

The Snap Lock Environmental Series is Cannon's newest environmentally-sealed connector created for printed circuit board, black box, cable-to-cable or bulkhead applications.

When your under-the-hood requirements call for tough performance, the SLE "snaps" into a tightly-sealed connection that can withstand heat, shock and vibration. The connector is designed to preserve the integrity of the solid state package, while protecting against contaminants—even when unmated.

Polarization, scoop-proofing and hand insertion of contacts are part of the package. Gold, tin/lead-plated stamped contacts add durability. A rugged, thermoplastic receptacle body maximizes performance by withstanding temperature variances from  $-40^{\circ}$  to  $+125^{\circ}\text{C}$ .

The SLE series is available in both 19 and 28 wire configurations. It can also be adapted to robotic assembly. Should your requirement demand higher density configurations, consult our applications engineering staff.

## Features

- Superior environmental sealing
- Integral mold latch
- $-40^{\circ}$  to  $+125^{\circ}\text{C}$  continuous operation at rated current
- Available in two sizes, 19 and 28 contacts
- Crimp stamped gold, tin/lead plated contacts
- Hand insertable/removable contacts
- Current rating 5 amp and 13 amp versions
- Low millivolt drop
- Low contact resistance
- Small footprint on P.C. board and low profile
- 5-way alternate polarization
- Adaptable to robotic assembly
- Multi-direction, easily assembled endbells
- Optional secondary bail latch

## Benefits

- Circuit protection and lowers warranty risk
- Latch with tactile and audible feedback
- Extends temperature operating range
- Meets most design requirements
- Increases durability and provides for minimum installation cost
- Low installed cost
- To meet signal and power requirements
- An absolute must in low signal applications
- A must for circuitry with low potentials
- Requires less P.C. board space
- One body offers 5 combinations of polarization
- Another avenue for cost savings
- Versatile cable strain relief, up, down, straight, left and right, flange/bulkhead
- Connector mating assurance

## How to Order

	SLE	B	19	P	4	S	G	**
SERIES PREFIX _____								
SIZE _____								
NUMBER OF CONTACTS _____								
CONTACT TERMINATION _____								
CONNECTOR TYPE _____								
CONNECTOR TERMINATION _____								
MECHANICAL MODIFIER _____								
MATERIAL OR FINISH MODIFIER _____								

### SERIES PREFIX

Snap-Lock Environmental

### SIZE

B or C

### NUMBER OF CONTACTS

19 or 28

### CONTACT TERMINATION

- T – Tuning Fork Straight  
(Plug with .120 (3.05) min. PCB tails)
- N – Tuning Fork 90°  
(Plug with .100 (2.54) min. PCB tails)
- P – Crimp Pin (receptacle)
- S – Crimp Socket (plug)
- P1 – Crimp Pin Power (Receptacle)
- S1 – Crimp Socket Power (Pin)

### CONNECTOR TYPE

- 2 – Plug
- 3 – PCB Plug
- 4 – Receptacle

### CONNECTOR TERMINATION

- S – Straight (Endbell)
- L – 90° Left (Endbell)
- R – 90° Right (Endbell)
- U – 90° Up (Endbell)
- D – 90° Down (Endbell)
- P – Potted (PCB only)

### MECHANICAL MODIFIER

- F – With Flange Mount (Plug only)
- G – Screwlock Applications (Receptacle only)
- M – Metric Threaded Inserts M3.5 × .60
- N – Threaded Inserts 6-32 UNC
- E – Threaded spacer 6-32 × .56

# ITT Cannon

Dimensions are shown in inches (millimeters).  
Dimensions subject to change.

For technical assistance, price or delivery information, call your local technical sales office or distributor.

## Test Parameters

SLE products are designed to meet ITT Cannon specification CS-189. Items of most general interest to users and designers are listed below.

