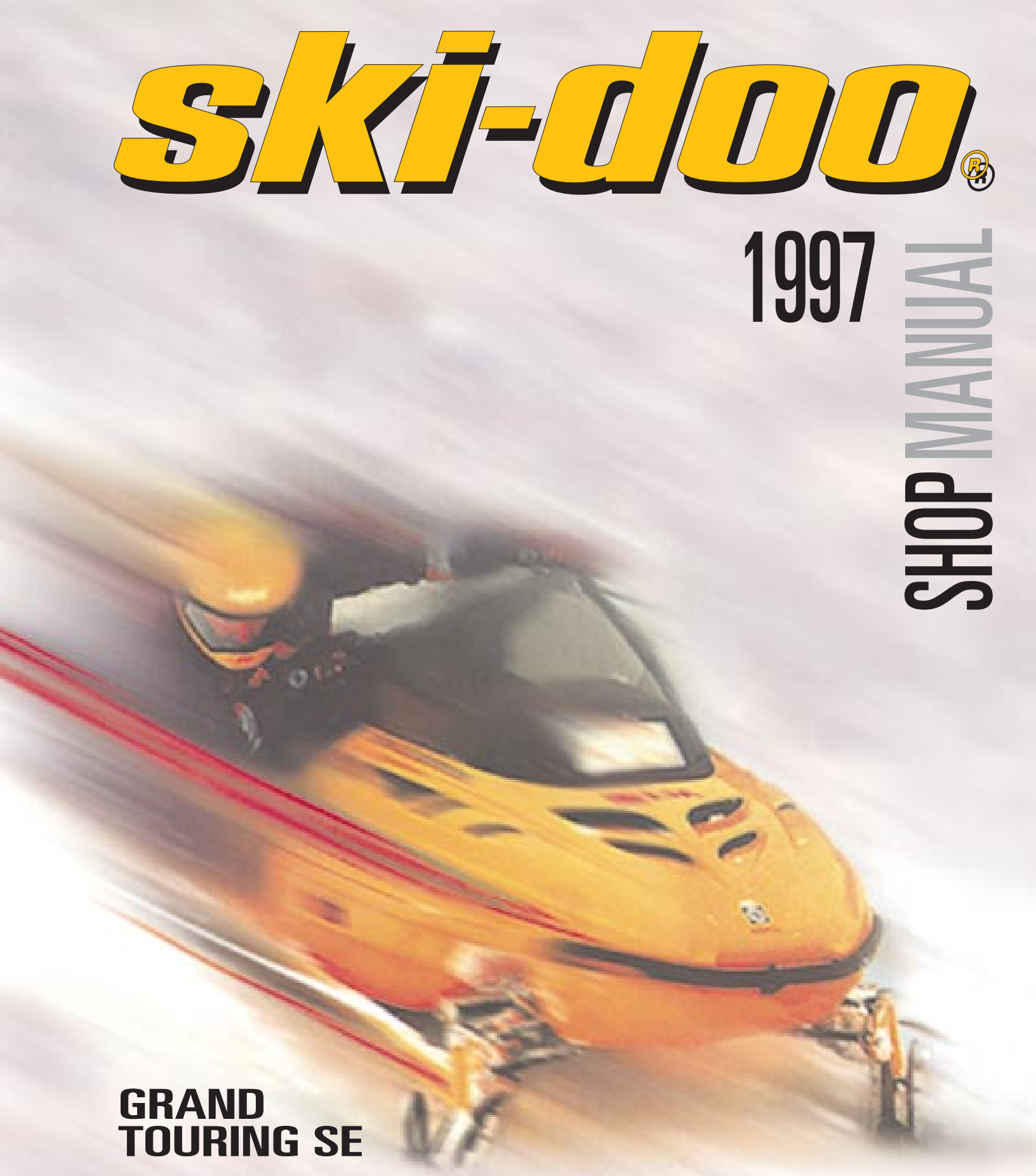
ski-doo®

1997

SHOP MANUAL



GRAND TOURING SE

SUPPLEMENT

484 0647 04

1997
Shop Manual Supplement

GRAND TOURING SE

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** Refer to *1997 Shop Manual volume 2* (P/N 484 0647 01)

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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair the 1997 Ski-Doo Grand Touring SE. See model list on next page.

This edition was primarily published to be used by snowmobile mechanics who are already familiar with all service procedures relating to Bombardier made snowmobiles.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This *Shop Manual Supplement* uses technical terms which may be slightly different from the ones used in *Parts Catalog*.

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex.: locking tab, elastic stop nut, etc.) must be installed or replaced with new ones, when damaged. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols;

◆ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

▼ CAUTION

Denotes an instruction which, if not followed, could severely damage vehicle components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

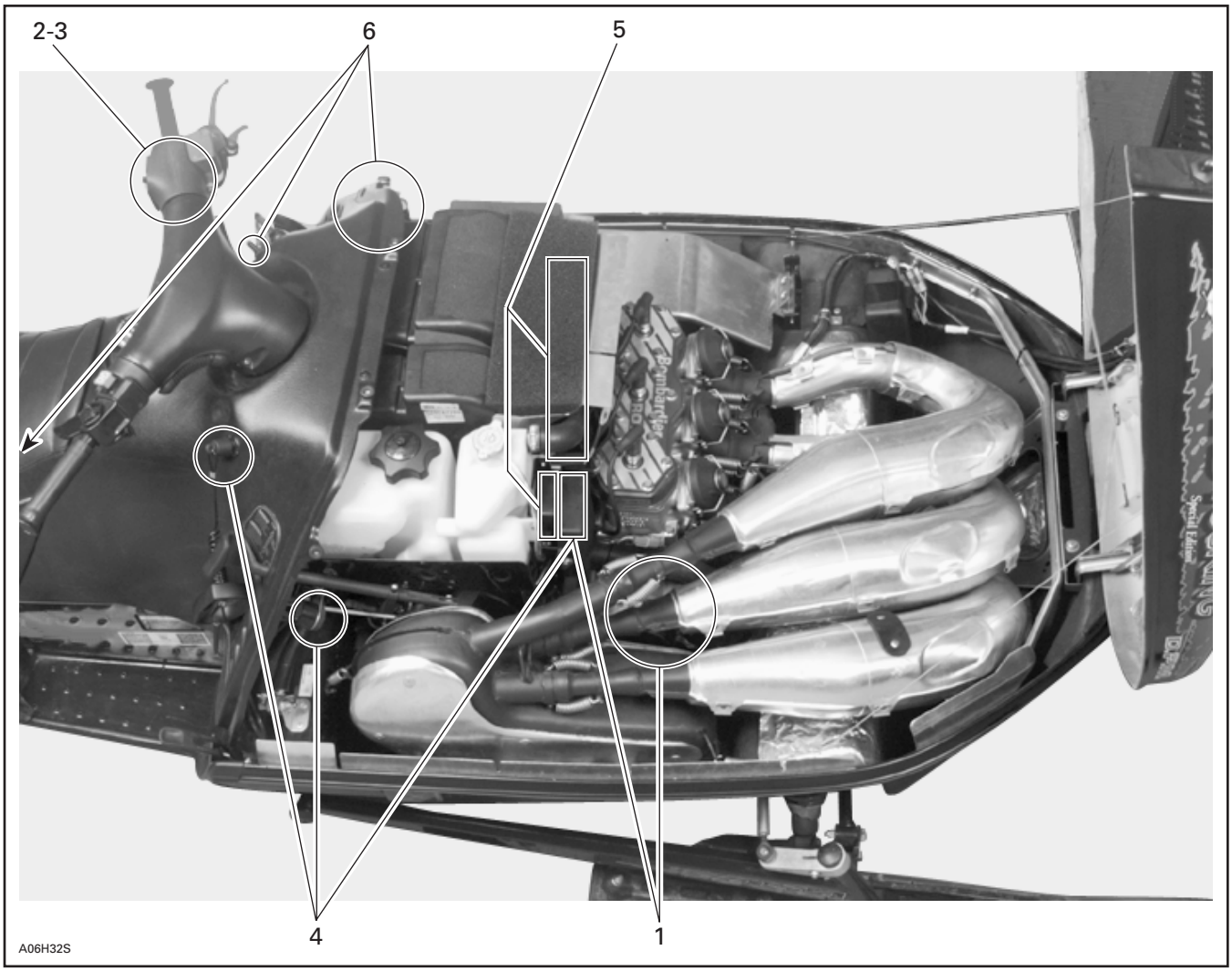
Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

This information relates to the preparation and use of Bombardier snowmobiles and has been utilized safely and effectively by Bombardier Inc. However, Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

1997 GRAND TOURING SE
SHOP MANUAL SUPPLEMENT

INTRODUCTION

The 1997 Grand Touring SE comprises 6 new systems. The *1997 Shop Manual Supplement* describes how these systems operate as well as the procedures to test them.



1. *Magneto system*
2. *Heating elements switches system*
3. *Headlamp dimmer switch system*
4. *DESS*
5. *Digital performance management system (DPM)*
6. *Air suspension*

Troubleshooting tables (by system) can be found in section 02 of this supplement.

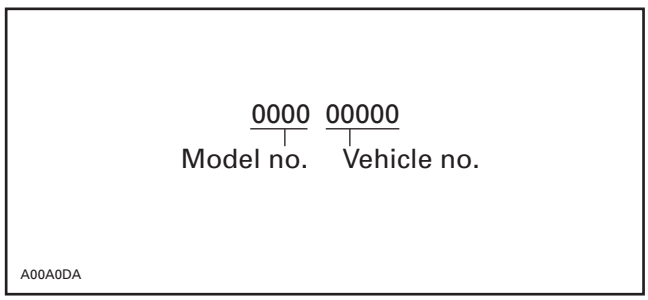
ABBREVIATION LIST

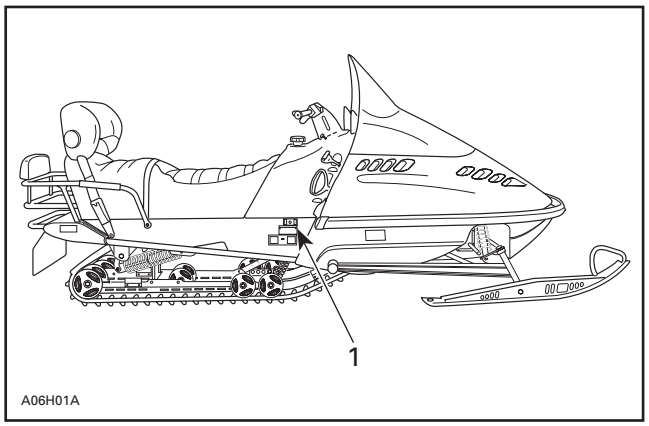
CDI Capacitor Discharge Ignition
DESS Digitally Encoded Security System
DPM Digital Performance Management
Hz Hertz (1 cycle per second)
PSI Pound per Square Inch
MAG Magneto (magneto side)
mbar millibar
MPEM Multi-Purpose Electronic Module
PTO Power Take Off (drive pulley side)
ROM Read Only Memory
RPM Revolutions Per Minute
VDC Volt Direct Current

MODELS	MODEL NUMBER
GRAND TOURING SE (CANADA)	1129
GRAND TOURING SE (U.S.).....	1130
GRAND TOURING SE (EUROPE)	1131

Each Vehicle has its Particular Vehicle Serial Number

Serial Number Meaning

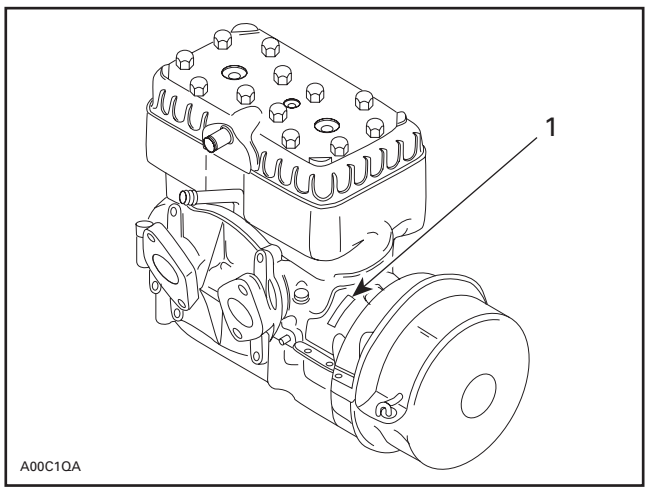




TYPICAL
1. Vehicle serial number

The engine also has a serial number.

