

REMOVING SOCKET/PIN TERMINALS

1. Remove connector from the retaining device, either attachment or rosebud clip.
2. Depress the button on the socket terminal side of the connector (plug) and pull apart the pin and socket halves.
3. Bend back the latch slightly and free one side of secondary lock, then repeat the step to release the other side. Rotate the secondary lock outward on hinge to access terminals in chambers of connector housing.
4. Looking in the terminal side of the connector (opposite the secondary lock), take note of the cavity next to each terminal.
5. See [Figure B-1](#). With the flat edge against the terminal, insert the pick tool (Snap-On TT600-3) into the cavity until it stops. Pivot the end of the pick away from the terminal (locktab is inside housing) and gently tug on wire to pull terminal from chamber. Do not tug on the wire until the tang is released or the terminal will be difficult to remove. A “click” is heard if the tang is engaged but then

inadvertently released. Repeat the step without releasing the tang.

NOTE

- If pick tool is not available, a push pin/safety pin may be used instead.
- An **ELECTRICAL TERMINAL CRIMP TOOL** (Part No. HD-41609) is used to install Amp Multi lock pin and socket terminals on wires. If new terminals must be installed, see *Crimping Instructions* on the next page.

INSTALLING SOCKET/PIN TERMINALS

NOTE

For wire location purposes, numbers are stamped into the secondary locks of both the socket and pin housings. See [Figure B-2](#).

1. From the secondary lock side of the connector, insert the terminal into its respective numbered chamber until it snaps in place. For proper fit, the slot in the terminal must face the tang in the chamber.

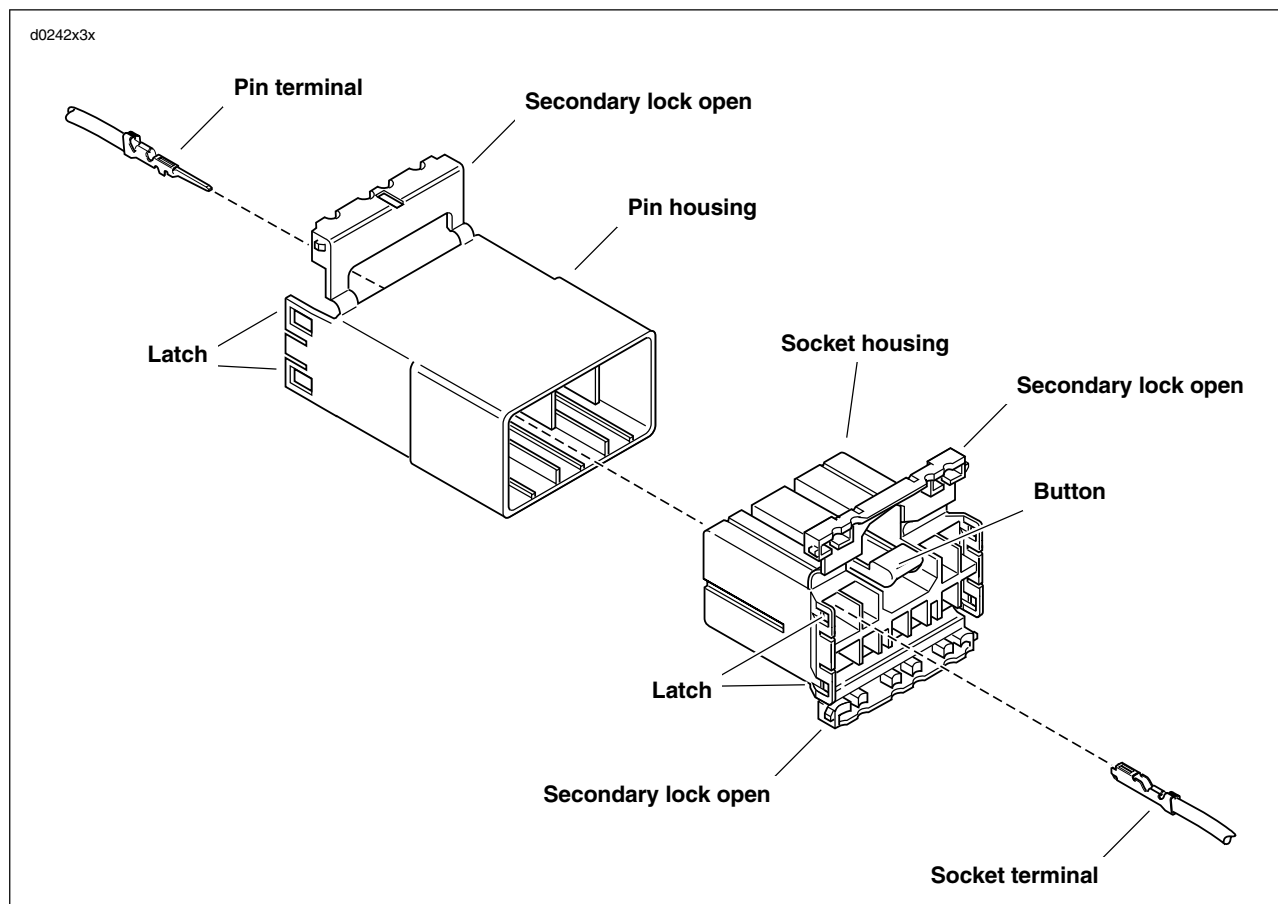


Figure B-1. 10-Place Amp Multilock Connector

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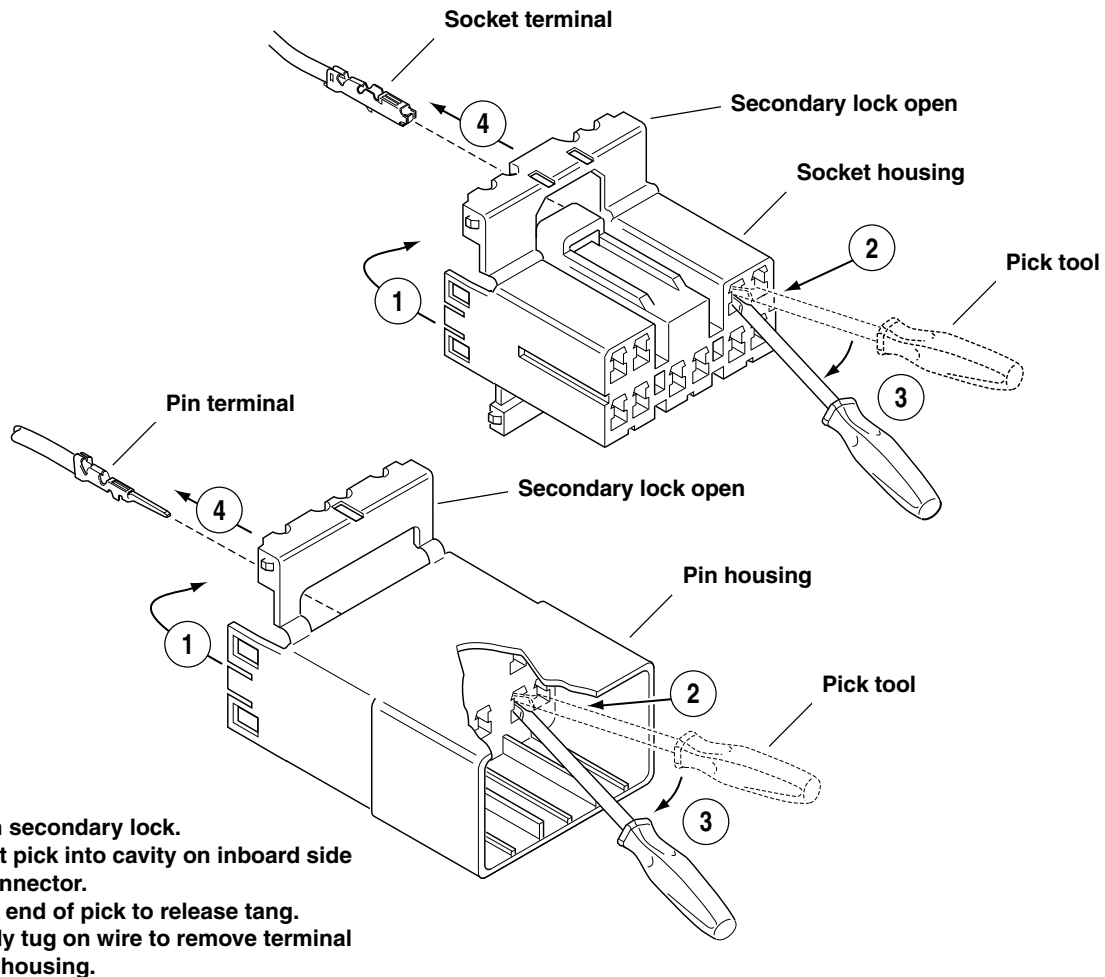


Figure B-2. Release Tang and Back Out Terminals

NOTES

- See Figure B-3. The tang in the chamber engages the slot to lock the terminal in position.
 - On the pin side of the connector, tangs are positioned at the bottom of each chamber, so the slot in the pin terminal (on the side opposite the crimp tails) must face downward.
 - On the socket side, tangs are at the top of each chamber, so the socket terminal slot (on the same side as the crimp tails) must face upward.
 - Up and down can be determined by the position of the release button (used to separate the pin and socket halves). Consider the button to always be on top of the connector.
2. Gently tug on wire end to verify that the terminal is locked in place and will not back out of chamber.
 3. Rotate the hinged secondary lock inward until tabs fully engage latches on both sides of connector.
 4. Insert the socket housing (plug) into the pin housing (receptacle) until it snaps in place.
 5. Install connector on retaining device, either attachment or rosebud clip.

