SECTION STR
STARTING SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000012788295

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery or batteries, and wait at least three minutes before performing any service.**

Precautions When Battery Is Discharged

INFOID:0000000012788296

When battery is discharged, disconnect the negative terminal of the battery and wait for 1 minute before connecting jumper cables to restart the engine. (This is necessary for resetting information in ECM)

PREPARATION

PREPARATION

Special Service Tool

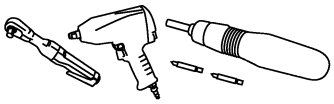
INFOID:0000000012788297

The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
— (—) Model GR8-1200 NI Multitasking battery and electrical diagnostic station  AWIIA1239ZZ	Tests batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.

Commercial Service Tool

INFOID:0000000012788298

Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts

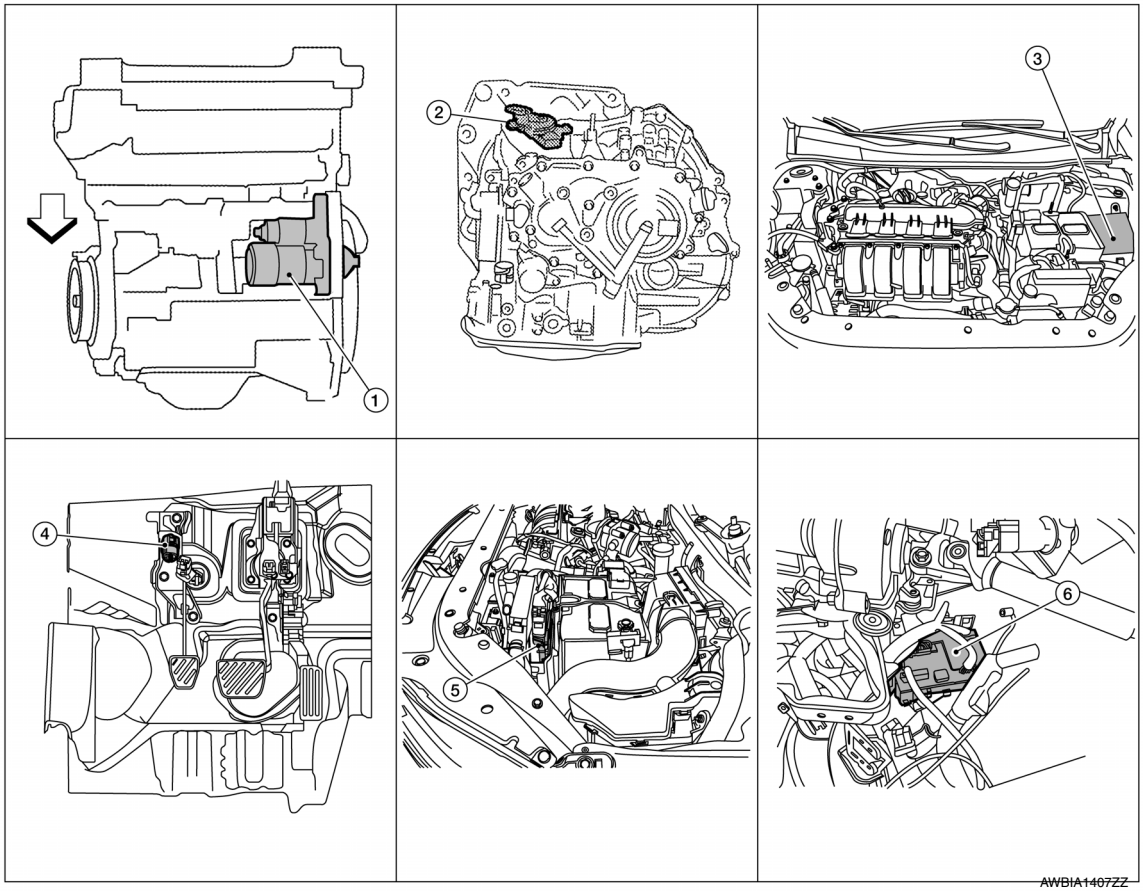
SYSTEM DESCRIPTION

COMPONENT PARTS

STARTING SYSTEM (WITH INTELLIGENT KEY)

STARTING SYSTEM (WITH INTELLIGENT KEY) : Component Parts Location

INFOID:0000000012788299



⇦ Vehicle front

1. Starter motor
2. Transmission range switch (CVT Models)
3. IPDM E/R (view with air inlet duct removed)
4. Clutch interlock switch (M/T Models)
5. ECM
6. BCM (view under instrument panel, left side of vehicle)

STARTING SYSTEM (WITH INTELLIGENT KEY) : Component Description

INFOID:0000000012788300

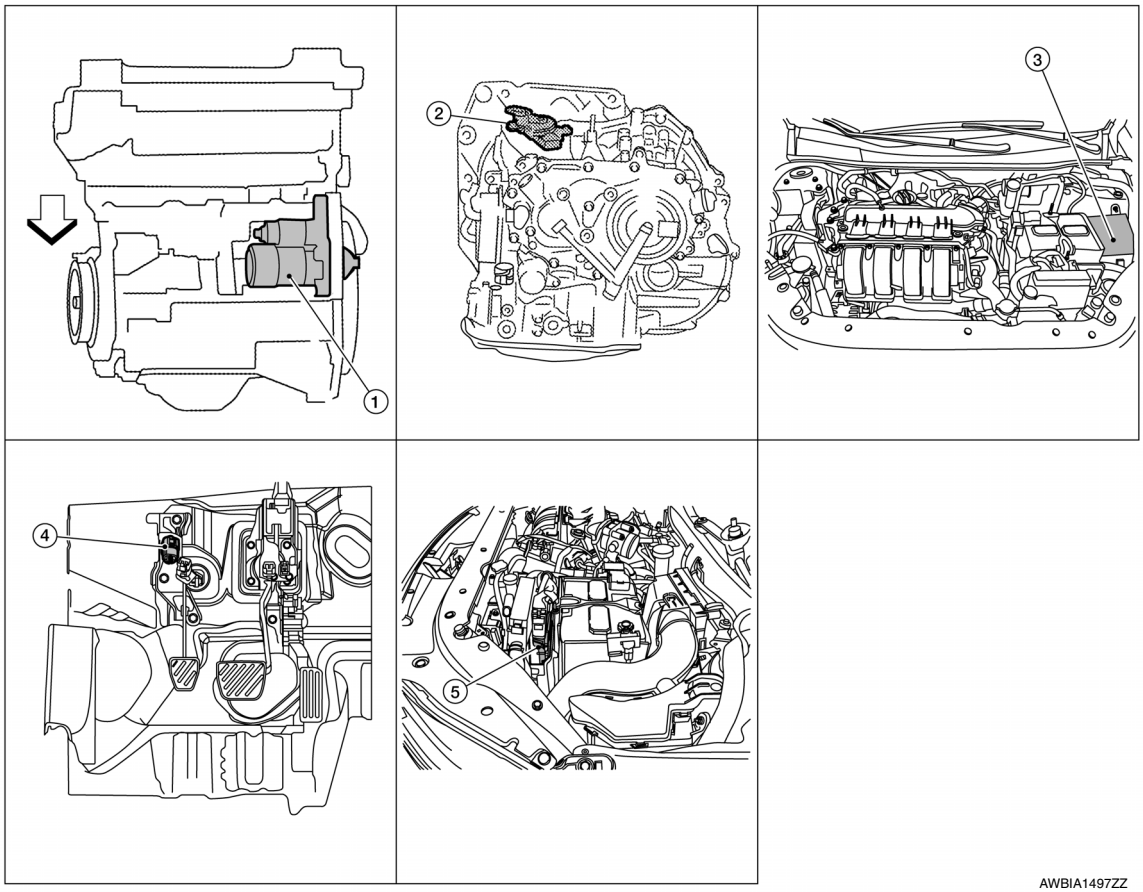
Component part	Description
Starter motor	The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the S terminal is supplied with electric power.
Transmission range switch (CVT Models)	Transmission range switch supplies power to the starter relay and starter control relay inside the IPDM E/R when the shift selector is placed in the P or N position.
IPDM E/R	CPU inside IPDM E/R operates the starter control relay when the ignition switch is in the start position.

