REFERENCE:	Nova Bus Manuals
SECTION:	10: Transmission
RS Nº:	MQR 7621-1654
EFFECTIVE IN PROD.:	LC90 (2020FE)

APPLICATION DEADLINE: N/A

SUBJECT:	Allison B400 transmission harness
JUSTIFICATION:	Whenever experiencing multiple random transmission fault codes, it is advisable to inspect the N40216 transmission harness for chafing and, if wiring defects are found, to repair these defects. Note that not all transmission codes are caused by wiring issues.

LEVEL	DESCRIPTION	DIRECT CHARGES		TIME
		LABOUR	MATERIAL	
1	Procedure to inspect, improve protection and secure excess length.	Client	Client	1h
2	Repair damaged wires / Replace severely damaged N40216 harness.	Client	Client	2h / 4h

MATERIAL

QTY	PART Nº	REV.	DESCRIPTION	REPLACES PART N°
LEVEL 1				
4 ft	N99985	–	LOOM – SPIRAL SLEEVING ID 7/16"	–
10 ft	N74787	A	COROPLAST TAPE – HIGH TEMP	–
2	N37749	B	DUAL CLAMP TIES – 19.2"	–
4 ft	N28083-07	–	CONVOLUTED TUBING	–
LEVEL 2				
12	N93457-02	–	SOLDER SLEEVE CLEAR - RED	–
1	N84090-07	–	P-CLAMP ID 1.000" THK 0.030" M8	–
1	N40492	B	SCREW M6X20 H YZ TRIV 96H 8.8	–
1	N38593	A	NUT LOCKNYL FL M6 ZP	–
12 ft	N25831-23	–	WIRE GXL 16GA GREY	–
1	N99235	–	WHA ALLISON ENGINE COMPARTMENT	N40216
4	G5007994	–	CABLE TIES	–

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DISPOSAL OF PARTS

REMOVED PARTS ARE:	DISCARDED*	RETAINED	* Dispose of the unused parts and the defective parts in accordance with local environmental standards in effect.
	Yes	–	

REVISION HISTORY

REV.	DATE	CHANGE DESCRIPTION	WRITTEN BY
NR	2020FE20	Initial release	Annie St-Jacques

APPROVED BY: Jean-Nicolas Fournier

Digitally signed by Jean-Nicolas Fournier
DN: cn=Jean-Nicolas Fournier, o=Nova Bus, email=jean-nicolas.fournier@volvo.com, c=CA
Date: 2020.02.19 10:16:52 -05'00'

CLIENT	ORDER	ROAD NUMBER		VIN (2NVY/4RKY...)		QTY
		FROM	TO	FROM	TO	
Houston - Texas	L952	1580	1580	S92J5G9775318	S92J5G9775318	1
Houston - Texas	L982	1581	1582	S92J5G9775514	S92J7G9775515	2
Houston - Texas	L982	1583	1583	S92J9G9775516	S92J9G9775516	1
Houston - Texas	L982	1584	1586	S92J2G9775518	S92J4G9775522	3
Houston - Texas	L982	1587	1587	S92J8G9775524	S92J8G9775524	1
Houston - Texas	L982	1588	1599	S92J1G9775526	S92J5G9775545	12
Mississauga Ontario	LA65	1770	1799	S92J8H9776254	S92J2H9776315	30
St. Catharines Ontario - Metrolinx	LB06	1860	1862	S92J1J3751000	S92J5J3751002	3

WARNING

FOLLOW YOUR INTERNAL SAFETY PROCEDURES.

