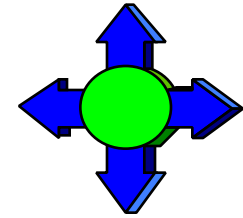


3M Low Cost, Small Form Factor Optical Interconnect Proposal



PROPOSAL

for the

**New, Low Cost, Small Form Factor
Optical Interconnect System**

IEEE 802.3z

Gigabit Ethernet

March 10-14, 1997

Tad Szostak
3M Company
6801 River Place Blvd. MS A147-2N-01
Austin, TX 78726
Tel: 512.984.3847
E-mail: tszostak1@mmm.com

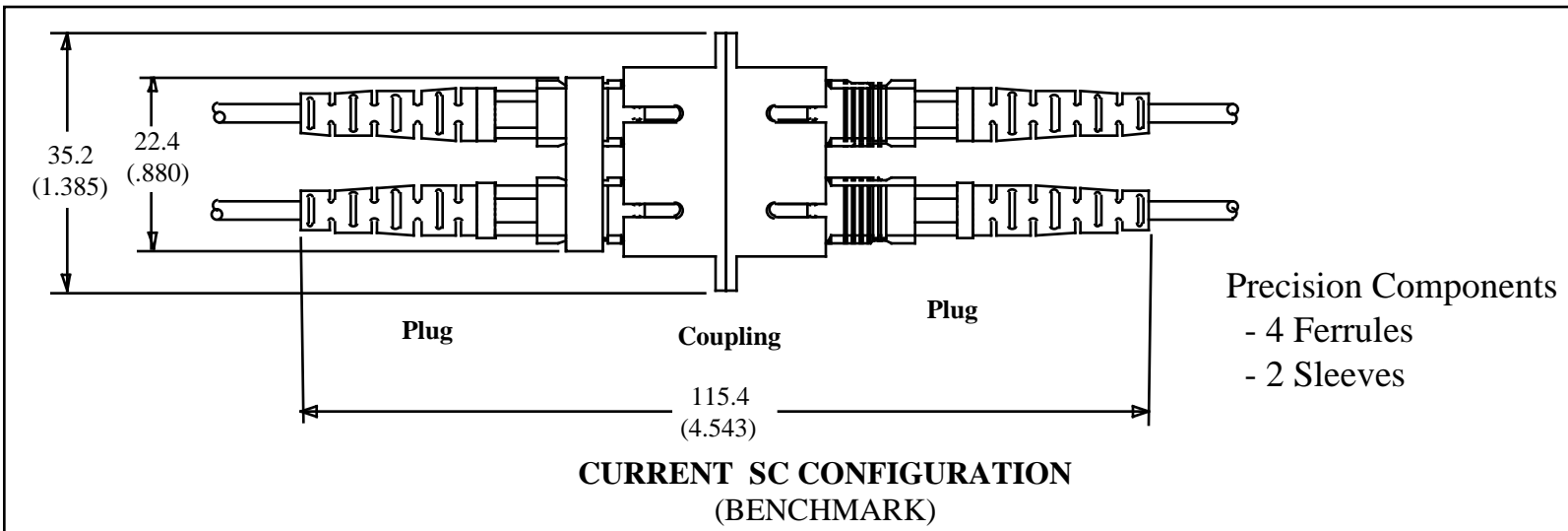
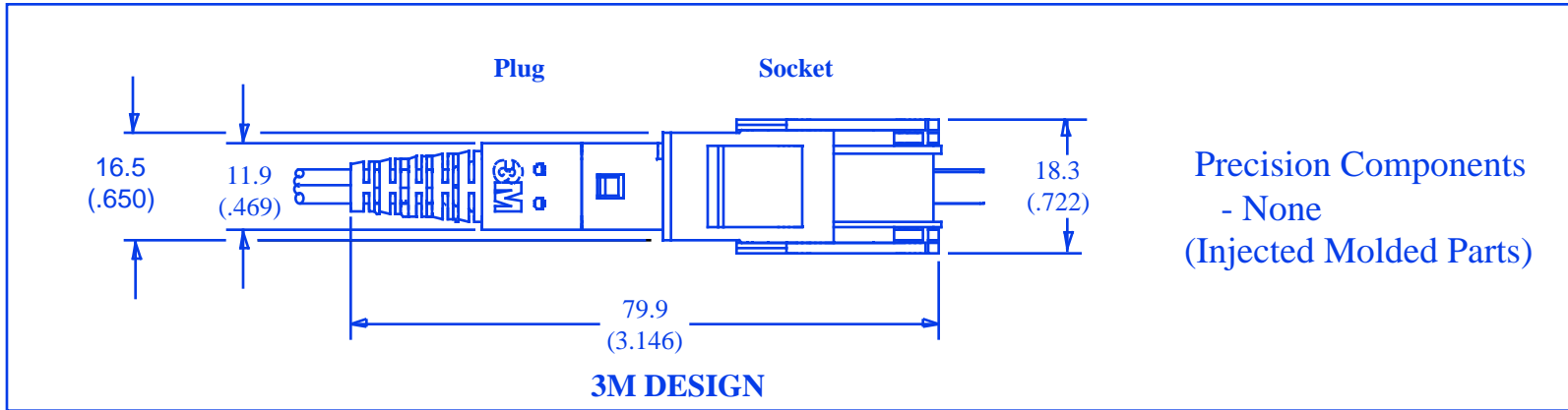
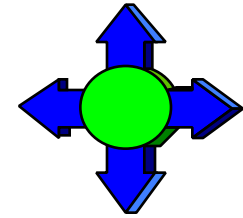
3M TSD

John Bowerman
Honeywell Micro Switch
830 E. Arapaho Rd.
Richardson, TX 75081-2241
Tel. 972.470.4553
jbowerma@micro.honeywell.com

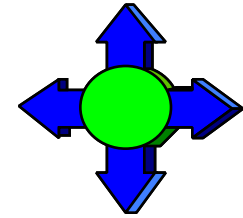
3/10/97

Honeywell

Low Cost, Small Form Factor Optical Interconnect Proposal - Outline



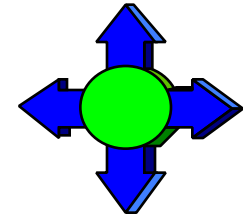
3M Low Cost, Small Form Factor Optical Interconnect Proposal - Development Criteria's



