F-LINK™ INTER-CONNECT

F-LINK™ Inter-Connect Solution

Overview

Optical Cable Corporation (OCC®) introduces the F-LINK™ Inter-Connect platform, which is simply the most remarkable connector system ever conceived. Born out of the proven performance of MIL-SPEC cylindrical components, the F-LINK Inter-Connect System is a cost-effective solution for commercial, industrial and military applications. The F-LINK Inter-Connect platform is a comprehensive family of connector components designed to solve a multitude of fiber optic applications, as well as enable the emerging trends and technological advances toward hybrid inter-connect systems (the combination of fiber optic and electrical power).

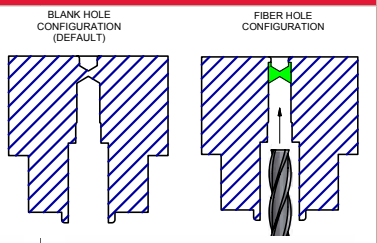
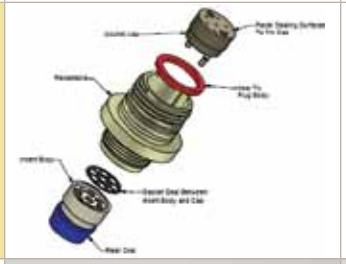
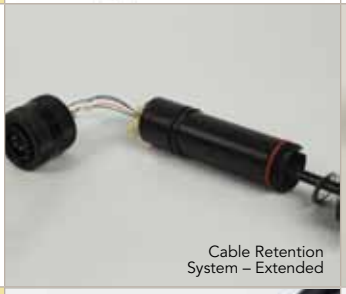
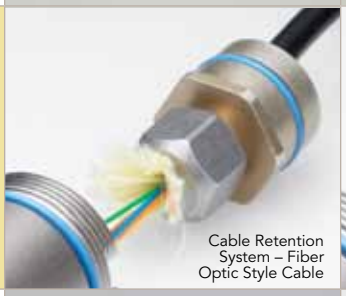
Background

Multi-channel fiber optic cylindrical connectors have long been the preferred inter-connect solution for military and defense systems. Ideal for electrical or RF applications, the integration of fiber optic connectivity into cylindrical components has proven challenging, resulting in expensive connector systems. The F-LINK Inter-Connect platform captures the proven performance of MIL-SPEC cylindrical-style components which are designed for extended operation in harsh or uncontrolled environments. Protective sealing features along with advanced materials enable F-LINK components to operate across a wide temperature and humidity range, and in high-vibration and/or corrosive environments. 1.25mm ceramic ferrule technology coupled with patent-pending, thermal plastic features provides a scalable, cost-effective inter-connect solution.

The flexibility of provisioning independent channels, gender-selectable plug and receptacles with superior environmental sealing positions the F-LINK Inter-Connect platform as the ideal solution for almost any application. The F-LINK Inter-Connect platform also features a comprehensive family of connector configurations, back shells and accessories. Available in three shell sizes.

F-LINK™ INTER-CONNECT

Features and Benefits

FEATURES		BENEFITS
Maximum Provisioning Flexibility	 	All termini cavities start as "BLANKS" and are machined to provide application-specific fiber optic/electrical requirements. BLANKS can be machined for 1.25mm F/O Pin or Socket, 16#AWG Copper Pin, 16#AWG Copper Socket
Interchangeable Pin/Socket Insert Caps	 In-Line Recpt., Male Insert Cap 6 Fiber  In-Line Recpt., Female Insert Cap 6 Fiber	F-LINK™ allows interchangeability of Pin or Socket insert caps, which can be provisioned into either Plug or Receptacle components.
Exceptional Environmental Sealing Capability	 	Four sealing surfaces, including Insert Cap, Insert Body, Plug and Receptacle Body and Rear Cable Seal, provide IP-68 compliance.
Versatile, Retractable Backshell System	 Cable Retention System – Extended  Cable Retention System – Retracted	The Backshell System is common to both fiber optic and composite cable (fiber optic & electrical). The F-LINK Backshell System provides ease of termination, allowing extension & retraction of the inner Cable Retention System.
Interchangeable Fiber Optic or Composite Hybrid Cable Retention System	 Cable Retention System – Fiber Optic Style Cable  Cable Retention System – Composite Style Cable	Supports either fiber optic cable or composite hybrid cable by replacement of the Cable Retention System for either fiber optic or hybrid-style cables.
F-Link™ Termini and Electrical Pin/Socket Contacts	 	1.25mm ceramic ferrules are used within the F-LINK fiber optic termini. Electrical contacts are based on the same proven technology used in D38999 connectors. Insertion/extraction tools are common and low cost.

