Original sent to Dealers 12/19/11 Updated 6/14/12

## **TECHNICAL INSTRUCTIONS**

## FOR

## SAFETY RECALL B0J

## INTELLIGENT POWER MODULE TRANSISTOR REPLACEMENT

## **CERTAIN 2006 – 2007 MODEL YEAR HIGHLANDER HYBRID**

## UPDATED JUNE 14, 2012

#### TECHNICAL INSTRUCTION UPDATE NOTICE:

#### Updated 6/14/12

- Additional part number and serial number information has been added (SECTION VI, STEP 2)

#### Updated 3/28/12

- Grease expiration date explanation has been provided (SECTION III) (SECTION VIII, STEP B 4)
- Part Number and Serial Number inspection process and lookup website have been updated (SECTION VI, STEP 2)

#### Updated 2/8/12

- Air conditioning harness sub-assembly bolt installation has been updated (SECTION IX, STEP A 15)
- Combined training video link has been added

#### Updated 12/21/11

Part number and Serial number inspection has been updated (SECTION VI)

Previous versions of these Technical Instructions should be discarded.

**Combined B0J Training Video** 

In order to perform this campaign, technician must be Hybrid Certified. If you have questions regarding certification, contact your area representative.

## I. OPERATION FLOW CHART



## **II. IDENTIFICATION OF COVERED VEHICLES**

### A. COVERED VIN RANGE

Model	WMI Yoor		VIN Range				
	••••	i edi	VDS	Range			
HIGHLANDER HV			DW21A	0001003 - 0016484			
		2006	EW21A	0001009 - 0033953			
			GW21A	0001541 - 0013007			
	ITE		VDS         Range           DW21A         0001003 - 0016484           EW21A         0001009 - 0033953           GW21A         0001541 - 0013007           HW21A         0001275 - 0020710           HW21A         00016485 - 0017412           EW21A         0016485 - 0034655           GW21A         0016486 - 0017411           HW21A         0033956 - 0034655           GW21A         0016486 - 0017411           HW21A         0033954 - 0034654				
	JIE						
		2007					
		2007					
			HW21A	0033954 - 0034654			

#### NOTE:

• Check the TIS Vehicle Inquiry System to confirm the VIN is involved in this Safety Recall, and that the campaign has not already been completed prior to dealer shipment or by another dealer.

• TMS warranty will not reimburse dealers for repairs conducted on vehicles that are not covered or were completed by another dealer.

## **III. PREPARATION**

#### A. PARTS

#### Required Parts – Necessary to complete the repair

Part Number	Part Description	Quantity
04001-29148	Intelligent Power Module Transistor	1
08887-02409	Grease G747	2



The expiration date *DOES NOT* indicate that the grease is not useable. It is OKAY to use grease that is beyond the expiration date. The tube of grease must be kneaded to confirm the grease is properly mixed prior to use.

#### Ancillary Parts – Only necessary if lost during the repair

Part Description	Part Number	Part Description	Part Number
10mm (0. 39 i n)	91551-80610	Slim end 14mm (0. 55 in)	90105-A0263
12mm (0. 47 i n)	90105-A0096	22mm (0. 87 in)	90080-11255
Straight to the end	91551-80614		

#### **B. TOOLS, SUPPLIES & EQUIPMENT**

- Standard hand tools Marking pen
- Torque wrench
   Air gun
  - Throttle plate cleaner 00289-1TP00
- TechstreamBrake cleaner

•

(or equivalent)

SST - These are essential special service tools that the dealership should have.