Liquid-Cooled Engines



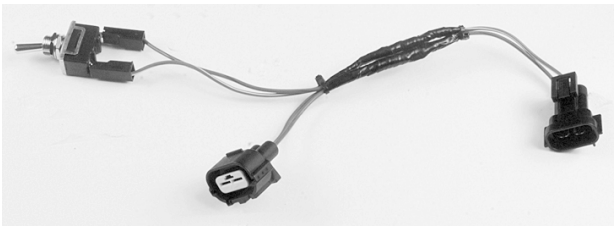
1. Engine serial number

▼ CAUTION

Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

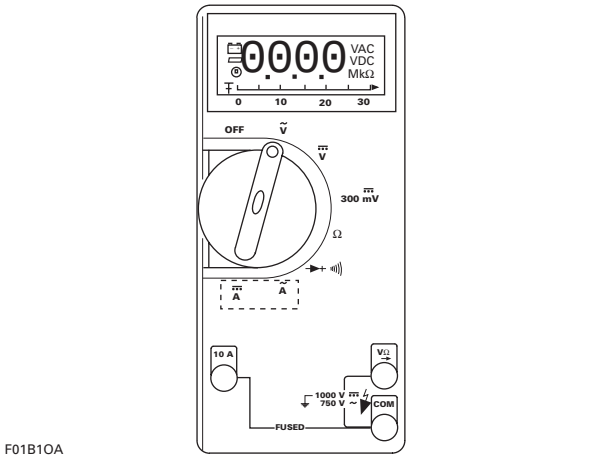
TOOLS

TYPICAL — ADAPTOR (P/N 529 0338 00)



BYPASS WIRES (P/N 529 0333 00)

These wires ensure continuity between the battery and loads without the engine running. All accessories are ON except for the buzzer.

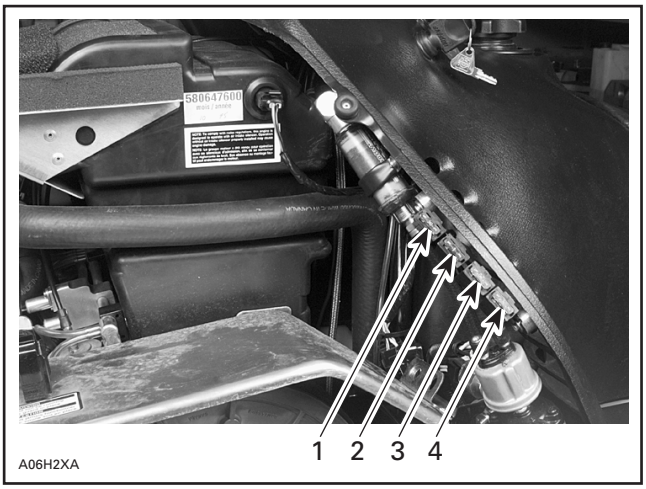


FLUKE MULTIMETER (P/N 529 0220 00)

TROUBLESHOOTING

ELECTRICAL SYSTEM

Always start by checking the fuse.



1. *Main including starter 30 A*
2. *Digital performance management 1 A*
3. *Compressor 20 A*
4. *All others except starter 20 A*

DESS SYSTEM (DIGITAL ENCODED SECURITY SYSTEM)

Always start by checking the fuse.

DIGITAL PERFORMANCE MANAGEMENT (DPM) SYSTEM

Always start by checking the fuse.

If the DPM seems to be defective, unplug fuse 1A while the engine is running. The carburation is now identical to that of carburetors without a DPM provided, of course, that all pipe fittings are tight and that solenoids are in good condition. None must be half-open.

AIR SUSPENSION SYSTEM

Always start by checking the fuse.

ELECTRICAL SYSTEM

360-WATT MAGNETO SYSTEM

COMPONENT LOCATION

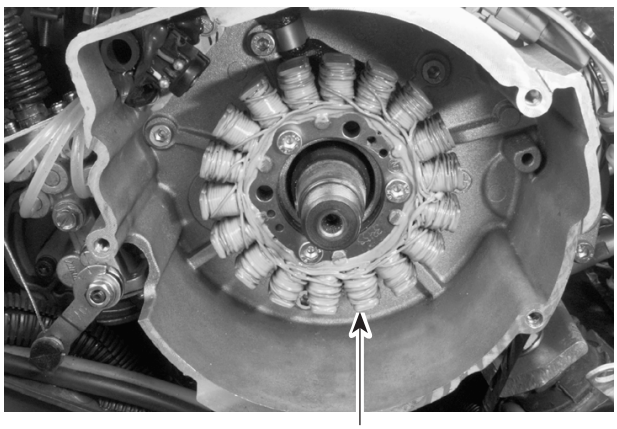
Refer to photos included with the electrical diagram.

THEORY AND OPERATION

Charging System

Lighting Coil

This 360-watt coil produces alternating current.



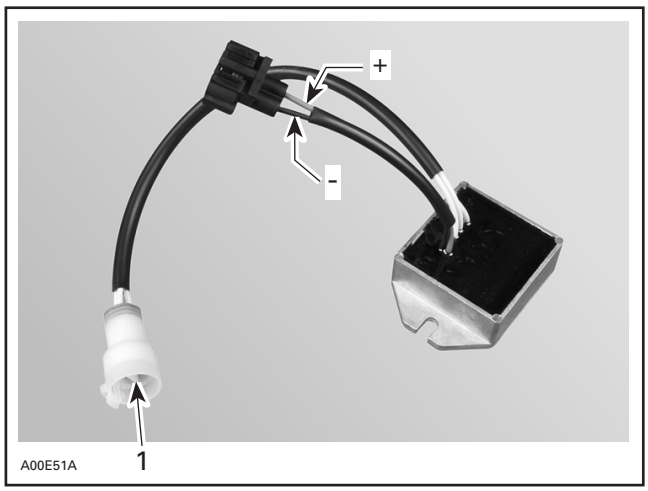
360-WATT MAGNETO
1. Triple coil (3-phase)

Regulator/Rectifier

First, the regulator/rectifier converts the alternating current of the magneto into direct current (DC).

It uses diode bridges allowing the alternating current to pass in one direction only.

The negative (-) wire (black) is connected to ground (regulator housing) and to the frame, while the positive wire is RED/BLUE.



+ Positive
- Negative
1. Magneto

All accessories are fed with direct current.

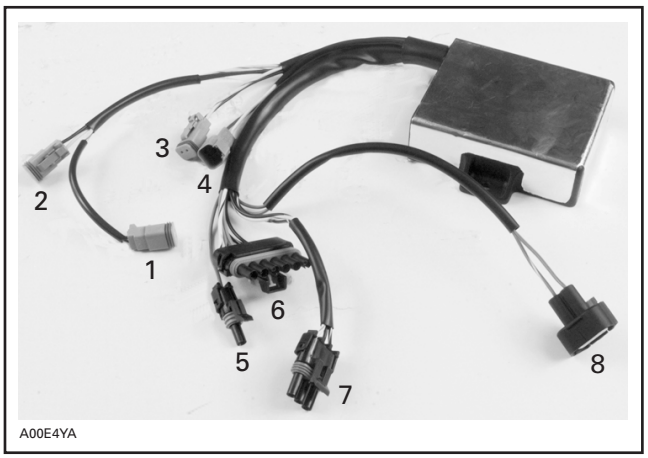
NOTE: The tachometer receives a very small portion of the alternating current through the WHITE/GREEN wire. The tachometer must detect a variable pulse (alternating current) to operate. Note that it is the only accessory fed with alternating current but operating on direct current.

After rectifying the magneto current, the regulator/rectifier limits the magneto voltage to 14.7 volts.

NOTE: In simpler terms, an electrical system producing 14.7 volts is called a 12-volt system.

Ignition System — MPEM Module (Multi-Purpose Electronic Module)

This module operates on direct current (12 VDC).

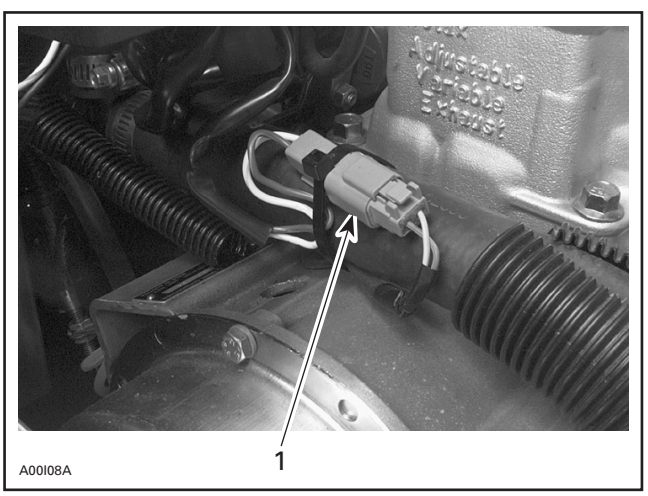


MPEM

1. *PTO high tension coil; 3-05 housing*
2. *CENTRE high tension coil; 3-04 housing*
3. *MAG high tension coil; 3-03 housing*
4. *Trigger coil; 2-03 housing*
5. *Positive supply; 2-03 housing*
6. *Ground, buzzer, warning light, signal to DPM, engine shut-off; 3-06 housing*
7. *DESS switch*
8. *Load breaker*

The 360-watt magneto has no ignition generator coil. All the ignition current comes from the magneto coil. A BLACK/YELLOW wire allows the engine to stop. Grounding this wire will short-circuit the ignition module.

Trigger coil pulses are sent to the module in order to ignite the spark plug at the right time.



1. *Trigger coil wires; 2-03 housing*

This device includes the DESS system. See section 3.

This module also activates the warning buzzer (reverse and DESS code).

Finally, the MPEM controls load supply (headlamp, taillight, dashboard gauges, heated components, etc.). If the key is left in the ON position without the engine running, the MPEM will not supply current to the loads, and this to prevent discharging of the battery. The MPEM will only allow the loads to be fed (20A fuse, through RED/YELLOW wire) if the engine revolution exceeds 800 RPM.

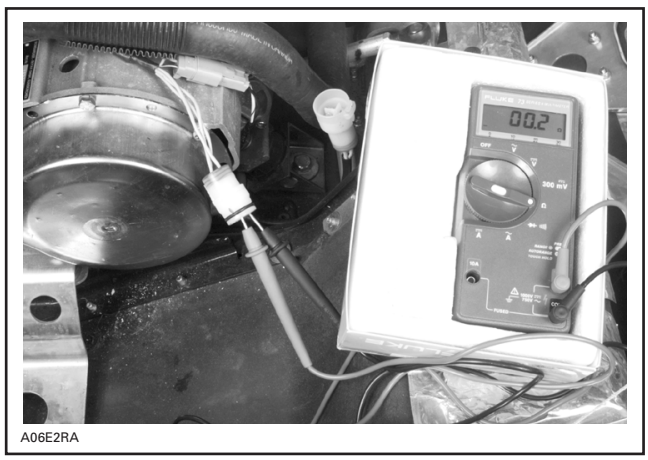
TESTING PROCEDURE

Magneto

Coil Testing

NOTE: The coil being triple, all 3 parts must be tested separately. Refer to the electrical diagram at the end of this supplement.

Connect an ohmmeter to the magneto YELLOW/YELLOW wires (2-04A, 2-04B and 2-04C).



The resistance must be as indicated in the following table. All 3 sections of the coil have the same resistance.

WIRES	RESISTANCE VALUES Ω
YELLOW and YELLOW	maximum 0.5

Coil Insulation Test

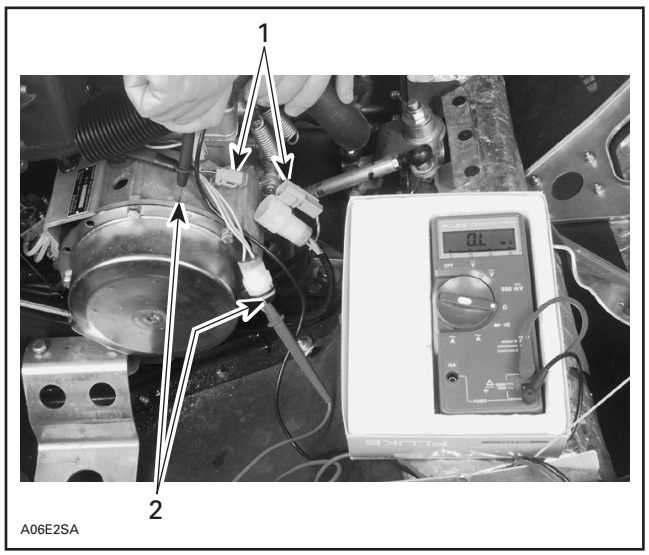
Disconnect 2-01 housing.

NOTE: Disconnect WHITE/GREEN wire (2-01-2) before testing coil insulation. Otherwise, the magneto coil remains connected to the tachometer and the reading will be false.

Disconnect 2-04 magneto outlet.

Connect an ohmmeter probe to ground and the other probe to each of the yellow wires.

There must be no continuity.



