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# MS<sup>2</sup><sup>TM</sup> Modular Splicing System

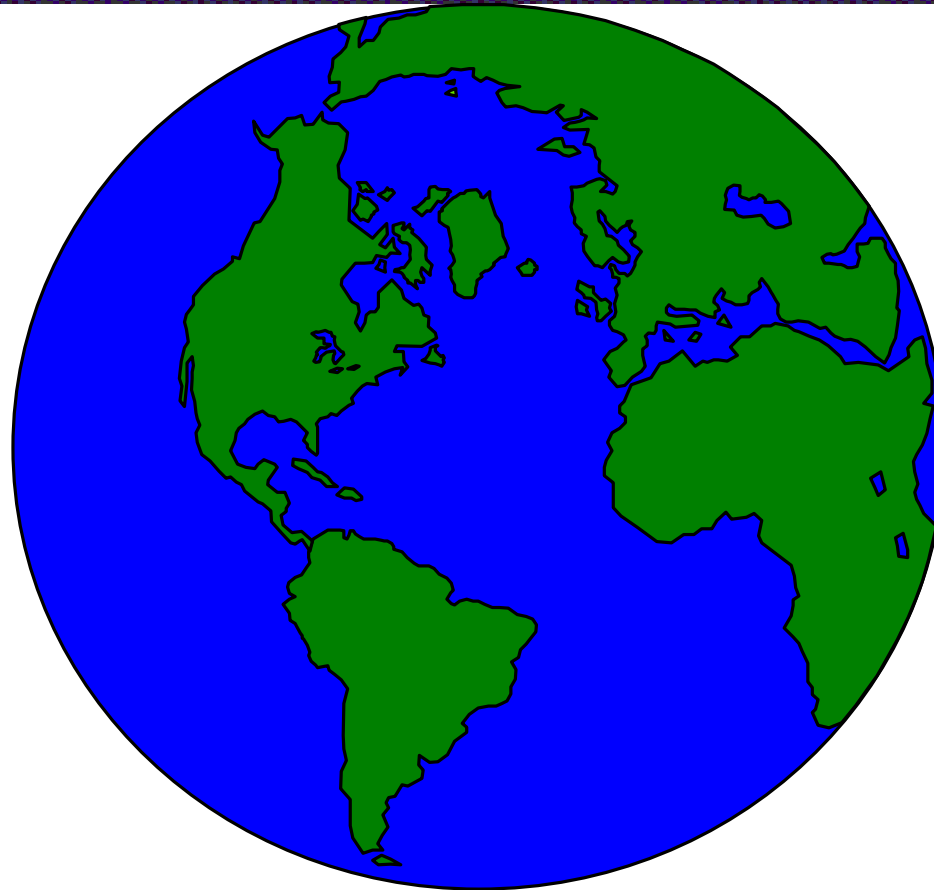


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*Communication Markets Division*

# Copper Splicing Connectors from 3M

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**A WORLD OF DIFFERENCE**

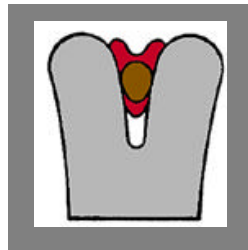
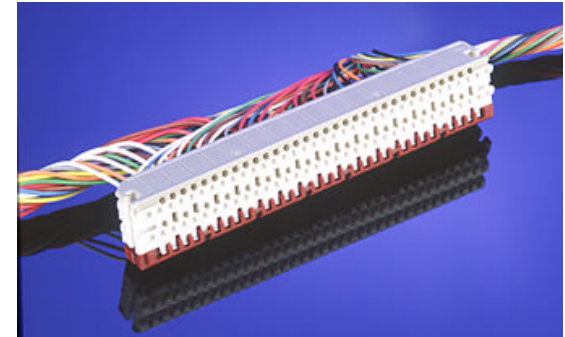
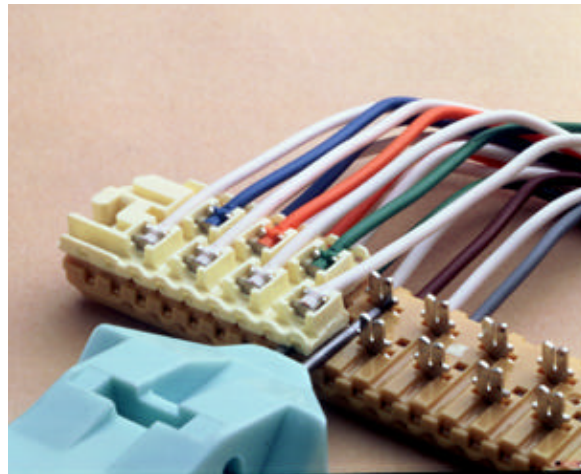
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Core Technologies . . .

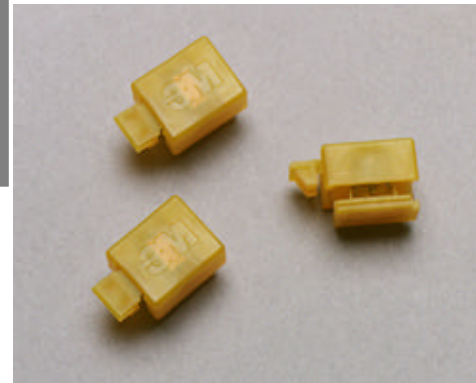
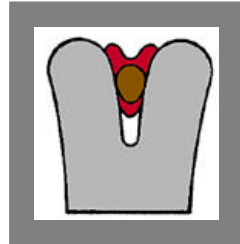
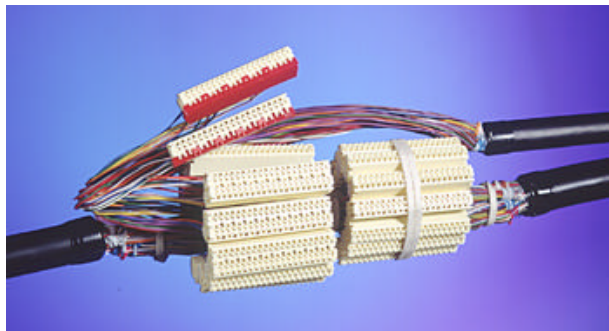
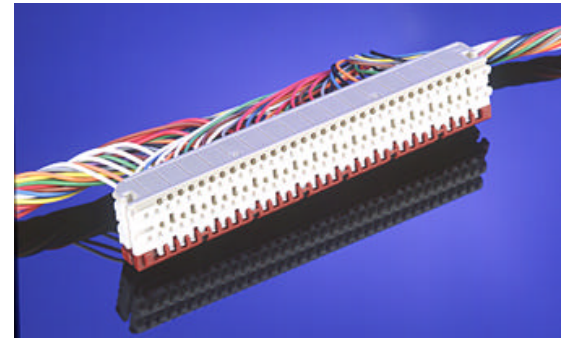
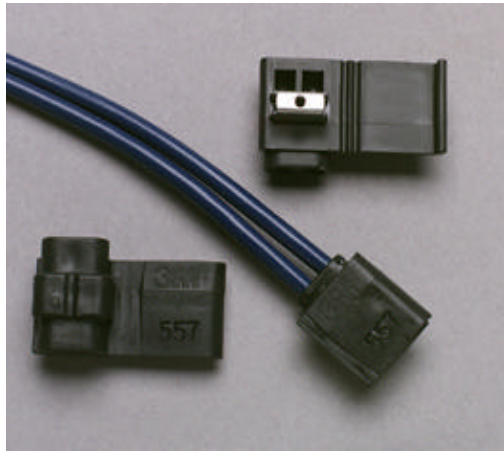
# The Evolution of Copper Splicing



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# Scotchlok™ Connectors and MS2™ Modules



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# 3M Copper Splicing Connectors

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**Innovative - Reliable  
40 Years of Proven  
Field Performance!**



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# Scotchlok™ Connectors

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- Proven IDC technology - 40 years history
- Matched twin double elements - ensures signal integrity
- Low cost
- Specialty connectors for all wire ranges - all applications
- Trim-out without service interruption - fast, reliable repairs
- Solvent resistant - compatible with most sprays



# 3M Pioneered “IDC” Technology

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## Features:

- “U” form contact:
    - cuts through conductor insulation
    - swages conductor, removes oxide films
    - creates and maintains a gas-tight connection between IDC element and conductor
  - No stripping insulation:  
fast, reliable wire joining
  - Worldwide standard:  
proven reliability for 40 years, global use
- 



# Scotchlok™ UR Connector

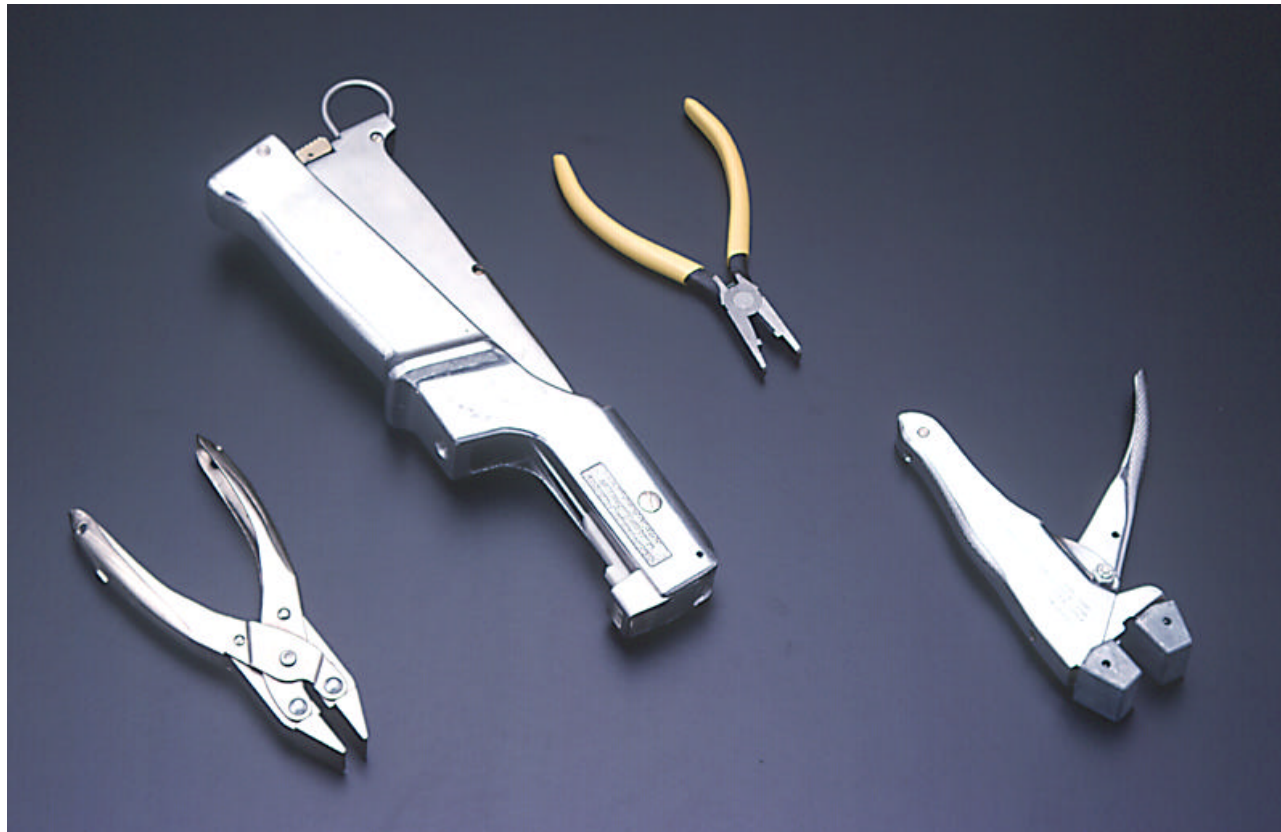
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# Connectors are crimped with a variety of specially developed tools.