Part Number	Part Name	Quantity
00002-03100-S	Electrical Insulating Gloves (Small)	
00002-03200-M	Electrical Insulating Gloves (Medium)	1
00002-03300-L	Electrical Insulating Gloves (Large)	

NOTE: If additional gloves are needed they can be ordered through SPX by calling 800-933-8335

#### Campaign Tools – These tools are provided to the dealership.

Part Name	Sample	Quantity	Part Name	Sample	Quantity
Protective Cover A		1	Protective Cover B	A A A A A A A A A A A A A A A A A A A	1
Masking Plate		1	Squeegee		1
Stud Bolt		2	Masking Plate Nut/Bolt	8mB	4

- Insulating tape
- DVOM

## **IV. BACKGROUND**



The Intelligent Power Module (IPM) is located inside the Hybrid System Inverter and contains a control board with transistors. Certain transistors on the control boards of some of the subject vehicles were inadequately soldered and could be damaged from heat caused by a large current during high-load driving. If this occurs, various warning lamps will be illuminated on the instrument panel. The vehicle may enter a fail-safe/limp-home mode that limits the driving speed of the vehicle. It is possible that the hybrid system will shut down while the vehicle is being driven, causing the vehicle to stall unexpectedly, increasing the risk of a crash.

V.	SAFETY PRECAUTIONS A. SAFETY CHECKLIST & PRECAUTIONS WHEN WORKING ON THE HIGH VOLTAGE SYSTEM
S	<ul> <li>Always remember <u>"SAFETY FIRST"</u></li> <li>Be extremely careful when handling high voltage components</li> <li>Before beginning and while working on the high voltage system, perform the following safety check list.</li> </ul>
1.	AIR VENTILATION AND FOREIGN MATERIALS
	<ul> <li>Perform work in an area that is free of dust and other airborne matter.</li> <li>Do not perform the work next to a stall where grinding or spraying of chemicals is performed.</li> <li>When not working in the inverter, temporarily install the inverter cover to prevent foreign material entering the inverter.</li> </ul>
2.	<ul> <li>PREVENT STATIC ELECTRICITY</li> <li>Static electricity can have an adverse effect on inverter components, discharge static electricity by touching a ground location on the vehicle before starting work.</li> </ul>
3.	<ul> <li>PREVENT ELECTRICAL SHOCKS &amp; SHORTS</li> <li>Confirm the auxiliary battery and the service grip have been unplugged for at least 5 minutes before beginning work on the high voltage system.</li> <li>Store the service grip in a secure location (in your pocket) to prevent accidental installation.</li> </ul>
	<ul> <li>To prevent short-circuiting of components, wrap tools with insulating tape before use.</li> <li>Do not wear metal; watches, rings, mechanical pencils, etc</li> <li>When working with or around a high voltage circuit (orange connectors and cables) wear the correct electrical insulating gloves.</li> <li>Confirm your electrical insulating gloves are not wet, or dirty.</li> <li>Confirm your electrical insulating gloves are not punctured or torn.</li> </ul>
4.	USE OF AIR & POWER TOOLS Do not use air tools or power tools on any component once the inverter cover has been removed to prevent damage and foreign materials from entering the inverter.
5.	<ul> <li>HANDLING OF PARTS</li> <li>Keep all removed parts organized and clean.</li> <li>Store all removed parts so they are not contaminated or damaged when removed from the inverter.</li> </ul>
6.	<ul> <li>HANDLING OF THE INVERTER &amp; CONNECTORS</li> <li>Cover all high voltage connectors with insulating tape immediately after disconnecting the connector.</li> <li>Use extreme care to prevent nuts/bolts from falling into the inverter when work is performed. If a part falls into the bottom section of the inverter the entire inverter assembly may need to be removed.</li> <li>Use extreme care to not drop any tools in the inverter assembly.</li> </ul>
7.	CONNECTING HIGH VOLTAGE TERMINALS  Confirm all terminals are clean before connecting to the inverter.  Torque specifications are critical, confirm all bolts are torque as described in these instructions.
8.	INTERMEDIATE INSPECTIONS
9.	ASSIGN A SAFETY SUPERVISOR
	<ul> <li>Assign a safety supervisor to be in charge of all safety precautions in the work area.</li> <li>Put a "Working with high voltage" warning sign on the vehicle during work.</li> </ul>

Person in charge: meters agetion deid **Working on** :NOITUAJ CAUTION: Working on high voltage system Person in charge:

Fold this page and place on the roof of vehicle.