F-LINK™ INTER-CONNECT

Connector Configurations

SS16, Plug, Male w/Backshell, F/O Cable

SS16, Panel Mount Receptacle, Male

SS16, In-Line Receptacle, Female

SS16, Jam-Nut Receptacle, Internal, Female

SS16, Panel Mount Plug, Female

SS16, Backshell for Composite Cable

SS22, Plug, Male w/Backshell, F/O Cable

SS22, Jam-Nut Receptacle, Internal, Female

SS22, Jam-Nut Receptacle, External, Male

SS28, Plug, Female w/Backshell,
Fiber Optic Cable

SS28, Plug, Female w/Backshell, F/O Cable,
Dust Cap, Brass

SS28, Panel Mount Receptacle, Female

Performance Specifications

PERFORMANCE SPECIFICATION		
PERFORMANCE	**SPECIFICATION**	**PARAMETER**
Insertion Loss (multimode)	EIA/TIA-455-171	0.50dB – Typical, 0.75dB – Maximum
Insertion Loss (single-mode)	EIA/TIA-455-171	0.40dB – Typical, 0.75dB – Maximum
Back Reflection (single-mode UPC polish)	EIA/TIA-455-107	-50dB – Typical, -40dB – Maximum
Operating Temperature	TIA/EIA-455-5	-40° C to + 85° C
Storage Temperature	TIA/EIA-455-5	-40° C to + 85° C
Mating Durability	TIA-455-21	500 cycles
Impact	TIA/EIA-455-2	Method B , Omit wall pipe
Twist	TIA-455-36	±90° rotation, one cycle/5sec., 1000 cycles
Cable Sealing Flex	EIA/TIA-455-1	Procedure I
Cable Retention[1]	TIA-455-6	400 lbs. min.
Crush Resistance	TIA-455-26	450 lbs.
Temperature Life	TIA/EIA-455-4	250 hrs., 85 ± 2°C
Thermal Shock	TIA-455-71	Condition B-0 except 10 cycles, @ 85° C and -62° C
Physical Shock	EIA/TIA-455-11	Condition C, 5 shocks/axis
Vibration	TIA-455-1	Condition III & VI Condition C for 1.5 hr, Except III
Humidity	EIA/TIA-455-5	Type II
Water Submersion	IP-68, IEC-60529	1M Depth, 48 Hours. Bulkhead mounted in watertight cube

NOTES
[1] Uses military tactical cable for test purposes

Ordering Information

F-LINK™ SHELL SIZE 16 (6 CHANNEL)		
PART NUMBER	**CONFIGURATION**	**DESCRIPTION**
HDANNNNNBU30B	Plug, w/Backshell	6 CH (Blank[1]), Plug, Male, Backshell, Blk. Anodized, 0.240–0.269" Cable O.D.
HDBNNNNNBU30B	Plug, w/Backshell	6 CH (Blank[1]), Plug, Female, Backshell, Blk. Anodized, 0.240–0.269" Cable O.D.
HDANNNNNBU30D	Plug, w/Backshell	6 CH (Blank[1]), Plug, Male, Backshell, Blk. Anodized, 0.316–0.345" Cable O.D.
HDBNNNNNBU30D	Plug, w/Backshell	6 CH (Blank[1]), Plug, Female, Backshell, Blk. Anodized, 0.316–0.345" Cable O.D.
HDCNNNNNBM30B	Recpt., In-Line w/Backshell	6 CH (Blank[1]), In-Line Recpt., Male, Backshell, Blk. Anodized, 0.240–0.269" Cable O.D
HDDNNNNNBM30B	Recpt., In-Line w/Backshell	6 CH (Blank[1]), In-Line Recpt., Female, Backshell, Blk. Anodized, 0.240–0.269" Cable O.D.
HDCNNNNNBM30D	Recpt., In-Line w/Backshell	6 CH (Blank[1]), In-Line Recpt., Male, Backshell, Blk. Anodized, 0.316–0.345" Cable O.D.
HDDNNNNNBM30D	Recpt., In-Line w/Backshell	6 CH (Blank[1]), In-Line Recpt., Female, Backshell, Blk. Anodized, 0.316–0.345" Cable O.D.
HDENNNNNBM00	Recpt., Panel Mount	6 CH (Blank[1]), Panel Mount Recpt., Male, Blk. Anodized
HDFNNNNNBM00	Recpt., Panel Mount	6 CH (Blank[1]), Panel Mount Recpt., Female, Blk. Anodized
HDQNNNNNBU00	Plug, Panel Mount	6 CH (Blank[1]), Panel Mount Plug, Male, Blk. Anodized
HDRNNNNNBU00	Plug, Panel Mount	6 CH (Blank[1]), Panel Mount Plug, Female, Blk. Anodized

