminum/Cadmium with Olive Drab Chromate
ZR	Aluminum/Zinc-Nickel with Non-Reflective Black Chromate RoHS Compliant
MT	Aluminum/Nickel-PTFE RoHS Compliant
Z1	Stainless Steel/Passivated RoHS Compliant

MATERIAL/FINISH

Barrel: Copper Alloy
 Shell/Release Sleeve: Aluminum Alloy or CRES
 Insulators: Liquid Crystal Polymer
 Interfacial Seal, O-Ring, Grommet: Fluorosilicone
 Contacts: Copper Alloy/Gold over Nickel Plating
 Spring: CRES/Gold Plated



For more information contact Glenair at **818-247-6000** or visit our website at **www.glenair.com**
 U.S. CAGE code 06324

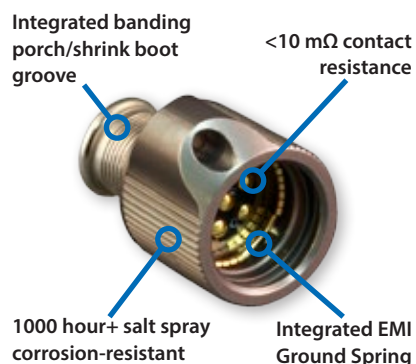


HiPer 55116 delivers improved mechanical, electrical, and environmental performance. Reduced size, superior materials, improved EMI shielding and better environmental sealing make HiPer 55116 the most advanced radio comm connector on the market.

SERIES 152 • MIL-DTL-55116 TYPE

HiPer 55116 Audio Frequency Connectors

Series 152 HiPer 55116 connectors offer significant performance advantages for modern soldier communication systems










Fully intermateable and interoperable with MIL-DTL-55116 connectors

- Intermateable and interoperable with standard MIL-DTL-55116 connectors
- Low contact resistance: less than 10 milliohms
- Integrated EMI ground spring provides improved 2.5 milliohm shell-to-shell conductivity performance
- IP68 rated sealing in mated and unmated condition, prevents water ingress into radio equipment
- 1,000 hour+ salt spray corrosion resistance
- Integrated cable shield termination band porch
- Superior 100 pound cable pull test rating

SERIES 152 HIGH PERFORMANCE MIL-DTL-55116 Type High-Performance Audio Frequency Connectors



Series 152 HiPer 55116 Selection Guide			
Part Description	Glenair P/N	Equivalent Mil P/N, "U" designator	Mates with
 Audio plug, field serviceable, with wire strain relief and rigid contacts	152-001	M55116/1 - /4 type U-229	152-003 HiPer 55116 type jam nut receptacle 152-004 HiPer 55116 type in-line receptacle 151-003 standard 55116 type jam nut receptacle 151-004 standard 55116 type in-line receptacle any M55116 receptacle
 Overmolded audio plug cordset with wire strain relief	152-006		
 Audio plug with shield termination porch, overmolding adapter and rigid contacts	152-002	M55116/5 - /8 type U-229	152-003 HiPer 55116 type jam nut receptacle 152-004 HiPer 55116 type in-line receptacle 151-003 standard 55116 type jam nut receptacle 151-004 standard 55116 type in-line receptacle any M55116 receptacle
 Overmolded audio plug cordset	152-005		
 In-line receptacle with shield termination porch, overmolding adapter, and non-rigid spring contacts	152-004	M55116/5 - /8 type U-229	152-003 HiPer 55116 type jam nut receptacle 152-004 HiPer 55116 type in-line receptacle 151-003 standard 55116 type jam nut receptacle 151-004 standard 55116 type in-line receptacle any M55116 receptacle
 Overmolded in-line receptacle cordset	152-007		
 Radio-mount jam nut receptacle with non-rigid spring contacts	152-003	M55116/9 - /10 type U-183	152-001 HiPer 55116 type plug 152-002 HiPer 55116 type plug 151-001 standard 55116 type plug 151-002 standard 55116 type plug any M55116 plug

