

WIRE HARNESS REPAIR

E4.0-5.5XN, E5.0XNS (E80-120XN, E100XNS) [A099];N35-40ZRS2,
N30ZDRS2 [B265];S6.0-7.0FT (S135-155FT) [D024, E024, F024, G024];
A1.3-1.5XNT (A25-30XNT) [D203];N35ZDR2, N45ZR2 [D264];
S30-35FT, S40FTS [E010, F010];N35-40ZR2, N30ZDR2 [E470];
H1.6-1.8FT, H2.0FTS (H30-35FT, H40FTS) [F001, G001];
S2.0-3.5FT (S40-70FT, S55FTS) [F187, G187, H187];
S4.0-5.5FT, S5.5FTS (S80-120FT; S80-100FTBCS; S120FTS;
S120FTPRS) [G004, H004, J004];
H6.0-7.0FT (H135-155FT) [H006, J006, K006, L006];
H2.0-3.5FT (H40-70FT) [L177, N177, P177];
H4.0FT5/FT6; H4.5FTS5, H4.5FT6; H5.0-5.5FT
(H80-120FT) [N005, P005, R005, S005, U005];
E2.2-3.5XN (E45-70XN) [A268];
J2.2-3.5XN (J45-70XN) [A276];J1.5-2.0XNT (J30-40XNT) [K160];J1.6-2.
0XN (J30-40XN) [A935];
H8.0FT, H8.0FT9, H9.0FT (H170FT, H175FT36, H190FT) [A299, B299,
C299];
E30HSD₂, E35HSD₂, E40HSD₂ [B219];E30HSD₃, E35HSD₃,
E40HSD₃ [C219];
S50CT [A267];S50CT, S50CT2 [B267];H2.0-2.5CT (H50CT) [A274,
B274];
E1.6-2.0XN (E30-40XN) [A269];J4.0-5.0XN, J5.0-5.5XN6 (J80-120XN,
J100XNL) [A970];H2.0-3.0XT (H40-60XT) [A380];J8.0XNL6, J8.0XNL9,
J9.0XNL (J170-190XNL) [A250]; H3.0XT [A409]

HYSTER

SAFETY PRECAUTIONS

MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the **WARNING** symbol and word are on orange background. The **CAUTION** symbol and word are on yellow background.

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This section is for the following models:

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 (N35-40ZRS2, N30ZDRS2) [B265];
 S6.0-7.0FT (S135-155FT) [D024, E024, F024, G024];
 A1.3-1.5XNT (A25-30XNT) [D203];
 (N35ZDR2, N45ZR2) [D264];
 (S30-35FT, S40FTS) [E010, F010];
 (N35-40ZR2, N30ZDR2) [E470];
 H1.6-1.8FT, H2.0FTS (H30-35FT, H40FTS) [F001, G001];
 S2.0-3.5FT (S40-70FT, S55FTS) [F187, G187, H187];
 S4.0-5.5FT, S5.5FTS (S80-120FT; S80-100FTBCS; S120FTS; S120FTPRS)
 [G004, H004, J004];
 H6.0-7.0FT (H135-155FT) [H006, J006, K006, L006];
 H2.0-3.5FT (H40-70FT) [L177, N177, P177];
 H4.0FT5/FT6; H4.5FTS5, H4.5FT6; H5.0-5.5FT (H80-120FT) [N005, P005, R005,
 S005, U005];
 E2.2-3.5XN (E45-70XN) [A268];
 J2.2-3.5XN (J45-70XN) [A276];
 J1.5-2.0XNT (J30-40XNT) [K160];
 J1.6-2.0XN (J30-40XN) [A935];
 H8.0FT, H8.0FT9, H9.0FT (H170FT, H175FT36, H190FT) [A299, B299, C299];
 (E30HSD₂, E35HSD₂, E40HSD₂) [B219];
 (E30HSD₃, E35HSD₃, E40HSD₃) [C219];
 (S50CT) [A267];
 (S50CT, S50CT2) [B267];
 H2.0-2.5CT (H50CT) [A274, B274];
 E1.6-2.0XN (E30-40XN) [A269];
 J4.0-5.0XN, J5.0-5.5XN6 (J80-120XN, J100XNL) [A970];
 H2.0-3.0XT (H40-60XT) [A380];
 J8.0XNL6, J8.0XNL9, J9.0XNL (J170-190XNL) [A250];
 H3.0XT [A409]

**"THE
QUALITY
KEEPERS"**

**HYSTER
APPROVED
PARTS**

General

This section covers the repair of the wire harness connectors, pins, sockets, and splicing of wires.

Deutsch Crimping Tool

HOW TO STRIP A WIRE FOR USE WITH DEUTSCH CRIMPING TOOL

1. Choose Metri-Pack Connector the correct AWG for the contact being used. See Table 15.
2. See Table 15 for recommended strip length for contact size. Measure strip length from end of wire as shown in Figure 1.