Test Description	Reference Paragraph	Requirements																																					
Environmental Sealing	3.2.3.5	Sand and Dust MIL-STD-202 Method 110 Test Condition A																																					
	3.2.3.6	5% salt spray 96 hours																																					
	3.2.3.7	10 cycles of 24 hours, 90-98% humidity																																					
	3.2.3.8	Steam Cleaning/Pressure Wash 95°C, 375 Cycles 750 PSIG																																					
	3.2.3.9	Solvent Resistance/Immersion (see 3.2.3.9)																																					
3.2.3.10	Thermal Shock Ten Cycles 4° to 100°C + 3°C																																						
Contact Crimp Tensile Strength	3.2.2.1	The minimum tensile load required to separate the wire from the contact, either by pulling the wire out of the crimp joint or breaking the wire within the crimp joint shall not be less than the applicable limits as specified. Wire breakage or contact damage not due to crimping at less than tensile loads shall not constitute a failure.																																					
		<table border="1"> <thead> <tr> <th>Wire Size AWG</th> <th>Crimp Tensile Strength, Pounds Minimum</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>35</td> </tr> <tr> <td>18</td> <td>25</td> </tr> <tr> <td>20</td> <td>20</td> </tr> </tbody> </table>	Wire Size AWG	Crimp Tensile Strength, Pounds Minimum	16	35	18	25	20	20																													
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Insulation Resistance	3.2.1.1	Mated and wired connectors shall exhibit an insulation resistance greater than 100 megohms between all contacts. This limit shall apply after exposure to each environment including salt solution immersion. Tests shall be performed at 100 VDC ± 10%.																																					
Dielectric Withstanding Voltage	3.2.1.2	Wired and mated connectors shall show no evidence of breakdown between adjacent contacts when tested at 1000 VDC ± 5%. Connectors shall meet this requirement after exposure to each environment. Current leakage shall be less than 1.0 milliamp.																																					
Low Level Contact Resistance	3.2.1.4	The low level contact resistance of mated contacts shall be less than 10 milliohms when measured across the contacts and crimp joints. The test current shall be a maximum of 100 milliamps with an open circuit test voltage of 20 millivolts maximum.																																					
Mechanical Shock	3.2.3.3	Connectors shall be subjected to three shocks in each direction applied along the three mutually perpendicular axes of the connector test specimen for a total of 18 shocks. Each shock shall consist of a terminal peak sawtooth pulse with a peak value of 100 g's and a duration of 6 milliseconds.																																					
Vibration	3.2.3.4	Connectors shall be subjected to random vibration in accordance with MIL-STD-1344, Method 2005.1, test condition VI, for 20 hours along each of the following three axes:																																					
		<table border="1"> <thead> <tr> <th>Direction</th> <th>Grms</th> </tr> </thead> <tbody> <tr> <td>Transverse axis of connector</td> <td>22.8</td> </tr> <tr> <td>Longitudinal axis of connector</td> <td>13.2</td> </tr> <tr> <td>Mating axis</td> <td>10.2</td> </tr> </tbody> </table>	Direction	Grms	Transverse axis of connector	22.8	Longitudinal axis of connector	13.2	Mating axis	10.2																													
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		Electrical continuity of the connectors shall be monitored during the last 20 minute sweep in each axis with a test current of 100 milliamps or less and a test voltage less than 2 VDC. Electrical discontinuities in excess of 10 microseconds shall be cause of failure.																																					
Durability	3.2.2.5	Connectors shall be subjected to 25 cycles of mating and unmating at room temperature. Following this test there shall be no evidence of damage to the contacts, contact plating, connector housing or seals which may prove detrimental to reliable performance of the connector.																																					
Contact	3.2.2.2	Contacts shall not be displaced greater than 0.030 inches from the connector body when a force of 25 pounds is applied. When this test follows maintenance aging the same contacts shall be tested.																																					
Maintenance Aging	3.2.2.3	Shall consist of subjecting each wired receptacle to 4 cycles of removal and reinsertion of 20% of the contacts or a minimum of 6 per connector with approved tooling.																																					
Mating and Separating Force	3.2.2.4	The maximum force required to mate the plug and receptacle shall be 25 pounds. The maximum force required to separate the plug and receptacle shall be 15 pounds. The rate of travel shall be one inch per minute.																																					
Solvent Resistance Immersion	3.2.3.9	Connectors shall be subjected to the following fluids at the temperature and length of time specified. Following the fluid dip or immersion, the connectors shall be immersed to a depth of 2 to 12 inches in a 5% salt water solution for 24 hours at room temperature. At the completion of the salt water immersion test, while still immersed, the connectors shall meet the insulation resistance requirement specified herein.																																					
		<table border="1"> <thead> <tr> <th>Fluid</th> <th>Method</th> <th>Temperature</th> </tr> </thead> <tbody> <tr> <td>No. 2 Diesel Fluid</td> <td>Immersion (2)</td> <td>140°F</td> </tr> <tr> <td>Methyl Alcohol</td> <td>Dip (1)</td> <td>Room Temperature</td> </tr> <tr> <td>Antifreeze</td> <td></td> <td></td> </tr> <tr> <td>—Prestone</td> <td>Immersion (2)</td> <td>180°F</td> </tr> <tr> <td>—50% Water/50% Ethylene Glycol</td> <td>Immersion (2)</td> <td>180°F</td> </tr> <tr> <td>Degreaser</td> <td></td> <td></td> </tr> <tr> <td>—Gunk</td> <td>Dip (1)</td> <td>Room Temperature</td> </tr> <tr> <td>—Mineral Spirits</td> <td>Dip (1)</td> <td>Room Temperature</td> </tr> <tr> <td>Paint (Oil Base)</td> <td>Immersion (2)</td> <td>Room Temperature</td> </tr> <tr> <td>Lubricating Oil (SAE 10 W40)</td> <td>Immersion (2)</td> <td>200°F</td> </tr> <tr> <td>Brake Fluid (Delco Supreme)</td> <td>Dip (1)</td> <td>Room Temperature</td> </tr> <tr> <td>Transmission Fluid (Dextron)</td> <td>Dip (1)</td> <td>Room Temperature</td> </tr> </tbody> </table>	Fluid	Method	Temperature	No. 2 Diesel Fluid	Immersion (2)	140°F	Methyl Alcohol	Dip (1)	Room Temperature	Antifreeze			—Prestone	Immersion (2)	180°F	—50% Water/50% Ethylene Glycol	Immersion (2)	180°F	Degreaser			—Gunk	Dip (1)	Room Temperature	—Mineral Spirits	Dip (1)	Room Temperature	Paint (Oil Base)	Immersion (2)	Room Temperature	Lubricating Oil (SAE 10 W40)	Immersion (2)	200°F	Brake Fluid (Delco Supreme)	Dip (1)	Room Temperature	Transmission Fluid (Dextron)
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		(1) Dip: Connectors shall withstand a one second dip and a three minute air dry for a total of 80 cycles. (2) Immersion: Connectors shall withstand immersion for one hour.																																					
Temperature Life	3.2.3.1	Connectors shall be subjected to a temperature of 125 ± 3°C for a period of 1000 hours. At the end of the temperature soak period and after removal from the chamber, the connectors shall meet the insulation resistance and dielectric withstanding voltage requirements specified herein. Connectors shall be operated at rated current throughout the duration of the temperature life test. Upon removal from the chamber at the conclusion of the test, the connectors shall show no visual signs of damage which may be detrimental to the performance of the connector.																																					
Thermal Cycling	3.2.3.2	Connectors shall be subjected to 100 thermal cycles from -40° to +125°C. One cycle shall consist of the transitions from room temperature to -40° to +125°C, and from 125°C to room temperature. One cycle shall be accomplished in a three hour period with a minimum stabilization period of 15 minutes at each temperature extreme. The chamber temperature transition rate shall be a minimum of 1.30°C per minute and a maximum of 6.00°C per minute.																																					

