

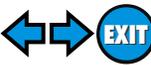
# STARTING & CHARGING SYSTEM

# SECTION SC

## CONTENTS

<b>PRECAUTIONS</b> .....	2	Construction.....	10	
Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER".....	2	Removal and Installation .....	10	
Wiring Diagrams and Trouble Diagnosis.....	2	Pinion/Clutch Check .....	10	
<b>BATTERY</b> .....	3	<b>CHARGING SYSTEM</b> .....	11	
How to Handle Battery .....	3	System Description.....	11	
METHODS OF PREVENTING OVER-DISCHARGE .....	3	Wiring Diagram - CHARGE -.....	12	
CHECKING ELECTROLYTE LEVEL .....	3	Trouble Diagnoses.....	13	
SPECIFIC GRAVITY CHECK .....	4	WITH IC REGULATOR.....	13	
CHARGING THE BATTERY.....	5	MALFUNCTION INDICATOR .....	13	
<b>STARTING SYSTEM</b> .....	6	Construction.....	14	
System Description.....	6	Removal and Installation .....	14	
WITH M/T.....	6	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	15	
WITH A/T .....	7	Battery.....	15	
Wiring Diagram - START -/With M/T .....	8	Starter .....	15	
Wiring Diagram - START -/With A/T.....	9	Alternator .....	15	

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX



## PRECAUTIONS

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

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

NASC0001

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL R50 is as follows:

- For a frontal collision  
The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision  
The Supplemental Restraint System consists of side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS 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, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, 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 RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.**

### Wiring Diagrams and Trouble Diagnosis

NASC0002

When you read wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-9, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

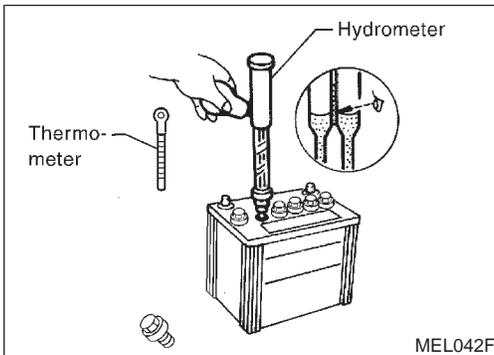
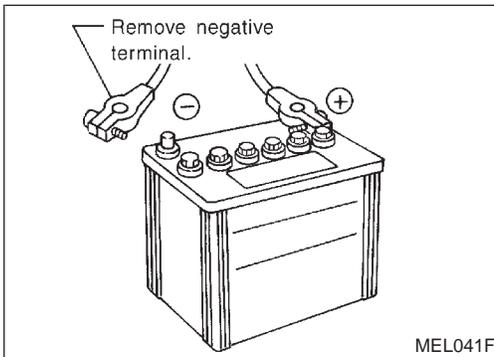
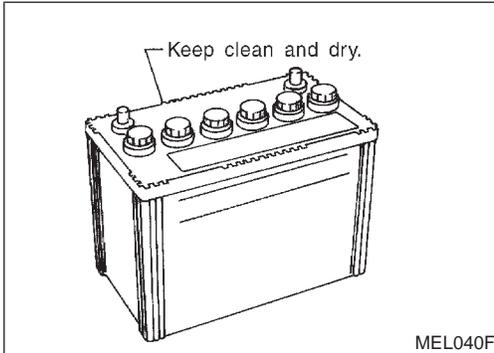
- GI-34, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS"
- GI-23, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

## How to Handle Battery

NASC0003

### CAUTION:

- If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.
- After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.
- Never add distilled water through the hole used to check specific gravity.



## METHODS OF PREVENTING OVER-DISCHARGE

NASC0003S01

The following precautions must be taken to prevent over-discharging a battery.

- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level. This also applies to batteries designated as “low maintenance” and “maintenance-free”.
- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal. (If the vehicle has an extended storage switch, turn it off.)
- Check the charge condition of the battery. Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge.

## CHECKING ELECTROLYTE LEVEL

NASC0003S02

### WARNING:

Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

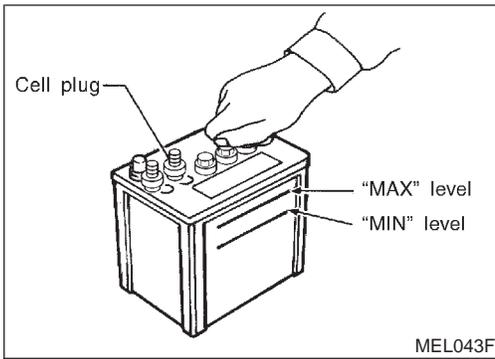
SC

EL

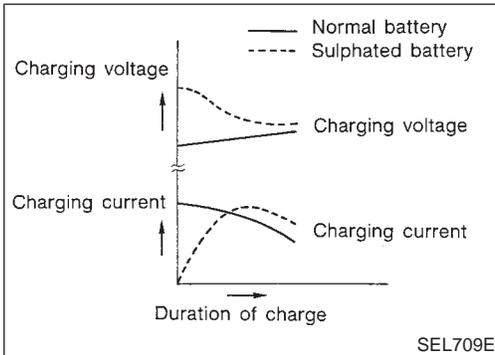
IDX

# BATTERY

## How to Handle Battery (Cont'd)



- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.