PROCEDURE

LEVEL 1 – PROCEDURE TO INSPECT, IMPROVE PROTECTION AND SECURE EXCESS LENGTH

1.1. Park the vehicle on an even surface with the transmission on neutral.

1.2. Set the master control switch to the STOP position and apply the parking brake.

1.3. Set the battery disconnect switch in the battery compartment to the OFF position.

INSPECTION

1.4. Open the rear engine panel and locate the transmission harness (see Figure 1).

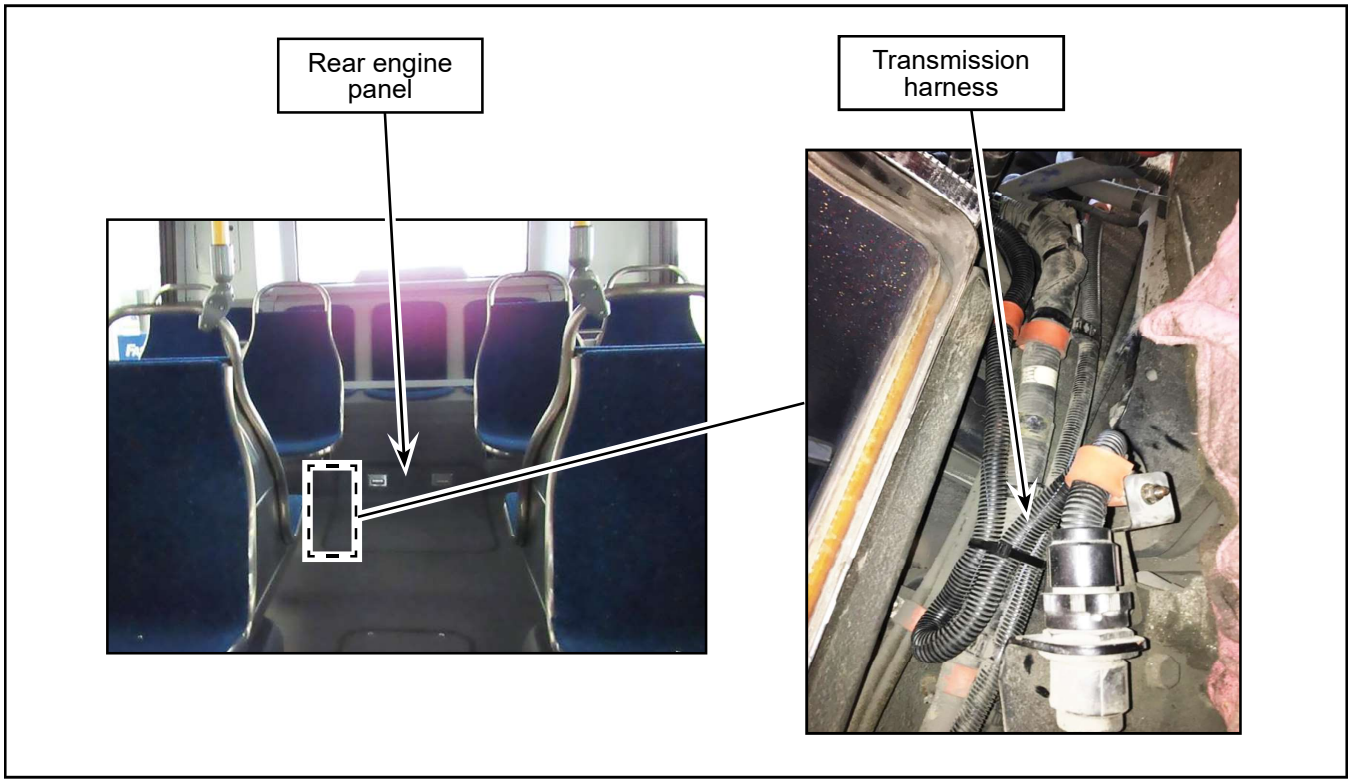

Figure 1 - Rear Engine Panel and Transmission Harness Locations

1.5. Remove the P-clamp near the transmission connector (the P-clamp can be missing and will need to be reinstalled later) and disconnect the connector. Do not remove the double P-clamp (see Figure 2).

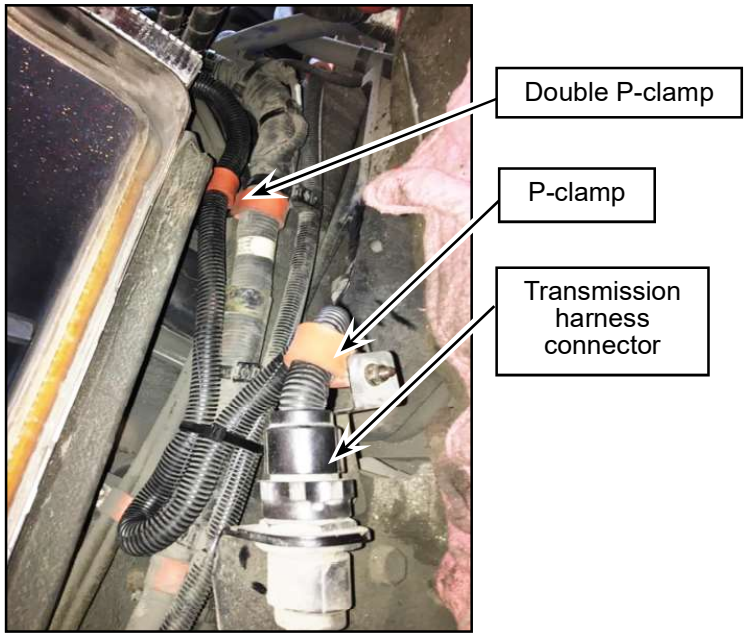

Figure 2 - Double P-clamp, P-Clamp and Transmission Harness Connector Locations

1.6. Remove the convoluted tubing (4 feet total) starting from the connector to the double p-clamp (see Figure 3).

Figure 3 - Convoluted Tubing Removed

1.7. Remove the PVC electrical tape for 1 foot starting from the transmission connector and inspect the wires. Then inspect the rest of the convoluted tubing for signs of chafing. If there are other signs if chafing, remove the PVC electrical tape further and inspect the underlying wires (see Figure 4).