Clutch interlock switch (M/T Models)	Clutch interlock switch supplies power to the coil side of the starter relay and starter control relay (inside IPDM E/R) when the clutch pedal is depressed to crank the engine.
ECM	ECM controls the starter control relay inside the IPDM E/R.
BCM	BCM controls the starter relay inside IPDM E/R.

STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

STARTING SYSTEM (WITHOUT INTELLIGENT KEY) : Component Parts Location

INFOID:0000000012788301



AWBIA1497ZZ

⇦ Vehicle front

1. Starter motor
2. Transmission range switch (CVT Models)
3. IPDM E/R (view with air inlet duct removed)
4. Clutch interlock switch (M/T Models)
5. ECM

STARTING SYSTEM (WITHOUT INTELLIGENT KEY) : Component Description

INFOID:0000000012788302

Component part	Description
Starter motor	The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the S terminal is supplied with electric power.
Transmission range switch	Supplies power to the starter relay and starter control relay (inside IPDM E/R) when the selector lever is shifted into the P or N position.
IPDM E/R	CPU inside IPDM E/R operates the starter control relay when the ignition switch is in the start position.

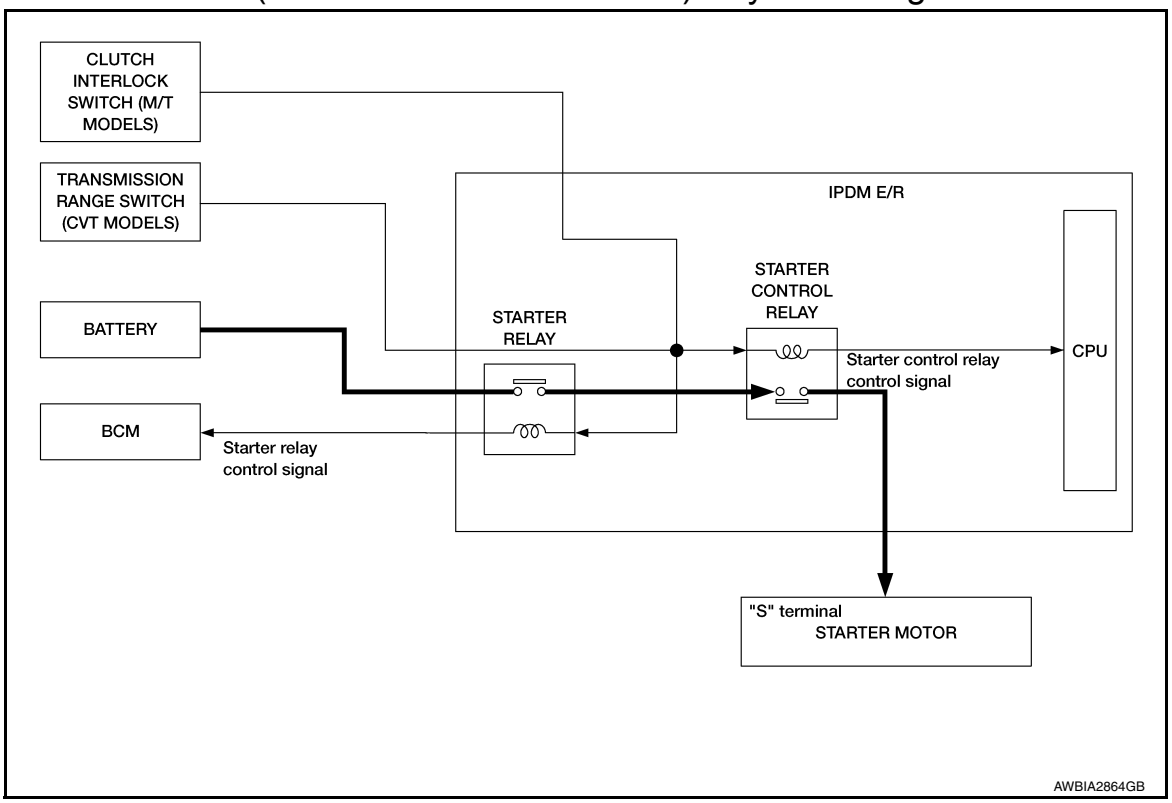
Clutch interlock switch (M/T Models)	Clutch interlock switch supplies power to the coil side of the starter relay and starter control relay (inside IPDM E/R) when the clutch pedal is depressed to crank the engine.
ECM	ECM controls the starter relay inside the IPDM E/R.

SYSTEM

STARTING SYSTEM (WITH INTELLIGENT KEY)

STARTING SYSTEM (WITH INTELLIGENT KEY) : System Diagram

INFOID:0000000012788303



STARTING SYSTEM (WITH INTELLIGENT KEY) : System Description

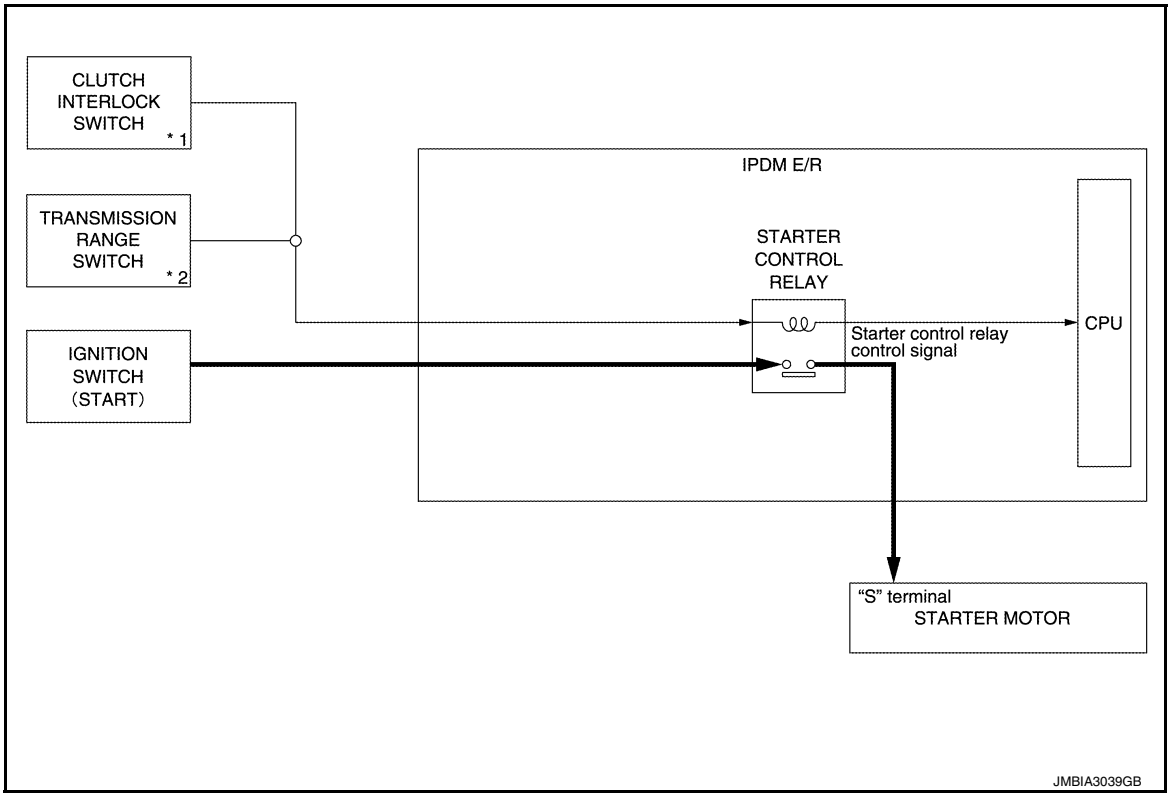
INFOID:0000000012788304

- When the selector lever is in the P or N position, power is supplied to starter relay and starter control relay by the transmission range switch. The BCM and IPDM E/R (CPU) will detect the selector lever position by the input signal.
- When the starter operating condition is meet, the IPDM E/R will turn the starter control relay ON by starter control relay control signal.
- When engine cranking condition is meet, the BCM turns ON the starter relay by starter control relay signal.
- Then battery power is supplied to starter motor (“S” terminal) through the starter control relay and starter relay.

STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

STARTING SYSTEM (WITHOUT INTELLIGENT KEY) : System Diagram

INFOID:0000000012788305



*1: M/T models

*2: CVT models

STARTING SYSTEM (WITHOUT INTELLIGENT KEY) : System Description

INFOID:0000000012788306

CVT MODELS

- When the selector lever is in the P or N position, power is supplied to starter control relay by the transmission range switch. The IPDM E/R (CPU) detects selector lever P/N condition by the inputted signal.
- When engine cranking condition is satisfied, then battery power is supplied to starter motor ("S" terminal) through starter control relay.

M/T MODELS

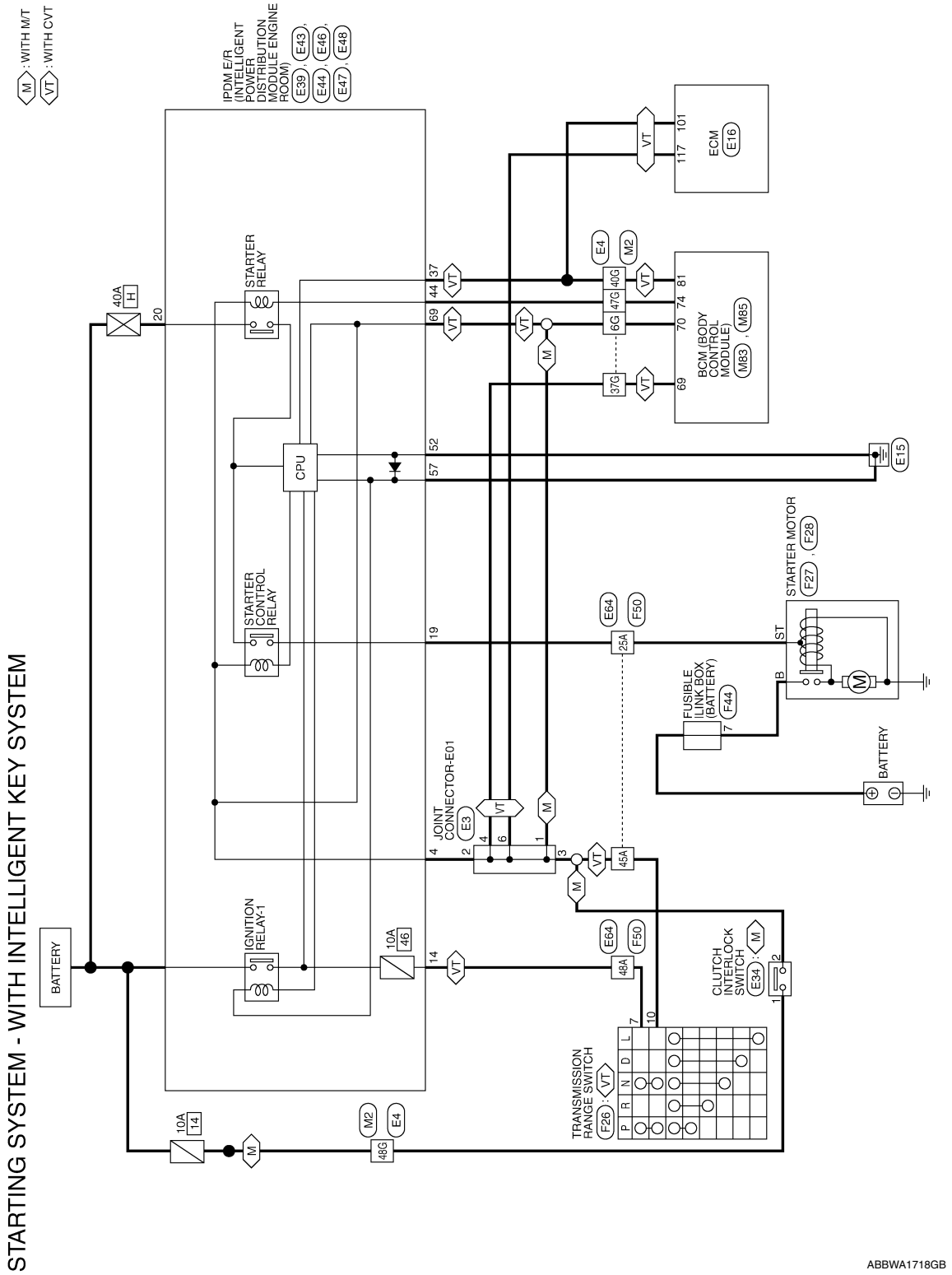
When the clutch pedal is depressed, battery power is supplied to starter motor ("S" terminal).

WIRING DIAGRAM

STARTING SYSTEM (WITH INTELLIGENT KEY)

Wiring Diagram

INFOID:0000000012788307



STARTING SYSTEM CONNECTORS - WITH INTELLIGENT KEY SYSTEM

Connector No.	M2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1G	2G	3G	4G	5G
6G	7G	8G	9G	10G

11G	12G	13G	14G	15G	16G	17G	18G	19G	20G	21G
22G	23G	24G	25G	26G	27G	28G	29G	30G		

31G	32G	33G	34G	35G	36G	37G	38G	39G	40G	41G
42G	43G	44G	45G	46G	47G	48G	49G	50G		

51G	52G	53G	54G	55G	56G	57G	58G	59G	60G	61G
62G	63G	64G	65G	66G	67G	68G	69G	70G		

71G	72G	73G	74G	75G	76G	77G	78G	79G	80G	81G
82G	83G	84G	85G	86G	87G	88G	89G	90G		

91G	92G	93G	94G	95G
96G	97G	98G	99G	100G

Terminal No.	Color of Wire	Signal Name
6G	BG	–
37G	L	–
40G	G	–
47G	SB	–
48G	G	–

Connector No.	M85
Connector Name	BCM (BODY CONTROL MODULE) (WITH INTELLIGENT KEY SYSTEM)
Connector Color	WHITE

H.S.

89	88	87	86	85	84	83	82	81
95	94	93	92	91	90			

Terminal No.	Color of Wire	Signal Name
81	G	STARTER OUTPUT ENABLE INPUT (WITH CVT)

Connector No.	M83
Connector Name	BCM (BODY CONTROL MODULE) (WITH INTELLIGENT KEY SYSTEM)
Connector Color	WHITE

H.S.

60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61

Terminal No.	Color of Wire	Signal Name
69	L	SHIFT N, P (WITH CVT)
70	BG	INHIBIT RLY OUT (WITH CVT)
70	BG	CLUTCH SW (WITH M/T)
74	SB	STARTER RELAY OUTPUT

Connector No.	E3
Connector Name	JOINT CONNECTOR-E01
Connector Color	BLUE

H.S.

12	11	10	9	8	7	6	5	4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	BR	–
3	BR	–
4	BR	–
6	BR	–

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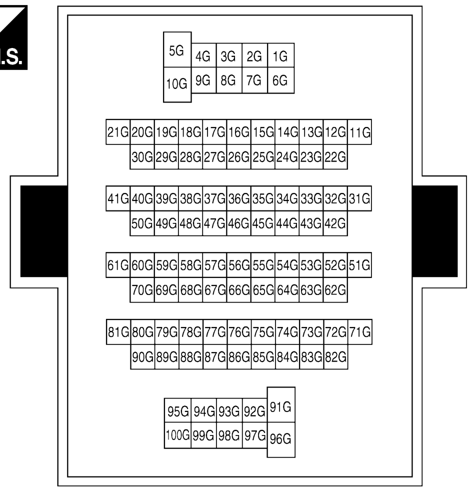
Connector No.	E4
Connector Name	WIRE TO WIRE
Connector Color	WHITE

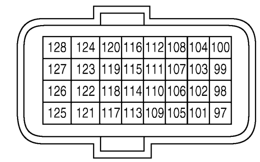
H.S.