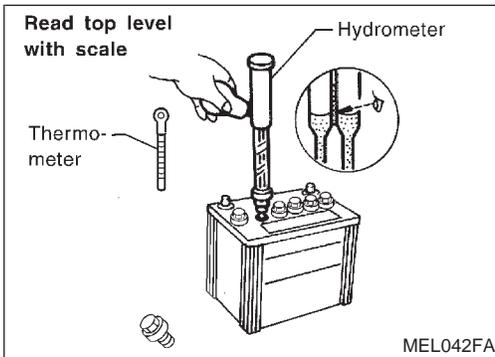


## Sulphation

A battery will be completely discharged if it is left unattended for a long time and the specific gravity will become less than 1.100. This may result in sulphation on the cell plates.

To determine if a battery has been "sulphated", note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulphated batteries.

A sulphated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.



## SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.

2. Use the chart below to correct your hydrometer reading according to electrolyte temperature.

## Hydrometer Temperature Correction

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
71 (160)	0.032
66 (150)	0.028
60 (140)	0.024
54 (130)	0.020
49 (120)	0.016
43 (110)	0.012
38 (100)	0.008
32 (90)	0.004
27 (80)	0
21 (70)	-0.004
16 (60)	-0.008
10 (50)	-0.012

# BATTERY

How to Handle Battery (Cont'd)

Battery electrolyte temperature °C (°F)	Add to specific gravity reading	GI
4 (40)	-0.016	
-1 (30)	-0.020	MA
-7 (20)	-0.024	EM
-12 (10)	-0.028	
-18 (0)	-0.032	LC
Corrected specific gravity	Approximate charge condition	EC
1.260 - 1.280	Fully charged	
1.230 - 1.250	3/4 charged	FE
1.200 - 1.220	1/2 charged	
1.170 - 1.190	1/4 charged	CL
1.140 - 1.160	Almost discharged	
1.110 - 1.130	Completely discharged	MT

## CHARGING THE BATTERY

NASC0003S04

### CAUTION:

- Do not “quick charge” a fully discharged battery.
- Keep the battery away from open flame while it is being charged.
- When connecting the charger, connect the leads first, then turn on the charger. Do not turn on the charger first, as this may cause a spark.
- If battery electrolyte temperature rises above 60°C (140°F), stop charging. Always charge battery at a temperature below 60°C (140°F).

## Charging Rates

NASC0003S0401

Amps	Time	SU
50	1 hour	BR
25	2 hours	
10	5 hours	ST
5	10 hours	

Do not charge at more than 50 ampere rate.

### NOTE:

The ammeter reading on your battery charger will automatically decrease as the battery charges. This indicates that the voltage of the battery is increasing normally as the state of charge improves. The charging amps indicated above refer to initial charge rate.

- If, after charging, the specific gravity of any two cells varies more than .050, the battery should be replaced.

SC

EL

IDX

## System Description

NASC0004

NASC0004S01

### WITH M/T

Power is supplied at all times

- to ignition switch terminal 1
- through 40A fusible link (letter **e**, located in the fuse and fusible link box).

With the ignition switch in the START position, power is supplied

- through terminal 5 of the ignition switch
- to clutch interlock relay terminal 3.

With the ignition switch in the ON or START position, power is supplied

- through 10A fuse [No. 21, located in the fuse block (J/B)]
- to clutch interlock relay terminal 2.

If clutch pedal is depressed, ground is supplied

- to clutch interlock relay terminal 1.
- through clutch interlock switch.

The clutch interlock relay is energized and power is supplied

- from terminal 5 of the clutch interlock relay
- to terminal 1 of the starter motor windings.

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.

## WITH A/T

=NASC0004S02

Power is supplied at all times

- to ignition switch terminal 1
- through 40A fusible link (letter e, located in the fuse and fusible link box).

With the ignition switch in the ON or START position, power is supplied through 10A fuse [No. 18, located in the fuse block (J/B)]

- to park/neutral position relay terminal 1.

Also, with the ignition switch in the START position, power is supplied

- from ignition switch terminal 5
- to park/neutral position relay terminal 6.

With the selector lever in the P or N position, ground is supplied

- to park/neutral position relay terminal 2 through the park/neutral position switch.

Then park/neutral position relay is energized and power is supplied

- from park/neutral position relay terminal 7
- to terminal 2 of the starter motor windings.