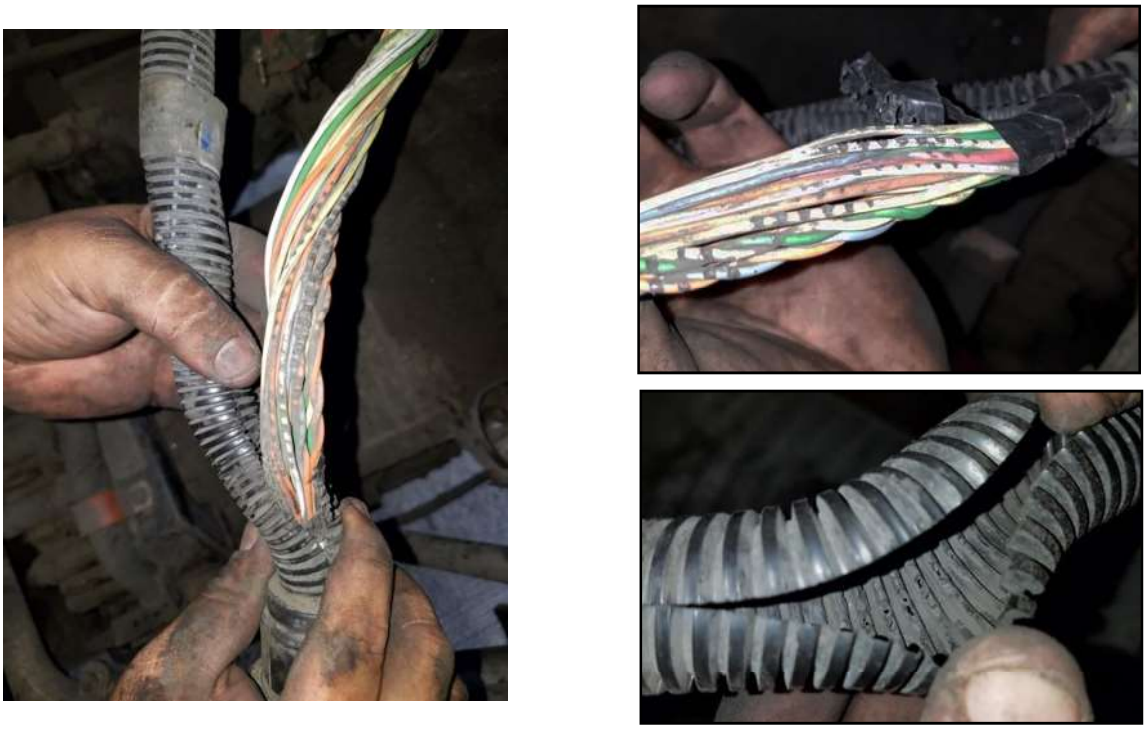

Figure 4 - Chafed Wires and Chafed Convoluted Tubing

1.8. At this point, refer to the table below for the next steps.

INSPECTION RESULTS	ACTION REQUIRED
No damage detected or only superficial damage on convoluted tubing and/or wires insulation.	Continue level 1 procedure steps 1.9 to 1.16.
Wiring copper strands conductors are visible (1 to 5 wires).	Go to repair procedure at step 2.1.
Wiring severely damaged (more than 5 wires damaged with the conductor copper strands exposed and/or corroded).	Go to repair procedure at step 2.2.

IMPROVE PROTECTION

1.9. Apply Coroplast tape (N74787) for 1 foot starting from the harness connector and over any further length of exposed wires where PVC electrical tape was removed at step 1.7 (see Figure 5).

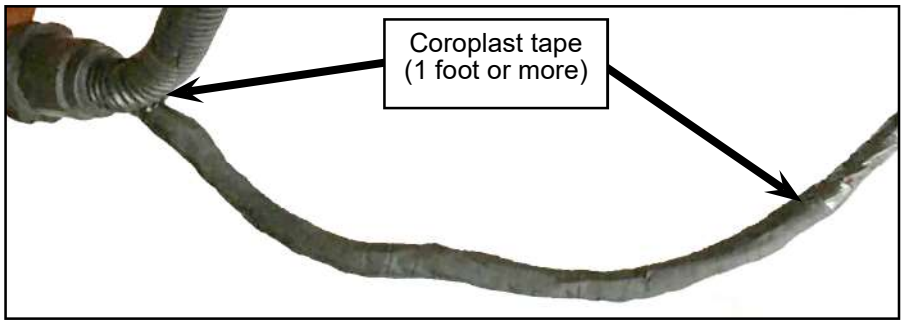

Figure 5 - Coroplast Tape Applied

1.10. Install spiral sleeving (N99985) over the full extents of the sires bundle now protected with the coroplast tape (see Figure 6).