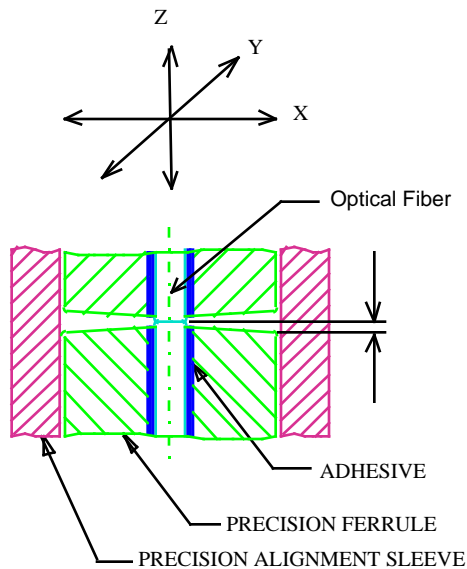
End Users Key Requirements Summary

- ▶ **Significant Improvement over SC**
- ▶ **Low Cost** (50% of Duplex SC)
 - components
 - installation (in-field, factory)
- ▶ **Small Size** (50% of duplex SC)
 - High Density (Reduced Real Estate, Cross Section)
 - PCI Mezzanine Height
 - Fiber Spacing
- ▶ **Duplex/Polarized**
- ▶ **Multi Mode** (62.5 and 50 μm)
- ▶ **Performance** Compliant with ISO 11801 and TIA-568A Premises Cabling Standards
- ▶ **All Source Technologies**
- ▶ **No Keying/Keying for Safety**
- ▶ **Dust Protection**
- ▶ **Ergonomics** (Fingers Access, Alignment)

3M Low Cost, Small Form Factor Optical Interconnect Proposal - Attributes Controlling Optical Performance/Cost

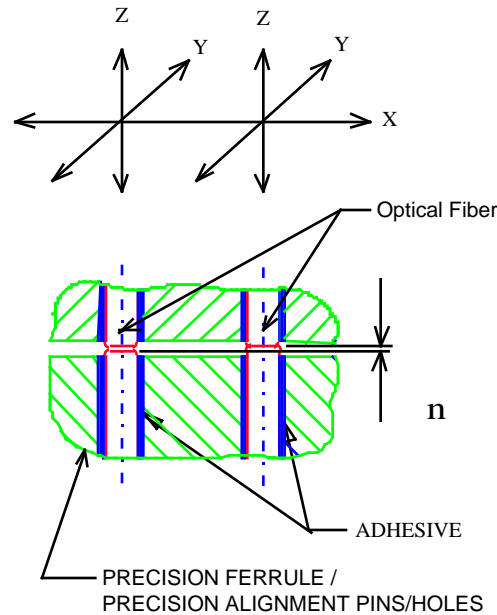


Benchmark SC
(Cylindrical Ferrule's)



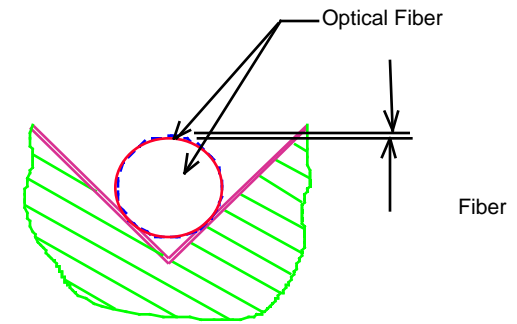
Optical Performance:
X-Y-Z Fiber Alignment

MT Like
(Rectangular Ferrule)



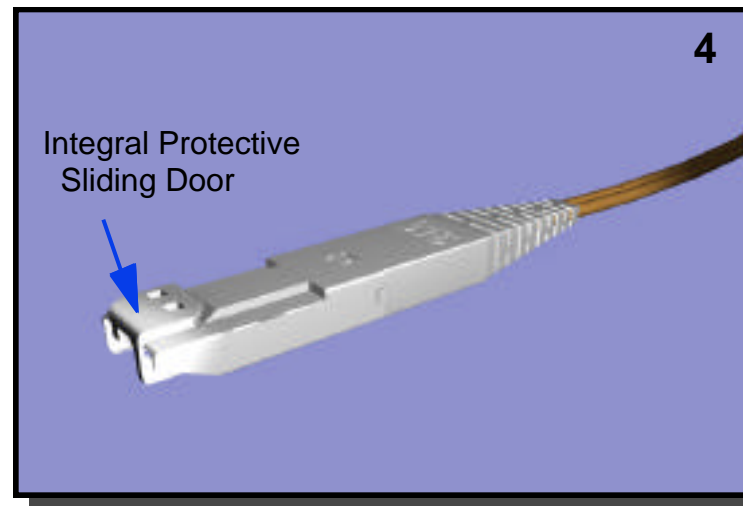
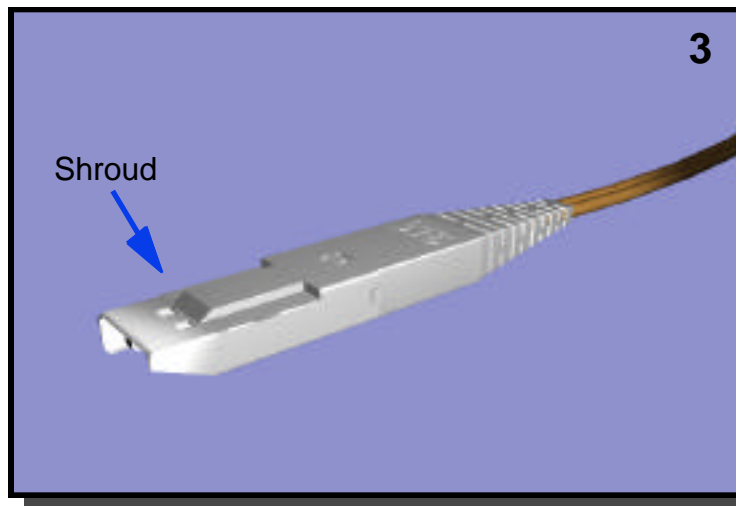
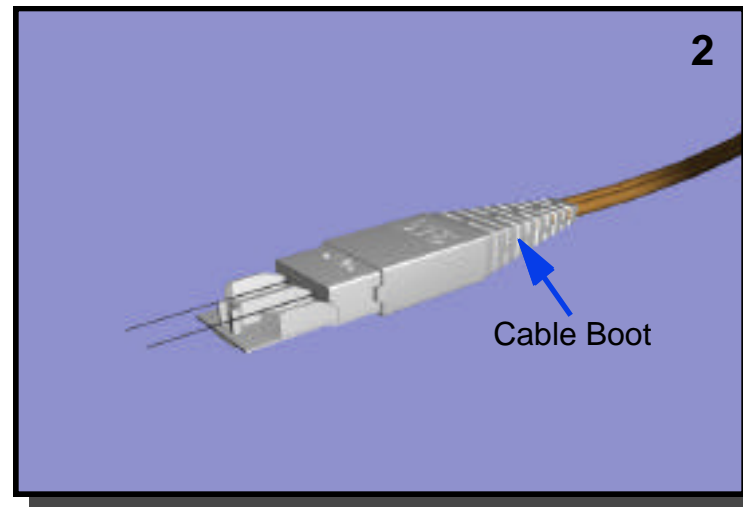
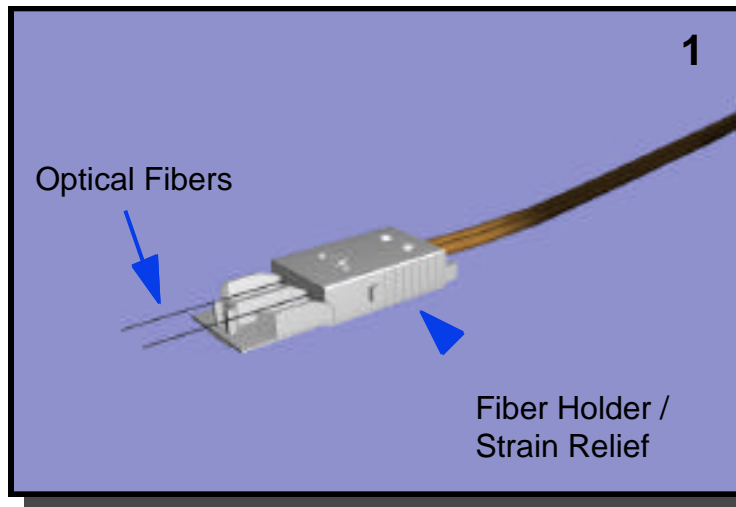
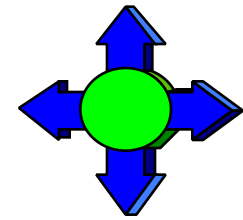
Optical Performance:
X-Y-Z Fiber Alignment