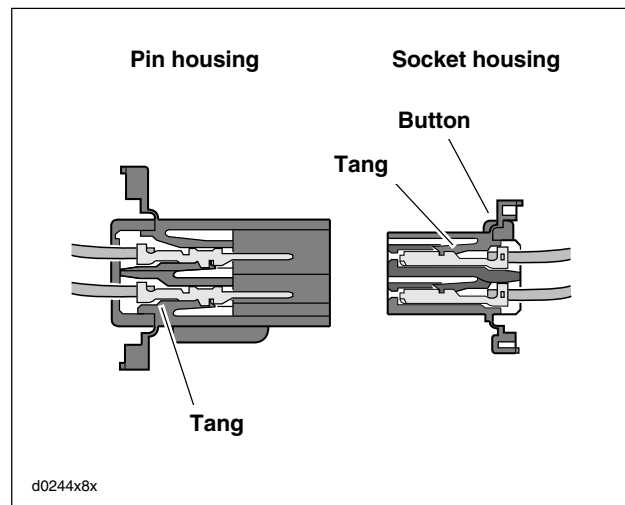


Figure B-3. Multilock Connector Cutaway View

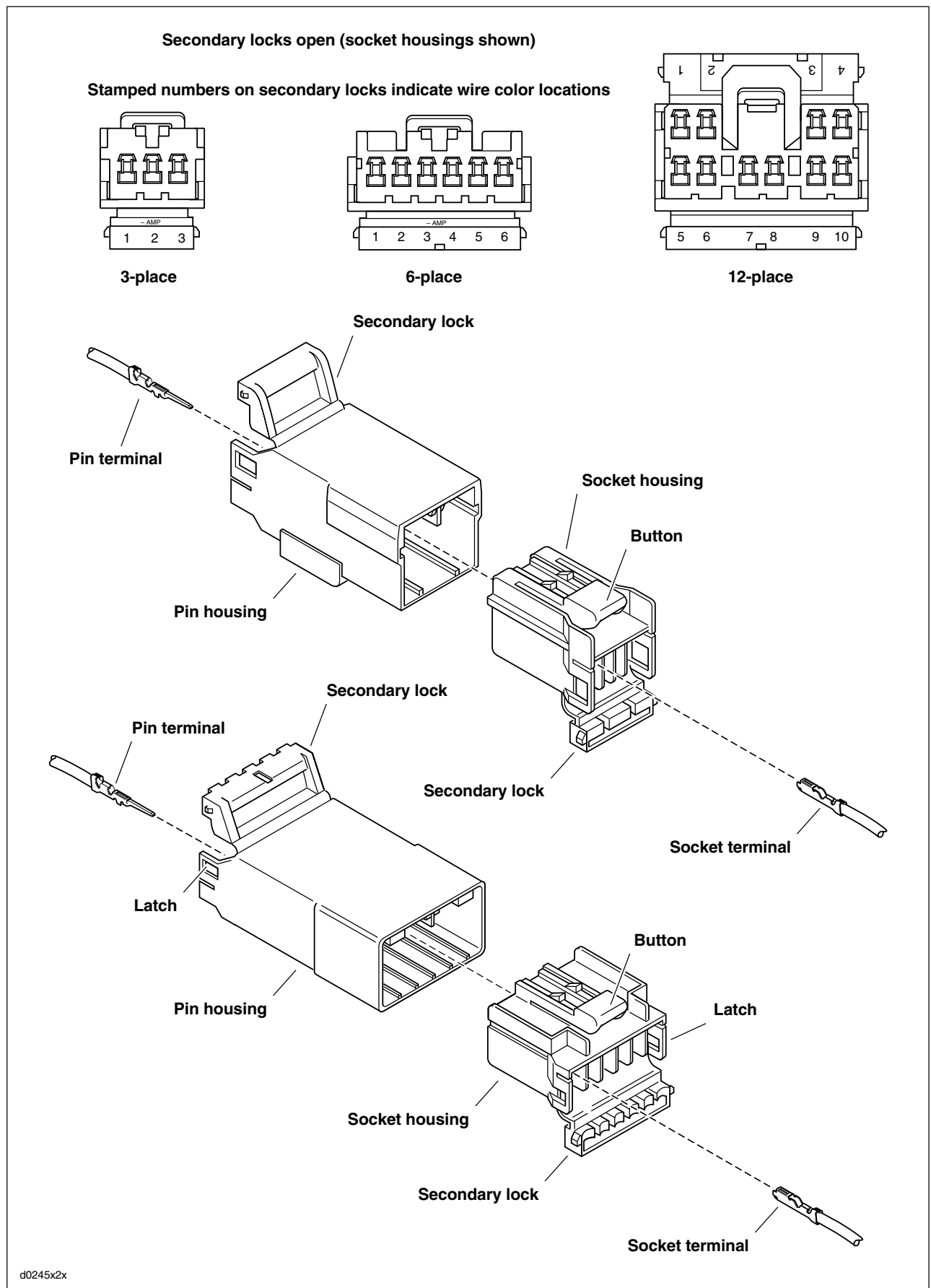


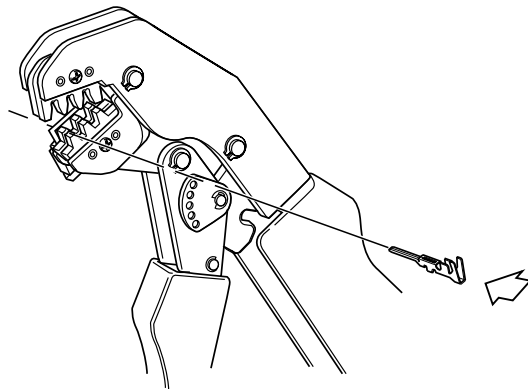
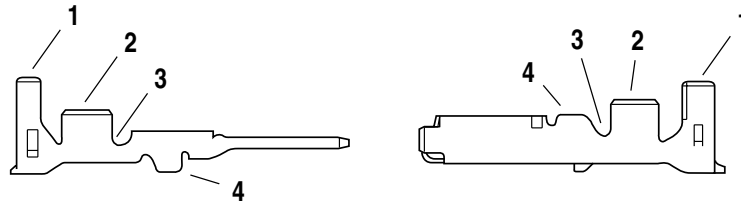
Figure B-4. 3-Place and 6-Place Amp Multilock Connectors

CRIMPING INSTRUCTIONS

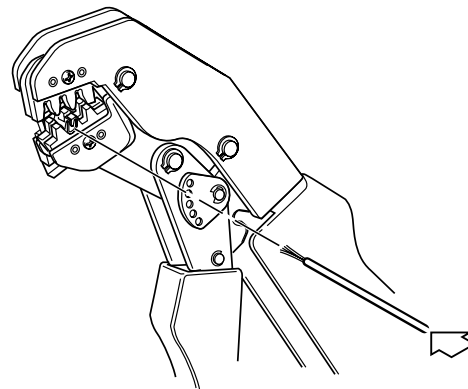
1. Squeeze the handles to cycle the crimp tool (Part No. HD-41609) to the fully open position.
2. Raise locking bar by pushing up on bottom flange. With the crimp tails facing upward, insert contact (socket/pin) through locking bar, so that the closed side of the contact rests on the front nest (concave split level area of the crimp tool). See [Figure B-3](#).
3. Release locking bar to lock position of contact. When correctly positioned, the locking bar fits snugly in the space at the front of the core crimp tails.

4. Strip lead removing 5/32 in. (4 mm) of insulation. Insert wires between crimp tails until ends make contact with locking bar. Verify that wire is positioned so that short pair of crimp tails squeeze bare wire strands, while long pair folds over insulation material.
5. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimping sequence is complete. Raise up locking bar and remove contact.
6. Inspect the quality of the core and insulation crimps. Distortion should be minimal.

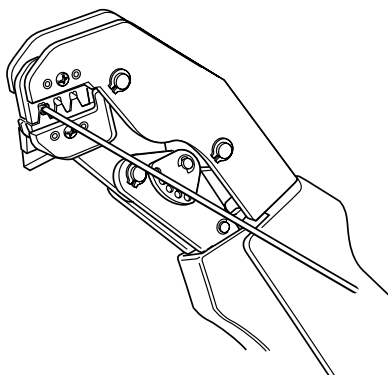
1. Insulating crimp tail
2. Core crimp tail
3. Locking bar groove
4. Tang slot



1. Raise locking bar and seat contact on front nest of crimp tool. Release locking bar

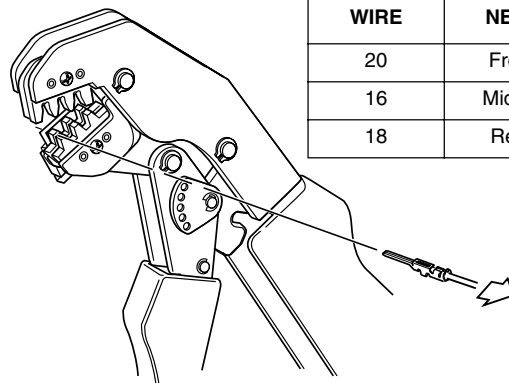


2. Insert stripped lead until it contacts locking bar.



3. Close and squeeze crimp tool.

GAUGE WIRE	CRIMPTOOL NEST
20	Front
16	Middle
18	Rear



4. Raise locking bar and remove contact.

d0246x8x

Figure B-5. Amp Multilock Crimping Procedure

GENERAL

Deutsch Connectors feature a superior seal to protect electrical contacts from dirt and moisture in harsh environments. The connector also provides superior pin retention.

See [Figure B-8](#). This 12-pin connector illustrates the various parts of the Deutsch connector. The following instructions may be followed for all 2-pin through 12-pin Deutsch connectors.

