SECTION STR
STARTING SYSTEM

CONTENTS

PRECAUTION 2

PRECAUTIONS 2
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 2
High Voltage Precautions 2

PREPARATION 5

PREPARATION 5
Special Service Tools 5
Commercial Service Tools 5

SYSTEM DESCRIPTION 6

COMPONENT PARTS 6
Component Parts Location 6

SYSTEM 8
System Description 8

WIRING DIAGRAM 9

STARTING SYSTEM 9
Wiring Diagram 9

BASIC INSPECTION 13

DIAGNOSIS AND REPAIR WORKFLOW 13
Work Flow (With GR8-1200 NI) 13
Work Flow (Without GR8-1200 NI) 17

DTC/CIRCUIT DIAGNOSIS 20

B TERMINAL CIRCUIT 20
Description 20
Diagnosis Procedure 20

S CONNECTOR CIRCUIT 21
Description 21
Diagnosis Procedure 21

SYMPTOM DIAGNOSIS 22

STARTING SYSTEM 22
Symptom Table 22

REMOVAL AND INSTALLATION 23

STARTER MOTOR 23
Exploded View 23
Removal and Installation 23
Inspection 24

SERVICE DATA AND SPECIFICATIONS (SDS) 26

SERVICE DATA AND SPECIFICATIONS (SDS) 26
Starter Motor 26

PRECAUTION

PRECAUTIONS

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

INFOID:0000000014742157

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.**

High Voltage Precautions

INFOID:0000000015277206

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

The colors of the high voltage harnesses and connectors are all orange. Orange "High Voltage" labels are applied to the Li-ion battery and other high voltage devices. Do not carelessly touch these harnesses and parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

Immediately insulate disconnected high voltage connectors and terminals with insulating tape.

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

Because this vehicle uses components that contain high voltage and powerful magnetism, do not carry any metal products which may cause short circuits, or any magnetic media (cash cards, prepaid cards, etc.) which may be damaged on your person when working.

POSTING A SIGN OF “DANGER! HIGH VOLTAGE AREA. KEEP OUT”

< PRECAUTION >

To call the attention of other workers, indicate "High voltage work in progress. Do not touch!" on vehicles where work is being performed on the high voltage systems.

Person in charge:_____

DANGER:
HIGH VOLTAGE
REPAIR IN PROGRESS.
DO NOT TOUCH!

DANGER:
HIGH VOLTAGE
REPAIR IN PROGRESS.
DO NOT TOUCH!

Person in charge:_____

Copy this page and put it after folding on the roof of the vehicle in service.

JSAIA1600GB

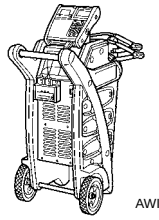
PREPARATION

PREPARATION

Special Service Tools

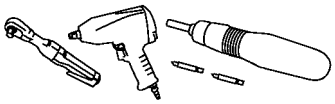
INFOID:0000000014631521

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

Tool number (TechMate No.) Tool name	Description
— (165-GR8-1200KIT-NI) Nissan battery and electronics tester  AWIIA1239ZZ	Testing batteries, starting and charging systems and charges batteries. For operating instructions, refer to diagnostic station instruction manual.

Commercial Service Tools

INFOID:0000000014631522

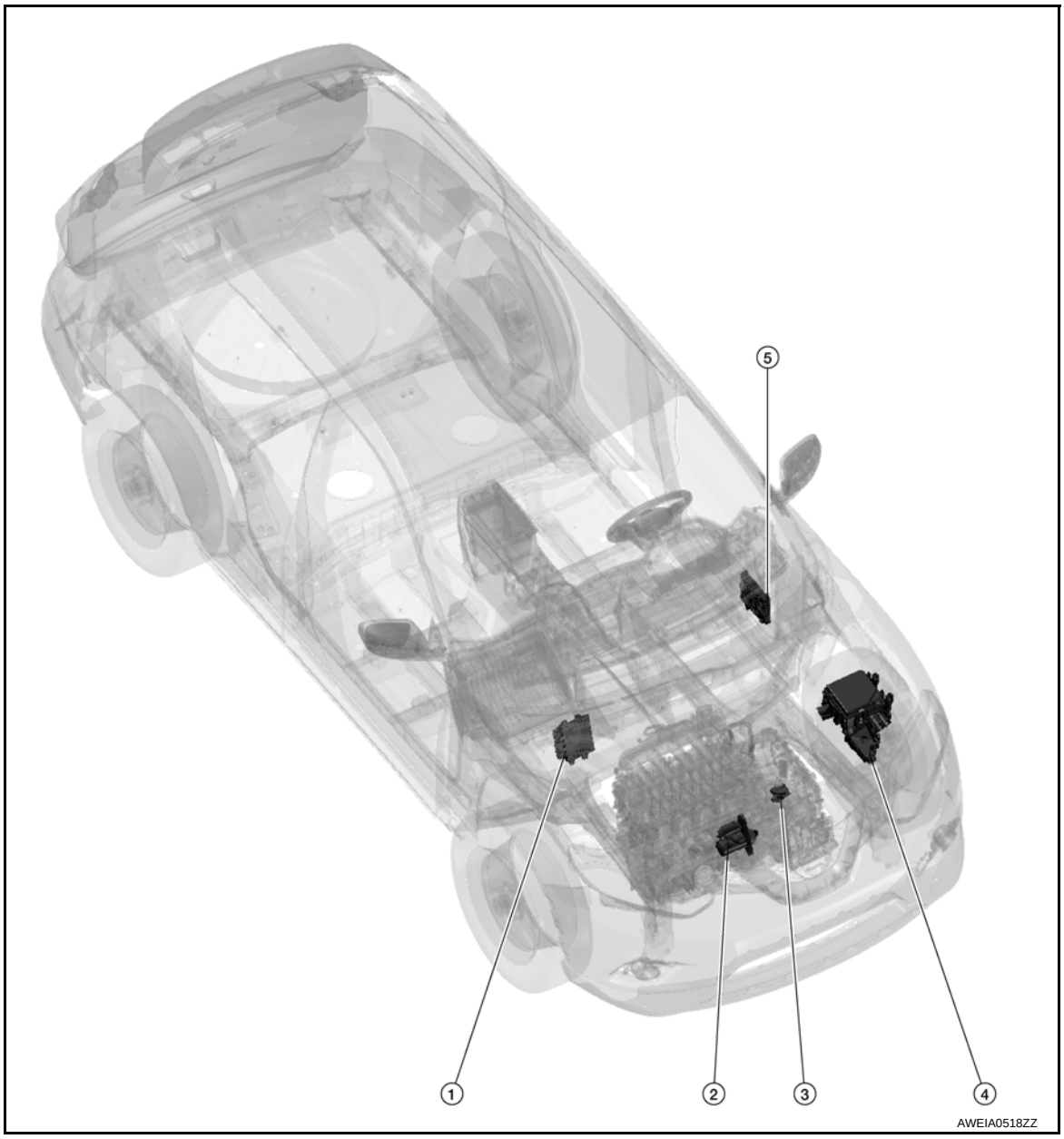
Tool name	Description
Power tool  PIIB1407E	Loosening bolts, nuts and screws

