WIRING HARNESS
REPAIR GUIDE

Published by SPX UK
Jaguar Cars Ltd
November 2005, Issue 2
Publication No. JTP 586

CONTENTS

INTRODUCTION

REPAIR KIT

Pre-terminated Leads and Butt Splice Connectors
Cable Identification Sleeves
Extraction Handle and Tips
Insulation Stripper
Crimping Pliers
Parts List

REPAIR METHOD

TERMINATION REQUIREMENT FORM

ILLUSTRATIONS

1 Pre-terminated Leads
2 Extraction Handle and Tips
3 Insulation Stripper
4 Stripper Blades
5 Crimping Pliers
6 Examples of Extraction Tips and Anti-backout Devices.
7 Examples of Extraction Tips and Anti-backout Devices.(continued)
8 Stripping Insulation
9 Butt Connector held correctly in Crimping Pliers

INTRODUCTION

The purpose of this document is to promote quick and efficient minor repair to harness connectors or cables using Jaguar Cars approved methods and the Wiring Harness Repair Kit. Repairs may only be made to cables and connectors which have been mechanically, **not electrically**, damaged. It also applies where the whole extent of the damage can be clearly identified and rectified.
Care and neatness are essential requirements in making a perfect repair.

CAUTION:
Jaguar Cars Limited, at the time of this first issue of the Harness Repair Guide, do not approve repairs to any of the following circuits:

1. **Any media orientated system transport (MOST) network harnesses.**
2. **Supplement restraint system (SRS) firing circuits (Air bags).**
3. **Link lead assembles, which are unique to safety critical circuits such as ABS and thermocouple circuits. An example of this is the ABS wheel speed sensors with moulded connectors.**
4. **Screened cables & leads.**

Any harnesses with defective terminations or cables from the above circuits must be replaced.

REPAIR KIT

A Jaguar Cars Wiring Harness Repair Kit has been produced which comprises:

- pre-terminated leads of different sizes and types
- three sizes of butt splice connectors
- a selection of coloured cable identification sleeves
- two sizes of heat shrink sleeve
- crimping pliers
- a wire cutter and insulation stripper
- a termination extraction handle and tips

A suitable heat source, for shrinking heat shrink sleeves will be required.

The PIDG (Pre-Insulated Diamond Grip) range of terminations and in-line, butt splice connectors contained within the Repair Kit are the **only** acceptable product for the repairs of Jaguar Cars wiring harnesses. The butt connectors not only grip the wire but also the insulation, making a very secure joint.

If a termination is not included in the kit then approval for the repair is **NOT** given and in these circumstances the harness must be replaced.

Pre-Terminated Leads and Butt Splice Connectors

All pre-terminated leads and butt splice connectors in the kit are contained in bags which can be resealed after use. Each bag is marked with the part number of the items stored within the bag. Each storage compartment in the kit is identified with the corresponding part number. To ensure that pre-terminated leads and connectors are not mixed up it is advisable to only open one bag at a time and to reseal the bag securely before opening another bag. Also, replace the bag in its mating part number compartment within the case.

The pre-terminated leads are supplied with the insulation in one of three colours, red, blue or yellow. The colours do not apply to any particular circuit but to the lead wire size. See the Relationship Table in the Repair Method section.

Butt splice connectors are also supplied with red, blue or yellow coverings, which must be matched to the pre-terminated lead insulation colour.

The illustration on the next page shows:
the pre-terminated leads which are included in the kit
the part number of the pre-terminated lead
the letter showing the extractor tip which must be used to remove this type of termination
those terminations which are gold

Some of the pre-terminated leads have seals fitted to the insulation for sealed connector applications. It is essential for prevention of moisture ingress that a sealed pre-terminated lead must be used where a sealed termination was removed.