1. 2-01 housing disconnected
2. Ohmmeter probes

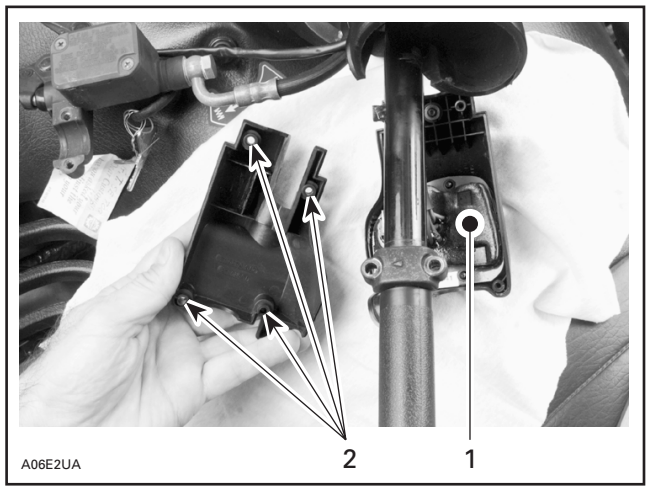
Voltage Regulator

The battery must be at room temperature. Connect a DC voltmeter to the battery. Note voltage. If the battery is charged, the voltmeter shall indicate 12.5 ± 0.3 VDC.

Start the engine. The voltage must increase depending on engine speed.

HEATING ELEMENTS SWITCHES SYSTEM

COMPONENT LOCATION



1. Intensity control module
2. Screw location

THEORY AND OPERATION

Heating Elements Switches

These toggle switches allow selecting 5 different heating levels from the heating elements (heated grips and heated throttle).

Each time the engine is started, the lowest heating intensity is selected.

Press switch at the desired position. Clicking **+** to increases heating and clicking **-** decreases it.

When holding switch for more than about 1 second will increase to maximum intensity or OFF position according selected position.

Intensity Control Module

This module controls the current returning from heating elements. This module also controls the dimmer switch.

TESTING PROCEDURE

Intensity Control Module

If indicator lights are on, the module works. This module cannot be repaired. It must be replaced when defective.

Removal

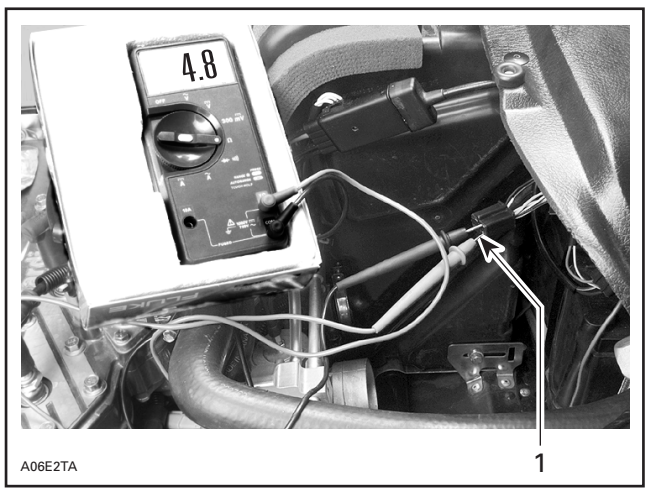
Remove brake master cylinder. See previous photo.

Unscrew the 4 screws holding the module to the handlebar.

Heating Elements

Measure element resistance.

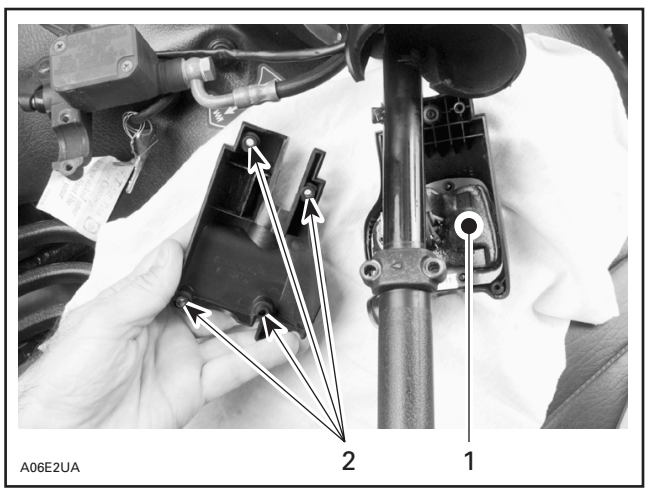
ELEMENTS	WIRES	RESISTANCE Ω
Handle (only one)	Wires of only one handle	9.7 ± 1
2 handles	YELLOW/BLACK and ORANGE (6-09A and 6-09D)	4.8 ± 1
Accelerator	YELLOW/BLACK and BROWN (6-09B and 6-09C)	72 ± 10



1. Probes to YL/BK and to OR wires (element side); 6-09 housing

DIMMER SWITCH SYSTEM

COMPONENT LOCATION



1. Intensity control module
2. Screw location

THEORY AND OPERATION

Dimmer Switch

The dimmer switch allows selection of headlamp beam.

NOTE: When holding switch for more than 1 second to dim light (from high to low beam), light will return to high beam position automatically after 10 seconds.

Intensity Control Module

This module controls the headlamp circuit ground.

TESTING PROCEDURE

This module cannot be repaired. Replace it when defective.

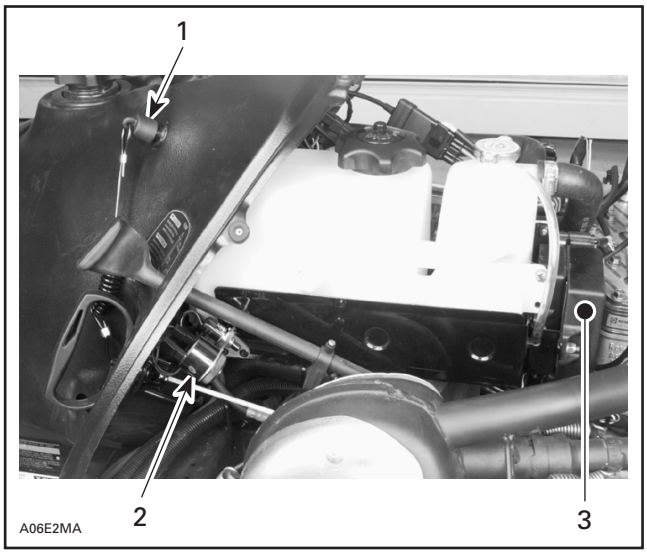
Removal

Remove brake master cylinder. See previous photo.

Unscrew the 4 screws holding the module to the handlebar.

DESS SYSTEM (Digitally Encoded Security System)

COMPONENT LOCATION



1. *Safety lanyard switch and cap*
2. *Buzzer*
3. *MPEM*

THEORY AND OPERATION

This system is a deterrent against theft. Dealer programmed, the tether cord provided with the snowmobile is the only one that allows engine to turn more than 2500 RPM. If a wrong tether cord is installed the engine can not reach engagement speed required to move vehicle.

The snowmobile micro-processor (MPEM) can be programmed to allow the use up to 8 tether cords.

After engine is started 2 beeps confirm that the micro-processor has recognized the tether cord. The vehicle can be normally driven.

A beep per 3 seconds and DESS pilot lamp blinking as same rate mean that a bad connection has been detected. Vehicle can not be driven.

To check for bad connection, remove tether cord make sure it is free of dirt or snow. Reinstall tether cord and restart engine. If a beep per 3 seconds still occurs verify tether cord switch.

A continuous beep and DESS pilot lamp blinking rapidly mean that a wrong tether cord is installed. Vehicle can not be driven.

Check that you have both good vehicle and tether cord.

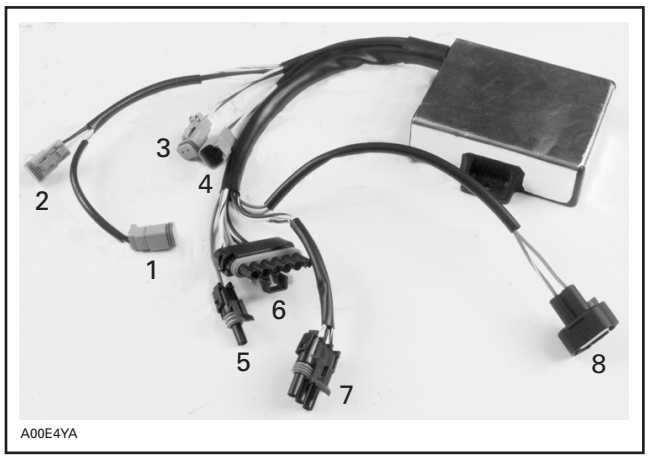
Multi-Purpose Electronic Module (MPEM)

NOTE: The module must be programmed in order to accept a tether cord.

This module cuts off the ignition at 2500 RPM in antitheft mode (wrong tether cord) or in case of a bad connection.

The module activates the indicator light and the alarm (depending on the antitheft mode).

It also activates the back-up alarm when required.



MPEM

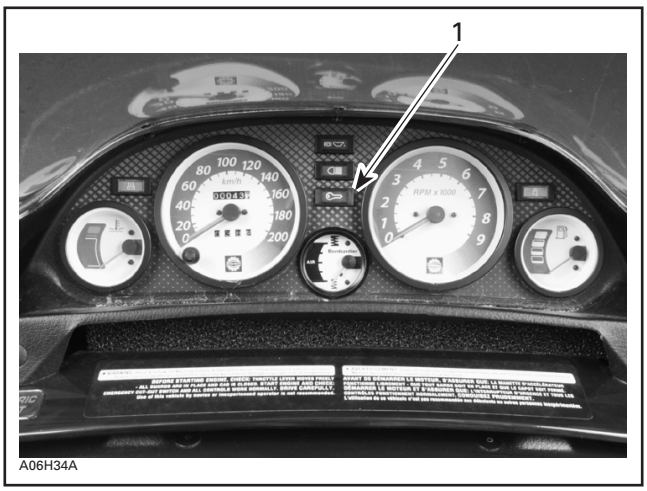
1. *PTO high-tension coil; 3-05 housing*
2. *CENTER high-tension coil;3-04 housing*
3. *MAG high-tension coil; 3-03 housing*
4. *Trigger coil; 2-03 housing*
5. *Positive supply; 2-03 housing*
6. *Ground, warning device, indicator light, DPM signal, engine shut-off; 3-06 housing*
7. *DESS switch*
8. *Load breaker*

DESS Indicator Light

This indicator light comes on when the DESS system is activated.

The indicator light blinks at the rate of once every 3 seconds to indicate a bad connection of the tether cord.

The indicator light blinks rapidly to indicate a wrong tether cord.



1. DESS indicator light

Buzzer

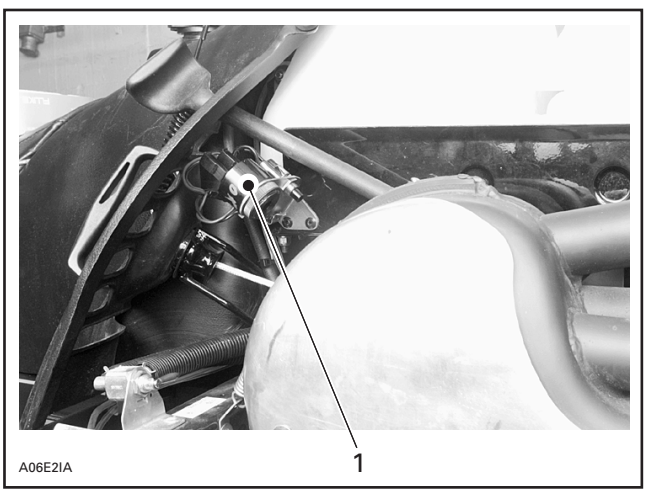
This buzzer comes on to indicate the DESS status.

The buzzer is heard twice to indicate that the proper tether cord has been connected. The engine can then be operated at full RPM.

The buzzer is heard once every 3 seconds to indicate a bad connection of the tether cord, and therefore, the engine revolution cannot exceed 2500 RPM.

The buzzer is heard continuously when connecting a wrong tether cord. It is then impossible to operate the engine at more than 2500 RPM.

When backing up, the buzzer is heard once every second.

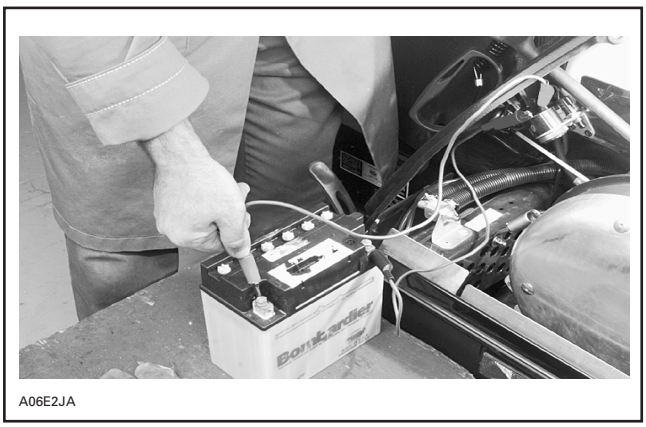


1. Buzzer

TESTING PROCEDURE

Buzzer

Unplug buzzer wires. Plug a battery in good operating condition to buzzer connectors. Observe polarity (the **+** and **-** signs are printed on the buzzer).