Terminal No.	Color of Wire	Signal Name
6G	BR	–
37G	BR	–
40G	SB	–
47G	V	–
48G	LG	–

Connector No.	E16
Connector Name	ECM
Connector Color	GRAY

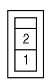
H.S.



Terminal No.	Color of Wire	Signal Name
101	SB	STARTER RELAY CUT OFF SIGNAL
117	BR	PNP SIGNAL

Connector No.	E34
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Color	BROWN

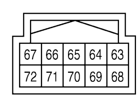
H.S.



Terminal No.	Color of Wire	Signal Name
1	LG	–
2	BR	–

Connector No.	E39
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

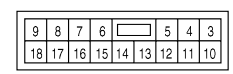
H.S.



Terminal No.	Color of Wire	Signal Name
69	BR	IGN SW IG2

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

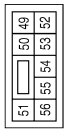
H.S.



Terminal No.	Color of Wire	Signal Name
4	BR	NP SW
14	LG	REVERSE LAMP

ABBIA3350GB

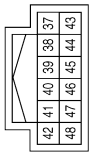
Connector No.	E47
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN



H.S.

Terminal No.	Color of Wire	Signal Name
52	B/Y	SIGNAL GND

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



H.S.

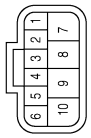
Terminal No.	Color of Wire	Signal Name
37	SB	INHIBIT CUT
44	V	START CONT

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
19	R	STARTER MOTOR
20	P	F/L IGN SW

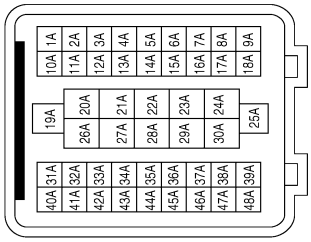
Connector No.	F26
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	BLACK



H.S.

Terminal No.	Color of Wire	Signal Name
7	GR	–
10	BR	–

Connector No.	E64
Connector Name	WIRE TO WIRE
Connector Color	BLACK



H.S.

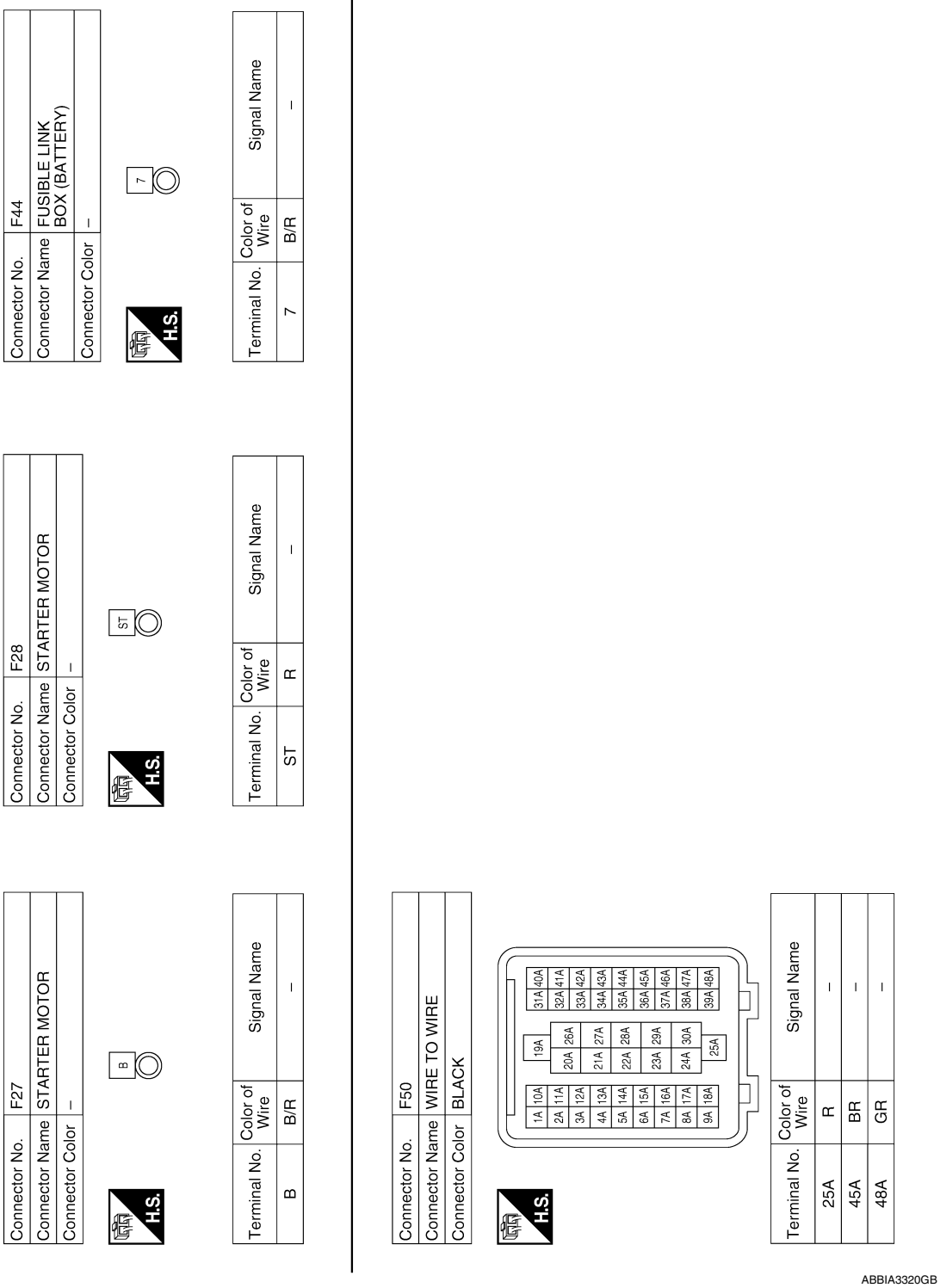
Terminal No.	Color of Wire	Signal Name
25A	R	–
45A	BR	–
48A	LG	–

Connector No.	E48
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
57	B/Y	POWER GND