NOTES
[1] "Blank" refers to an untapped cavity that can be modified (drilled or molded) to accommodate fiber optic pin, fiber optic socket, electrical pin or electrical socket.

F-LINK™ INTER-CONNECT

Ordering Information

F-LINK™ SHELL SIZE 16 (6 CHANNEL)		
PART NUMBER	CONFIGURATION	DESCRIPTION
HDSNNNNNBM00	Recpt., Jam-Nut, Internal	6 CH (Blank[1]), Jam-Nut Recpt., Male, Internal, Blk. Anodized, w/o D-Flat
HDTNNNNNBM00	Recpt., Jam-Nut, Internal	6 CH (Blank[1]), Jam-Nut Recpt., Female, Internal, Blk. Anodized, w/o D-Flat
HDUNNNNNBM00	Recpt., Jam-Nut, External	6 CH (Blank[1]), Jam-Nut Recpt., Male, External, Blk. Anodized, w/o D-Flat
HDVNNNNNBM00	Recpt., Jam-Nut, External	6 CH (Blank[1]), Jam-Nut Recpt., Female, External, Blk. Anodized, w/o D-Flat
HDJNNNNNB001	Dust Cap	SS16, Dust Cover, Metal, Plug, Blk. Anodized
HDJNNNNNH001	Dust Cap	SS16, Dust Cover, Plastic, Plug, Blk. Anodized
HDJNNNNNB002	Dust Cap	SS16, Dust Cover, Metal, Rcpt., Int. Jam-Nut, Blk. Anodized
HDJNNNNNB003	Dust Cap	SS16, Dust Cover, Metal, Rcpt., Ext. Jam-Nut, Blk. Anodized
HDJNNNNNB004	Dust Cap	SS16, Dust Cover, Metal, Rcpt., Panel Mount, Blk. Anodized

