THE NISSAN WAY

N-STEP

NISSAN Service Technician Education Program

STEP 1
INSTRUCTOR GUIDE

NISSAN

FOUR STEP REPAIR TECHNIQUE

Use the information below to help you plan and carry out effective repairs to electrical problems. Try to follow a logical, systematic procedure during your diagnosis and repair. This process is summarized as follows.

VERIFY

- Check to confirm the complaint is occurring.
- Is the condition described abnormal? (Use the owner's manual or another vehicle for verification)
- What else is not working? (Related circuits)
- What is working?

ISOLATE

- Locate schematic and wiring diagrams for the YEAR and MODEL vehicle you are repairing.
- Is the circuit controlled by:
  - A switch?
  - A relay?
  - An ECM?
- Are components in the same parallel circuit operating correctly or not?
- Are components in series operating or not?
- Choose test points that:
  - Can be quickly and easily accessed
  - Follow a logical process leading to a decision
- Separate the relay circuits and individually test the field coil and contact point circuits.
- "Bench test" components - supply power and ground to cheek their operation
- Remember circuit essentials:
  - POWER source with sufficient voltage
  - LOAD operating properly in good condition
  - GROUND with sufficient current capacity

REPAIR

- Fix the harness
- Clean the connections
- Replace the malfunctioning component and repair the cause of the failure

RECHECK

- Make sure the complaint has been resolved
- Be sure no other problem was caused during the repair
- Clean the vehicle so it is "customer ready"

GLOSSARY OF ELECTRICAL TERMS

AMMETER-An electrical test meter that measures the amount of current flow in a circuit.

AMPERE-A unit of measurement for the flow of current. Sometimes referred to as AMPS.

CONBINATION CIRCUIT-A circuit which combines series and parallel circuits.

CONDUCTOR-A material that will easily carry current flow.

CONNECTOR-The plastic that holds wires and wire terminals in position.

CONTINUITY-A complete path for current flow. In the service manual, current flow does NOT mean 'V' ohms resistance.

CROSSED CIRCUIT-Current flow from a switch operates a LOAD from, or SHORT CIRCUITS a different, unrelated circuit.

CURRENT FLOW-The movement of electrons in a circuit. Also called amperage or electricity.

DIODE-An electrical one-way cheek valve that permits current flow in one direction, but stops it from flowing in the other direction.

ECM-An Electronic Control Module that has the logic for the operation of electronically controlled circuits.

GROUNDED CIRCUIT-A circuit in which there is an unwanted contact between a conductor and ground. On the POWER side of a circuit, this will cause the fuse to blow. On the ground side of the circuit, the LOAD may be on all the time.

INSULATOR-A material that will not allow current flow. Plastic, rubber and air are common electrical insulators.

MULTIMETER-A electrical test meter that includes voltmeter, ammeter and ohmmeter scales.

OHM-A unit of measurement for resistance, or opposition to the flow of electrons.

OHMMETER-An electrical test meter that measures the amount of resistance in a circuit or component.

OHM'S LAW-A basic statement that shows the relationship between volts, amps and ohms in an electrical circuit.

OPEN CIRCUIT-An incomplete circuit in which current can not flow from POWER to LOAD to GROUND because of a disconnection, broken wire, blown fuse or other interruption.

PARALLEL CIRCUIT-A circuit ill which there is a separate path for current flow for each LOAD. If one of the Load's becomes open circuited. the other loads will continue to operate.

POTENTIOMETER-A variable resistor that is mechanically operated.

POWER-A supply of voltage to operate a circuit. This includes the source of the power, the wires, and all other components that provide voltage to the circuit LOAD.

RELAY-An electrically operated switch that uses low current flow in the COIL CONTROL CIRCUIT to activate high current flow in the CONTACT POINT CIRCUIT.

SERIES CIRCUIT-A circuit in which there is only a single path for current flow. If one of the components or LOADS in the circuit becomes open, the circuit will no longer operate.

SHORTED CIRCUIT-A circuit in which current flow takes a shorter path (less resistance) between POWER and GROUND, bypassing part or all of the circuit LOAD. Short circuits increase current flow and can cause blown fuses.

TERMINAL-Metal part at the end of a wire. Terminals fit into wire connectors.

THERMISTOR-An electronic component that changes its resistance as its temperature changes.

VARIABLE RESISTOR-A component whose resistance value can be changed to change the operation of a LOAD in the circuit.

VOLT-A measurement unit of electrical pressure.

VOLTMETER-An electrical test meter that measures the amount of voltage, or electrical pressure in a circuit.

VOLTAGE DROP-The amount of voltage consumed by a LOAD during circuit operation. The total of all voltage drops in a circuit, is equal to available voltage. Voltage drop is the measurement of the voltage loss in one section of a circuit.