3M (Galaxy)
(No Ferrules)

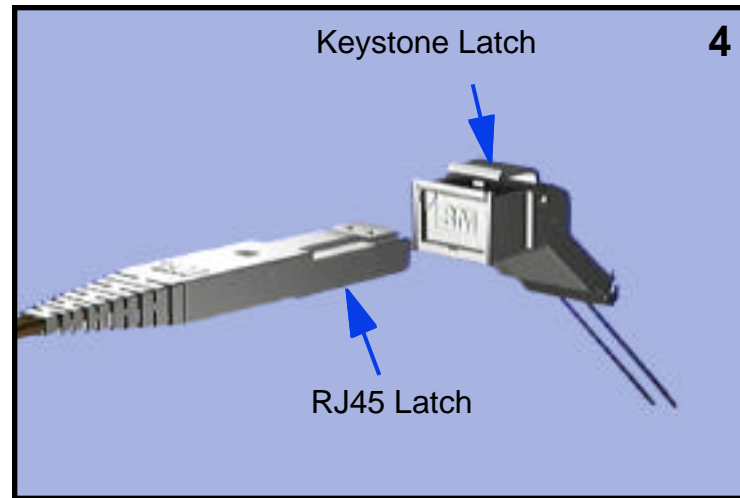
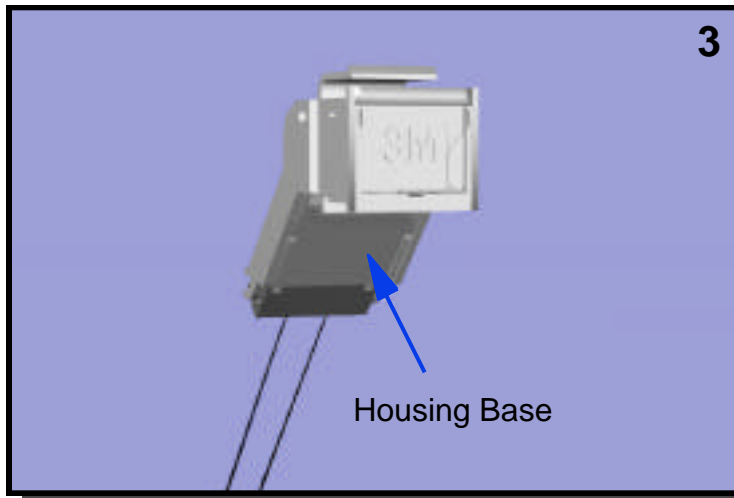
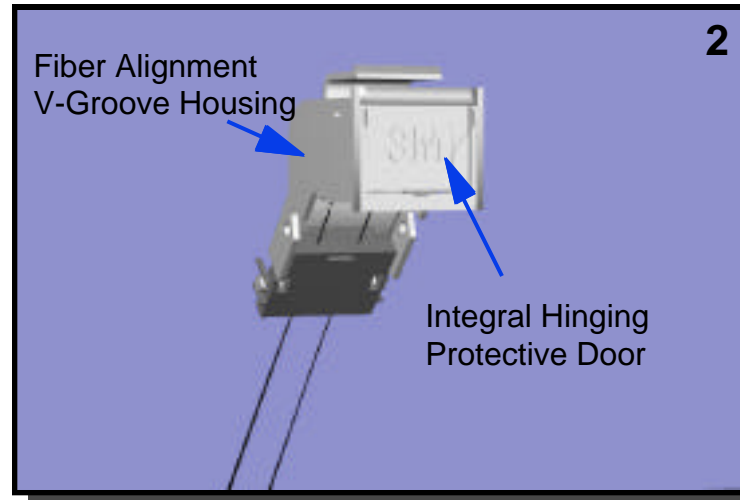
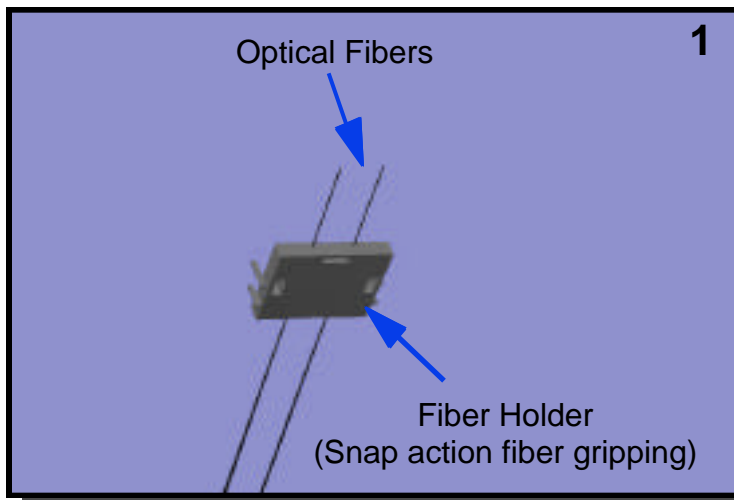
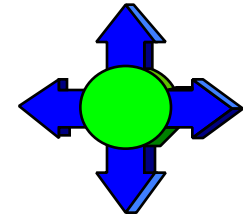


Optical Performance:
Self Alignment of Optical Fiber
Typ. Tolerance: Multi Mode - 3 μm
Single Mode - 0.8 μm