Replace the buzzer if it remains silent.

Buzzer Supply

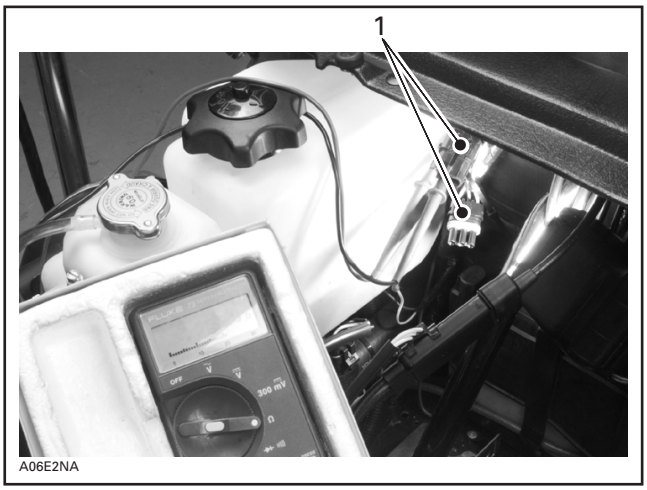
With the engine running, connect a jumper between ground and buzzer negative connector. The buzzer should then be heard. If not, check positive supply as follows. Plug the positive probe of a voltmeter to the buzzer RED/YELLOW wire (4-02) and the negative sensor to ground. The voltage must be the same as that of the battery. If not, check RED/YELLOW wire continuity.

If the positive supply is good, check BEIGE/BLACK wire leading to the MPEM. If this wire is good, replace MPEM and recheck.

Tether Cord Switch

Switch Continuity Check

Connect an ohmmeter to BLACK/GREEN (6-01B) and BLACK/WHITE wires (6-01C). Install a tether cord in good operating condition previously checked with programmer. Resistance must be equal to zero (0).



1. 6-01 housing

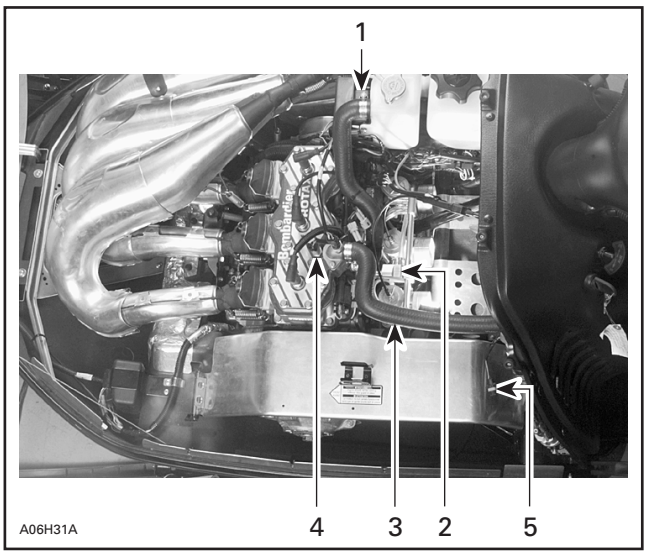
Switch Wire Continuity Check

Check continuity (null resistance) between switch center terminal and WHITE/GRAY wire (6-01A).

Check continuity (null resistance) between switch side ring and BLACK/GREEN wire connector (6-01B).

DIGITAL PERFORMANCE MANAGEMENT (DPM) SYSTEM

COMPONENT LOCATION



1. *DPM module*
2. *Manifold*
3. *Pump*
4. *Engine temperature sensor*
5. *Air temperature sensor*

THEORY AND OPERATION

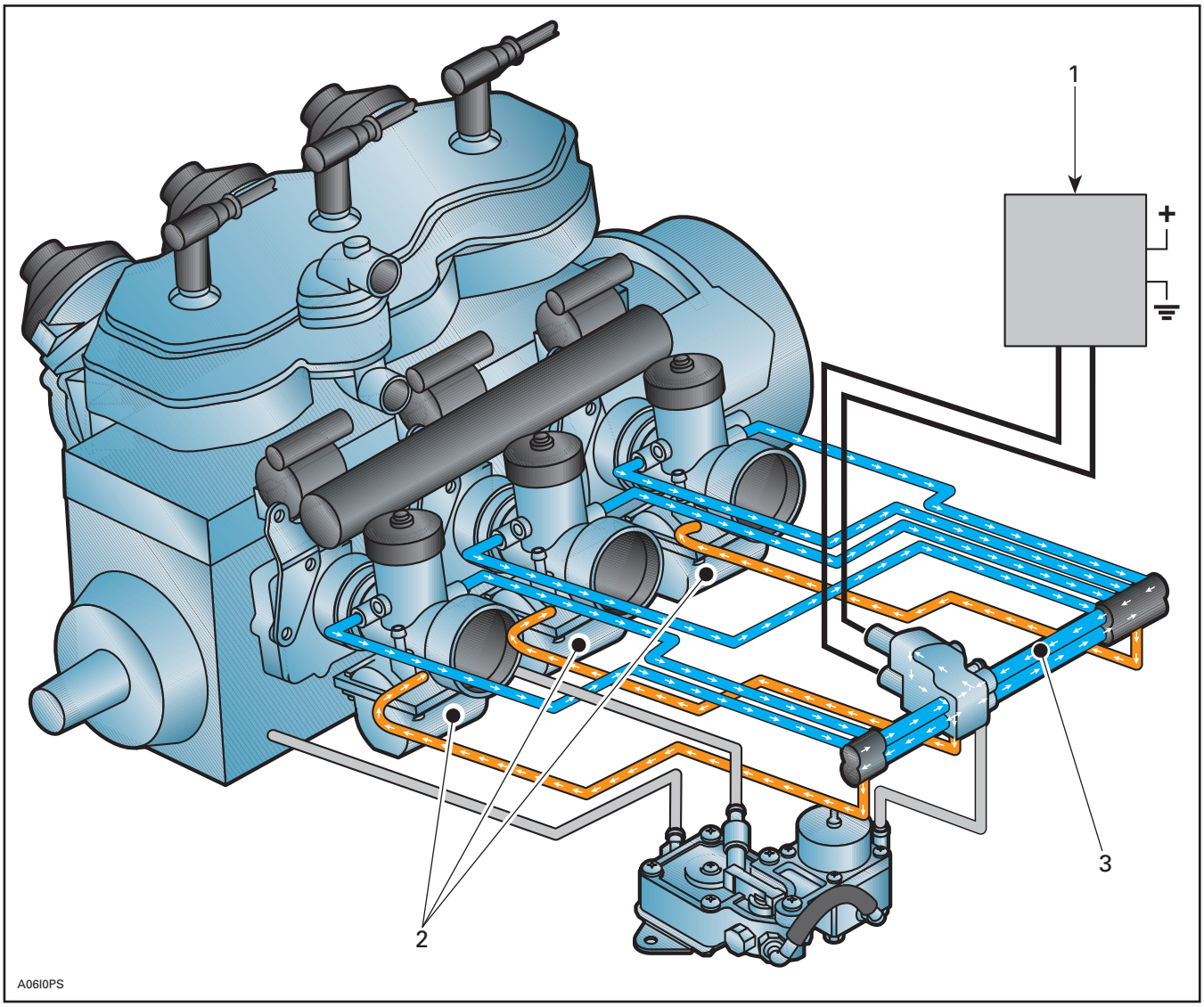
PURPOSE

Calibrate the air/fuel mixture in order to optimize the engine output while reducing fuel consumption.

METHOD

The system makes the pressure vary within the carburetor bowl.

OVERALL SYSTEM OPERATION



1. *DPM module*
2. *Carburetor bowls*
3. *Distribution gallery (upper tube)*

Introduction

The engine is being started using the electrical or the manual starter.

The DPM module increases pressure within all 3 carburetor bowls thus the air/fuel mixture is enriched. This is what we call the enrichment mode.

As soon as the spark plug gives off its first spark, the DPM module calculates the enrichment time and rate based on the engine temperature.

Approximately one minute after starting the engine, the module goes from enrichment to standby mode.

Carburetor bowls then receive the atmospheric pressure, and the air/fuel mixture is identical to that of carburetors without the digital performance management (DPM) system.

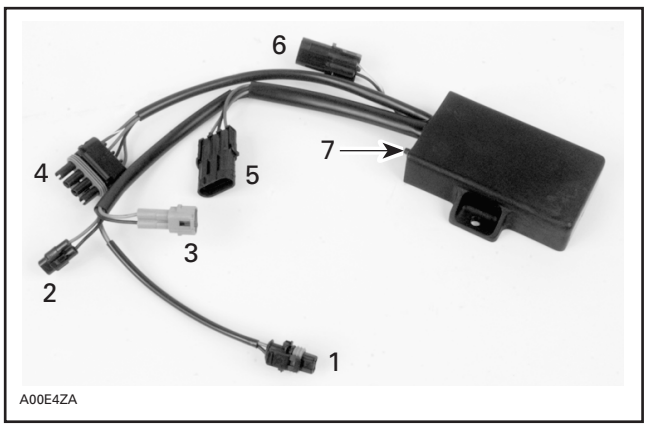
If engine speed is increased to approximately 3000 RPM, the module goes from standby to compensation mode. The air temperature must exceed -20°C (-4°F) and the air pressure must be lower than 1000 mbar.

Float bowls are now under vacuum and the air/fuel mixture is leaner.

NOTE: Both modes can never operate at the same time. The system either makes the mixture richer or leaner. Or, the mixture remains unchanged when module is on standby.

DPM MODULE OPERATION

General

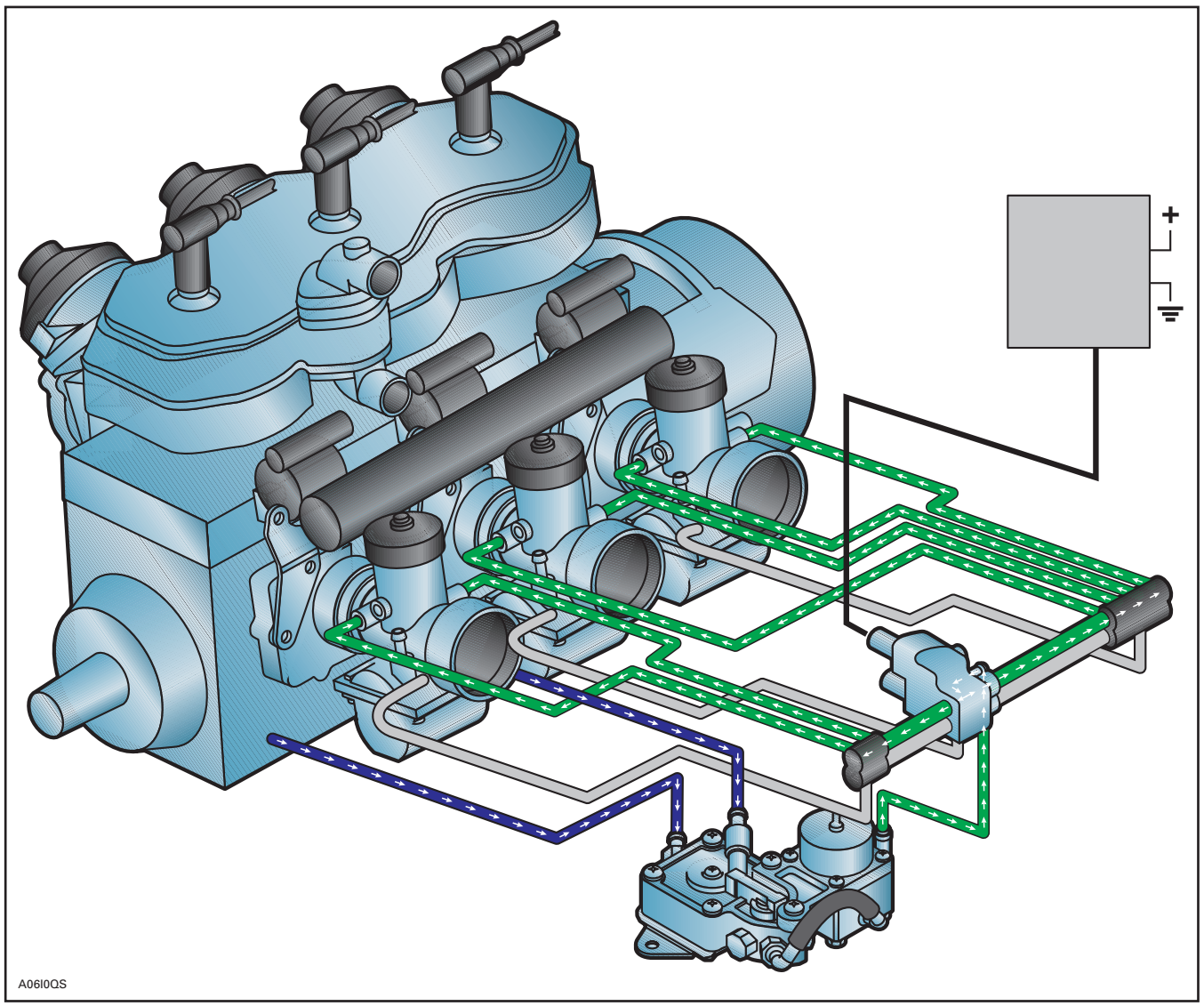


1. *Engine temperature sensor, 3-09 housing*
2. *Enrichment solenoid, 3-11 housing*
3. *Compensation solenoid, 3-10 housing*
4. *Power supply (+ and -), signal for MPEM, air temperature sensor, 3-07 housing*
5. *Enrichment switch, 3-08 housing*
6. *Communication port (reserved to manufacturer), 2-05 housing*
7. *Atmospheric pressure nipple*

Direct current is supplied to the module which is protected with a 1 A fuse.