WIRE GAUGE-Diameter of a wire. Smaller gauge wire (larger number) carries less current.

1. TROUBLESHOOTING GUIDES

DIAGNOSIS POINTS

STEP 1. For circuits that you are not familiar with, it might help to start with the schematic diagram. This will give you an over view of the circuit. The schematic diagram will show circuit components, and the way in which they are wired. Always locate the circuit LOAD first, then trace the wires to locate the POWER and GROUND.

STEP 2. Use the wiring diagram for a more complete picture of the circuit. The wiring diagram is your best source of guidance for logically tracing the circuit because it includes information such as wire colors, connector numbers, and relay box layout. Use your knowledge of POWER, LOAD and GROUND along with the wiring diagram to guide you in isolating the circuit for test purposes.

STEP 3. The harness layout section of the service manual will give you specific harness and connector locations on the vehicle. By using the harness layout diagram, you can find the exact locations on the vehicle for performing your diagnosis.

STEP 4. Finally, locate the actual components and the most accessible test points by using the Location of Electrical Units section of the Service Manual. When you make electrical tests remember to use test points that:

- Are the quickest to locate and test
- Are easiest to locate and test at
- Will tell you the most information about the circuit

DON'T REMOVE THE DASHBOARD BEFORE CHECKING THE FUSE!

TROUBLESHOOTING TIP #5

After tracing a circuit with the wiring diagram, use the Location of Electrical Units section to locate test points that are easy to find and will help isolate the problem.

CIRCUIT COLOURING

The wires used for automotive wiring are colored for efficient identification and service.

Color classification / Name of circuit	Standard color	Supplementary color (color of stripe)
Starting/ignition circuit	B	W. Y. R. G.
Charging circuit	W (Y)	B. R. L.
Lighting circuit	R	B. W. G. L. Y.
Signal circuit	G (LG, B R)	B. W. R. L. Y.
Instrument circuit	Y	B. W. R. G. L.
Other circuit	L (BR)	B. W. R.
Grounding circuit	B	

B: black, W: white, R: red, G: green, Y: yellow, L: blue, BR: brown, LR: light green

Wire colors are classified as follows:

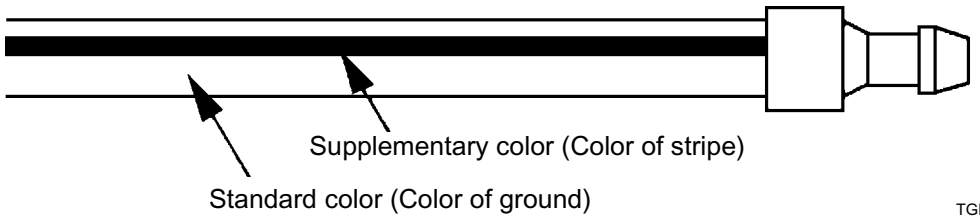
Main systems: Standard colors

Detailed circuit: Supplementary colors

Standard and supplementary colors are indicated as follows:

R, W, B, ... One–letter symbols, representing standard colors only R/W.G/Y ... Two-letter symbols, with the first letter standing for a standard color and the second letter representing a supplementary color

Example:



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CIRCUIT CLASSIFICATION

Starting/ignition circuits

Circuit for ignition switch, ignition coil, distributor, starter motor, diesel glow plug, etc.

Charging circuit

Circuit for alternator, voltage regulator, ammeter or charge warning lamp, etc.

Lighting circuits

Circuit for headlamps, fog lamps and backup lamps, meter illumination lamps, room lamps, personal lamps, etc.

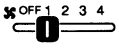
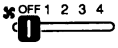
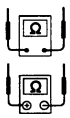
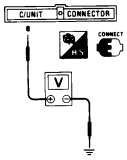
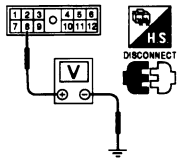
Signal circuits

Circuit for sparking, turn signal, 4-way flashers, stop, tail, clearance and license lamps, and for devices that indicate the driver's intent, such as the horn.

In addition, the troubleshooting guide flow chart use symbol explanations to indicate whether a test should be performed with the connector connected or disconnected, as well as many other testing conditions that must be met.