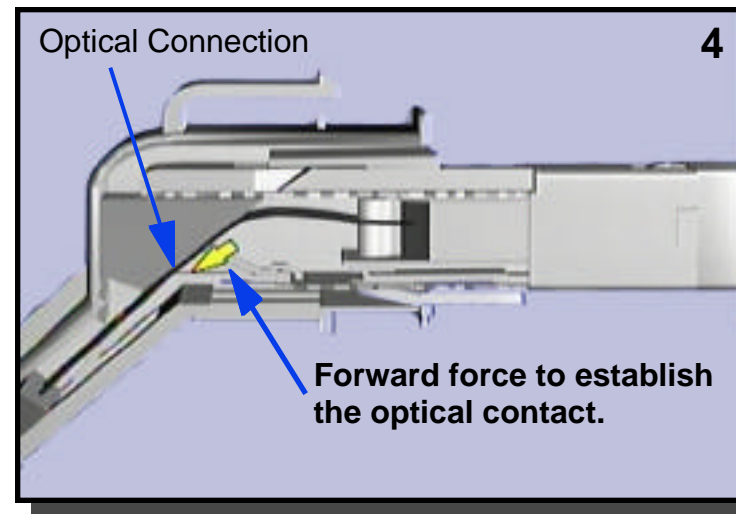
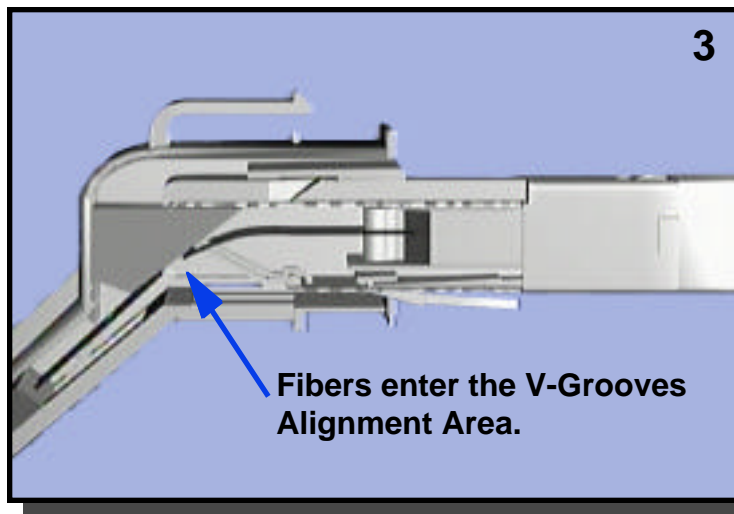
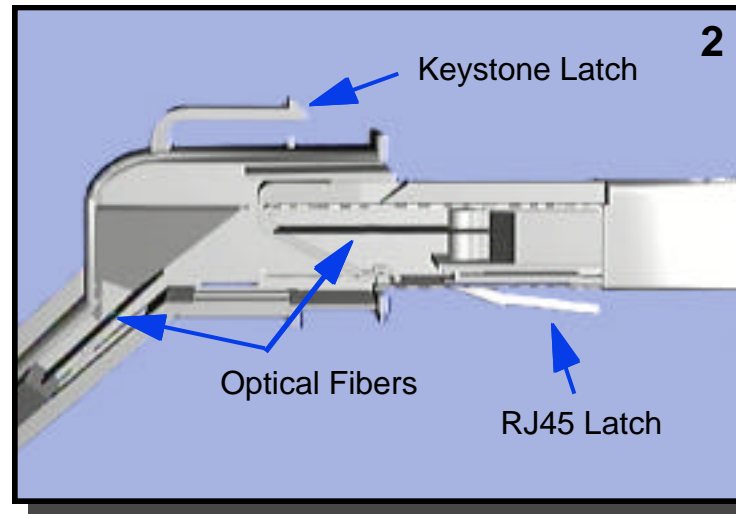
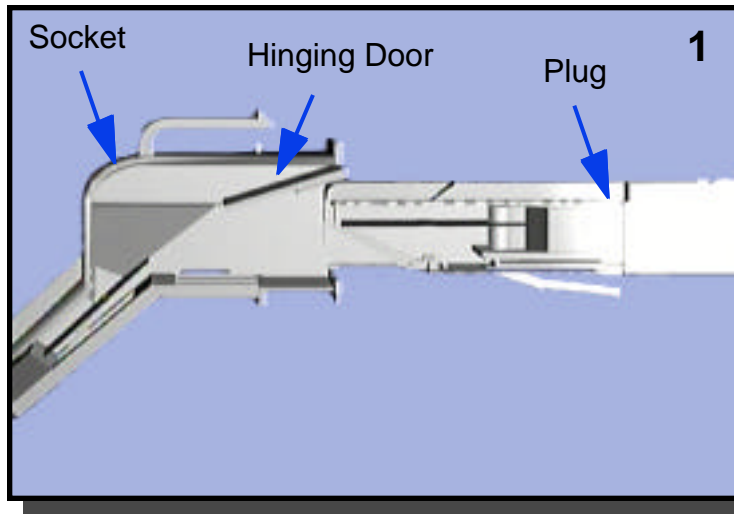
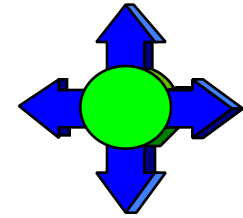
3M Low Cost, Small Form Factor Optical Interconnect Proposal - Patch Cord/Plug, Assembly Sequence



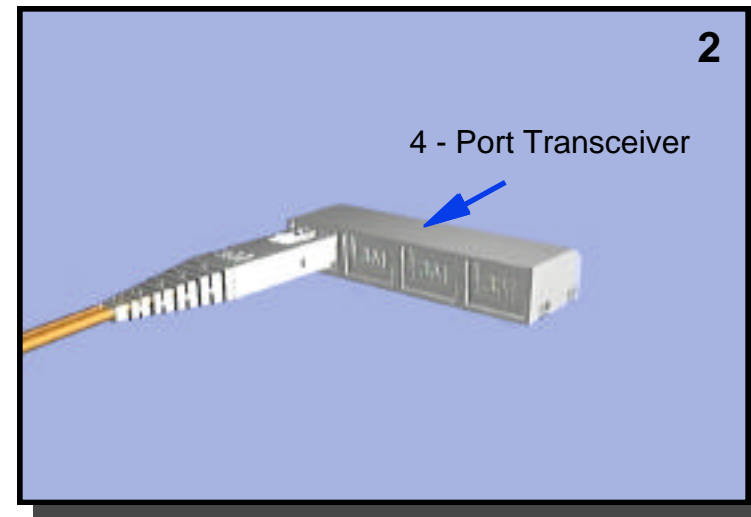
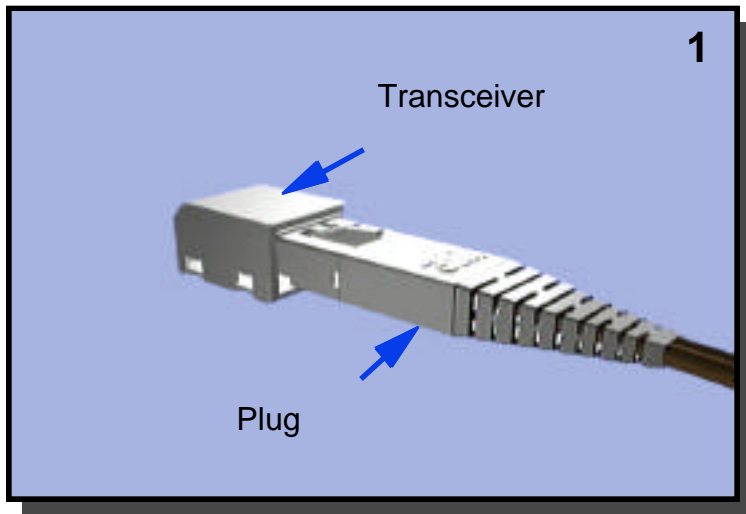
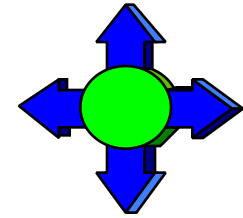
3M Low Cost, Small Form Factor Optical Interconnect Proposal - Socket Assembly