## **VI. INVERTER VERIFICATION**



REMOVE THE ENGINE ROOM SIDE LH COVER

 a) Remove the 2 clips and the engine room cover.

Click here to watch the video introduction

#### 2. CONFIRM THE PART NUMBER and SERIAL NUMBER

- a) Record the part number and serial number on the repair order.
- b) Use the following website to determine if intelligent power module (IPM) transistor replacement is necessary.

http://b0j-bld-lookup.imagespm.info

#### NOTE:

- If the part number or serial number cannot be determined, the IPM transistor should be replaced.
- If there are any concerns regarding this inspection, email a picture of the label to quality\_compliance@toyota.com for assistance.

#### **PART & SERIAL NUMBER INFORMATION**

Use this information when interpreting the inverter part & serial numbers. If the part or serial number on the inverter is misinterpreted the appropriate repair may not be applied to the vehicle.



- Pay close attention to the differences in the letters I and L and the number 1.
- Pay close attention to the differences in the letter O and number 0.
- Pay close attention to the differences in the letter G and the number 6.
- Letters: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z

Numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

## VII. DISASSEMBLY

#### A. COMPONENTS



#### TORQUE SPECIFICATIONS INSIDE THE INVERTER ARE CRITICAL CONFIRM ALL BOLTS ARE TORQUED AS OUTLINED IN THESE INSTRUCTIONS





#### **B. VEHICLE DISASSEMBLY**



It is extremely important that all of the vehicle disassembly steps are followed prior to proceeding to the inverter disassembly steps. Failure to follow all steps could result in inverter damage.

#### 1. DETERMINE THE WORK PLACE

a) Choose a spot that is free of dust and debris. **DO NOT** work next to a place where grinding or spraying of chemicals is performed.



It is extremely important to prevent contamination of the inverter assembly. Confirm the work area is clean and free from airborne matter.

- 2. PLACE THE PROVIDED CAUTION SIGN ON THE ROOF OF THE VEHICLE
- 3. RECORD AUDIO AND AIR CONDITIONING SYSTEM SETTINGS
- 4. CHECK FOR DIAGNOSTIC TROUBLE CODES a) If any DTCs are output record the data.
- 5. DISCONNECT THE NEGATIVE BATTERY CABLE







- c) Remove the 2 connectors as described in the illustration.
- d) Wrap the terminals of the connectors with insulating tape.

- e) Disconnect the 2 wire harness clamps.
- f) Remove the 2 bolts and the ECU.

## 14. REMOVE THE POWER STEERING ECU BRACKET

a) Remove the bolt and bracket.

- 15. DISPLACE THE INVERTER RESERVE TANK SUB ASSEMBLY
  - a) Confirm the tank cap is securely tightened.
  - b) Plug the overflow hose, then fix the hose with tape as illustrated to prevent coolant leakage.





#### 19. DISPLACE THE INVERTER RESERVE TANK SUB ASSEMBLY

- a) Displace the reserve tank and secure it to the hood hinge to gain access to the inverter cover.
- b) Confirm the reserve tank does not leak coolant when in the displaced position.

## NOTE: *DO NOT* put excessive strain on the reserve tank hoses.

#### 20. CLEAN THE AREA AROUND THE INVERTER

a) Confirm all dust and water has been removed from the areas highlighted in the illustration. Clean using shop cloths and an air gun.



The inverter is a precision component and any contamination may cause a malfunction.