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000014631523



No.	Component part	Description
1.	HPCM	HPCM supplies power to the starter relay and starter control relay inside the IPDM E/R when the selector lever is shifted to the P or N position. Refer to HBC-18, "HPCM".
2.	Starter motor	The starter motor plunger closes and the motor is supplied with battery power, which in turn cranks the engine, when the S terminals supplied with electric power.
3.	Transmission range switch	Transmission range switch supplies power to the starter relay and starter control relay inside IPDM E/R when the selector lever is shifted to the P or N position. Refer to TM-215, "Removal and Installation".

No.	Component part	Description
4.	IPDM E/R	CPU inside IPDM E/R operates the starter relay when the ignition switch is in the start position. Refer to PCS-6, "Component Parts Location".
5.	BCM	BCM controls the starter relay inside IPDM E/R. Refer to BCS-5, "BODY CONTROL SYSTEM : Component Parts Location".

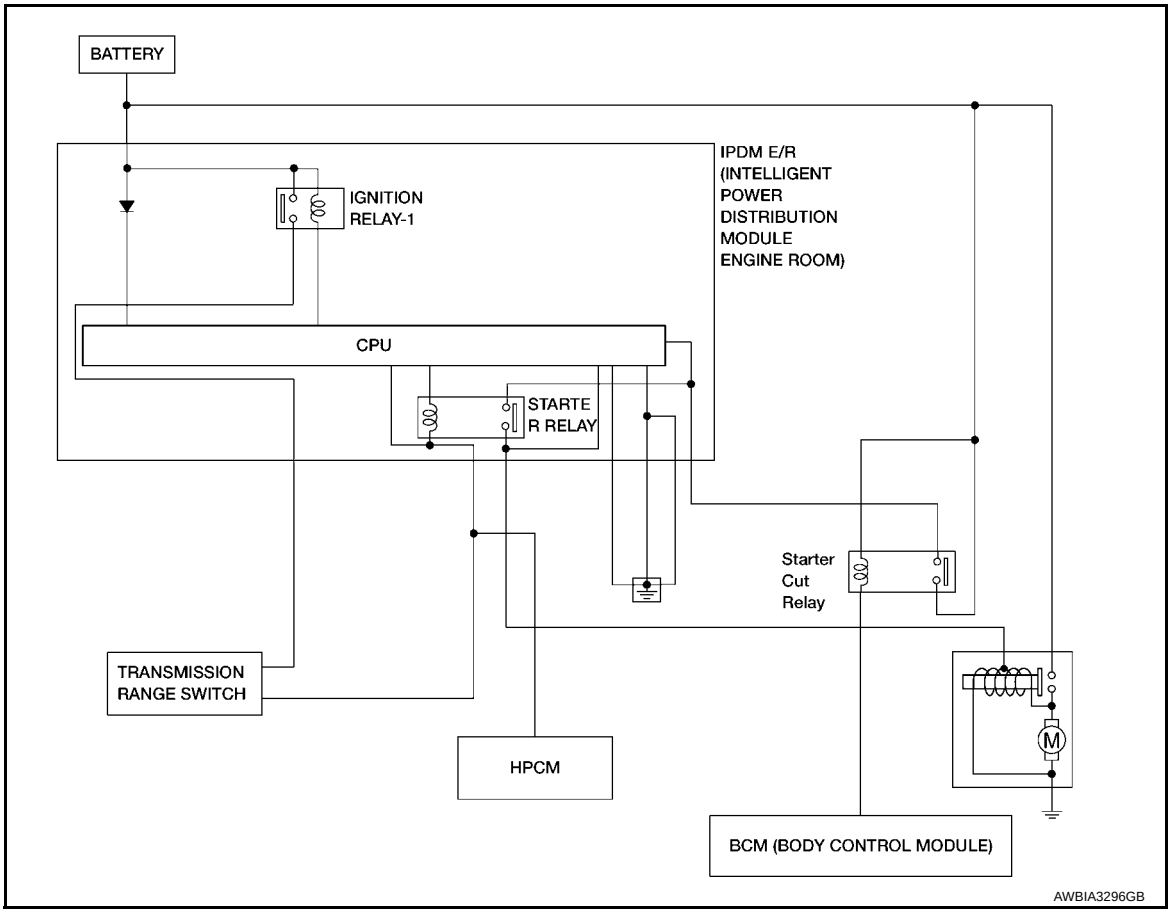
SYSTEM

System Description

INFOID:0000000014631524

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

SYSTEM DIAGRAM

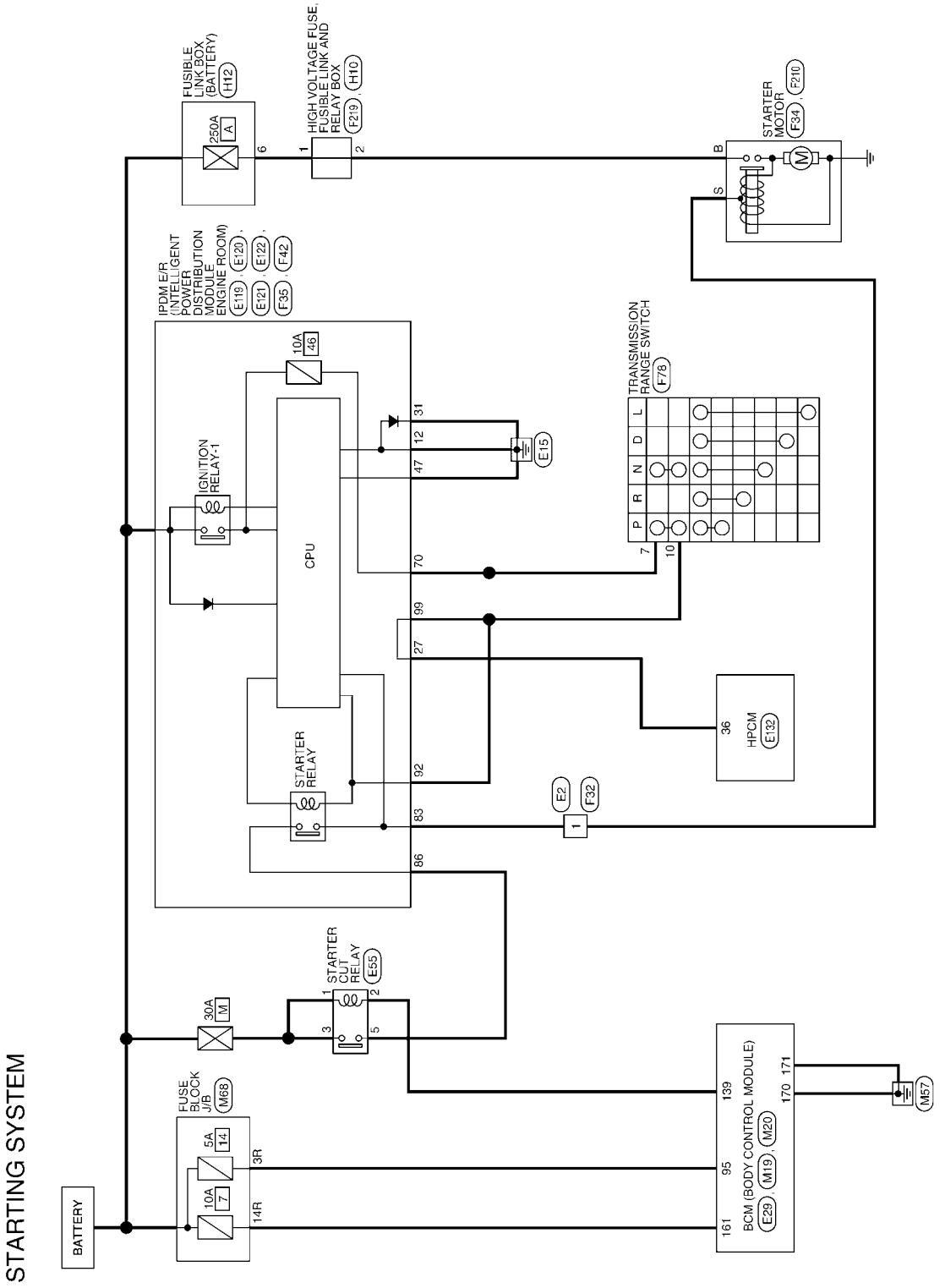


WIRING DIAGRAM

STARTING SYSTEM

Wiring Diagram

INFOID:0000000014631525



AABWA1317GB

STARTING SYSTEM CONNECTORS

Connector No.	E2
Connector Name	WIRE TO WIRE
Connector Type	M02MW-LC
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	G	TO ENGINE CONTROL HARNESS
2	–	TO ENGINE CONTROL HARNESS

Connector No.	E29
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH24FB-NH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
121	–	–
122	–	–
123	–	–
124	–	–
125	LG	BRAKE SW2