Series 152 HiPer 55116 Performance Specifications	
Complies with all MIL-DTL-55116 specifications and exceeds the following performance criteria:	
Shell-to-shell conductivity	152-001 and -002 Plugs: 2.5 milliohms max. 152-003 receptacle: 2.5 milliohms max when mated to Glenair HiPer 55116 plug 152-001 or -002
Cable shield-to-shell conductivity	2.5 milliohms max.
Contact resistance (mated)	15 milliohms max. average; 20 milliohms max.
Water immersion (mated & un-mated)	152-002 plug, 152-003 receptacle: IP68 (10 meters of standing water for 1 hour)
Air Pressure	15 psi
Salt spray	1,000 hours (MIL-STD-202, Method 101E)
Cable pull-out force (unmated)	152-001 and -002 plugs: 100 lbs. (Cable shield strength dependent)
All other performance characteristics of Series 152 HiPer 55116 connectors are compliant with MIL-DTL-55116 (see table on Page 11 for specifications)	

The incorporation of ever-larger numbers of electronic equipment sets in mounted and dismounted soldier package applications requires package innovations that reduce I/O connector profiles and facilitate cable routing. Mighty Mouse Cobra is the lowest-profile right-angle I/O cable connector package available for standard Mighty Mouse series connectors.



MIGHTY MOUSE Cobra

The ultra-low profile EMI/RFI plug and backshell assembly

Innovative shielded low profile right angle connector plug and backshell assemblies reduce clearance requirements without compromising ruggedness or shielding performance. Available in Series 801 double-start, Series 804 QDC push-pull, and Series 805 triple-start, Cobra assemblies provide optimal low-profile cable routing and legendary Mighty Mouse connector performance in a single package. Each Cobra assembly is equipped with a removable rear cover and gasket for easy crimp or solder contact termination of the connector. Integrated low-profile backshell is equipped with an EMI/RFI shield termination platform and a shrink boot lip. The ultra-lightweight assembly may be clocked in eight different angle orientations for additional flexibility in cable routing. Connectors are equipped with polarization keying to prevent mis-mating. Glenair Mighty Mouse Cobra mates with available square flange and jam nut receptacles from each respective connector series. Fourteen contact arrangements are available, all with Size #23 contacts from shell size 5 to shell size 21 with 3-130 contacts respectively. Connector shells are aluminum alloy or stainless steel.



- **Space-saving design features one-piece machined and brazed connector shell and right angle backshell for minimum height and optimal EMI performance.**
- **Master key clocking enables easy cable entry/exit routing in eight angles**
- **Removable rear cover and gasket provides easy access to end of connector for crimp or solder contact termination**

SPECIFICATIONS

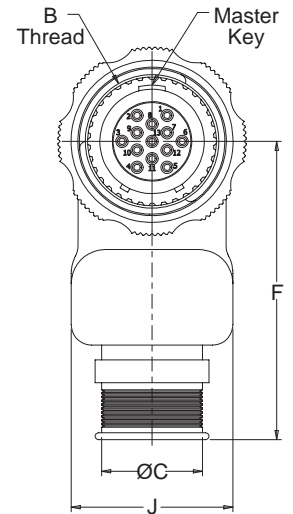
- Current Rating: #23 5 Amps
- Test Voltage (DWV) #23: 500 VAC Sea Level
- Insulation Resistance: 5000 megohms minimum
- Contact Resistance: 73 millivolt drop at 5 Amp test current
- Mating Cycles Series 801 and 804: 2000; Series 805: 500
- Operating Temperature: -55° C to +150° C
- Shielding Effectiveness: 50 dB min from 100MHz to 1000MHz.
- Magnetic Permeability: 2.0μ
- Vibration: 37g / Shock: 300g
- Immersion, mated: 1 meter water immersion for 1 hour