Socket housing: alignment tabs and/or external latch, secondary locking wedge, internal seal, wire seal, seal pin.

NOTE

Seal pins or plugs are installed in the wire seals of unused pin and socket locations. If removed, seal pins must be replaced to maintain the integrity of the environmental seal.

Pin housing: alignment grooves and/or external latch cover, attachment clip, secondary locking wedge, wire seal, seal pin.

REMOVING/DISASSEMBLING

Attachment clips are attached to the pin housings of most connectors. The clips are then attached to T-studs on the motorcycle frame. T-studs give positive location to electrical connectors and wire harness. Consistent location reduces electrical problems and improves serviceability.

1. Push the connector to disengage small end of slot on attachment clip from T-stud. Lift connector off T-stud.
2. Depress the external latch(es) on the socket housing side and use a rocking motion to separate the pin and socket halves. Two-, three-, four- and six-pin Deutsch connectors have one external latch, while eight- and twelve-pin connectors have two, both of which must be pressed simultaneously to separate the connector halves.

NOTE

With few exceptions, the socket housing can always be found on the accessory side, while the pin side of the connector is connected to the wiring harness.

REMOVING/INSTALLING SOCKETS

1. See [Figure B-7](#). Remove the secondary locking wedge. Insert the blade of a small screwdriver between the socket housing and locking wedge inline with the groove (inline with the pin holes if the groove is absent). Turn the screwdriver 90 degrees to pop the wedge up.
2. See [Figure B-8](#). Gently depress terminal latches inside socket housing and back out sockets through holes in rear wire seal.

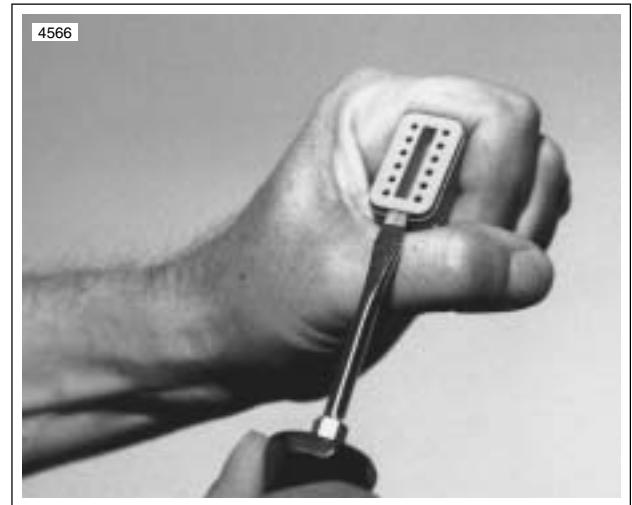


Figure B-6. Remove Secondary Locking Wedge

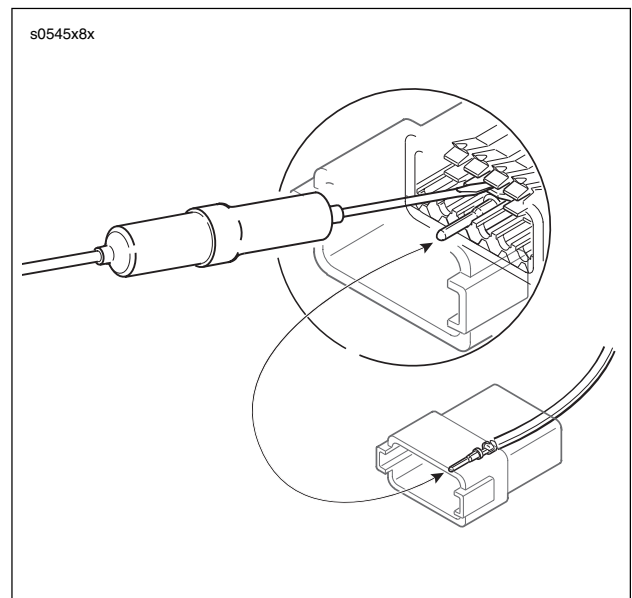


Figure B-7. Depress Terminal Latches/Back Out Pins

NOTE

An **ELECTRICAL TERMINAL CRIMP TOOL** (Part No. HD-39965) is used to install Deutsch pin and socket terminals on wires. If **new** terminals must be installed, follow the instructions included with the crimping tool or see *Crimping Instructions* in this section.

Fit rear wire seal into back of socket housing, if removed. Grasp socket approximately 1.0 in. (25.4 mm) behind the contact barrel. Gently push sockets through holes in wire seal into their respective chambers. Feed socket into chamber until it “clicks” in place. Verify that socket will not back out of chamber; a slight tug on the wire will confirm that it is properly locked in place.

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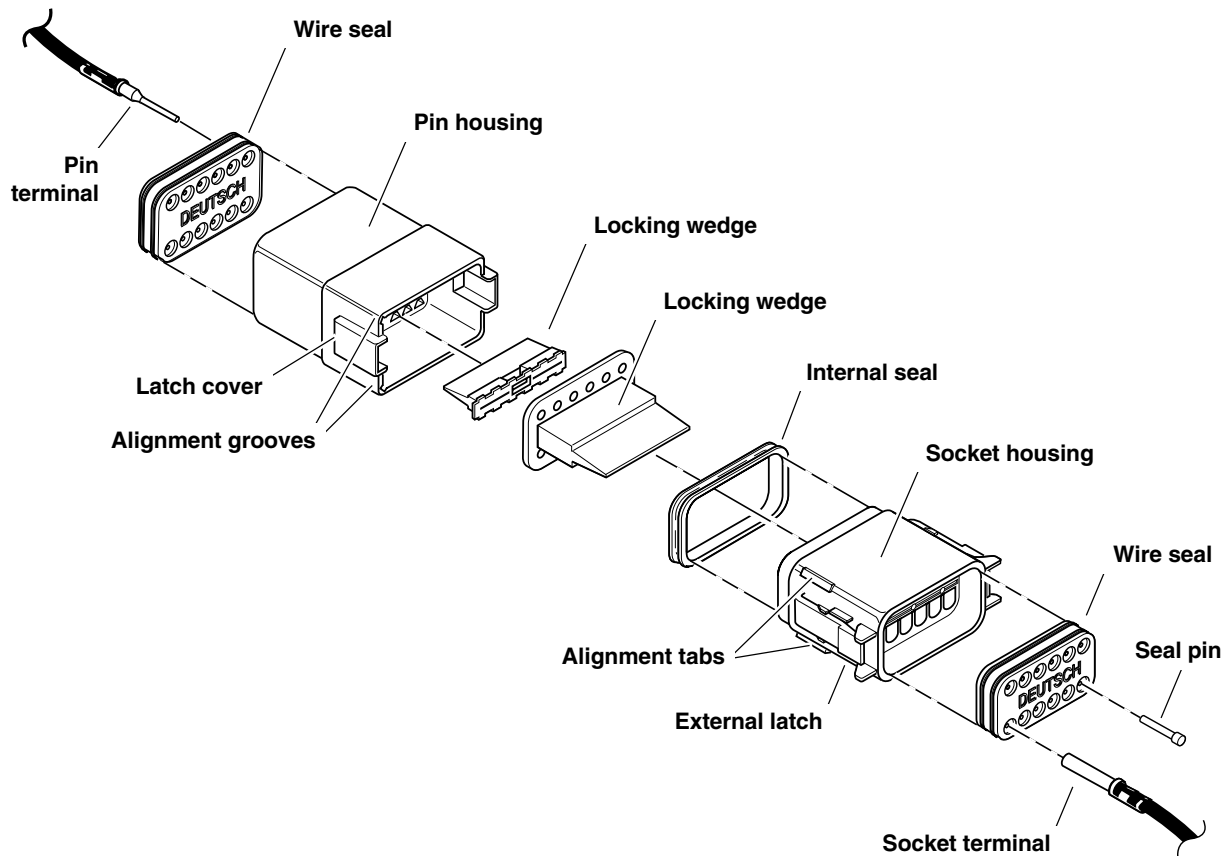


Figure B-8. 12-pin Deutsch Connector (Exploded View)

3. Install internal seal on lip of socket housing, if removed. Insert tapered end of secondary locking wedge into socket housing and press down until it snaps in place. The wedge fits into the center groove within the socket housing and holds the terminal latches tightly closed.

NOTES

- While rectangular wedges do not require a special orientation, the conical secondary locking wedge of the 3-pin connector must be installed with the arrow pointing toward the external latch. See [Figure B-9](#).
- If the secondary locking wedge does not slide into the installed position easily, verify that all terminals are fully installed in the socket housing. The lock indicates when terminals are not properly installed by not entering its fully installed position.

REMOVING/INSTALLING PINS

1. Remove the secondary locking wedge. Use the hooked end of a stiff piece of mechanics wire or a needle nose pliers, or a suitable pick tool (Part No. HD-41475-100). See [Figure B-10](#).
2. Gently depress terminal latches inside pin housing and back out pins through holes in wire seal.

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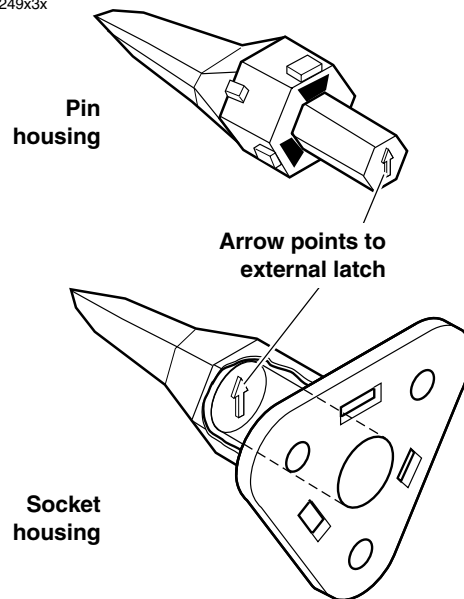


Figure B-9. Depress Terminal Latches/Back Out Pins

NOTE

An **ELECTRICAL TERMINAL CRIMP TOOL** (Part No. HD-39965) is used to install Deutsch pin and socket terminals on wires. If **new** terminals must be installed, see *Crimping Instructions* in this section.