F-LINK™ SHELL SIZE 22 (17 CHANNEL)		
PART NUMBER	CONFIGURATION	DESCRIPTION
HGANNNNNB130D	Plug, w/Backshell	17 CH (Blank[1]), Plug, Male, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HGBNNNNNB130D	Plug, w/Backshell	17 CH (Blank[1]), Plug, Female, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HGANNNNNB130G	Plug, w/Backshell	17 CH (Blank[1]), Plug, Male, Backshell, Blk. Anodized, 0.422–0.462" Cable O.D.
HGBNNNNNB130G	Plug, w/Backshell	17 CH (Blank[1]), Plug, Female, Backshell, Blk. Anodized, 0.422–0.462" Cable O.D.
HGCNNNNNB130D	Recpt., In-Line w/Backshell	17 CH (Blank[1]), In-Line Recpt., Male, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HGDNNNNNB130D	Recpt., In-Line w/Backshell	17 CH (Blank[1]), In-Line Recpt., Female, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HGCNNNNNB130G	Recpt., In-Line w/Backshell	17 CH (Blank[1]), In-Line Recpt., Male, Backshell, Blk. Anodized, 0.422–0.462" Cable O.D.
HGDNNNNNB130G	Recpt., In-Line w/Backshell	17 CH (Blank[1]), In-Line Recpt., Female, Backshell, Blk. Anodized, 0.422–0.462" Cable O.D.
HGENNNNNB100	Recpt., Panel Mount	17 CH (Blank[1]), Panel Mount Recpt., Male, Blk. Anodized
HGFNNNNNB100	Recpt., Panel Mount	17 CH (Blank[1]), Panel Mount Recpt., Female, Blk. Anodized
HGQNNNNNB100	Recpt., Jam-Nut, Internal	17 CH (Blank[1]), Recpt., Jam-Nut, Internal, Male, Blk. Anodized
HGRNNNNNB100	Recpt., Jam-Nut, Internal	17 CH (Blank[1]), Recpt., Jam-Nut, Internal, Female, Blk. Anodized
HGGNNNNNB100	Plug, Panel Mount	17 CH (Blank[1]), Plug, Panel Mount, Male, Blk. Anodized
HGHNNNNNB100	Plug, Panel Mount	17 CH (Blank[1]), Plug, Panel Mount, Female, Blk. Anodized
HGUNNNNNB100	Plug, Panel Mount	17 CH (Blank[1]), Plug, Panel Mount, Male, Blk. Anodized
HGVNNNNNB100	Plug, Panel Mount	17 CH (Blank[1]), Plug, Panel Mount, Female, Blk. Anodized
HGJNNNNNB001	Dust Cap	SS22, Dust Cover, Metal, Plug, Blk. Anodized
HGJNNNNNH001	Dust Cap	SS22, Dust Cover, Plastic, Plug, Blk. Anodized
HGJNNNNNB002	Dust Cap	SS22, Dust Cover, Metal, Recpt., Internal Jam-Nut, Blk. Anodized
HGJNNNNNB003	Dust Cap	SS22, Dust Cover, Metal, Recpt., External Jam-Nut, Blk. Anodized
HDJNNNNNB004	Dust Cap	SS16, Dust Cover, Metal, Recpt., Panel Mount, Blk. Anodized

NOTES

[1] "Blank" refers to an untapped cavity that can be modified (drilled or molded) to accommodate fiber optic pin, fiber optic socket, electrical pin or electrical socket.

F-LINK™ INTER-CONNECT

Ordering Information

F-LINK™ SHELL SIZE 28 (33 CHANNEL)		
PART NUMBER	CONFIGURATION	DESCRIPTION
HJANNNNNB130D	Plug, w/Backshell	33 CH (Blank[1]), Plug, Male, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HJBNNNNNB130D	Plug, w/Backshell	33 CH (Blank[1]), Plug, Female, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HJANNNNNB130K	Plug, w/Backshell	33 CH (Blank[1]), Plug, Male, Backshell, Blk. Anodized, 0.550–0.589" Cable O.D.
HJBNNNNNB130K	Plug, w/Backshell	33 CH (Blank[1]), Plug, Female, Backshell, Blk. Anodized, 0.550–0.589" Cable O.D.
HJCNNNNNB130D	Recpt., In-Line w/Backshell	33 CH (Blank[1]), In-Line Recpt., Male, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HJDNNNNNB130D	Recpt., In-Line w/Backshell	33 CH (Blank[1]), In-Line Recpt., Female, Backshell, Blk. Anodized, 0.316–0.342" Cable O.D.
HJCNNNNNB130K	Recpt., In-Line w/Backshell	33 CH (Blank[1]), In-Line Recpt., Male, Backshell, Blk. Anodized, 0.550–0.589" Cable O.D.
HJDNNNNNB130K	Recpt., In-Line w/Backshell	33 CH (Blank[1]), In-Line Recpt., Female, Backshell, Blk. Anodized, 0.550–0.589" Cable O.D.
HJENNNNNB100	Recpt., Panel Mount	33 CH (Blank[1]), Panel Mount Recpt., Male, Blk. Anodized
HJFNNNNNB100	Recpt., Panel Mount	33 CH (Blank[1]), Panel Mount Recpt., Female, Blk. Anodized
HJQNNNNNB100	Recpt., Jam-Nut, Internal	33 CH (Blank[1]), Recpt., Jam-Nut, Internal, Male, Blk. Anodized
HJRNNNNNB100	Recpt., Jam-Nut, Internal	33 CH (Blank[1]), Recpt., Jam-Nut, Internal, Female, Blk. Anodized
HJGNNNNNB100	Plug, Panel Mount	33 CH (Blank[1]), Plug, Panel Mount, Male, Blk. Anodized
HJHNNNNNB100	Plug, Panel Mount	33 CH (Blank[1]), Plug, Panel Mount, Female, Blk. Anodized
HJUNNNNNB100	Plug, Panel Mount	33 CH (Blank[1]), Plug, Panel Mount, Male, Blk. Anodized
HJVNNNNNB100	Plug, Panel Mount	33 CH (Blank[1]), Plug, Panel Mount, Female, Blk. Anodized
HJJNNNNNB001	Dust Cap	SS28, Dust Cover, Metal, Plug, Blk. Anodized
HJJNNNNNH001	Dust Cap	SS28, Dust Cover, Plastic, Plug, Blk. Anodized
HJJNNNNNB002	Dust Cap	SS28, Dust Cover, Metal, Recpt., Int. Jam-Nut, Blk. Anodized
HJJNNNNNB003	Dust Cap	SS28, Dust Cover, Metal, Recpt., Ext. Jam-Nut, Blk. Anodized
HDJNNNNNB004	Dust Cap	SS16, Dust Cover, Metal, Recpt., Panel Mount, Blk. Anodized