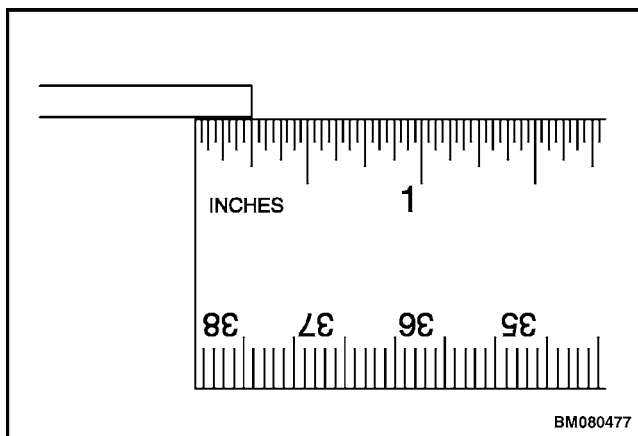


Figure 1. Strip Length Measurement

3. Strip the wire to the recommended strip length. A small piece of insulation should come off the wire after stripping. See Figure 2.

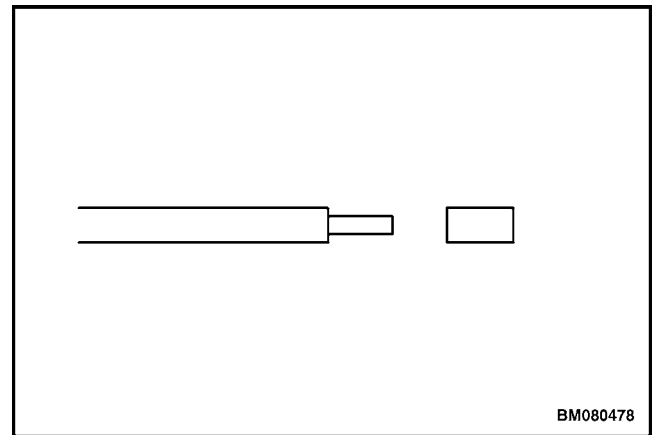


Figure 2. Stripped Wire

4. Check for any broken strands or for a nick in the wire. If either exists, the wires are damaged and should be cut and stripped again.
5. Measure the exposed strands to verify strip length is correct. See Figure 3.

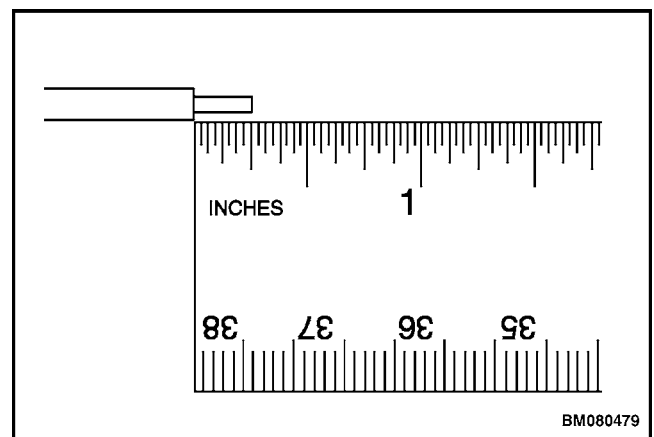


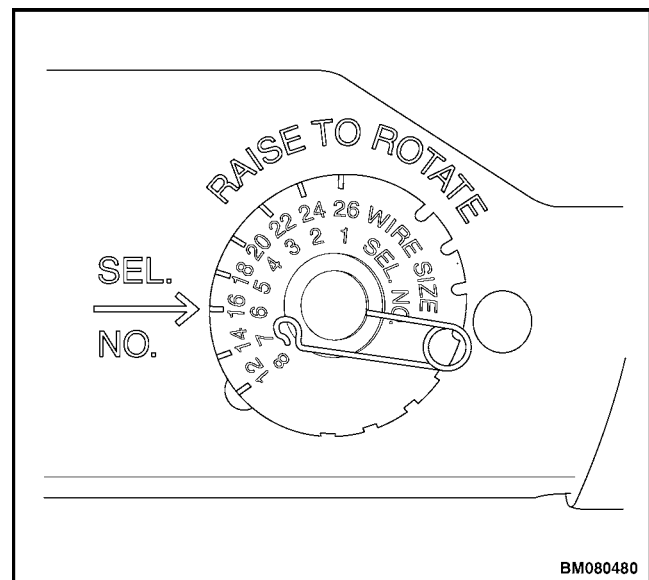
Figure 3. Strip Length Measurement Verification