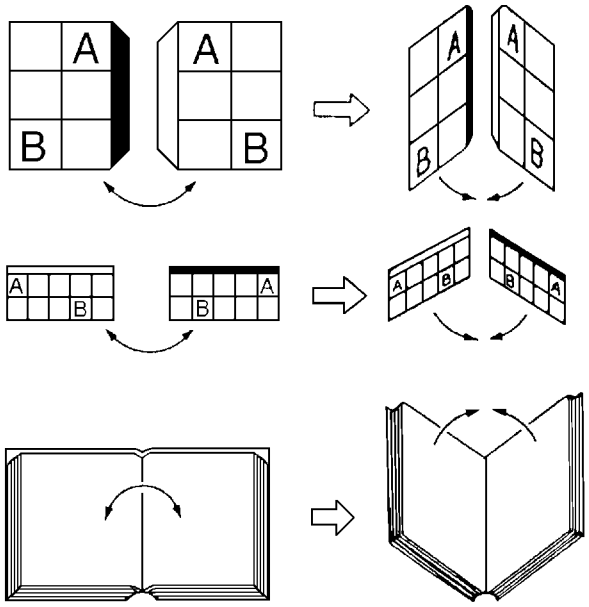
HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSIS

Key to symbols signifying measurements or procedures

Symbol	Symbol explanation	Symbol	Symbol explanation
	Check after disconnecting the connector to be measured.		Procedure without CONSULT
	Check after connecting the connector to be measured.		A/C switch is "OFF".
	Insert key into ignition switch.		A/C switch is "ON".
	Turn ignition switch to "OFF" position.		REC switch is "ON".
	Turn ignition switch to "ON" position.		REC switch is "OFF".
	Turn ignition switch to "START" position.		DEF switch is "ON".
	Turn ignition switch from "OFF" to "ACC" position.		VENT switch is "ON".
	Turn ignition switch from "ACC" to "OFF" position.		Fan switch is "ON". (At any position except for "OFF" position)
	Turn ignition switch from "OFF" to "ON" position.		Fan switch is "OFF".
	Turn ignition switch from "ON" to "OFF" position.		Apply battery voltage directly to components.
	Do not start engine, or check with engine stopped.		Drive vehicle.
	Start engine, or check with engine running.		Disconnect battery negative cable.
	Apply parking brake.		Depress brake pedal.
	Release parking brake.		Release brake pedal.
	Check after engine is warmed up sufficiently.		Depress accelerator pedal.
	Voltage should be measured with a voltmeter.		Release accelerator pedal.
	Circuit resistance should be measured with an ohmmeter.		Pin terminal check for S.M.J. type E.C.U. and A/T control unit connectors. **For details regarding the terminal arrangement, refer to the foldout page.** 
	Current should be measured with an ammeter.		
	Procedure with CONSULT		

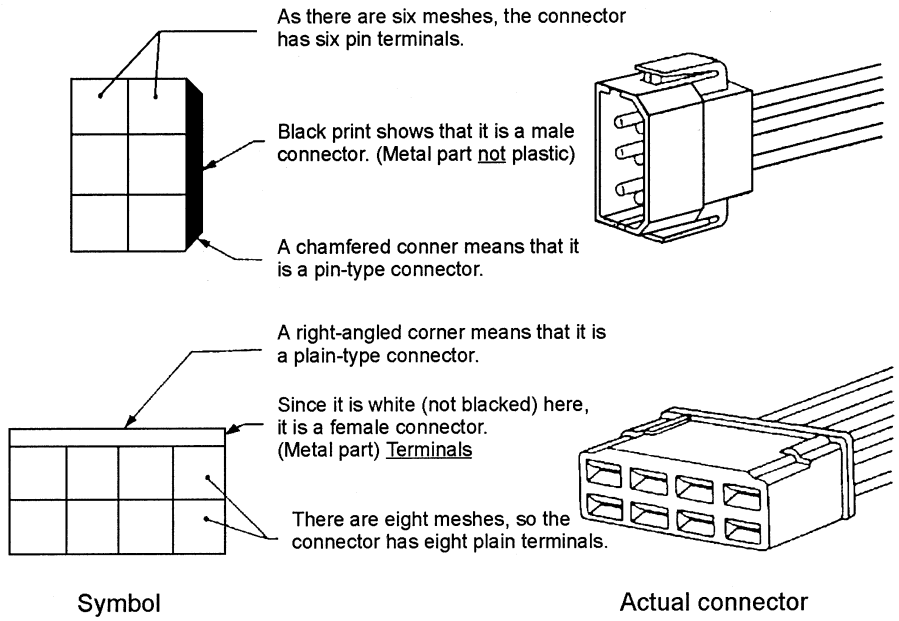
TGI002

Since electrical diagrams include a lot of information on a single page, accurate tracing of a single circuit is not always easy. When you use the diagrams, important points to remember are:



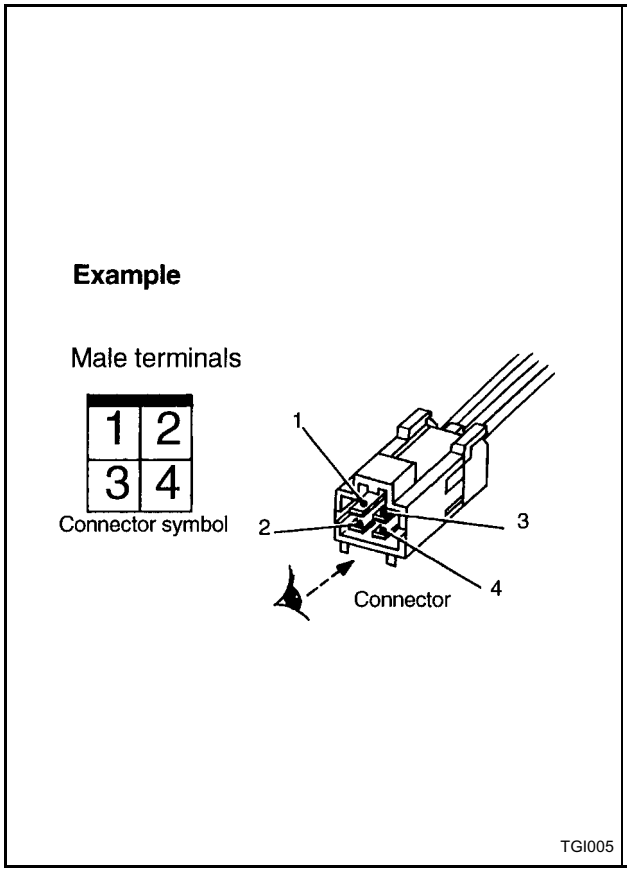
TGI003

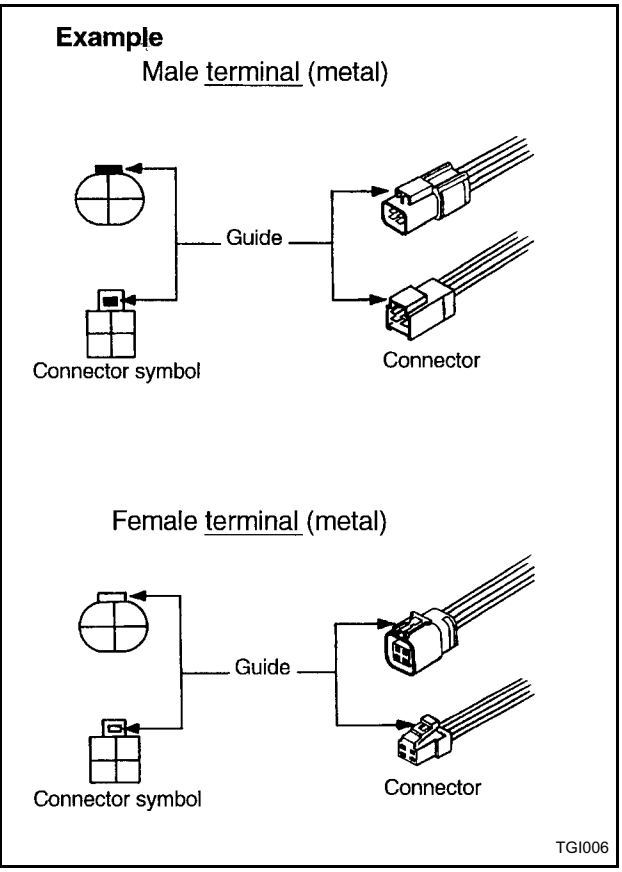
- The two halves of a connector are folded together like a book.
- Wires sometimes change colors from one side of a wire connector to the other side.



TGI004

- All connector symbols in wiring diagrams are viewed from the terminal side.
- Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.





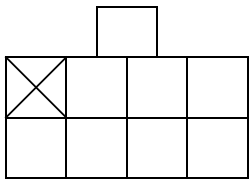
The number of wires, type of connector and whether it is male of female can be determined by reading a Nissan wiring diagram. This information is outlined in the chart below.

SYMBOL	ACTUAL CONNECTOR
Number of meshes	Number of terminals available
Black print	Male connector (terminal)
White (not blacked) print	Female connector (terminal)
Chamfered corner	Pin-type connector (bullet)
Right-angled corner	Plain-type connector (spade)

TROUBLESHOOTING TIP #4

An “X” in a wiring diagram wire Connector means that is NO terminal in that connector hole.