### THE FOLLOWING CONFIRMATION STEPS ARE VITAL CONFIRM THESE STEPS ARE FOLLOWED CLOSELY

#### PERFORM THIS INTERMEDIATE INSPECTION BEFORE BEGINNING WORK ON THE INVERTER.

- 1. Is the work space clear of dust and water?
- 2. Is the "Working with high voltage" warning sign posted?
- 3. Is the auxiliary battery disconnected and the service grip in a secure location (in your pocket)?
- 4. Is the inverter reserve tank displaced securely and free of leaks?
- 5. Are the areas around the inverter and the underside of the hood properly cleaned?
- 6. Are you wearing electrical insulating gloves that are in good condition?
- 7. Is the protective cover A clean and available for use?
- 8. Have you discharged all potential static electricity from your person?
  - C. INVERTER DISASSEMBLY
    - It is extremely important to prevent contamination of the inverter assembly.
    - Confirm the work area is clean and free from airborne matter.
    - Be sure to wear electrical insulating gloves during the entire inverter disassembly procedure.
    - DO NOT use any air tools or power tools during the inverter disassembly procedure.
    - Confirm all tools used on HV components are insulated or wrapped with insulating tape.
    - Internal components in the inverter are not available as service parts, be careful when removing, storing, and reinstalling these components.



- 1. REMOVE THE INVERTER COVER
  - a) Remove the bolt and the interlock bracket.
  - b) Wrap the terminal with insulating tape.



Confirm the entire cowl assembly has been removed prior to removing the inverter cover. Failure to do so could result in damage in the inverter.

Click here to watch the video supplement for steps 1-8







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#### 9. PROTECT THE HARNESSES AND TERMINALS

a) Position the disconnected harness outside the inverter so it does not obstruct the work.

Click here to watch the video supplement for steps 9-20

b) Cover the terminals indicated in the illustration with insulating tape.

- c) Secure the terminal to the other harnesses at the rear of the inverter so it does not obstruct the work.
- d) Secure the 2 forward terminals to the inner wall of the inverter as indicated in the illustration so they do not obstruct the work.

NOTE: *DO NOT* position the terminals in a way that will allow the inverter cover to pinch them when the cover is temporarily installed.



a) **4WD** – Remove the 15 bolts and disconnect the high voltage MG1, MG2, and MGR cables. Cover the terminals with insulating tape.

**2WD** – Remove the 10 bolts and disconnect the high voltage MG1 and MG2 cables. Cover the terminals with insulating tape.



To prevent contamination, *DO NOT* use the bolts that were removed from the outside of the inverter on the inside.







#### VIII. **GREASE APPLICATION**

#### THE FOLLOWING CONFIRMATION STEPS ARE VITAL **CONFIRM THESE STEPS ARE FOLLOWED CLOSELY**

#### PERFORM THIS INTERMEDIATE INSPECTION BEFORE APPLYING GREASE TO THE IPM TRANSISTOR.

- 1. Is the smoothing capacitor stored properly with protective cover A installed?
- 2. Are the disconnected high voltage terminals covered with insulating tape?
- 3. Has the inverter case been thoroughly cleaned?
- 4. Is the inverter cover temporarily installed?
- 5. Is the grease application work space clear of dust, water and other forms of contamination?
- 6. Is the masking plate and squeegee clean and in good condition?
- Have you discharged all potential static electricity from your person? 7.

#### A. IPM TRANSISTOR ASSEMBLY



#### 1. ASSEMBLE THE NEW IPM TRANSISTOR

a) Place the new IPM transistor on a clean shop cloth.

Clean shop cloth



DO NOT touch the circuit board that is between the upper and lower sections of the **IPM transistor.** 

#### Do not touch the board



b) Install the sub capacitor with the 4 bolts.

Torque: 6.0N·m (61kgf·cm, 53in. lbf)

c) Install the 2 wires with the 2 screws.

NOTE:

- DO NOT attach the wires to the incorrect terminals.
- Position the wires so they do not protrude past the IPM transistor.

#### **B. IPM TRANSISTOR GREASE APPLICATION**



1. PLACE THE IPM TRANSISTOR UPSIDE DOWN ON A CLEAN SURFACE

#### 2. INSPECT THE MASKING PLATE AND SQUEEGEE

- a) Confirm the masking plate and squeegee are clean.
- b) Confirm the masking plate and squeegee are not bent or damaged.

#### 3. INSTALL THE MASKING PLATE

- a) Place the IPM transistor so the 3 notches are at the top.
- b) Align the upper left notch in the masking plate with the alignment notch in the IPM transistor.
- c) Tighten the masking plate by hand using the 4 nuts/bolts provided.