The starter motor plunger closes and provides a closed circuit between the battery and starter motor. The starter motor is grounded to the engine block. With power and ground supplied, cranking occurs and the engine starts.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

**SC**

EL

IDX

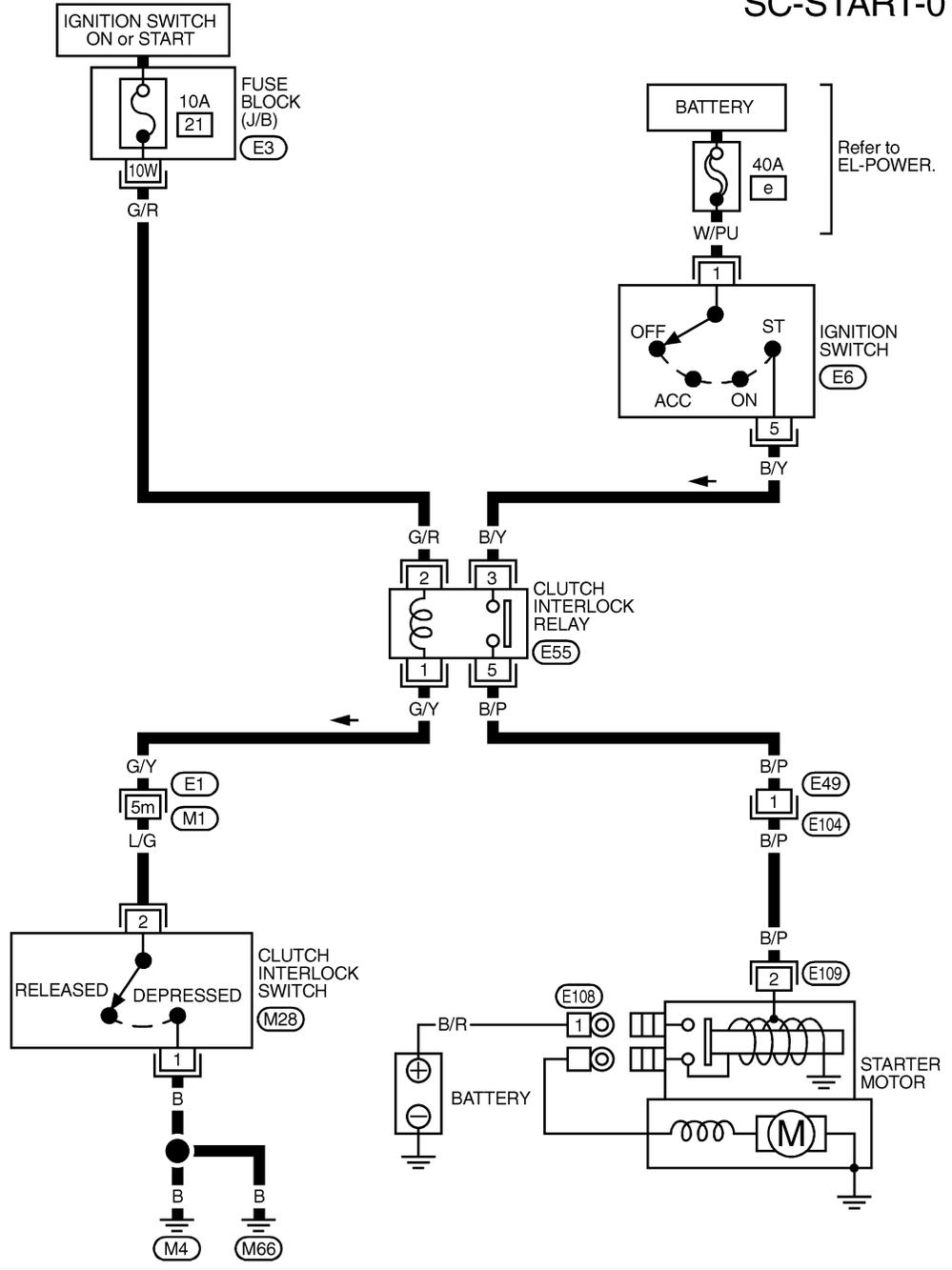
# STARTING SYSTEM

Wiring Diagram — START —/With M/T

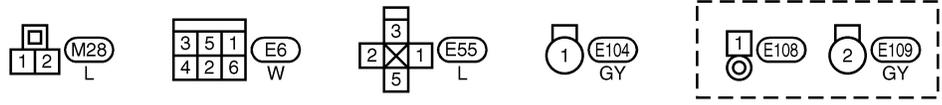
## Wiring Diagram — START —/With M/T

NASC0005

SC-START-01



Refer to EL-POWER.



Refer to last page (Foldout page).

