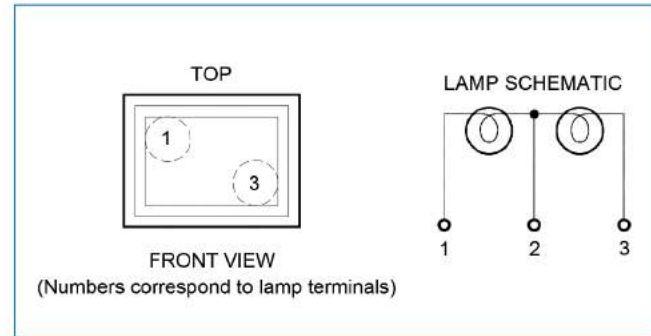


SERIES 90E TERMINAL I.D. & PANEL CUTOUT

LAMP LOCATION AND LAMP TERMINAL IDENTIFICATION

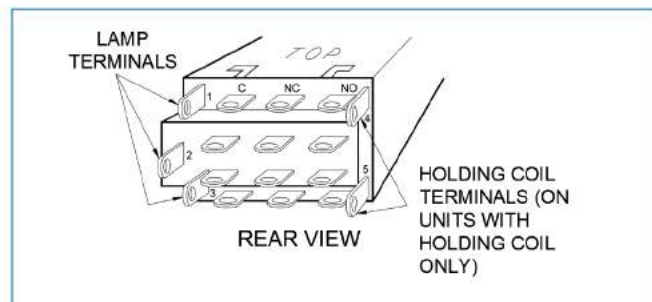
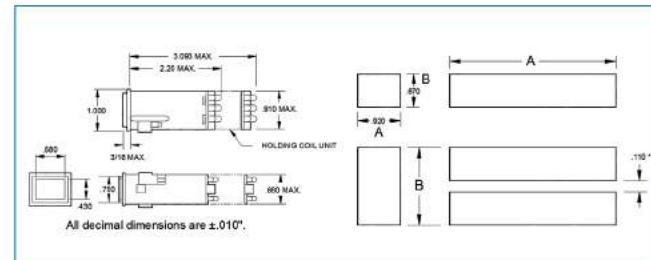


SWITCH TERMINAL IDENTIFICATION

NOTES:

1. On 2 PDT switches, switch terminals are furnished in center only.
2. Terminals will accept two No. 20 AWG wire leads.
3. Electrical ratings: 3 amps resistive, 1 1/2 amps inductive, 1 amp lamp load.
4. Holding coil power requirement: Maximum 3 watts.

Outline Dimensions and Panel Cutout



NOTES:

1. The unit will mount in panels 3/32" to 3/16" thick. For units to fit other panel thicknesses, contact the factory.
2. When mounting unit on end, the side marked "top" is on the left as viewed from the front of the panel.

PANEL CUT-OUT DIMENSIONS IN INCHES (±0.10)

NO. OF UNITS IN ROW	1	2	3	4	5	6	7	8
Horizontal Row "A"	.920	1.925	2.930	3.935	4.940	5.945	6.950	7.955
Vertical Row "B"	.670	1.425	2.180	2.935	3.690	4.445	5.200	5.955

*For matrix arrangement, allow .110" in panel between cut-outs for adjacent horizontal or vertical rows.

SERIES 90K FEATURES

SERIES 90K

The Series 90K Tellite units are available in three versions as an indicator-lite only, switch-lite, or switch-lite with holding coil. Package sizes of each version are shown in the dimensional drawings on page 8. Units are available with a choice of wiring terminals. All units may be specified with solder lugs or plug-in connector pins. In addition, indicator-lite only units may be specified with screw-type terminals. Each unit incorporates mounting tabs that provide a positive hard mount after inserting the unit through the panel cutout from the panel front. Captive mounting screws inside the unit cam out these mounting tabs and tighten them up against the back of the panel.

No external hardware required.



GENERAL

Basic Unit Types Available

Indicator-Lite, Switch-Lite, Switch-Lite with Holding Coil. Press to test indicator.