Table 1. Wire Strip Length Specifications

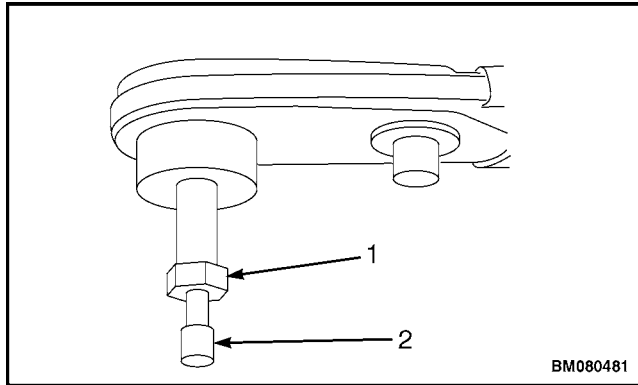
Contact Part Number	Type	Wire Gauge Range	Recommended Strip Length
1463136	Pin	20 AWG (0.5 mm ²)	3.96 to 5.54 mm (0.156 to 0.218 in.)
1463137	Socket	20 AWG (0.5 mm ²)	3.96 to 5.54 mm (0.156 to 0.218 in.)
1660396	Pin	20 AWG (0.5 mm ²)	4.0 to 5.5 mm (0.157 to 0.217 in.)
1330433	Pin	16 to 20 AWG (1.0 to 0.5 mm ²)	6.35 to 7.92 mm (0.250 to 0.312 in.)
1330434	Socket	16 to 20 AWG (1.0 to 0.5 mm ²)	6.35 to 7.92 mm (0.250 to 0.312 in.)
1659638	Pin	16 to 20 AWG (1.0 to 0.5 mm ²)	6.4 to 7.9 mm (0.252 to 0.311 in.)
1579860	Socket	16 to 20 AWG (1.0 to 0.5 mm ²)	6.4 to 7.9 mm (0.252 to 0.311 in.)
1330435	Pin	14 AWG (2.0 mm ²)	6.35 to 7.92 mm (0.250 to 0.312 in.)
1330436	Socket	14 AWG (2.0 mm ²)	6.35 to 7.92 mm (0.250 to 0.312 in.)
1653804	Socket	14 AWG (2.0 mm ²)	6.4 to 7.9 mm (0.252 to 0.311 in.)
0866401	Pin	12 to 14 AWG (3.0 to 2.0 mm ²)	5.64 to 7.21 mm (0.222 to 0.284 in.)
1554359	Socket	12 to 14 AWG (3.0 to 2.0 mm ²)	5.64 to 7.21 mm (0.222 to 0.284 in.)

HOW TO CRIMP WITH THE DEUTSCH CRIMPING TOOL

- Strip the insulation from the wire. See How to Strip a Wire for Use With Deutsch Crimping Tool.
- Raise the selector knob and rotate until arrow is aligned with wire gauge to be crimped. See Figure 4.

**Figure 4. Selector Knob**

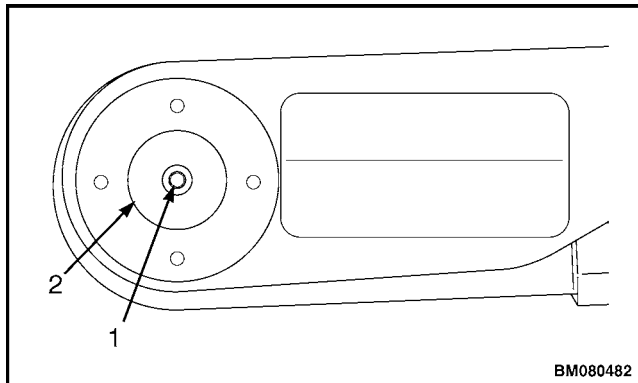
- Loosen lock nut and turn adjusting screw until it stops. See Figure 5.



1. LOCK NUT
2. ADJUSTING SCREW

Figure 5. Adjusting Screw and Lock Nut

4. Insert the contact into the crimping tool; for pin contacts, insert short end into crimping tool; for socket contacts, insert long end into crimping tool. See Figure 6.



1. INSERTION POINT
2. INDENTOR COVER

Figure 6. Insertion Point

5. Turn the adjusting screw clockwise until the contact is flush or slightly above flush with the indenter cover (cover around insertion point). See Figure 6. Tighten the lock nut.
6. Insert the wire into the contact. There should be no loose strands. All strands should be contained in the contact barrel. The contact must be centered between indicators. See Figure 7.

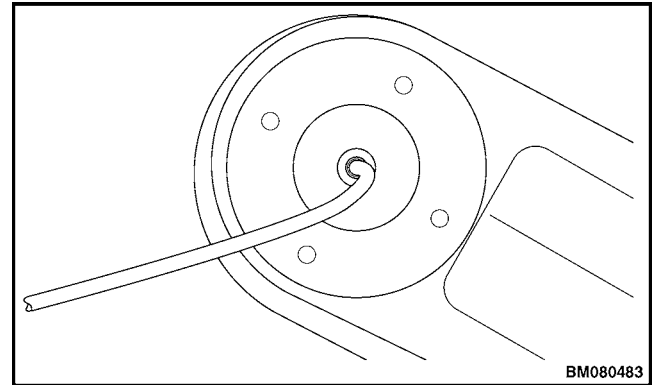
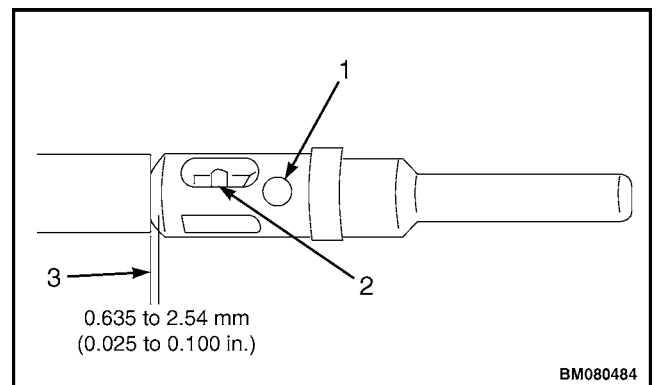