## Performance and Material Specifications

### MATERIALS AND FINISHES

Plug	High temperature thermoplastic with silicone elastomer sealing
Contacts	Copper alloy.
Finish	Engaging area: Gold over nickel Crimp/P.C. tail area: Tin lead over nickel.

### ELECTRICAL

Contact Resistance	10 milliohms maximum
Insulation Resistance	100 megohms minimum
Current Rating	5 amp signal continuous at 125°C all contacts 13 amp power continuous at 125°C all contacts
Dielectric Withstanding Voltage	1000 volts ACRMS at sea level
Applicable ITT Cannon Specification	CS-189
Operating Temperature	-40° to +125°C

### MECHANICAL

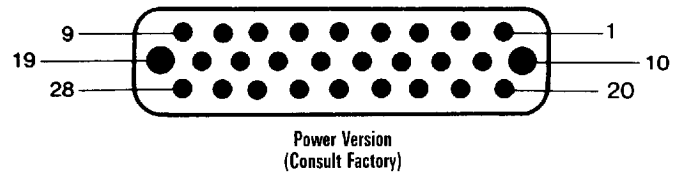
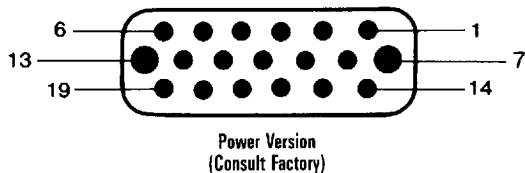
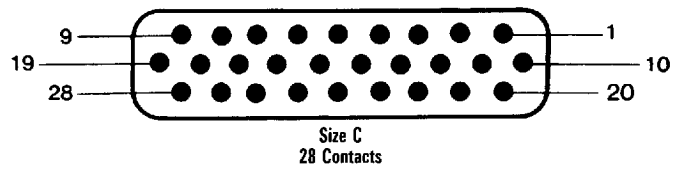
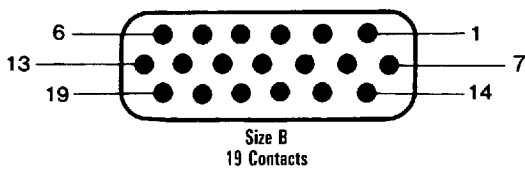
Crimp Contacts	Semi-automatic or hand crimpable
Wire Size	16-18-20 AWG
Wire Insulation Sealing Range	.095 (2.41) to .130 (3.30) inch dia.
Polarization	'D' shaped interface with five alternate positions.
Contact Insertion	No tool required. Suitable for automation.
Contact Extraction	Rear removable
Contact Retention	25 lbs. minimum per contact
Wire Strip Length	.220 (5.59) to .210 (5.33) inch

## Conversion Chart

Assembly Number	Part Number	Assembly Number	Part Number
<b>Receptacle, In-Line</b>		<b>Receptacle, In-Line</b>	
130408-0000	SLEB19P4S	130412-0000	SLEC28P4S
130408-0001	SLEB19P4L	130412-0001	SLEC28P4L
130408-0002	SLEB19P4R	130412-0002	SLEC28P4R
130408-0003	SLEB19P4U	130412-0003	SLEC28P4U
130408-0004	SLEB19P4D	130412-0004	SLEC28P4D
130408-0010	SLEB19P4SG	130412-0010	SLEC28P4SG
130408-0011	SLEB19P4UG	130412-0011	SLEC28P4UG
130408-0012	SLEB19P4DG	130412-0012	SLEC28P4DG
<b>Plug, In-Line</b>		<b>Plug, In-Line</b>	
130409-0000	SLEB19S2SF	130413-0000	SLEC28S2SF
130409-0001	SLEB19S2S	130413-0001	SLEC28S2S
130409-0002	SLEB19S2L	130413-0002	SLEC28S2L
130409-0003	SLEB19S2R	130413-0003	SLEC28S2R
130409-0004	SLEB19S2U	130413-0004	SLEC28S2U
130409-0005	SLEB19S2D	130413-0005	SLEC28S2D
<b>Plug, 90° PCB</b>		<b>Plug, 90° PCB</b>	
130410-0000	SLEB19N3P	130414-0000	SLEC28N3P
130410-0001	SLEB19N3PM	130414-0001	SLEC28N3PM
130410-0002	SLEB19N3PN	130414-0002	SLEC28N3PN
130410-0004	SLEB19N3	130414-0004	SLEC28N3
<b>Plug, Straight PCB</b>		<b>Plug, Straight PCB</b>	
130411-0000	SLEB19T3P	130415-0000	SLEC28T3P
130411-0001	SLEB19T3PM	130415-0001	SLEC28T3PM
130411-0002	SLEB19T3PN	130415-0002	SLEC28T3PN
130411-0004	SLEB19T3	130415-0004	SLEC28T3PE
130411-0005	SLEB19T3H	130415-0005	SLEC28T3