Figure 6 - Spiral Sleeving Installation

1.11. Replace the convoluted tubing if damaged (N28083-07) and reinsert the taped wire bundle into it. Apply Coroplast tape (N74787) over the convoluted tubing to tighten the loom. Do not overlap (see Figure 7).

Figure 7 - Convoluted Tubing and Coroplast Tape

SECURE EXCESS LENGTH

1.12. Reconnect the transmission harness and reinstall the P-clamp (N84090-07) with screw (N40492) and nut (N38593). If P-clamp was missing, install new a one.

1.13. Secure harness excess length with two dual clamp ties (N37749) (see Figure 8).

Figure 8 - Final Routing

1.14. Close the rear engine panel.

1.15. Set the battery disconnect switch to the ON position.

1.16. The vehicle can return in service.

LEVEL 2 – TRANSMISSION HARNESS REPAIR

2.1. WIRES REPAIR

NOTE

This repair procedure is only recommended for a N40216 transmission harness having 1 to 5 damaged wires. In case of more wires being damaged, the recommendation is to replace the harness (see step 2.2).

2.1.1. Identify all wires with visible conductor copper strands (see Figure 9) and execute step 2.1.2 to step 2.1.5 for each wire.

Figure 9 - Wire Conductor Copper Strands Visible

2.1.2. Cut out the damaged section of the wire (see Figure 10).

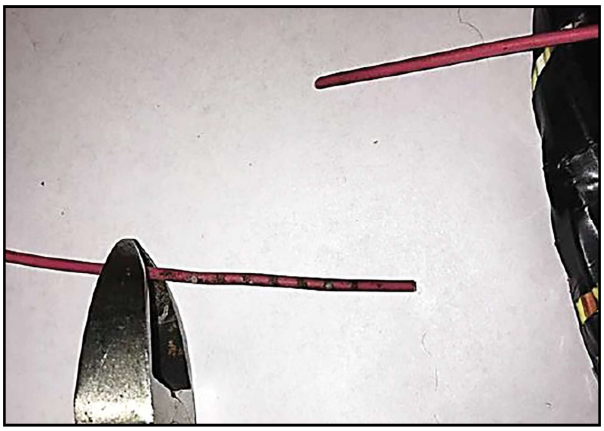

Figure 10 - Cut Wire Damaged Section

2.1.3. Replace the damaged wire section with the grey wire (N25831-23). Adjust length by adding 1 inch for soldering purpose: (grey wire length = damaged section length + 1 inch) (see Figure 11).