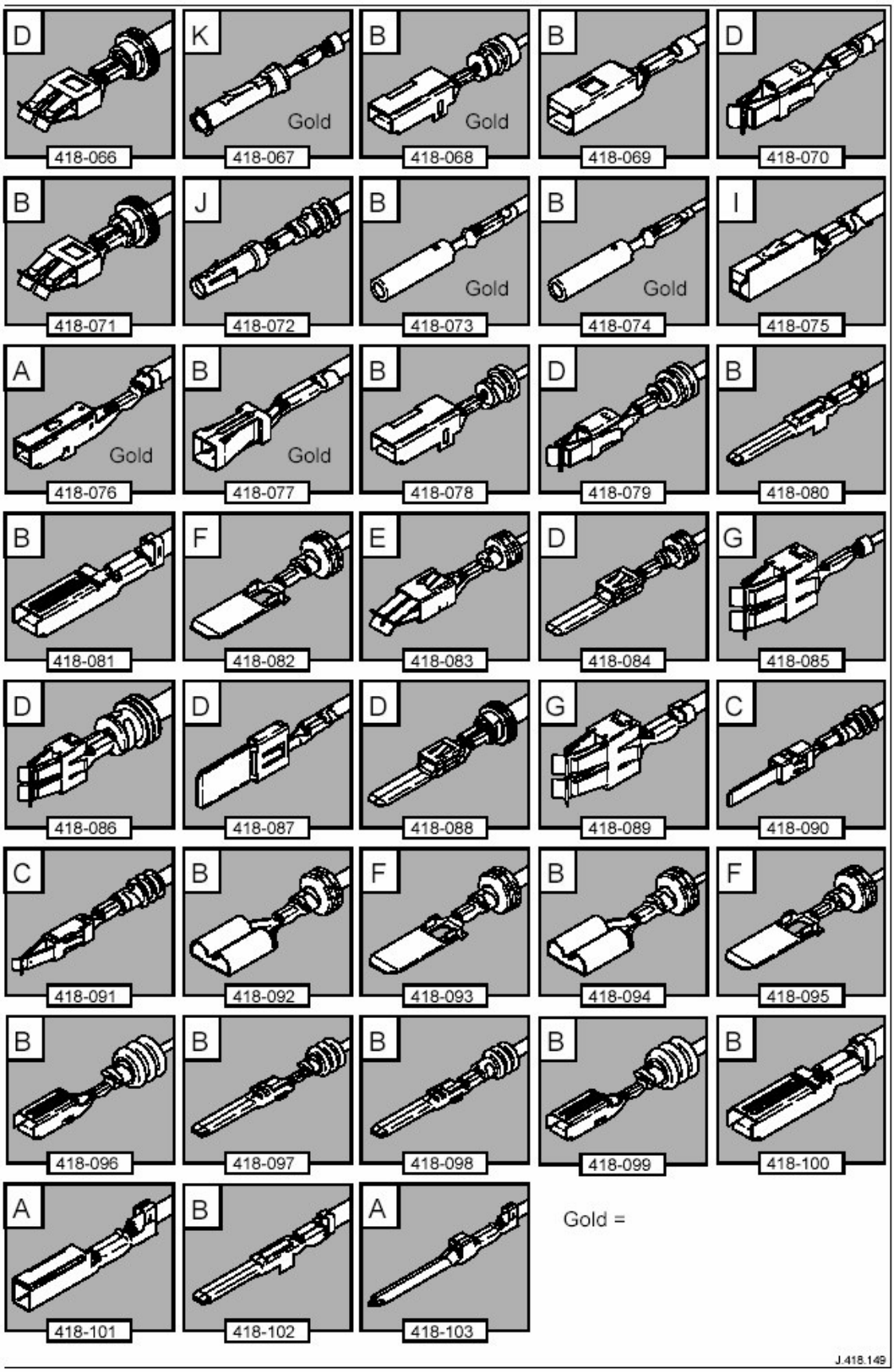

Figure 1 Pre-terminated Leads.

Two sizes of heat shrink sleeving are supplied in the kit. Each heat shrink sleeve contains a sealant glue. These must be used when connecting leads or terminations at all times. The smaller diameter heat shrink sleeve is to be used with the red and blue butt splice connectors and the larger diameter sleeve with the yellow butt splice connectors.

For ease and speed, some of the pre-terminated leads may already have the insulation partly stripped at the splice end. If the repair requires insulation to be stripped from the cable, refer to the Relationship Table for the correct length of insulation to be stripped.

Figure 1 shows the termination type, the part number of the pre-terminated lead and the letter of the extractor tip which must be used to extract the termination from the connector housing. Additionally, those terminations which are gold are identified, all others are, therefore, tinned and not gold.

Cable Identification Sleeves

A selection of coloured sleeves are contained in the repair kit for maintaining the harness cable identification on the pre-terminated lead. Place the correct coloured sleeve(s) over the pre-terminated lead insulation as near to the connector as possible with the main cable colour nearest to the connector.
For example, if the original harness cable colour is pink with a black trace put the pink identification sleeve on the pre-terminated lead first followed by a black sleeve, and slide both along the cable to the connector termination.

Extraction Handle and Tips

The extraction handle, in conjunction with the correct tip, is used to remove a termination from a connector. Each tip contained in the kit is marked with an identification letter, A to K inclusive. Each tip has been specially designed to extract a particular type of termination. The use of any other tool is not recommended and is liable to cause damage to the connector. The tip is fastened to the handle by a screw which holds the tip firmly yet enables it to be easily replaced. Figure 2 shows the handle and extraction tips.