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# Scotchlok™ Connectors and Tools



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# Scotchlok™ Series I Connectors

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## Features:

- Full wire range: 19-26 AWG

	<u>Gauge</u>	<u>Max. Insulation Diameter</u>
ULG Connector	.5-.9 mm	2.08 - three wire
UR Connector	.4-.9 mm	1.67 - three wire
UY Connector	.4-.7 mm	1.52 - two wire

- Filled, dry/FR
- Translucent material
- Easy to use

# Scotchlok™ Connectors seal out moisture, prevent corrosion, and provide solder equivalent connections

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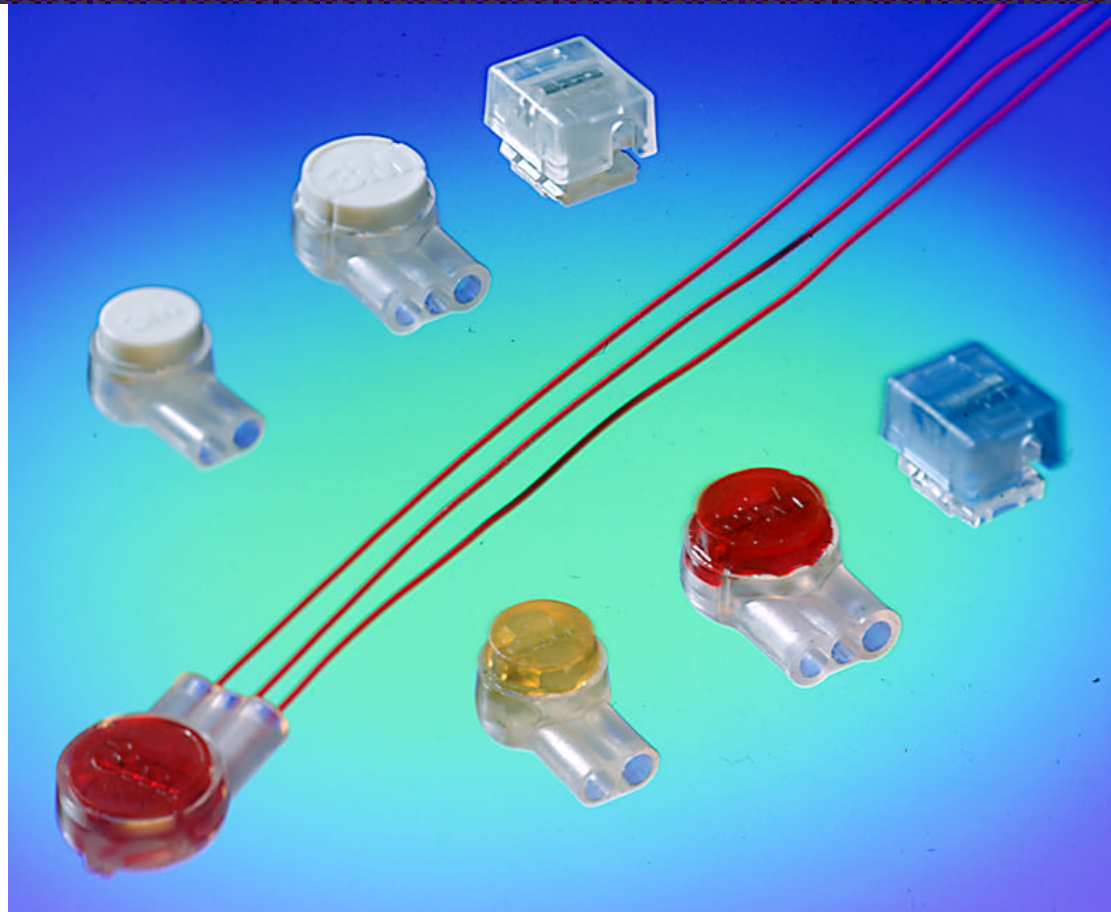
# Scotchlok™ Series II Connectors

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## Features:

- **Matched twin double elements**
- **Full wire range: 19-26 AWG (.4-.9 mm)**
- **Large port diameters - meets all wire requirements**
- **Maximum insulation diameter of 2.08 mm**
- **Translucent material - less mistakes, easy to use**
- **Filled, dry and flame retardant connectors available**
- **Solvent resistant - bug sprays, cleaning solvents**

# Scotchlok™ Family

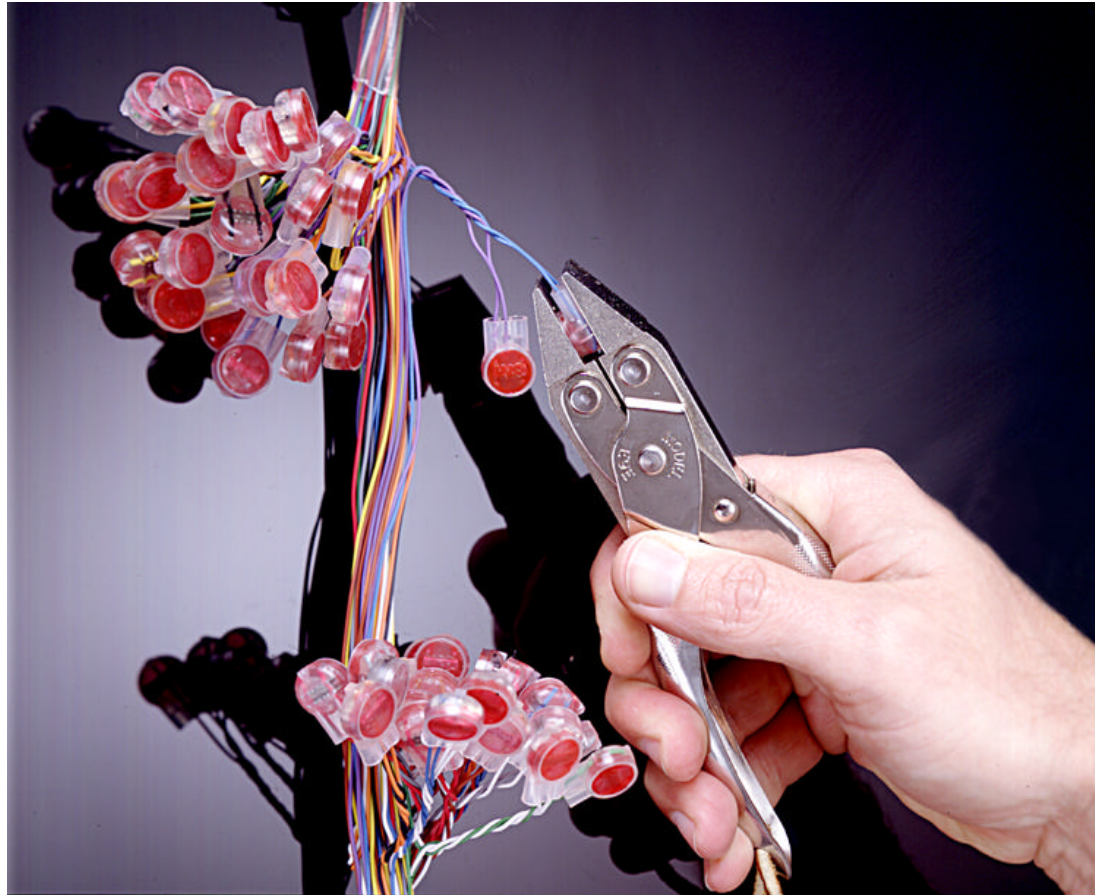


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# 3M connectors accept any two or three solid copper conductor combinations.

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# Scotchlok™ UB2A Bridge Connector

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## Features:

- **Interruption-free bridging**
- **Full wire range - 1 connector:**
  - 19-26 AWG**
  - .4-.9 mm**
  - all bridge applications**
- **Inside wire retention holds wire before crimping; no errors**



# Scotchlok™ Connectors seal out moisture, prevent corrosion, and provide solder equivalent connections

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# Scotchlok™ 211 Trim-out Connector

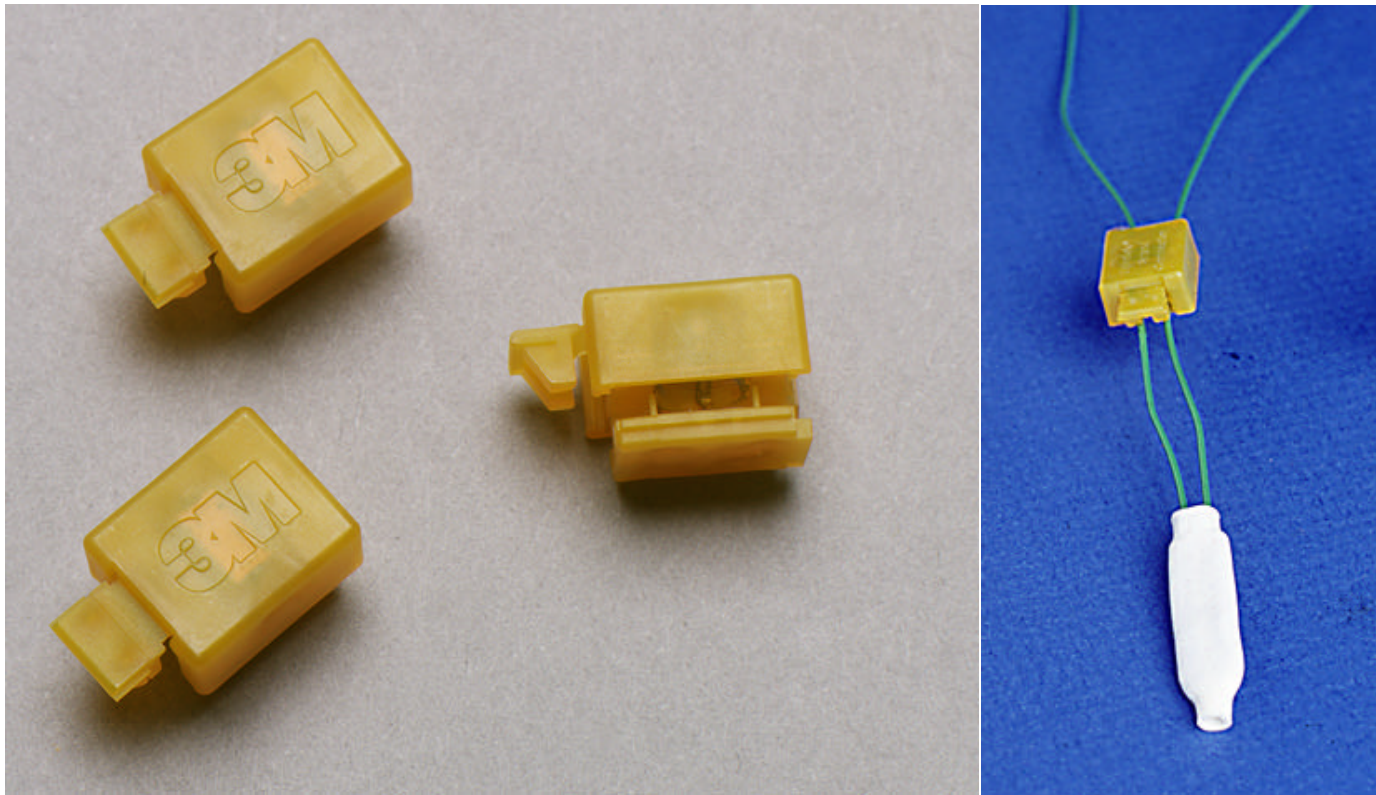
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## Features:

- **“Make before break” electrical contact:**
  - fast, easy, low cost repairs**
  - no service interruptions**
  - decrease maintenance expenses by 50% or more**
- **Pre-crimp minimizes conductor waste**
- **Easy test port access**
- **Full wire range:**
  - 19-26 AWG (.4-.9 mm)**
  - maximum insulation diameter - 2.08 mm**

# The Scotchlok™ 211 designed specifically for interruption-free replacement of bad/failed connectors, with proven 3M IDC Technology