MIGHTY MOUSE Low-Profile Cobra Plug Connectors



805-061 triple-start with self-locking coupling nut, exploded view

How To Order Mighty Mouse Cobra Plug Connector and Backshell Assemblies	
Sample Part Number	801-069-26 ZNU 8-13 P A 1 05
Connector Series and Mighty Mouse Cobra Basic Part Number	801-069-26 Double-Start self-locking plug with ratchet mechanism (the clicker) 804-066-06 QDC Push-Pull plug 805-061-16 Triple-Start plug with ratcheting anti-decoupling mechanism
Material/Finish	M = Aluminum / Electroless Nickel RoHS Compliant NF = Aluminum / Cadmium with Olive Drab Chromate ZNU = Aluminum / Zinc-Nickel with Black Chromate MT = Aluminum / Nickel-PTFE RoHS Compliant ZI = Stainless Steel / Passivated RoHS Compliant
Shell Size - Contact Arrangement	See Table V - A: 801-069 B: 804-066 C: 805-061
Contact Style	A = Pin, Solder B = Socket, Solder P = Pin, Crimp S = Socket, Crimp
Polarization Key Position	A, B, C, D, E, F - See Table II
Cable Exit Direction	1, 2, 3, 4, 5, 6, 7, 8 - See Table I
Cable Entry Size	See Table VI



Cable Exit Direction Code	C°
1	0°
2	45°
3	90°
4	135°
5	180°
6	225°
7	270°
8	315°

	A°	B°
A	150°	210°
B	75°	210°
C	95°	230°
D	140°	275°
E	75°	275°
F	95°	210°

Code	Entry Size	Code	Entry Size
02	.125	10	.625
03	.188	11	.688
04	.250	12	.750
05	.313	13*	.813
06	.375	14*	.875
07	.438	15*	.938
08	.500	16*	1.000
09	.563	17*	1.063

* Entry codes 13-17 not available for Series 804 Cobra

A: 801-069			B: 804-066			C: 805-061		
Shell Size	Contact Arr.	Max Entry	Shell Size	Contact Arr.	Max Entry	Shell Size	Contact Arr.	Max Entry
5	5-3	03	5	5-3	03	8	8-4, 8-6, 8-7	04
6	6-4, 6-6, 6-7	04	6	6-4, 6-6, 6-7	04	9	9-10	05
7	7-10	05	7	7-10	05	10	10-13	06
8	8-13	06	8	8-13	06	11	11-19	07
9	9-19	07	9	9-19	07	12	12-26	08
10	10-26	08	10	10-26	08	13	13-31	09
11	11-31	09	12	12-37	10	15	15-37	10
13	13-37	10	14	14-55	12	18	18-55	12
16	16-55	12				19	19-85	13
17	17-85	13				21	21-100	15
19	19-100	15				23	23-130	17
21	21-130	17						

MATERIALS/FINISH

- Contacts: Copper alloy, gold plated
- Backshell Housing, Connector Shell, Coupling Nut and Lid: Aluminum or Stainless Steel
- Backshell Sealing Gasket and Interfacial Seal: Fluorosilicone
- Screws: 300 Series Stainless Steel
- Insulator: LCP

NOTES

- Rear insulator grommet not supplied.
- Cobra plugs mate with respective series receptacles with same layout, polarization and opposite contact gender.
- Hand crimp tool: P/N 809-015. Positioner for hand tool: P/N 809-005. Insertion/extraction tool P/N 809-088.
- Crimp barrel accommodates 22, 24, 26 and 28 gage wire.
- All Cobra plugs equipped with Size #23 contacts.

General-duty power and signal interconnection has for decades been reliably performed by MIL-DTL-24682 type connectors. Glenair IPT and IPT-SE versions of this standard bayonet and push-pull connector are widely and reliably used in military battery power cables, vehicle applications, and equipment charging systems.



SERIES IPT AND IPT-SE

Military Battery and Power Connectors



The Versatile MIL-C-26482 type connector is a medium-density power and signal connector used in a broad range of general-purpose and environmental applications. Typically supplied with bayonet mating and locking, special versions of the IPT are supplied without bayonets for fast push-pull mating. These "Q" series push-pull connectors are the industry standard configuration for M5590 and 2590 rechargeable lithium ion battery packs. Glenair supplies both discrete connectors as well as turnkey cable assemblies for battery applications, military vehicle applications, sensors, power generators, and more. Standard IPT series connectors feature resilient high-insulation synthetic neoprene inserts. IPT-SE versions utilize a hard plastic dielectric and crimp contact retention clips.