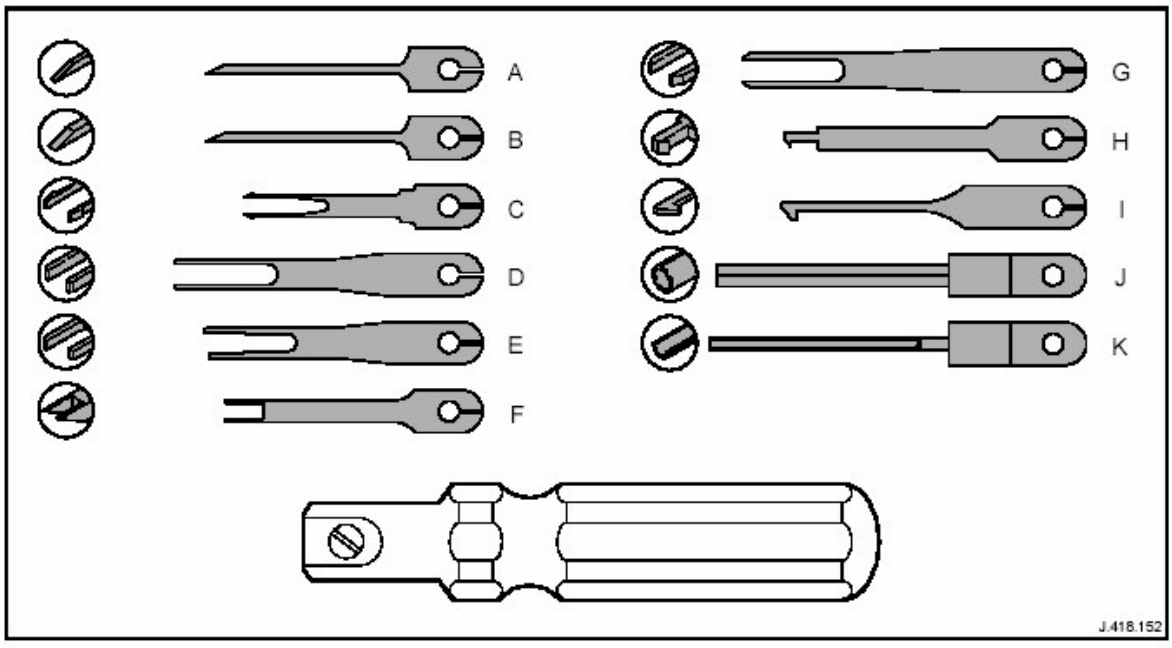

Figure 2 Extraction Handle and Tips

Insulation Stripper

The moving jaw has an adjuster wheel which has a series of holes in it. Turning the wheel and placing the cable in the matching size hole will automatically adjust the jaw to the correct pressure. Note that some harness leads may have a harder insulation and slight adjustment of the wheel may be needed to make a clean strip but exercise care not to damage the wire.
By pressing the outer edges of the cable length stop together the adjuster can be slid up or down the jaw. This decreases or increases the length by which the cable insulation will be stripped from the pre-terminated lead or harness lead. The adjuster has a position indicator to align with a graduated scale and this sets the correct length in millimetres, of insulation to be stripped. The amount of insulation to be stripped is shown in the Relationship Table. Figures 3 and 4 show the insulation stripper tool and a lead correctly gripped in the jaws.
A wire cutter is provided on the outer side of the fixed jaw.