M1, E1  
E3

# STARTING SYSTEM

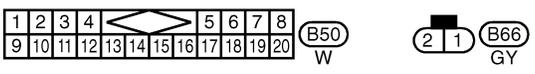
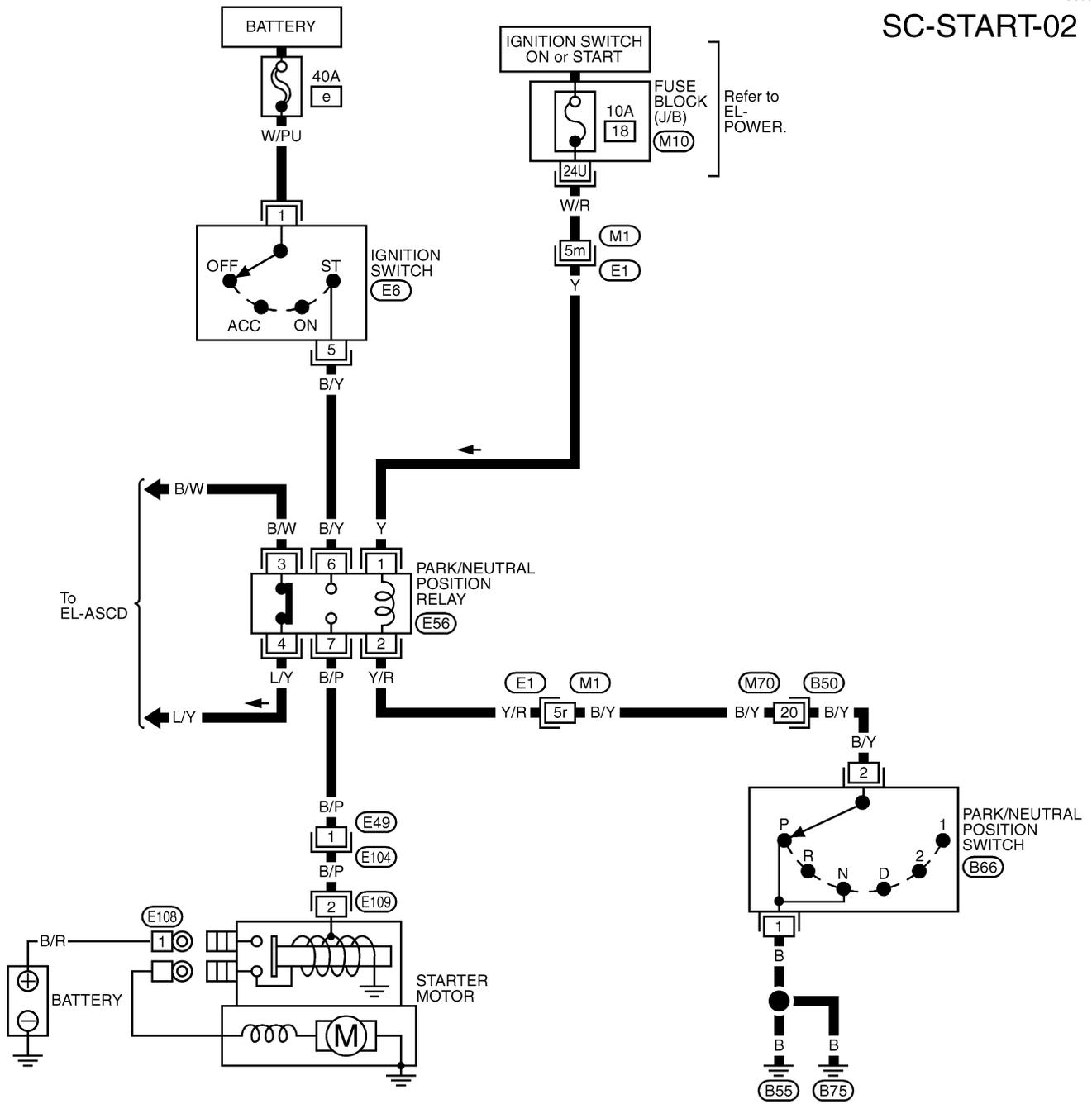
Wiring Diagram — START —/With A/T

## Wiring Diagram — START —/With A/T

NASC0017

SC-START-02

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA  
SC  
EL  
IDX



Refer to last page (Foldout page).