Switch Configurations and Actions

2PDT or 4PDT, momentary or alternate action

Lamp Types/Number of Lamps/Voltage

Two T-1 3/4 incandescent 6, 12, or 28 volt based lamps (115 VAC neon lamps available)

Lamp Circuits Available

Common ground

Display Screen Arrangements

Full display, two-way vertical or horizontal split, two-color full display

Color Control Method

Slab filter in yellow, amber, red, green, blue, and white. Projected color (silicone rubber bulb boots) also available

Lens Types Available

Lighted letters or lighted background, letters either legible or not when unit is unlighted

Engraving Size

0.110" high with .017" stroke (standard)

Relamping

Front of panel without tools

Mounting Panel Thickness

1/32" to 3/16"

Mounting Method

Hard mount from front of panel with integral mounting nuts

Wiring Terminations

Switch: double turret, connector pins. Indicator: solder lugs, connector pins, screw type

Wire Sizes

Screw type and solder lug terminals accept up to 2 #20 gauge wires. Connector pin type terminals accept #20 through 28 gauge wires

Optional Features Available

Control Circuits, Drip Proof Seal, RFI Screen, Spacer Barriers, Switch Guard, Panel Plug, Crimp Tool, Locator, Removal Tool

ELECTRICAL AND MECHANICAL CHARACTERISTICS

Operation

Momentary or Alternate

Action

Snap-action

Contacts

2PDT or 4PDT

Contact Ratings

3 amps resistive @115 to 250 VAC; 3 amps resistive, 1.5 amps inductive (minimum - 10mA @ 5V)

Contact Resistance

50 Milliohms @ 6 VDC and 100 ma

Operation Force

64 oz. max

Feel

Tactile

Mechanical Life

100,000 cycles (on and off = 1 cycle)

Electrical life

100,000 cycles

Stroke

0.125" nominal

Tease proof

Yes, 100%

Holding Coil Nominal Voltage

6, 12, 28 and 48 VDC

Holding Coil, Min. Hold-In Voltage

50% of nominal rating

Holding Coil, Max. Drop-Out Voltage

40% of nominal rating

Holding Coil Power

3 watts, max.