Figure 7. Wire Insertion

7. Close handles until handles stop.
8. Release handles and remove crimped contact.
9. Visually check the crimped contact for the following:
 - a. The conductor is inserted to the proper depth and is visible through the inspection hole. See Figure 8.
 - b. There is about 0.635 to 2.54 mm (0.025 to 0.100 in.) of conductor between the contact and the insulator.
 - c. There are no damaged wire strands.
 - d. There are no frayed wires or wires not entering the contact barrel.



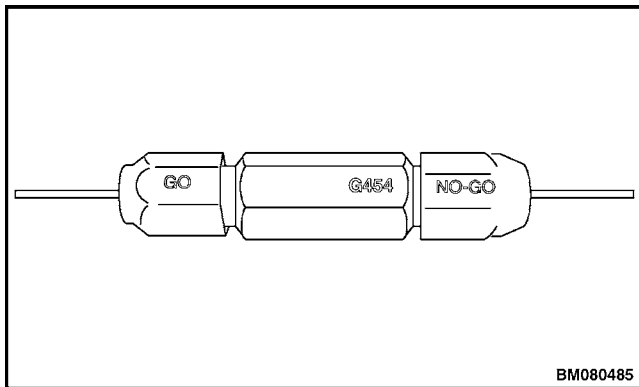
1. INSPECTION HOLE
2. CRIMP
3. INSULATION GAP,
0.635 TO 2.54 mm (0.025 TO 0.100 in.)

Figure 8. Proper Crimp

- If any of the conditions in Step 9 are not met, discard the contact, re-cut and strip the wire, and start the crimping process over.

CALIBRATION TEST FOR THE DEUTSCH CRIMPING TOOL

The G454 testing tool is needed for the following procedures. The G454 testing tool is for use with the Deutsch hand crimping tool only. See Figure 9.

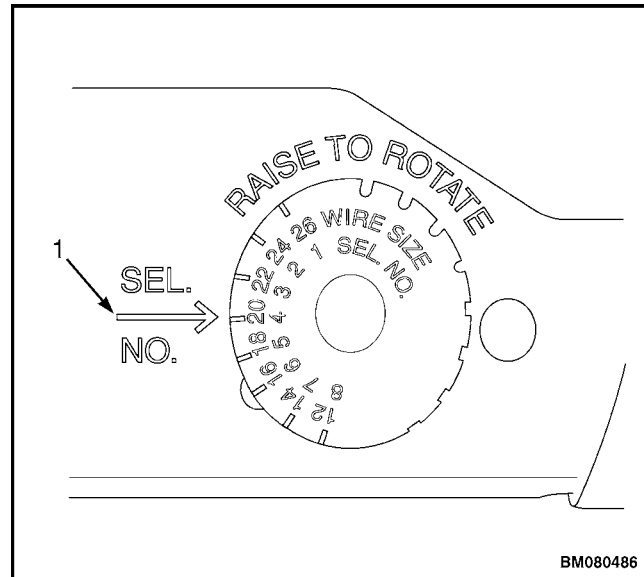


- GO END (GREEN)
- NO-GO END (RED)

Figure 9. G454 Testing Tool

NOTE: Testing for all wire sizes should be #20 wire size, selector number 4. This ensures proper calibration for all settings and further testing is not needed for the other selections.

- Set the Deutsch hand crimp tool to #20 wire size, selector number 4. See Figure 10.



- SELECTOR SET AT #20 WIRE SIZE, SELECTOR NUMBER 4

Figure 10. Selector Test Setting

- Squeeze the handles of the crimp tool completely together. See Figure 11.