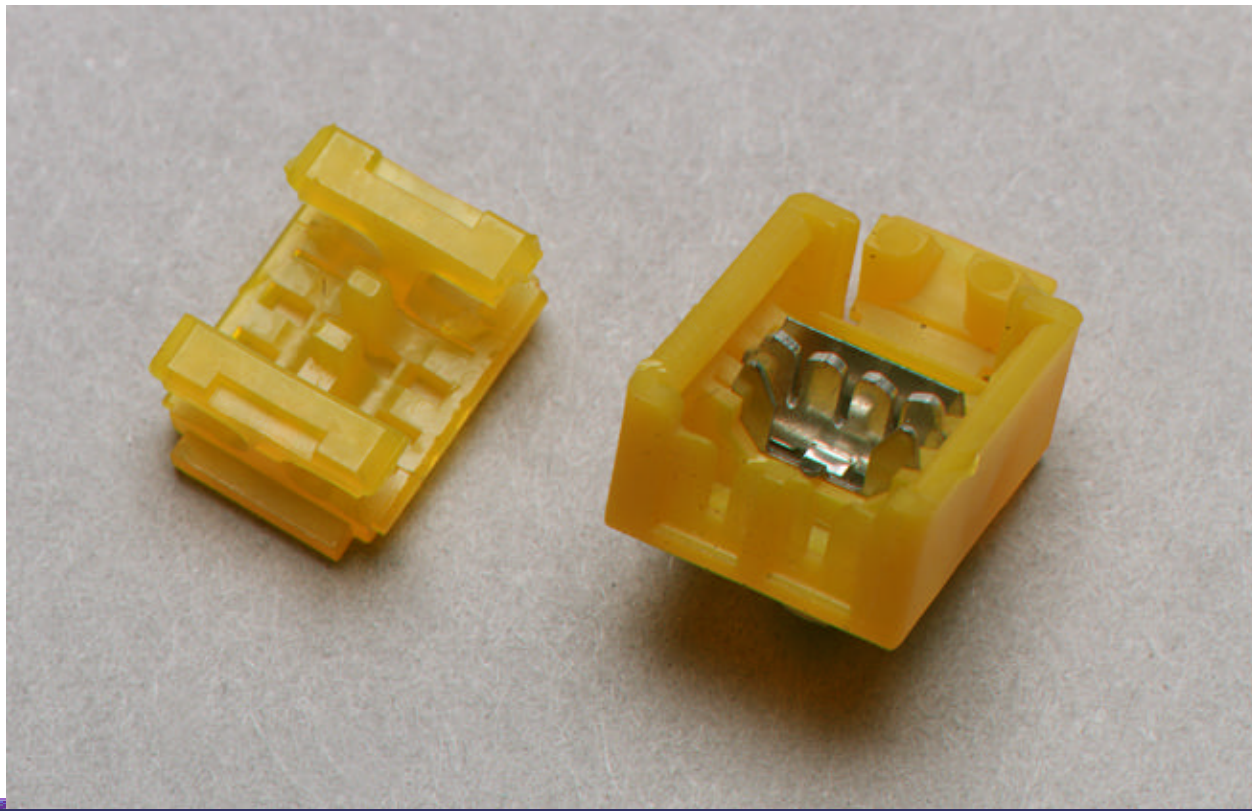
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# **The Scotchlok™ 211 Trim-out Connector contains a wire cut-off blade to trim out old connectors without service interruption**

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# Scotchlok™ 211 Trim-Out Connector

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# Scotchlok™ 211 Connector

## Typical VRS 100-pair Splice Example

	<u>Discrete Connectors</u>	<u>211 Connector</u>
TEST	30 minutes	not required
ID SPECIALS	30 minutes	not required
SPLICE	62 minutes	56 minutes
TOTAL TIME	122 minutes	56 minutes
<u>Discrete Connectors</u>		
Loaded labor rate per hour	\$ <u>56.00</u> X 2.03 hr. =	<u>113.68</u>
Material (connectors)	\$ <u>.03</u> X 200 ea. =	<u>6.00</u>
	TOTAL =	<u>119.68</u>
<u>211 Connectors:</u>		
Loaded labor rate per hour	\$ <u>56.00</u> X 0.93 hr. =	<u>52.08</u>
211 Connectors	\$ <u>.06</u> X 200 ea. =	<u>12.00</u>
	TOTAL =	<u>64.08</u>
* What are interruption free repairs worth?	DIFFERENCE =	<u>52.08</u>



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# Trimlok 211 Connector

Trimlok vs. Conventional Repairs per 100 pair Splice:

	<u>Discrete</u>	<u>211</u>
100 pr. splice	92 min's	56 min's
Identify any special circuits	30 min's	Not needed
Total time required	112 min's	56 min's
Assume loaded labor		
\$56.00 per hour:	\$104.00	\$52.00
Return trouble trips:	4 Hrs Minimum	None
4 hrs. x \$56.00	\$224.00	
Total:	\$328.00	\$52.00
<b>Total 211 Connector Savings:</b>	<b>\$276.00</b>	

- Requires no testing before trim-out or special circuit identification
- Make before break contact - no service interruptions
- Return trips required if all faults aren't detected during first visit: conductor degradation; bad connector faults; US practice dictates more cost effective to replace all connectors on initial trouble call



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# 557TG Drop Wire Connector

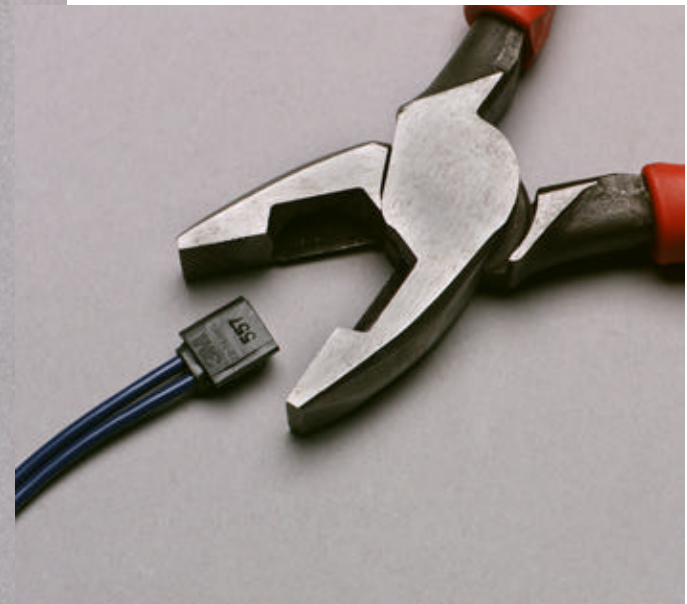
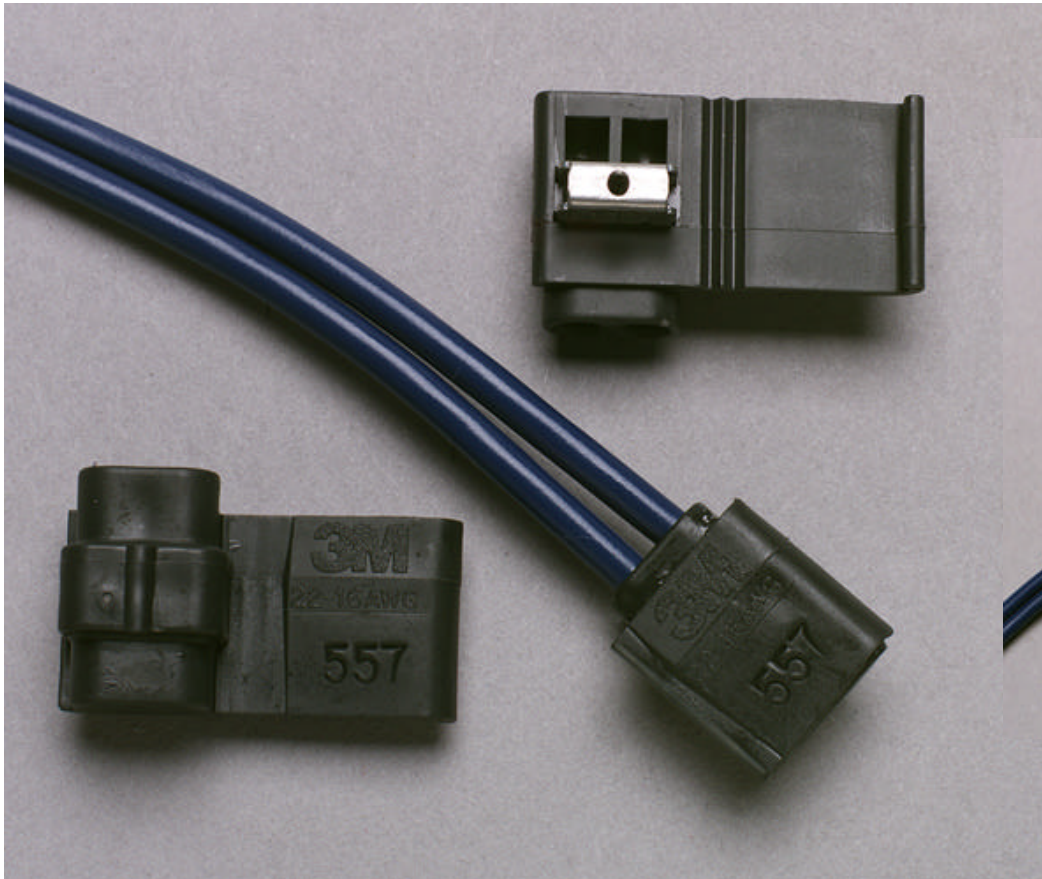
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## Features:

- **Matche twin double elements**
- **Self-stripping IDC contact**
- **Matched twin double elements**
- **16-22 AWG (.65-1.29 mm)**
- **Solid copper-tinned or untinned**
- **Maximum insulation diameter = 0.12 inches (3.0 mm)**
- **Sealed - insulates, provides moisture protection**
- **No special tools**



# 557TG Self-Stripping Drop Wire Connector



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# Scotchlok™ UDW2 Drop Wire Connector

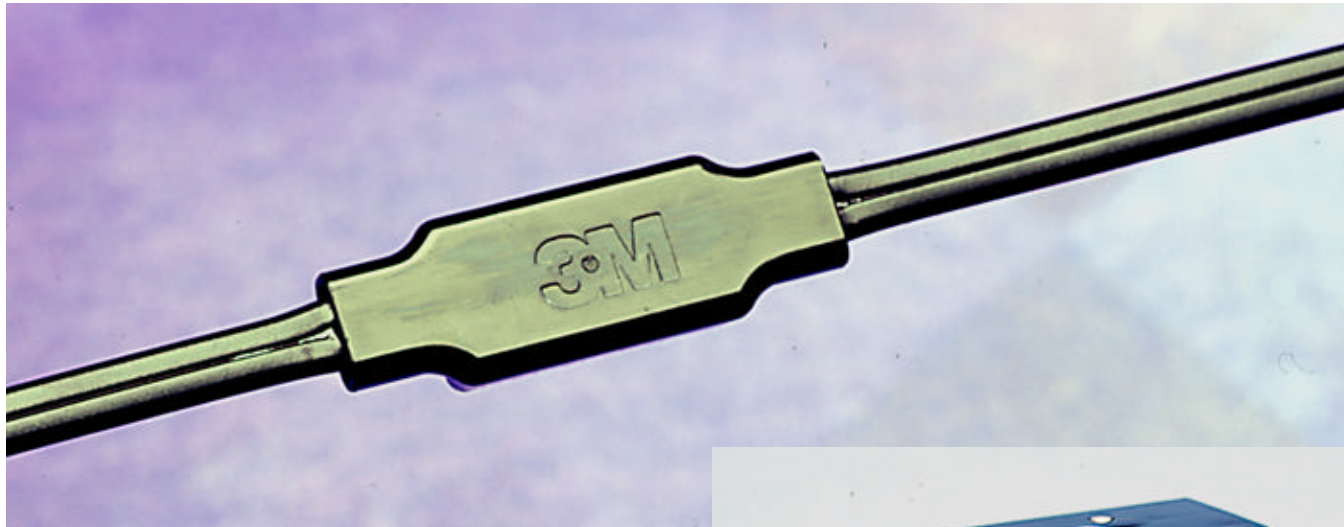
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## Features:

- **Black molded plastic: UV resistant, no tape needed**
- **Gel sealant: insulates, provides moisture protection**
- **Full pair: ideal for inline connections in non-strain relief areas**
- **16-19 AWG (.9-1.3 mm): copper or copper clad steel conductors**
- **Pre-crimp - holds wires before crimping**
- **Self-stripping, solderless fast terminations**

# Scotchlok™ UDW2 Drop Wire Connector

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# Scotchlok™ UCC & UPC Connectors

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## Features:

- **Plastic element**  
isolates pair  
no electrical contact
- **Gel sealant**  
clears, caps, prevents shorts
- **Red color easy to identify**
- **UPC dry version flame retardant for building wiring applications**
- **Full wire range - max insulation**  
Diameter = .06 inches (1.52 mm)

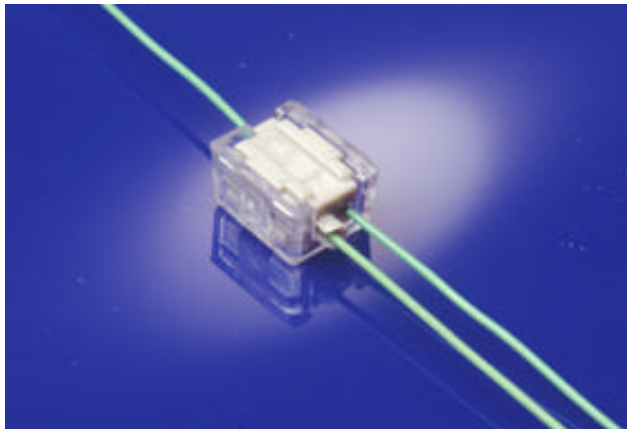
# UL Listed Flame Retardant Scotchlok™ Connectors