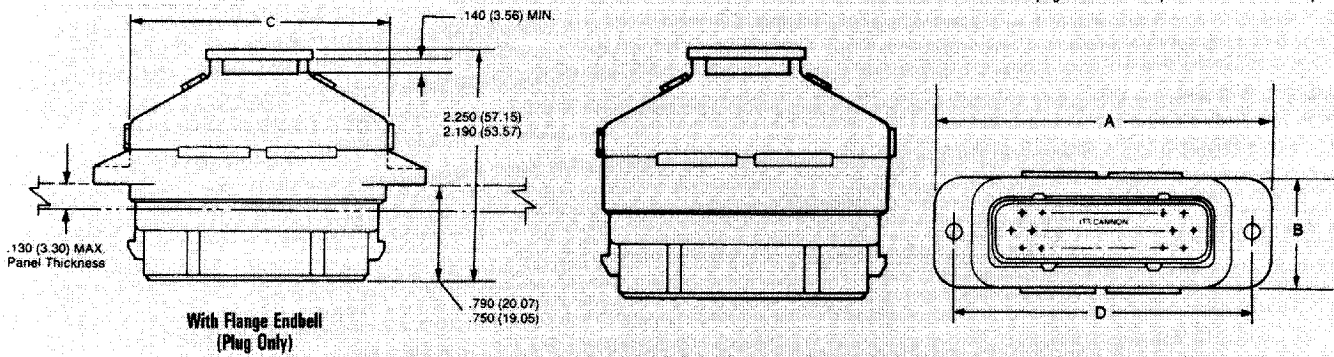
## Contact Arrangements

Face View – Engaging Face of Plug



## Plug (In-Line, Cable-to-Cable)\*

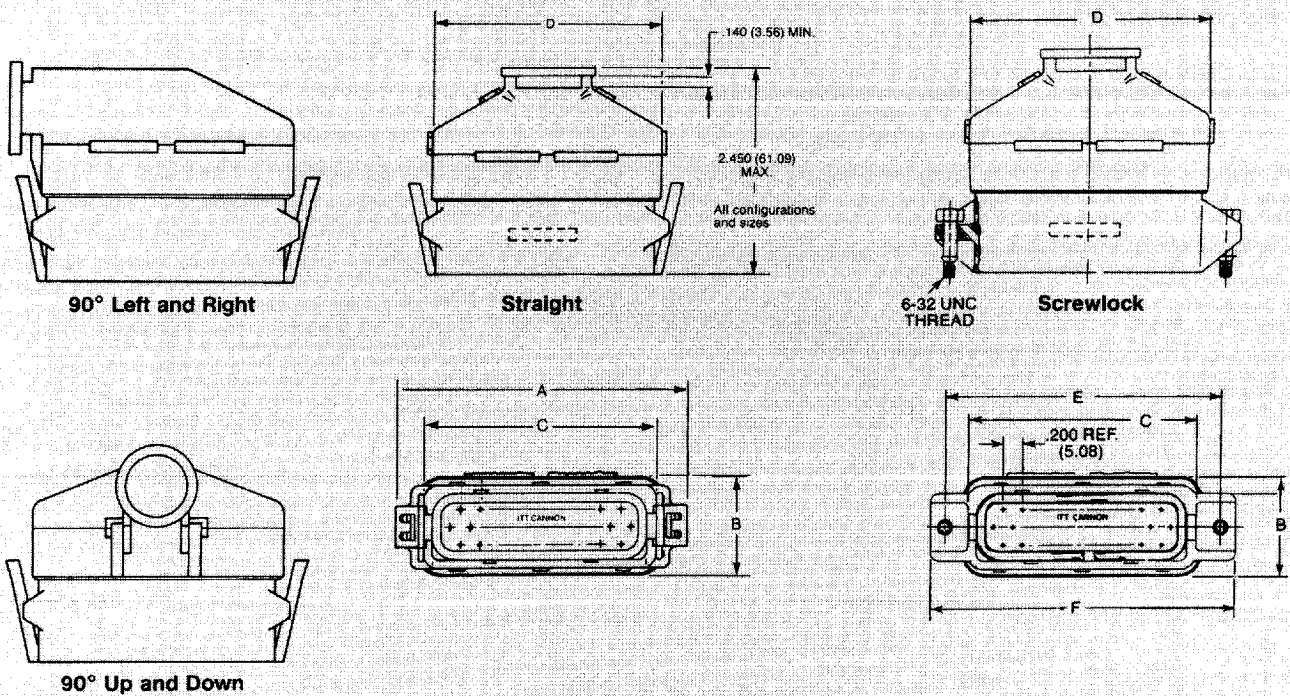
\* Cable Plugs are supplied with endbell assemblies.  
See page 217 for complete list of endbell options.