ABBIA3319GB

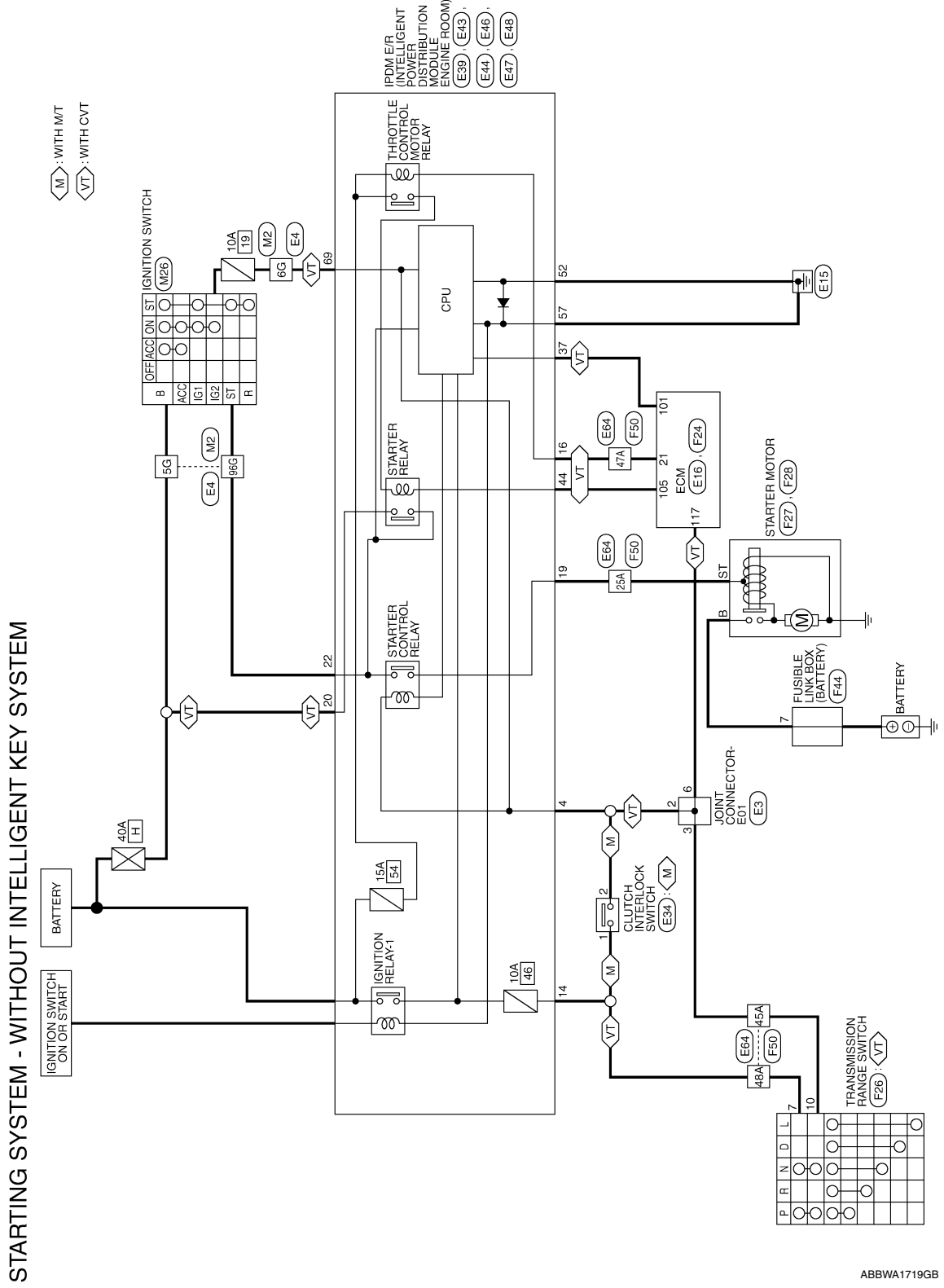


ABBIA3320GB

STARTING SYSTEM (WITHOUT INTELLIGENT KEY)

Wiring Diagram

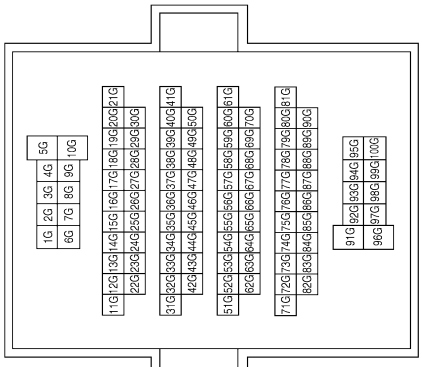
INFOID:0000000012788308



STARTING SYSTEM CONNECTORS - WITHOUT INTELLIGENT KEY SYSTEM

Connector No.	M2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
5G	G	–
6G	BG	–
96G	L	–

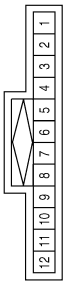
Connector No.	M26
Connector Name	IGNITION SWITCH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
B	G	–
IG2	P	–
ST	L	–

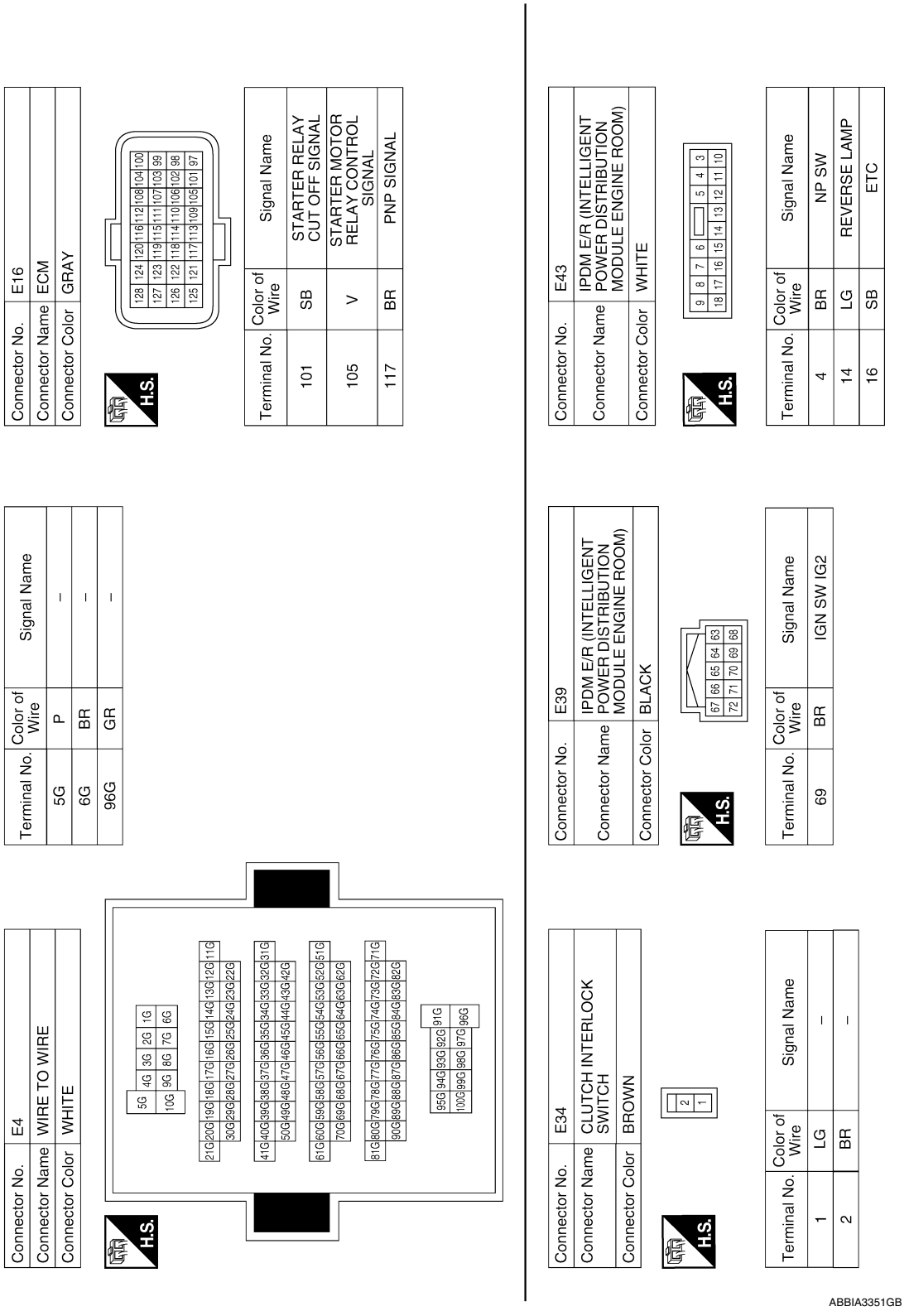
Connector No.	E3
Connector Name	JOINT CONNECTOR-E01
Connector Color	BLUE

H.S.



Terminal No.	Color of Wire	Signal Name
2	BR	–
3	BR	–
6	BR	–

ABBIA3321GB



Connector No.	E16
Connector Name	ECM
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
101	SB	STARTER RELAY CUT OFF SIGNAL
105	V	STARTER MOTOR RELAY CONTROL SIGNAL
117	BR	PNP SIGNAL

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
4	BR	NP SW
14	LG	REVERSE LAMP
16	SB	ETC

Terminal No.	Color of Wire	Signal Name
5G	P	–
6G	BR	–
96G	GR	–

Connector No.	E4
Connector Name	WIRE TO WIRE
Connector Color	WHITE

Connector No.	E39
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
69	BR	IGN SW IG2

Connector No.	E34
Connector Name	CLUTCH INTERLOCK SWITCH
Connector Color	BROWN

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	BR	–

ABBIA3351GB

Connector No.	E47
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

51		50	49
56	55	54	53	52

Terminal No.	Color of Wire	Signal Name
52	B/Y	SIGNAL GND

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39	38	37
48	47	46	45	44	43

Terminal No.	Color of Wire	Signal Name
37	SB	INHIBIT CUT
44	V	START CONT

Connector No.	F24
Connector Name	ECM
Connector Color	BLACK

H.S.