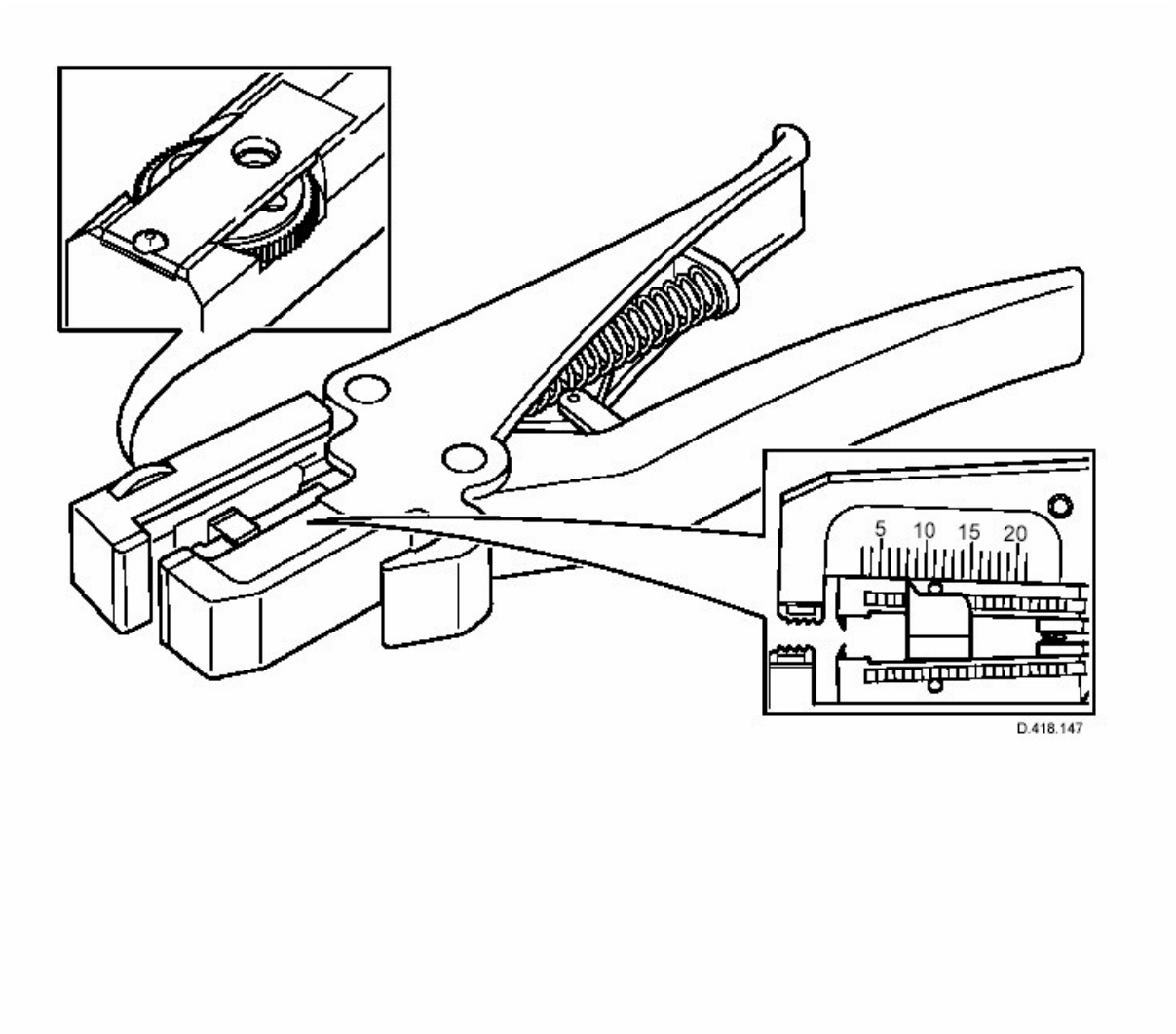

Figure 3 Insulation Stripper

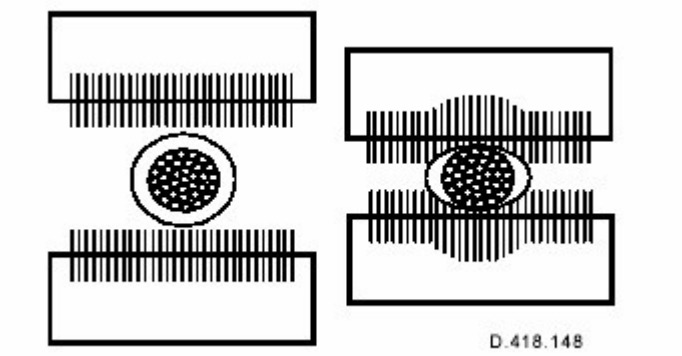

Figure 4 Cable Correctly Gripped in Stripper Blades

Crimping Pliers

The crimping pliers have a moving jaw and a stationary jaw, with three different sized crimping enclosures. Each of the enclosures is identified by a red, blue or yellow coloured dot which corresponds to the three colours of the pre-terminated leads and butt splice connector colours.

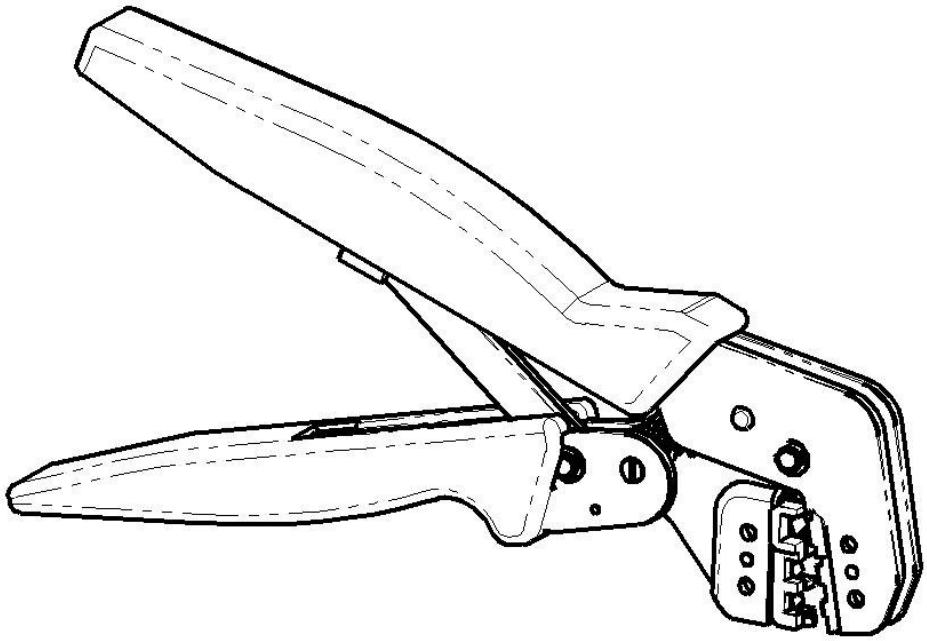

Figure 5 Crimping Pliers

List of Parts

Description	Part Number	Quantity
Wiring Harness Repair Kit	418-S065	1
Pre-Terminated Leads	418-066 to 418-103 inclusive	10 each
Heat Shrink Pack – small diameter	418-104	25 per pack
Heat Shrink Pack – larger diameter	418-105	10 per pack
Case Assembly Comprising – carry case, lid, inner lid, base, insert, trays foam spacers	418-106	1
Butt Splice Connector – Red	418-107	50 per pack
Butt Splice Connector – Blue	418-108	50 per pack
Butt Splice Connector – Yellow	418-109	20 per pack
Extraction Tool Handle	418-110	1
Extraction Tip Pack consists of 2 spare screws plus	418-S111	1
Tip A	418-118	1
Tip B	418-119	1
Tip C	418-120	1
Tip D	418-121	1
Tip E	418-122	1
Tip F	418-123	1
Tip G	418-124	1
Tip H	418-125	1
Tip I	418-126	1
Tip J	418-127	1
Tip K	418-128	1
Sleeve Identification Pack – for Red insulation leads	418-112	500
Sleeve Identification Pack – for Blue insulation leads	418-113	500
Sleeve Identification Pack – for Yellow insulation leads	418-114	500
Instruction Manual	JTP 593	1
Crimping Pliers	YRW500010	1
Wire Stripping Tool	418-117	1

Replenishment items can be ordered from:

SPX United Kingdom Limited
Genoa House
Everdon Park
Daventry
Northants
NN11 8YH
United Kingdom
Telephone: +44 (0) 1327 704461
Fax: +44 (0) 1327 706632

REPAIR METHODS

CAUTION: Several different types and sizes of terminal may be found in a single connector housing.