Part Number by Shell Size	No of Contacts	A Max.	B Max.	C Max.	D ±.015 (0.38)
SLE-B	19	2.830 (71.88)	1.030 (26.16)	1.870 (47.50)	2.325 (59.05)
SLE-C	28	3.430 (87.11)	1.030 (26.16)	2.470 (62.74)	2.925 (74.29)

## Receptacle\*

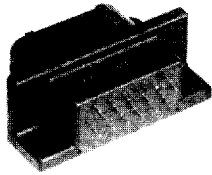
\* Receptacles are supplied with endbell assemblies.  
See page 217 for complete list of endbell options.



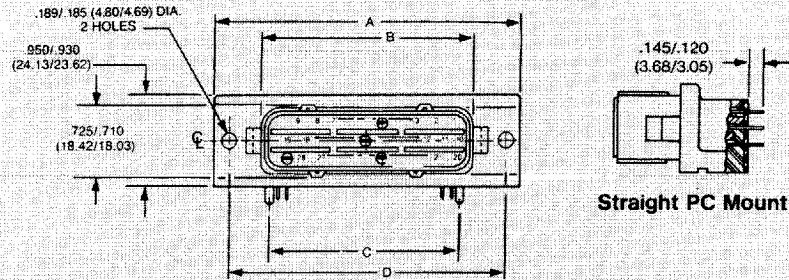
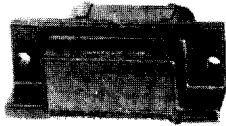
Part Number by Shell Size	No of Contacts	A Max.	B Max.	C Max.	D Max.	E ±.015 (0.38)	F Max.
SLE-B	19	2.340 (59.44)	1.030 (26.16)	1.735 (44.07)	2.000 (50.80)	2.200 (55.87)	2.530 (64.25)
SLE-C	28	3.010 (76.45)	1.030 (26.16)	2.335 (59.31)	2.600 (66.04)	2.800 (71.11)	3.130 (79.49)

## Plug, PC Board

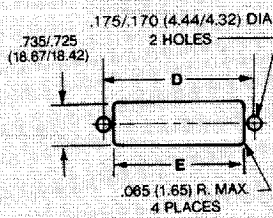
Straight



90°

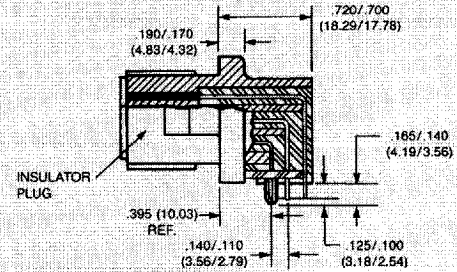


**Straight PC Mount**



Panel Thickness .200 Max.

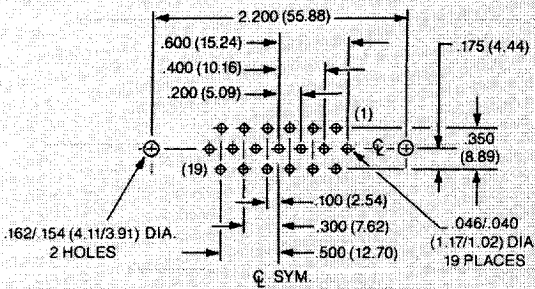
**Panel Cutout Pattern**



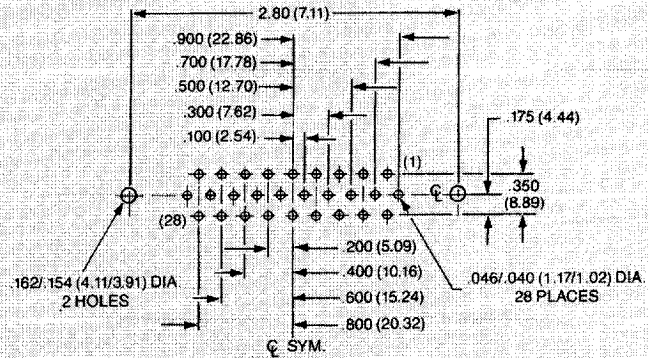
**90° PCB Mount**

Part Number by Shell Size	No of Contacts	A Max.	B Max.	C Max.	D Max.	E Max.
SLE-B	19	2.530 (64.26)	1.550 (39.37)	1.410 (35.81)	2.210 (56.13)	1.875 (47.62)
SLE-C	28	3.130 (79.50)	2.150 (54.61)	2.010 (51.05)	2.810 (71.37)	2.475 (62.86)