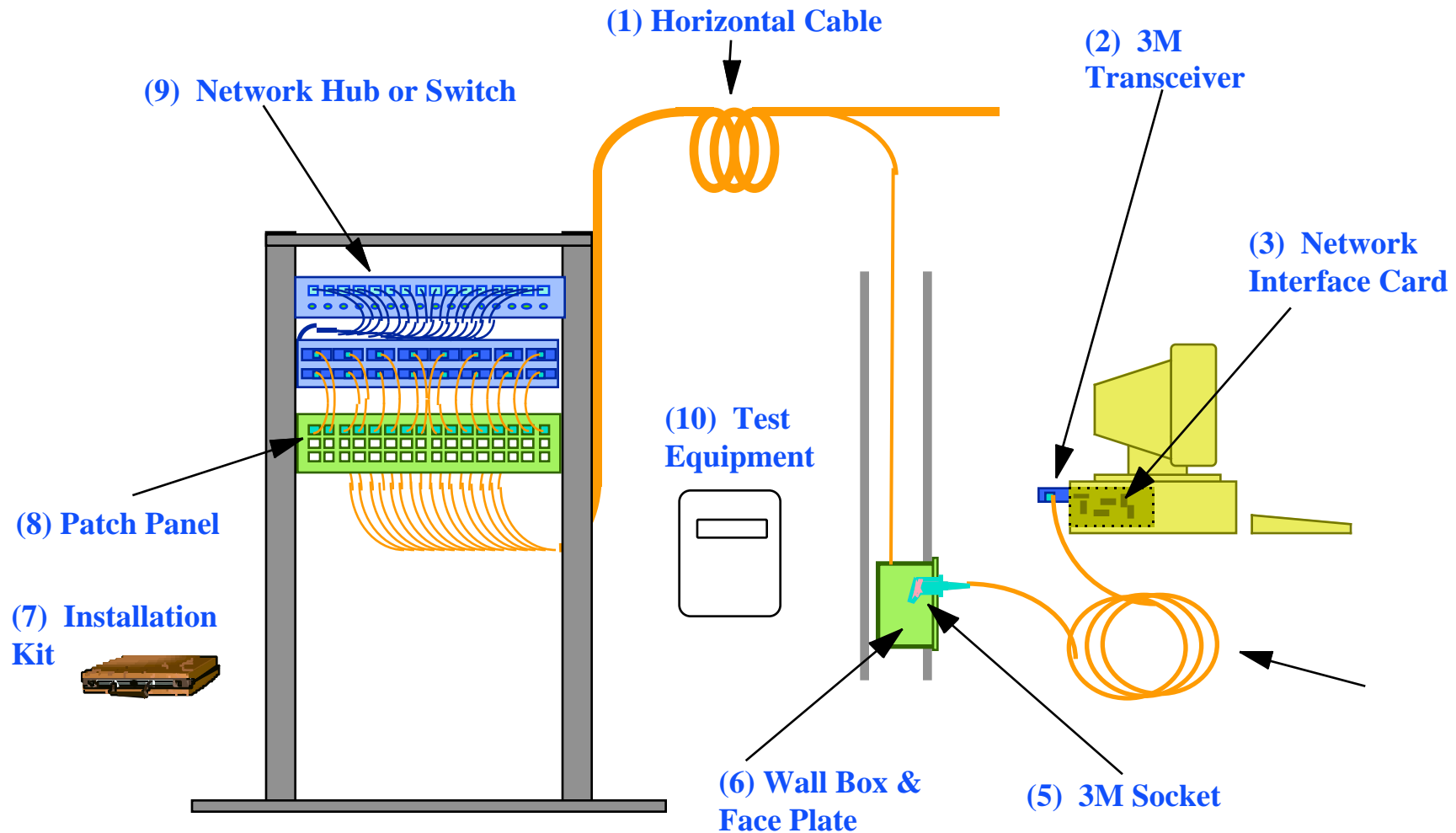
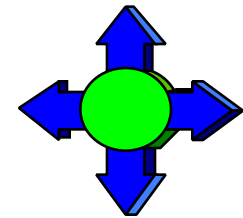
3M Low Cost, Small Form Factor Optical Interconnect Proposal - Principle of Operation



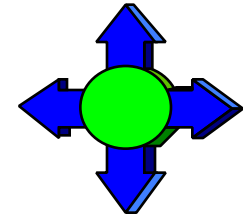
3M Low Cost, Small Form Factor Optical Interconnect Proposal - Typical PCI Card Applications



3M Low Cost, Small Form Factor Optical Interconnect Proposal - System Solution

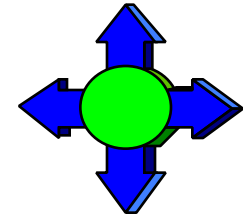


3M Low Cost, Small Form Factor Optical Interconnect Proposal - Features and Benefits



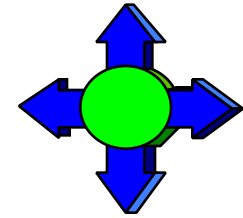
Features	Benefits
<ul style="list-style-type: none">▶ V-Groove Self Alignment (No Precision Components Including Ferrules, Alignment Sleeves or Pins)▶ Plug and Socket (No Adapter)▶ Three Piece Snap-In Assembly (No Adhesives, Curing)▶ Fiber Bow - Maintains Optical Contact ▶ Duplex/Multiple Fiber Connection ▶ RJ-45 Style Latch ▶ Performance	<ul style="list-style-type: none">▶ Low Cost, Proven Technology (Optical Fiber Splicing)▶ Low Cost▶ Fast, Cost Effective In-Field Termination in < 2 Minutes. Ease of Use.▶ Low Cost, Performance, Simplicity and Ease of Termination▶ Duplex - Half the Time/Cost of Duplex SC Termination▶ High Density - Half the Size of Duplex SC▶ Ease of Use, Familiarity, Cost Effective Hardware▶ Compliant with ANSI/EIA/TIA-568A ISO 11801 Premises Cabling and TIA/EIA and ISO/IEC Component Standards

3M Low Cost, Small Form Factor Optical Interconnect Proposal - Licensing and Availability