- Solder cup wire termination with optional crimp contacts
- Resilient environmental inserts
- Keyed polarization
- Standard bayonet as well as push-pull
- Intermateable with all industry-standard MIL-C-26482 Series I and qualified VG95328 connectors
- Straight and right-angle environmental overmolded cable assemblies
- Wide range of standard connector accessories



▶ Turnkey Glenair M2590 battery cable incorporating shrouded six-pin IPT push-pull connector with velcro strap attachment to Glenair Series 804 Mighty Mouse

SERIES IPT AND IPT-SE Military Battery and Power Connectors



IPT KEYED PUSH-PULL MILITARY BATTERY CONNECTORS



12-A6 six #16 gage contact push-pull IPT connector for battery applications



Right-angle overmolded cable assembly

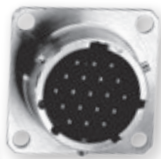


Available cable strain relief clamp

IPT AND IPT-SE CRIMP AND SOLDER CONTACT M26482 TYPE BAYONET-LOCK CONNECTOR



High-performance IPT-SE crimp-contact rigid dielectric bayonet-lock environmental connectors



Right-angle IPT bayonet plug with environmental EMI/RFI backshell



Available IPT connector accessories include designs with cable glands and cable shield termination

IPT-MB MIL-DTL-26482 MARINE BRONZE CONNECTORS



Harsh-environment marine bronze series for amphibious vehicles, landing craft and other high-corrosion applications

- Marine bronze alloy for superior corrosion resistance in seawater and other harsh environments
- Ideal for shipboard and amphibious applications
- IP67 environmental sealing in mated condition; IP68 available
- Power, signal as well as hybrid insert arrangements available
- Non-ferrous marine bronze material resists corrosion, galling, and galvanic interaction with adjacent equipment

IPT SUPERSEAL RJ45 AND USB BAYONET-LOCK FIELD CONNECTORS



Environmentally sealed CAT5 and CAT6 Ethernet interconnects for field applications



Available with RJ45 plug or jack inserts



Inserts are fully grounded and sealed



The reduction of interconnect cable size and weight is a primary goal of future soldier system design. Carry weights may be significantly reduced through the selection of lightweight microfilament EMI/RFI cable shielding. Both ArmorLite (microfilament stainless steel) and AmberStrand (metal-clad composite) shielding are widely used in wearable soldier equipment.



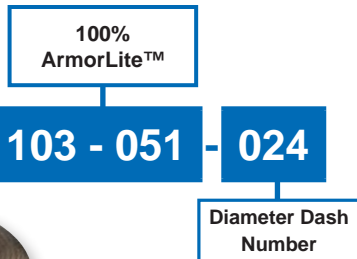
SERIES 103

Lightweight EMI/RFI Braided Shielding

Lightweight stainless steel ArmorLite™ and composite AmberStrand® microfilament braid save pounds compared to standard QQ-B-575/A-A-59569 copper braid

- Ultra-lightweight EMI/RFI braiding
- Microfilament stainless steel: 70% lighter than NiCu A-A-59569
- Outstanding EMI/RFI shielding and conductivity
- Reduce shielding weight up to 70% and more
- Superior flexibility and "windowing" resistance: 90 to 95% optical coverage
- 220,000 psi (min) tensile strength

ARMORLITE™



A single layer of ArmorLite™ Shields from 40dB to 80dB in Frequency Ranges from 30kHz to 2.5GHz. Now available in equipment ground straps

LIGHTWEIGHT ArmorLite™ and AmberStrand®



Microfilament nickel-clad EMI/RFI braided shielding

AmberStrand®



AmberStrand® is ultra-lightweight microfilament metal clad EMI/RFI composite braiding