F-LINK™ FIBER OPTIC TERMINI AND ELECTRICAL CONTACTS		
PART NUMBER	CONFIGURATION	DESCRIPTION
TP2042DD01	Termini, Fiber Optic	Termini, Fiber Optic, Genderless, Pin, 1.25 Ceramic Ferrule, 126µm
UV164016AA	Contact, Electrical	Contact, Pin, Electrical, 16# AWG
UV165016AA	Contact, Electrical	Contact, Pin, Electrical, 16# AWG, Long (Ground)
UV164116AA	Contact, Electrical	Contact, Socket, Electrical, 16# AWG
PA35395-99-01	Crimp Sleeve	Crimp Sleeve, Brass, .114 O.D.

NOTES

[1] "Blank" refers to an untapped cavity that can be modified (drilled or molded) to accommodate fiber optic pin, fiber optic socket, electrical pin or electrical socket.

All F-LINK connectors can be utilized in any pre-terminated turnkey assemblies.

FIBER OPTIC ONLY

1) Select the appropriate Shell Size to accommodate the fiber optic channel count.
2) Select the connector configurations that meet the intent of the application. Most fiber optic applications require male plugs with BACKSHELL to support connectivity with female receptacles. Receptacles are selected based on internal, external jam-nut or panel-mount options.
3) Identify the number of termini required to support the fiber count.
4) Apply one (1) crimp sleeve to each terminus when using receptacle configurations without backshells. Receptacles are typically provisioned with Simplex 2.0mm loose tube fiber optic cable and Simplex connectors (ex: SC, LC, ST, FC) to form pigtails.
5) See section insert provisioning to specify the hole pattern portion of the final part number by completing the NNNNN portion of each connector configuration (ex: HJVNNNNNBU00 becomes HJV00024BU00 for a 24 CH fiber optic application).

HYBRID (Combination of Electrical and Fiber Optic)

1) Select the appropriate Shell Size to accommodate the fiber optic and electrical channel count.
2) Select the connector configurations that meet the intent of the application. Most hybrid applications require the source of electricity to be protected from hazardous shock along the path of inter-connect. F-LINK supports this requirement through interchangeable pin/socket insert caps as well as in-line receptacles w/backshell and panel-mounted plugs.
3) Receptacles options include in-line internal, external jam-nut, in-line or panel mount and can be provisioned as female or male to protect from hazardous shock. Backshells are typically used with in-line receptacles.
4) Plug options include standard plug or panel-mounted plug provisioned as female or male to protect from hazardous shock. Backshells are typically used with plugs.
5) Identify the number of termini required to support the fiber count.
6) Apply one (1) crimp sleeve to each terminus when using receptacle configurations without backshells. Receptacles are typically provisioned with Simplex 2.0mm loose tube fiber optic cable and Simplex connectors (ex: SC, LC, ST, FC) to form pigtails.
7) Identify the number of 16#AWG PIN contacts to support male plug or male receptacle configurations.
8) Identify the number of 16#AWG SOCKET contacts to support female plug or female receptacle configurations.
9) For applications greater than 16#AWG, larger gauge wire can be supported by splitting stranded wire between two 16#AWG contacts or with custom F-LINK applications using 10#AWG contacts. Contact OCC Technical Sales person for additional information.
10) For applications that require ground fault detection, a long pin (UV165016AA) is applied to the center hole of the male insert body, making first contact with the mating socket (also located in the center hole), prior to full connector engagement.
11) See section insert provisioning to specify the final part number by completing the NNNNN portion of each connector configuration (ex: HJVNNNNNB100 becomes HJV20324B100 for a 3 electrical + 24 fiber optic with long ground pin).