- ▶ 3M/Honeywell Will Provide Licensing in Accordance with ANSI Licensing Policy
- ▶ ANSI, ASC X3T11, Fibre Channel Gigabit interface standard
- ▶ ANSI/TIA/EIA FO-6.3 Component Standardization in Process
- ▶ ANSI/TIA/EIA TR-41.8.1 Premises Cabling (568A) in process
- ▶ Multiple Sourcing Discussion in Process
- ▶ Availability:
 - Production, Beginning 2nd Quarter of 1997

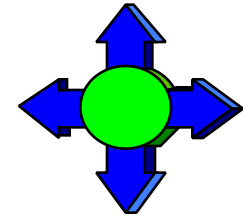
3M Low Cost, Small Form Factor Optical Interconnect Proposal - Cost



Proposed Interconnect Cost is Presently Seven Times Lower Than the Industry Benchmark Duplex SC Due To:

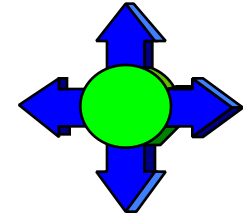
- ▶ Elimination of All Precision Components (Ferrules and Sleeves)
- ▶ Elimination of Alignment Coupling/Adapter
- ▶ Minimum Component Count
- ▶ Use of readily Available Materials and Transferable Technologies
(Injection Molding)
- ▶ Elimination of Adhesives and Corresponding Accessories
- ▶ Simplicity and Efficiency of Installation

3M Low Cost, Small Form Factor Optical Interconnect Proposal - Summary and Recommendations



- ▶ The Outlined Proposal Meets or Exceeds the End User's Development Criteria's and Performance Requirements
- ▶ The Proposal Applied Cost is Presently Seven Times Lower Than the Industry Benchmark, Duplex SC
- ▶ The Performance and Reliability Values are Based on the Extensive Testing
- ▶ 3M and Honeywell Propose to the IEEE, 802.3z Gigabit Ethernet Committee to Accept This Contribution as Basis for the Development of a New, Low Cost, Small Form Factor Optical Interconnect

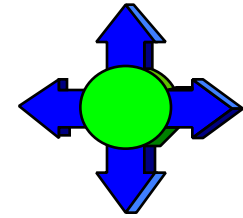
3M Low Cost, Small Form Factor Optical Interconnect Proposal



ATTACHMENTS

3M (GALAXY) PROPOSAL

3M Low Cost, Small Form Factor Optical Interconnect Proposal - Data Sheet

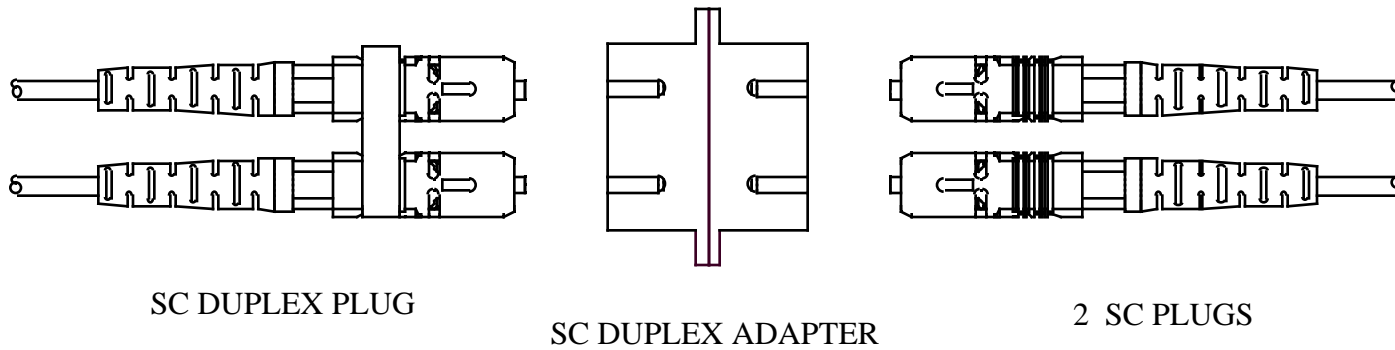
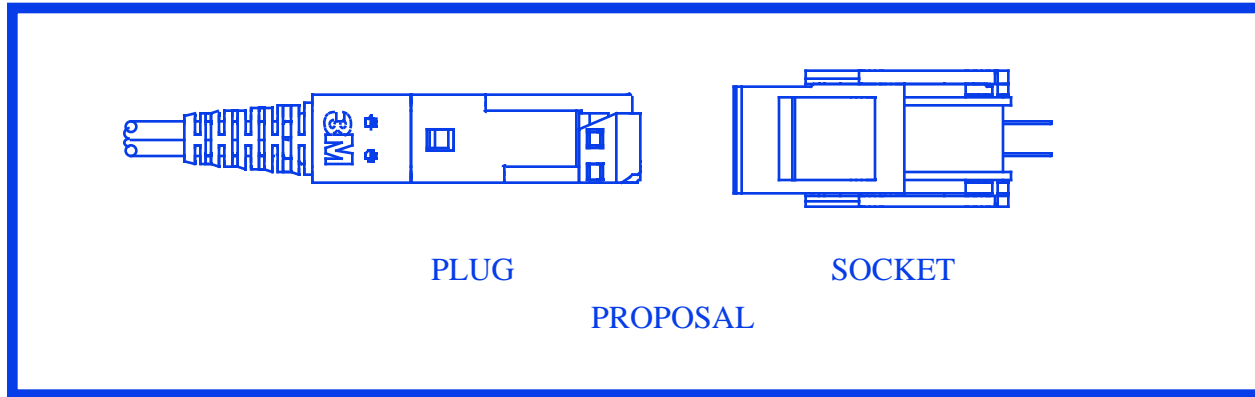
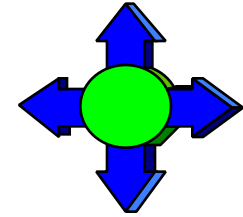


<u>Material</u>	<u>Specification</u>
Connector	Engineering Thermoplastic UL-94 VO
Boot	Thermoplastic Elastomer
<u>Test</u>	<u>Test Condition/Requirement</u>
Attenuation	< 0.75 dB Max, 0.5 dB Typical
Mating Durability	500 Cycles, < 0.75 dB Max
Strength of Coupling	> 33 Newtons, < 0.75 dB Max
Cable Retention	Tensile Load > 66 Newtons Side Pull > 6.6 Newton, < 0.75 dB
Flex	100 Cycles, +/- 90 degrees, 0.5 kg, < 0.75 dB Max
Twist	10 Cycles, +/- 2.5 revolutions, 15 Newtons, < 0.75 dB Max
Cold	-10 C for 96 hours, < 0.3 dB increase
Heat	+60 C for 14 days, < 0.3 dB increase
Thermal Cycling	-10 C to 60 C, 5 Cycles, < 0.3 dB increase
Vibration	10 to 55 Hertz, 2 hours each axis, < 0.3 dB increase

Note: Performance compliant with the above specifications.