126	W	BRAKE SW1
127	–	–
128	–	–
129	–	–
130	–	–
131	–	–
132	Y	BUZZER (WITH I-KEY)
133	–	–
134	–	–
135	BR	DI FR LEFT E
136	GR	DI FR RIGHT E
137	–	–
138	–	–
139	G	STCUT RL
140	–	–
141	–	–
142	–	–
143	–	–
144	–	–

Connector No.	E55
Connector Name	STARTER CUT RELAY
Connector Type	MS02FL-M2-LC
Connector Color	BLUE

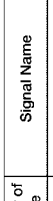
H.S.



Terminal No.	Color of Wire	Signal Name
1	SB	BATTERY
2	G	RELAY CONTROL
3	L	BATTERY
5	GR	RELAY OUTPUT

Connector No.	E119
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FGY-CS
Connector Color	GRAY

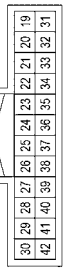
H.S.



Terminal No.	Color of Wire	Signal Name
3	–	–
4	Y	LIGHT POSITION REAR LH
5	–	–
6	–	–
7	–	–
8	BR	ACTUATOR4 CABIN (3FB4)
9	L	LO HORN RLY
10	–	–
11	V	IGN AIRBAG
12	B	SIGNAL GROUND
13	–	–
14	–	–
15	–	–
16	G	LIGHT REVERSE LAMP
17	W	LIGHT POSITION REAR RH
18	–	–

Connector No.	E120
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FGY-NH
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
19	LG	IGN ECM
20	–	–
21	–	–
22	P	CAN-L
23	–	–
24	L	CAN-H
25	–	–
26	–	–
27	SB	CABIN MOTOR 5
28	R	CABIN MOTOR 6
29	LG	CABIN MOTOR 7
30	Y	CABIN MOTOR 8
31	B	2ND SIGNAL GROUND
32	GR	LI PUSH SW
33	BR	AUTO STOP WIPER
34	–	–
35	–	–
36	–	–
37	–	–
38	–	–
39	L	HEV CAN-H
40	G	HEV CAN-L
41	W	CABIN MOTOR 3
42	R	CABIN MOTOR 4

Connector No.	E121
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	243405408R
Connector Color	RED

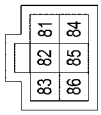
H.S.



Terminal No.	Color of Wire	Signal Name
43	–	–
44	R	BAT ABS VALVE
45	V	FR WIPER HI
46	W	FUEL PUMP
47	B	POWER GROUND
48	Y	FR WIPER LO

Connector No.	E122
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	YLA06FGY
Connector Color	GRAY