Figure 11 - Cut Grey Wire

2.1.4. On each harness wires insert 2 in. of heat shrink tubing (N82227-03) (see Figure 12).

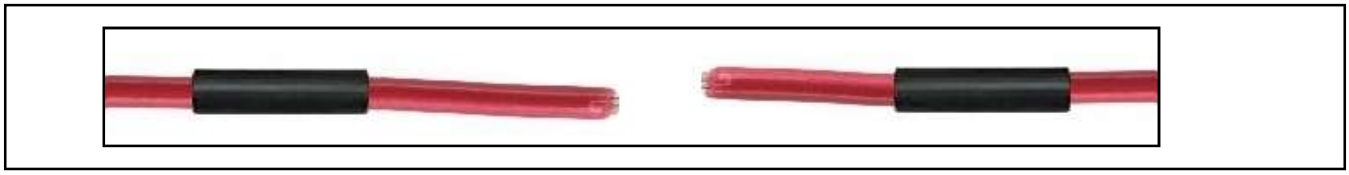

Figure 12 - Insert Heat Shrink Tubing

2.1.5. Prepare grey and harness wires by stripping 0.313 in. (7,5 mm) of insulation at each wire end (see Figure 13).

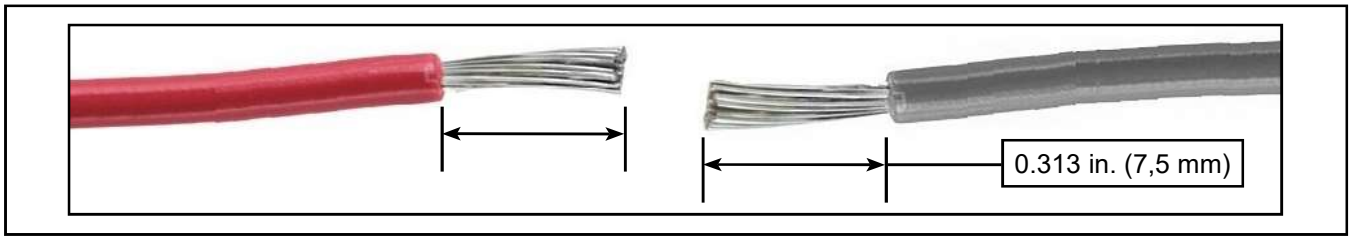

Figure 13 - Wires Insulation Removed

2.1.6. Using a crimp tool AD-1522 (see Figure 14) install butt splices (N8910917) at each connection between grey wires and harness wires. Follow the steps illustrated at Figure 15 for crimping. See Figure 16 for repair result.

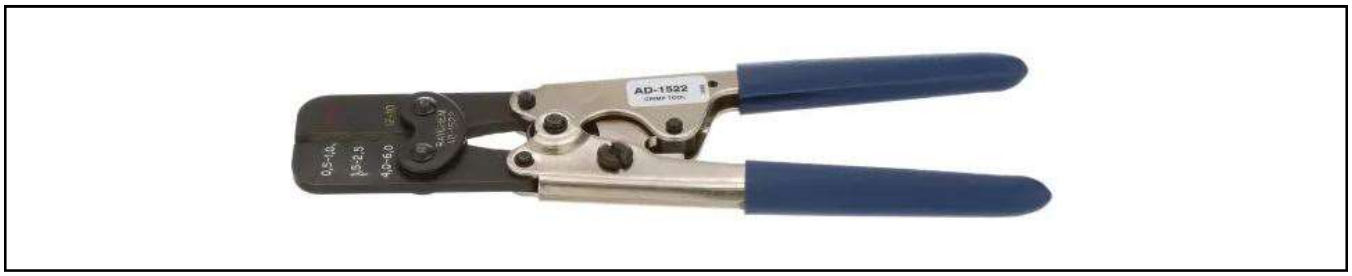

Figure 14 - Crimp Tool AD-1522 (For Reference Only)