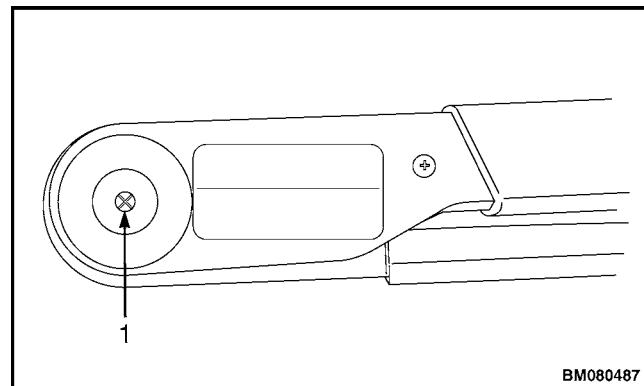
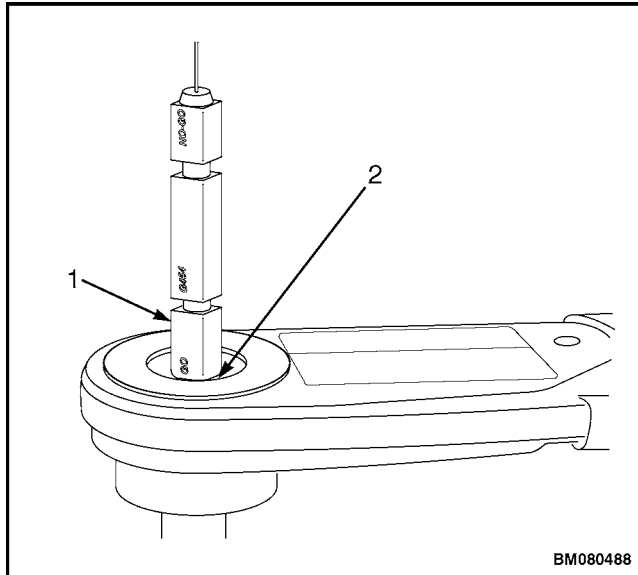


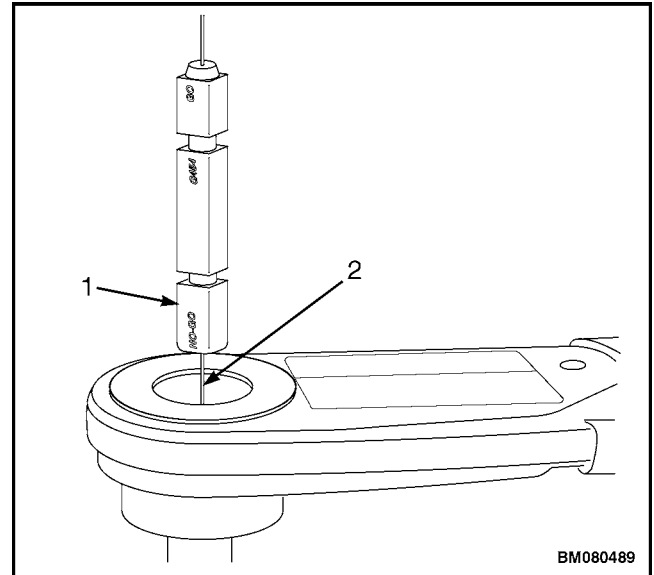
Figure 11. Insertion Point

- Insert the Go end (green) of the G454 testing tool into the insertion point of the crimp tool while the handles are completely closed. The Go end (green) should insert easily. If it does not insert, the calibration is incorrect and the crimp tool must be replaced. See Figure 12.



1. GO END (GREEN)
2. GO END COMPLETELY INSERTED

Figure 12. Go End Test



1. NO-GO END (RED)
2. NO-GO END SHOULD NOT INSERT ANY FURTHER

Figure 13. No-Go End Test

4. Insert the No-Go end (red) of the G454 testing tool into the insertion point of the crimp tool while the handles are still completely closed. The No-Go end (red) should not insert. If it does insert, the calibration is incorrect and the crimp tool must be replaced. See Figure 13.