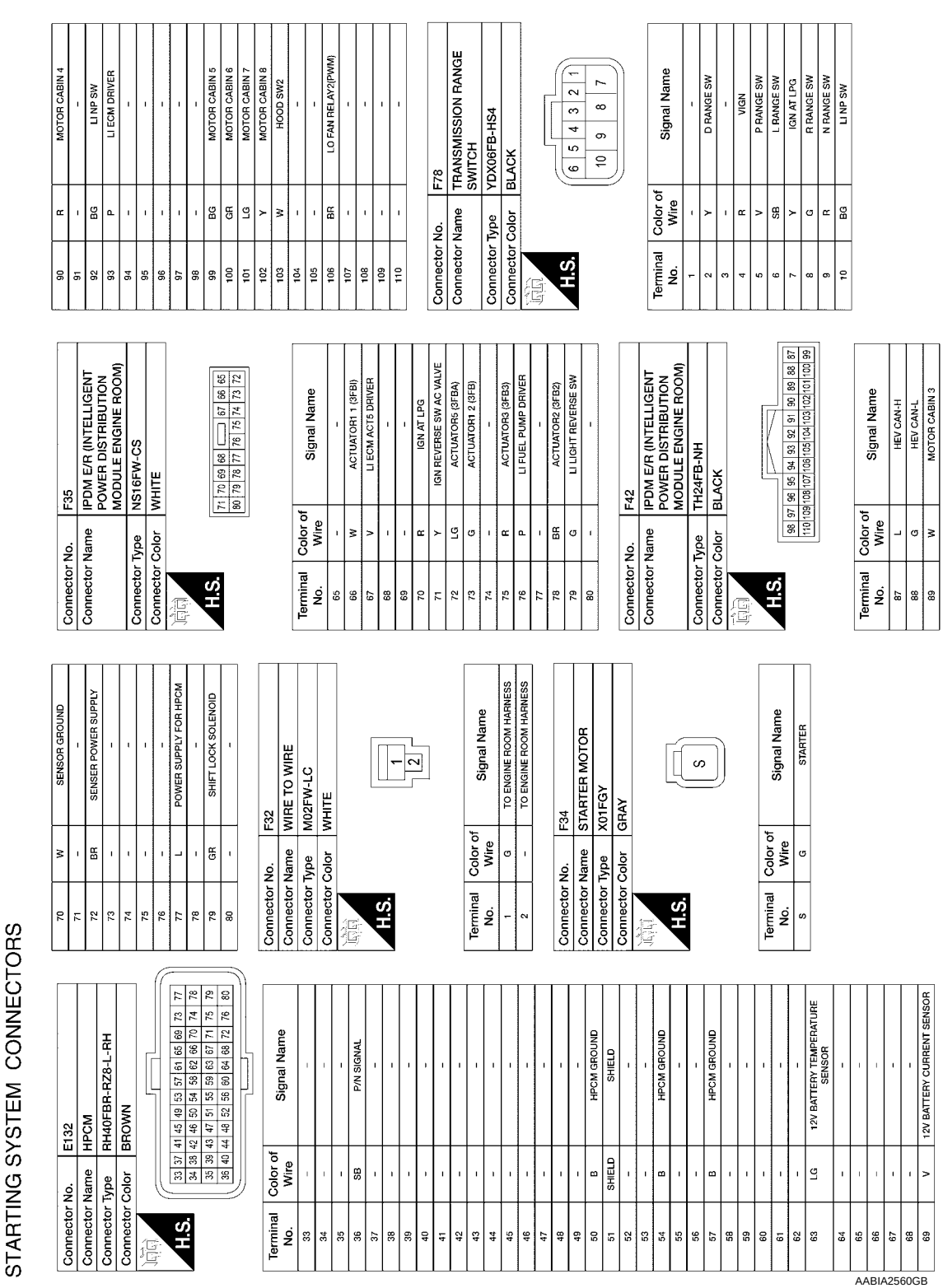
H.S.



Terminal No.	Color of Wire	Signal Name
81	V	FL ECM USM SUPPLY
82	–	–
83	G	STARTER
84	LG	BATT MOTOR FAN LO
85	–	–
86	GR	FL STARTER

AABIA2559GB

STARTING SYSTEM CONNECTORS



AABIA2560GB

STARTING SYSTEM CONNECTORS

Connector No.	F210
Connector Name	STARTER MOTOR
Connector Type	24340-JG04B
Connector Color	-

H.S.

B

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

Connector No.	F219
Connector Name	HIGH VOLTAGE FUSE, FUSIBLE LINK AND RELAY BOX
Connector Type	24340_BB60A
Connector Color	-

H.S.

2

Terminal No.	Color of Wire	Signal Name
2	B/R	BATTERY

Connector No.	H10
Connector Name	HIGH VOLTAGE FUSE, FUSIBLE LINK AND RELAY BOX
Connector Type	24340_JA04D
Connector Color	-

H.S.

1

Terminal No.	Color of Wire	Signal Name
1	B	BATTERY

Connector No.	H12
Connector Name	FUSIBLE LINK BOX (BATTERY)
Connector Type	24340_79906
Connector Color	-

H.S.

6

Terminal No.	Color of Wire	Signal Name
6	B	BATTERY

Connector No.	M19
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FB-NH
Connector Color	BLACK

H.S.

120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81

Terminal No.	Color of Wire	Signal Name
81	-	-
82	W	SES FR HANDLE BUTTON SW
83	-	-
84	BR	CSW 2
85	SB	CSW 1
86	P	CSW 3
87	BG	CSW 4
88	W	START SW BACKLIGHT LED
89	Y	START WO ESCL SW
90	-	-
91	-	-
92	BR	KEY CYLINDER LOCK SW
93	P	KEY CYLINDER UNLOCK SW
94	G	AT LOCKED IN PARK SW
95	V	SHORTING PIN
96	-	-
97	-	-
98	-	-
99	-	-
100	V	SES EXT DR ANTENNA A

Terminal No.	Color of Wire	Signal Name
101	-	-
102	-	-
103	-	-
104	R	DR KNOB SW
105	Y	SES DR HANDLE BUTTON SW
106	W	AUTO ACC2
107	-	-
108	-	-
109	-	-
110	BG	MR OUTPUT
111	-	-
112	-	-
113	-	-
114	Y	IMMOBILIZER KAZASHI B
115	W	IMMOBILIZER KAZASHI A
116	BG	SES INT FRONT ANTENNA B
117	GR	SES INT FRONT ANTENNA A
118	SB	SES EXT AS ANTENNA B
119	P	SES EXT AS ANTENNA A
120	BR	SES EXT DR ANTENNA B

Connector No.	M20
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	NS16FBR-CS
Connector Color	BROWN

H.S.

176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157
156	155	154	153	152	151	150	149	148	147	146	145	144	143	142	141	140	139	138	137

Terminal No.	Color of Wire	Signal Name
161	W	PWR ECU
162	SB	PWM ROOMLAMP 1
163	L	AS LOCK OR UNLOCK D
164	-	-
165	V	DR OR FR LOCK D
166	-	-
167	LA/V	PWR DOORLOCK1
168	BG	PWR FLASHERS
169	GR	PWR STOP LAMP
170	B	GND1
171	B	GND2
172	G	FR OR DR UNLOCK D
173	-	-
174	-	-
175	R	PWR DOORLOCK2

176	LG	PWR WIPER

Connector No.	M68
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FBR-CS
Connector Color	BROWN

H.S.