3. Fit wire seal into back of pin housing. Grasp crimped pin approximately 1.0 in. (25.4 mm) behind the contact barrel. Gently push pins through holes in wire seal into their respective numbered locations. Feed pin into chamber until it “clicks” in place. Verify that pin will not back out of chamber; a slight tug on the wire will confirm that it is properly locked in place.
4. Insert tapered end of secondary locking wedge into pin housing and press down until it snaps in place. The wedge fits in the center groove within the pin housing and holds the terminal latches tightly closed.

NOTES

- While rectangular wedges do not require a special orientation, the conical secondary locking wedge of the 3-pin connector must be installed with the arrow pointing toward the external latch. See [Figure B-9](#).
- If the secondary locking wedge does not slide into the installed position easily, verify that all terminals are fully installed in the pin housing. The lock indicates when terminals are not properly installed by not entering its fully installed position.

ASSEMBLING/INSTALLING

1. Insert socket housing into pin housing until it snaps in place. Two-, three-, four- and six-pin Deutsch connectors have one external latch on the socket half of the connector. To fit the halves of the connector together, the latch on the socket side must be aligned with the latch cover on the pin side.

For those connectors with two external latches (8-pin and 12-pin), a different system is used to prevent improper assembly. Align the tabs on the socket housing with the grooves on the pin housing. Push the connector halves together until the latches “click.” If latches do not click (latch), press on one side of the connector until that latch engages, then press on the opposite side to engage the other latch.

NOTE

Deutsch connectors are color coded for location purposes. Those connectors associated with **left** side accessories, such as the front and rear **left** turn signals, are **gray**. All other connectors, including those associated with right side accessories, are black.

If it should become necessary to replace a plug or receptacle, please note that the 8-pin and 12-pin gray and black connectors are not interchangeable. Since location of the alignment tabs differ between the black and gray connectors, plugs or receptacles must be replaced by those of the same color. If replacing both the socket and pin halves, then the black may be substituted for the gray, and vice versa. The socket and pin halves of all other connectors are interchangeable, that is, the black may be mated with the gray, since the alignment tabs are absent and the orientation of the external latch is the same.



Figure B-10. Deutsch Connector Pick Tool
(Part No. HD-41475-100)

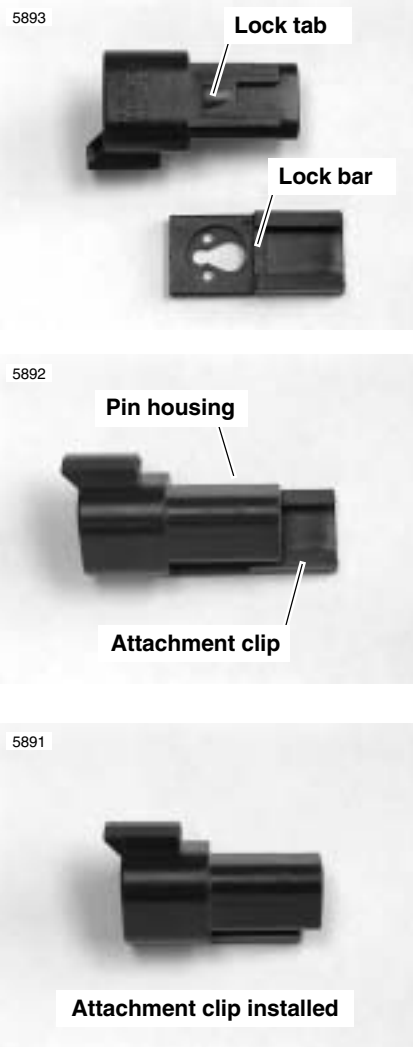


Figure B-11. Attachment Clip Installation

2. See [Figure B-11](#). Fit the attachment clip to the pin housing, if removed. Place large end of slot on attachment clip over T-stud on frame. Push assembly forward to engage small end of slot.

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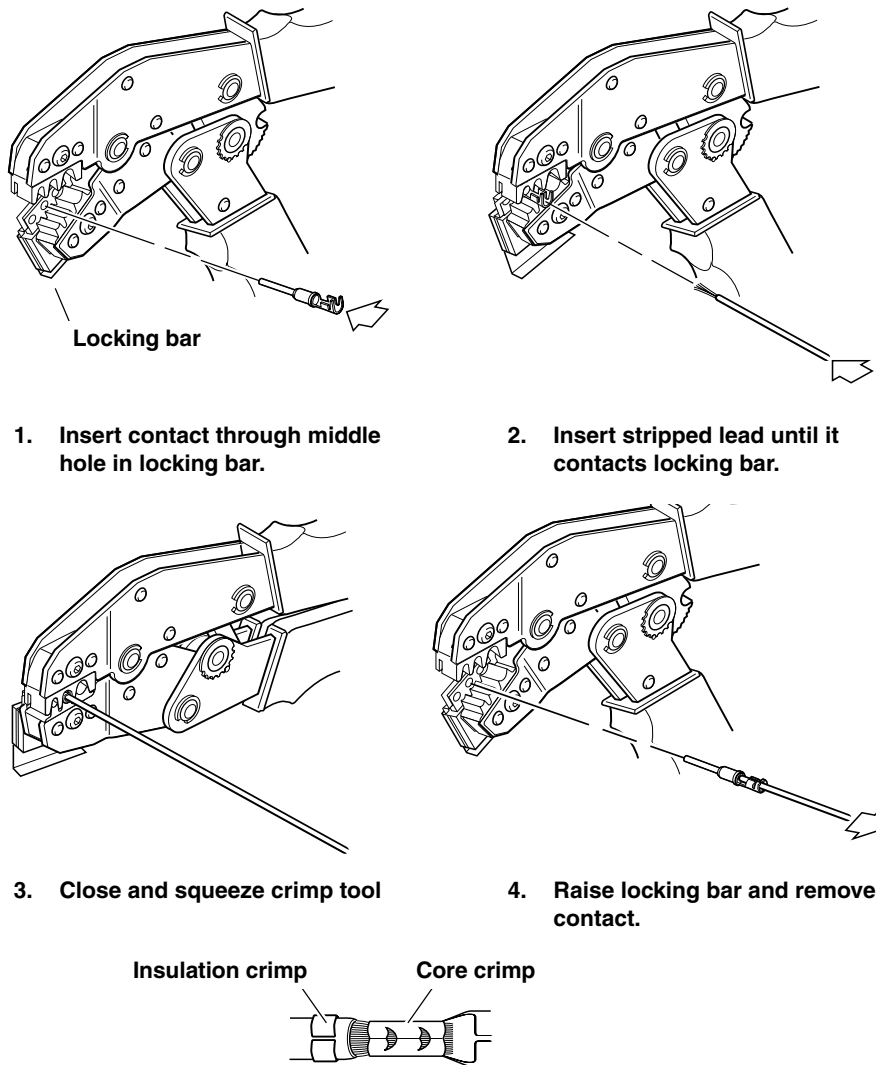


Figure B-12. Deutsch Crimping Procedure

CRIMPING INSTRUCTIONS

1. See [Figure B-12](#). Squeeze the handles to cycle the crimp tool to the fully open position.
2. Raise locking bar by pushing up on bottom flange. With the crimp tails facing upward and the rounded side of the contact barrel resting on the concave split level area of the crimp tool, insert contact (socket/pin) through middle hole of locking bar.
3. Release locking bar to lock position of contact. If the crimp tails are slightly out of vertical alignment, the crimp tool automatically rotates the contact so that the tails face straight upward. When correctly positioned, the locking bar fits snugly in the space between the contact band and the core crimp tails.
4. Strip lead removing 5/32 in. (4 mm) of insulation. Insert wires between crimp tails until ends make contact with locking bar. Verify that wire is positioned so that short pair of crimp tails squeeze bare wire strands, while long pair folds over insulation material.
5. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimping sequence is complete. Raise up locking bar and remove contact.
6. Inspect the quality of the core and insulation crimps. Distortion should be minimal.