PLATING OPTIONS

All F-LINK™ configurations are supplied with BLACK Anodized as standard plating. Additional plating options are available by designating the 9th digit position of the part number (ex: HDUNNNNN**B**U00) with a choice of plating /alternate materials as listed:

"A" Electroless Nickel Plating, Mil-C-26074, 3mil(±0.5mil)
"B" Black Anodized, Mil-A-8625 TYPE 2 CLASS 2
"D" 303 Stainless Steel, Passivation per QQ-P-35/ASTMA967
"E" 316 Stainless Steel, Passivation per QQ-P-35/ASTMA967
"G" Naval Brass, C 46400 H02 Half Hard ASTMB 21/B21M

KEYING OPTIONS: All F-LINK plug/receptacles are supplied with KEY 1 mechanical key options. Alternate keying options are available upon request. Contact your OCC Technical Sales personnel for additional information.

INSERT ARRANGEMENT AND PROVISIONING

The F-LINK™ family of connectors features an advanced means of provisioning fiber optic and hybrid (fiber optic and electrical) insert arrangements. All F-LINK™ pin and socket insert caps are manufactured as blank, then drilled or injection molded according to the desired hole pattern and termini/ contact arrangement. Hole patterns can be custom drilled for fast prototype assemblies. Hole patterns and termini/ contact assignment are designated by the "NNNNN" scheme within the core part number of any plug or receptacle configuration (HGDNNNNNB130G).

N	N	N	N	N
1	0	2	1	2

ELECTRICAL ARRANGEMENT	
N	Not Used
1	16#AWG w/o Ground
2	16#AWG w/Ground

F/O CH COUNT	
NN	Not Used
00–33	00–33 F/O

ELECTRICAL CH COUNT	
NN	Not Used
00–33	00–33 Elec.

NOTES

(1) If no electrical contacts are necessary, select (N) for the 1st digit. "1" is selected if no "center ground" pin/socket are necessary. "2" is selected if ground detection (Make-Before-Contact) is required.
(2) Selection of option "2" will place the ground pin/socket in the center of the PIN or SOCKET insert body. This will void the use of the Insert Cap removal tool.
(3) The maximum number of fiber optic contacts ranges from "00" to "33" (6 for SS#16, 17 for SS#22 and 33 for SS#28).
(4) The maximum number of electrical contacts ranges from "00" to "33" (6 for SS#16, 17 for SS#22 and 33 for SS#28).
(5) Any combination of 33 fiber optic or electrical contacts/termini can be applicable.
(6) F-LINK™ can be used as an "all electrical" connector.

HOLE PATTERN AND CHANNEL DESIGNATION

Identification of hole patterns and channel designation for each family member is identified in the following table.

		
Male Plug, Shell Size 16 (1–6 CH)	Male Plug, Shell Size 22 (1–17 CH)	Male Plug, Shell Size 28 (1–33 CH)
		
Female Plug, Shell Size 16 (1–6 CH)	Female Plug, Shell Size 22 (1–17 CH)	Female Plug, Shell Size 28 (1–33 CH)
		
Male Receptacle, Shell Size 16 (1–6 CH)	Male Receptacle, Shell Size 22 (1–17 CH)	Male Receptacle, Shell Size 28 (1–33 CH)
		
Female Receptacle, Shell Size 16 (1–6 CH)	Female Receptacle, Shell Size 22 (1–17 CH)	Female Receptacle, Shell Size 28 (1–33 CH)

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