7R	6R	5R	4R									3R	2R	1R
16R	15R	14R	13R	12R	11R	10R	9R	8R						

Terminal No.	Color of Wire	Signal Name
1R	V	ILLUMINATION +
2R	G	IGNITION
3R	V	BATTERY
4R	-	-
5R	-	-
6R	LA/L	ACCESSORY
7R	LA/V	BATTERY
8R	-	-
9R	-	-
10R	GR	BATTERY
11R	-	-
12R	-	-
13R	-	-
14R	W	BATTERY
15R	W	BATTERY
16R	GR	ACCESSORY

AABIA2561GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow (With GR8-1200 NI)

INFOID:0000000014773759

STARTING SYSTEM DIAGNOSIS WITH GR8-1200 NI

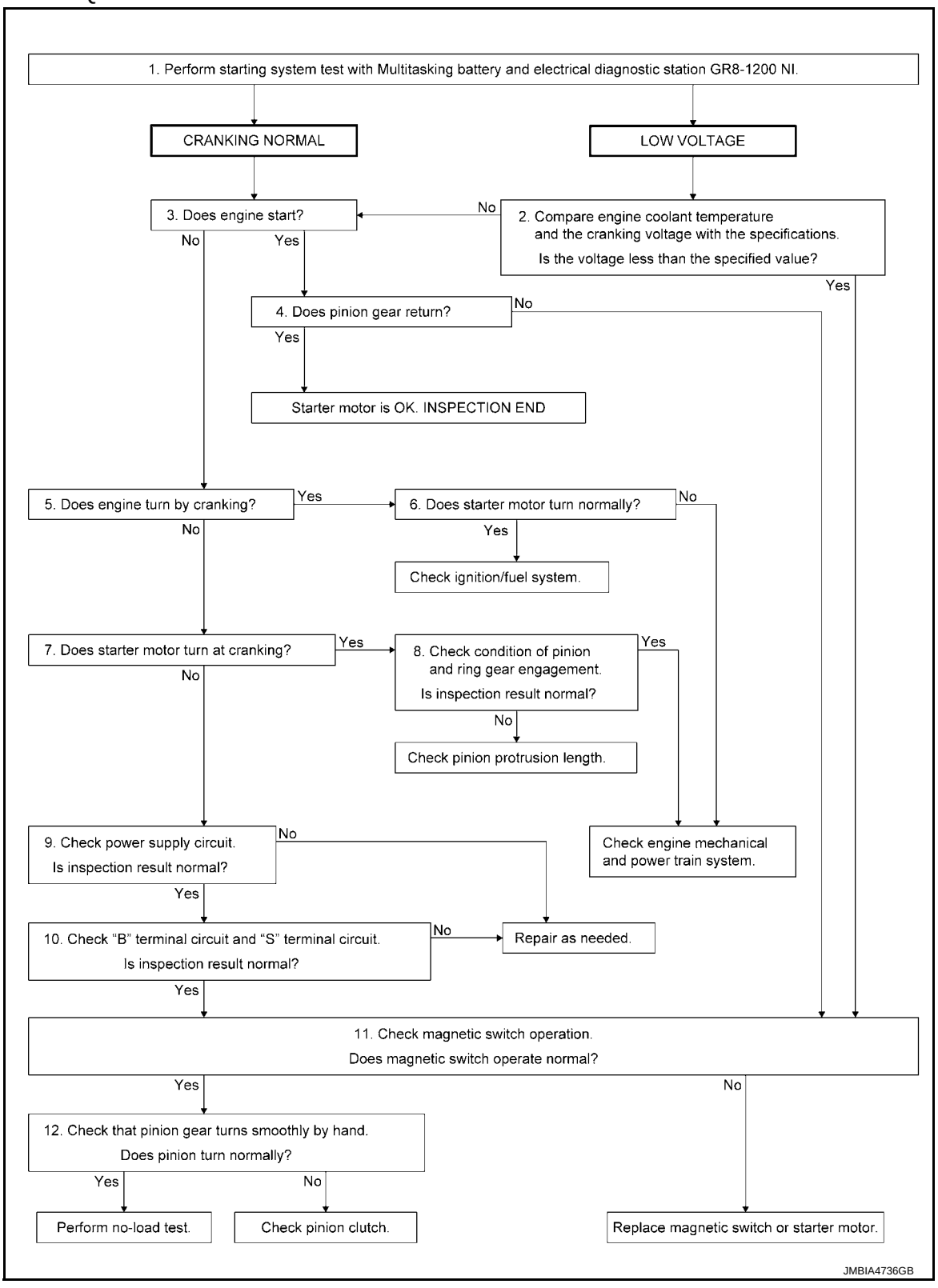
To test the starting system, use the following special service tool:

- Multitasking battery and electrical diagnostic station GR8-1200 NI

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 alternator 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.

How is the test result?

CRANKING NORMAL>> GO TO 3.
LOW VOLTAGE>>GO TO 2.
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.COMPARISON BETWEEN ENGINE COOLANT AND CRANKING VOLTAGE

Compare engine coolant temperature and the cranking voltage with the 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 11.
NO >> GO TO 3.

3.CHECK ENGINE START

Crank engine and check that engine starts.

Does engine start?

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

4.CHECK RETURN OF PINION GEAR

Check that pinion gear returns to original position after engine starts.

Does pinion gear return?

YES >> Starter motor is OK. INSPECTION END.
NO >> GO TO 11.

5.CHECK ENGINE SPEED WITH CRANKING

Check that engine turns while cranking.

Does engine turns while cranking?

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

6.CHECK STARTER MOTOR TURNING WITH CRANKING

Check that starter motor runs smoothly without abnormal noise at cranking.

Does starter motor turn normally?

YES >> Check ignition/fuel system.
NO >> Check engine mechanical and powertrain system.

7.CHECK STARTER MOTOR SPEED WITH CRANKING

Check that starter motor turns while cranking.

Does starter motor turn at cranking?

YES >> GO TO 8.
NO >> GO TO 9.

8.CHECK PINION GEAR AND RING GEAR ENGAGEMENT

Check condition of pinion and ring gear engagement.

Is inspection result normal?