ENVIRONMENTAL

Operating Temperature Range

-55°C to +85°C

Terminal Strength

5 lbs. parallel and perpendicular per MIL-STD-202, Method 211, Cond. A

Actuator and Stop Strength

25 lbs. for 1 minute

Thermal Shock

-55°C to +85°C per MIL-STD-202, Method 107B, Cond. A

Dielectric Strength

1000 volts, per MIL-STD-202, Method 301

Insulation Resistance

500VDC for 1 minute, 1000 megohms minimum per MIL-STD-202, Method 302, Cond. B

Shock

50 G's, per MIL-STD-202, Method 202B

Vibration

10 G's of 10 to 500Hz, per MIL-STD-202, Method 204A, Cond. A

Salt Spray

48 hours, per MIL-STD-202, Method 101B, Cond. B

Moisture Resistance

10 cycles at 90% to 98% relative humidity, per MIL-STD-202, Method 106B

Sand and Dust

6 hours, per MIL-STD-202, Method 110, Cond. B

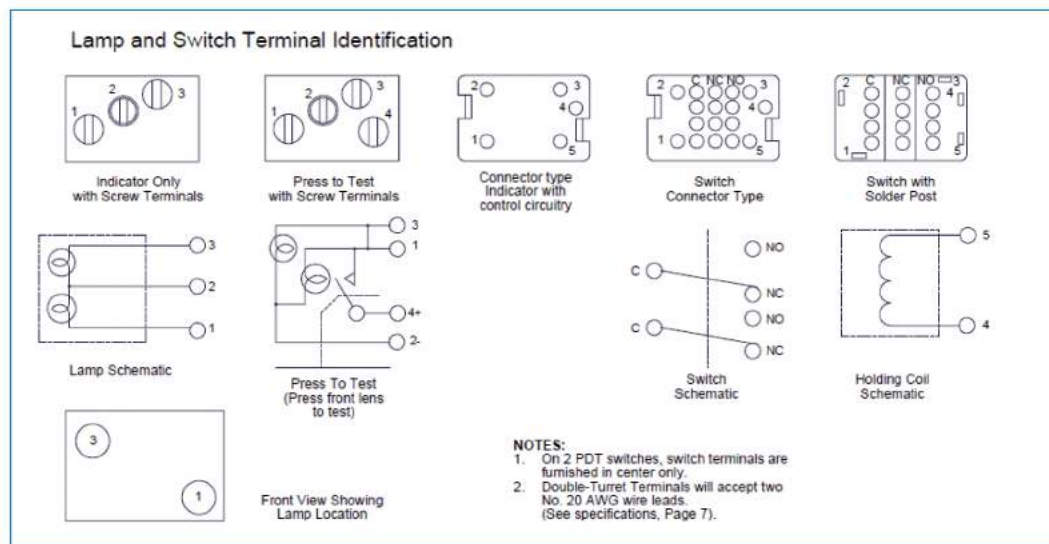
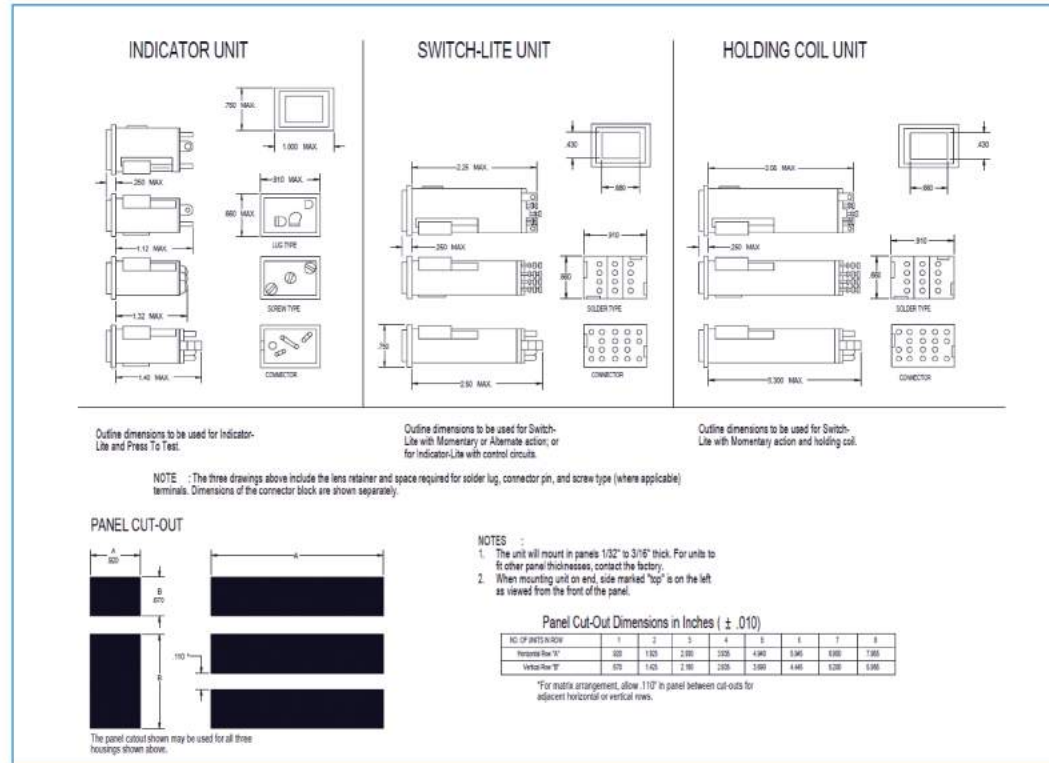
Overload

50 cycles at 6 amps, 28 VDC

RFI, EMI

70 DB minimum relative attenuation in the frequency range of 10K Hz to 10,000 MHz, per MIL-STD-285.

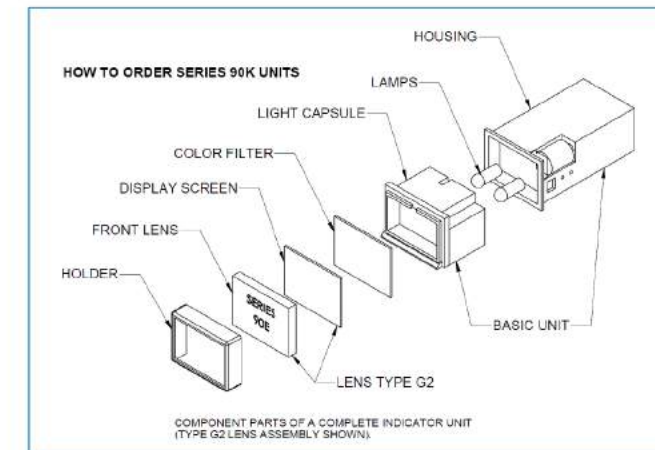
SERIES 90K FEATURES



SERIES 90K ORDERING INFORMATION

90KA1C2D1F1G2H1J1(R)L1N1R120FF

90K	□	A1C2	D1	E1	F1	G1	H1	J1()	L1	N1	R1	ON OFF
Series Number	Basic Unit Variation	Basic Unit	Terminals	Control Circuits	Lamps	Lens Type	RFI Screen	Color Filters	Display Screen	Front Lens	Legend Configuration	Legend Wording