48	44	40	36	32	28	24	20	16	12	8	4
47	43	39	35	31	27	23	19	15	11	7	3
46	42	38	34	30	26	22	18	14	10	6	2
45	41	37	33	29	25	21	17	13	9	5	1

Terminal No.	Color of Wire	Signal Name
21	Y	THROTTLE CONTROL MOTOR RELAY

Connector No.	E64
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

40A	31A		19A		10A	1A
41A	32A			26A	20A	11A	2A
42A	33A					12A	3A
43A	34A			27A	21A	13A	4A
44A	35A			28A	22A	14A	5A
45A	36A			29A	23A	15A	6A
46A	37A			30A	24A	16A	7A
47A	38A				25A	17A	8A
48A	39A					18A	9A

Terminal No.	Color of Wire	Signal Name
25A	R	–
45A	BR	–
47A	SB	–
48A	LG	–

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

21	20	19
24	23	22

Terminal No.	Color of Wire	Signal Name
19	R	STARTER MOTOR
20	P	F/L IGN SW
22	GR	IGN SW (ST)

Connector No.	E48
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

59	58	57
62	61	60

Terminal No.	Color of Wire	Signal Name
57	B/Y	POWER GND

ABBIA3352GB

Connector No.	F26
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
7	GR	–
10	BR	–

Connector No.	F27
Connector Name	STARTER MOTOR
Connector Color	–

H.S.

Terminal No.	Color of Wire	Signal Name
B	B/R	–

Connector No.	F28
Connector Name	STARTER MOTOR
Connector Color	–

H.S.

Terminal No.	Color of Wire	Signal Name
ST	R	–

Connector No.	F44
Connector Name	FUSIBLE LINK BOX (BATTERY)
Connector Color	–

H.S.

Terminal No.	Color of Wire	Signal Name
7	B/R	–

Connector No.	F50
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
25A	R	–
45A	BR	–
47A	Y	–
48A	GR	–

ABBIA2899GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow (With GR8-1200 NI)

INFOID:0000000012788309

STARTING SYSTEM DIAGNOSIS WITH GR8-1200 NI

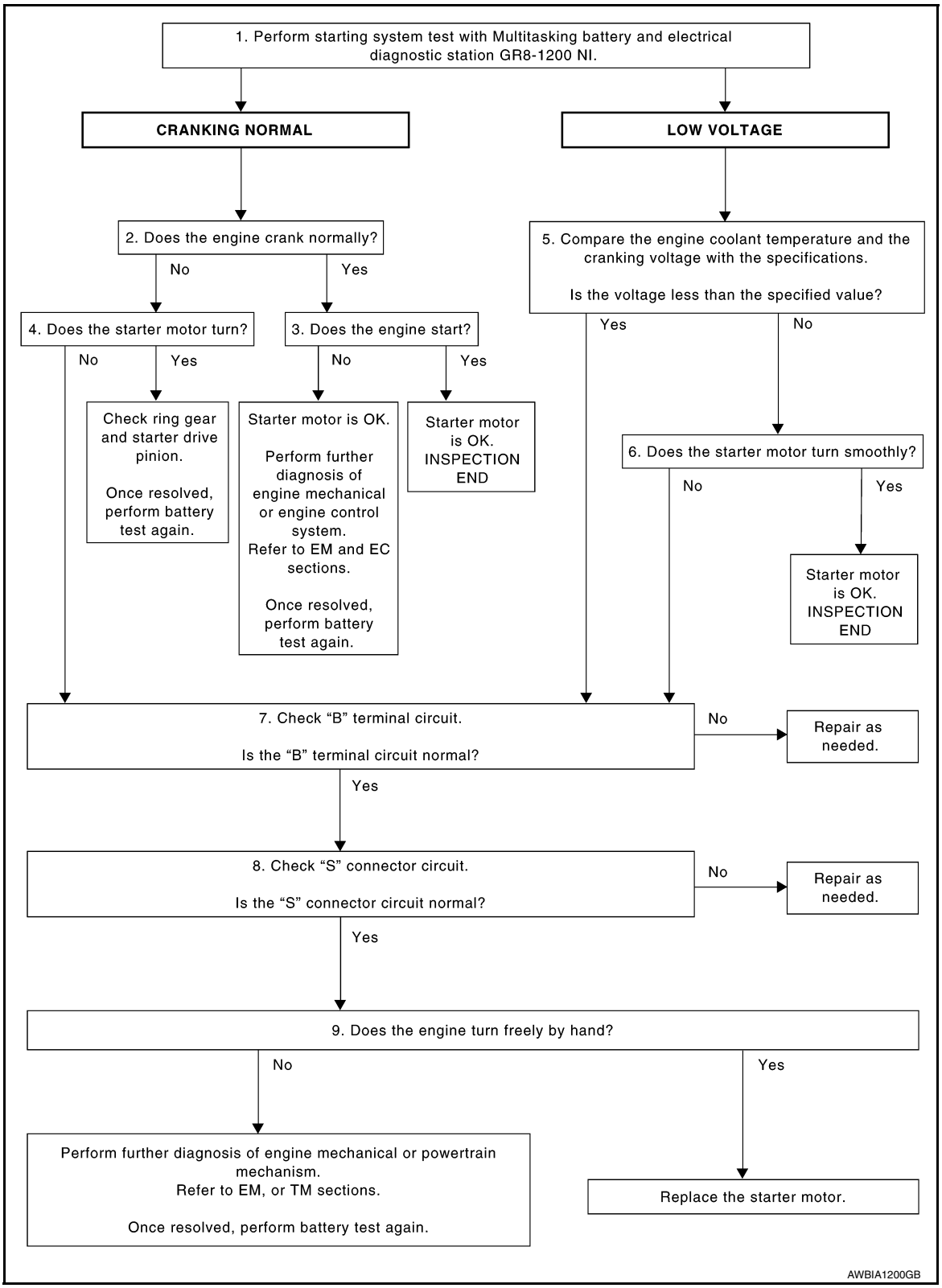
To test the starting system, use the following special service tool:

- GR8-1200 NI Multitasking battery and electrical diagnostic station

NOTE:

Refer to the diagnostic station Instruction Manual for proper starting system diagnosis procedures.

OVERALL SEQUENCE



DETAILED FLOW

NOTE:

To ensure a complete and thorough diagnosis, the battery, starter motor and generator test segments must be done as a set from start to finish.

1. DIAGNOSIS WITH MULTITASKING BATTERY AND ELECTRICAL DIAGNOSTIC STATION GR8-1200 NI

Perform the starting system test with Multitasking battery and electrical diagnostic station GR8-1200 NI. For details and operating instructions, refer to diagnostic station Instruction Manual.

Test result

CRANKING NORMAL>>GO TO 2.
LOW VOLTAGE>>GO TO 5.
CHARGE BATTERY>>Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again. Refer to diagnostic station instruction manual.
REPLACE BATTERY>>Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again. Refer to diagnostic station instruction manual. If second test result is “REPLACE BATTERY”, then do so. Perform battery test again to confirm repair.

2.CRANKING CHECK

Check that the starter motor operates properly.

Does the engine crank normally?

YES >> GO TO 3.
NO >> GO TO 4.

3.ENGINE START CHECK

Check that the engine starts.

Does the engine start?

YES >> Inspection End.
NO >> Perform further diagnosis of engine mechanical or engine control system. Refer to EM and EC sections. Once resolved, perform battery test again.

4.STARTER MOTOR ACTIVATION

Check that the starter motor operates.

Does the starter motor turn?