YES >> Check engine mechanical and powertrain system.
NO >> Check pinion protrusion length. Refer to STR-24, "Inspection" .

9.CHECK POWER SUPPLY CIRCUIT

Check the following conditions.
- Fuse and fusible link
- Charge condition, corrosion and connection condition of battery. Refer to STR-13, "Work Flow (With GR8-1200 NI)".

Are these inspection result normal?

YES >> GO TO 10.
NO >> Repair as needed.

10.CHECK STARTING SYSTEM WIRING

Check the following.
- “B” terminal circuit. Refer to STR-20, "Diagnosis Procedure".
- “S” terminal circuit. Refer to STR-21, "Diagnosis Procedure".

Are these inspection results normal?

YES >> GO TO 11.
NO >> Repair as needed.

11.CHECK MAGNETIC SWITCH OPERATION

Check magnetic switch operation. Refer to STR-24, "Inspection".

Does magnetic switch operate normal?

YES >> GO TO 12.
NO >> Replace magnetic switch or starter motor.

12.CHECK PINION TURNING

1. Remove starter motor.
2. Check that pinion turns smoothly by hand.

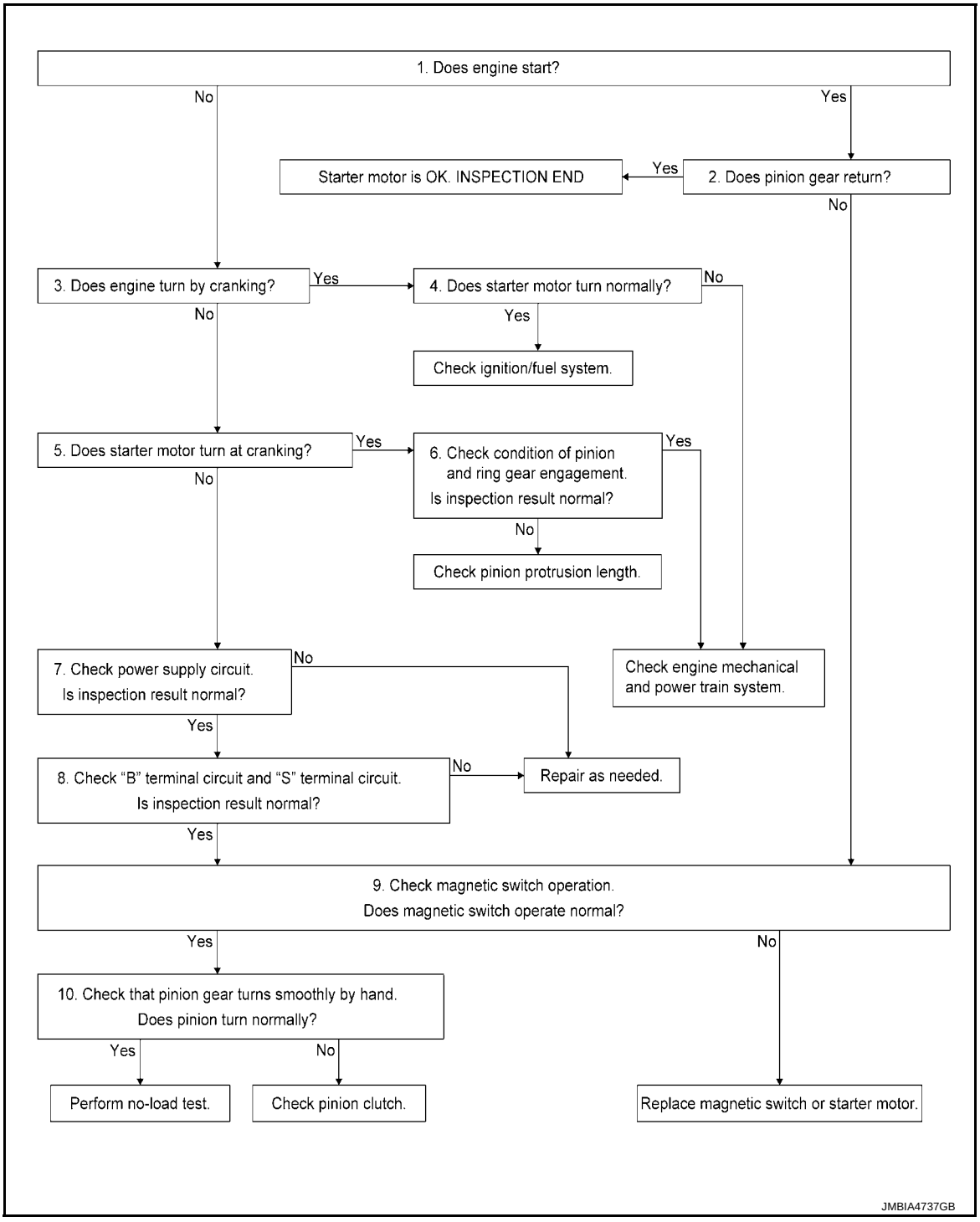
Does pinion turn normally?

YES >> Perform no-load test of starter motor. Refer to STR-24, "Inspection".
NO >> Check pinion clutch. Refer to STR-24, "Inspection".

Work Flow (Without GR8-1200 NI)

INFOID:0000000014773760

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 RETURN OF PINION GEAR

Check that pinion gear returns to original position after engine starts.

Does pinion gear return?

YES >> Starter motor is OK. INSPECTION END.
NO >> GO TO 9.

3.CHECK ENGINE SPEED WITH CRANKING

Check that engine turns while cranking.

Does engine turn by cranking?

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

4.CHECK STARTER MOTOR TURNING WITH CRANKING

Check that starter motor runs smoothly without abnormal noise at cranking.

Does starter motor turn normally?

YES >> Check ignition/fuel system.
NO >> Check engine mechanical and power train system.

5.CHECK STARTER MOTOR SPEED WITH CRANKING

Check that starter motor turns while cranking.

Does starter motor turn at cranking?

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

6.CHECK PINION GEAR AND RING GEAR ENGAGEMENT

Check condition of pinion and ring gear engagement.

Is inspection result normal?

YES >> Check engine mechanical and power train system.
NO >> Check pinion protrusion length. Refer to STR-24, "Inspection".

7.CHECK POWER SUPPLY CIRCUIT

Check the following conditions.

- Fuse and fusible link.
- Charge condition, corrosion and connection condition of battery. Refer toSTR-17, "Work Flow (Without GR8-1200 NI)".

Are the inspection results normal?