## NOTE: *DO NOT* use tools when tightening the masking plate to prevent damage.

- d) Confirm the masking plate is installed in the correct position.
- e) Confirm the masking plate is securely attached.
- f) Confirm the masking plate is clean.



#### 4. PREPARE 2 TUBES OF THERMAL CONDUCTIVE GREASE

- a) Knead the tubes to confirm the grease is properly mixed.
- b) Clean the tubes with brake cleaner.

NOTE: The tubes may be used to apply the grease, it is critical that they are clean.





### 7. SPREAD THE GREASE

- a) Position the IPM transistor so the alignment notch on the masking plate is in the upper left position.
- b) Hold the squeegee at a 45 degree angle.
- c) Beginning on the upper side of the IPM transistor, slide the squeegee down past the bottom of the application windows.

# NOTE: To ensure all grease is used effectively, *DO NOT* slide the squeegee into the bolts.

- d) Lift the squeegee with the grease.
- e) Turn the squeegee around and slide it from the bottom of the IPM transistor up past the top of the application windows.



*DO NOT* remove the excess grease from the squeegee until it has been confirmed that the grease has been spread correctly.

THE FOLLOWING STEPS ARE VITAL CONFIRM THESE STEPS ARE FOLLOWED CLOSELY								
CONFIRM THE CONDITIO	N OF THE THERMAL CONDUCTIVE GREASE							
SAMPLE	CONDITION & ACTION REQUIRED							
	CONDITION: Smooth surface and complete coverage. ACTION: Proceed to: SECTION X. REASSEMBLY							
	transistor <b>NOT</b> visible through the grease.							
Contraction of the second	ACTION: Proceed to: SECTION X. REASSEMBLY							
Real Property and the second sec	<b>CONDITION:</b> Grease unsmooth. Metal surface of the IPM transistor visible through the grease.							
	ACTION: Proceed to: STEP C #2. REAPPLY GREASE TO THE NEEDED AREAS							
	<b>CONDITION:</b> Hole or imperfection in the grease exposing the metal surface of the IPM transistor.							
k	ACTION: Proceed to: STEP C #2. REAPPLY GREASE TO THE NEEDED AREAS							
	<b>CONDITION:</b> Foreign material in the grease.							
T	ACTION: Proceed to: STEP C #1. REMOVE FOREIGN MATERIAL FROM THE GREASE							

#### C. GREASE APPLICATION CORRECTION (Only perform these steps if the above inspection determines it is necessary)



### IX. REASSEMBLY

#### A. INVERTER REASSEMBLY





- c) Loosely install 10 bolts.
- d) Remove the 2 installation studs.
- e) Loosely install the 2 remaining bolts.

f) Tighten the 12 bolts in the sequence shown in the illustration.

Torque: 6N·m (61kgf·cm, 53 in.lbf)

NOTE: Confirm the 12 bolts are tightened in the correct sequence to ensure the grease contacts correctly.

4. *4WD ONLY* –REMOVE PROTECTIVE COVER B NOTE: Protective Cover B will be removed on STEP 11 on 2WD vehicles.

- 5. INSTALL THE INVERTER WIRE HARNESSES
  - a) **4WD ONLY** Connect the 2 clamps and 1 connectors. **2/4WD** – Connect the 2 clamps and the connector.











e) Connect the 2 connectors and fit the 2 grommets.



Cross the 2 harnesses inside the inverter.The harnesses can be crossed in either

direction. Confirm the grommets are clean before installing to prevent leaks.

## THE FOLLOWING CONFIRMATION STEPS ARE VITAL CONFIRM THESE STEPS ARE FOLLOWED CLOSELY

- PERFORM THIS INTERMEDIATE INSPECTION BEFORE INSTALLING THE INVERTER CASE COVER.
- 1. Are the high voltage cables (MG1, MG2 and MGR for 4WD) connected correctly?
- 2. Are all of the MG ECU connectors secured and the ground bolts connected?
- 3. Have all components been installed correctly in the inverter assembly?