It is necessary to identify:

the conductor (wire) size of the affected lead
the connector range from which the damaged lead is to be removed
the termination type

Use of the WDS will greatly assist in the quick identification of connectors and faulty pin terminations. Reference can also be made to the Sedan and XK8 Electrical Guides, held by Dealers, to identify harnesses and connectors.

RELATIONSHIP TABLE

CABLE RANGE	SPLICE	STRIP LENGTH
0.35 mm² to 1.50 mm²	RED	6.00 to 7.00 mm
1.00 mm² to 2.50 mm²	BLUE	6.00 to 7.00 mm
4.00 mm² to 6.00 mm²	YELLOW	9.00 to 9.50 mm

By using the table above, the cable conductor (wire) size can be related to a suitable pre-terminated lead by the colour of the insulation. Also, the correct length of insulation to be stripped from the harness lead is identified.

It must be noted that some connectors have anti-backout devices which prevent the terminations from being removed from the connector. Some examples of these are shown in Figures 6 and 7. The anti-backout device must be released before attempting to remove the termination from the connector. Some anti-backout devices require a special tip to release the device and these have been included in the kit. Most can be released by carefully using a small screwdriver.

Various types of connector have seals fitted internally or externally to prevent moisture ingress. These normally do not have to be removed but ensure that they are fitted when the connectors are mated.

The illustrations on Figures 6 and 7, show examples of each tip used on different types of connectors. There are a large number of different types of connector used on Jaguar cars therefore only one example using each tip is shown. Technicians experience and judgement will dictate which type of tip should be used for those connectors which are not shown. Care should be exercised to avoid further damage when removing terminations from the connector.