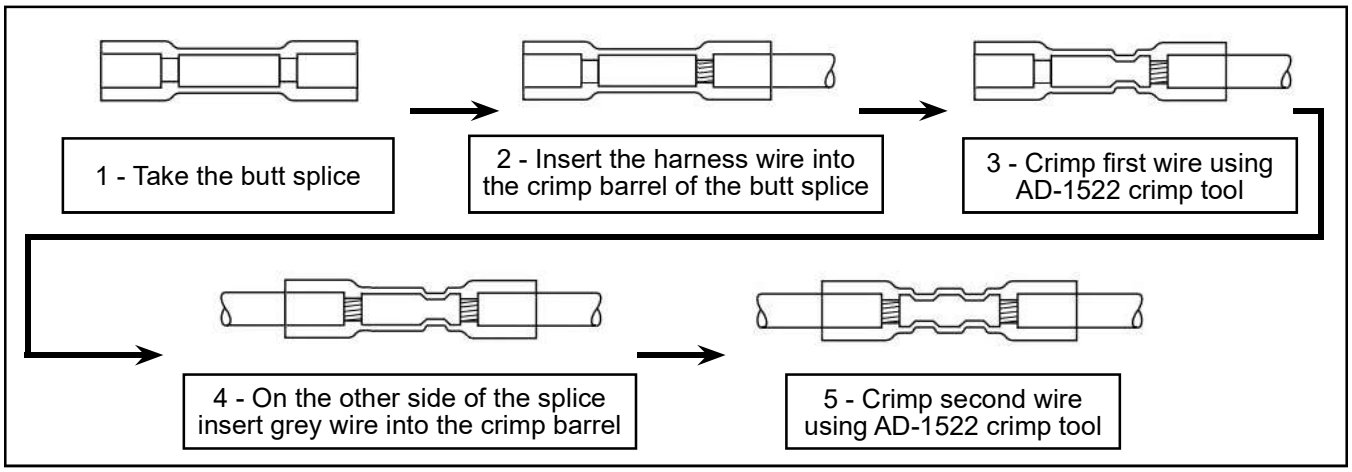

Figure 15 - Butt Splice Crimping Step by Step

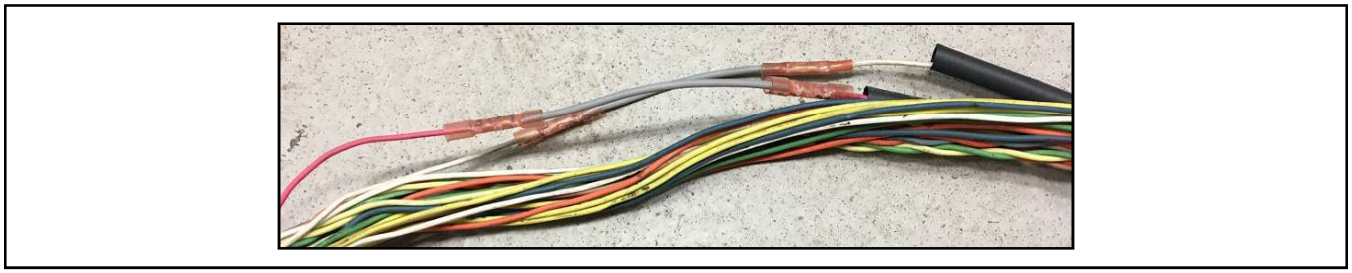

Figure 16 - Exemple of Repaired Wires

2.1.7. Heat splices with the heat gun until their tubing recovers and adhesive flows (see Figure 17).

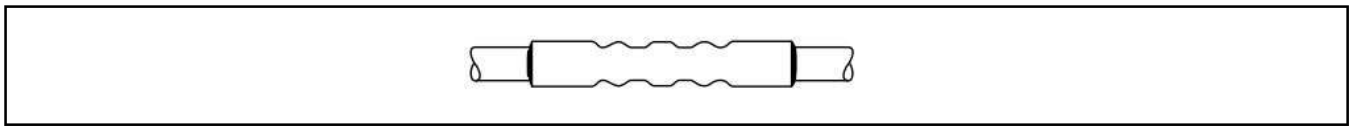

Figure 17 - Butt Splice Appearance after Being Heat

2.1.8. Cover each butt splice with the piece of heat shrink tubing inserted at step 2.1.4 and heat with a heat gun until tubing recovers and adhesive flows (see Figure18).

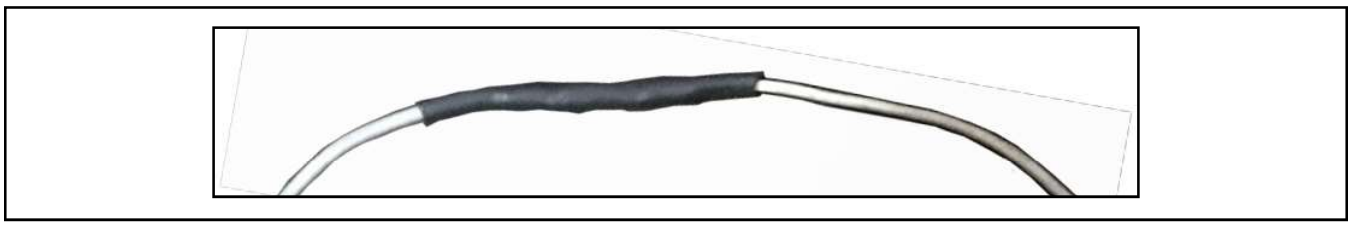

Figure 18 - Butt Splice Covered with Heat Shrink Tubing

2.1.9. When all damaged wires are repaired, continue with level 1 steps 1.9 to 1.16.

2.2. N40216 TRANSMISSION HARNESS REPLACEMENT

2.2.1. Remove the P-clamps (there should be 5) and the cable ties to free the damaged N40216 harness and replace it with N99235 harness (see Figure 19).