Deutsch Connectors

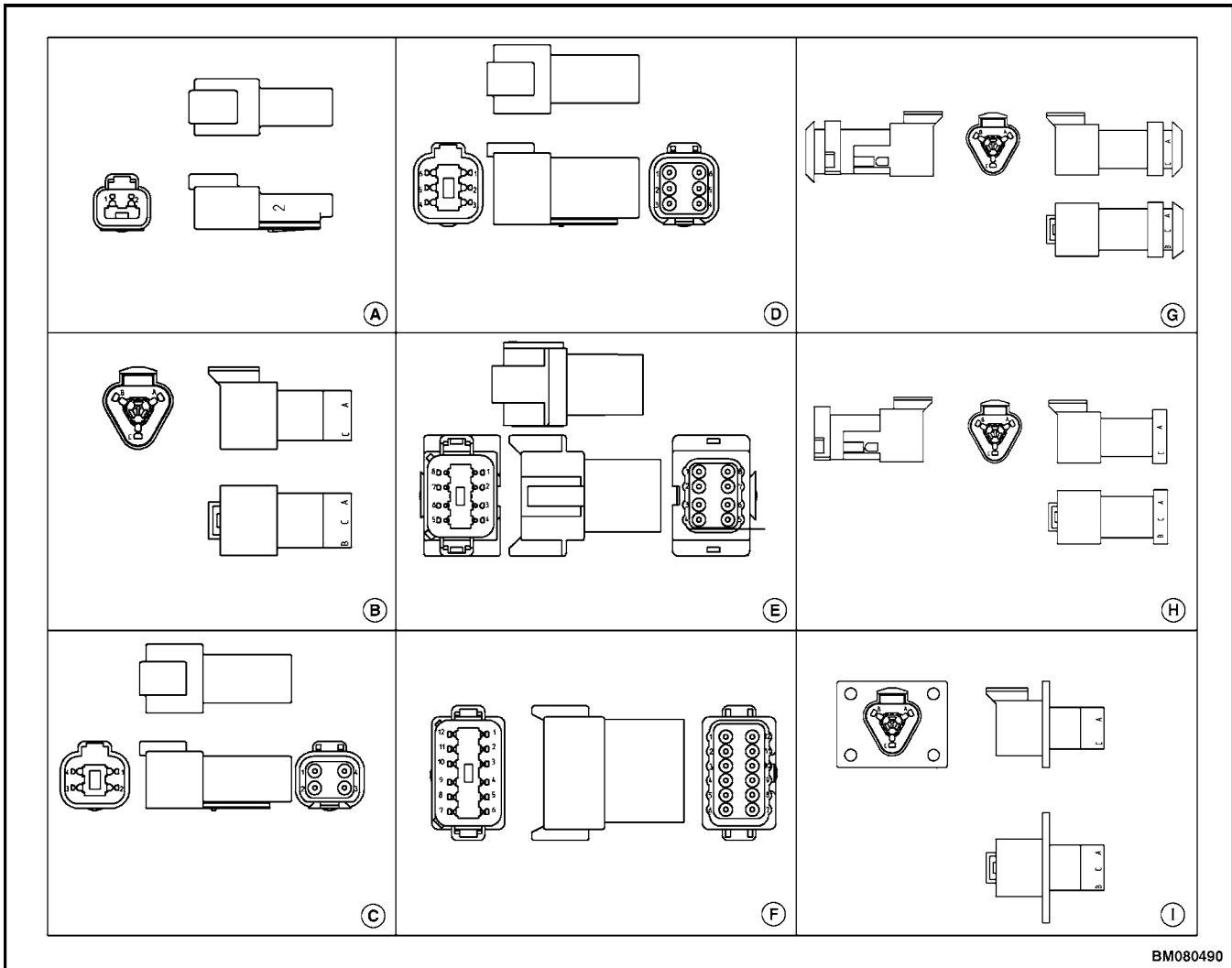
DT, DTM, AND DTP SERIES CONNECTORS

All Deutsch DT, DTM, and DTP series pin- and socket-type connectors are repaired in the same manner.

For examples of the DT connectors, see Figure 14 for the different connector receptacles, Figure 15 for the different connector receptacle secondary locks,

Figure 16 for the different connector plugs, and Figure 17 for the different connector plug secondary locks.

For examples of the DTM and DTP connectors, see Figure 18 for the different connector receptacles, Figure 19 for the different connector receptacle secondary locks, Figure 20 for the different connector plugs, and Figure 21 for the different connector plug secondary locks.

