8 CONNECTORS, TERMINALS, AND SPLICING

8.1 CRIMP AND REMOVAL TOOLS

Crimp tools and connector removing tools can be purchased from Kent–Moore. The part and associated part numbers are listed in Table 8–1.

Connector	Tool	Part Number
Metri–Pack 150	Removing	J 35689
	Crimp	J 35123
Weather Pack	Removing	J 36400–5
	Crimp	J 35606
Metri–Pack 280	Removing (18 AWG)	J 33095
	Crimp (18 AWG)	J 38125–6
	Removing (12 AWG – Used for power harness)	J 33095
	Crimp (12 AWG – Used for power harness)	J 39848
Deutsch	Removing (12 AWG)	J 37451
	Removing (16–18 AWG)	J 34513
	Crimp	J 34182

Table 8–1 Crimp and Removal Tools

8.2 METRI–PACK 150 CONNECTORS

Metri–Pack 150 series connectors are "pull–to–seat" connectors. Each wire must be pushed through the connector prior to crimping the terminal. Cable seals are inserted into the shell of the connector and hold many wires. Metri–Pack 150 connectors are listed in Table 8–2.

ECM Engine Harness		**ECM Vehicle Interface Harness**	
Connector	P/N: 12034400	Connector	P/N: 12034398
Terminal	P/N: 12103881	Terminal	P/N: 12103881
Seal	In Connector	Seal	In Connector
Plug	P/N: 12034413	Plug	P/N: 12034413
ECM Communication Harness Connector		**Temperature Sensor Harness**	
Connector	P/N: 12066317	Connector	P/N: 12162193
Terminal	P/N: 12103881	Terminal	P/N: 12103881
Seal	In Connector	Seal	In Connector
Plug	P/N: 12034413	Plug	P/N: Not Applicable
Pressure Sensor Harness		**Fire Truck Pressure Sensor (PGS)**	
Connector	P/N: 12047909	Connector	P/N: 12065287
Terminal	P/N: 12103881	Terminal	P/N: 12103881
Seal	In Connector	Seal	In Connector
Plug	P/N: Not Applicable	Plug	P/N: Not Applicable
SRS Harness		**TRS Harness**	
Connector	P/N: 12162193	Connector	P/N: 12162197
Terminal	P/N: 12103881	Terminal	P/N: 12103881
Seal	In Connector	Seal	In Connector
Plug	P/N: Not Applicable	Plug	P/N: Not Applicable
Injector (Gray)		**Injector (Black)**	
Connector	P/N: 12162830	Connector	P/N: 12040947
Terminal	P/N: 12103881	Terminal	P/N: 12103881
Seal	P/N: Not Applicable	Seal	P/N: Not Applicable
Plug	P/N: 12034413	Plug	P/N: 12034413

Table 8–2 Metri–Pack 150 Connector Part Numbers

8.2.1 Installation

Metri-Pack 150 connectors are of the "pull-to-seat" design. The cable is pushed through the seal and correct cavity of the connector before crimping the terminal to the cable. It should be stripped of insulation *after* it is placed through the seal and connector body. Use the following instructions for terminal installation:

1. Position the cable through the seal and correct cavity of the connector. See Figure 8-1.

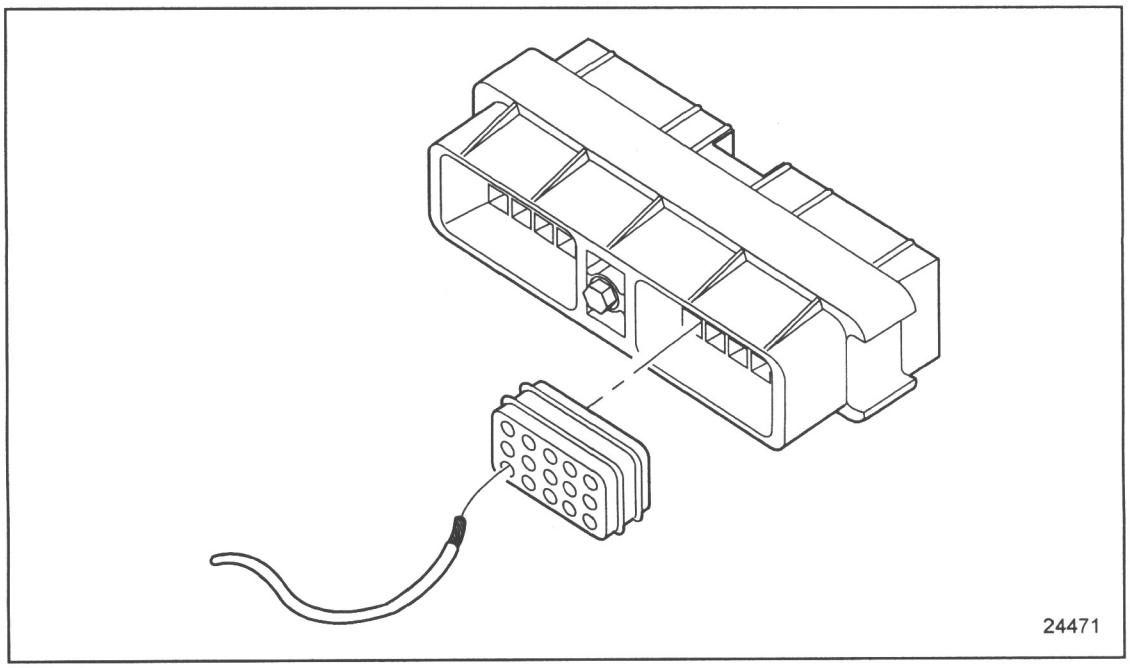

Figure 8–1 Inserting Wire in Connector

2. Strip the end of the cable using wire strippers to leave 5.0 ± 0.5 mm (0.2 ±0.02 in.) of bare conductor.
3. Squeeze the handles of the crimping tool together firmly to cause the jaws to automatically open.
4. Hold the "wire side" facing you.

5. Push the terminal holder to the open position and insert the terminal until the wire attaching portion of the terminal rests on the 20–22 anvil. Be sure the wire core wings and the insulation wings of the terminal are pointing toward the upper jaw of the crimping tool. See Figure 8–2.

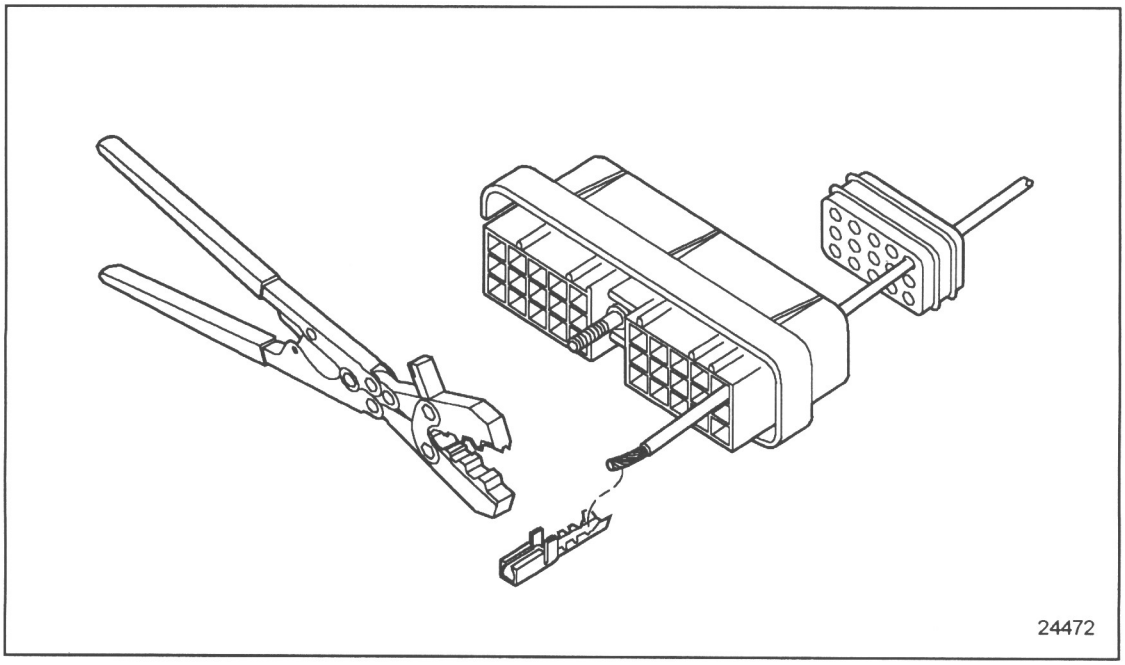

Figure 8–2 Terminal and Crimping Tool Position

6. Insert the cable into the terminal until the stripped portion is positioned in the wire core wings, and the insulation portion ends just forward of the insulation wings. See Figure 8–3.