Complete Switch-Lite and Indicator-Lite assemblies may be ordered using a single coded part number. Each item required for a complete assembly has been assigned a code number and is described on the following pages. By selecting the part number code for each item desired, and then placing these numbers in alphabetical sequence immediately following the series number **«90K»**, a complete part number is formulated. Above is the code number sequence to be used in ordering.



ELIMINATION OF ITEMS

Where one or more items comprising a complete unit are not required, omit the code number for that item.

ORDERING SEPARATE ITEMS

When separate items are required, precede an item's code number with the basic **«90K»** to obtain the correct order number for that item. Lamps, when ordered separately, are always considered 1 each rather than 2.

BASIC UNIT VARIATIONS

Variations of the basic unit, such as units with connector pins, may be specified in this space. Future expansions of the line, which will be described in Supplement Sheets to this Catalog, may also be specified here, if applicable.

BASIC UNIT CODE NUMBERS

Basic Unit Type	Indicator or Switch/Lite Code	Holding Coil Unit Order Code			
		6 Volt	12 Volt	28 Volt	48 Volt
Indicator Only (U.L. approved)	A1				
2PDT Momentary Switch	A1C2	A3C2	A4C2	A2C2	A5C2
Momentary 4PDT Alternate	A1C3	A3C3	A4C3	A2C3	A5C3
2PDT Alternate Switch	A1C4				
4PDT Alternate Switch	A1C5				
Press to Test (Indicator Only)	A6D2				

SERIES 90K TERMINALS, CONTROL CIRCUITS & LAMPS

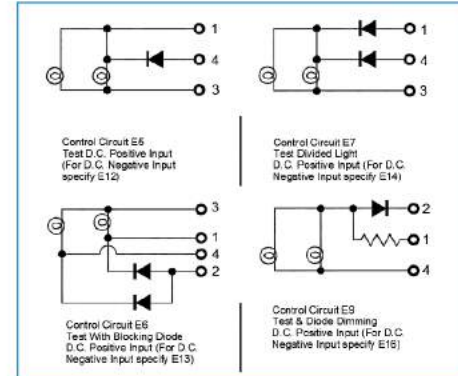
90KA1D1E1F1G2H1J1(R)L1N1R120FF



TERMINALS

Series 90K units are available with a choice of wiring terminals. All units may be specified with solder lugs or plug-in connector pins. In addition, Indicator-Lites may be specified with screw-type terminals. To specify the proper terminals, insert the appropriate code number in the basic ordering sequence.

CODE	TERMINAL
D1	Solder Lug
D2	Screw Type (Indicator Only)
D3	Connector Pin



CODE	LAMP
F1	6 Volt Incandescent
F2	12 Volt Incandescent
F3	28 Volt Incandescent
F14	28 Volt Long Life Incandescent
F4	115 Volt Neon With Resistor (*)
F10	115 Volt Neon Without Resistor (for use with external resistor)*

*Recommended for use with red or amber color filters only.

CONTROL CIRCUITS (INDICATORS ONLY)

Special circuits which provide master lamp test and dimming capabilities are available as an integral part of the basic unit. These circuits eliminate the need for external circuitry and are available in four standard circuits which provide positive and negative test inputs for all full display screen styles. Other control circuits are available on request.

NOTE: The indicator only units with control circuits are the same package size as switch-lite units.

LAMPS

Series 90K units accept two T-1 3/4 midget flanged base lamps. To specify, insert the appropriate code number in the basic ordering sequence.

NOTE: LED's are available upon request. Please contact a Safran representative.

SERIES 90K LENS TYPE & RFI SCREEN

90KA1C2F1G1H1J1(R)L1N1R120FF



LENS TYPE

Series 90K units are available with four types of lenses, each producing a different type of legend display. To order, use the appropriate «G» code number from those described below.