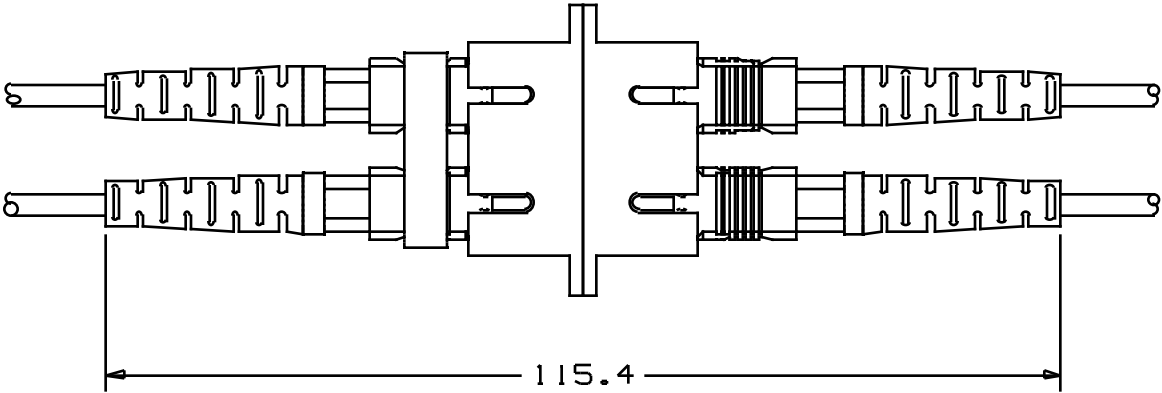
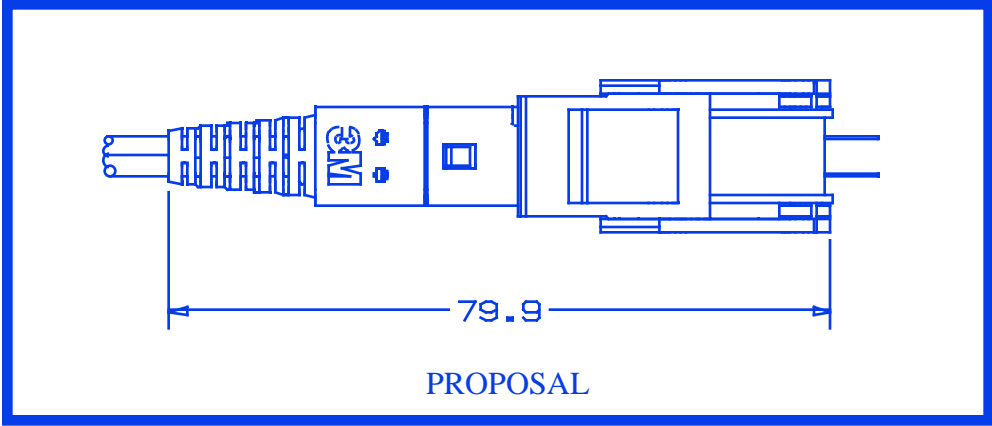
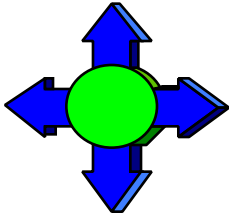
▶ Insertion Loss Statistics: 0.31 dB Mean Loss, 0.10 Standard Deviation

Proposal for the Low Cost, Small Form Factor Optical Interconnect



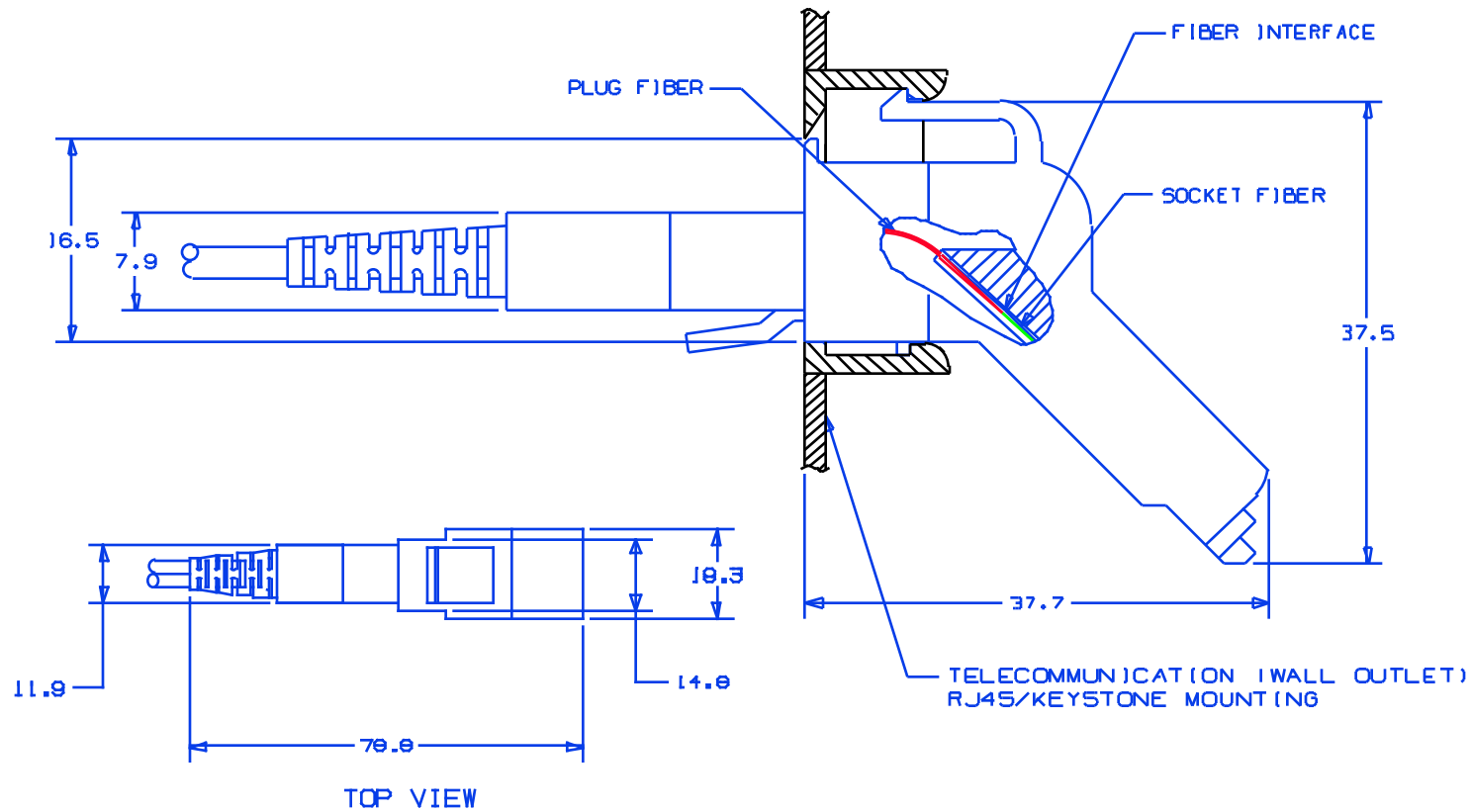
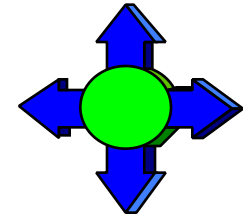
CURRENT SC CONFIGURATION