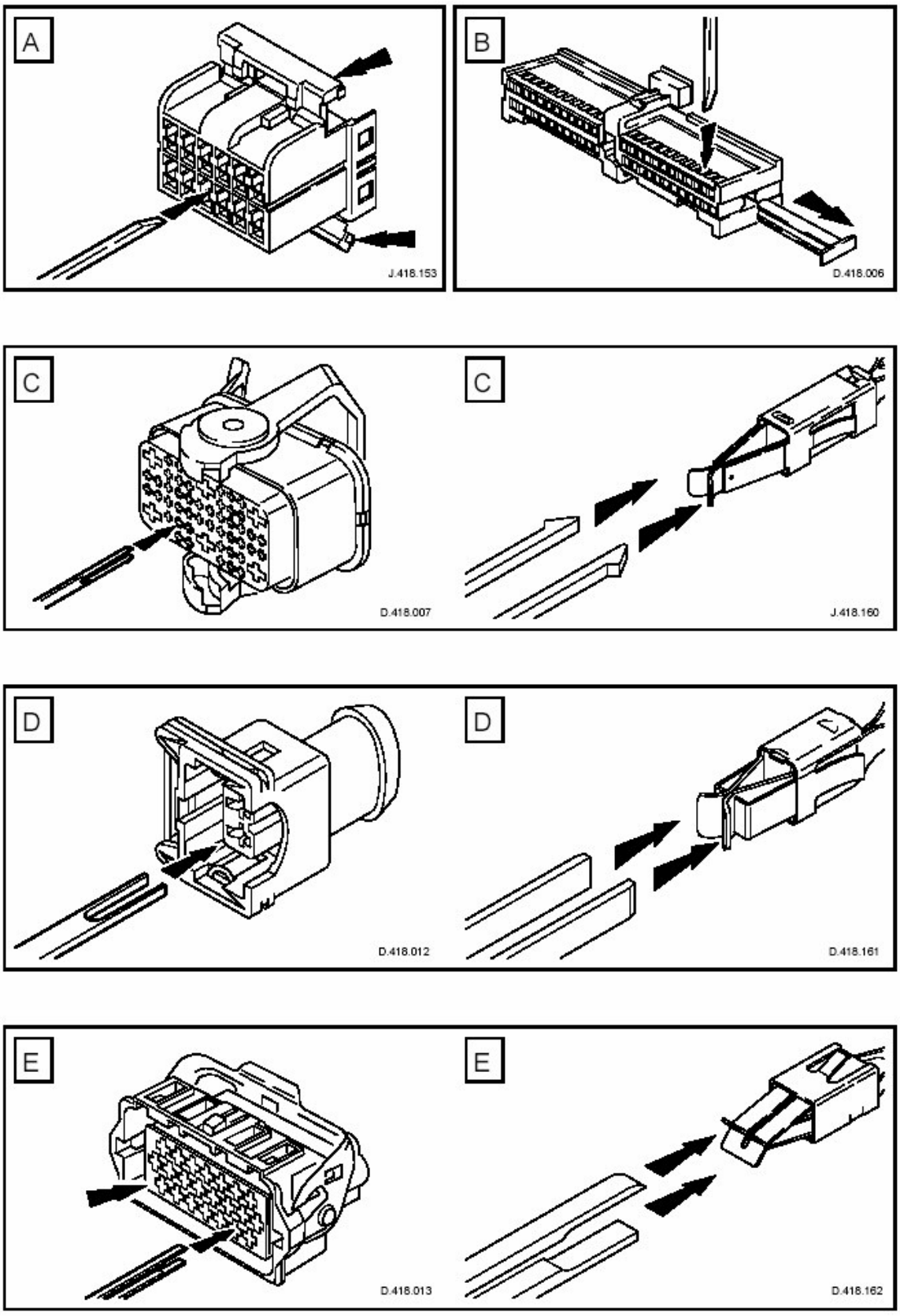

Figure 6 Examples of extraction Tips and Anti-backout devices

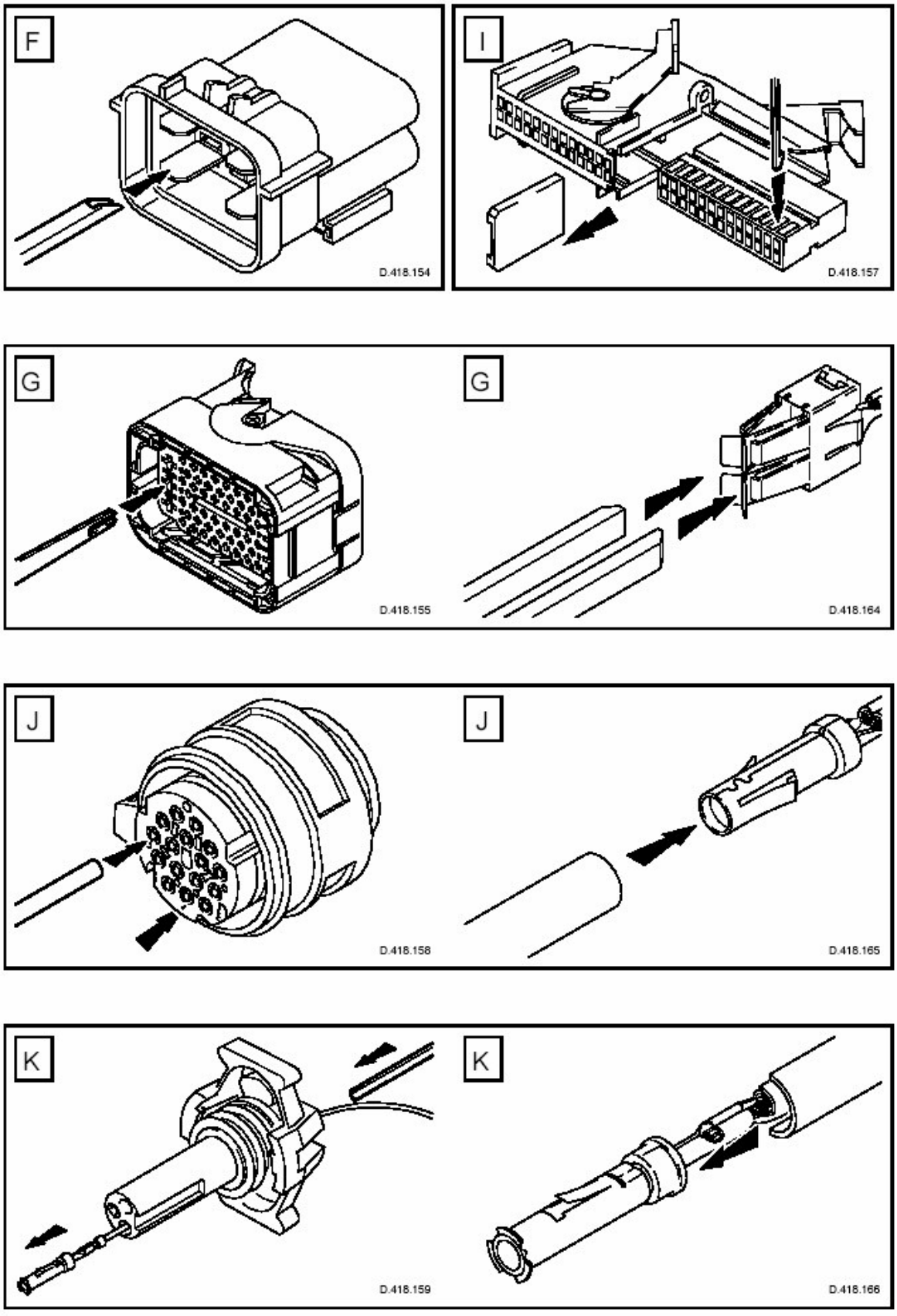

Figure 7 Examples of Extraction Tips and Anti-backout Devices (Continued)

The chart which follows shows connector types, termination pin or socket, tip to be used to release the termination and tip to be used to remove or release the anti-backout device.