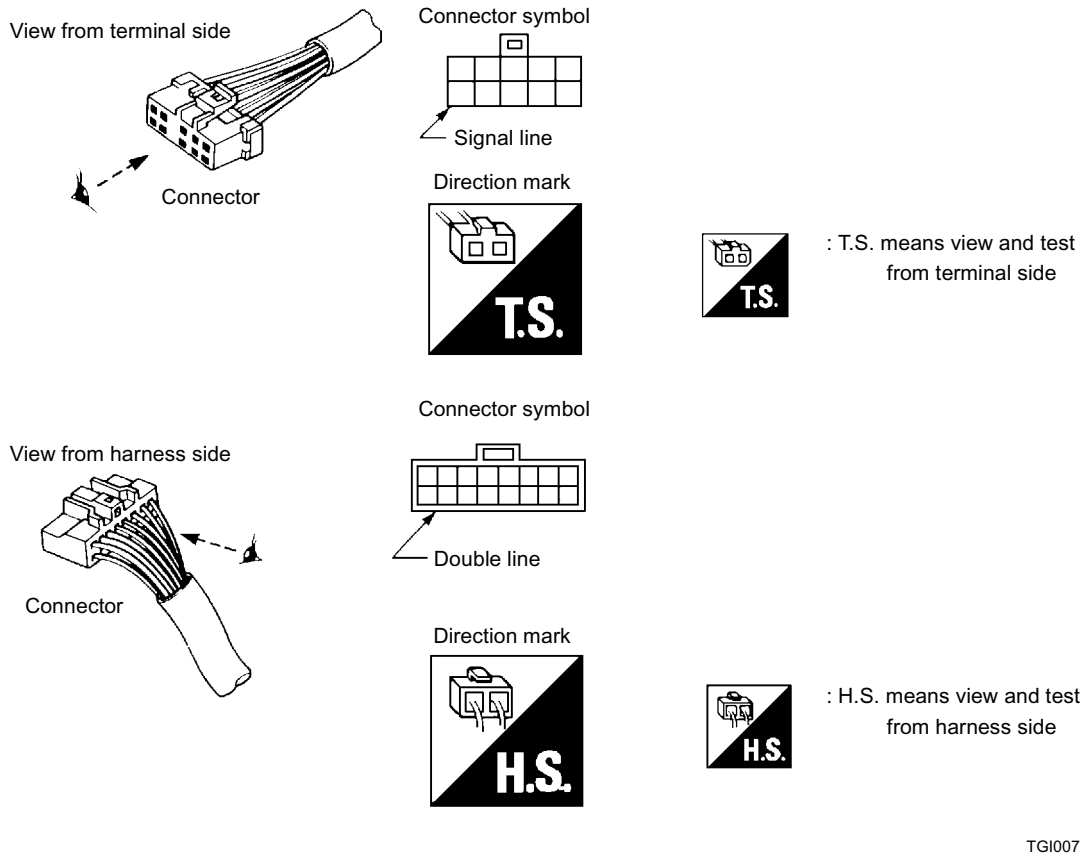
Example:



Service Manuals include troubleshooting guides for a number of Nissan vehicle systems. Troubleshooting guide flow charts use a number of symbols to describe the steps that need to be taken during diagnosis.

DIRECTION MARK

A direction mark is included in the troubleshooting guides of the Service Manual to differentiate between the harness side of the connector and the terminal side of the connector. These direction marks indicate which side of a wire connector is being viewed, and which side of the connector tests should be made from.