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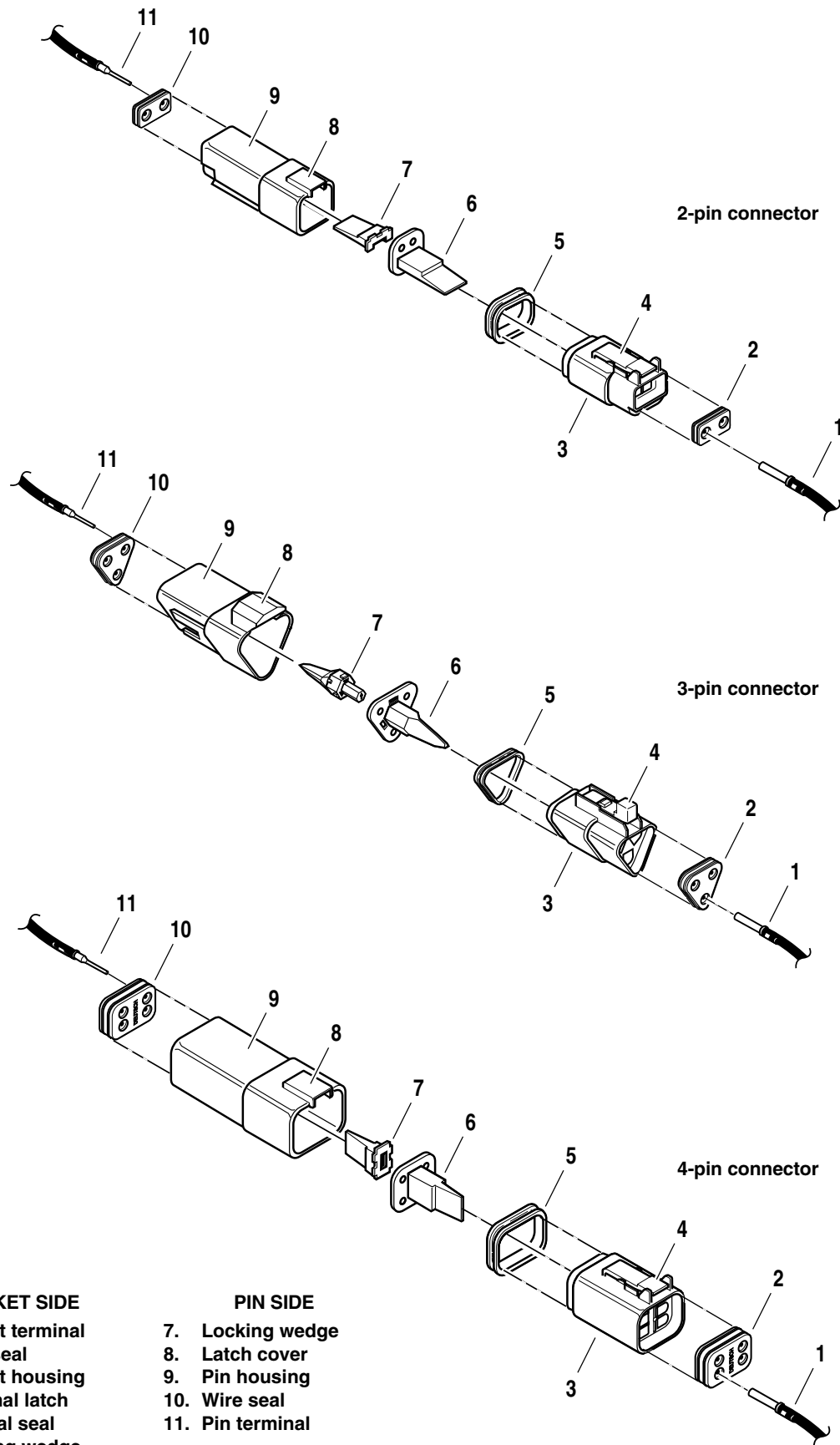


Figure B-13. 2-Pin, 3-pin and 4-pin Deutsch Connectors

GENERAL

From a servicing standpoint, there are two basic types of Packard electrical connectors, those with pull-to-seat terminals and those with push-to-seat terminals.

Look into the mating end of the connector. If it appears that the terminal can be extracted from this side, then it is probably the pull-to-seat type.

At least one Packard pull-to-seat terminal can be easily recognized by the presence of a locking ear. The ear engages a slot in the connector housing and prevents the terminal from being removed from the wire end side of the connector. The ear also acts as a strain relief in the event that the wires are pulled and further inhibits movement of the terminal inside the chamber. For an example of this type of connector, note the MAP sensor connector [80].

Unlike most connectors, where the terminals are pulled out the wire end of the connector, to remove the terminals from the pull-to-seat connectors, the terminal is pushed out the mating end of the connector. Once a **new** terminal is crimped onto the end of the wire, the wire is pulled to draw the terminal back inside the chamber of the connector housing.

Two types of Packard pull-to-seat electrical connectors are used. One type has an external latch to lock the pin and socket halves together, while the other makes use of a wire-form. See Figure B-14. The manner in which the terminals are picked differs between these two types of connectors, as further described below.

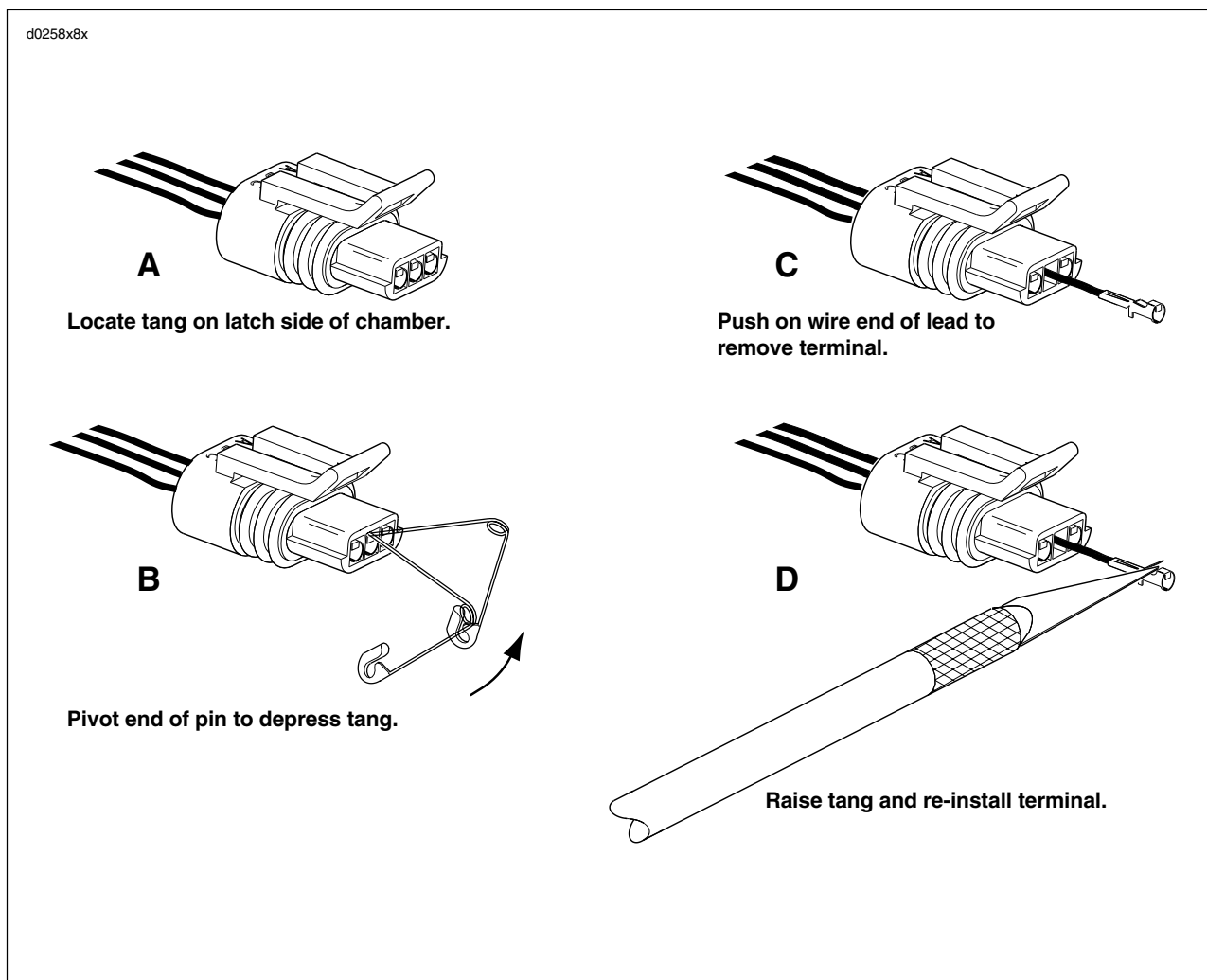


Figure B-14. Packard Connectors

PULL-TO-SEAT TERMINALS

Removing External Latch Type

To remove a pull-to-seat terminal from connectors with external latches, proceed as follows:

1. Remove the connector from the retaining device, if present.
2. Bend back the external latch(es) slightly and separate the pin and socket halves of the connector.
3. To free a pull-to-seat terminal from the connector housing, first look into the mating end of the connector to find the locking tang. See A in [Figure B-14](#). The tangs are always positioned in the middle of the chamber and are on the same side as the external latch. On those connectors with locking ears, the tang is on the side opposite the ear.
4. At a slight angle, gently insert the point of a one inch safety pin down the middle of the chamber (about 1/8 inch) and pivot the end of the pin toward the terminal body. When a click is heard, remove the pin and repeat the procedure. See B in [Figure B-14](#). The click is the sound of the tang returning to the locked position as it slips from the point of the pin. Pick at the tang in this manner until the clicking stops and the pin seems to slide in at a slightly greater depth than it had previously. This is an indication that the tang has been depressed.

NOTES

- *On those terminals that have been extracted on a previous occasion, no clicking sound may be heard when the pin is pivoted to depress the tang, but proceed as if the clicking is audible and then push on the wire end of the lead to check if the terminal is free.*
 - *When picking multiple terminals, the end of the pin may become malleable. For best results, continue the procedure with a new safety pin.*
5. Remove the pin and push on the wire end of the lead to extract the terminal from the mating end of the connector. See C in [Figure B-14](#). If necessary, pull back the conduit and remove the wire seal at the back of the connector to introduce some slack in the wires.

NOTE

*A series of Packard Electrical Terminal Crimp Tools are available to install Packard pin and socket terminals on wires. If **new** terminals must be installed, see *Crimping Instructions*.*

Installing External Latch Type

NOTE

For wire location purposes, alpha characters are stamped into the socket housings.