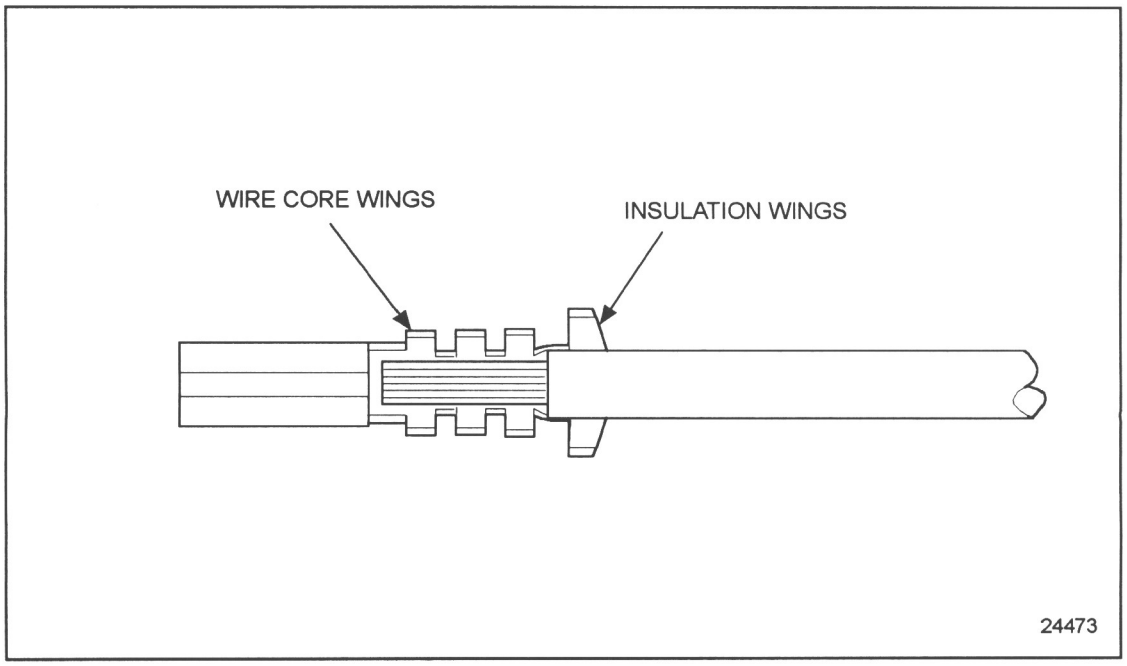

Figure 8–3 Cable to Terminal Alignment

7. Compress the handles of the crimping tool until the ratchet automatically releases and the crimp is complete.

NOTE:
For faster, more efficient crimping operation, a bracket or bench rest may be used to cradle one handle of the tool. The operator can apply the terminals by grasping and actuating only one handle of the tool. See Figure 8–4.

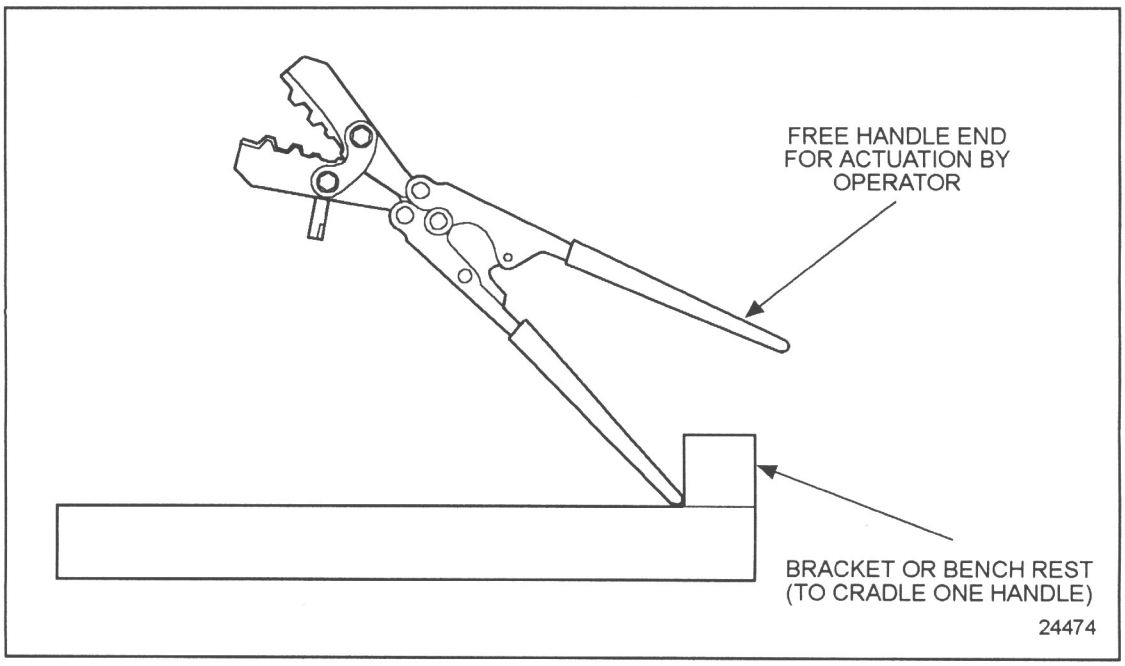

Figure 8–4 Crimping Operation

8. Release the crimping tool with the lock lever located between the handles, in case of jamming.
9. Align the locking tang of the terminal with the lettered side of the connector.

10. Pull the cable back through the connector until a click is heard. See Figure 8–5. Position the seal into the connector.

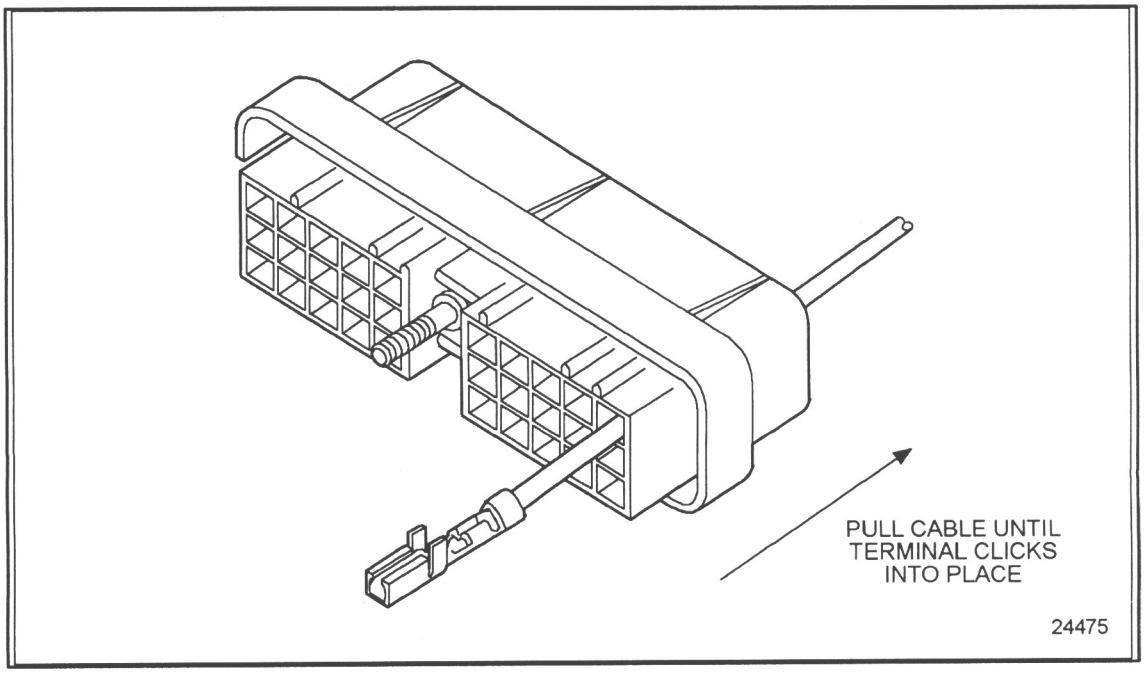

Figure 8–5 Pulling the Terminal to Seat

NOTE:
For ECM 30–pin connectors, put locking tang opposite lettered side.