YES >> Check ring gear and starter motor drive pinion. Once resolved, perform battery test again.
NO >> GO TO 7.

5.COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE

Compare the engine coolant temperature and verify the cranking voltage is within specifications.

Minimum Specification of Cranking Voltage Referencing Coolant Temperature

Engine coolant temperature [°C (°F)]	Voltage [V]
−30 to −20 (−22 to −4)	8.6
−19 to −10 (−2 to 14)	9.1
−9 to 0 (16 to 32)	9.5
More than 1 (More than 34)	9.9

Is the voltage less than the specified value?

YES >> GO TO 7.
NO >> GO TO 6.

6.STARTER OPERATION

Check the starter operation.

Does the starter motor turn smoothly?

YES >> Inspection End.
NO >> GO TO 7.

7.“B” TERMINAL CIRCUIT INSPECTION

Check “B” terminal circuit. Refer to STR-26, "Diagnosis Procedure".

Is “B” terminal circuit normal?

YES >> GO TO 8.
NO >> Repair as needed.

8.“S” CONNECTOR CIRCUIT INSPECTION

Check “S” connector circuit. Refer to STR-28, "Diagnosis Procedure".

Is “S” connector circuit normal?

YES >> GO TO 9.
NO >> Repair as needed.

9. ENGINE ROTATION STATUS

Check that the engine can be rotated by hand.

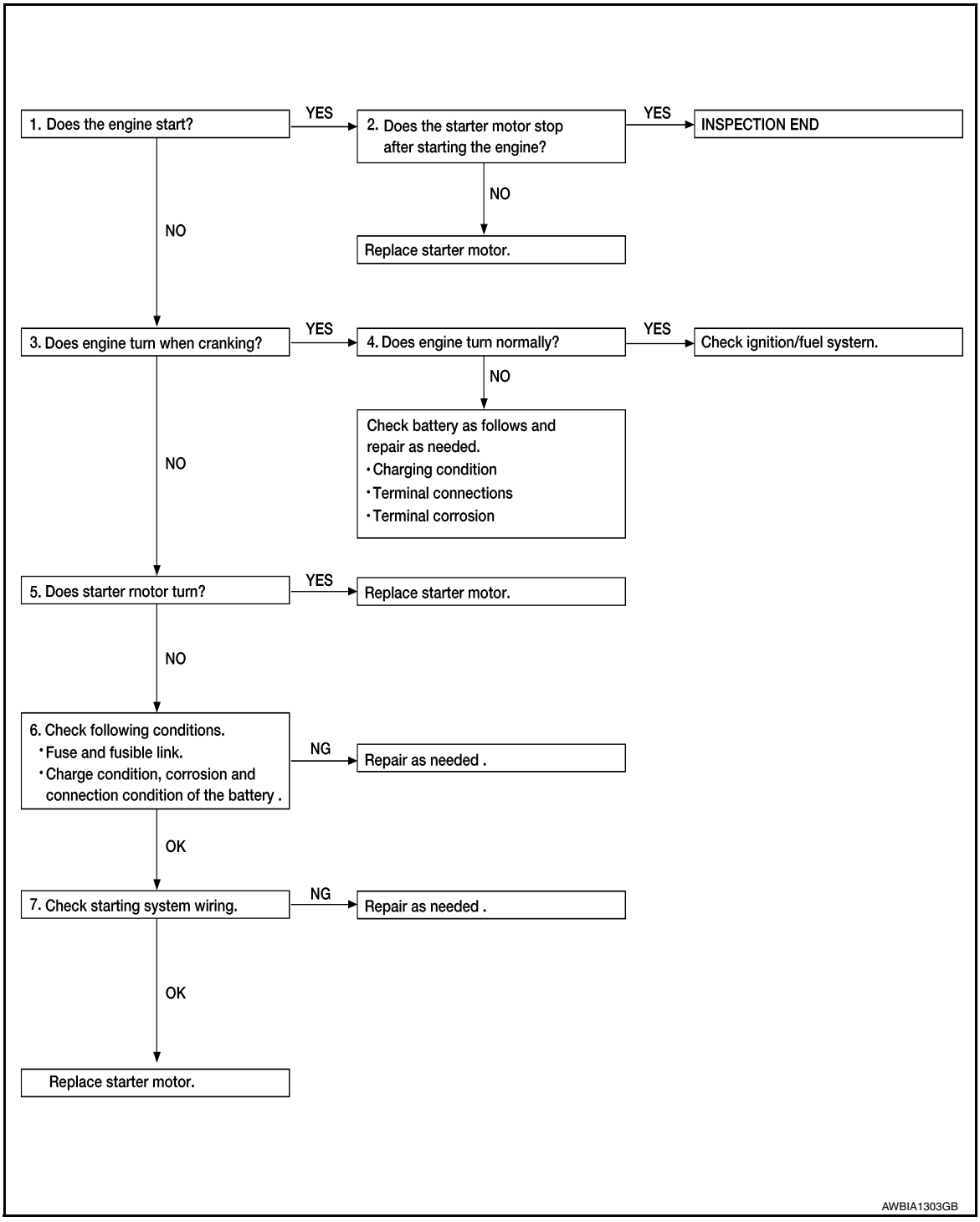
Does the engine turn freely by hand?

YES >> Replace starter motor.
NO >> Perform further diagnosis of engine mechanical or powertrain mechanism. Once resolved, perform battery test again using Multitasking battery and electrical diagnostic station GR8-1200 NI. Refer to the diagnostic station Instruction Manual for proper testing procedures.

Work Flow (Without GR8-1200 NI)

INFOID:0000000012788310

OVERALL SEQUENCE



DETAILED FLOW

NOTE:

If any malfunction is found, immediately disconnect the battery cable from the negative terminal.

1.CHECK ENGINE START

Crank the engine and check that the engine starts.

Does the engine start?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK THAT THE STARTER MOTOR STOPS

Check that the starter motor stops after starting the engine.

Does the starter motor stop?

YES >> Inspection End.
NO >> Replace starter motor. Refer to STR-30, "Removal and Installation".

3.CHECK THAT THE ENGINE TURNS WHEN CRANKING

Check that the engine turns when cranking.

Does engine turn when cranking?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK THE ENGINE SPEED WHEN CRANKING

Check that the engine speed is not low when cranking.

Does engine turn normally?

YES >> Check ignition/fuel system.
NO >> Check charge condition, corrosion and connection condition of the battery. Refer to PG-65, "How to Handle Battery".

5.CHECK STARTER MOTOR ACTIVATION

Check that the starter motor runs at cranking.

Does starter motor turn?

YES >> Replace starter motor. Refer to STR-30, "Removal and Installation".
NO >> GO TO 6.

6.CHECK POWER SUPPLY CIRCUIT

Check the following conditions:
- Fuse and fusible link
- Charge condition, corrosion and connection of the battery.

Are these inspection results normal?

YES >> GO TO 7.
NO >> Repair as needed.

7.CHECK STARTING SYSTEM WIRING

Check the following:
- “B” terminal circuit. Refer to STR-26, "Diagnosis Procedure".
- “S” terminal circuit. Refer to STR-28, "Diagnosis Procedure".

Are the inspection results normal?

YES >> Replace starter motor. Refer to STR-30, "Removal and Installation".
NO >> Repair as needed.

DTC/CIRCUIT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000012788311

Terminal “B” is constantly supplied with battery power.

Diagnosis Procedure

INFOID:0000000012788312

Regarding Wiring Diagram information, refer to STR-10, "Wiring Diagram" (with Intelligent Key system) or STR-15, "Wiring Diagram" (without Intelligent Key system).

CAUTION:

Perform diagnosis under the condition that the engine cannot start by the following procedure.

1. **Remove fuel pump fuse.**
2. **Crank or start the engine (where possible) until the fuel pressure is released.**

1.CHECK “B” TERMINAL CIRCUIT

1. Turn ignition switch OFF.
2. Check that starter motor B” terminal connection is clean and tight.
3. Check voltage between starter motor connector F27 and ground.