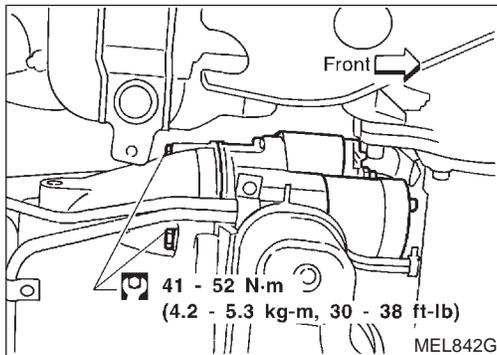
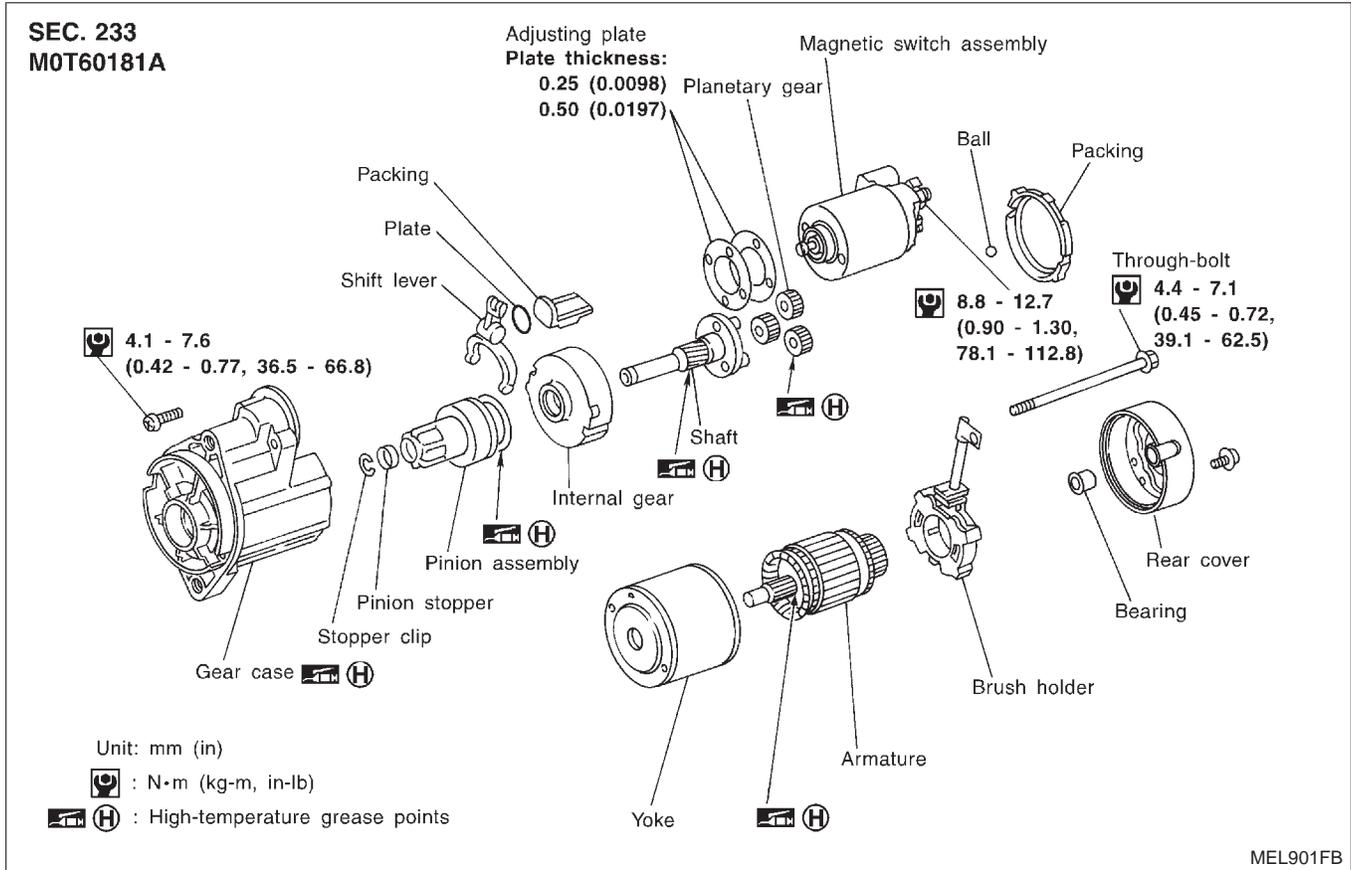
M1, E1  
M10

# STARTING SYSTEM

Construction

## Construction

NASC0006



## Removal and Installation

NASC0007

### Pinion/Clutch Check

NASC0008

1. Inspect pinion teeth.
  - Replace pinion if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. Inspect reduction gear teeth.
  - Replace reduction gear if teeth are worn or damaged. (Also check condition of armature shaft gear teeth.)
3. Check to see if pinion locks in one direction and rotates smoothly in the opposite direction.
  - If it locks or rotates in both directions, or unusual resistance is evident, replace.

## System Description

NASC0009

The alternator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. The voltage output is controlled by the IC regulator.

Power is supplied at all times to alternator terminal S through:

- 100A fusible link (letter **a**, located in the fuse and fusible link box), and
- 7.5A fuse (No. 65, located in the fuse and fusible link box).

Terminal B supplies power to charge the battery and operate the vehicle's electrical system. Output voltage is controlled by the IC regulator at terminal S detecting the input voltage. The charging circuit is protected by the 100A fusible link.

Terminal E of the alternator supplies ground through body ground E101.

With the ignition switch in the ON or START position, power is supplied

- through 10A fuse [No. 8, located in the fuse block (J/B)]
- to combination meter terminal 12 for the charge warning lamp.

Ground is supplied to terminal 43 of the combination meter through terminal L of the alternator. With power and ground supplied, the charge warning lamp will illuminate. When the alternator is providing sufficient voltage with the engine running, the ground is opened and the charge warning lamp will go off.