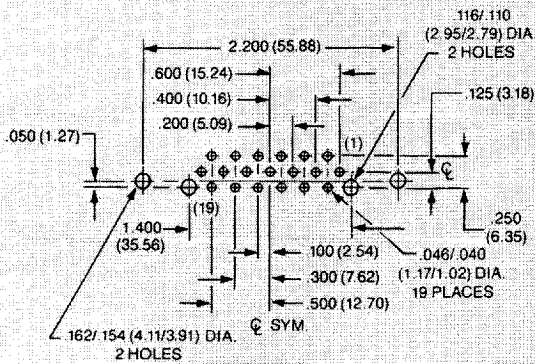
## PC Board Mounting



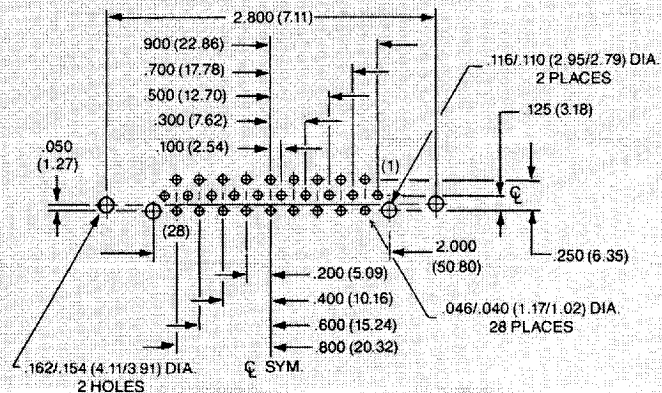
**B19-Straight**



**C28-Straight**

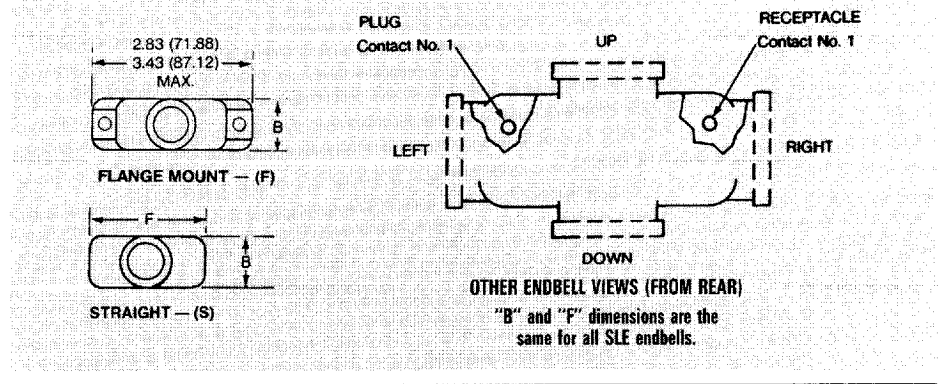


**B19-90°**



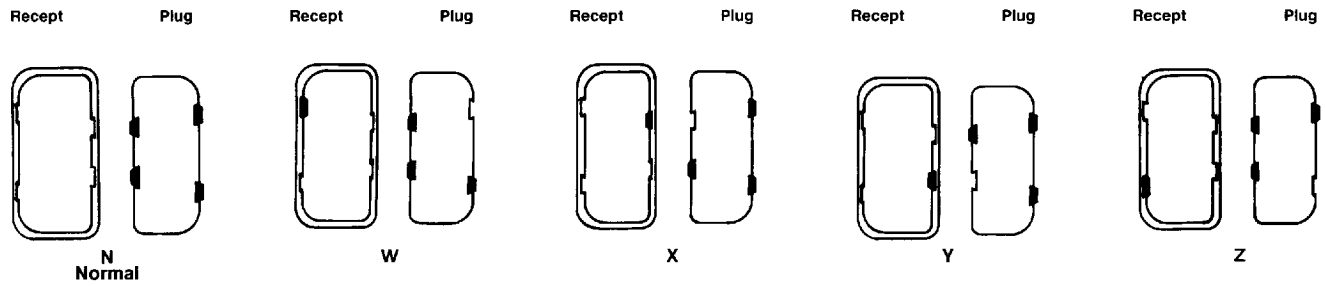
**C28-90°**

## Endbells



Part Number by Shell Size	B Max.	F Max.	Cable Entry I.D.
SLE-B	1.030 (26.16)	2.00 (50.80)	.580 (14.73)
SLE-C	1.030 (26.16)	2.60 (66.04)	.780 (19.81)

## Polarization



NOTE: Connectors are shipped with keys installed in the "Normal" position unless otherwise ordered.

## Test Methods

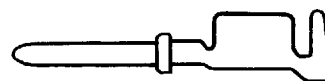
Insulation Resistance	MIL-STD-1344	Method 3003.1
Dielectric Withstanding Voltage	MIL-STD-1344	Method 3001.1
Contact Resistance	MIL-STD-1344	Method 3004.1
Low Level Contact Resistance	MIL-STD-1344	Method 3002.1
Crimp Tensile Strength	MIL-STD-1344	Method 2003.1
Contact Retention	MIL-STD-1344	Method 2007.1
Mating Separating Force	MIL-STD-1344	Method 2013.1
Durability	MIL-STD-1344	Method 2016
Temperature Life	MIL-STD-202	Method 108 Condition D
Mechanical Shock	MIL-STD-202	Method 213 Condition I
Maintenance Aging	MIL-STD-1344	Method 2002.1
Vibration	MIL-STD-1344	Method 2005.1 Condition VI 20 Hours/Axis
Sand and Dust	MIL-STD-202	Method 110
Salt and Spray	MIL-STD-202	Method 101 Condition A
Humidity	MIL-STD-202	Method 106
Steam Cleaning/Pressure Wash	SAE	Proposed