8.2.2 Removal and Repair

A tang on the terminal locks into a tab molded into the plastic connector to retain the cable assembly. Remove Metri–Pack 150 terminals using the following instructions.

1. Insert the removal tool into the cavity of the connector, placing the tip of the tool between the locking tang of the terminal and the wall of the cavity. See Figure 8–6.

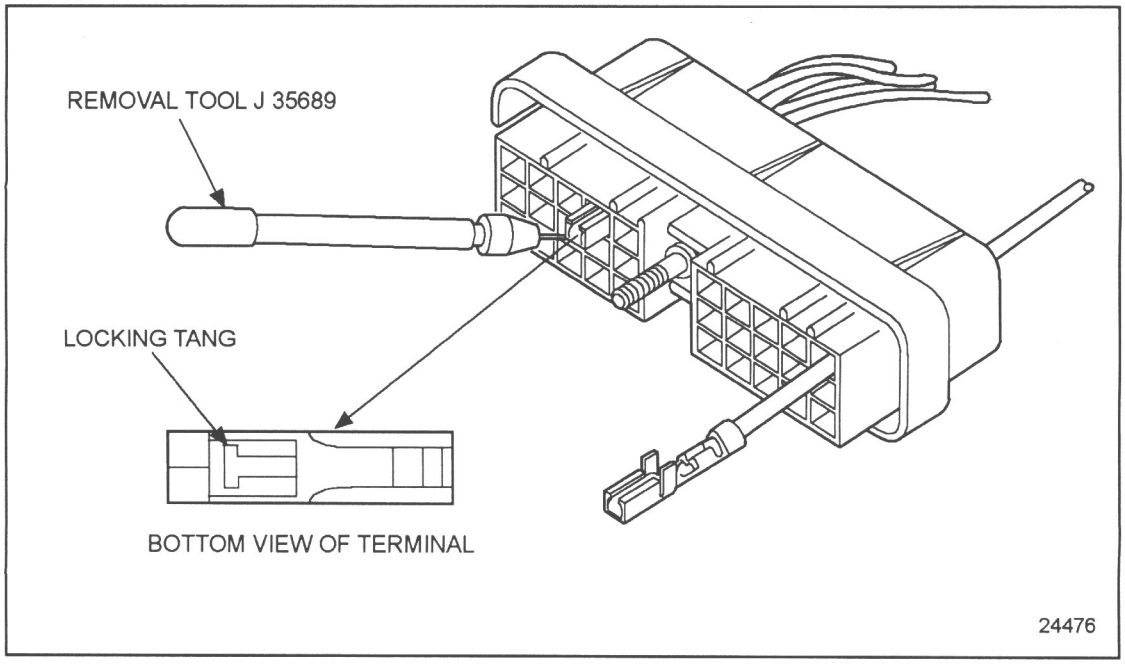

Figure 8–6 Terminal Removal

2. Depress the tang of the terminal to release it from the connector.
3. Push the cable forward through the terminal until the complete crimp is exposed.
4. Cut the cable immediately behind the damaged terminal to repair it.
5. Follow the installation instructions for crimping the terminal and inserting it into the connector.

8.3 WEATHER PACK AND METRI–PACK 280 CONNECTORS

Weather Pack and Metri–Pack 280 series connectors are push–to–seat. The terminal is crimped onto each wire before it is inserted into the connector. A cable seal is crimped on each wire at the same time the terminal is crimped onto the wire. Weather Pack connectors use a secondary lock on both male and female connector bodies and the lock snaps into place over the cable seals after installation. Some Metri–Pack connectors have secondary locks as well. Weather Pack connectors and their associated part numbers are listed in Table 8–3. Metri–Pack 280 connectors and their associated part numbers are listed in Table 8–4.

Turbo Boost Pressure Sensor Harness		**Engine Brake Connector, Series 60**	
Connector	P/N: 12015384	Connector	P/N: 12010973 / 12162000
Terminal	P/N: 12089040	Terminal	P/N: 12048074 / 12045773
Seal	P/N: 12015323	–	–
Throttle Position Sensor Harness Side		**Throttle Position Sensor Sensor Side**	
Connector	P/N: 12015793	Connector	P/N: 12010717
Terminal	P/N: 12089188	Terminal	P/N: 12089040
Seal	P/N: 12015323	Seal	P/N: 12015323
Plug	P/N: Not Applicable	Plug	P/N: Not Applicable
Ignition Connector Power Harness Side		**Ignition Connector Vehicle Interface Harness Side**	
Connector	P/N: 12034074	Connector	P/N: 12015378
Terminal	P/N: 12089040	Terminal	P/N: 12089188
Allison Interface Module		**Allison Interface Module Maximum Feature**	
Connector	P/N: 12015791	Connector	P/N: 12015799
Terminal	P/N: 12089188	Terminal	P/N: 12089188
Seal	P/N: 12015323	Seal	P/N: 12015323
		Plug	P/N: 12010300

Table 8–3 Weather Pack Connectors and Part Numbers

Coolant Level Sensor Connector		**Power Harness**	
Connector	P/N: 15300027	Connector	P/N: 12124634
Terminal	P/N: 12077411	Terminal	P/N: 12077413
Seal	P/N: 12015323	Seal	P/N: 12015193
Secondary Lock	P/N: 15300014	Secondary Lock	P/N: 12052816
Plug	P/N: Not Applicable	Plug	P/N: Not Applicable

Table 8–4 Metri–Pack 280 Connectors and Part Numbers

8.3.1 Installation

Use the following instructions for terminal installation:

1. Insert the terminal into the locating hole of the crimping tool using the proper hole according to the gage of the cable to be used. See Figure 8–7.

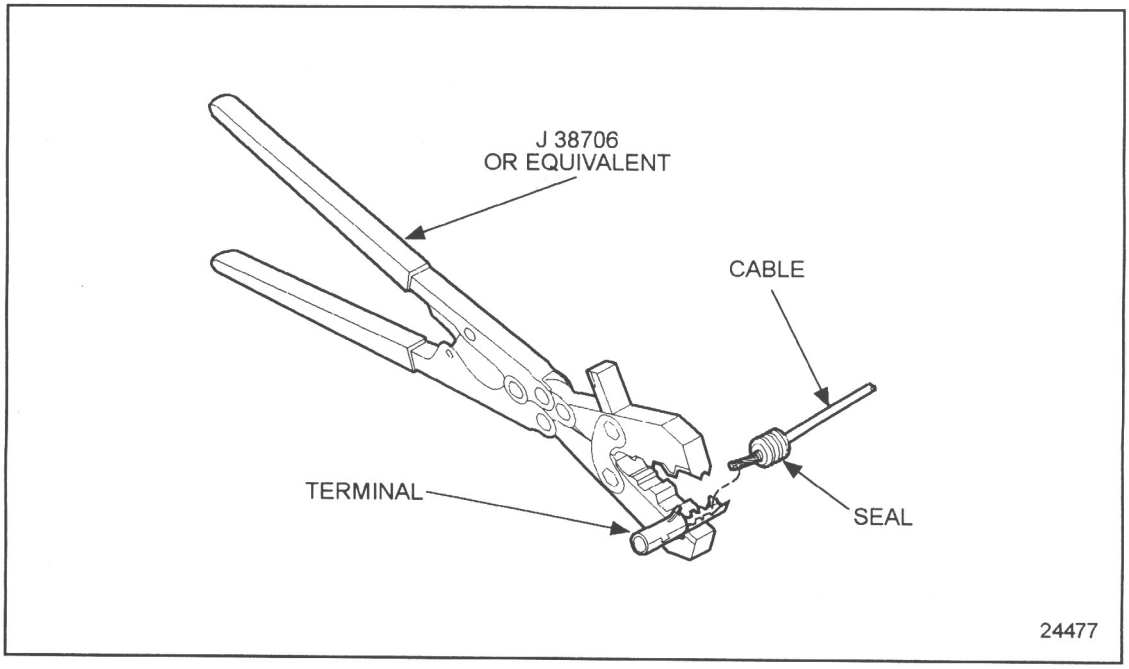

Figure 8–7 Terminal Position

2. Insert the cable into the terminal until the stripped portion is positioned in the cable core wings, and the seal and insulated portion of the cable are in the insulation wings. See Figure 8–8.