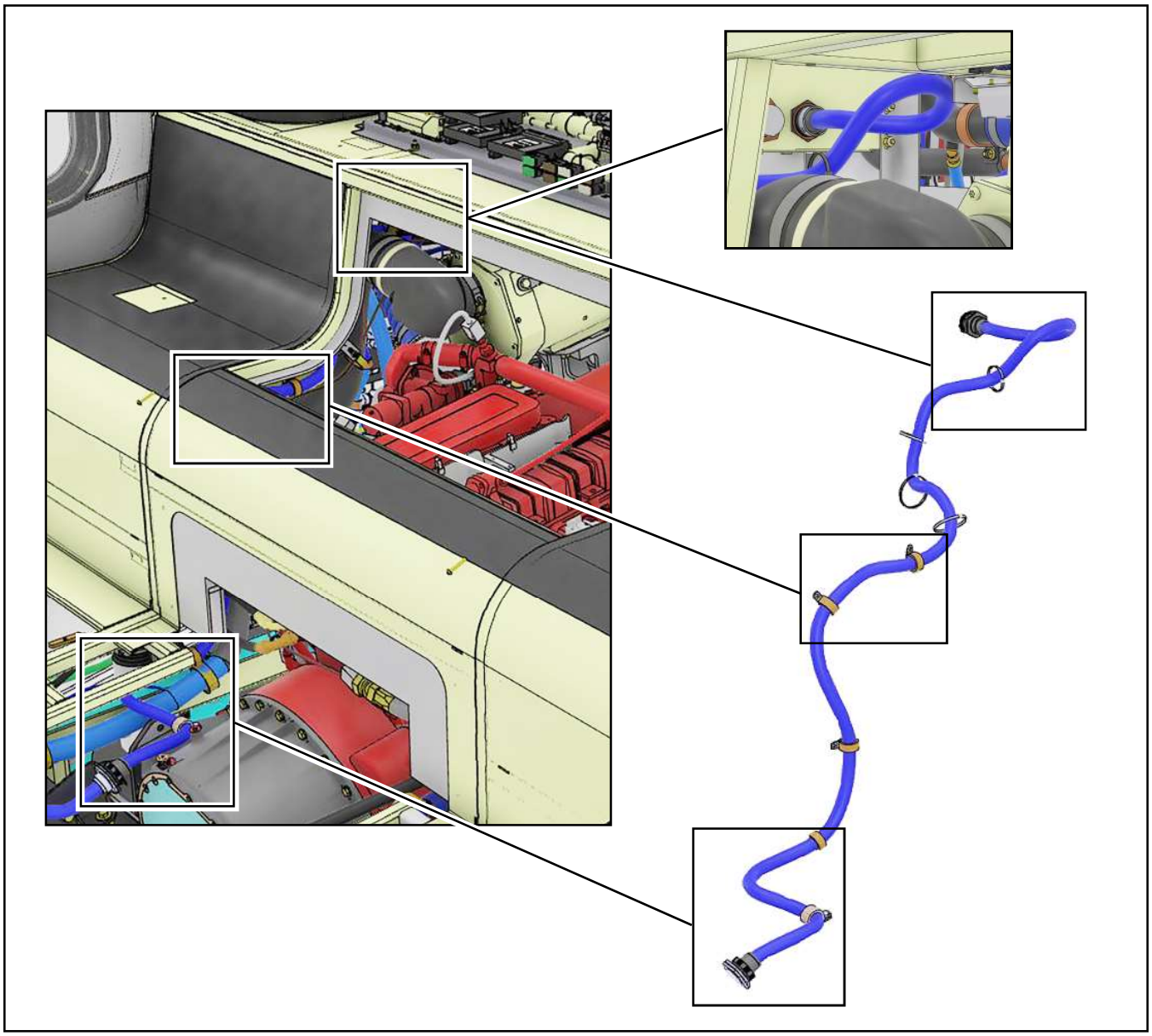

Figure 19 - N40216 Transmission Harness and P-clamps Locations

2.2.2. Start the routing of the new N99235 harness at the interior back panel connector. Follow the original routing and using the white tape as reference, attach the harness to the first P-clamp (see Figure 20). Then attach the harness section between the interior back panel connector and the first P-clamp with cable ties.