## Contacts, Stamped

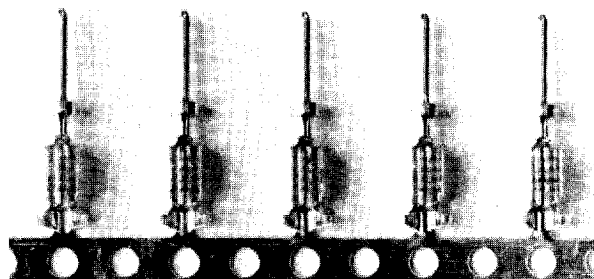
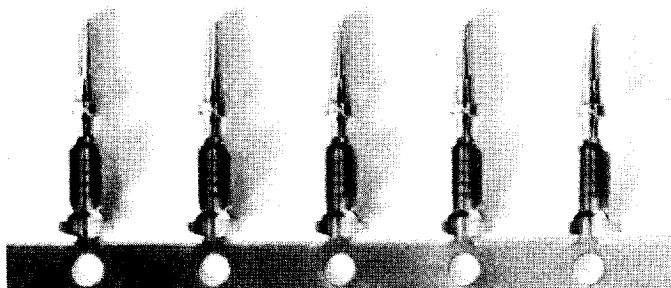
5 and 13 Amp



Socket



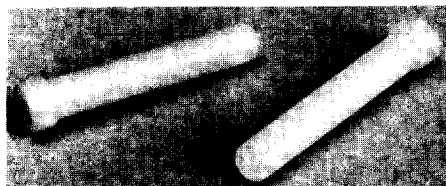
Pin



Description	Loose*		Reeled		No. of Contacts
	Pin Part Number	Socket Part Number	Pin Part Number	Socket Part Number	
5 Amps	030-2464-000	030-2480-000	110238-0446	110238-0488	4,500
13 Amps	030-2464-003	030-2480-003	110238-2004	110238-2003	4,000

\*Loose contact part numbers for reference. Contacts sold on reels only.

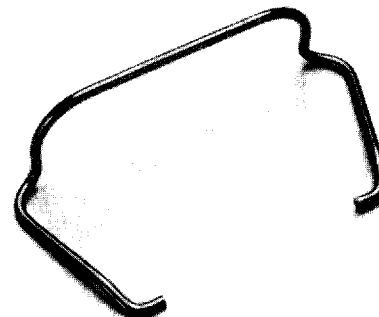
## Accessories



Sealing Plug for unused cavities  
Part No. 225-0093-000



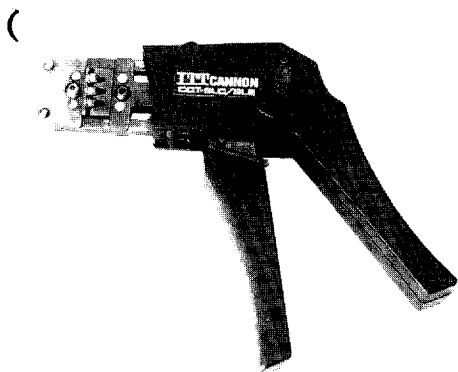
Female Screwlock Post for use on PCB connectors, Suffix "G".  
Part No. 265-0061-000  
(2 required)



Bail Latch For Redundant Latch Applications

SLE-B	029-0281-000
SLE-C	029-0281-001

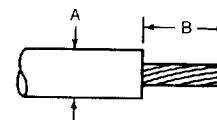
## Hand Crimp Tool Operation



The CCT-SLC/SLE hand crimp tool is designed to crimp individual SLC/SLE contacts on wire sizes 16, 18 and 20 AWG. Each cycle is ratchet-controlled (the tool must be completely closed before it can be re-opened) to assure a satisfactory crimp each time. Over and under crimps are eliminated.

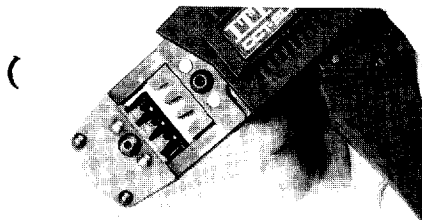
This tool is for use where the requirement is for low to moderate volume quantities, and for on-site applications where semi-automatic tools cannot be practically used.

### WIRE STRIPPING

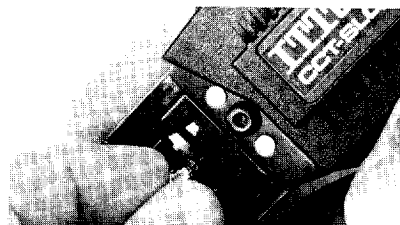


Contact Size	A	B
5 & 13 Amp	.095 (2.41) .130 (3.30)	.210 (5.33) .220 (5.59)

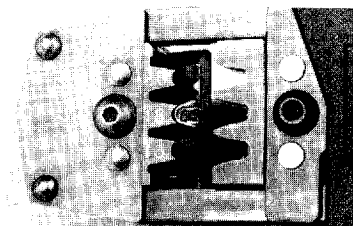
### Hand Crimp Tool — CCT-SLC/SLE Part Number: 995-0002-232



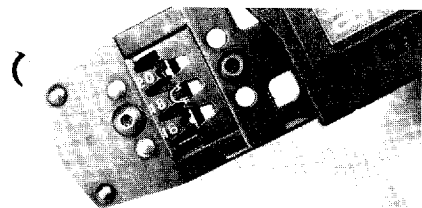
1. Cycle the CCT-SLE/SLC hand tool to the open position.



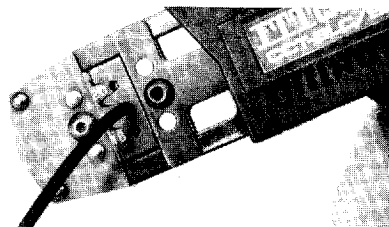
2. While pressing upward on the locator spring, insert the contact with tails upward completely into the locator.