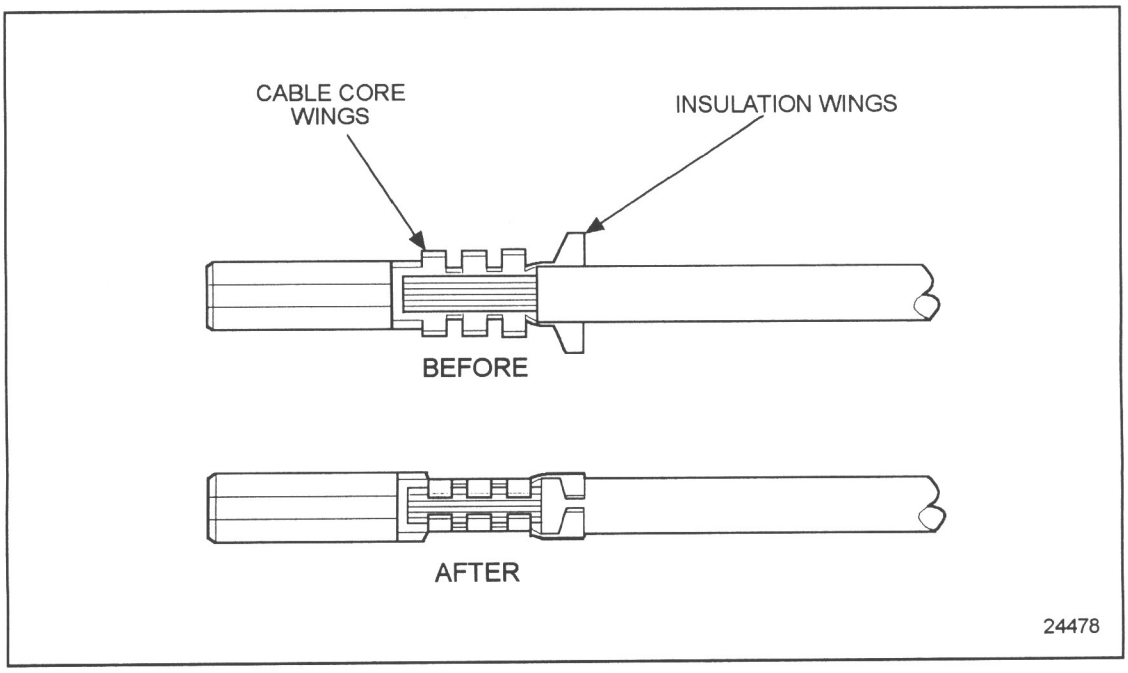

Figure 8–8 Cable and Terminal Position Before and After Crimping

3. Compress the handles of the crimping tool until the ratchet automatically releases and the crimp is complete. A properly crimped terminal is shown. See Figure 8–8.
4. Release the crimping tool with the lock lever located between the handles, in case of jamming.

5. Push the crimped terminal into the connector until it clicks into place. Gently tug on the cable to make sure it is secure. See Figure 8–9.

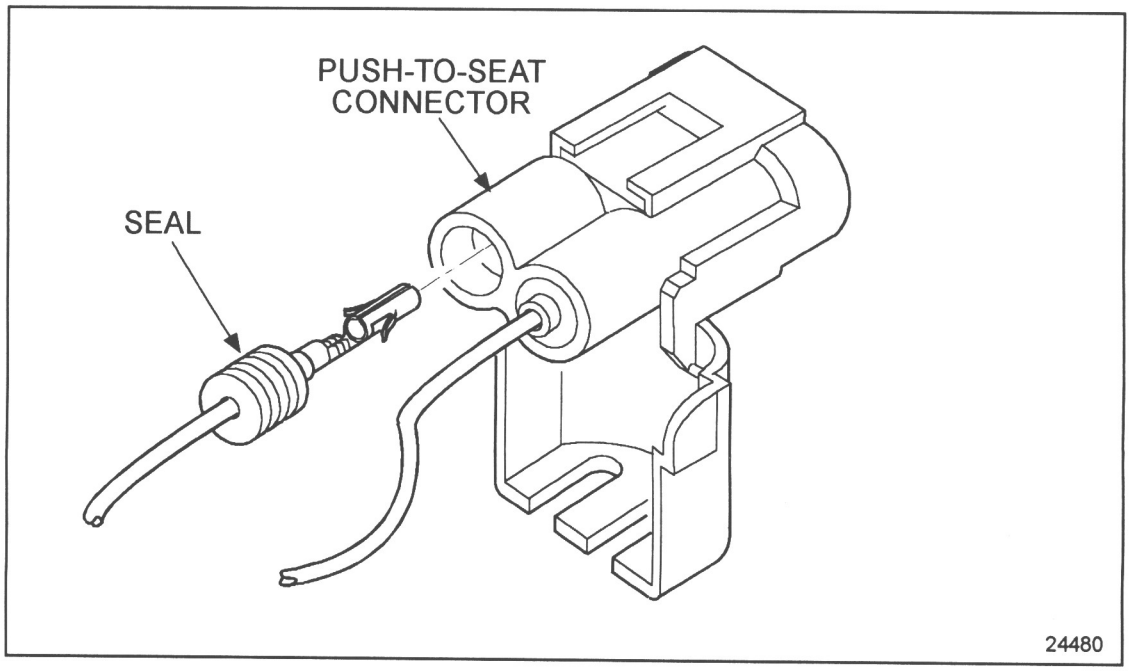

Figure 8–9 Inserting Terminal in Connector

8.3.2 Removal and Repair

Two locking tangs are used on the terminals to secure them to the connector body. Use the following instructions for removing terminals from the connector body.

1. Disengage the locking tang, securing the connector bodies to each other. Grasp one half of the connector in each hand and gently pull apart.
2. Unlatch and open the secondary lock on the connector. See Figure 8–10.

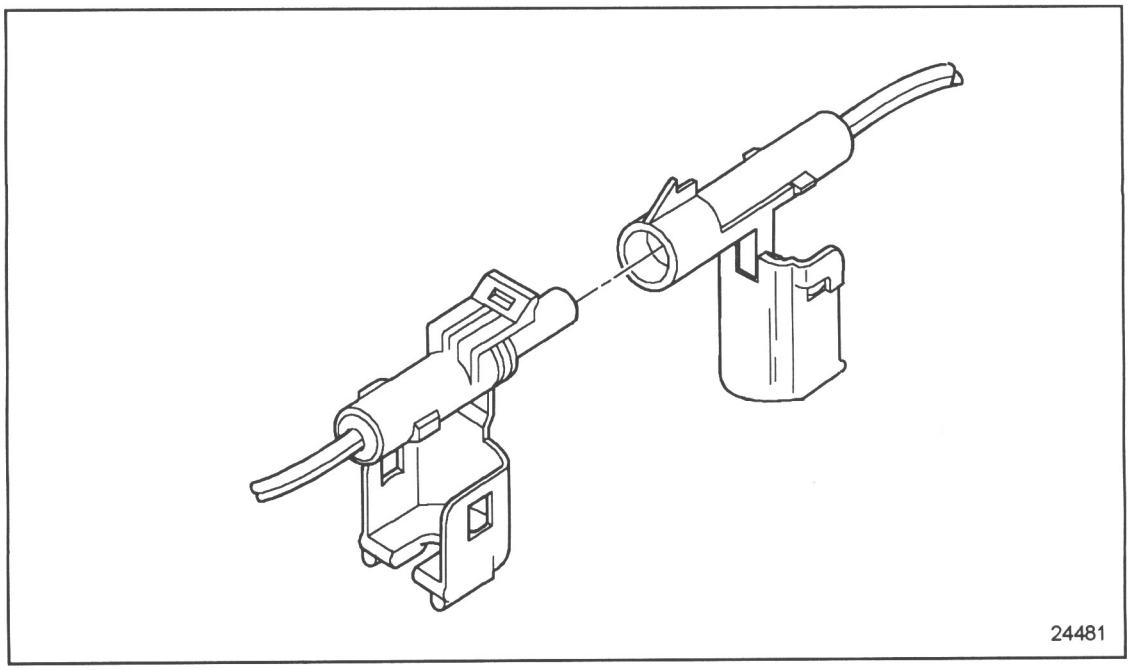

Figure 8–10 Unlatched Secondary Lock

3. Grasp the cable to be removed and push the terminal to the forward position.
4. Insert the removal tool straight into the front of the connector cavity until it resists on the cavity shoulder.