LENS TYPE CODE	DESCRIPTION
G1	Lighted Letters: Letters appear white on a black background until illuminated, and then letters appear in color, background remains black.
G2 (*)	Lighted Background: Letters appear black on a white background until illuminated and then background appears in color, letters remain black.
G3	Lighted Letters: Letters are not legible until illuminated and then letters appears in color, background is black.
G4	Lighted Background: Letters are not legible until illuminated, then background appears in color, letters are black.

**This is the most commonly used and preferred type of lens for most applications.*

RFI SCREENS

The passage of radiated and/or conducted RFI through panel cutouts can be reduced by the fine mesh, metal RFI screen, which is mounted between the lamps and display screen of the light capsule. RFI is grounded by electrical contact from the screen to the unit housing to the panel.

Available for full, horizontal and vertical split displays. To order RFI screens for complete units, insert the code number shown below, according to the screen configuration, into the basic ordering sequence.

CODE NUMBER	DESCRIPTION
H1	Full Display RFI Screen
H2	Horizontal Split Display RFI Screen
H3	Vertical Split Display RFI Screen

To order RFI screens as separate parts, consult factor for ordering information.



SERIES 90K COLOR FILTERS

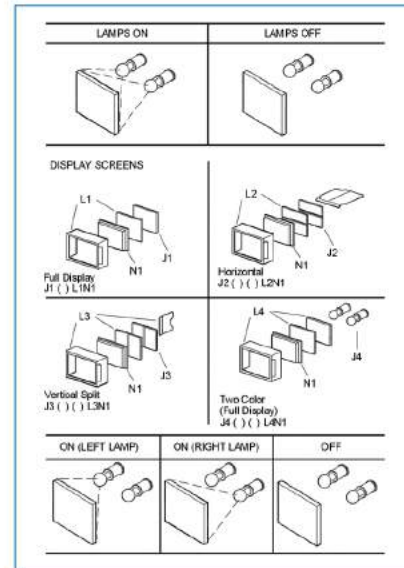
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TRANSMITTED COLOR (SLAB FILTERS)

To order a color slab filter for a Series 90K unit for a specific display arrangement, use the code numbers shown at the right for the desired display, followed by the color code letter desired in parenthesis. In a horizontal split, the first color code denotes the top half of the display; the second color denotes the bottom half. In a vertical split, the first color code denotes the color for the left half of the display; the second color code denotes the color for the right half, as viewed from the front.

The code number includes the holder and dividers, and spacers where applicable. Full displays or horizontally or vertically split displays, and two color full displays, are available. The coded part number, «L1», etc., also includes the holder for the lens assembly.

Note: The display screen illustration at the right is provided as an example only. It illustrates the Series 90K; the series 90E and 90H use slightly different parts, but the part number codes are the same.



PROJECTED COLOR (TWO COLOR FULL DISPLAY)

Two colored lamp filters (silicone rubber bulb boots) are required for each unit. Use the color code described in this sequence: the first color code denotes the color to be used with the left lamp; the second color code denotes the color for the right lamp, as viewed from the panel front. These codes should be preceded by the code «J4».

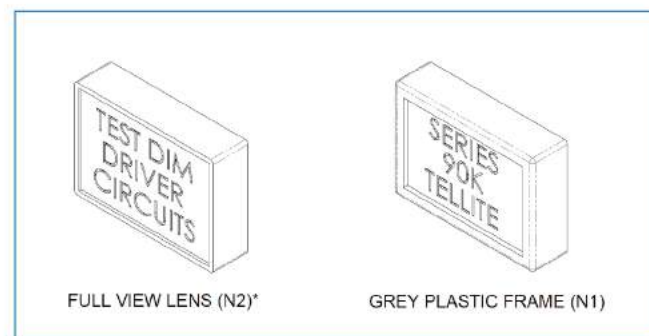
Example: J4 (RG) would produce a red and green indication in a full two-color display.

LENS FRAME

Select the lens most suited to your application and add the appropriate order code, N1 or N2, to the part number in the proper sequence. When ordering N2 lens for the Series 90K, omit the «G» lens type code and the «L» display screen code, since the N2 lens is available only in the G2 type lens. The standard color for the frame on the N1 lens is gray. Other frame colors such as black, red, white, etc., are available on special order. The standard color for the N2 lens is white, which is used with color filters. Other colors for the lens itself, for use without color filters, are available, such as red, yellow, green, etc. on special order. Also white and colored lenses with concave front surfaces are available on special order. Consult the factory for ordering information on special front lens colors and shapes.