If the charge warning lamp illuminates with the engine running, a fault is indicated.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

**SC**

EL

IDX

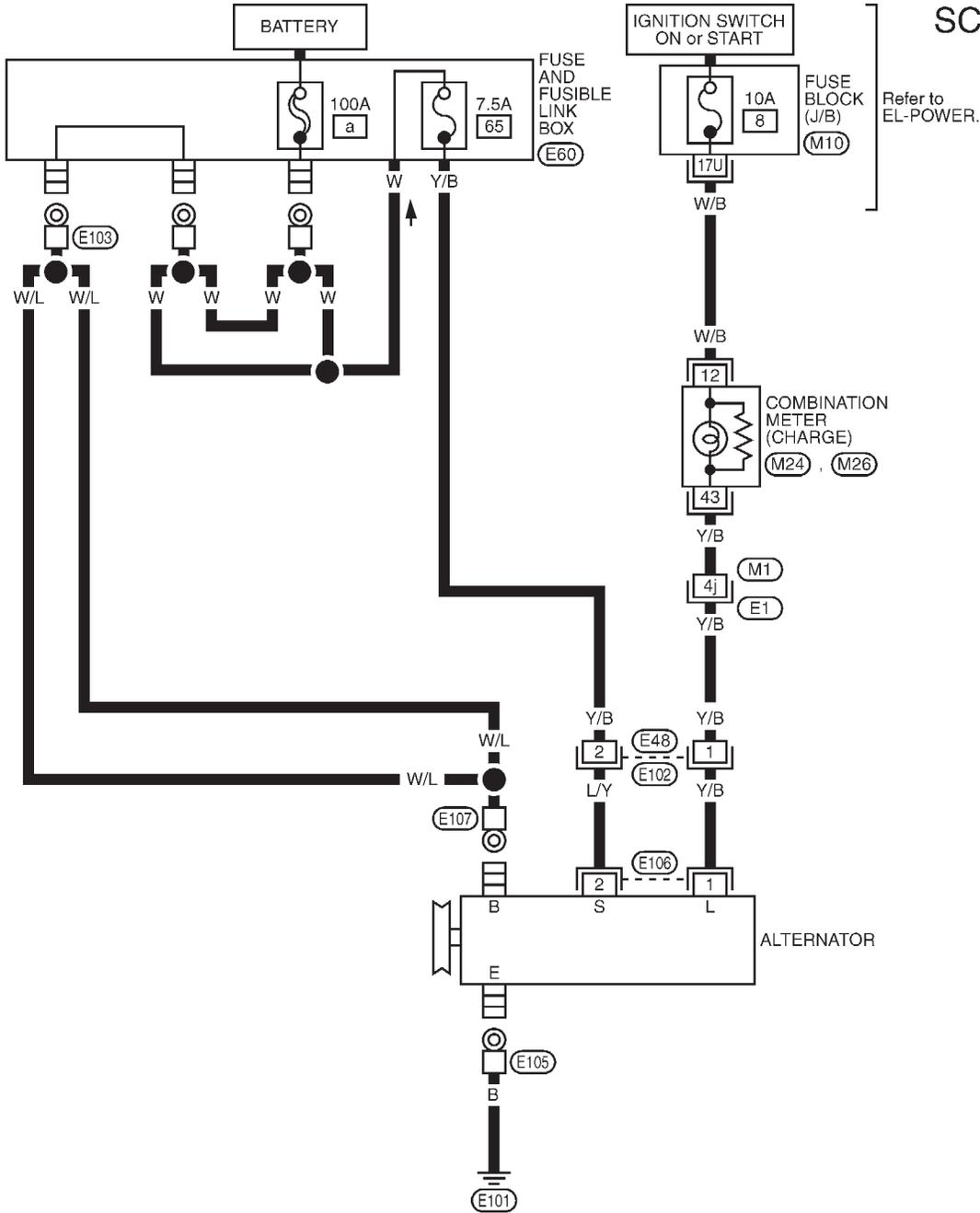
# CHARGING SYSTEM

Wiring Diagram — CHARGE —

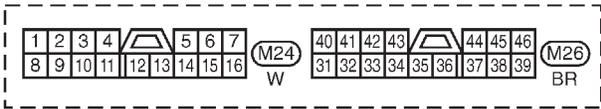
## Wiring Diagram — CHARGE —

NASC0010

SC-CHARGE-01



Refer to EL-POWER.



Refer to last page (Foldout page).

(M1), (E1)

(M10)

(E60)