5. Grasp the cable and push it forward through the connector cavity into the tool while holding the tool securely in place. See Figure 8–11.

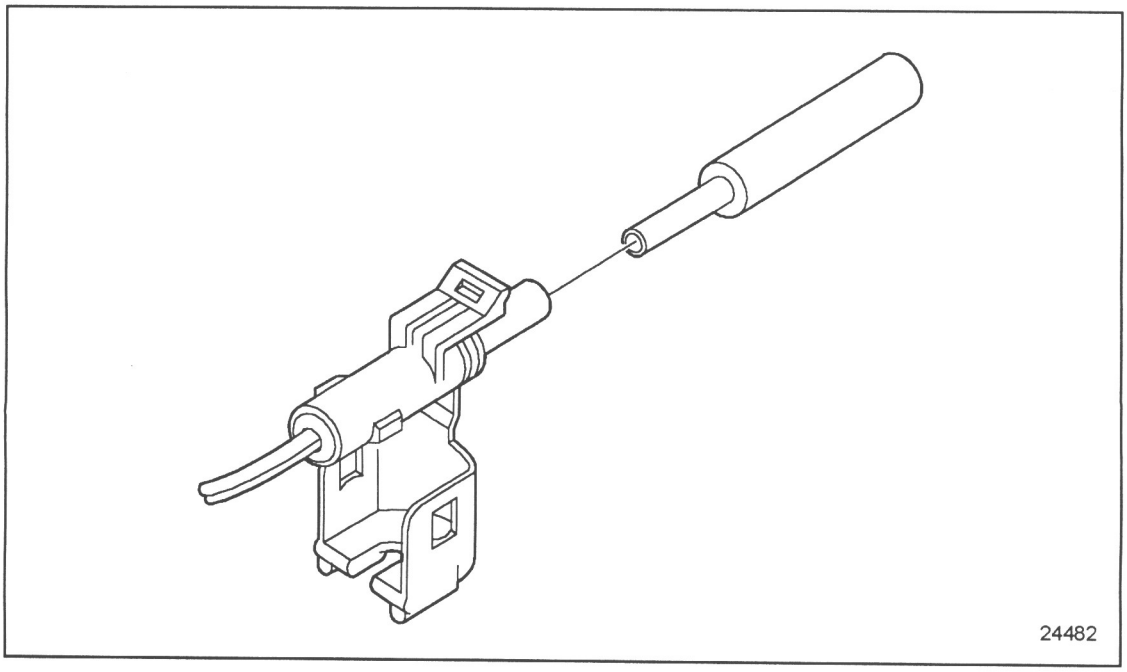

Figure 8–11 Removal Tool Procedure

6. The tool will press the locking tangs of the terminal. Pull the cable rearward (back through the connector). Remove the tool from the connector cavity.
7. Cut the wire immediately behind the cable seat and slip the new cable seal onto the wire.

8. Strip the end of the cable using strippers to leave 5.0 ± 0.5 mm (0.2 ±0.02 in.) of bare conductor. Position cable seal as shown. See Figure 8–12.

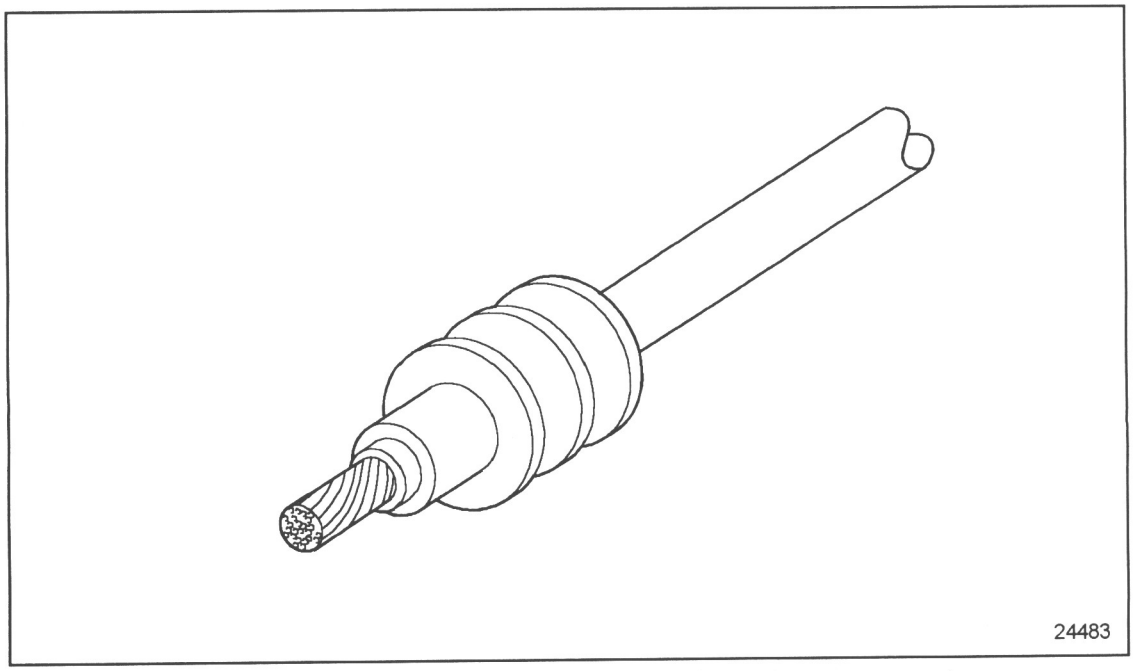

Figure 8–12 Proper Cable Seal Position

9. Crimp new terminal onto wire using the crimp tool. See Figure 8–13.

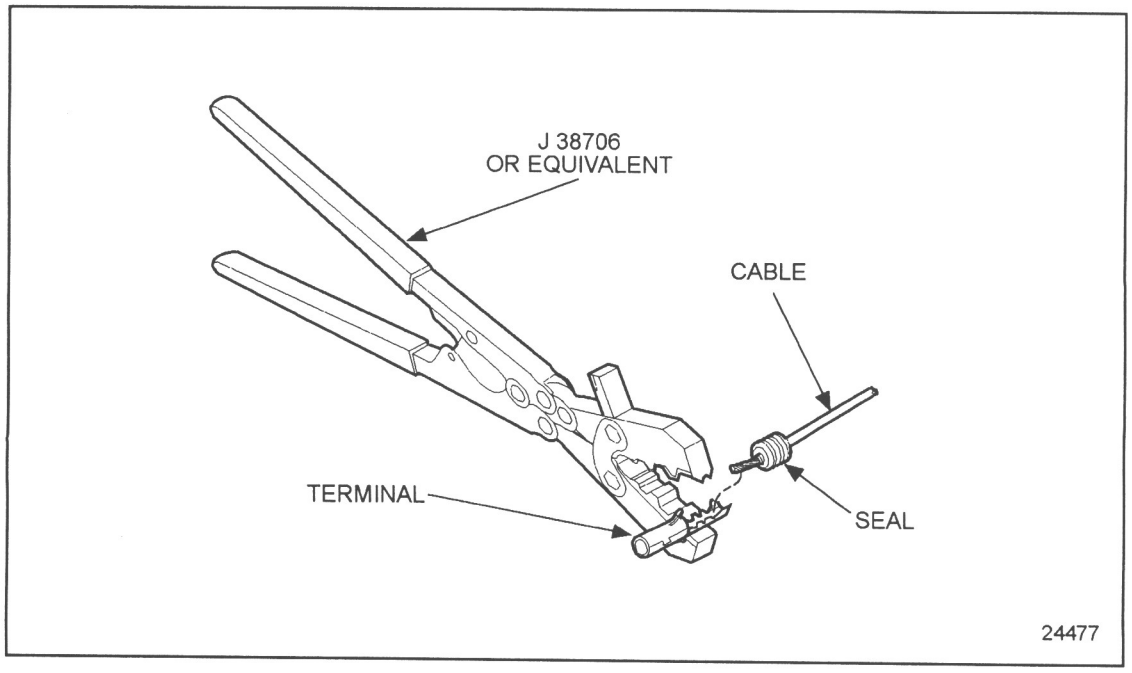

Figure 8–13 Crimping Procedure

8.4 DEUTSCH CONNECTORS

Deutsch connectors have cable seals molded into the connector. These connectors are push to seat connectors with cylindrical terminals. The diagnostic connector terminals are gold plated for clarity. Deutsch connectors and their associated part numbers are listed in Table 8–5.