Proposal for the Low Cost, Small Form Factor Optical Interconnect - Assembly

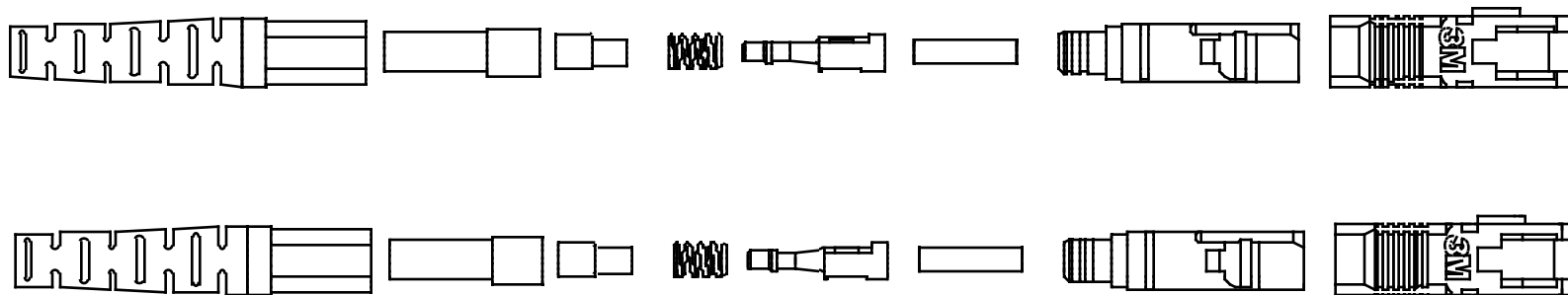
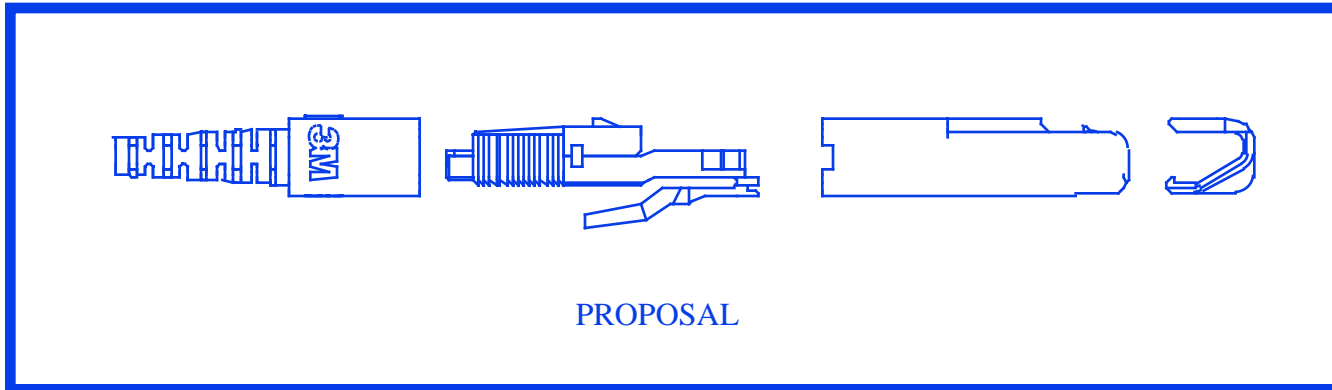
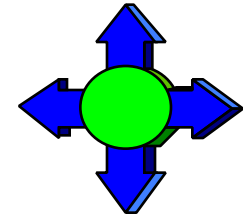


CURRENT SC CONFIGURATION

Proposal for the Low Cost, Small Form Factor Optical Interconnect - Principal of Operation

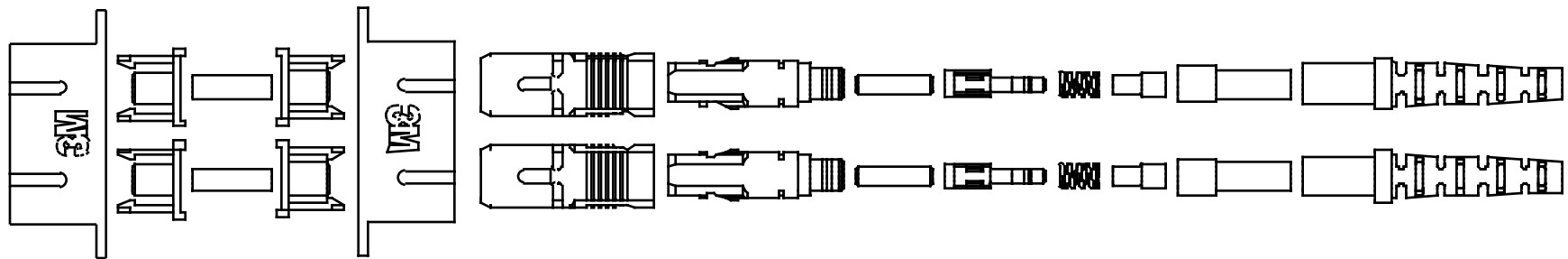
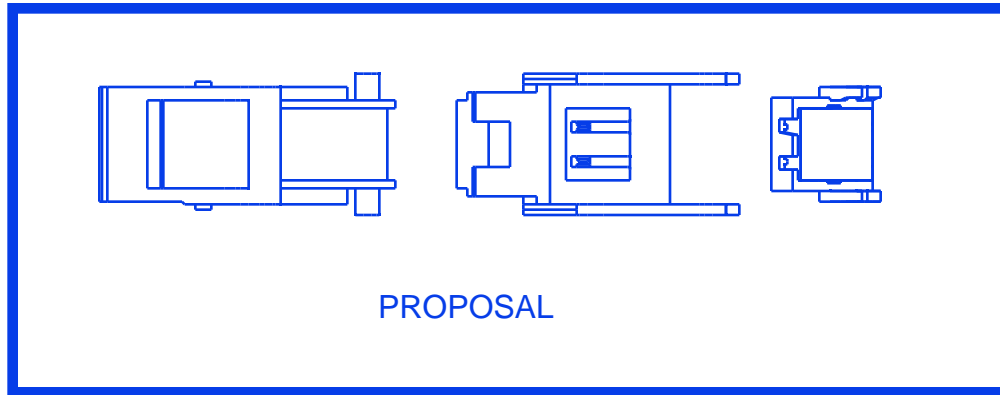
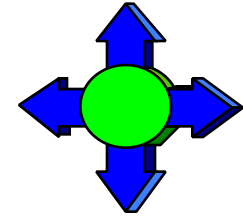


Proposal for the Low Cost, Small Form Factor Optical Interconnect - Plug



CURRENT SC CONFIGURATION

Proposal for the Low Cost, Small Form Factor Optical Interconnect - Coupling/Socket



CURRENT SC CONFIGURATION