UP3 connector



UP2 connector



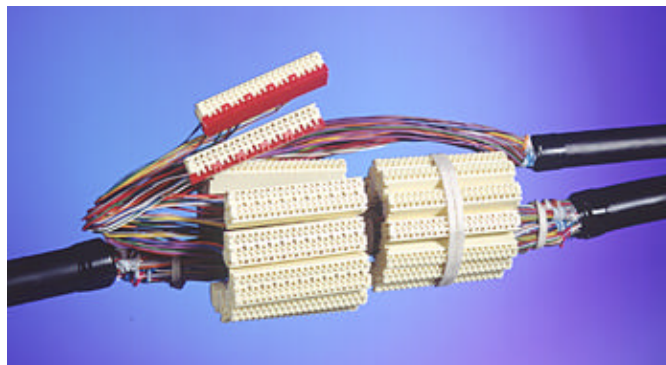
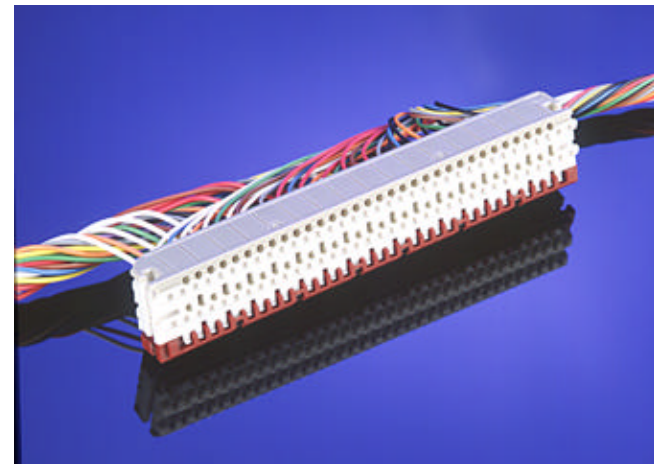
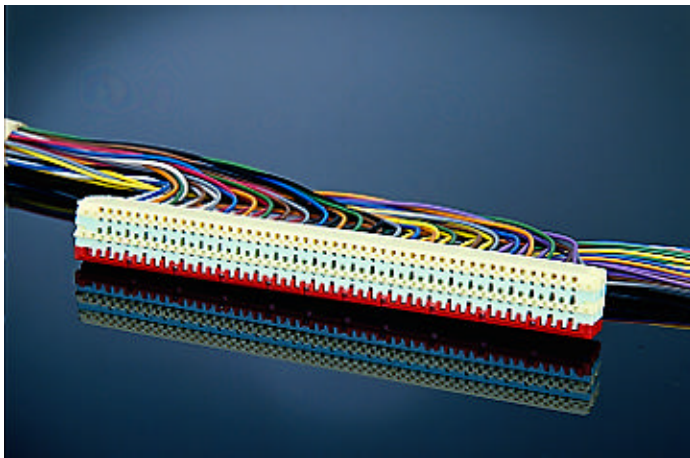
UPB connector



UPC connector

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# MS<sup>2</sup>™ Modular System Splicing



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# **MS<sup>2</sup>™ Module reduces installation time and maintenance costs for 10-, 16-, 20- and 25-pair wire jointing.**

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# MS<sup>2</sup>™ Modular Connectors

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## Features:

- 10, 16, 20 and 25 Pair - connectors for all applications
- Full wire range: 19-28 AWG (.32-.9 mm)
- Maximum insulation diameter - 1.8mm
- Unique pluggable twisted “IDC” contact
- Fast, economical
- 1/2 tap
- Bridge



# MS<sup>2</sup>™ Modular Connectors (continued)

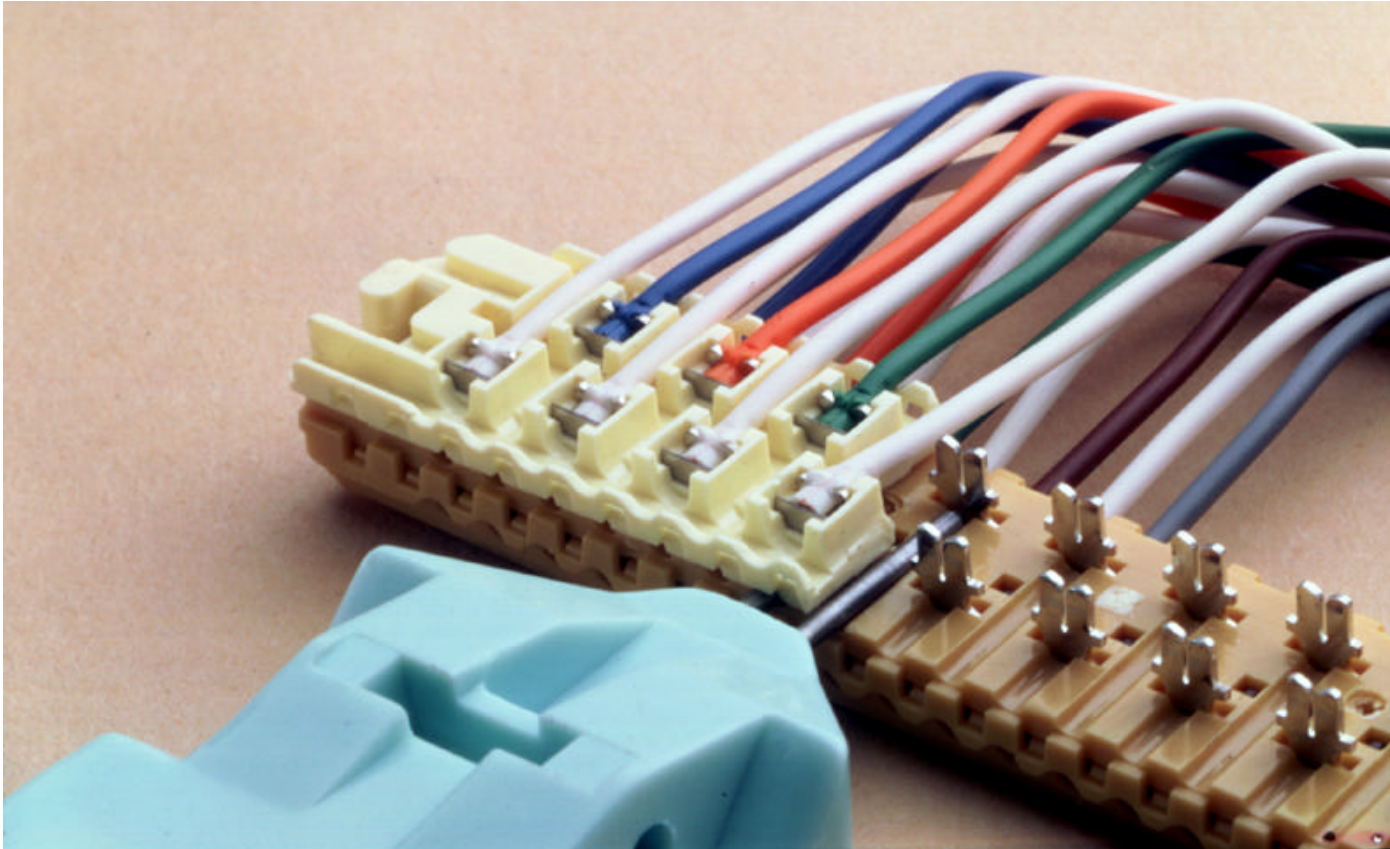
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## Features:

- Fire retardant
- No service interruptions
- Unique, pluggable contact

# Expanding on the Scotchlok™ Connector design, 3M developed the first MS<sup>2</sup>™ Module for multi-pair splicing

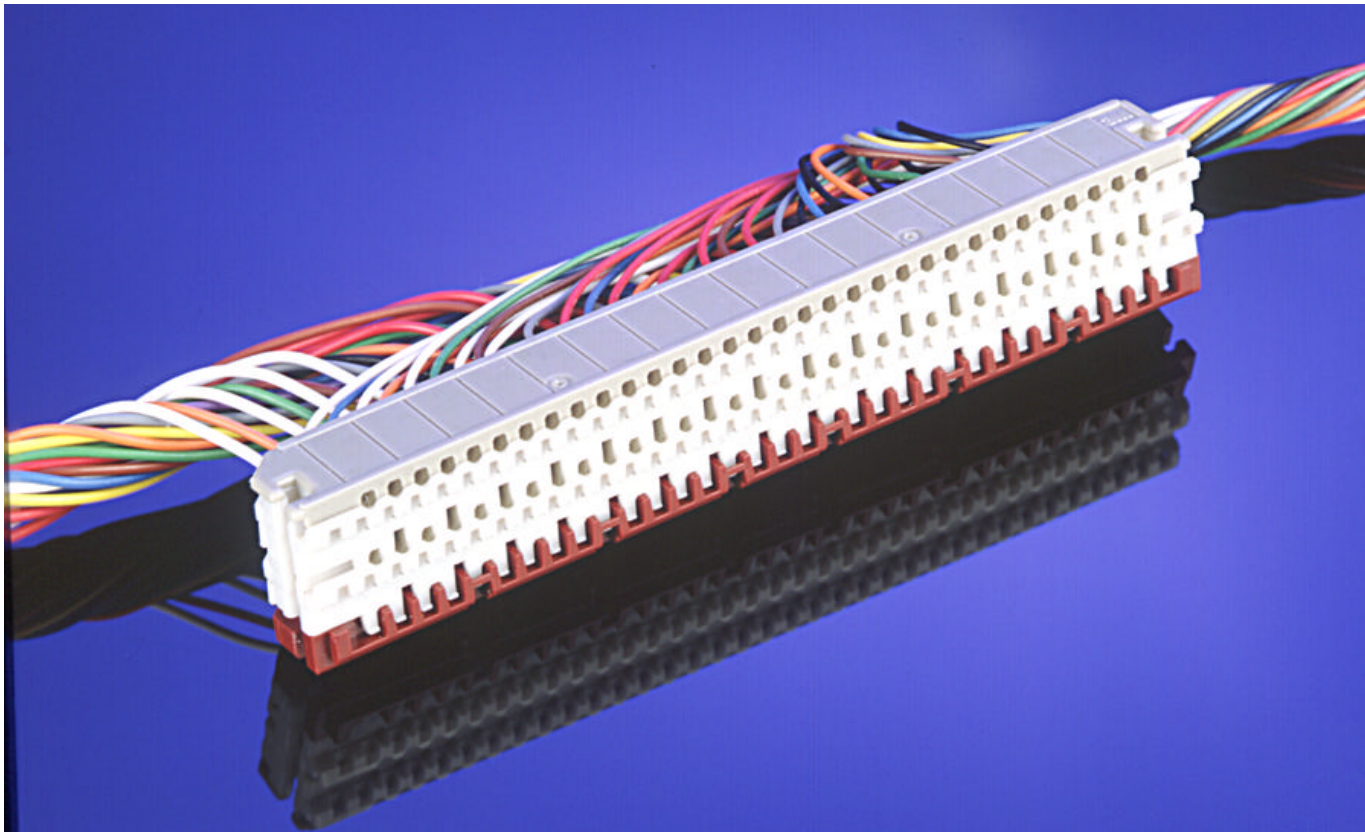
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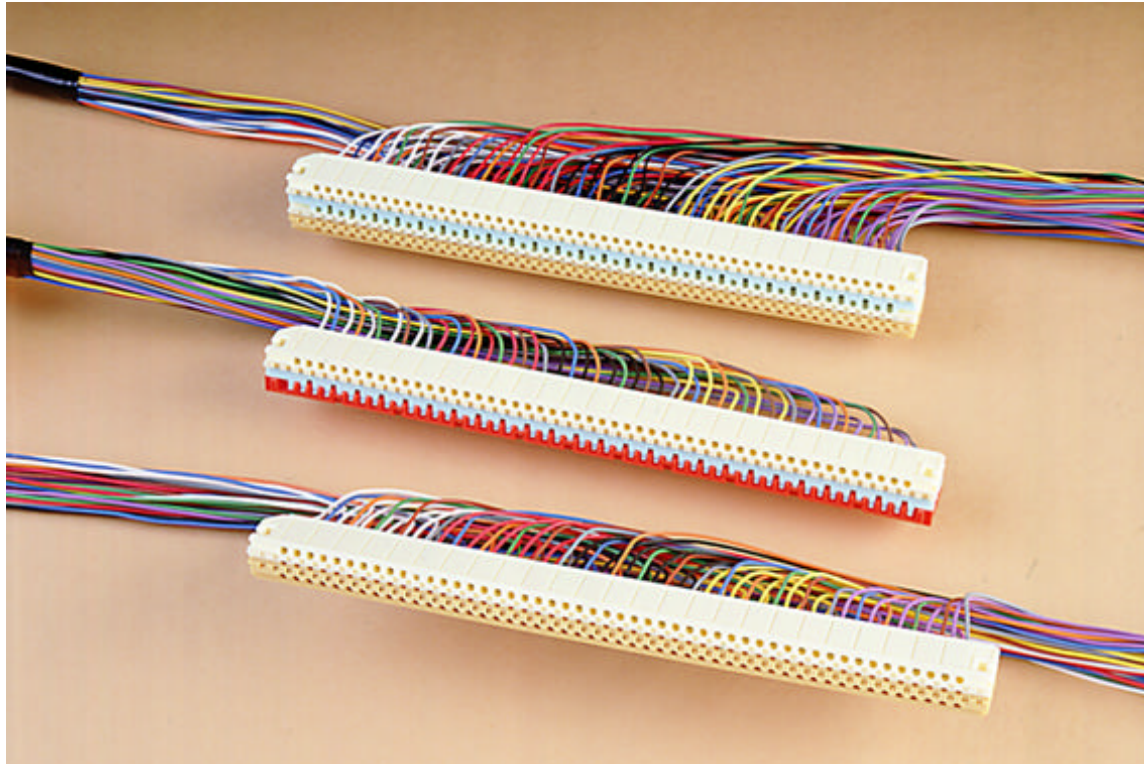
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# MS<sup>2</sup>™ Modules provide the reliability of soldered connections plus the efficiency of multi-paired splicing