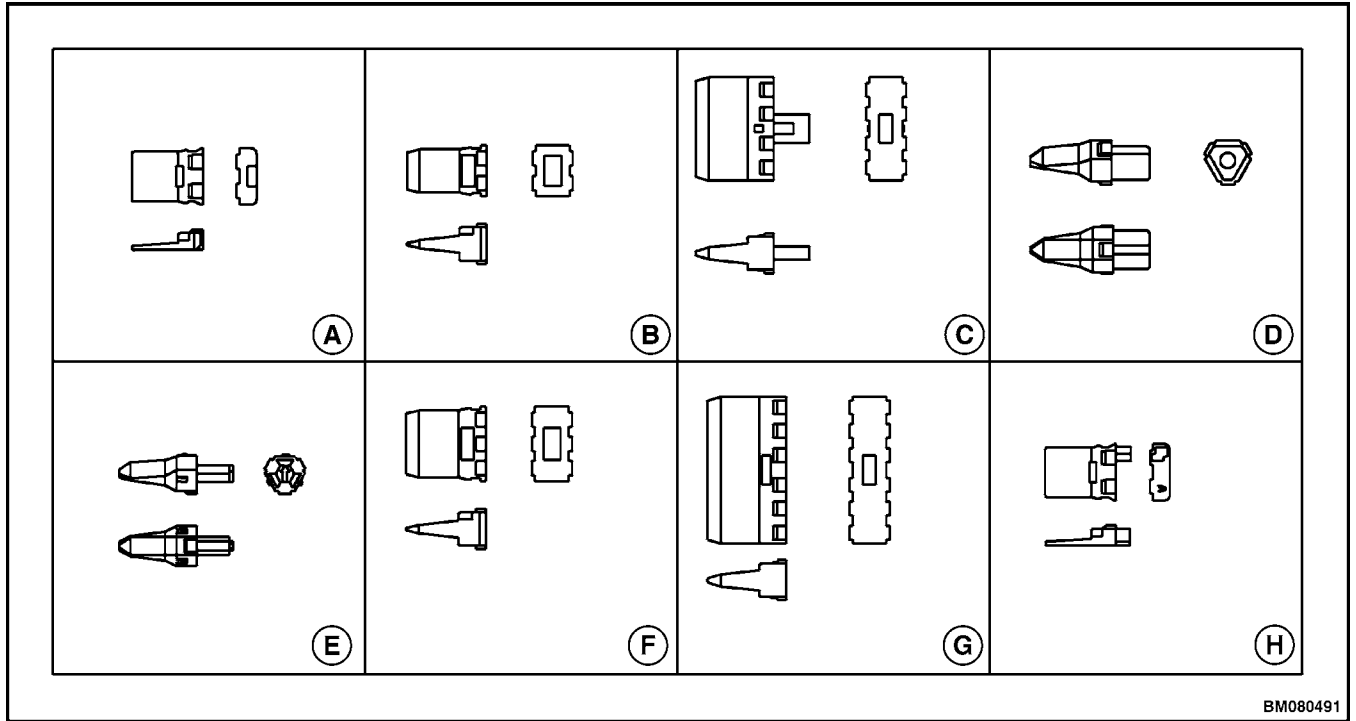


BM080490

NOTE: ALL CONNECTOR RECEPTACLES ARE SHOWN WITH THE SECONDARY LOCK INSTALLED.

- A. CONNECTOR TYPE AA
- B. CONNECTOR TYPE AB
- C. CONNECTOR TYPE AC
- D. CONNECTOR TYPE AD
- E. CONNECTOR TYPE AE
- F. CONNECTOR TYPE AF
- G. CONNECTOR TYPE AB-A (SIMILAR TO TYPE AB)
- H. CONNECTOR TYPE AB-B (SIMILAR TO TYPE AB)
- I. CONNECTOR TYPE AB-C (SIMILAR TO TYPE AB)