BLACK and WHITE/GRAY wires (2-05 housing) are used for programming by the manufacturer. Nothing must be plugged to this housing.

Enrichment Mode (starting)

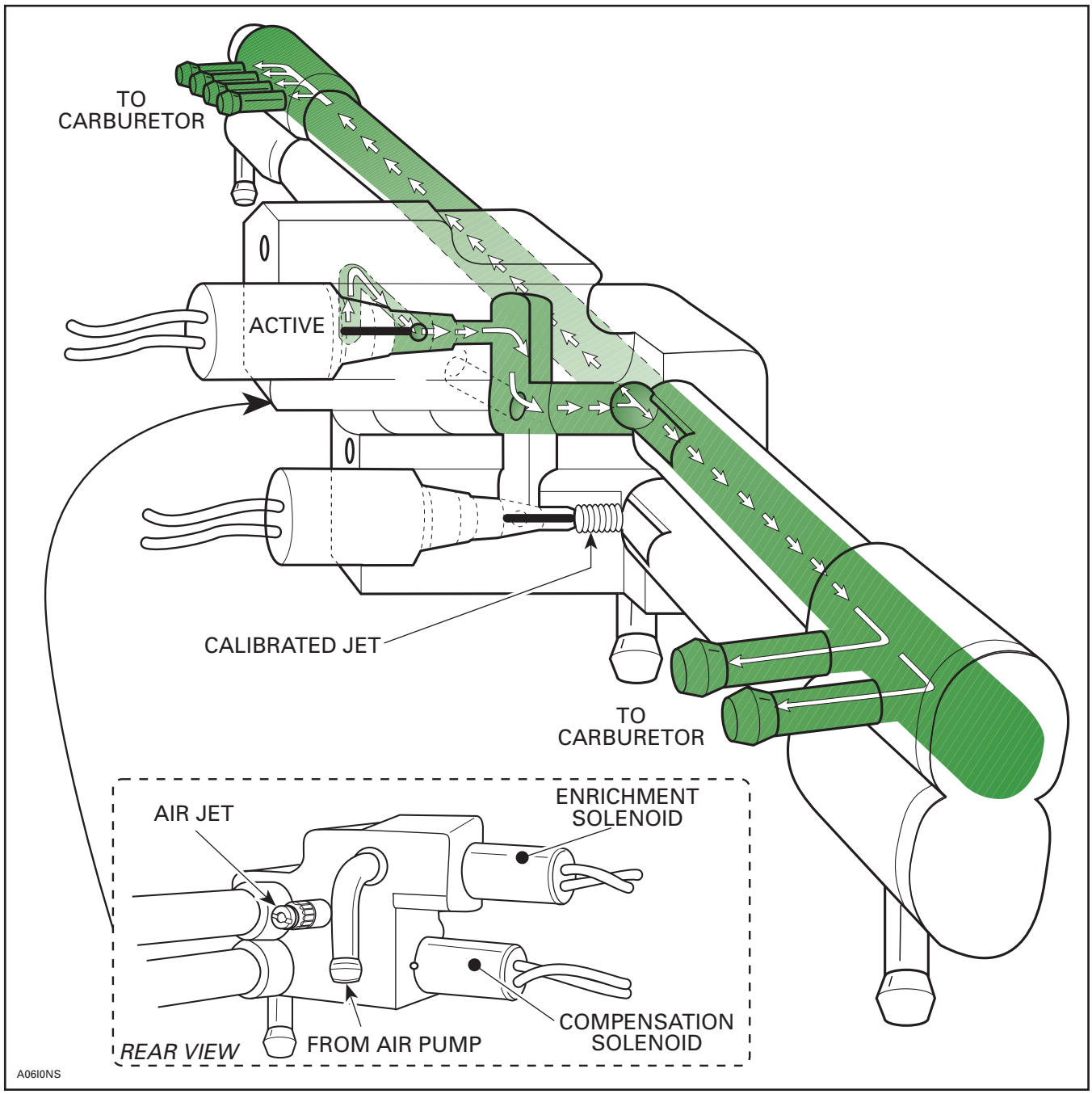


When turning the ignition key to the ON position, the module is energized and goes on standby. The module uses no electricity when on standby.

Once the engine begins to turn (using either the electrical or rewind starter), the module receives pulses through the MPEM (multi-purpose electronic module) ignition system GRAY/GREEN wire.

The DPM module then comes on by reading the engine temperature through the sensor located on the cylinder head. The DPM module calculates the enrichment solenoid opening time and the enrichment rate according to the temperature. The air/fuel mixture is then enriched in order to facilitate starting.

The system pressurizes all 3 carburetor bowls in order to enrich the air/fuel mixture. This is accomplished with the help of an air pump.



This enrichment process of the air/fuel mixture takes place at start-up and during engine warm-up, and it depends on engine temperature.

The higher the engine temperature upon start-up, the leaner the mixture.

This enrichment progressively decreases and takes place during no more than approximately 1-1/2 minutes. Once the engine is started, the module reduces the solenoid duty cycle. The warmer the engine, the shorter the enrichment mode.

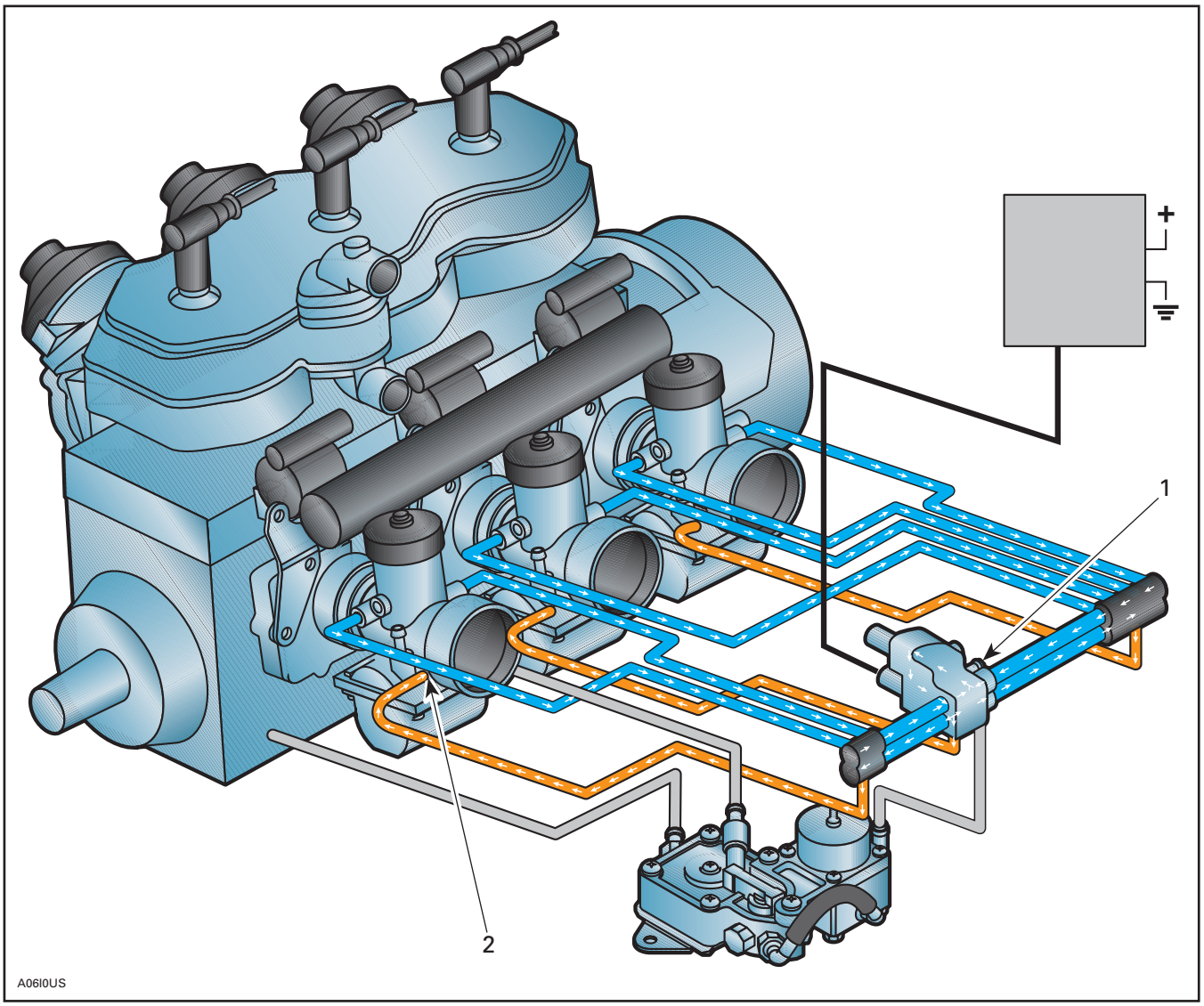
If the throttle opening exceeds one quarter, the enrichment mode is interrupted during the starting process, which allows unflooding the engine.

However, the enrichment mode is restored when releasing the throttle.

Following the enrichment mode, carburetors are operating normally, i.e. without additional pressure within bowls.

NOTE: Calibration is exactly the same on engines with a DPM Module and those without.

Compensation Mode

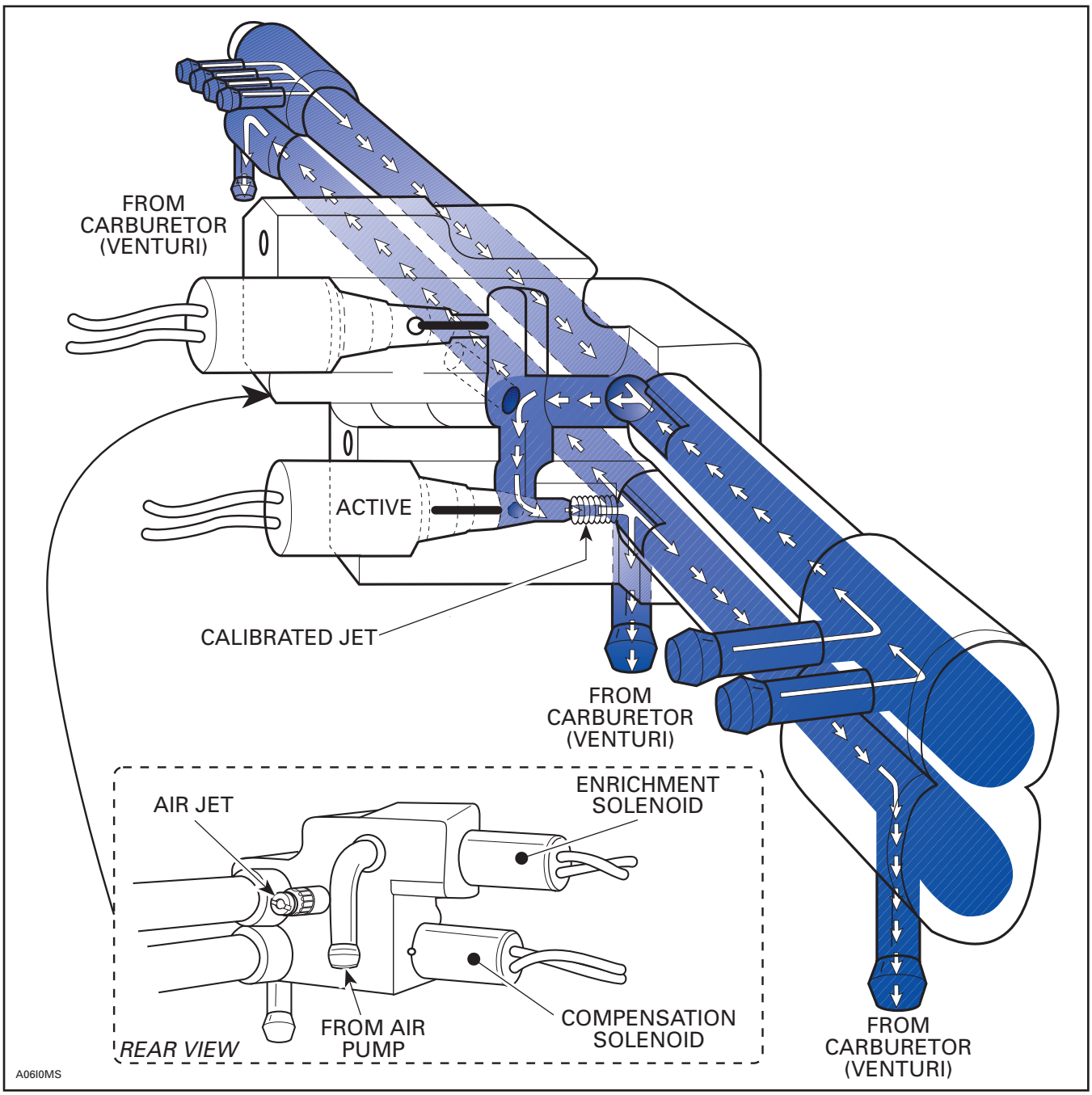


1. Air jet
2. Needle jet air inlet

Three conditions must be met for the compensation mode to operate:

1. The engine must operate at over 3000 RPM. Signal received by the GRAY/GREEN wire.
2. The air temperature must exceed -20°C (-4°F).
3. The atmospheric pressure must be lower than 1000 mbar.