1. To install a terminal back into the chamber of the connector housing, use a thin flat blade, like that on an X-Acto knife, and carefully bend the tang outward away from the terminal body. See D in [Figure B-14](#).
2. Gently pull on the lead at the wire end of the connector to draw the terminal back into the chamber. A click is heard when the terminal is properly seated.
3. Push on the lead to verify that the terminal is locked in place.
4. Push the pin and socket halves of the connector together until the latches “click.”

PUSH-TO-SEAT TERMINALS

The Packard push-to-seat terminal connectors found on Softail model vehicles are listed below.

- Ignition Switch [33]
- Fuse Terminals
- MAP Sensor [80]

Removing Push-to-Seat Terminals

Like most connectors, Packard push-to-seat terminals are pulled out the wire end of the connector. To remove a push-to-seat terminal, proceed as follows:

1. Remove the connector from the retaining device, if present.
2. Bend back the external latch(es) slightly and separate the pin and socket halves of the connector.

NOTE

Both the Ignition Light/Key Switch and the Main Power connectors are provided with secondary locks. The secondary lock, which may be molded onto the connector or exist as a separate piece, aids in terminal retention. Secondary locks must be opened (or removed) before the terminals can be extracted from the connector housing.

3. Open or remove the secondary lock. Bend back the latch slightly and free one side of the secondary lock, then repeat the step to release the other side. Rotate the secondary lock outward on hinge to access the terminals in the chambers of the connector housing.
4. Looking in the mating end or terminal side of the connector (opposite the secondary lock), take note of the larger cavity next to each terminal.
5. Insert the pick (Snap-On TT600-3) into the cavity until it stops. Pivot the end of the pick toward the terminal to depress the locking tang. Remove the pick and gently tug on the wire to pull the terminal from the wire end of the connector. Repeat the step if the terminal is still locked in place.

NOTE

A series of Packard Electrical Terminal Crimp Tools are available to install Packard pin and socket terminals on wires. If new terminals must be installed, see Crimping Instructions.

Installing Push-to-Seat Terminals

NOTE

For wire location purposes, alpha characters are stamped onto the secondary locks or onto the wire end of the connector housing.

1. To install a terminal back into the chamber of the connector housing, use a thin flat blade, like that on an X-Acto knife, and carefully bend the tang outward away from the terminal body.
2. Push the lead into the chamber at the wire end of the connector. A click is heard when the terminal is properly seated.
3. Gently tug on the wire end to verify that the terminal is locked in place and will not back out of the chamber.
4. Close or install the secondary lock. Rotate the hinged secondary lock inward until tabs fully engage latches on both sides of connector.
5. Push the pin and socket halves of the connector together until the latches “click.”
6. Install connector on retaining device, if present.

CRIMPING INSTRUCTIONS

1. Strip wire lead removing 5/32 in. (4 mm) of insulation.
2. Compress handles until ratchet automatically opens.

NOTE

Always perform core crimp before insulation/seal crimp.

3. See [Table B-1](#). Determine the correct dye or nest for the core crimp.

NOTE

When the word “TIP” appears in the Crimp Table, use the tip of the tool specified to perform the core crimp procedure. See [Figure B-15](#).

4. Lay the back of the core crimp tails on the appropriate nest. Be sure the core crimp tails are pointing towards the forming jaws.
5. Gently apply pressure to handles of tool until crimpers slightly secure the core crimp tails.
6. Insert stripped wire between crimp tails. Verify that wire is positioned so that short pair of crimp tails squeeze bare wire strands, while long pair folds over insulation or seal material.
7. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimping sequence is complete.
8. [Table B-1](#). Determine the correct dye or nest for the insulation/seal crimp.
9. Lay the back of the insulation/seal crimp tails on the appropriate nest. Be sure the insulation/seal crimp tails are pointing towards the forming jaws.
10. Squeeze handle of crimp tool until tightly closed. Tool automatically opens when the crimping sequence is complete.
11. See [Figure B-16](#). Inspect the quality of the core (3) and insulation/seal (2) crimps. Distortion should be minimal.

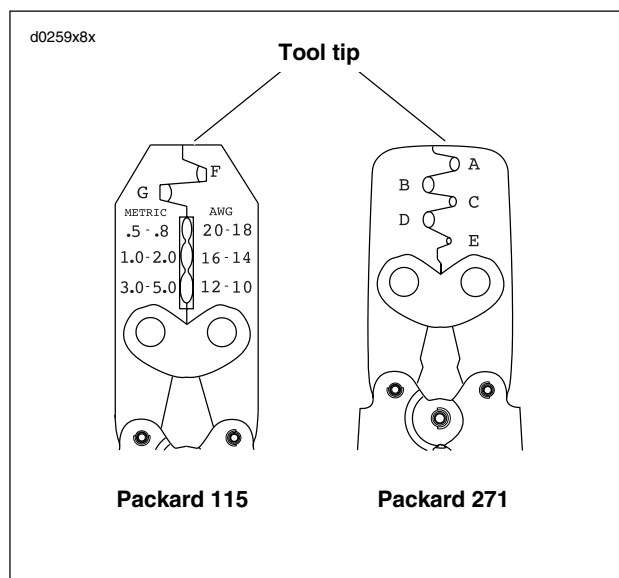


Figure B-15. Packard Terminal Crimp Tools

Table B-1. Packard Terminal Crimp Tools

SPECIFICATION	PACKARD 115	PACKARD 271
Part No.	HD-38125-8	HD-38125-7
Type of Crimp	Non-sealed terminals, butt splices	Non-sealed terminals
Dye/nests	F-G	A-E

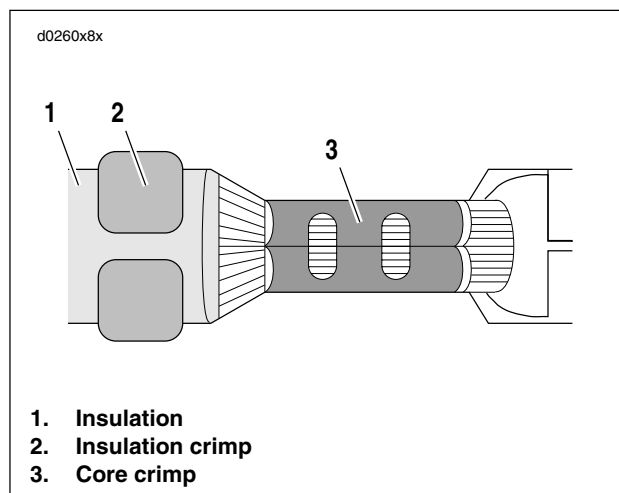


Figure B-16. Inspect Core and Insulation/Seal Crimps

GENERAL

Connector numbers are listed in [brackets] in this manual.

The following table provides a brief description of the connectors found on the Buell Lightning.

Table B-2. Electrical Connector and Location Table

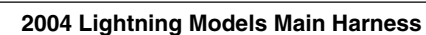
CONNECTOR	COMPONENT(S)	DESCRIPTION	LOCATION
[10]	ECM (black)	12-place Deutsch	under seat
[11]	ECM (gray)	12-place Deutsch	under seat
[14]	cam position sensor	3-place Deutsch	under sprocket cover
[18]	right rear turn signal	2 1-place bullet	under seat
[19]	left rear turn signal	2 1-place bullet	under seat
[22]	right hand controls	4-place Multilock	behind windscreen
[24]	left hand controls	4-place Multilock	behind windscreen
[30]	flasher	5-place Amp	behind windscreen
[31]	right front turn signal	2 1-place bullet	behind windscreen
[31]	left front turn signal	2 1-place bullet	behind windscreen
[33]	ignition switch	4-place Augat	behind windscreen
[38]	headlamp connector	4-place Amp	behind windscreen
[39]	instrument module	20-place Multilock	in front modules behind windscreen
[45]	license plate lamp	2 1-place bullet	under seat
[46]	stator	4-place Deutsch	under sprocket cover
[65]	vehicle speed sensor	3-place Deutsch	under sprocket cover
[77]	voltage regulator	2-place Packard	under sprocket cover
[83]	ignition coil	3-place Packard	beneath airbox base
[84]	front fuel injector	2-place Packard	beneath airbox base
[85]	rear fuel injector	2-place Packard	beneath airbox base
[86]	fuel pump	4-place Multilock	left side of rear shock absorber
[88]	throttle position sensor	3-place Packard	right side of engine between cylinders
[89]	intake air temperature sensor	2-place Amp	in airbox base
[90]	engine temperature sensor	1-place bullet	beneath airbox base
[91A]	data link	4-place Deutsch	under seat, right side of vehicle
[93]	tail light	2-place spade 1-place spade (ground)	back of tail light, under seat
[95]	clutch switch	2-place Multilock	underside of clutch lever assembly
[97]	cooling fan	2-place Multilock	behind rear cylinder, under seat
[120]	oil pressure switch	post terminal	crankcase above oil filter