Terminals			Voltage (Approx.)
(+)		(-)	
Starter motor “B” terminal	Terminal		
F27	B	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check harness between battery and starter motor for open circuit.

2.CHECK BATTERY CABLE CONNECTION STATUS (VOLTAGE DROP TEST)

1. Shift selector lever to P (Park) or N (Neutral) position (CVT Models) or the clutch pedal is depressed (M/T Models).
2. Check voltage between battery positive terminal and starter motor B terminal.

Terminals			Condition	Voltage (Approx.)
(+)	(-)			
	Starter motor “B“ terminal	Terminal		
Battery positive terminal	F27	B	When the ignition switch is in START position	Less than 0.5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check harness between the battery and starter motor for continuity.

3.CHECK GROUND CIRCUIT STATUS (VOLTAGE DROP TEST)

1. Shift selector lever to P (Pack) or N (Neutral) position (CVT Models) or the clutch pedal is depressed (M/T Models).
2. Check voltage between starter motor case and battery negative terminal.

Terminals		Condition	Voltage (Approx.)
(+)	(-)		
Starter motor case	Battery negative terminal	When the ignition switch is in START position	Less than 0.2V

Is the inspection result normal?

YES >> “B” terminal circuit is OK. Further inspection is necessary. Refer to STR-20, "Work Flow (With GR8-1200 NI)" or STR-24, "Work Flow (Without GR8-1200 NI)".

NO >> Check the starter motor case to engine mounting for high resistance.

S CONNECTOR CIRCUIT

Description

INFOID:0000000012788313

The starter motor magnetic switch is supplied with power when the ignition switch is turned to the START position while the selector lever is in the P (Park) or N (Neutral) position (CVT Models) or the clutch pedal is depressed (M/T Models).

Diagnosis Procedure

INFOID:0000000012788314

Regarding Wiring Diagram information, refer to STR-10, "Wiring Diagram" (with Intellignet Key system) or STR-15, "Wiring Diagram" (without Intelligent Key system).

CAUTION:

Perform diagnosis under the condition that engine cannot start by the following procedure.

1. **Remove fuel pump fuse.**
2. **Crank or start the engine (where possible) until the fuel pressure is released.**

1.CHECK “S” CONNECTOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect starter motor connector.
3. Shift selector lever to “P” (Park) or “N” (Neutral) position (CVT Models) or the clutch pedal is depressed (M/T Models).
4. Check voltage between starter motor harness connector F28 and ground.

(+)		(-)	Condition	Voltage (Approx.)
Connector	Terminal			
F28	ST	Ground	When the ignition switch is in START position	Battery voltage

Is the inspection result normal?

YES >> “S” circuit is OK. Further inspection is necessary. Refer to STR-20, "Work Flow (With GR8-1200 NI)" or STR-24, "Work Flow (Without GR8-1200 NI)".

NO >> GO TO 2.

2.CHECK HARNESS CONTINUITY (OPEN CIRCUIT)

1. Disconnect IPDM E/R connector.
2. Check continuity between starter motor harness connector F28 and the IPDM E/R harness connector E44.

Starter motor harness connector		IPDM E/R harness connector		Continuity
Connector	Terminal	Connector	Terminal	
F28	ST	E44	19	Yes

Is the inspection result normal?

YES >> Further inspection is necessary. Refer to STR-20, "Work Flow (With GR8-1200 NI)" or STR-24, "Work Flow (Without GR8-1200 NI)".

NO >> Repair or replace the harness or connectors.

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:0000000012788315

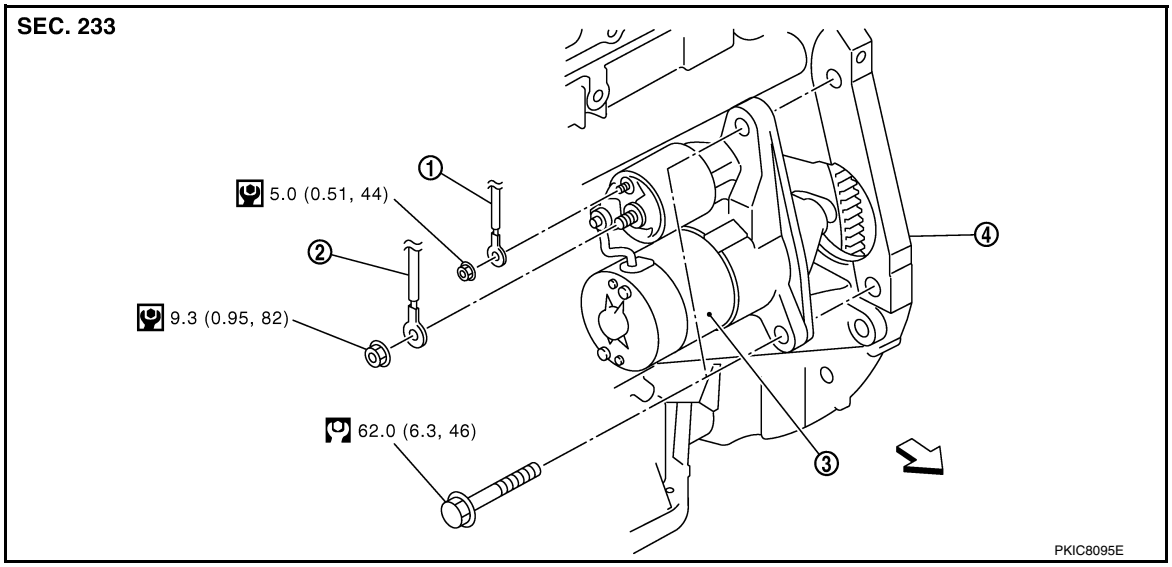
Symptom	Reference
No normal cranking	Refer to STR-20, "Work Flow (With GR8-1200 NI)" or STR-24, "Work Flow (Without GR8-1200 NI)".
Starter motor does not rotate	

REMOVAL AND INSTALLATION

STARTER MOTOR

Exploded View

INFOID:0000000012788316



1. “S” terminal harness
2. “B” terminal harness
3. Starter motor
4. Cylinder block
⇦ Front

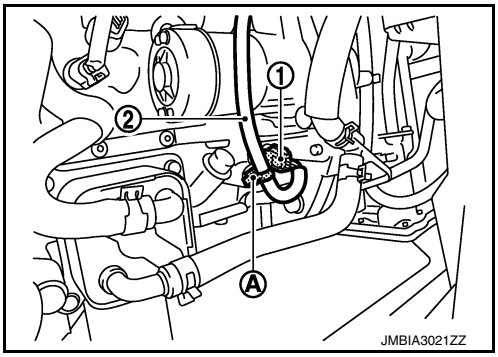
Removal and Installation

INFOID:0000000012788317

NOTE:
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

REMOVAL

1. Disconnect the battery negative terminal. Refer to PG-74, "Removal and Installation (Battery)".
2. Remove fan shroud and motor assembly. Refer to CO-17, "Component".
3. Remove reservoir hose upper from radiator to water outlet. Refer to CO-15, "Exploded View".
4. Remove “B” terminal nut and “B” terminal harness.
5. Remove “S” terminal nut and “S” terminal harness.
6. Disconnect harness connector from oil temperature sensor. Refer to EM-94, "Exploded View".
7. Disconnect harness connector (1) from crankshaft position sensor.
8. Remove harness clip (A) from oil pan (upper), and then remove harness (2) and set aside.



9. Remove upper starter motor bolt.
10. Remove lower starter motor bolt and remove starter motor.

INSTALLATION

Installation is in the reverse order of removal.

- Refill engine coolant. Refer to CO-13, "Changing Engine Coolant".

CAUTION:

Be careful to tighten "B" terminal nut to the specified torque.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Starter Motor

INFOID:0000000012788318

Type*			S114-955D
			HITACHI
			Reduction gear type
System voltage		[V]	12
No-load	Terminal voltage	[V]	11
	Current	[A]	Less than 110
	Revolution	[rpm]	More than 3,000

*: Always check with the Parts Department for the latest parts information.