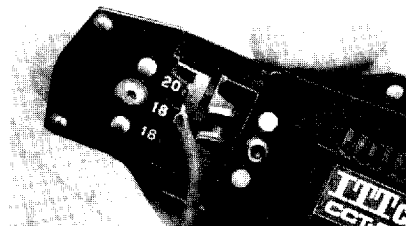
3. When correctly positioned the contact should be located beyond flush with the edge of the CCT-SLE/SLC and positioned on the concave polished split level crimp areas.



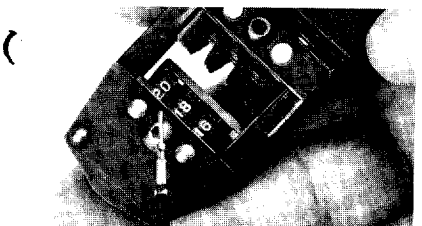
4. Partially (usually the first click) cycle the hand tool assuring that the upward thrusting tails of the contact has started engaging with the top jaw of the tool. (There is a slight tendency for the contact to roll out of vertical alignment.)



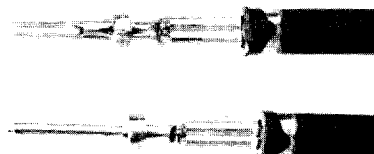
5. Insert the prestripped wire into the crimp area of the contact and completely cycle the tool.



6. While pressing upward on the locator spring withdraw the crimped termination.



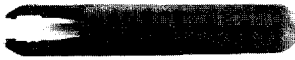
7. The result will be a perfect termination.



8. Note that there are no unterminated wire strands, and that some strand ends can be seen at the forward edge of the crimp. Also note the insulation is gripped by the smaller secondary crimp. Distortion is at a minimum, both axially and laterally – no sharp edges.



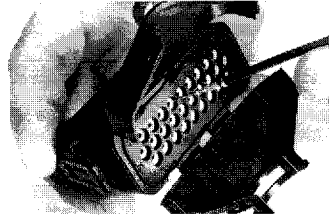
## Assembly Instructions



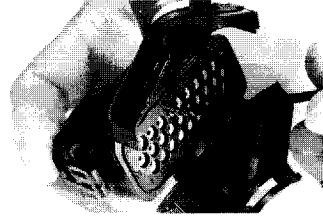
A standard CET-SLE/SLC is available for extraction of the individual crimped contacts. Insertion tool is not required.

**Contact Extraction Tool**  
**Part Number: 274-7068-001**  
**Tip Part Number: 323-9519-000**

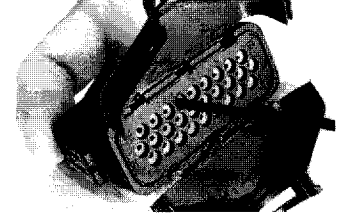
### INSERTION



1. Move to the rear of the connector so that the contact cavities can be identified.

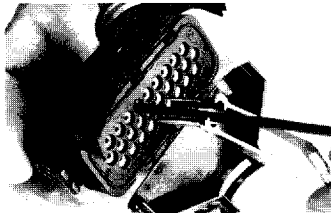


2. Insert a crimped terminated assembly into a selected cavity.

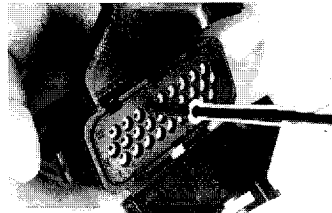


3. Continue the forward movement until an audible snap can be felt and heard. Slight pull in the opposite direction will confirm complete insertion.

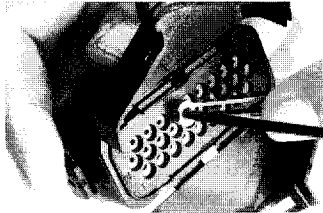
### EXTRACTION



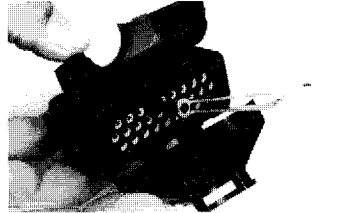
1. Open the CET-SLE extraction tool and place it over the insulation of the wire.



2. Using a straight motion forward, insert the tool along the wire until it bottoms against the connector. (Do not use a screwing motion — damage will result.)

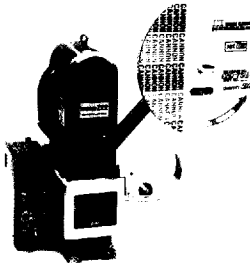


3. While the CET-SLE is bottomed, simply pull the wire/contact assembly out.



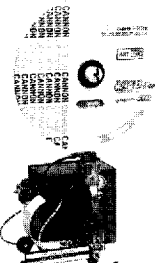
4. Remove the CET-SLE. Extraction is complete.

## Semi-Automatic Tooling

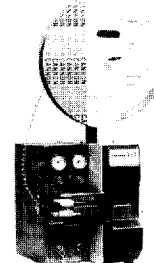


**ATB-500-UCCS**  
**Strip-Crimp Machine**

(See pages 223-224)



**ABT-607**  
**Pneumatic Crimp Machine**



**ABT-620-UCCS**  
**Strip-Crimp Machine**