- Metal-clad EMI/RFI Shielding with a lightweight composite thermoplastic base material
- Highly conductive surface plating
- Reduce shielding weight up to 80% and more
- Reduce soldier carry weights
- A superior high frequency shielding compared to tinned and/or nickel plated copper
- Exceptional tensile strength: 590,000 psi (min)

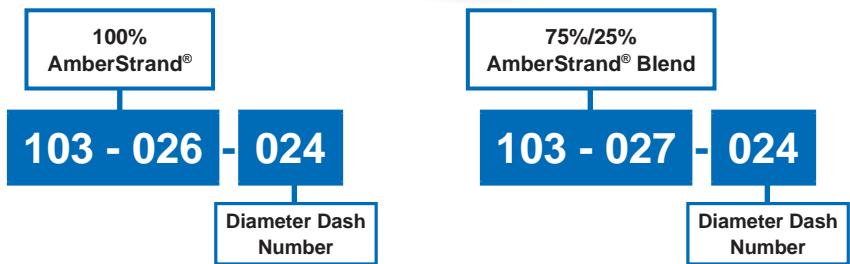


AmberStrand®: The smart way to reduce cable and assembly weights in soldier systems



Glenair can also offer AmberStrand® users direct factory overbraiding services for both point-to-point as well as multi-branch interconnect assemblies.

EMC shielded multibranch cable assembly with reduced-weight AmberStrand® metal-clad composite braided shielding



How does Amberstrand® compare, in terms of mechanical performance, to other materials?											
Material Type	AmberStrand® Thermoplastic	PEEK (Monofil)	Teflon (Yarn)	Kevlar (Yarn)	Dacron (Yarn)	Halar (Monofil)	Teflon FEP (Monofil)	Nomex (Yarn)	Polyester Type FR (Monofil)	Ryton Type R-7 (Monofil)	PTFE-Glass (Yarn)
Glenair P/N	103-026 103-027	102-051	102-061	102-071	102-073	102-023	102-060	103-013	102-001 102-002	102-080	100-022
Temperature Range	-65°C to +200°C	-65°C to +260°C	-55°C to +200°C	-73°C to +175°C	-62°C to +150°C	-65°C to +200°C	-55°C to +260°C	-55°C to +125°C	-55°C to +200°C	-65°C to +200°C	-75°C to +525°C
Tensile Strength (PSI) Yield	590,000	780,000	40,000	400,000	160,000	35,000	14,000	90,000	50,000	19,000	450,000
Elongation Percentage	2.5%	38%	19%	3.6%	12%	15%	50%	25%	20%	35%	5%
Chemical Resistance	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Good	Excellent	Excellent
Abrasion Resistance	Good	Excellent	Good	Good	Excellent	Excellent	Good	Good	Good	Excellent	Excellent
Specific Gravity	1.45	1.30	2.10	1.44	1.38	1.68	2.17	1.58	1.38	1.25	2.50
Flammability	Will Not Burn	Very Low	Will Not Burn	Will Not Melt	Flammable	Flammable	Very Low	Will Not Melt	Very Low	Very Low	Will Not Burn

CATALOG CORDSETS AND SPECIAL JUMPERS for soldier system power, signal, and data applications



STANDARD AND HIGH-SPEED CATALOG CORDSETS

Turnkey, fast-turnaround solutions

Catalog cordsets for soldier C4ISR applications		
		
Native Mighty Mouse to Mighty Mouse point-to-point cordsets with polyamide or high-temp rubber overmolding and shielded, jacketed cable for high-speed applications	Mighty Mouse to commercial USB point-to-point cordsets with polyamide or high-temp rubber overmolding and shielded, jacketed cable for Universal Serial Bus applications	Mighty Mouse to commercial RJ45 point-to-point cordsets with polyamide or high-temp rubber overmolding and shielded, jacketed cable for Cat 5 and Cat 6 Ethernet applications
		
Series 88 SuperFly™ catalog cordsets feature high-flexibility GhostWire cable in overmolded, shielded, and fabric braided versions	Ultra low-profile MouseBud™ cordset with customer's choice of Mighty Mouse or other small form-factor I/O connector	MIL-DTL-38999 Series III type RJ45 SuperSeal™ cordsets (shown here with commercial RJ45 plug)
Special application, point-to-point cordsets for wearable soldier applications		
		