Connector Terminal Type	Pin or Socket	Extractor Tip	Anti-backout Tip
Multilock 040 series	D	A	
Multilock 040 series	B	A	
Multilock 070 series	B	B	
Multilock 040 series	D	B	
Econoseal III 070 series	D	B	
Econoseal III 070 series	B	B	
Econoseal III 070 series	B	B	
Econoseal III J2	D	B	
Econoseal III 250 series	B	F	
Econoseal III 250 series	D	B	
Econoseal III 250 series	B	F	
Econoseal III 250 series	D	B	
Micro-timer II 1.5mm	D	C	
Micro-timer II 1.5mm	B	C	
Std power timer 4.8 flat	D	G	
Std power timer 5.8 flat	B	D	
Std power timer 5.8 flat	B	D	
Std power timer 2.8 flat	D	D	
Std power timer 4.8 flat	D	G	
Std power timer 5.8 flat	B	D	
Ford 2.8 Flat	D	E	H
Multilock 070 series	D	B	
Multilock 070 series	B	B	
Junior power timer 2,8 flat	D	D	
Sumitomo TS90 connector	B	B	H
Modu IV Gold plated	D	B	
Multilock 040 series Gold plated	D	A	
Micro Quadlock	D	I	
EECV	D	B	
EECV	D	B	
Kostal dia 1.50 series	D	J	
AMP 6.3 flat	D	B	
Junior power timer 2,8 flat	D	D	
2.8 series	D	B	I
Sumitomo TS90 connector	D	B	H
Ducon 0.60 Gold plated	D	K	
AMP 6.3 flat	D	D	
Econoseal III 250 series	B	F	

Repair Procedure

CAUTION: Do not use crimping pliers, insulation strippers, butt splice connectors, heat shrink sleeves or pre-terminated leads that are not supplied with the Jaguar harness repair kit.
Each part has been designed to be used only with the other parts in this kit.

It is undesirable to make more than five repair joints on the wiring to any harness connector and if more damage is found at the same connector then the harness must be replaced.

1. Remove the faulty termination from the connector using the extractor tool and correct tip, (see Figures 6 and 7 and the connector chart from the previous page). Ensure that any anti-backout device is released before trying to remove the termination.

Caution: A number of connector terminations are gold plated or gold flashed. When defective, they must be replaced with a gold pre-terminated lead from the repair kit. It is not always easy to identify the female as gold but the male pins are visually easier, therefore, always check both male and female terminations to identify those which are gold. Under no circumstances are gold and tin terminations to be mixed as this will lead to early failure of the electrical contact.

2. Select the correct size and type of pre-terminated lead and butt splice connector from the kit. Note; Never use a lead with a smaller diameter than the original harness lead.

3. Using the wire cutter on the stripping tool, cut the pre-terminated lead and the harness cable the required length

4. From the Relationship Table, find the correct length of insulation to be stripped from the pre-terminated lead and set the adjustable cable length stop to the correct length. Place the pre-terminated lead in the wire stripper and remove the insulation.

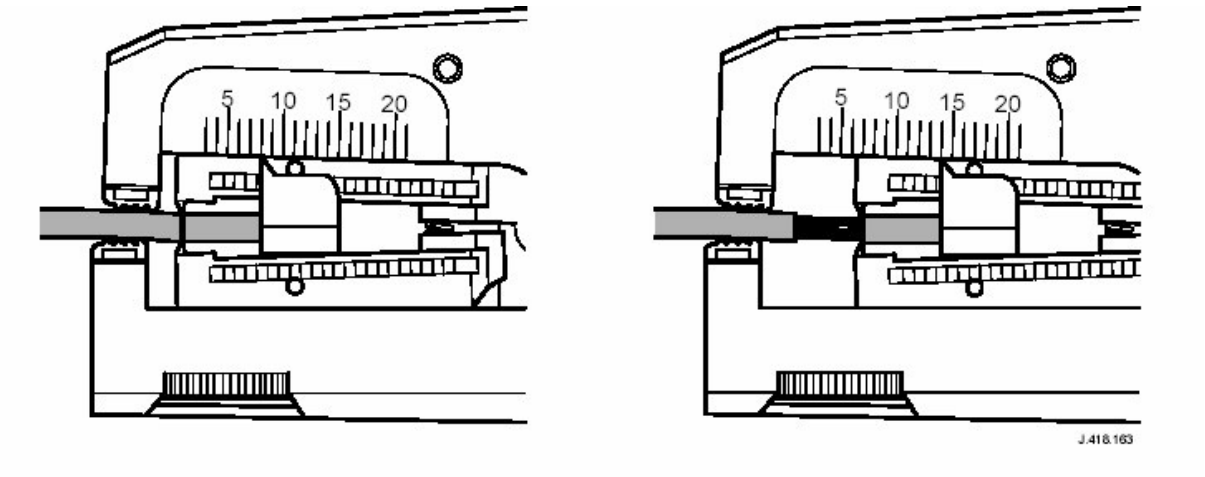

Figure 8 Stripping Insulation

5. Put the cable identification sleeve(s) on to the terminated lead with the main cable colour nearest to the termination.

6. During this next step do no overtighten. Place the selected butt splice connector in the crimping tool, matching the aperture and the butt connector colours, (see Figure 9). Ensure that the window indentation in the butt connector is resting over the guide bar on the lower jaw. Partially close the grip until the butt connector is securely held in the aperture. This will give support to the butt connector while the pre-terminated lead is inserted into it

7. Insert the pre-terminated lead into the butt connector and ensure that the wire is against the wire stop. Close the grip firmly, crimping the lead to the butt connector. When the handles have been completely closed the butt connector will be freed from the tool as the handles are released. If the handles have not been completely closed then the jaws will hold the butt connector and it cannot be removed from the tool until the crimp is fully made by closing the handles completely.