#### **18. INSTALL THE INVERTER COVER**

- a) Confirm the cover gasket is set in the cover groove.
- b) Confirm the cover gasket and inverter mating surface are clean.
- c) Install the cover using the 12 bolts.

Torque: 10N·m (102kgf·cm, 84in. lbf)

NOTE: The cover gasket can be reused even if it has come out of the groove.

- d) Remove the insulating tape from the interlock bracket.
- e) Install the bracket with the 1 bolt.

Torque: 10N·m (102kgf·cm, 84in. lbf)



#### **B. VEHICLE REASSEMBLY**



#### 1. CLEAN THE THROTTLE BODY

a) Use a shop cloth soaked in throttle plate cleaner to clean the throttle body.

NOTE:

- **DO NOT** spray the throttle valve directly.
- This procedure should be performed to ensure the engine learn values are set correctly.

#### 2. INSTALL THE COMPONENTS ILLUSTRATED BELOW



#### NOTE:

- Install ALL air intake system components prior to attempting READY ON; otherwise, DTCs may occur.
- Wear insulating gloves when installing the power steering ECU components.
- For detailed installation information, refer to the repair manual.

#### 3. INSTALL THE SERVICE GRIP

4. INSTALL THE NEGATIVE BATTERY CABLE

#### 5. CONFIRM VEHICLE OPERATION

- a) Turn the vehicle to READY ON.
- b) Confirm the vehicle is in park.
- c) Turn the air conditioner on high and allow vehicle to run for 3 minutes.
- d) Confirm auxiliary battery voltage.

#### Specification: 13 to 15 V

e) Check for DTCs. If DTCs are output use the repair manual and the trouble shooting table in the Appendix of these instructions to diagnose.

#### NOTE:

- If DTCs are present after IPM replacement, first confirm IPM replacement was performed correctly, if it is determined that inverter replacement is required you *MUST* contact TAS (800-233-3178) to confirm your diagnosis, then contact your regional representative to obtain operation codes for dealership reimbursement.
- If DTCs that were not present prior to IPM replacement are present after IPM replacement, confirm IPM replacement was performed correctly.

- 6. INSTALL ALL REMAINING COMPONENTS
- 7. CHECK FOR DIAGNOSTIC TROUBLE CODES
- 8. TEST DRIVE THE VEHICLE
- 9. PERFORM SYSTEM INITIALIZATIONS

## ◄ VERIFY REPAIR QUALITY ►

- Confirm the part number AND serial number before replacing the IPM transistor
- Confirm the work area is very clean before disassembling the inverter
- Confirm ALL removal steps are followed, to prevent damage DO NOT skip any steps
- Confirm the inverter is cleaned thoroughly and the grease is applied correctly to the IPM transistor
- Confirm ALL installation steps are followed

#### If you have any questions regarding this recall, please contact your regional representative

### X. APPENDIX

#### A. RECALL PARTS DISPOSAL

As required by Federal Regulations, please make sure all recalled parts (original parts) removed from the vehicle are disposed of in a manner in which they will not be reused, **unless requested for parts recovery return.** 

#### **B. TROUBLESHOOTING TABLE**

Use this table if any DTCs are output after performing the campaign. If the DTC output is not listed in this table, or checking the connectors does not remedy the condition, refer to the repair manual for additional diagnostic information.