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# MS<sup>2</sup>™ Family



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# MS<sup>2</sup>™ 25-pair Super-Mini Module

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## Features:

- 22-28 AWG (.32-.65 mm), max. insul. diam. 1.65 mm
- Accepts MS<sup>2</sup> 4005-DPM module
- External test access
- Removable, transparent cover and base
- IDC element
- Simple, fast, accurate, low cost splicing

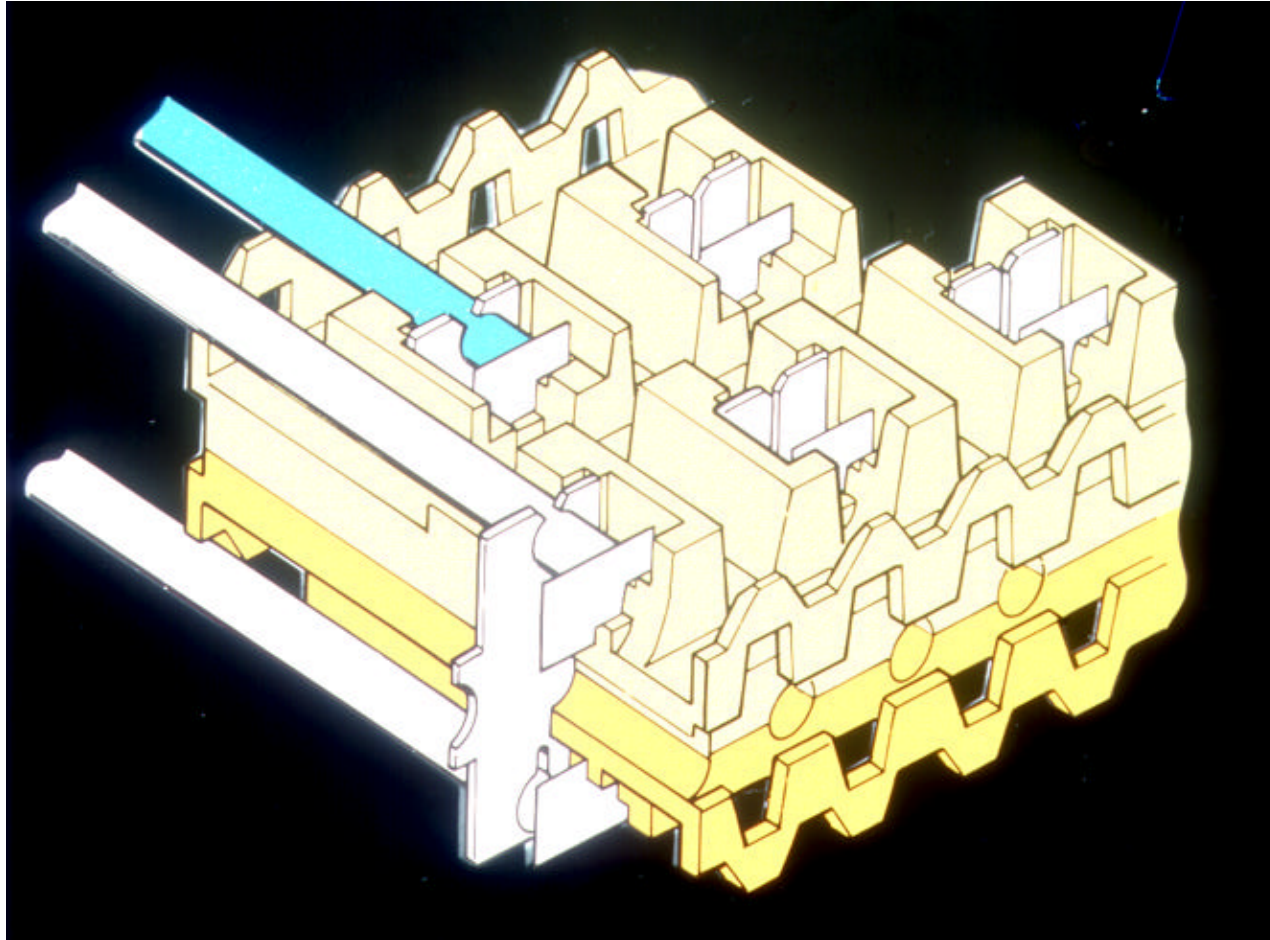
# MS<sup>2</sup>™ 25-pair Super-Mini Module (continued)

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- Full wire range for most wire diameters
- Lower inventory cost
- Full bridging capability
- Fast pair identification
- Easy bridge access and repair
- Make before break contact; no service interruptions



# MS<sup>2</sup>™ 25-pair Super-Mini Module (continued)



# MS<sup>2</sup>™ 4005-DPM Super Mate Module

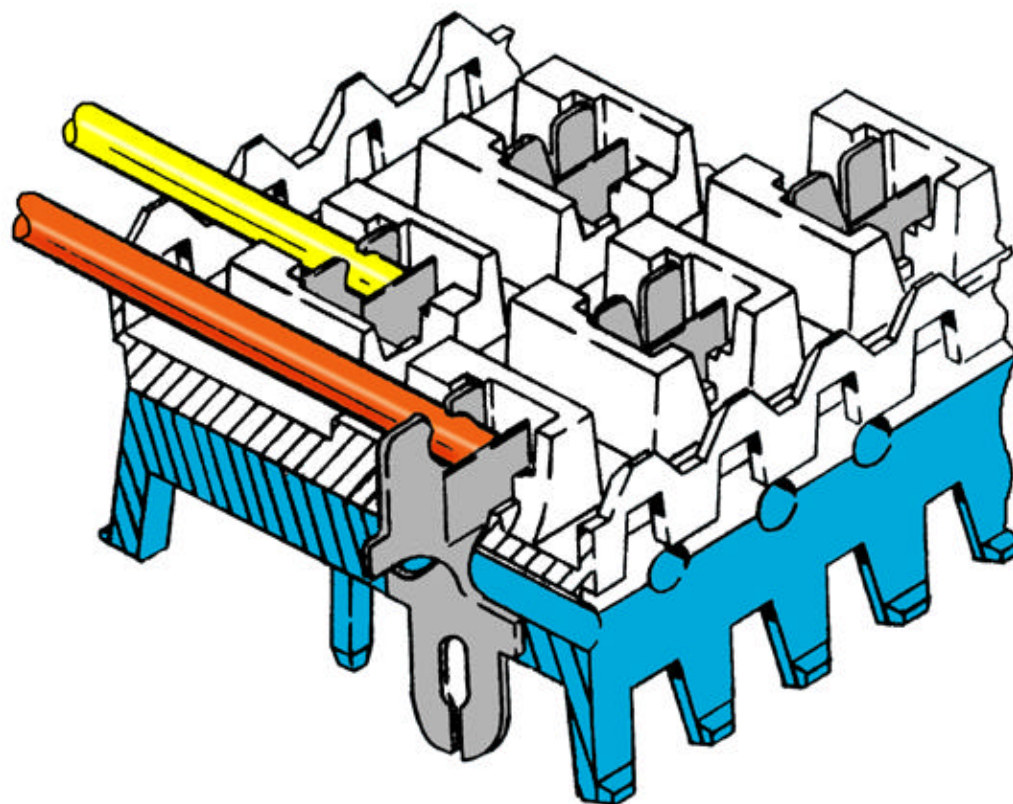
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## Features:

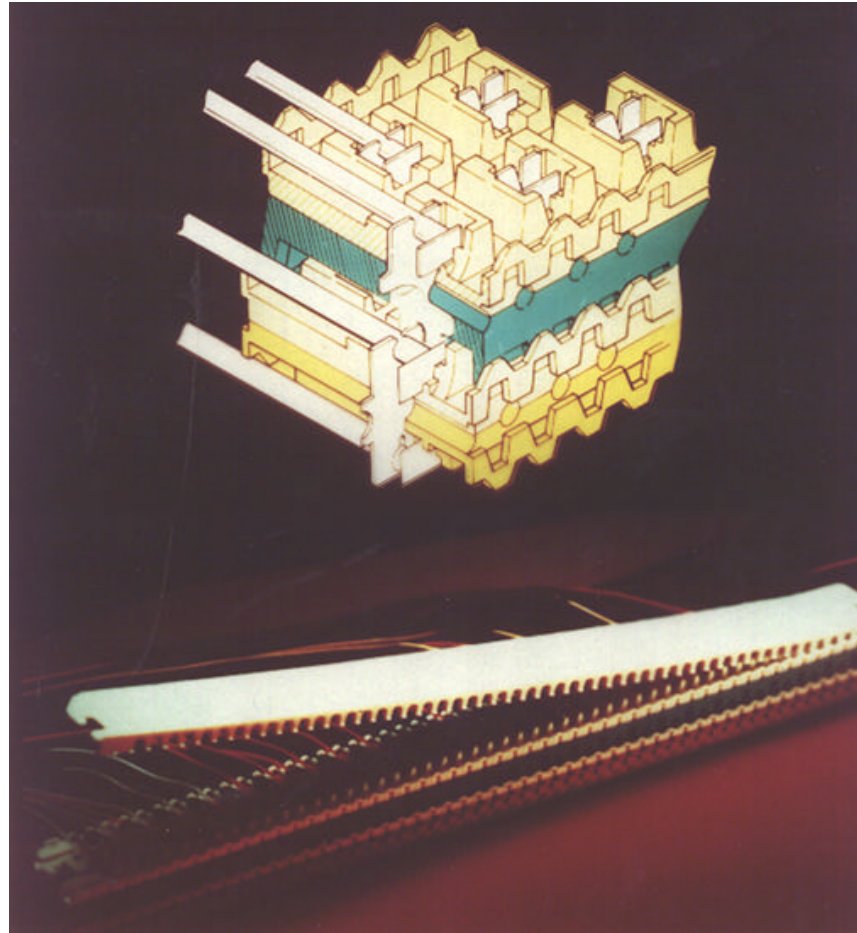
- **Pluggability enables full interruption-free transfers and 1/2 taps**
- **Mates to existing MS<sup>2</sup> 4000D splice modules for bridging applications**
- **Mates to itself for pluggable splices and bridges**
- **Allows preconnectorization of apparatus**
- **No cutting & resplicing conductors**
- **Pluggable splices provide complete plant flexibility**