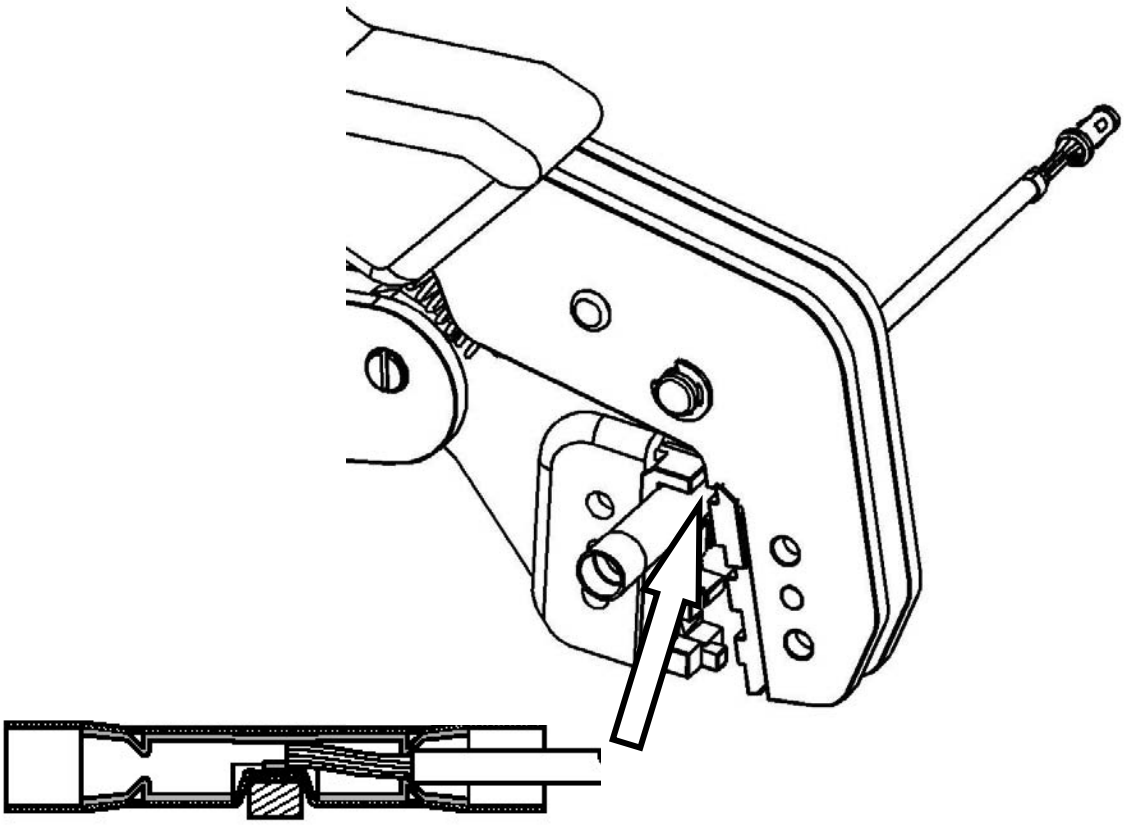

Figure 9 Splice correctly located in crimp pliers.

8. Ensure that the harness cable has been squarely cut and the correct length of insulation removed. If more than one splice is needed the butt connectors must be not be crimped to the harness at the same distance from the connector. The splices must be staggered to prevent a bulk of splices in the same area of the harness.

9. It is preferable to cover the butt splice joint with heat shrink sleeve. This is desirable, not essential, except where the connector is a sealed connector. Use the smaller diameter sleeve for red and blue pre-terminated leads and the large diameter sleeve for the yellow pre-terminated leads. It is advisable to place the heat shrink over the completed joint but in some instances the sleeve will not pass over the termination. Check, and if required, place the correct size sleeve onto the harness cable or pre-terminated lead before crimping the butt splice to the harness.

10. Place the harness cable into the butt splice with the splice window over the guide bar. Ensuring that the cable harness wire is against the stop in the butt splice, crimp the butt splice connector to the harness.

11. Gently pull the cables each side of the butt splice to ensure that a secure joint has been made.

WARNING: Do not use a naked flame in areas where fuel or oil have been spilt. Clean the area of residual oil and fuel and wait until the fuel spill has fully evaporated.

CAUTION: When using a heat source ensure that it is localised and causes no damage to surrounding materials.

12. Using a suitable heat source, shrink the sleeve over the butt splice.

13. If further pre-terminated leads are to be fitted to the same connector, ensure that the lead is cut at a different length to the previous joint. This ensures that the splices will, where possible, be staggered on the harness and prevent a bulk of splices in one area.

14. When all of the splices have been made, fit the terminations to the connector, taking care that the terminations are correctly orientated..

15. Replace the harness cover and secure with adhesive electrical tape. Do not cover the harness right to the connector as the terminations must have a little movement and not be firmly bound to the connector or harness. Make sure that the cable identification sleeve(s) are showing at the harness connector

No other repairs should be carried out to terminals other than replacement following the standard set out within the guide

If terminals or connectors are not available in the wiring harness repair kit then contact SPX for assistance