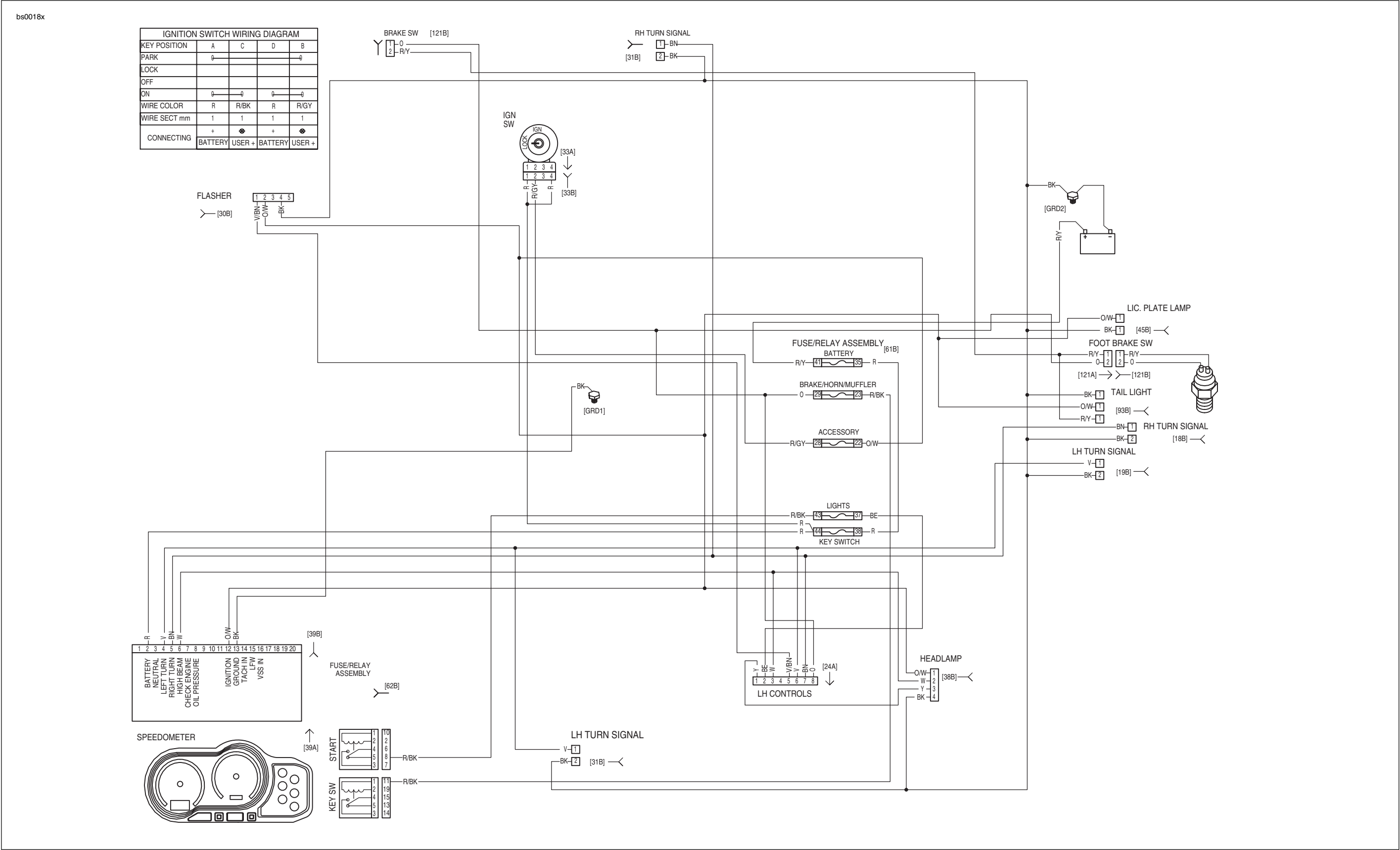
Table B-2. Electrical Connector and Location Table

CONNECTOR	COMPONENT(S)	DESCRIPTION	LOCATION
[121]	front brake switch	2-place Multilock	underside of front master cylinder assembly
[121]	rear brake switch	2-place Multilock	under seat
[122]	horn	spade terminals	behind windscreen
[128]	starter solenoid	spade terminals	top of starter
[131]	neutral switch	1-place bullet	under sprocket cover
[134]	bank angle sensor	6-place Sumitomo	under seat
[137]	oxygen sensor	1-place Packard	behind rear cylinder head

Table B-3. Wiring Diagrams

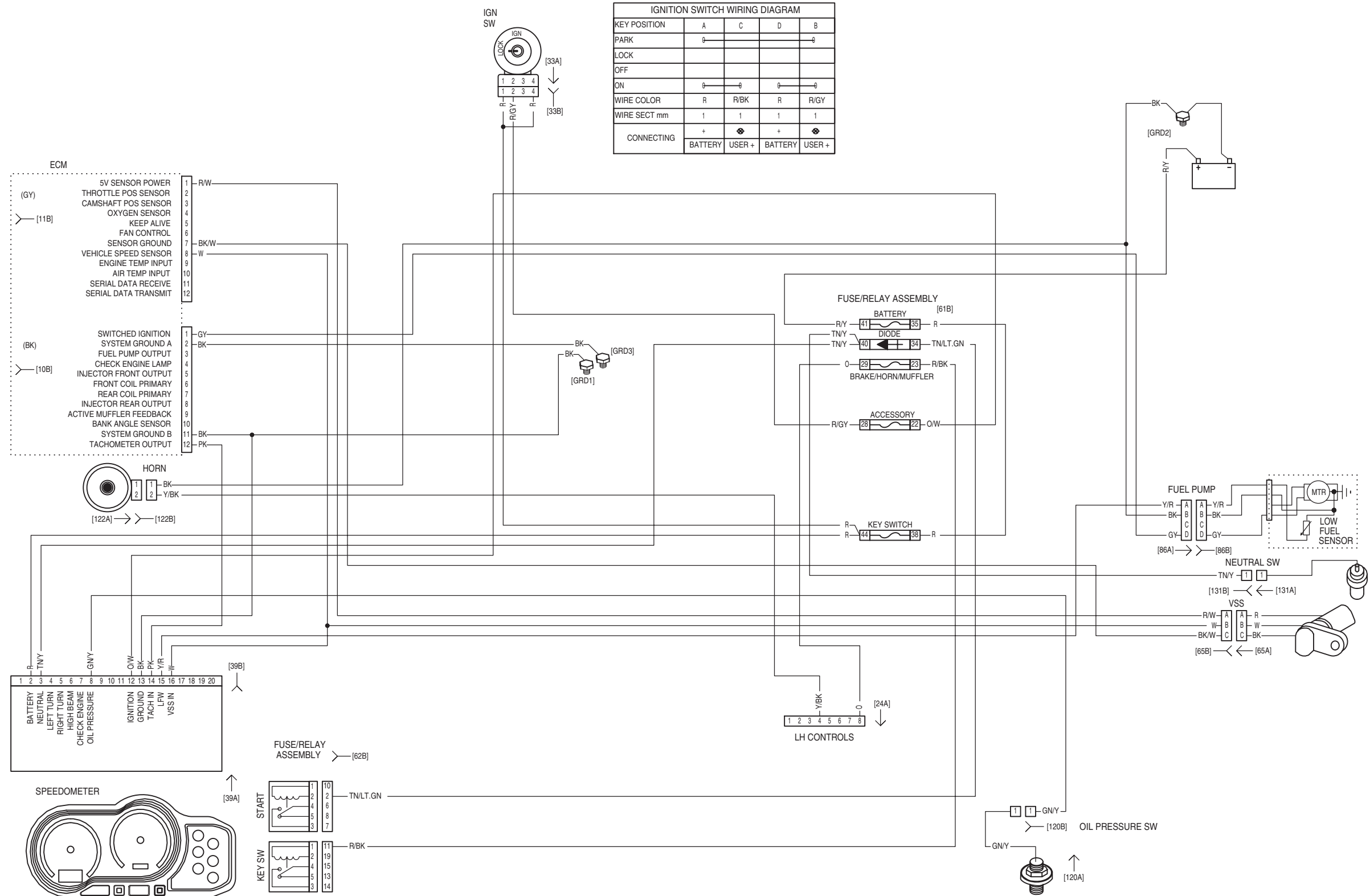
DIAGRAM	PAGE
Main harness	B-17
Engine management circuit	B-18
Lighting circuit	B-19
Horn and instruments circuit	B-20
Starting circuit	B-21
Charging circuits	B-22
Component Circuits	B-23