# 4005-DPM Module Body



# Super Mate/Super-Mini



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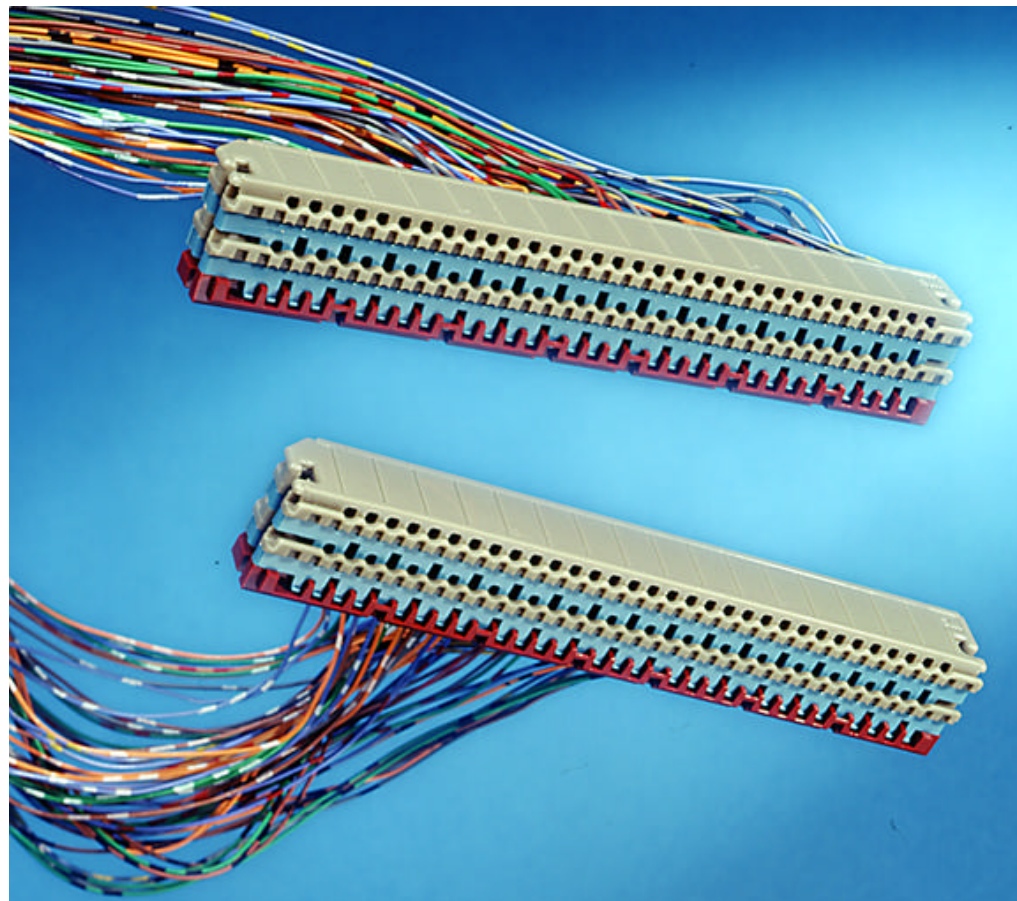
# MS<sup>2</sup>™ 16-pair Super Mate Module

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## Features:

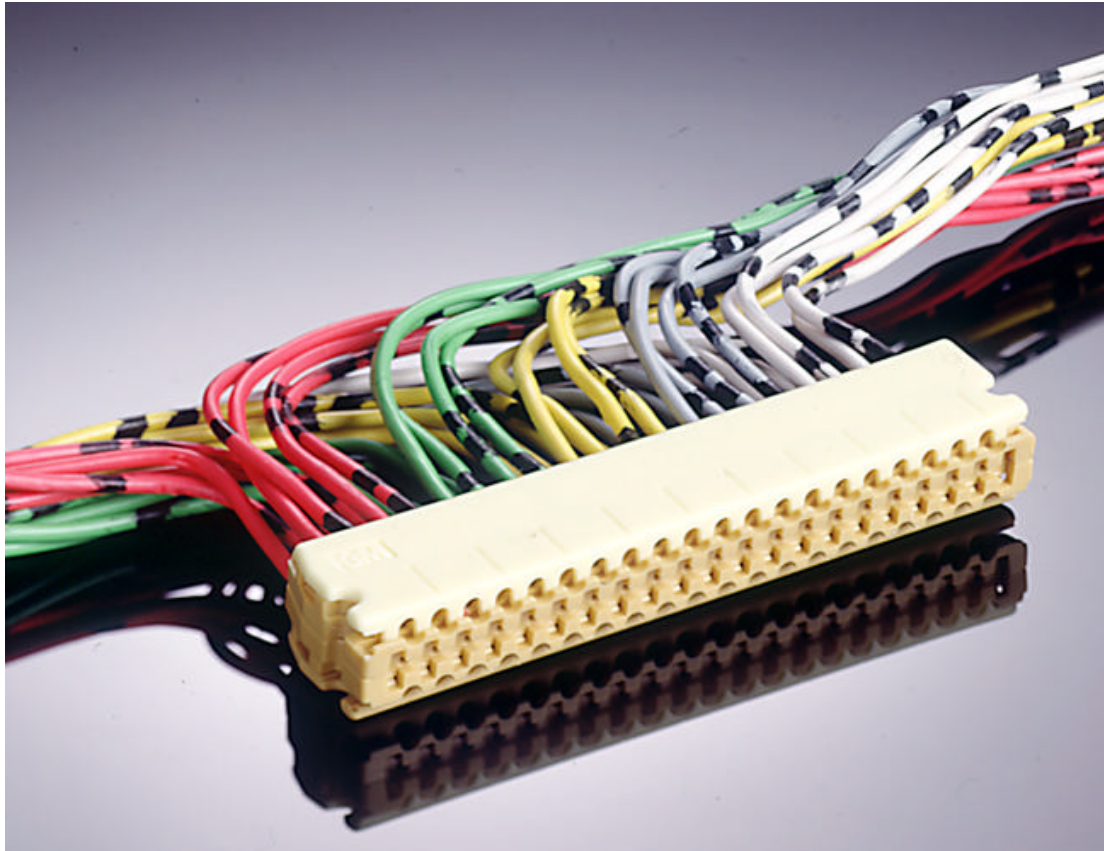
- **Developed specifically for central office equipment interruption free transfers**
- **Fast cutovers transparent to customers**
- **Reversible for fail-safe installations**
- **Pluggable splices provide complete central office equipment flexibility**

# MS<sup>2</sup>™ 4005-DPM/16-pair Fire Retardant Module



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# MS<sup>2</sup>™ 9700-10 Module



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# MS<sup>2</sup>™ 9700 10-pair Module

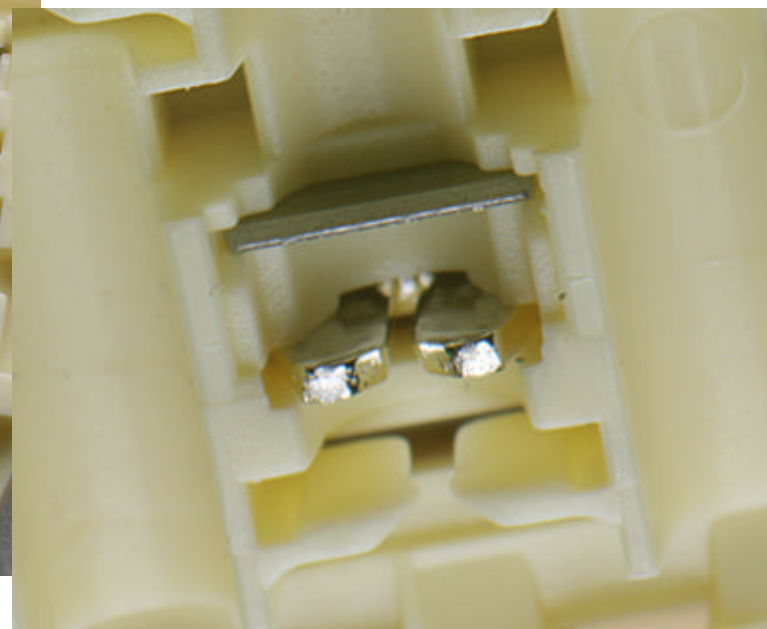
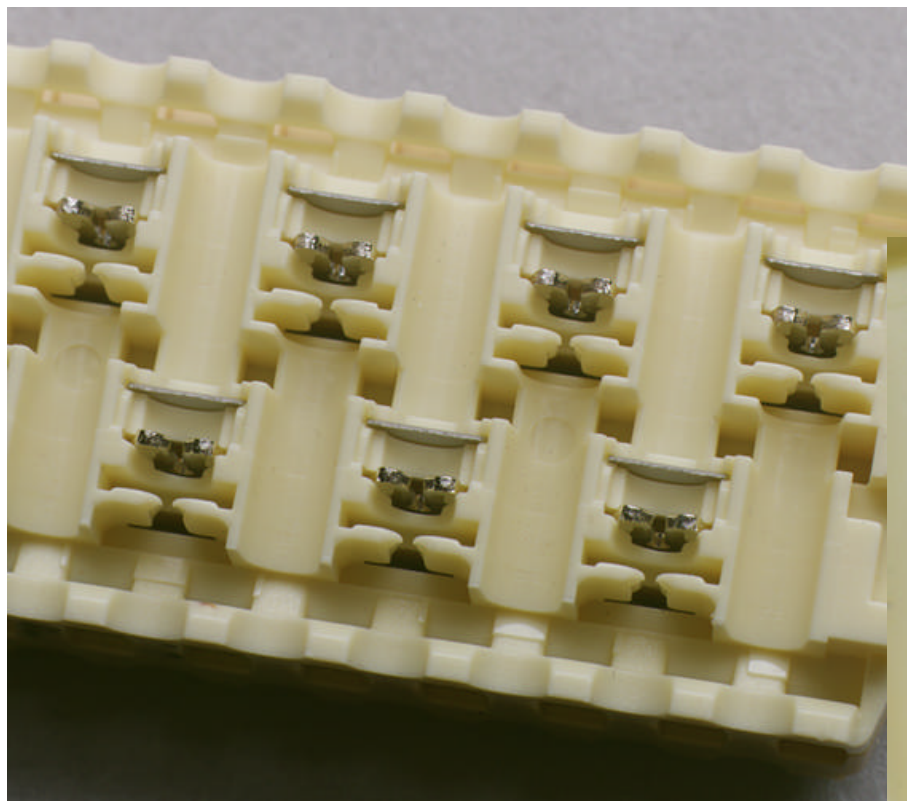
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## Features:

- **Full wire range - 19-26 AWG(.35-.9 mm)**
- **Maximum insulation diameter - 1.8 mm**
- **Internal strain relief insures mechanical integrity for all insulation types**
- **Reduced bundle size saves money**
- **Light weight tools are easy to use**



# MS<sup>2</sup>™ 9700-10 10-pair Super-Mini Splicing Module



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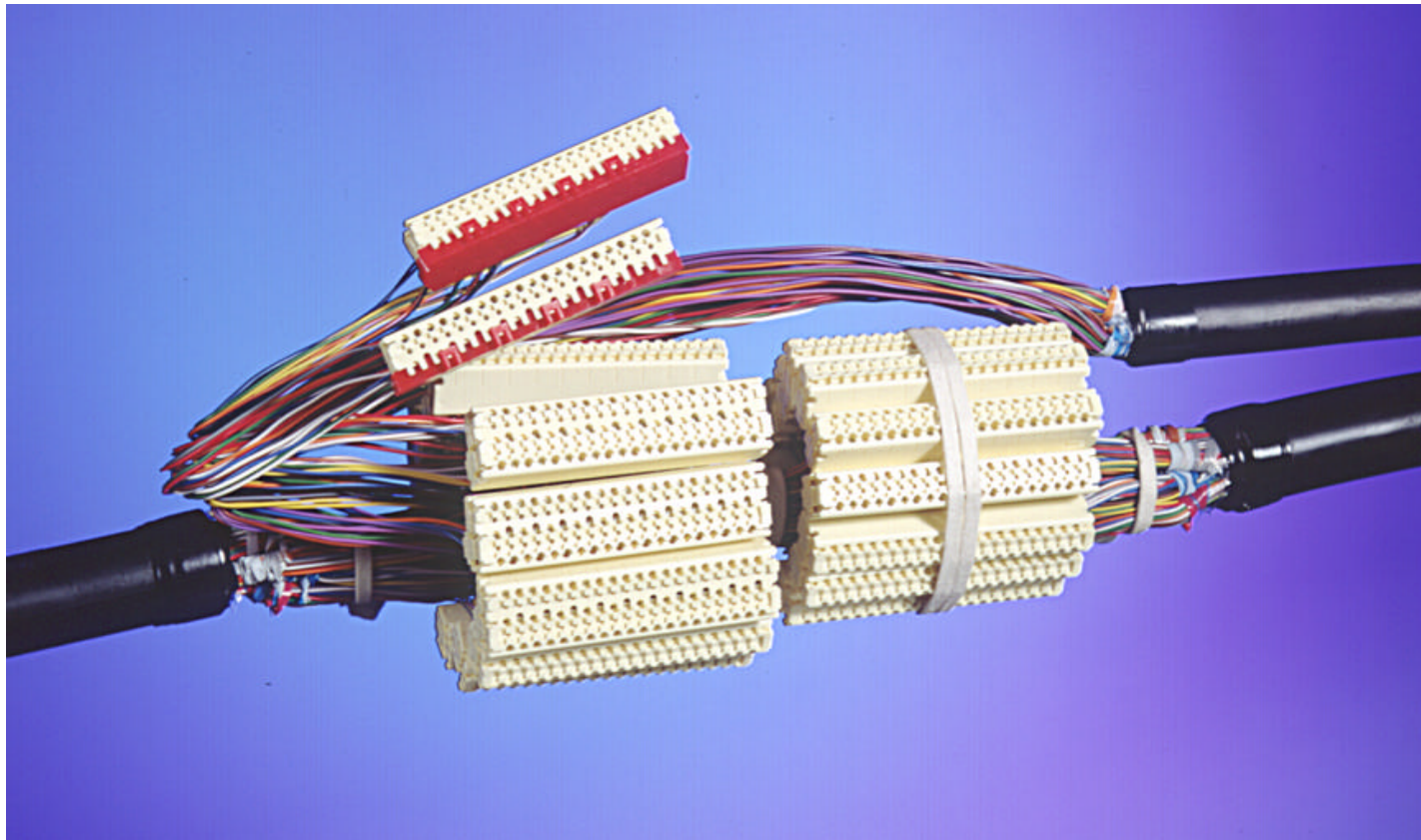
# MS<sup>2</sup>™ 9705 10-pair DPM