Diagnostic Connector	
Connector	P/N: 23513052
Terminal	P/N: 23513053
Protective Cap	P/N: 23413054
Plug	P/N: 23507136
Engineminder	
Connector	P/N: 23512222
Terminal	P/N: 23507132
Plug	P/N: 23507136
Mastermind – Power and Communication Link	
Connector	P/N: 23512221
Terminal	P/N: 23507132
Plug	P/N: 23507136
Mastermind – Inputs and Outputs	
Connector	P/N: 23512223
Terminal	P/N: 23507066
Plug	P/N: 23507136

Table 8–5 Deutsch Connectors and Part Numbers

8.4.1 Installation

Use the following instructions for installation:

1. Strip approximately ¼ inch (6 mm) of insulation from the cable.
2. Remove the lock clip, raise the wire gage selector, and rotate the knob to the number matching the gage wire that is being used.
3. Lower the selector and insert the lock clip.

4. Position the contact so that the crimp barrel is 1/32 of an inch above the four indenters. See Figure 8–14. Crimp the cable.

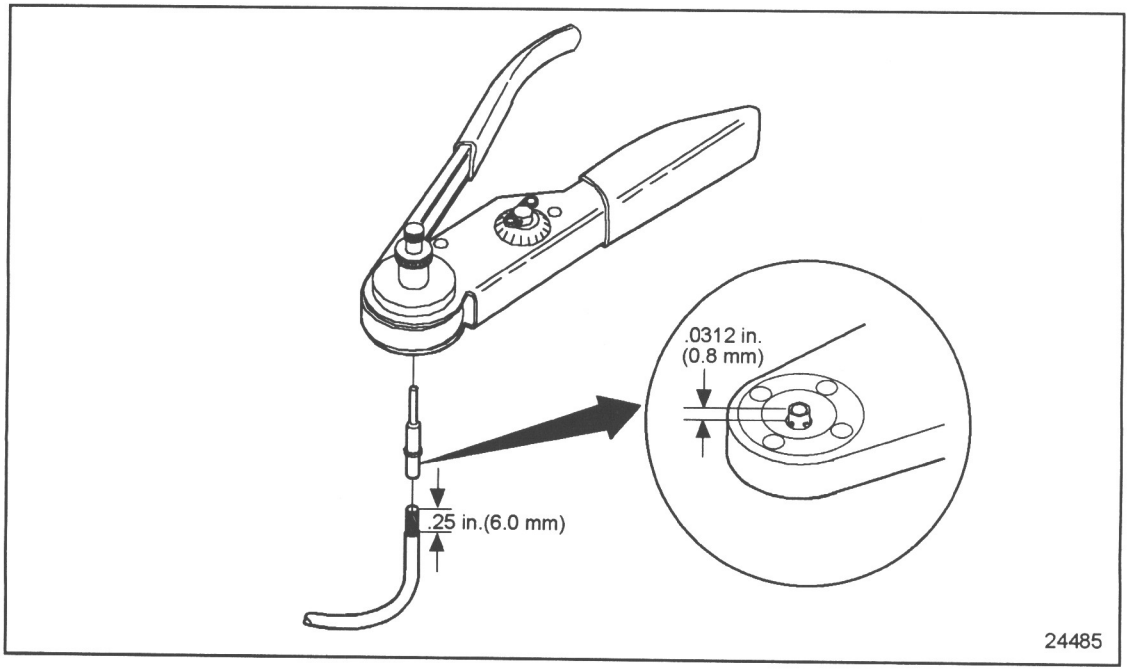

Figure 8–14 Setting Wire Gage Selector and Positioning the Contact

5. Grasp the contact approximately one inch behind the contact crimp barrel.

6. Hold the connector with the rear grommet facing you. See Figure 8–15.

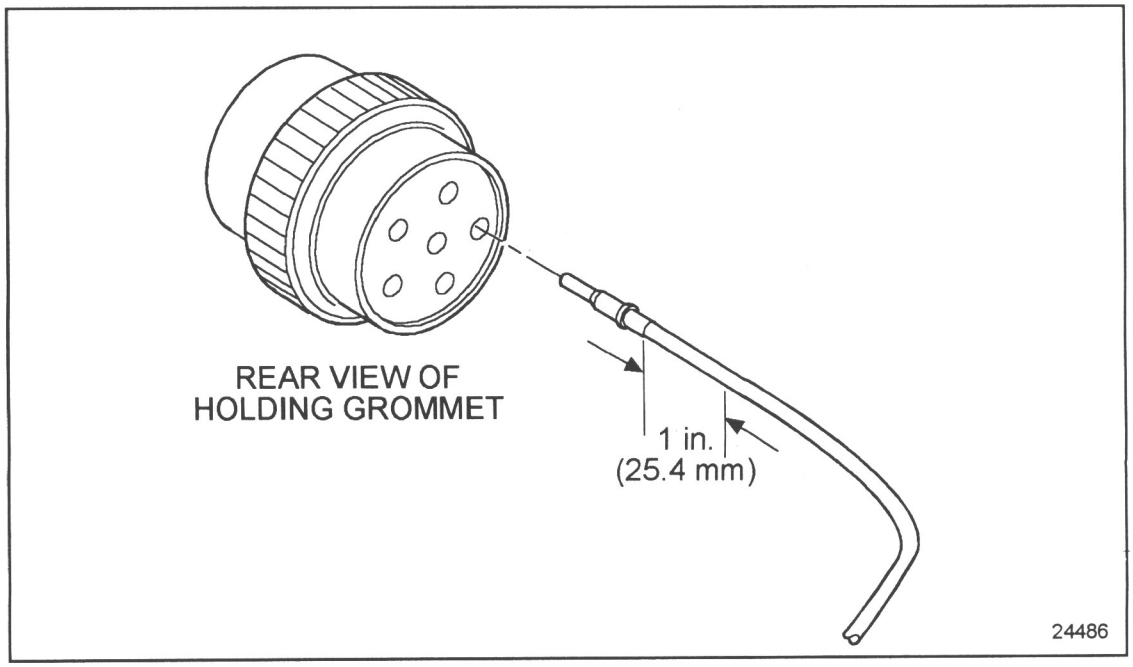

Figure 8–15 Pushing Contact Into Grommet

7. Push the contact into the grommet until a positive stop is felt. See See Figure 8–15. A slight tug will confirm that it is properly locked into place. See Figure 8–16.

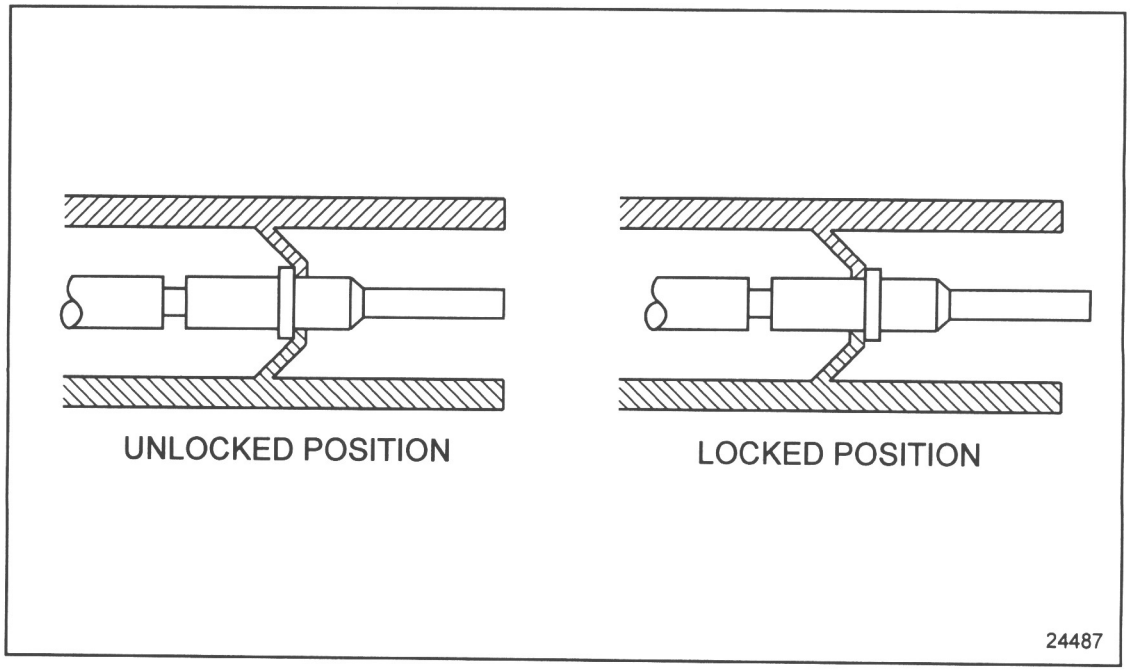

Figure 8–16 Locking Terminal Into Connector

8.4.2 Removal

The appropriate size removal tool should be used when removing cables from connectors. The proper removal tool size is listed in Table 8–1.