The system brings all 3 carburetor bowls under vacuum in order to make the air/fuel mixture leaner. The required vacuum is produced within the needle jet air inlet.



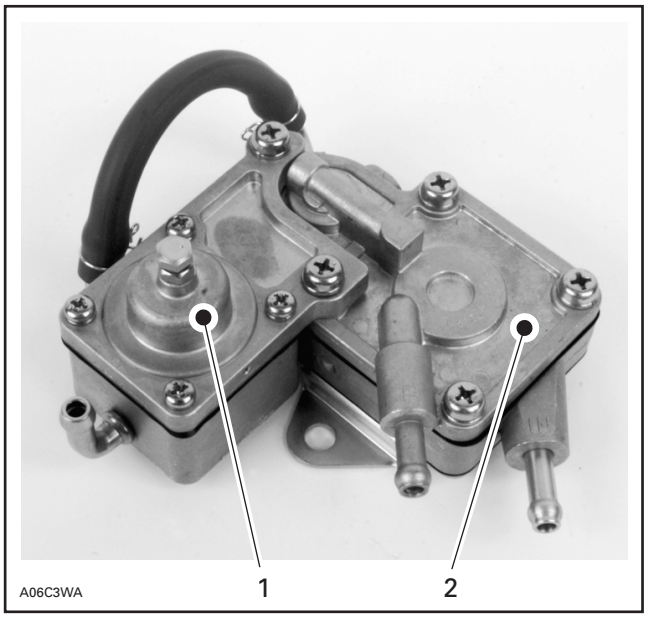
The compensation ratio will depend on the air temperature and the atmospheric pressure.

The higher the air temperature, the leaner the air/fuel mixture.

The lower the atmospheric pressure, the leaner the air/fuel mixture.

NOTE: The atmospheric pressure decreases as the altitude increases.

AIR PUMP OPERATION



1. Regulator
2. Pump

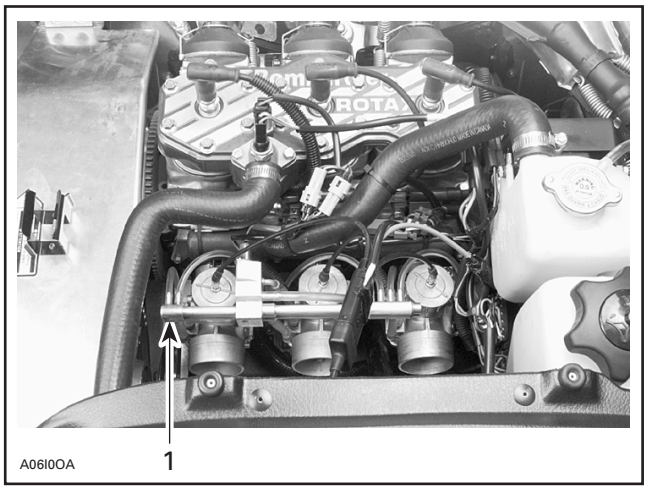
This pump supplies the distribution gallery through a unique pipe.

The pump diaphragm is activated by the alternating pressure/vacuum within the engine crankcase. Two pipes connect the crankcase (cylinders nos. 2 and 3) to the pump.

A regulator within the pump stabilizes the pump pressure.

Since the pump pressure is insufficient upon starting, the regulator is fed directly by the crankcase pressure.

DPM MANIFOLD OPERATION

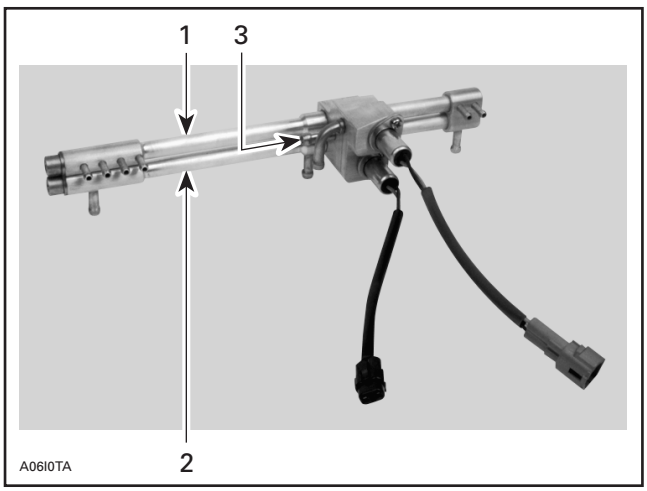


1. Manifold

The DPM manifold consists of 2 tubes. Depending on the mode, the upper tube (distribution gallery) distributes pump pressure or vacuum to each bowl through 2 pipes. The passage is then opened by the enrichment or the compensation solenoid, depending on the mode.

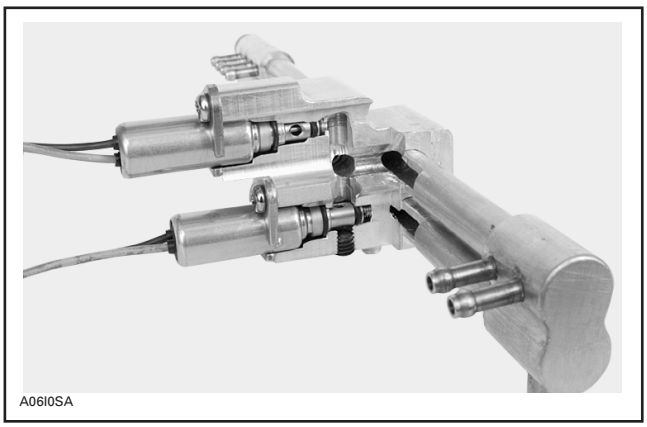
The lower tube (vacuum collector) receives the vacuum created by each carburetor within the needle jet air inlet.

An air jet also allows the atmospheric pressure to enter.



MANIFOLD ASS'Y

1. Upper tube: distribution gallery
2. Lower tube: vacuum collector
3. Air jet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Enrichment Solenoid

Solenoid Operating Principle

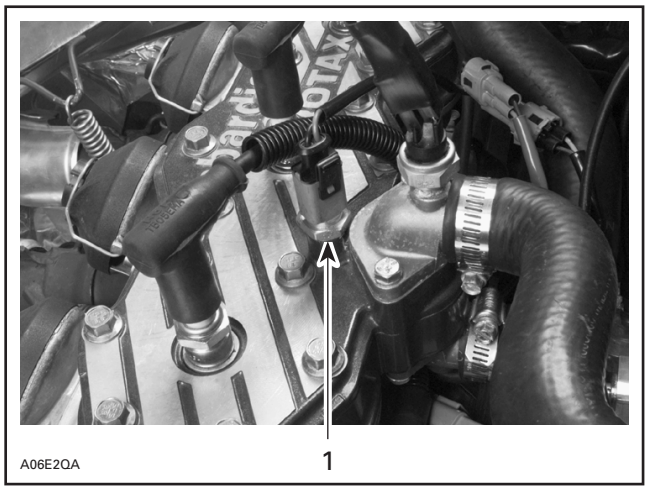
A solenoid is a winding coiled in order to produce a magnetic field. A metal rod crosses the coil and cuts the magnetic field. Each time the coil is activated, the magnetic field attracts the rod. If the supply current is interrupted, a spring pushes the rod.

Solenoid Function within the DPM System

The DPM module turns the solenoid on and off 10 times per second, which means that it operates at 10 cycles/second or 10 Hertz (Hz). The solenoid therefore opens and closes 10 times per second, thus allowing the pump pressure to reach the distribution gallery (upper tube).

For the pressure to vary within the bowls, the solenoid is activated in part by the DPM during each cycle. This is what is called the duty cycle. In other words, the solenoid will not open throughout the whole cycle. The duty cycle depends on the engine temperature.

The colder the engine, the longer the duty cycle. Therefore, the solenoid will stay open longer, thus giving way to pressure.



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1. Engine temperature sensor

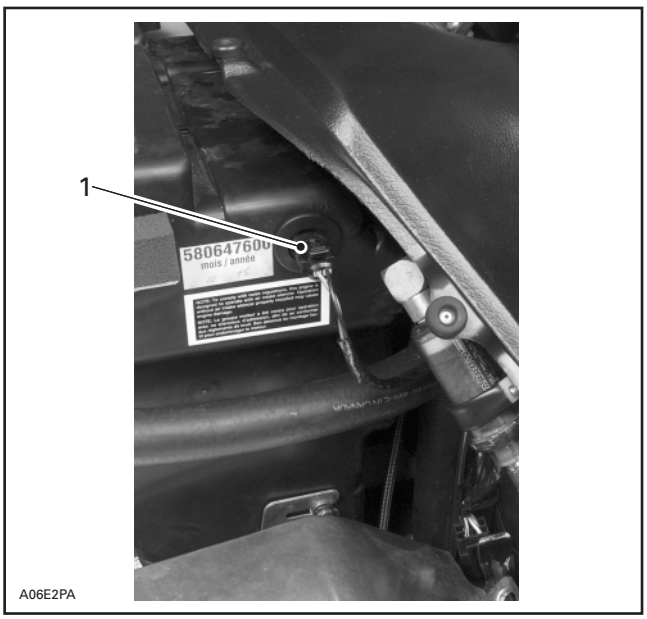
Compensation Solenoid

NOTE: Read *Operating Principle of a Solenoid* at the beginning of the chapter concerning the enrichment solenoid.

The DPM module turns the solenoid on and off 10 times per second, which means that it operates at 10 cycles/second or 10 Hertz (Hz). The solenoid therefore opens and closes 10 times per second, thus allowing the pump pressure to reach the distribution gallery (upper tube).

For the vacuum to vary within the bowls, the solenoid is activated in part by the DPM module during each cycle. This is what is called the duty cycle. In other words, the solenoid will not open throughout the whole cycle. The duty cycle depends on the air temperature and the atmospheric pressure.

The warmer the air, the longer the duty cycle. Therefore, the solenoid will stay open longer, thus giving way to vacuum. The same applies when the altitude increases.



1. Air temperature sensor

Manifold Air Jet

This jet allows the atmospheric pressure to reach carburetor bowls when the DPM is on standby.

See manifold ass'y illustration.

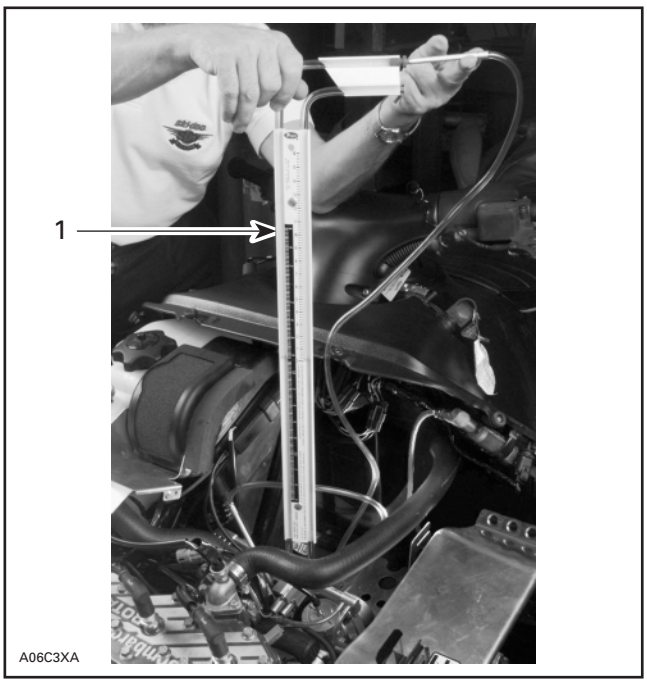
TESTING PROCEDURE

Pump

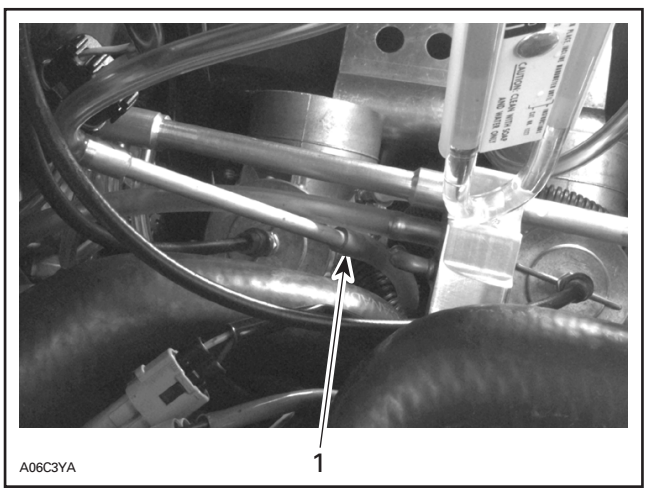
Pressure test

The pump must create a minimum pressure of 400 ± 50 mm of water. Connect a U-tube to pump outlet.