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

8.CHECK STARTING SYSTEM WIRING

Check the following.

- “B” terminal circuit. Refer to STR-20, "Diagnosis Procedure".
- “S” terminal circuit. Refer to STR-21, "Diagnosis Procedure".

Are the inspection results normal?

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

9.CHECK MAGNETIC SWITCH OPERATION

Check magnetic switch operation. Refer to STR-24, "Inspection".

Does magnetic switch operate normal?

YES >> GO TO 10.
NO >> Replace magnetic switch or starter motor.

10.CHECK PINION TURNING

1. Remove starter motor.
2. Check that pinon turns smoothly by hand.

Does pinion turn normally?

YES >> Perform no-load test of starter motor. Refer to STR-24, "Inspection".
NO >> Check pinion clutch. Refer to STR-24, "Inspection".

DTC/CIRCUIT DIAGNOSIS

B TERMINAL CIRCUIT

Description

INFOID:0000000014631528

Terminal “B” is constantly supplied with battery power.

Diagnosis Procedure

INFOID:0000000014631529

Regarding Wiring Diagram information, refer to STR-9, "Wiring Diagram".

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 ”B” terminal and ground.

(+)		(-)	Voltage (Approx.)
Connector	Terminal		
F210	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.
2. Check voltage between battery positive terminal and starter motor ”B” terminal.

(+)	(-)		Condition	Voltage (Approx.)
	Connector	Terminal		
Battery positive terminal	F210	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” (Park) or ”N” (Neutral) position.
2. Check voltage between starter motor case and battery negative terminal.

(+)	(-)	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-13, "Work Flow (With GR8-1200 NI)" or STR-17, "Work Flow (Without GR8-1200 NI)".
NO >> Check the starter motor case to engine mounting for high resistance.

S CONNECTOR CIRCUIT

Description

INFOID:0000000014631530

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.

Diagnosis Procedure

INFOID:0000000014631531

Regarding Wiring Diagram information, refer to STR-9, "Wiring Diagram".

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.
4. Check voltage between starter motor harness connector and ground.

(+)		(-)	Condition	Voltage (Approx.)
Connector	Terminal			
F34	S	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-13, "Work Flow (With GR8-1200 NI)" or STR-17, "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 and the IPDM E/R harness connector.

Connector	Terminal	Connector	Terminal	Continuity
F34	S	F41	83	Yes

3. Check continuity between starter motor terminal S and ground.

Connector	Terminal	—	Continuity
F34	S	Ground	No

Is the inspection result normal?

YES >> Further inspection is necessary. Refer to STR-13, "Work Flow (With GR8-1200 NI)" or STR-17, "Work Flow (Without GR8-1200 NI)".

NO >> Repair or replace the harness or connectors.

SYMPTOM DIAGNOSIS

STARTING SYSTEM

Symptom Table

INFOID:0000000014631532

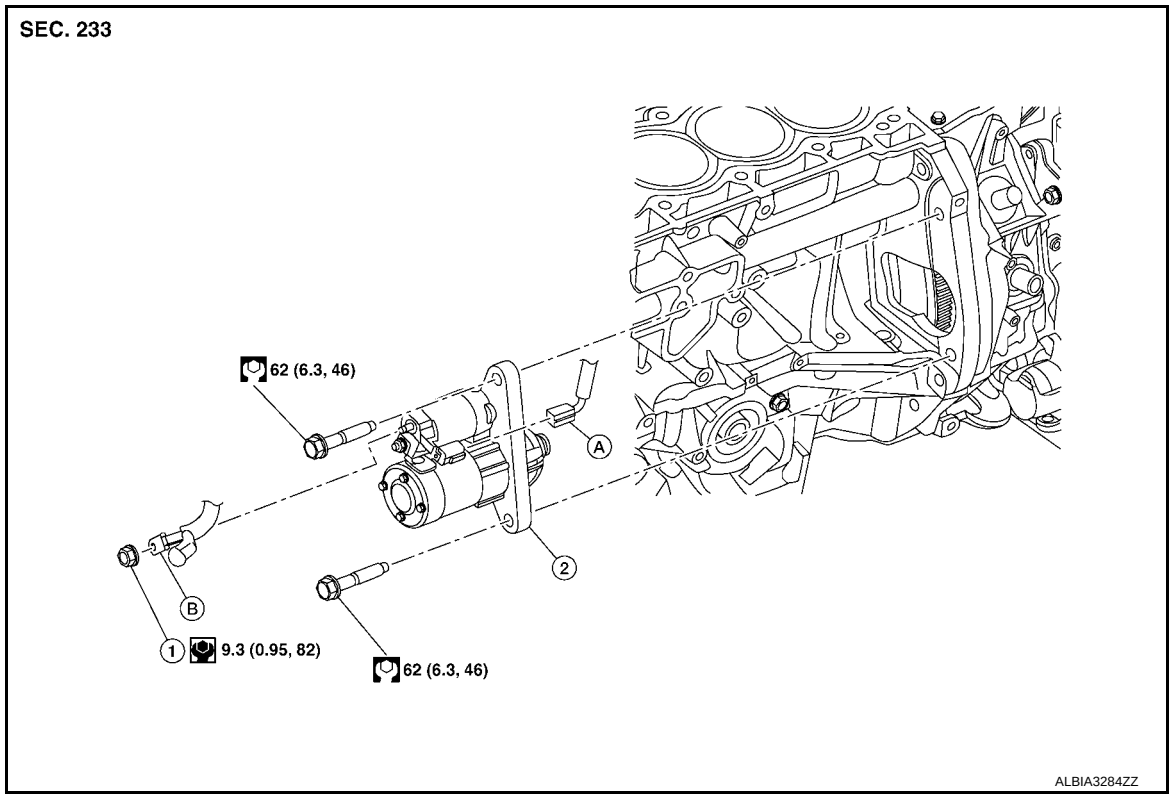
Symptom	Reference
No normal cranking	Refer to STR-13, "Work Flow (With GR8-1200 NI)" or STR-17, "Work Flow (Without GR8-1200 NI)".
Starter motor does not rotate	

REMOVAL AND INSTALLATION

STARTER MOTOR

Exploded View

INFOID:0000000014631533



1. Terminal "B" nut
2. Starter motor
A. Terminal "S" connector
B. Terminal "B" connector

Removal and Installation

INFOID:0000000014631534

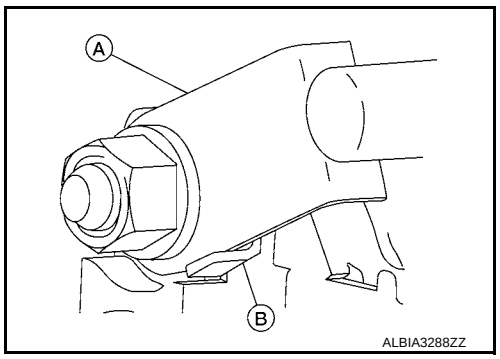
REMOVAL

1. Disconnect the negative battery terminal. Refer to PG-129, "Removal and Installation (Battery)".
2. Disconnect terminal "S" harness.
3. Remove terminal "B" nut and harness.
4. Remove starter motor bolts.
5. Remove starter motor upward from the vehicle.