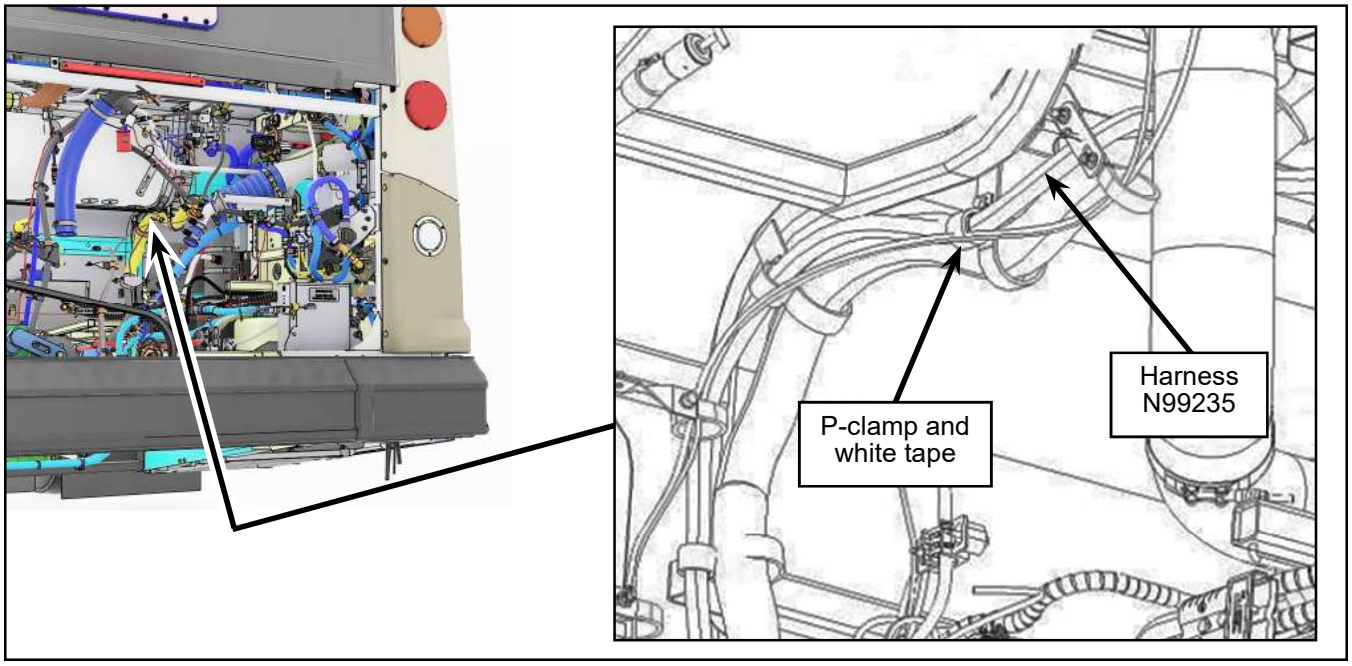

Figure 20 - Attach the Harness to the First P-clamp at the White Tape (Some Components Removed For Clarity)

2.2.3. Keep following the original routing and secure the harness with the removed P-Clamps. Before installing the last P-clamp connect the harness connector on transmission. Then secure the harness N99235 using one cable tie and the white tape as reference (see Figure 21).

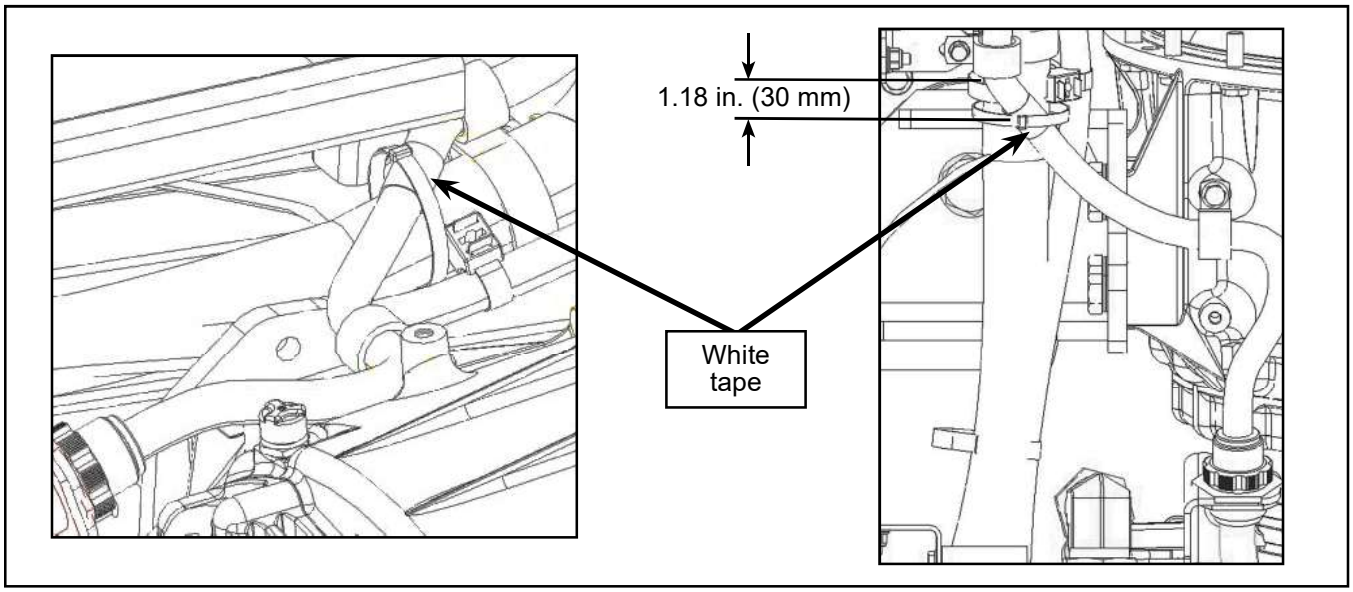

Figure 21 - At the White Tape Attach the Harness at the Shown Location with a Cable Tie (Side and Top View)

2.2.4. Close the rear engine panel.
2.2.5. Set the battery disconnect switch to the ON position.
2.2.6. The vehicle can return in service. ❖