Start engine and note water height.



1. U-tube



1. Pump outlet

DPM Module

Solenoids are supplied by the DPM module. If this module does not work, there will be no current on the RE/WH and BK connectors (3-10 housing); and on the RE/GR and BK connectors (3-11 housing).

Unplug upper solenoid wire (enrichment). Connect a good solenoid to module output connector. Use adaptor (P/N 529 0338 00) as required.

▼ CAUTION

Do not disconnect both DPM connectors. The compensation solenoid must remain plugged.

Disconnect engine temperature sensor connector. The DPM module now operates as though the engine temperature was -20°C (-4°F) to allow maximum mixture enrichment.

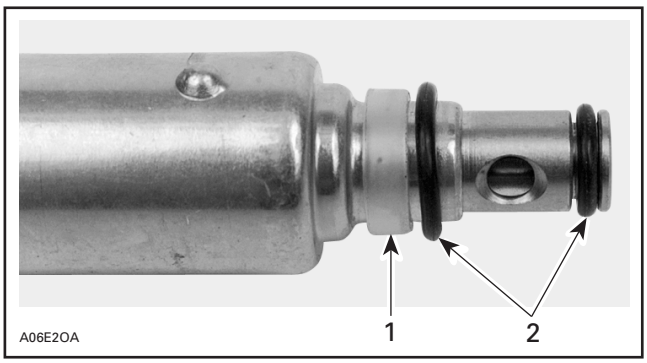
Start the engine and observe the solenoid. A vibrating solenoid indicates that the module is in good working order. If not, replace the module and repeat test.

Solenoid

Static Test

Disassemble the solenoid and connect it to a 12 V battery. The solenoid must open and stay open. Repeat test several times.

At reassembly, ensure that solenoid seals are in place.



1. Plastic seal
2. O-rings

Dynamic test

When checking the enrichment solenoid, disconnect engine temperature sensor connector. The DPM module now operates as though the engine temperature was -20°C (-4°F) to allow maximum mixture enrichment.

Remove the solenoid, hold it in hand and start the engine.

For the enrichment solenoid, check if it vibrates as soon as the engine is started.

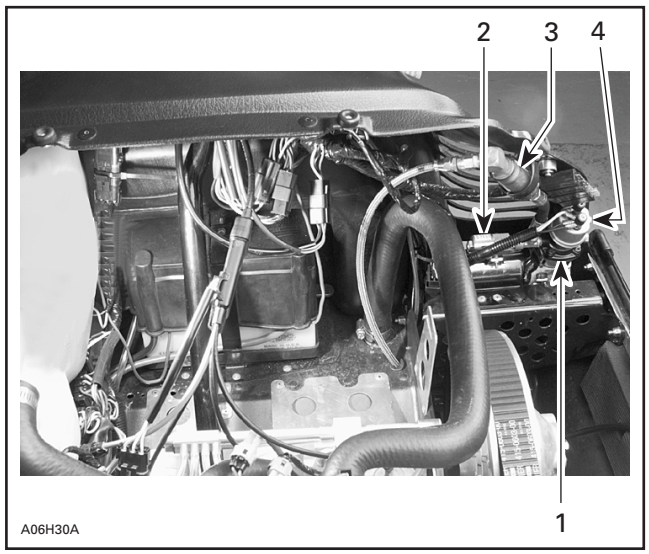
For the compensation solenoid, the air temperature sensor must be at room temperature. Operate the engine at 3500 RPM. The solenoid must vibrate.

Temperature Sensor (air and engine)

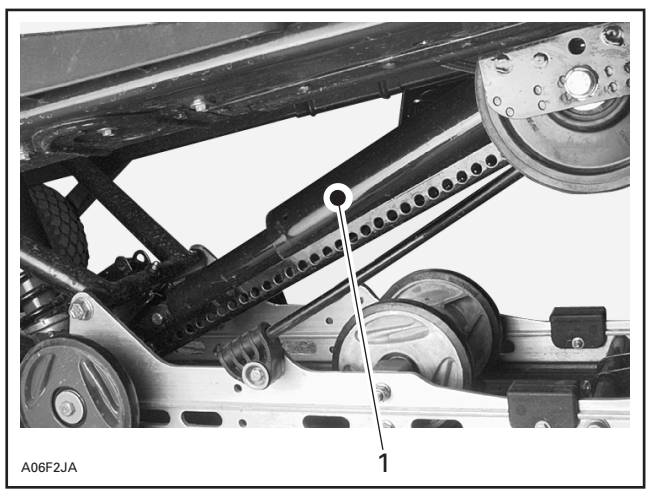
At room temperature 20°C (68°F), the sensor resistance must be 2500 Ω ± 300.

AIR SUSPENSION SYSTEM

COMPONENT LOCATION



1. *Compressor*
2. *Release valve*
3. *Desiccator*
4. *Pressure sensor*



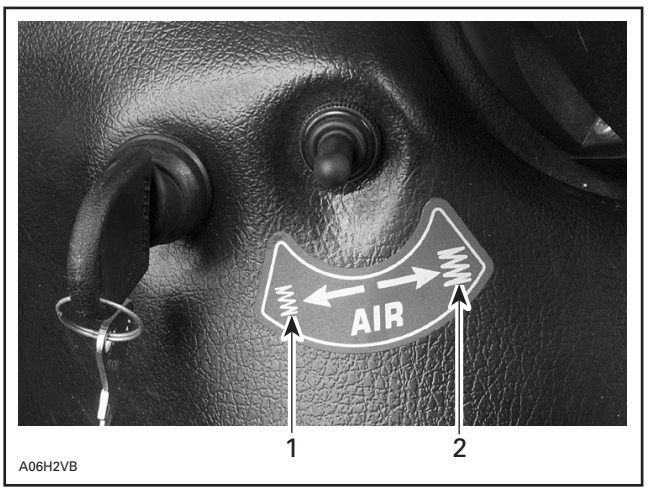
1. *Pneumatic shock absorber*

THEORY AND OPERATION

A compressor creates a pressure within the rear shock absorber.

This shock absorber has been designed from a conventional shock absorber to which an airtight chamber has been added. A rubber boot connects the shock absorber body to the shock absorber piston rod.

The pressure in the air chamber increases when the compressor is activated, and it decreases when the release valve is activated. The compressor and the release valve are controlled by a three-way switch.



1. *Activates the release valve*
2. *Activates the compressor*

This shock absorber prevents the suspension from bouncing just like a conventional shock absorber. The air pressure within acts as a spring by increasing the preload.

TESTING PROCEDURE

Air Suspension System Tightness

Activate the compressor until the dashboard pressure gauge indicates more than half.

Remove the ignition key.

Connect an ohmmeter to pressure sensor connectors. No polarity need to be observed.

NOTE: The pressure sensor electrical resistance varies according to system pressure.

Note resistance and wait 3 minutes. The resistance should not decrease. If it does, there is a leak in the air system.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Spray soapy water on fittings in order to locate leaks.

Pressure Sensor

Release shock absorber pressure by activating the air suspension switch.

Remove the ignition key.

Plug an ohmmeter to pressure sensor connectors. No polarity need to be observed.

NOTE: The pressure sensor electrical resistance varies according to system pressure.

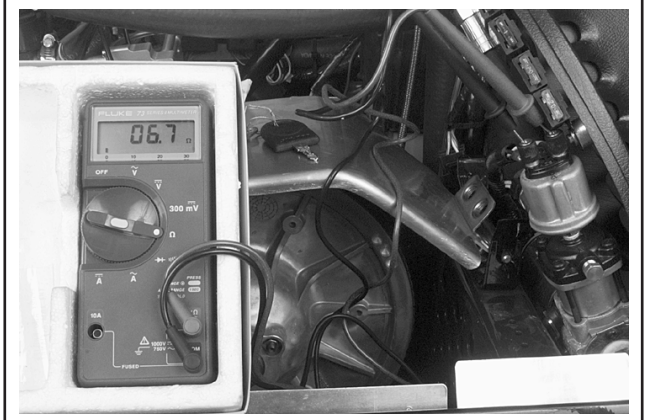
Compare the reading to the minimum value in the following table.

Disconnect ohmmeter. Activate compressor during 60 seconds.

Remove the ignition key.

Connect an ohmmeter to pressure sensor connectors. No polarity need to be observed.

Compare the reading to the maximum value in the following table.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PRESSURE	RESISTANCE ± 10 Ω
Minimum (residual pressure)	6
Maximum (60 sec. of compressor operation)	180

NOTE: The residual pressure prevents the shock absorber rubber boot from turning over. Otherwise, it would wear out by rubbing on itself.

ENGINE

VEHICLE MODEL				GRAND TOURING SE
ENGINE TYPE				**699**
Number of Cylinders				3
Bore			mm (in)	69.75 (2.7461)
Stroke			mm (in)	61.0 (2.402)
Displacement			cm^3 (in^3)	699.2 (42.7)
Compression Ratio (corrected)				6.8
Maximum Power Engine Speed ①			± 100 RPM	8500
Piston Ring Type			1st/2nd	ST/R
Ring End Gap	new wear limit		mm (in) mm (in)	0.2 (.008) 1.0 (.039)
Ring/Piston Groove Clearance	new wear limit		mm (in) mm (in)	0.03 (.0012) 0.2 (.008)
Piston/Cylinder Wall Clearance	new wear limit		mm (in) mm (in)	0.10 (.0039) 0.15 (.0059)
Connecting Rod Big End Axial Play	new wear limit		mm (in) mm (in)	0.39 (.0154) 1.2 (.0472)
Maximum Crankshaft End-play ②			mm (in)	0.3 (.0118)
Maximum Crankshaft Deflection			mm (in)	0.08 (.0031)
Rotary Valve Timing ③ and P/N 420 924 XXX			Opening Closing	N.A.
Magneto Generator Output			W	360
Ignition Type				CDI
Spark Plug Make and Type				NGK BR9ES
Spark Plug Gap			mm (in)	0.45 (.018)
Ignition Timing BTDC ④			mm (in)	2.18 (.086)
Trigger Coil ⑤			Ω	190 – 300
Generating Coil ⑤		Low Speed	Ω	N.A.
		High Speed	Ω	N.A.
Lighting Coil ⑤			Ω	0.20 – 0.35
High Tension Coil ⑤		Primary	Ω	0.2 – 0.5
		Secondary	kΩ	6 – 13
Carburetor Type			PTO/CTR/MAG	VM 38-372/373/372
Main Jet			PTO/CTR/MAG	350/350/350
Needle Jet				480 P-7
Pilot Jet				50
Needle Identification – Clip Position				6DEY2-4
Slide Cut-away				2.5
Float Adjustment			± 1 mm (± .040 in)	18.1 (.71)
Air Screw Adjustment			± 1/16 Turn	2-1/4
Idle Speed			± 200 RPM	1800
Gas Type/Pump Octane Number				Super Unleaded/91
Gas/Oil Ratio				Injection
Type				Liquid
Axial Fan Belt Adjustment		Deflection ⑥	mm (in)	N.A.
		Force	kg (lbf)	N.A.
Thermostat Opening Temperature			°C (°F)	42 (108)
Radiator Cap Opening Pressure			kPa (PSI)	90 (13)
ENGINE COLD N•m (lb•ft)	Drive Pulley Retaining Screw			⑦
	Exhaust Manifold Nuts or Bolts			9 (6.6)
	Magneto Ring Nut			125 (92)
	Crankcase Nuts or Screws		M6 M8	13 (9.5) 22 (16)
	Crankcase/Engine Support Nuts or Screws			13 (9.6)
	Cylinder Head Nuts			29 (21)
	Crankcase/Cylinder Nuts or Screws			29 (21)
	Axial Fan Shaft Nut			N.A.