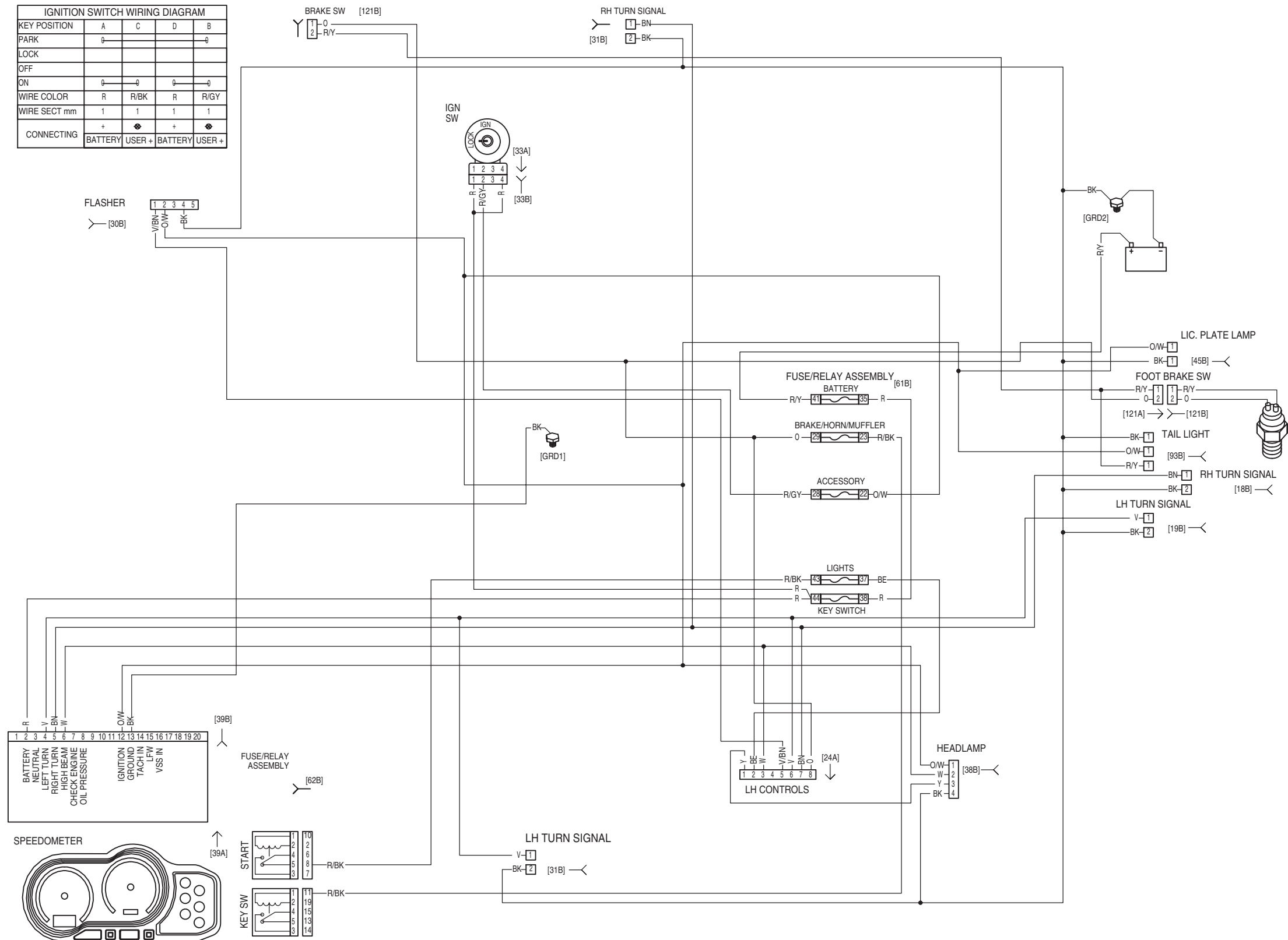
2004 Lightning Lighting Circuit

bs0019xx



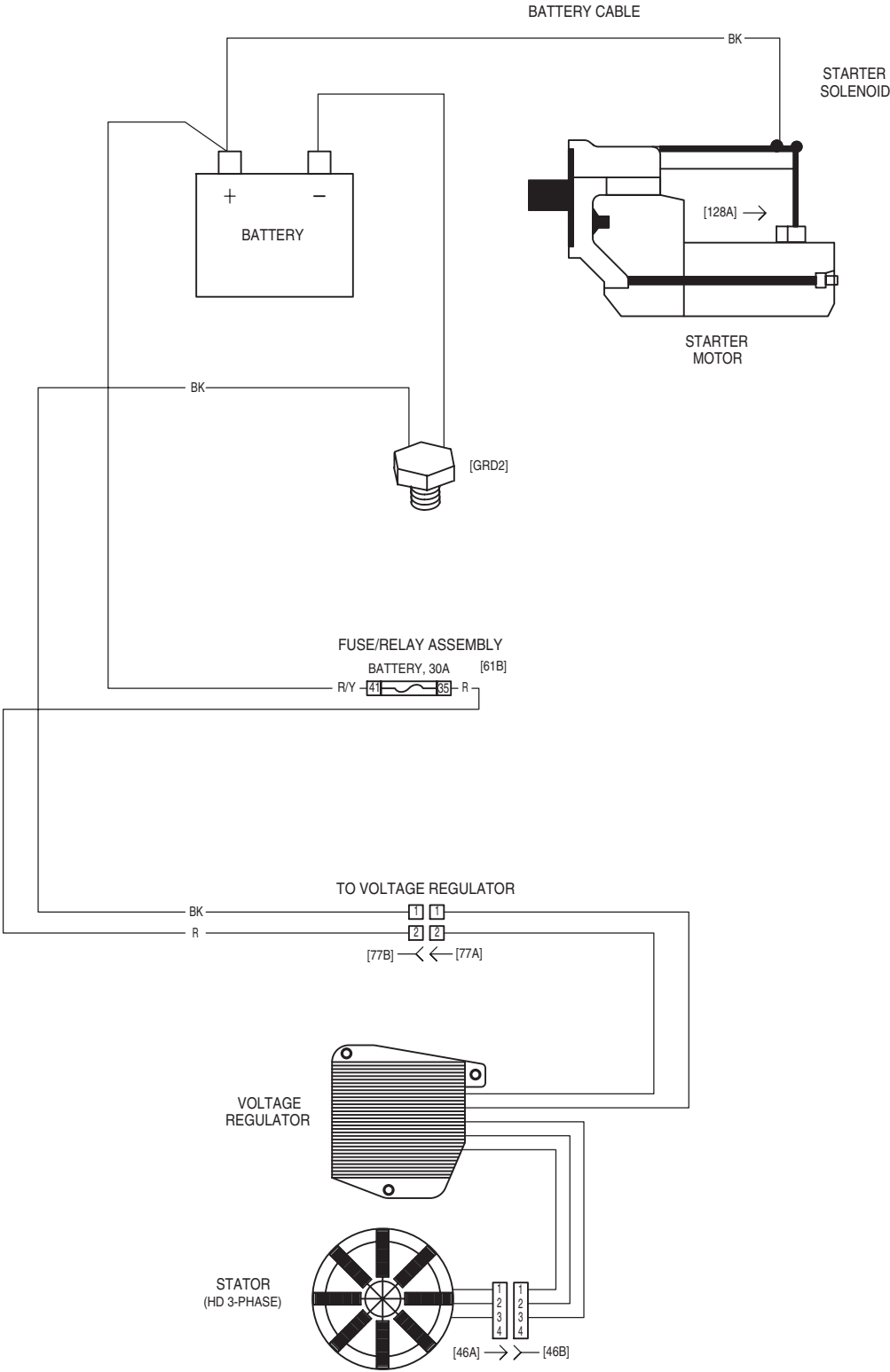
2004 Lightning Models Horn & Instruments Circuit

bs0018xx



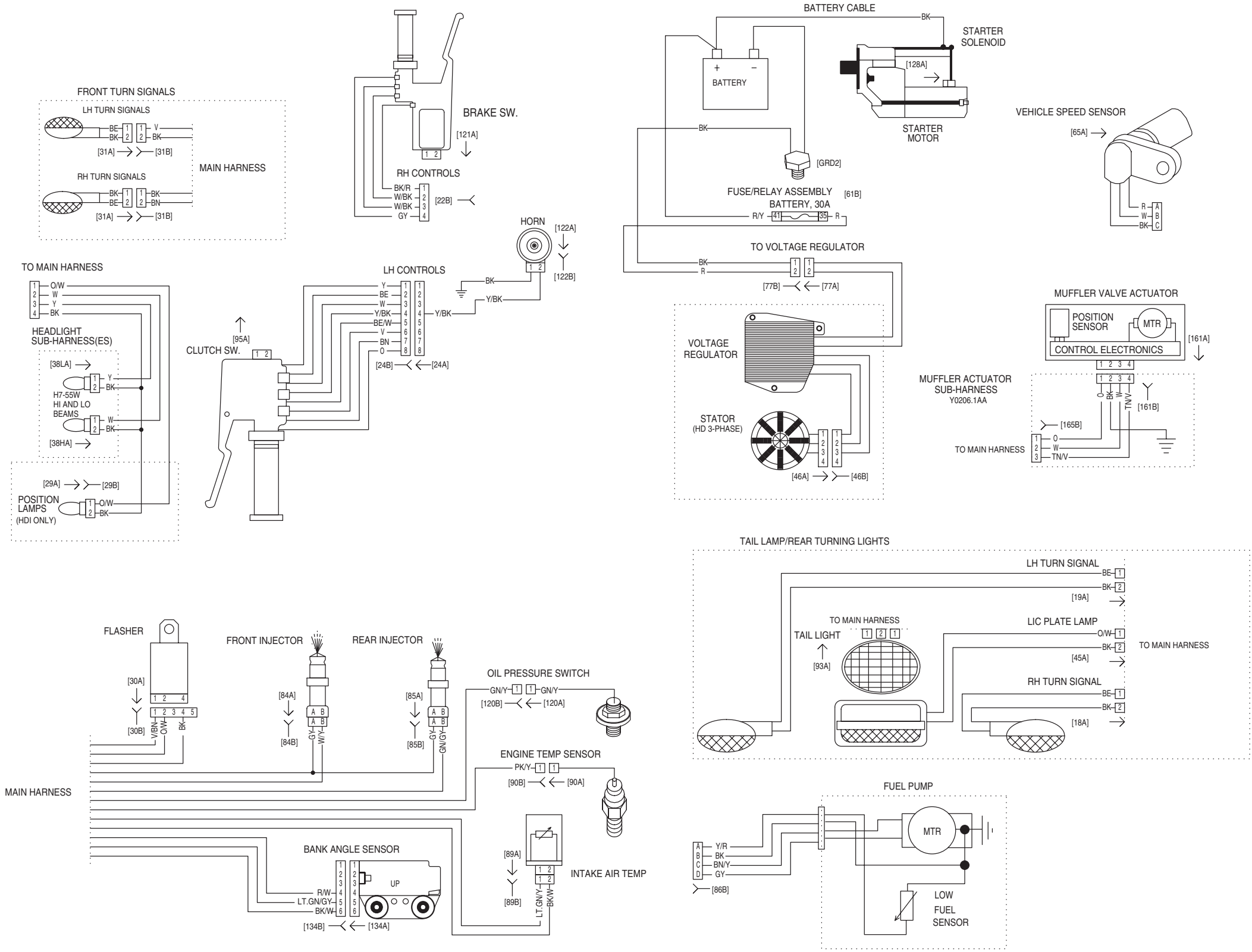
2004 Lightning Models Starting Circuit

bs0021xx



2004 Lightning Models Charging Circuit

bs0020xx



2004 Lightning Models Component Circuits