## Trouble Diagnoses

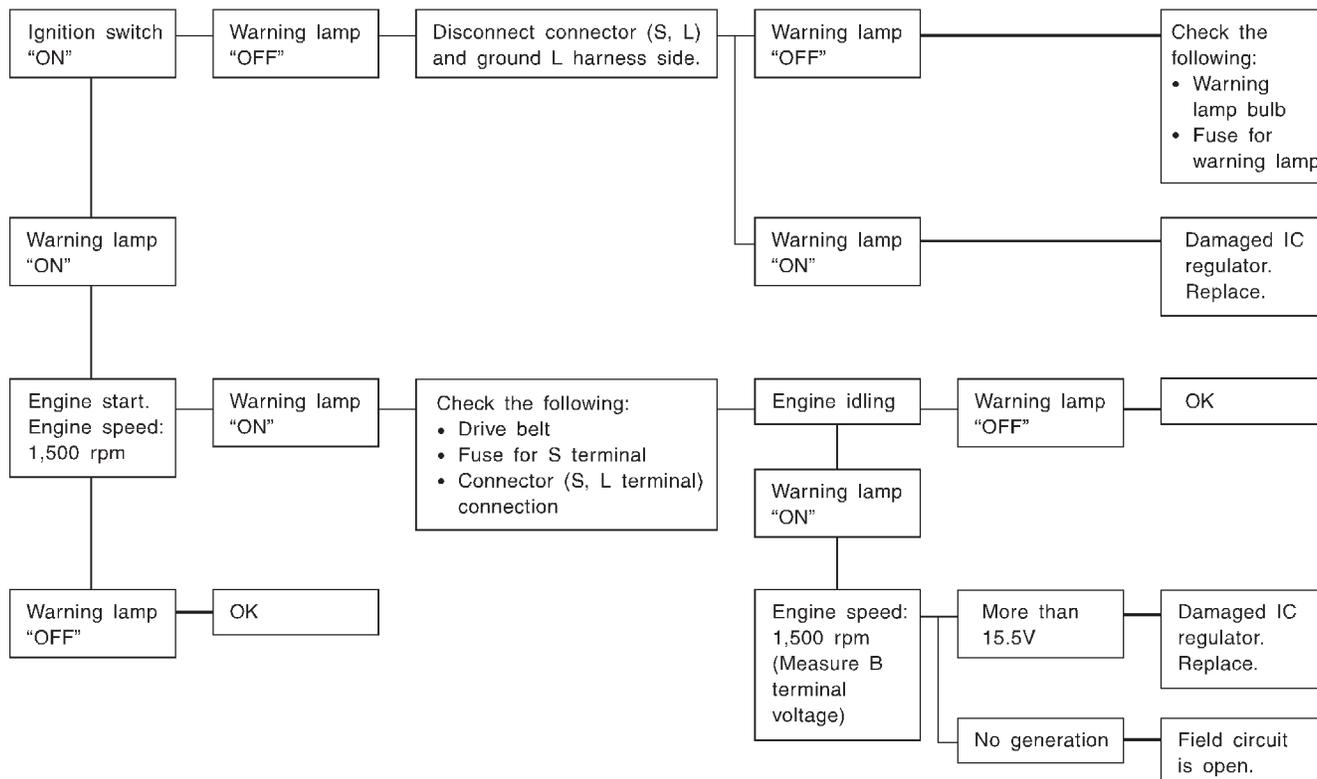
NASC0011

Before conducting an alternator test, make sure that the battery is fully charged. A 30-volt voltmeter and suitable test probes are necessary for the test. The alternator can be checked easily by referring to the Inspection Table.

- Before starting, inspect the fusible link.
- Use fully charged battery.

### WITH IC REGULATOR

NASC0011S01



Warning lamp: "CHARGE" warning lamp in combination meter

SEL338V

### NOTE:

- If the inspection result is OK even though the charging system is malfunctioning, check the B terminal connection. (Check the tightening torque.)
- When field circuit is open, check condition of rotor coil, rotor slip ring and brush. If necessary, replace faulty parts with new ones.

### MALFUNCTION INDICATOR

NASC0011S02

The IC regulator warning function activates to illuminate "CHARGE" warning lamp, if any of the following symptoms occur while alternator is operating:

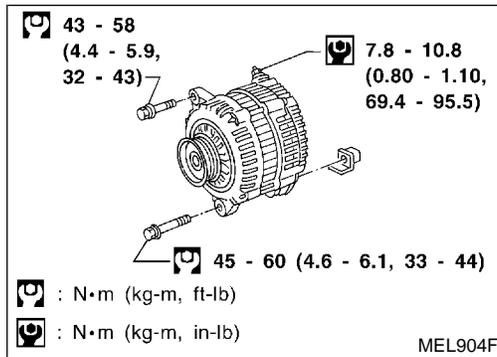
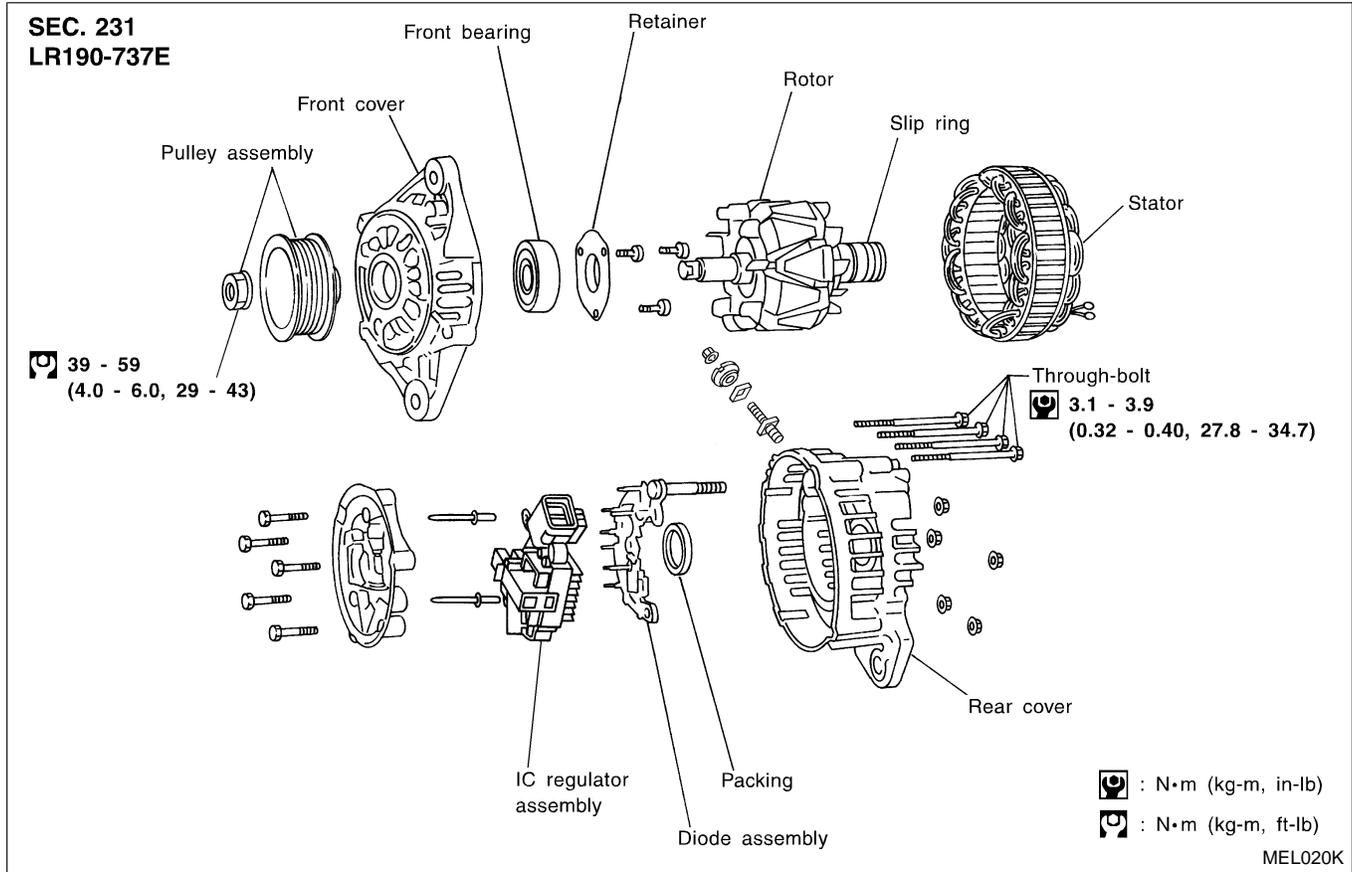
- Excessive voltage is produced.
- No voltage is produced.

# CHARGING SYSTEM

Construction

## Construction

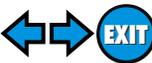
NASC0012



## Removal and Installation

NASC0013

# SERVICE DATA AND SPECIFICATIONS (SDS)



Battery

## Battery

NASC0014

Applied area	USA		Canada
	Standard	Option	Standard
Type	55D23R	80D26R	
Capacity V-AH	12-60	12-65	
Cold cranking current A (For reference value)	356	582	

## Starter

NASC0015

Type	M0T60181A	
	MITSUBISHI make	
	Reduction gear type	
System voltage	12V	
No-load	Terminal voltage	11.0V
	Current	Less than 90A
	Revolution	More than 2,500 rpm
Minimum diameter of commutator	28.8 mm (1.134 in)	
Minimum length of brush	7.0 mm (0.276 in)	
Brush spring tension	18.3 - 24.8 N (1.87 - 2.53 kg, 4.11 - 5.58 lb)	
Clearance between pinion front edge and pinion stopper mm (in)	—	

## Alternator

NASC0016

Type	LR190-737E
	HITACHI make
Nominal rating	12V-90A
Ground polarity	Negative
Minimum revolution under no-load (When 13.5 volts is applied)	Less than 1,000 rpm
Hot output current (When 13.5 volts is applied)	More than 23A/1,300 rpm More than 65A/2,500 rpm More than 87A/5,000 rpm
Regulated output voltage	14.1 - 14.7V
Minimum length of brush	6.0 mm (0.236 in)
Brush spring pressure	1.000 - 3.432 N (102 - 350 g, 3.60 - 12.34 oz)
Slip ring minimum outer diameter	26.0 mm (1.024 in)
Rotor (Field coil) resistance	2.67Ω

GI  
MA  
EM  
LC  
EC  
FE  
CL  
MT  
AT  
TF  
PD  
AX  
SU  
BR  
ST  
RS  
BT  
HA

SC

EL

IDX

## NOTES