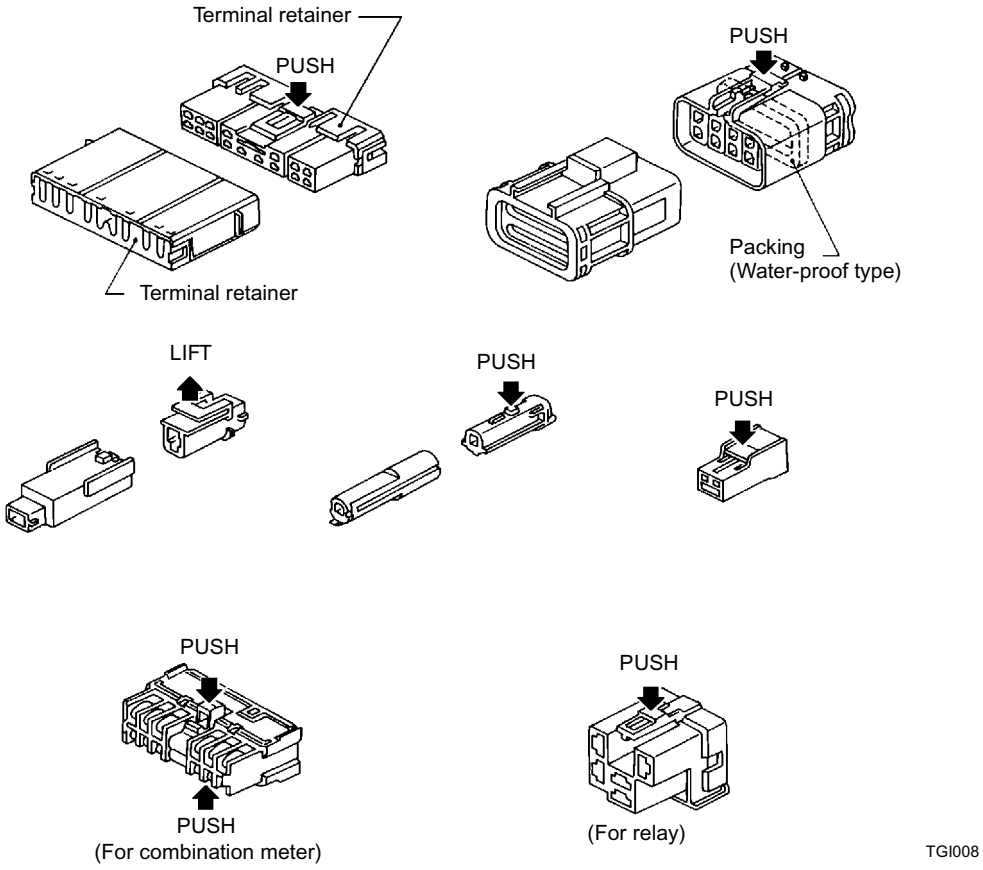


All connector symbols shown from the terminal side are enclosed by a single line, and connector symbols shown from the harness side are enclosed by double lines.

Each connector symbol also includes a guide for the connectors.

IF THE GUIDE IS HOLLOW, THE WIRE TERMINALS ARE FEMALE.
IF THE GUIDE IS BLACK, THE WIRE TERMINALS ARE MALE.

All harness connectors have been modified to prevent accidental loosing or disconnection. Pushing or lifting the locking section can disconnect them.

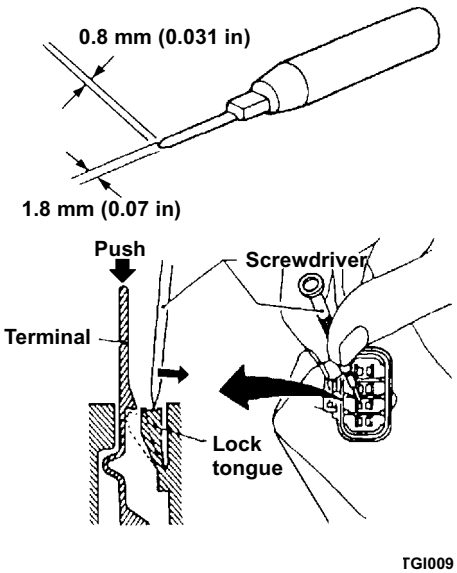


EXTRACTION OF TERMINAL FROM A CONNECTOR

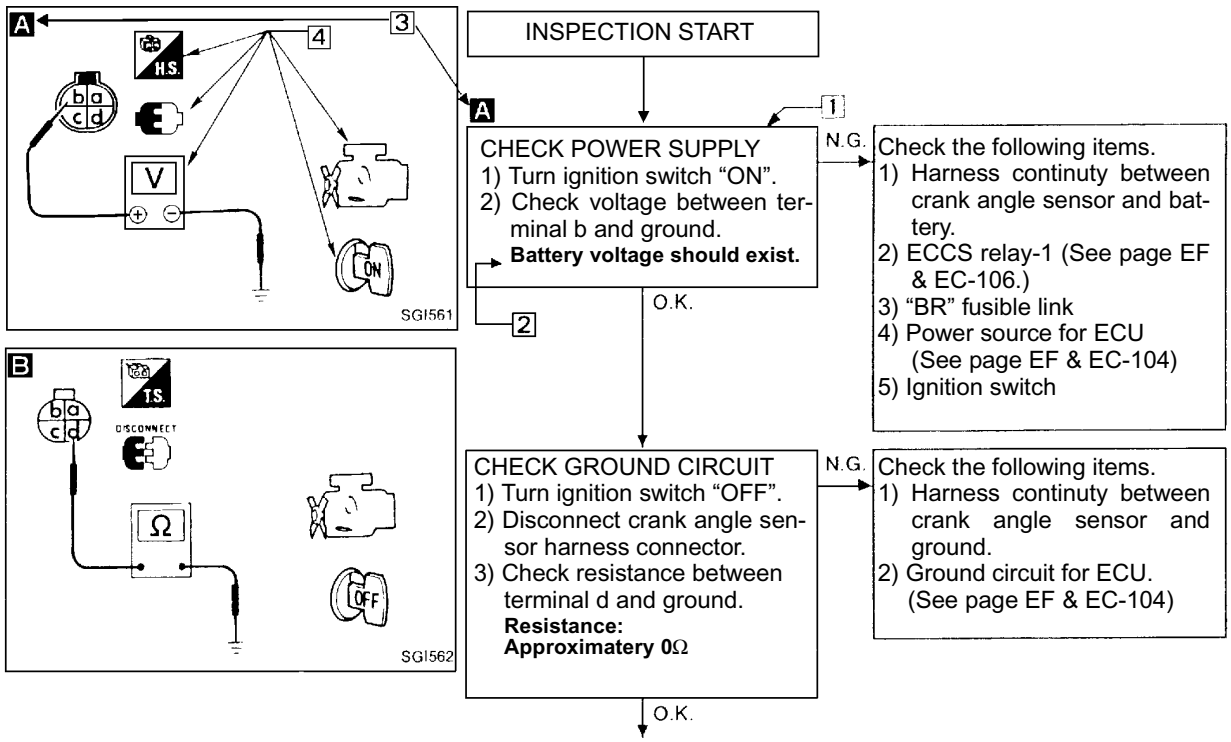
1. Remove the terminal retainer.