1. With the rear insert toward you, snap the appropriate size remover tool over the cable of contact to be removed. See Figure 8–17.

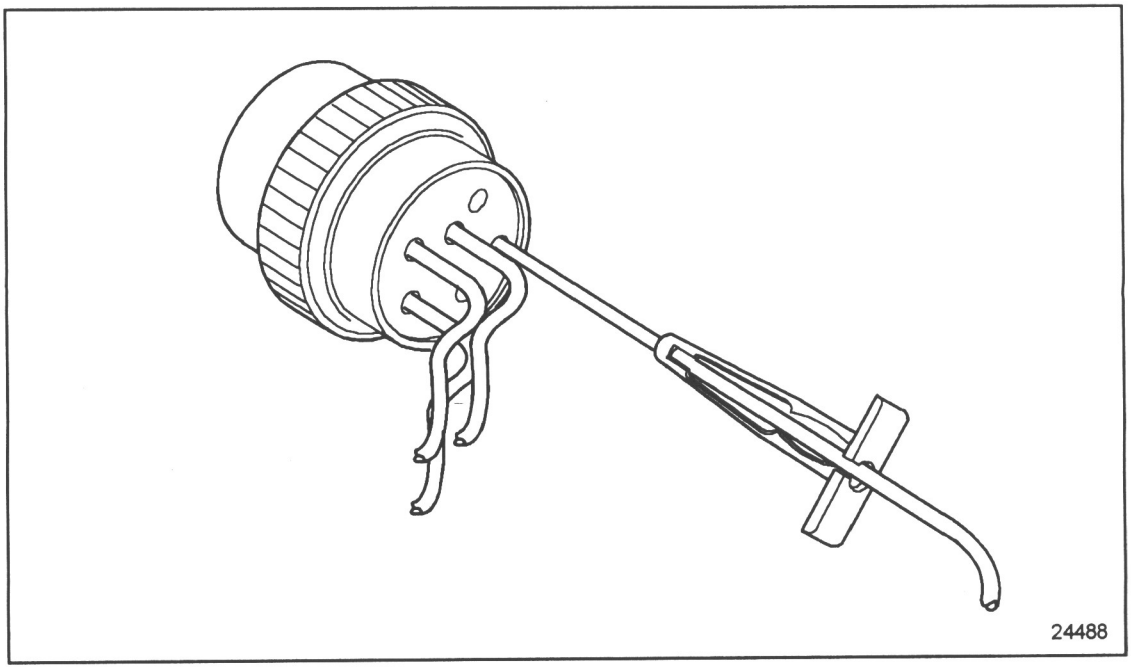

Figure 8–17 Removal Tool Position

2. Slide the tool along the cable into the insert cavity until it engages and resistance is felt. Do not twist or insert tool at an angle.
   See Figure 8–18.

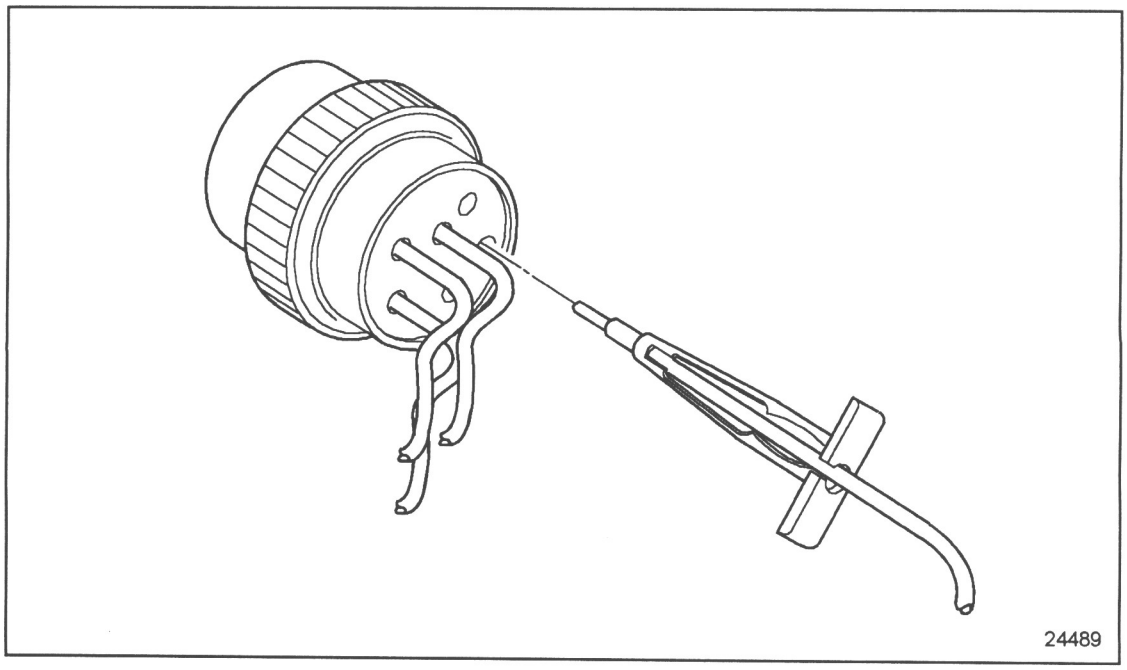

Figure 8–18 Removal Tool Insertion

3. Pull contact cable assembly out of the connector. Keep reverse tension on the cable and forward tension on the tool.

8.5 SPLICING GUIDELINES

The following are guidelines which may be used for splices. The methods described are not the only acceptable methods. Any method should produce a high quality, tight splice with durable insulation which can be expected to last the life of the vehicle.

The selection of crimpers and splice connectors is optional. Select a high quality crimper equivalent to the Kent–Moore tool, J 38706, and commercially available splice clips.

8.5.1 Tools Required

The following is a list of tools required for splicing wires:

- ❑ Soldering iron
- ❑ Rosin core solder
- ❑ Wire strippers
- ❑ Heat shrink tubing
- ❑ Splice clips
- ❑ Crimp pliers

8.6 STRAIGHT LEADS

To splice straight leads:

1. Locate broken wire.
2. Remove insulation as required; be sure exposed wire is clean and not corroded.
3. Slide a sleeve of shrink wrap on the wire long enough to cover the splice and overlap the wire insulation, about ¼ inch on both sides.
4. Insert one wire into splice clip (P/N: 0597428 or equivalent) and crimp.
5. Insert the other wire into splice and crimp. See Figure 8–19.