Color Code	Description
(A)	Amber
*(B)	Blue
*(G)	Green
(R)	Red
*(W)	White +
*(Y)	Yellow

*Not recommended for use with 115 VAC neon lamps.
+Light blue bulb is used for white illumination.



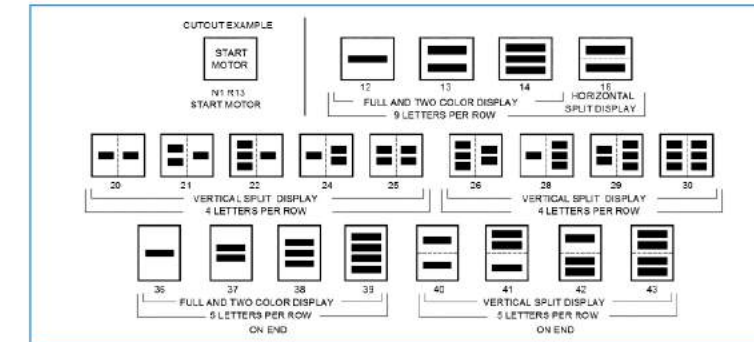
For representation only

SERIES 90K LEGEND CONFIGURATIONS & CRIMP-TYPE TERMINALS

90KA1C2D1E1F1G1H1J1(R)L1N1R120FF

LEGEND CONFIGURATION

Engraving of the Series 90 unit lenses produces letters 0.110 ± 0.010 inch in height, with a 0.017 ± 0.005 inch stroke. Letters are filled with special black filler. To specify the engraving, add the letter «R» to the part number following the front lens code. The «R» code is then followed by the number or the engraving configuration desired, as shown in the illustration to the left. Use commas to separate rows of wording and a straight vertical line to separate splits.

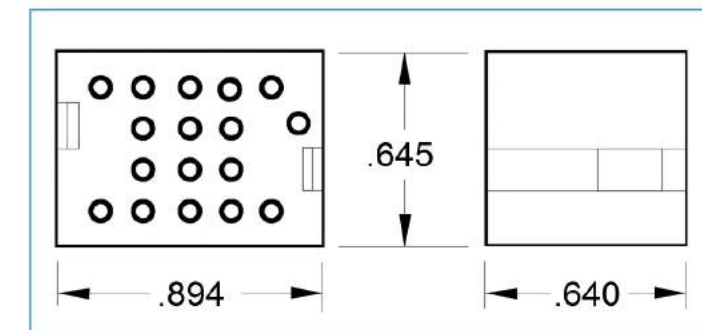


CRIMP-TYPE TERMINALS

A standard connector block, which accepts crimp-type terminals is available for Series 90K units. This connector quickly snaps over the Series 90K connector pin terminals and offers the advantages of fast installation and replacement, as well as simplified wiring. To order the connector block, specify Safran Electronics & Defense part number **901K-600**.

CRIMP TOOL AND LOCATOR

A standard MS3191 crimp tool and a special Safran Electronics & Defense locator are used to attach each terminal to its wiring. These items are available from Safran Electronics & Defense. Part number **800-3191** is for the crimp tool itself. Part number **800-3191-L20** covers the Safran Electronics & Defense locator only, which must be ordered even if you have your own crimp tool. (Part Number **800-3191-L20-2** is required when using **800-CT20-2** terminals). These tools are not required if the terminals are to be soldered.



CRIMP-TYPE TERMINALS

The crimp-type terminals used to wire the terminal blocks are also ordered as a separate item. These terminals are packaged in plastic bags, 25 terminals to the bag. Each bag of 25 terminals may be ordered by using the part number **800-CT20**. (Takes on #20, 22, or 24 gauge wire or two #24 gauge wires.) Part Number **800-CT20-2** takes one #26 or #28 gauge wire.

Terminals can be shipped from stock prior to shipment of the units. This permits advance attachment of the terminals to the wires and speeds installation when units arrive.

REMOVAL TOOL

Crimp terminals may be quickly removed from the connector block by using the Safran Electronics & Defense Removal Tool. To order, specify Safran Electronics & Defense part number **800-P2**.