Unique overmolding compounds, jacketing and overbraid materials available on a build-to-print basis, including flat broom-stitch designs	Power module jumper cable with industry-standard MIL-C-26482 (Glenair Series IPT) and Mighty Mouse Series 804 push-pull	Ethernet / high-speed jumpers incorporating Glenair's range of small form-factor interconnects—from Mighty Mouse to SuperFly
		
Special MIL-DTL-38999 Series III type Quadrax to rear-panel-mount RJ45 SuperSeal jumper with special flop lid protective cover	Coil-cord technology for headsets and radio communications	Catalog and build-to-print flex jumpers incorporating Glenair small form-factor I/O and board interconnects

MULTIBRANCH BUILD-TO-PRINT CABLE ASSEMBLIES for soldier system power, signal, and data applications



TURNKEY COMPLEX AND MULTIBRANCH CABLE ASSEMBLIES

Save time, labor, and engineering bandwidth with Glenair
Mighty Mouse, SuperFly™ and SuperSeal™ cable assemblies



Overmolded breakout assembly featuring 100% Glenair content; a true turnkey solution



Non-environmental aircraft cable with integrated circuit breakout box and Mighty Mouse 804 push-pull connectors



Multibranch cable assembly with Glenair Mighty Mouse, HiPer-D M24308 and customer-supplied power connector



Heads-up display (HUD) cable with custom Series 804 Mighty Mouse and low-profile cable routing



Turnkey overmolded GPS cable assembly with integrated switch



Series 88 SuperFly™ overmolded cable assembly with ultra-flexible GhostWire cable



Environmental cable with Glenair Series 804 Mighty Mouse, Series 79 Micro-Crimp, and RF Coax terminations



Hybrid Mighty Mouse and Micro-D aircraft pilot helmet cable assembly

INTEGRATED SUB-SYSTEMS AND ASSEMBLIES for soldier system power, signal, and data applications



TURNKEY ENGINEERING, FABRICATION, AND ASSEMBLY

Integrated electronic equipment assemblies—built around Glenair small form-factor connectors and wire protection technologies

Glenair ultra-small form-factor interconnects are used in hundreds of the most advanced land, sea, air and space applications. Today, our factory is positioned to meet every requirement for complex integrated systems—from cable and enclosure design to turnkey electronic system packaging. Glenair is your one-stop-shopping solution for integrated interconnect cabling and electronic equipment



Lightweight soldier system with ruggedized computing, radio communications, power supply and tactical USB/networking patchcords—all integrated with turnkey Glenair connector technology.



Ultra-flexible RF cable assembly, USB hub, and connectorized black box enclosure—tested, terminated, and ready for immediate application



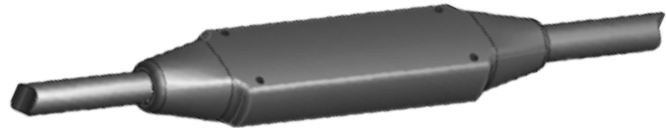
Turnkey integrated cable and EUD assembly featuring Mighty Mouse, 55116 audio and USB interconnects—all fabricated, assembled and tested by Glenair's integrated systems group



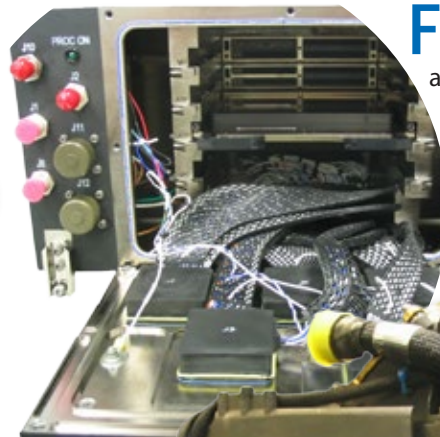
INTEGRATED SUB-SYSTEMS AND ASSEMBLIES for soldier system power, signal, and data applications



USB 3.0 Flash Drive Features Series 804 Mighty Mouse Push/Pull ruggedized interface available with 8GB, 16GB, 32GB or 64GB storage capacities. Designed for ground soldier data upload and download; IP67 sealed for harsh environments.