INSTALLATION

Installation is in the reverse order of removal.

- Orient terminal "B" harness (A) against anti-rotation tab (B) as shown.

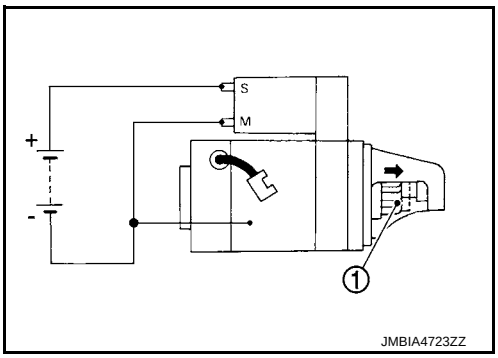


Inspection

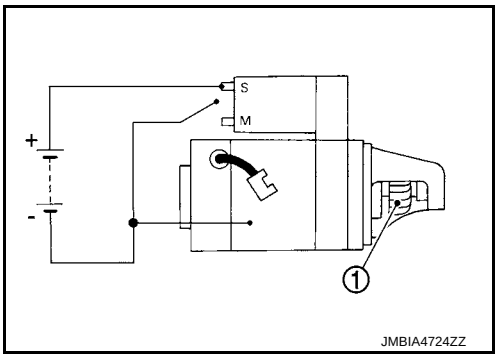
INFOID:0000000014742172

INSPECTION

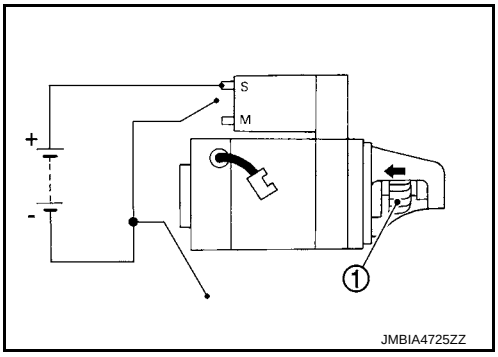
1. Remove starter motor from vehicle. Refer to STR-23, "Removal and Installation".
2. Connect 12V battery to starter motor as shown. Check that pinion gear (1) is driven out by magnetic switch.
   - Replace starter motor if pinion gear is not driven out.



3. Disconnect "M" terminal as shown. Check that pinion gear (1) does not return to original position.
   - Replace starter motor if pinion gear returns.



4. Disconnect (-) wire from starter motor body as shown. Check that pinion gear (1) returns to original position.
   - Replace starter motor if pinion gear does not return.

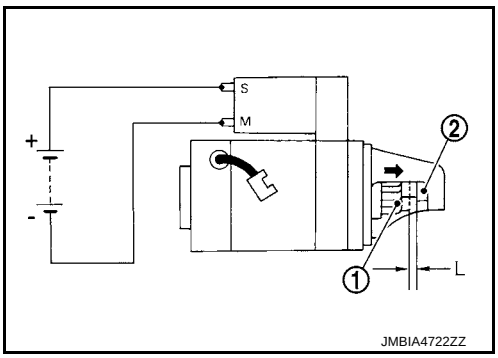


PINION PROTRUSION LENGTH

1. With pinion gear (1) driven out by magnetic switch, push pinion gear back to remove slack and measure the clearance "L" between the front edge of the pinion gear and the pinion stopper (2).

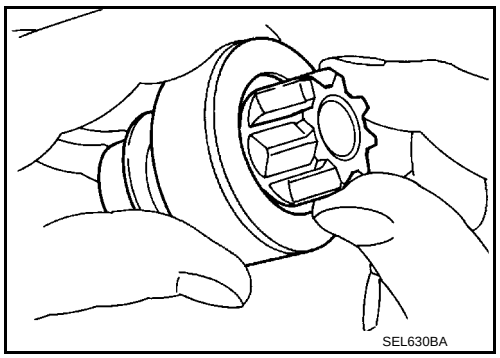
   Movement "L" **: Refer to STR-26, "Starter Motor".**

   - Replace starter motor if the measurement value is not within specifications.



PINION CLUTCH

1. Check pinion gear teeth.
   - Replace starter motor if teeth are worn or damaged. (Also check condition of ring gear teeth).
2. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction.
   - Replace starter motor if pinion is locked, rotates in both directions or unusual resistance is evident.

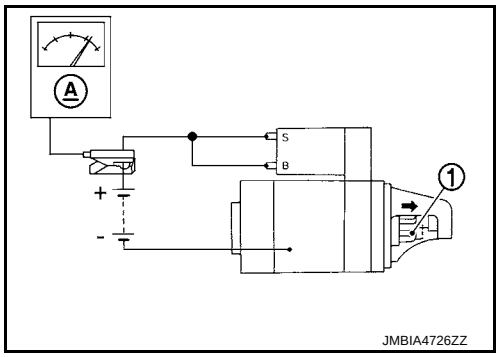

SEL630BA

NO-LOAD TEST

1. Remove starter motor from vehicle. Refer to STR-23, "Removal and Installation".
2. Connect 12V battery and ammeter to starter motor as shown. Check no load current with pinion gear (1) driven out and starter motor operating.

No-load current **: Refer to STR-26, "Starter Motor".**

- Replace starter motor if the measurement value is not within specifications.



JMBIA4726ZZ

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Starter Motor

INFOID:0000000014631535

Application			MR20DD
Type*			MITSUBISHI M000TC5271ZC
			Reduction gear type
System voltage		[V]	12
No-load	Terminal voltage	[V]	11
	Current	[A]	95 Maximum
	Revolution	[rpm]	3,000 Minimum
Clearance "L" between pinion front edge and pinion stopper		[mm (in)]	0.5 - 2.0 (0.019 - 0.078)

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