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## Features:

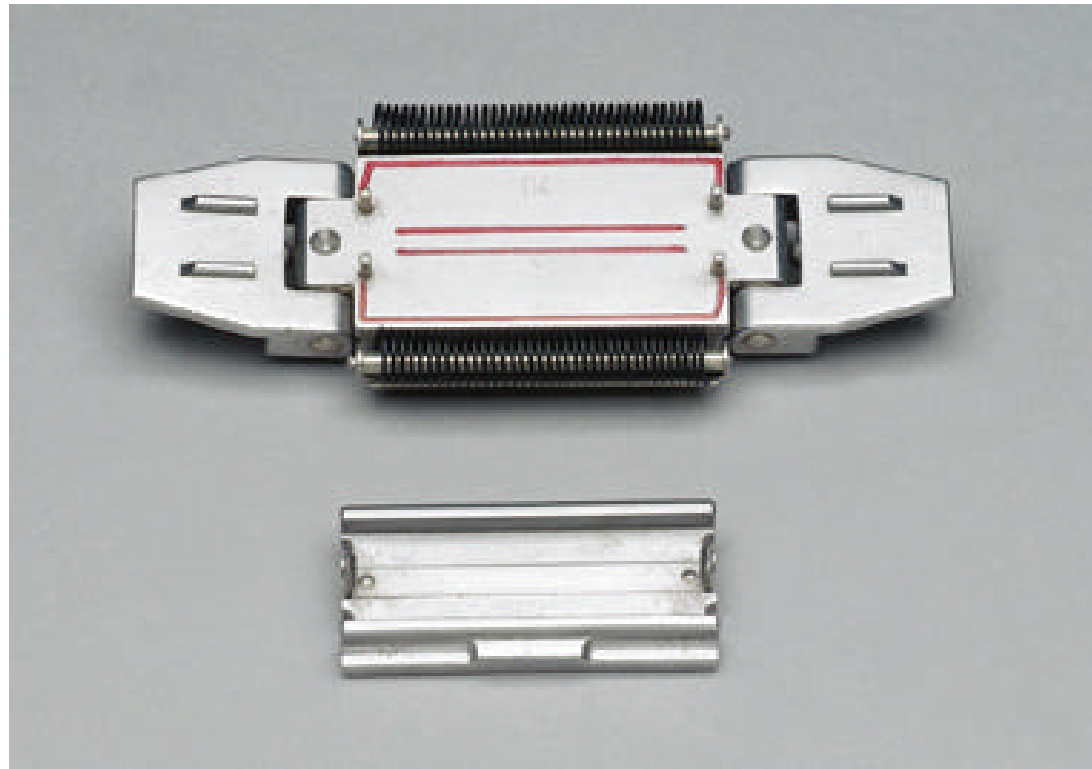
- Full wire range - 20-26 AWG(.4-.8 mm); maximum insulation diameter of 1.8 mm
- Connector meets all common wire ranges
- Pluggable system
- Mates to 9700 splice modules for bridging applications
- Mates to itself for pluggable splices and bridges
- Allows preconnectorization of apparatus
- Pluggable splices provide complete plant flexibility

# MS<sup>2</sup>™ 9705 10-pair DPM Module provides gas-tight connections for up to 10 pairs of wire.



# MS<sup>2</sup>™ Inline Extension Tool

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# MS<sup>2</sup>™ 9002 20-pair Splice Module

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## Features:

- Specifically designed for grease filled cable jointing
- Full wire range 20-28 AWG (.32-.8 mm)
- Maximum insulation diameter 1.65 mm
- 1/2 tap option
- Low cost, fast, inline wire jointing
- Air core or filled applications

# MS<sup>2</sup>™ 4005 DPM/BTP Bottom Test Plug Jumper

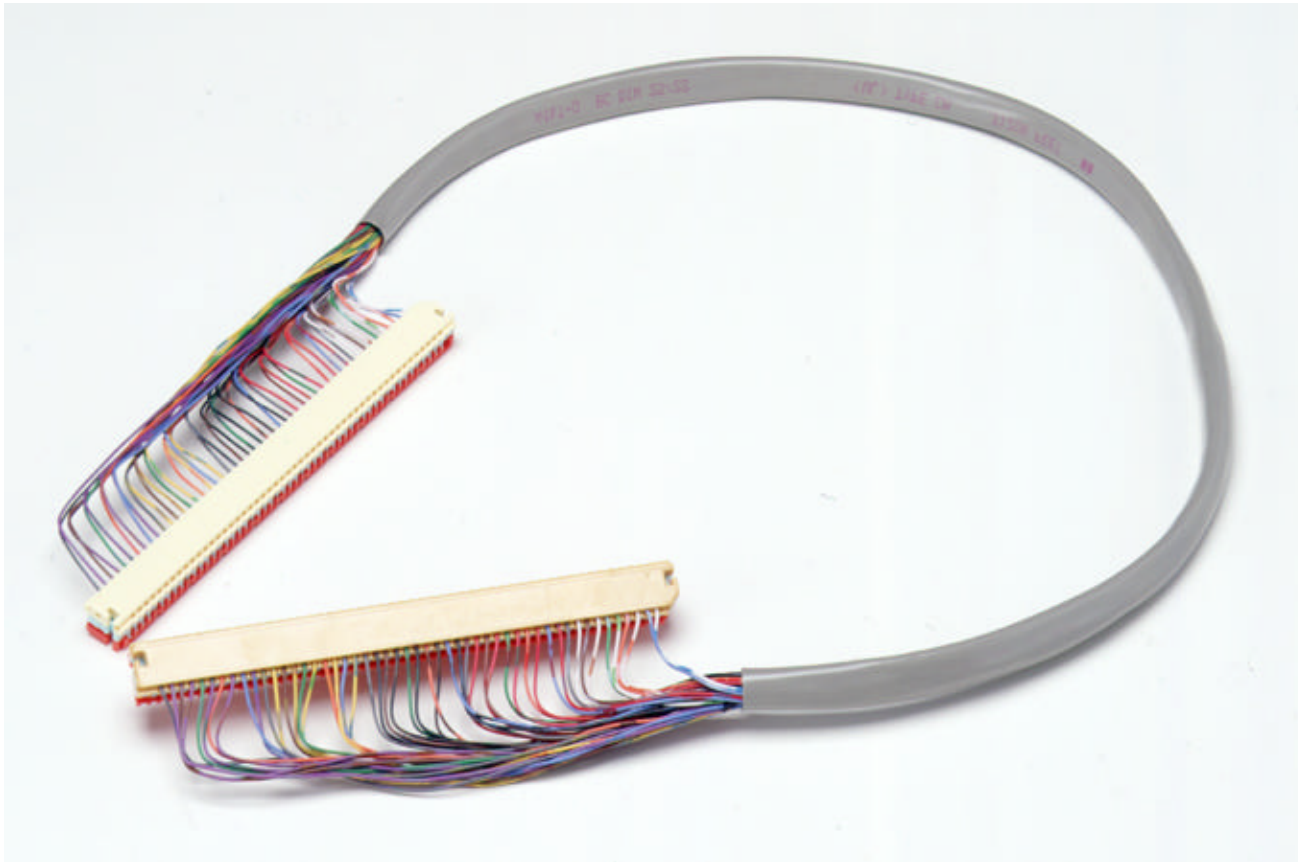
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## Features:

- **Designed specifically for accessing top wire in an existing 4005 DPM/4000 D Bridge configuration**
- **NO service interruptions**
- **Preterminated 2 ft. (50.8 mm) sheathed cable**
- **BTP allows plugging to bottom of the 4000 D connector**
- **Easy test access**

# MS<sup>2</sup>™ 4005-DPM/BTP Bottom Test Plug

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# MS<sup>2</sup>™ Sealant Box

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## Features:

- **MS<sup>2</sup>™ 4000 D Modules with moisture protection**
  - **Completely fills, protects and seals the module**
  - **Prevents splice encapsulants from filling test entry ports**
  - **Future reentry and re-arrangements are fast and simple even after splice encapsulation**
- **Applicator tool**
  - **Forces sealant through the wire channels and test entry ports**
  - **Insures complete module encapsulation**

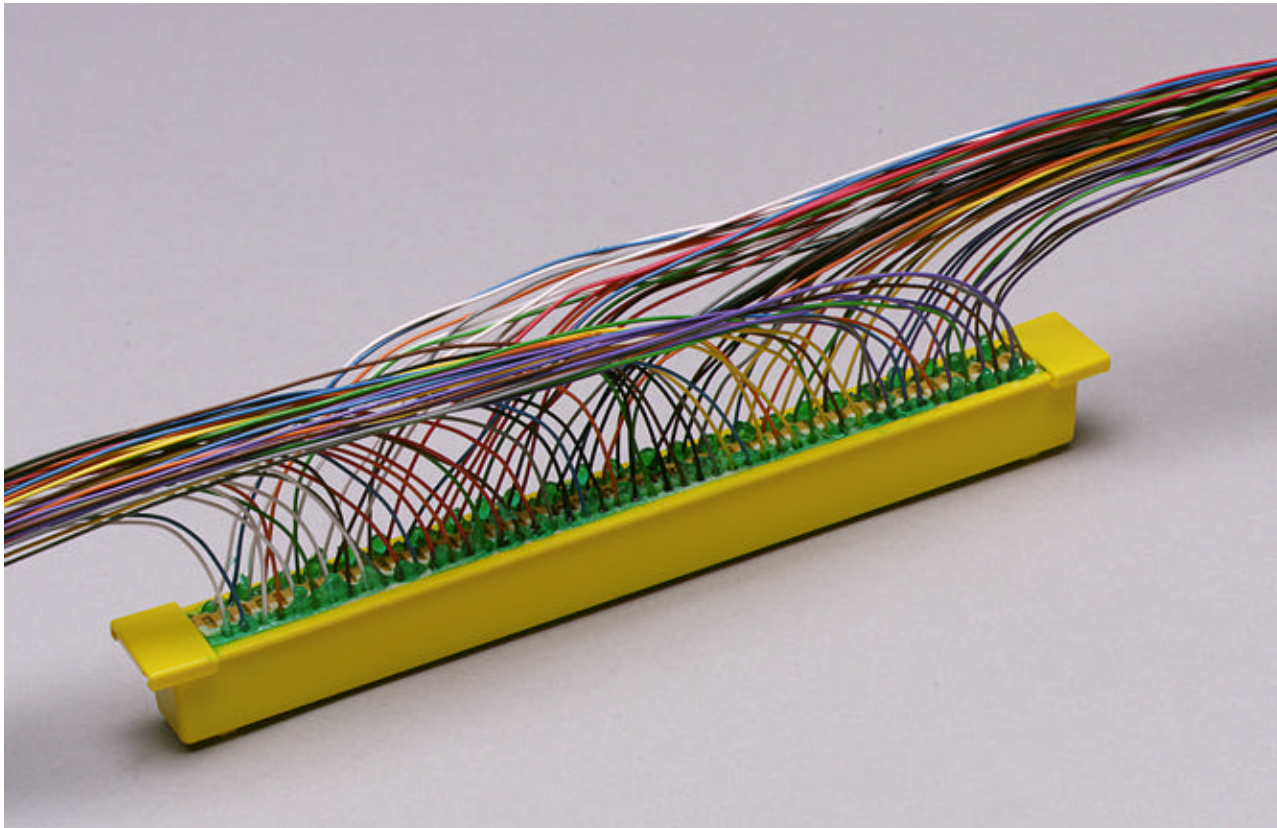
# Sealant Box (continued)