Ethernet-to-USB 2.0 and RS232-to-USB 2.0 Cordset with In-line overmolded conversion adapters. Unique Glenair solution to mixed-protocol network environments.



From simple integration projects like the USB 3.0 flash drive shown above, to highly-complex integrated assemblies such as this helicopter FLIR package, Glenair has become the industry's design partner and turnkey fabrication and assembly supplier.



AN/PRC-148, AN/PRC-152, 152A, 154 and RF-7800T Radio Connectors with Series 804 Mighty Mouse Push/Pull Interface. Radio connector cables are available as cabled, un-cabled, and pigtail versions. Radio interface features spring-loaded contacts for reliable and mating and are 100% electrically tested for shorts, continuity and insulation resistance at 200 Megohms minimum.



Connectorized (Series 804 Mighty Mouse push-pull) PDA for ruggedized/tactical applications.



Taking the Time to Salute

One of my mentors told me a sure sign of wisdom and maturity is an individual's ability to sincerely express thanks and gratitude. Over the last dozen years or so, especially since 9/11, a lot of "wise and mature" people have made it their habit to express their thanks to members of the armed forces that they come across at airports, restaurants, ball games and elsewhere. I can't think of a more correct and positive behavior.



That these service men and women are heroes—in dozens of ways both big and small—doesn't just go without saying. They are our front line in a dangerous and challenging world and their service and sacrifice not only deserves our tacit recognition and respect, it deserves our vocal and personal affirmation as well; so hats off and thank you to all the men and women of the armed forces throughout the world that work so hard and sacrifice so much to make our lives safer, richer and happier.

I believe what we do at Glenair—designing, building and marketing interconnect technology—also requires dedication, commitment and sometimes even sacrifice. While the gravity of our work pales in comparison to the heavy lifting soldiers, sailors and others in uniform perform on our behalf, it still adds significant value to the world and is an integral part of what makes the defense and security of our nation possible. So doing my best to be "wise and mature" in word as well as deed, I wanted to take a moment to celebrate the hard work of our own "front line." The men and women of our sales and marketing team that live so much of their lives out on the road, knocking on doors for Glenair.

I was recently chatting with one of our senior marketing road-warriors and was pleasantly shocked to hear that in the past month he had travelled to no fewer than four continents, calling on literally dozens and dozens of customers—several of them in truly out-of-the-way places with names I admit I can't even pronounce. Talk about dedication and sacrifice! And of course he is just one of over a hundred front-line sales professionals in North America, Europe and Asia that bring equal amounts of dedication and commitment to their work. So if I don't say it as frequently and as loudly as I need to, let me make up for it now: *Thank you, thank you, thank you.* And to you and everyone on the Glenair team, best wishes for a healthy and prosperous 2015.

Chris Toomey

Publisher

Christopher J. Toomey

Executive Editor

Marcus Kaufman

Managing Editor

Carl Foote

Editor/Art Director

Mike Borgsdorf

Graphic Designer

George Ramirez

Technical Consultant

Jim Donaldson

Issue Contributors

Eran Agami
 Lisa Amling
 Deniz Armani
 Josh Castrey
 Eric Griswald
 Lutz Mueller
 Chris Parsons
 Grant Turnbull

Distribution

Terry White

QwikConnect is published quarterly by Glenair, Inc. and printed in the U.S.A. All rights reserved. © Copyright 2015 Glenair, Inc. A complete archive of past issues of QwikConnect is available on the Internet at www.glenair.com/qwikconnect

GLENAIR, INC.

1211 AIR WAY
 GLENDALE, CA 91201-2497
 TEL: 818-247-6000
 FAX: 818-500-9912
 E-MAIL: sales@glenair.com
www.glenair.com