DTC		(	Conr	necto	or to	insp	ect	
DIC	Α	В	С	D	Ε	F	G	Η
B1477/71								0
B1477/77								0
P0A02-719			0					
P0A03-720			0					
P0A08-264		0						
P0A09-265		0						
P0A10-263		0						
P0A1A-151	0	0	0	0	0			
P0A1A-155	0	0	0	0	0			
P0A1A-156	0	0	0	0	0			
P0A1A-158	0	0	0	0	0			
P0A1A-166	0	0	0	0	0			
P0A1A-200	0	0	0	0	0			
P0A1A-658	0	0	0	0	0			
P0A1A-659	0	0	0	0	0			
P0A1A-791	0	0	0	0	0			
P0A1A-792	0	0	0	0	0			
P0414-793	0	0	0	0	0			
P0A1B-163	0	0	0	0	0			
P0A1B-164	0	0	0	0	0			
P0A1D-104	0	0	0	0	0			
P0A1D-100	0	0	0	0	0			
PUAID-192	0	0	0	0	0			
PUAID-193	0	0	0	0	0			
PUAID-193	0	0	0	0	0			
PUAID-190	0	0	0	0	0			
PUA IB-190	0	0	0	0	0			
PUA IB-311	0	0	0	0	0			
PUA1B-512	0	0	0	0	0			
PUA1B-661	0	0	0	0	0			
P0A1B-662	0	0	0	0	0			
P0A1B-781	0	0	0	0	0			
P0A1B-786	0	0	0	0	0			
P0A1B-788	0	0	0	0	0			
P0A1B-794	0	0	0	0	0			
PUA1B-795	0	0	0					
PUA1B-796	0	0	0	0	0			
P0A1C-706	0	0	0	0	0			
P0A1C-707	0	0	0	0	0			
P0A1C-708	0	0	0	0	0			
P0A1C-709	0	0	0	0	0			
P0A1C-710	0	0	0	0	0			
P0A1C-711	0	0	0	0	0			
P0A1C-713	0	0	0	0	0			
P0A1C-715	0	0	0	0	0			
P0A1C-797	0	0	0	0	0			
P0A1C-798	0	0	0	0	0			
P0A1C-799	0	0	0	0	0			
P0A3F-243	0							
P0A40-500	0							

DTC		(	Conr	necto	or to	insp	ect	
DIC	Α	В	С	D	Ε	F	G	Η
P0A41-245	0							
P0A45-669		0						
P0A46-671		0						
P0A47-670		0						
P0A4B-253	0							
P0A4C-513	0							
P0A4D-255	0							
P0A55-687					0		0	
P0A60-288				0		0		
P0A60-289				0		0		
P0A60-290				0		0		
P0A60-292				0		0		
P0A60-294				0		0		
P0A60-501				0		0		
P0A63-296				0		0		
P0A63-297				0		0		
P0A63-298				0		0		
P0463-300				0		0		
P0463-302				0		0		
P0463-502				0		0		
D0A60 677					0		0	
P0A09-077					0		0	
PUA09-079					0		0	
PUA09-000					0		0	
PUA09-003					0		0	
PUA09-004					0		0	
PUA09-088					0		0	
PUA6C-678					0		0	
PUA6C-681					0		0	
P0A6C-682					0		0	
P0A6C-685					0		0	
P0A6C-686					0		0	
P0A6C-689					0		0	
P0A72-326				0		0		
P0A72-327				0		0		
P0A72-328				0		0		
P0A72-330				0		0		
P0A72-333				0		0		
P0A72-515				0		0		
P0A75-334				0		0		
P0A75-335				0		0		
P0A75-336				0		0		
P0A75-338				0		0		
P0A75-341				0		0		
P0A75-516				0		0		
P0A78-278				0		0		
P0A78-280				0		0		
P0A78-283				0		0		
P0A78-285				0		0		
P0A79-690					0		0	
		I	1	1				

DTC	Connector to inspect									
	Α	В	С	D	Ε	F	G	Η		
P0A79-691					0		0			
P0A7A-321				0		0				
P0A7A-323				0		0				
P0A94-545			0							
P0A94-546			0							
P0A94-551			0							
P0A94-552			0							
P0A94-587			0							
P0AA6-526										
P0AA6-613										
P0AA6-614										
P0AA6-655										
P0AEF-275				0						
P0AF0-274				0						
P0AF4-673					0					
P0AF4-674					0					
P3222-313				0						
P3223-312				0						
P3227-583		0								
P3228-584		0								
U0110-159	0	0	0	0	0					
U0110-160	0	0	0	0	0					
U0110-656	0	0	0	0	0					
U0110-657	0	0	0	0	0					
Auxiliary battery voltage error		0								