2. With a small screwdriver or suitable tool, tilt the lock tongue and, at the same time, push out the terminal.

Note: Some have a different design and care must be taken so that the connector is not damaged.

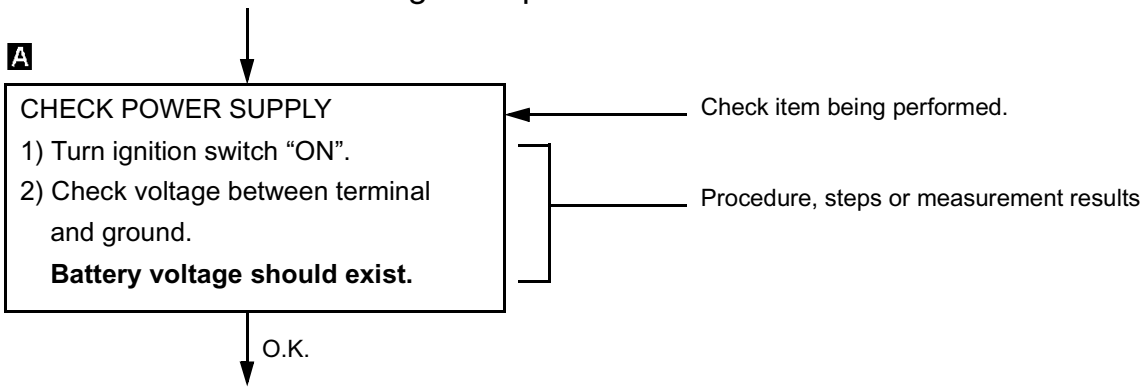


1) HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSE



3. Work and diagnostic procedure

Start to diagnose a problem using procedures indicated in enclosed blocks, as shown in the following example.



4. Measurement results

Required results are indicated in bold type in the corresponding block, as shown below:

These have the following meanings:

Battery voltage ~ 11 - 14V or approximately 12V

Voltage: **Approximately** 0V ~ Less than 1V

5. **Cross reference of work symbols in the text and illustration.**
   Illustrations are provided as visual aids for work procedures. For example, symbol A indicated in the left upper portion of each illustration corresponds with the symbol in the flowchart for easy identification. More precisely, the procedure under “CHECK POWER SUPPLY” outlined previously is indicated by an illustration A.
6. **Symbols used in illustrations**
   Symbols included in illustrations refer to measurement or procedures. Before diagnosing a problem, familiarize yourself with each symbol.