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- **Snap over latches**
  - secures the connector in the sealant box
  - ensures connector is fully inserted in the box
- **Prepackaged DWP 4000 D Module and sealant box in a kit for all MS<sup>2</sup>™ 4000 module family splice applications**

# MS<sup>2</sup>™ 4000-DWP Module with Sealant Box

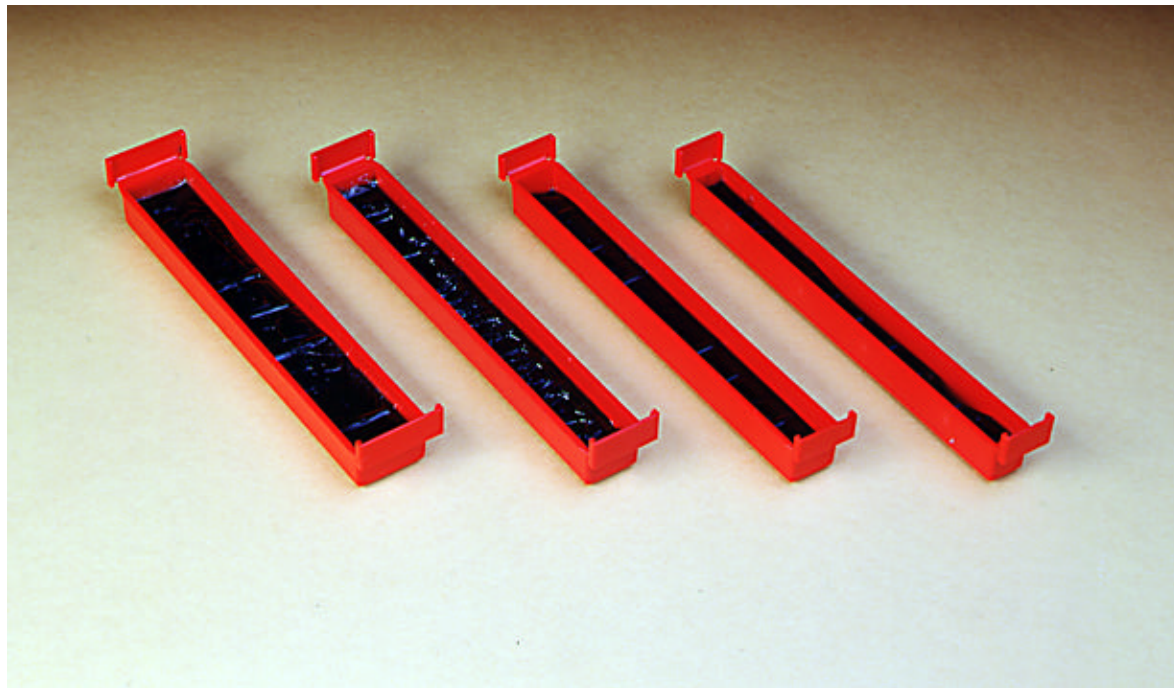
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# MS<sup>2</sup>™ Sealant Boxes

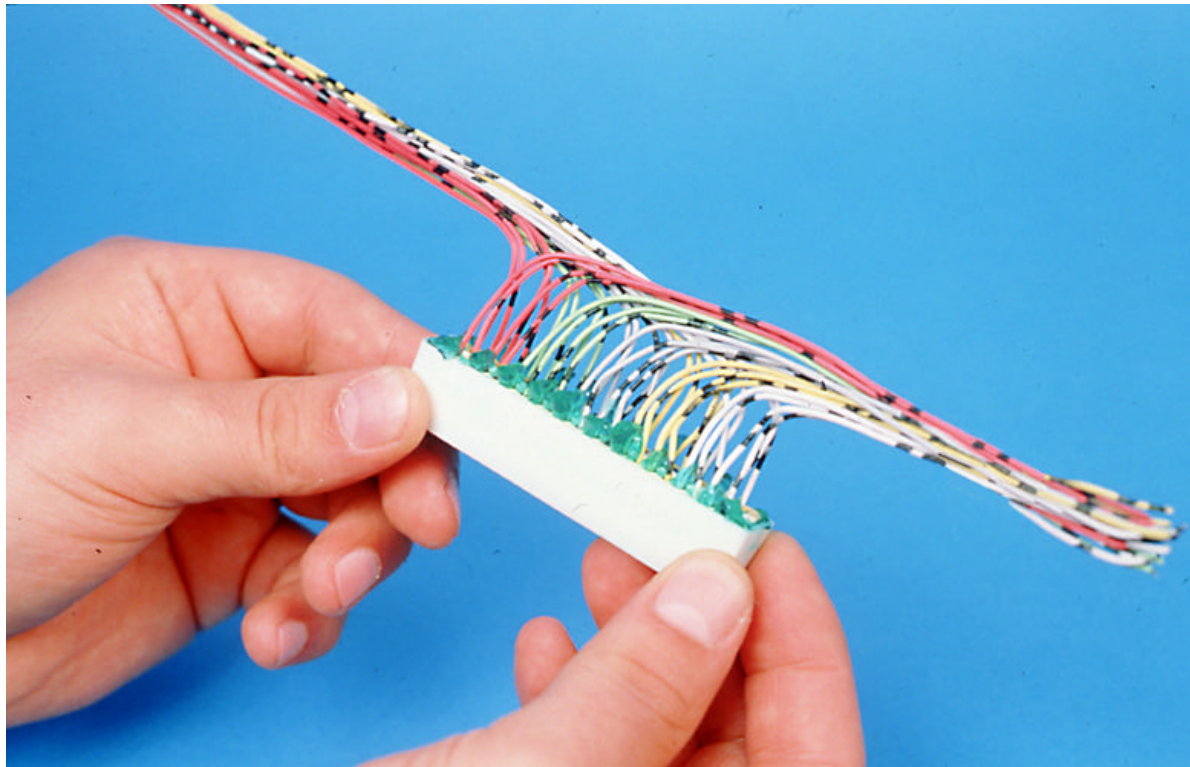
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# MS<sup>2</sup>™ 9700-DWP 10-pair Super-Mini Module with Sealant Box

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# **3M™ MS<sup>2</sup>™ Modular System Splicing Tools & Accessories**



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# 4021-M2 Splicing Rig Kit



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# MS<sup>2</sup>™ 4049 Lite Rig



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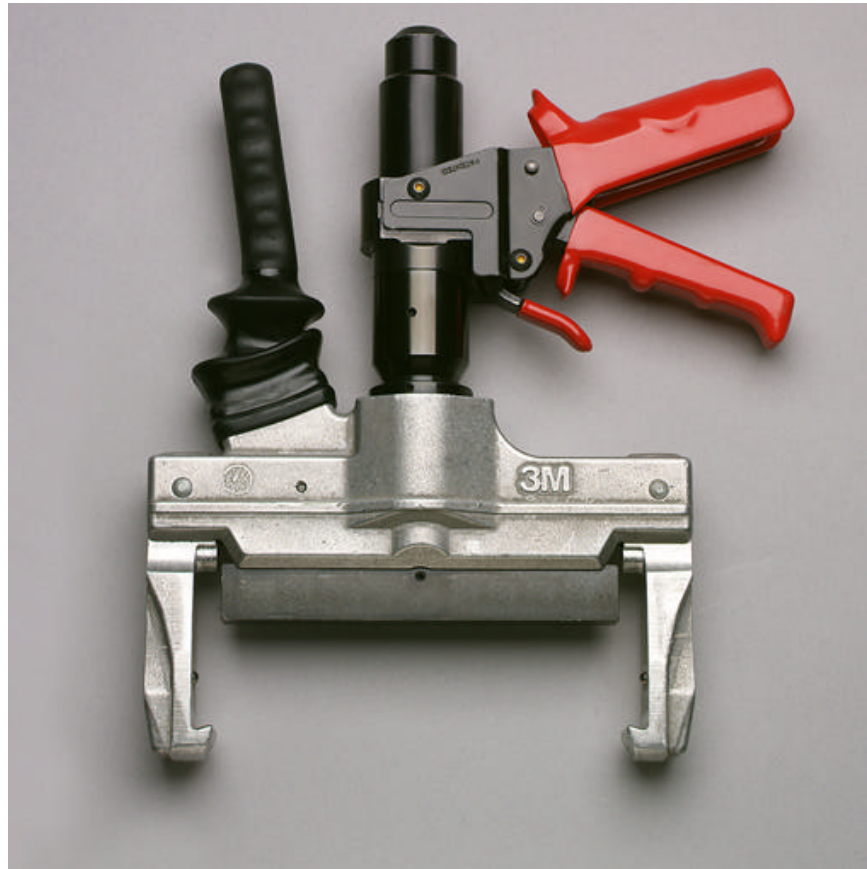
# MS<sup>2</sup>™ 4049 Lite Rig (Inside View)

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# MS<sup>2</sup>™ 4036-25 Hand Hydraulic Crimper

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# MS<sup>2</sup>™ Pluggable Module Hand Tools





# MS<sup>2</sup>™ 4026-A Module Maintenance Kit

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# 4048-SAB1 Super-Mini Test Probe Kit

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# MS<sup>2</sup>™ 9721 Rig Kit



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# 3M - Proven “System” Connector Technology!

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- Proven 3M IDC technology
- 40 years proven field reliability
- Spring energy, self-stripping IDC “U” elements provide gas tight, solder equivalent connections
- Highest quality materials/processes ensure signal integrity for today and the future
- Clear plastic covers/bases allow easy visual inspections
- Moisture and corrosion resistant
- Interruption free test/transfers
- 50% saving in maintenance and rehab work



# (continued)

- 
- Defacto industry standard
  - Global technical service
  - 6 sigma quality - all ISO 9002 manufacturing facilities
  - Craft friendly
  - Field tested under all conditions
  - Simple low cost tooling
  - Extensive global customer referral base
  - Multiple sources of supply



# 3M™ Copper Connectors

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- Moisture resistant, encapsulated, dry and flame retardant options
- Custom packaging options
- Sealant boxes for best moisture protection
- Clearing and capping connectors
- Testing during and after splicing w/o circuit interruption
- Tools for all special applications



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# Comments from Nordic Telco on Non-3M Look-Alike Module Manufactures

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- “They have no tools to the 25-pair system”
- “We will not use “Company X” whatsoever”
- “They have no sales support”
- “We will not take a chance to mix a “copied product” in the network”
- “The quality of 3M has been excellent and the price of failures is too critical and must be avoided”



# Typical Construction/Rehab Project

- Cost per line ranges from \$1000-\$1500

@ \$1000	Central Office	\$100
	Cable	\$500
	Infrastructure	\$200
	Accessories	\$200

- Each line has 10-25 connection points - 15 Average
- Assume a module at \$1 to \$1.25

<u>Cost</u>	<u>Cost/Line</u>	<u>%ACC</u>	<u>%Total</u>
\$1.00 ( )	\$ .60 ( )	0.30 ( )	0.060 ( )
\$1.25 ( )	\$ .75 ( )	0.37 ( )	0.075 ( )

- Replacement costs for faulty connectors is usually underestimated & hidden
- Closure + Connector + Infrastructure + Lost Revenue

\$50.00 + 0.05 + \$20.00 + \$10.00

TOTAL COST OF REPAIR PER LINE= \$80.05 ( )



# 3M™ Copper Splicing Technology

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Why even risk using non-3M  
“look-alike” connectors?

Can you Afford to buy Only a  
connector?



WWW.CABLEJOINTS.CO.UK  
THORNE & DERRICK UK  
TEL 0044 191 490 1547 FAX 0044 477 5371  
TEL 0044 117 977 4647 FAX 0044 977 5582  
WWW.THORNEANDDERRICK.CO.UK