Figure 14. DT Connector Receptacles

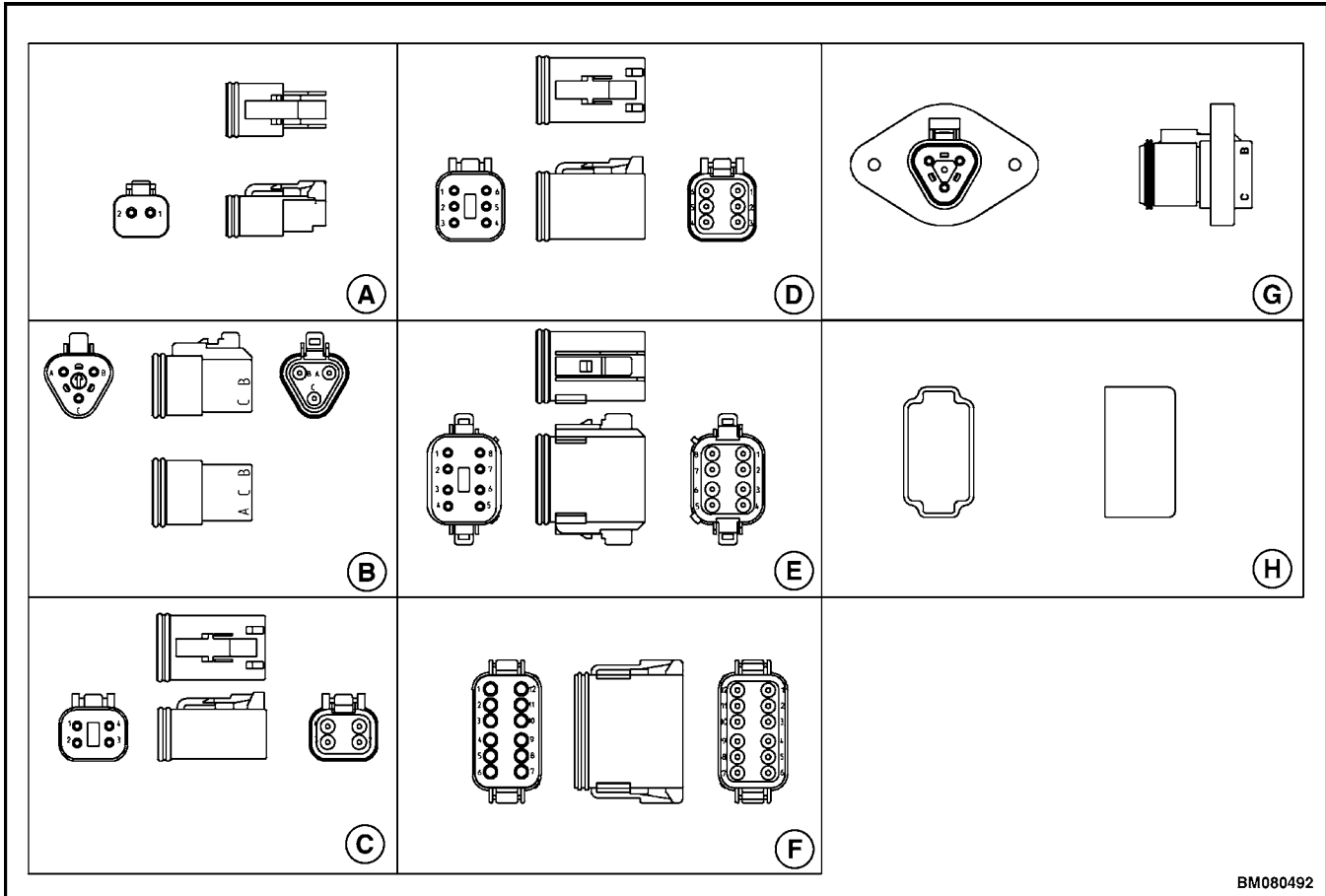


BM080491

- A. SECONDARY LOCK TYPE BA
- B. SECONDARY LOCK TYPE BB
- C. SECONDARY LOCK TYPE BC
- D. SECONDARY LOCK TYPE BD

- E. SECONDARY LOCK TYPE BE
- F. SECONDARY LOCK TYPE BF
- G. SECONDARY LOCK TYPE BG
- H. SECONDARY LOCK TYPE BH

Figure 15. DT Connector Receptacle Secondary Locks

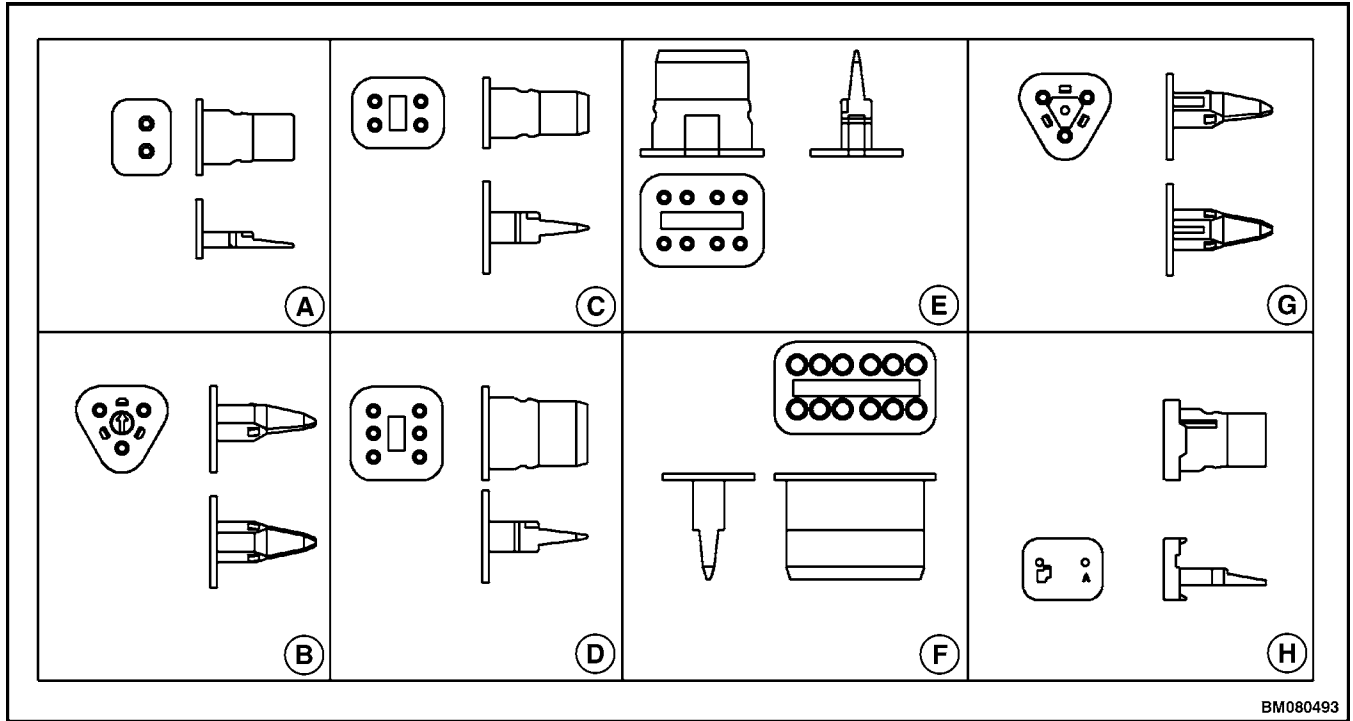


NOTE: ALL CONNECTOR PLUGS ARE SHOWN WITH THE SECONDARY LOCK INSTALLED.

- A. CONNECTOR TYPE CA
- B. CONNECTOR TYPE CB
- C. CONNECTOR TYPE CC
- D. CONNECTOR TYPE CD

- E. CONNECTOR TYPE CE
- F. CONNECTOR TYPE CF
- G. CONNECTOR TYPE CH (SIMILAR TO TYPE CB)
- H. CONNECTOR TYPE CG

Figure 16. DT Connector Plugs



BM080493

- A. SECONDARY LOCK TYPE DA
- B. SECONDARY LOCK TYPE DB
- C. SECONDARY LOCK TYPE DC
- D. SECONDARY LOCK TYPE DD

- E. SECONDARY LOCK TYPE DE
- F. SECONDARY LOCK TYPE DF
- G. SECONDARY LOCK TYPE DG
- H. SECONDARY LOCK TYPE DH

Figure 17. DT Connector Plug Secondary Locks

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