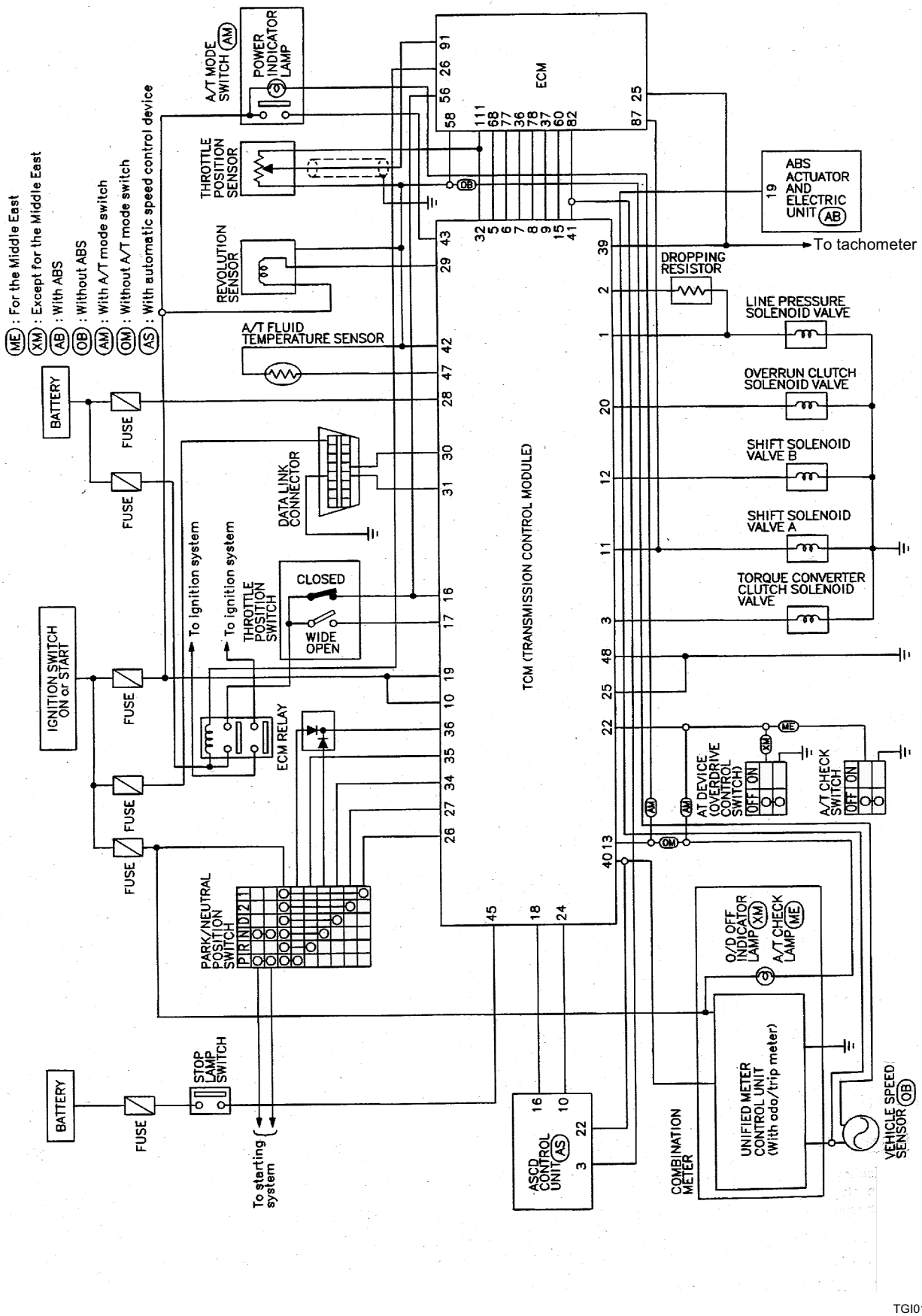
2) USAGE OF WIRING DIAGRAM

There are two types of diagrams used in the Service Manual to perform trouble diagnosis.

* Schematic Diagrams
* Wiring Diagrams

Schematic diagrams

The SCHEMATIC DIAGRAM is a simplified electrical diagram.
In this example of a Automatic transmission circuit, all the main components of the circuit are shown from the POWER source to GROUND.
However, not shown are important repair details such as connector numbers, wire color codes and location, so the example at the next page indicates the schematic diagrams.


(ME) : For the Middle East
(XM) : Except for the Middle East
(AB) : With ABS
(OB) : Without ABS
(AM) : With A/T mode switch
(OM) : Without A/T mode switch
(AS) : With automatic speed control device
A/T MODE SWITCH (AM)
POWER INDICATOR LAMP
THROTTLE POSITION SENSOR
REVOLUTION SENSOR
A/T FLUID TEMPERATURE SENSOR
ECM
ABS ACTUATOR AND ELECTRIC UNIT (AB)
To tachometer
DROPPING RESISTOR
LINE PRESSURE SOLENOID VALVE
OVERRUN CLUTCH SOLENOID VALVE
SHIFT SOLENOID VALVE B
SHIFT SOLENOID VALVE A
TORQUE CONVERTER CLUTCH SOLENOID VALVE
BATTERY
FUSE
IGNITION SWITCH ON or START
DATA LINK CONNECTOR
To ignition system
THROTTLE POSITION SWITCH
CLOSED
WIDE OPEN
ECM RELAY
TCM (TRANSMISSION CONTROL MODULE)
AT DEVICE (OVERDRIVE CONTROL SWITCH)
A/T CHECK SWITCH
OFF ON
PARK/NEUTRAL POSITION SWITCH
P R N D 2 1
STOP LAMP SWITCH
To starting system
ASCD CONTROL UNIT (AS)
O/D OFF INDICATOR LAMP (XM)
A/T CHECK LAMP (ME)
UNIFIED METER CONTROL UNIT (With odo/trip meter)
COMBINATION METER
VEHICLE SPEED SENSOR (OB)

TGI011

Wiring diagrams

WIRING DIAGRAMS provide a road map of the electrical system and contain more detail than SCHEMATIC DIAGRAMS.

The advantages of wiring diagrams are:

* Connector type
* Wire color
* Connector location
* Fuse valves
* Wire connection

Reading WIRING DIAGRAMS

WIRING DIAGRAMS contain many important abbreviations and symbols. These important features are described in the following examples.