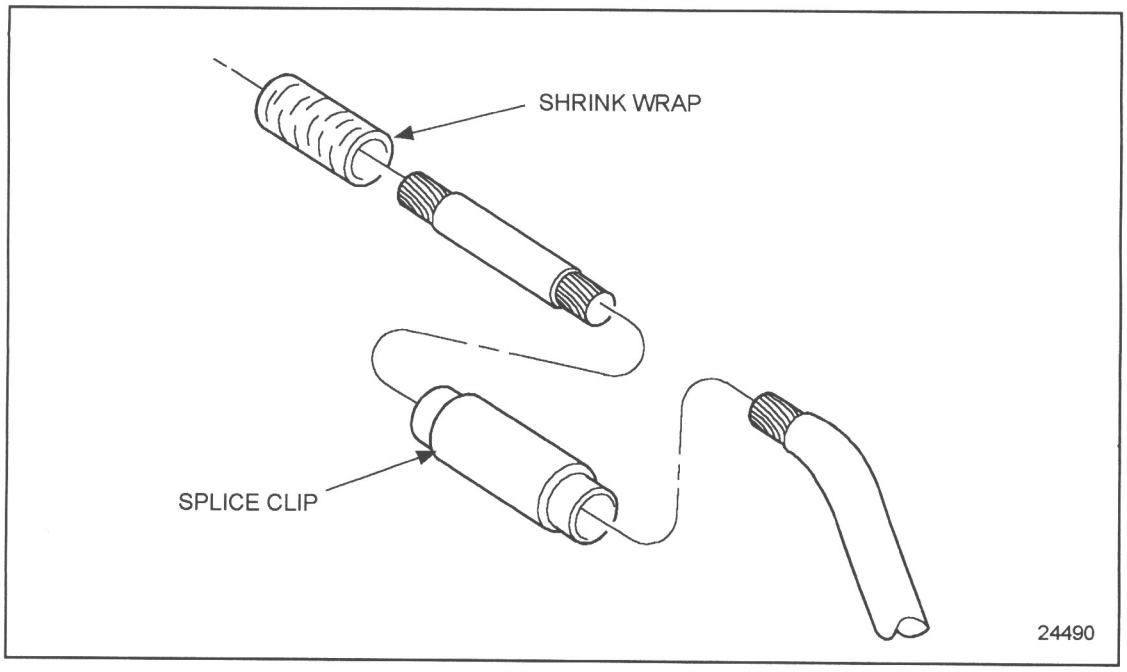

Figure 8–19 Spliced Wire

8.7 SOLDER

Soldering splice connectors is optional. To solder splice connectors:

1. You *mus*t use rosin core solder.
2. Check the exposed wire before the splice is crimped in its connector. The exposed wire *must* be clean before the splice is crimped.
3. Use a suitable electronic soldering iron to heat the wires. Apply the solder to the heated wire (not to the soldering iron) allowing sufficient solder flow into the splice joint.
4. Pull on connection to assure crimping and soldering integrity.

8.8 SHRINK WRAP

Shrink wrap is required. Alpha FIT-300, Raychem TAT-125 or any equivalent heat shrink dual wall epoxy encapsulating adhesive polyolefin is required.

Alpha Wire Corp
711 Lidgerwood Ave
P.O. Box 711
Elizabeth, New Jersey 07207-0711
1-800-52ALPHA

Raychem Corporation, Thermofit Div
300 Constitution Drive, Bldg. B
Menlo Park, CA 94025
415-361-3860

To heat shrink wrap a splice:

1. Select the correct diameter to allow a tight wrap when heated. The heat shrink wrap *must* be long enough to overlap the wire insulation about ¼ inch on both sides of the splice.
2. Heat the shrink wrap with a heat gun; do not concentrate the heat in one location, but play the heat over the entire length of shrink wrap until the joint is complete.

8.9 MULTIPLE BROKEN WIRES

To splice multiple broken wires:

1. Stagger the position of each splice as illustrated. See Figure 8–20.
2. You *must* stagger positions to prevent a large bulge in the harness and to prevent the wires from chafing against each other.

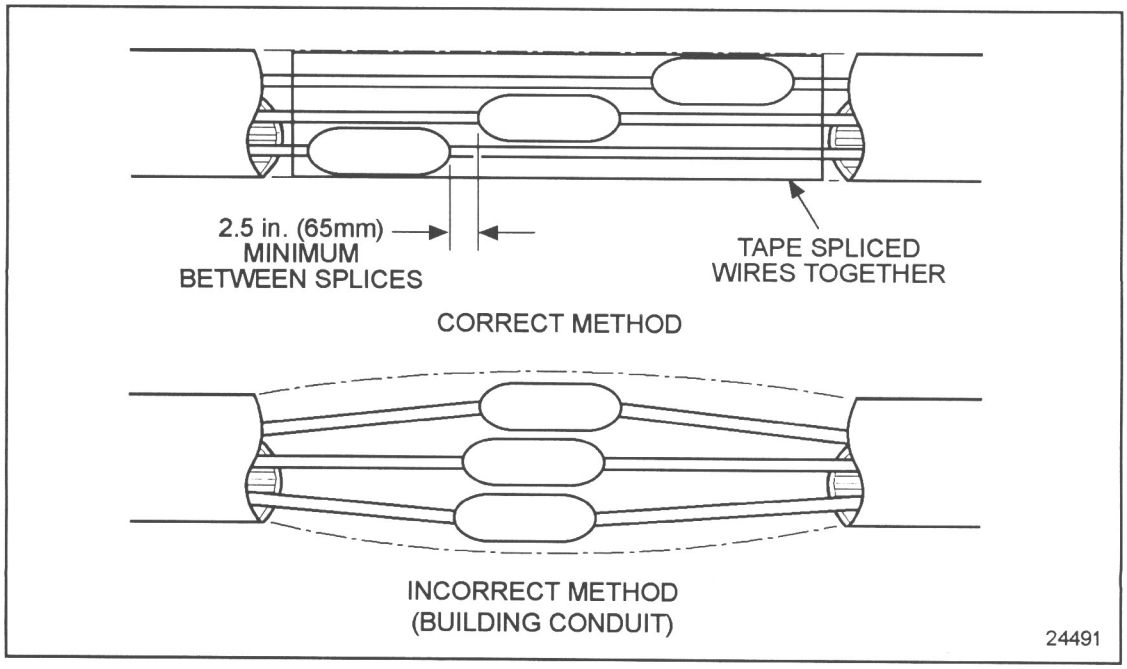

Figure 8–20 Multiple Splices

8.10 THREE–WIRE SPLICE

Three–way splice connectors are commercially available to accommodate three–wire splices. The technique is the same as a single butt splice connector. See Figure 8–21.

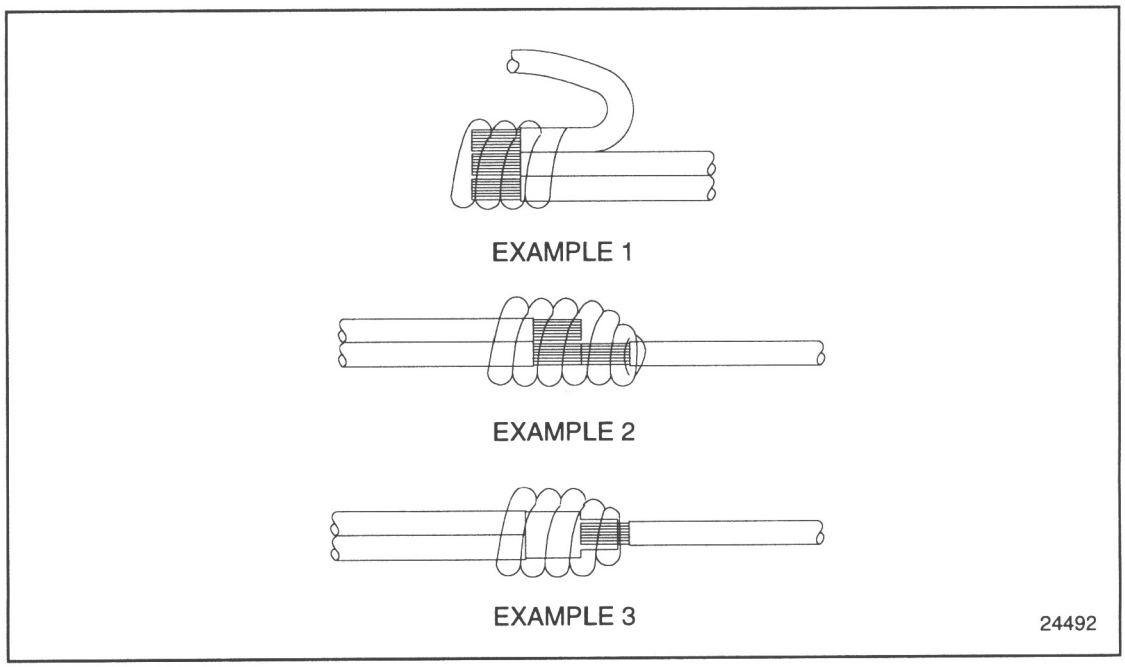

Figure 8–21 Three–Way Splice