VEHICLE

VEHICLE MODEL				GRAND TOURING SE
ENGINE TYPE				699
Chain Drive Ratio				25/44
Chain	Pitch		in	3/8
	Type/Links Qty/Plates Qty			Silent/74/13
Drive Pulley	Type of Drive Pulley			TRAC
	Ramp Identification			286 ⑥
	Calibration Screw Position or Calibration Disc Quantity			4
	Spring Color			Blue/Pink
	Spring Length		± 1.5 mm (± 0.060 in)	93.5 (3.68)
	Clutch Engagement		± 200 RPM	3600
Driven Pulley Spring Preload Cam Angle			± 0.7 kg (±1.5 lb) degree	7.0 (15.4) 47°
Pulley Distance Z			(+ 0, –1) mm ((+ 0, –1/32) in)	16.5 (21/32)
Offset	X		± 0.4 mm (± 1/64 in)	35.0 (1-3/8)
	Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (0.039 – 0.079)
Drive Belt Part Number (P/N)				415 0603 00
Drive Belt Width (new) ①			mm (in)	35.0 (1-3/8)
Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)
		Force ②	kg (lbf)	11.3 (25)
Track	Width		cm (in)	38.1 (15.0)
	Length		cm (in)	345.5 (136)
	Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-3/4)
		Force ③	kg (lbf)	7.3 (16)
Suspension Type		Track		SC-10 Touring
		Ski		DSA
Length			cm (in)	302.0 (118.9)
Width			cm (in)	120.7 (47.5)
Height			cm (in)	128.3 (50.5)
Ski Stance			cm (in)	106.7 (42)
Mass (dry)			kg (lb)	285 (628)
Ground Contact Area			cm^2 (in^2)	7479 (1159)
Ground Contact Pressure			kPa (PSI)	3.74 (.542)
Frame Material				Aluminum
Bottom Pan Material				Impact Copolymer
Hood Material				RRIM Polyurethane
Battery			V (A•h)	12 (22)
Headlight			W	H4 60/55
Taillight and Stoplight			W	8/27
Tachometer and Speedometer Bulb			W	2 x 3
Fuel and Temperature Gauge Bulb			W	3/3
Fuse	Starter Solenoid		A	30
	Tachometer		A	N.A.
Fuel Tank			L (U.S. gal)	42 (11.1)
Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)
Cooling System ④			L (U.S. oz)	5.1 (172.5)
Injection Oil Reservoir			L (U.S. oz)	4.1 (139)

ENGINE LEGEND

CDI: Capacitor Discharge Ignition

BTDC: Before Top Dead Center

CTR: Center

K: Kilo (× 1000)

MAG: Magneto Side

PTO: Power Take Off Side

R: Rectangular

N.A.: Not Applicable

ST: Semi-trapez

① The maximum power engine speed is applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER INC. reserves the right to modify it without obligation.

② Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.

③ Rotary valve to crankcase clearance: 0.27 – 0.48 mm (.011 – .019 in).

④ At 6000 RPM (engine cold) with headlamp turned on.

⑤ All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

⑥ Force applied midway between pulleys to obtain specified tension deflection.

⑦ Drive pulley retaining screw: torque to 90 to 100 N•m (66 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km / h (20 MPH)) and apply the brake; repeat 5 times. Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

VEHICLE LEGEND

DSA: Direct Shock Action

RRIM: Reinforced Reaction Injection Molding

TRA: Total Range Adjustable

N.A.: Not Applicable

① Minimum allowable width may not be less than 3.0 mm (1/8 in) of new drive belt.

② Force applied midway between pulleys to obtain specified tension deflection.

③ Force or downward pull applied to track to obtain specified tension deflection.

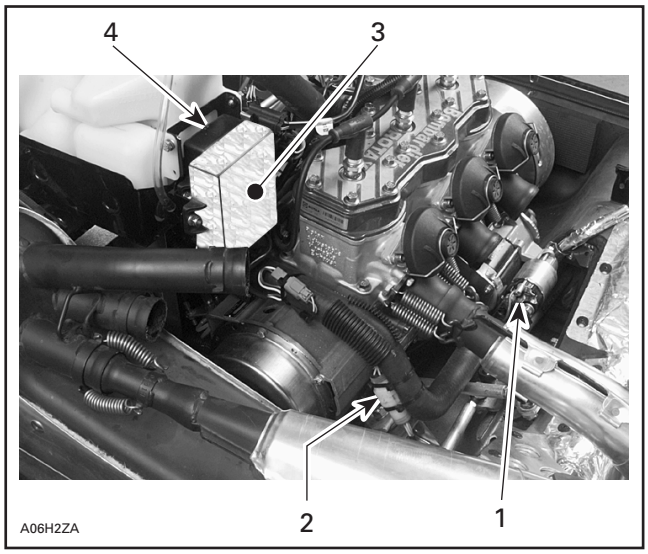
④ Coolant mixture: 60% antifreeze/40% water.

⑤ Lever with roller pin P/N 417 0043 03 (hollow).

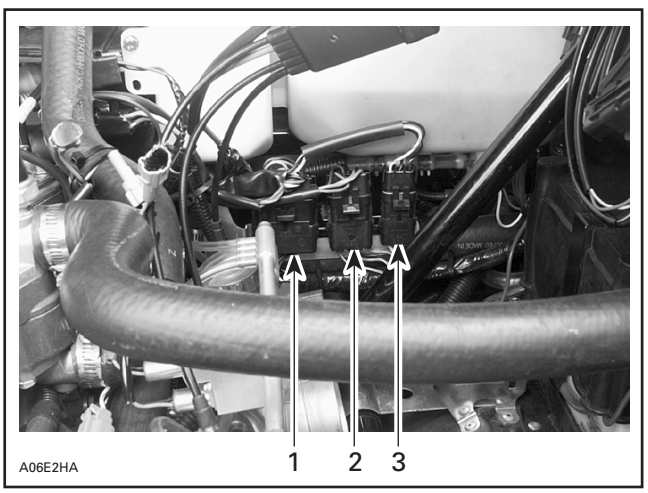
⑥ Lever with roller pin P/N 417 0043 04 (solid).

WIRING DIAGRAM

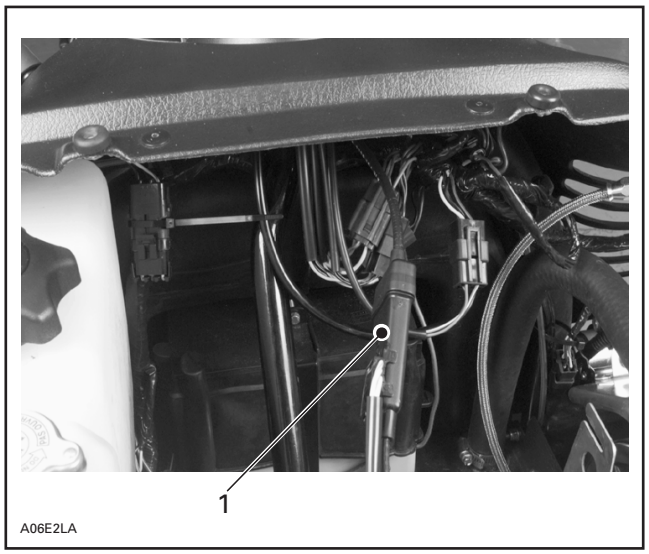
COMPONENT LOCATION



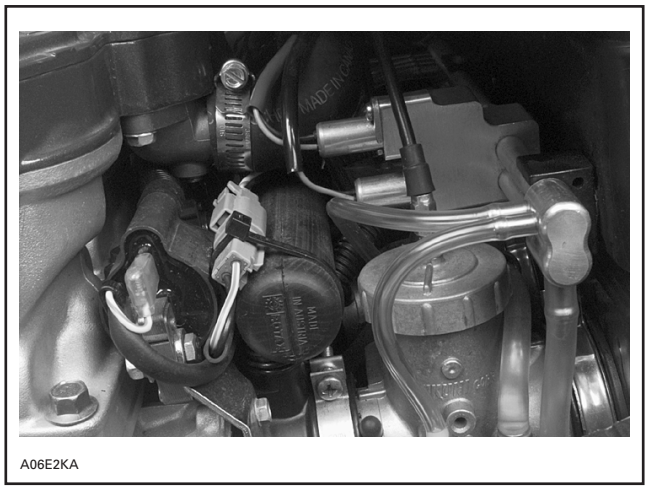
1. *Starter wires*
2. *Magneto wires*
3. *MPEM: (ignition system and DESS)*
4. *DPM module*



1. *MPEM: 3-06 housing*
2. *MPEM: 3-02 housing*
3. *DPM: 3-07 housing*



1. *DPM enrichment switch*



HIGH-TENSION COIL

Section 08 WIRING DIAGRAM

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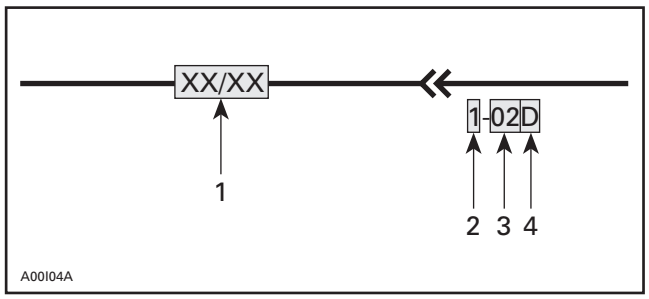
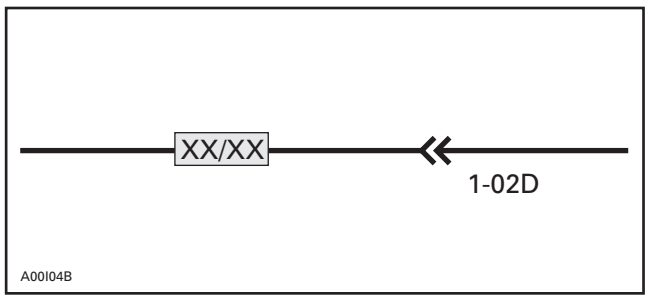
GAUGES

WIRING DIAGRAM LEGEND



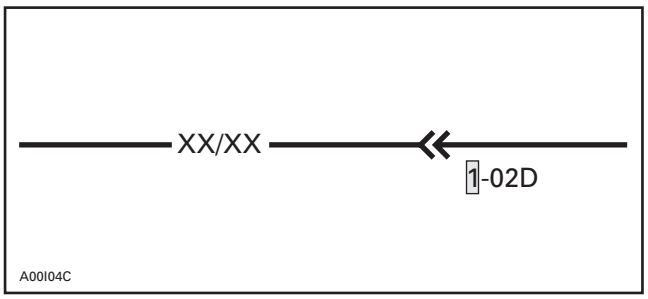
1. *Wire colors*
2. *Housing area*
3. *Housing number per area*
4. *Wire connector location in housing*

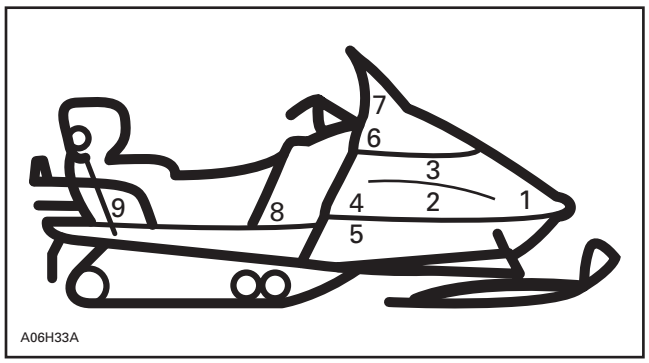
WIRE COLORS AND CIRCUIT



CODE	CIRCUIT
WH	Rear brake light
WH/BL	Ignition: between CDI and coils
WH/GY	Safety lanyard cap
WH/YL	Trigger coil wire no. 1
WH/BK	DESS pilot lamp (-)
WH/GN	Magneto output/360-W tachometer signal
TA/BK	Back-up alarm
TA	Back-up alarm switch
BR	Heated lever
BL	Fuel level sender; DPM enrichment switch
BL/YL	Trigger coil wire no. 2
GY	High beam
GY/GN	Engine speed signal from ADC to DPM
GY/VI	Low beam
YL	Alternating current supply AC +
YL	Direct current supply; rear light and heated grip
YL/BR	Compressor
YL/GN	Release valve
BK	Engine ground, frame, DC battery-, enrichment switch ground, DPM
BK/WH	Engine stopping: closed ignition ON
BK/YL	Engine stopping; opened ignition ON
BK/GN	Digital signals ground: ROM key
OR	Heated grips
RD	DC + battery, DPM enrichment switch supply
RD/WH	DC +: 30A fuse, DPM compensation solenoid
RD/BL	DC + regulator output
RD/GY	DPM supply
RD/YL	Loads supply
RD/OR	Compressor supply
RD/GN	Starter solenoid, DPM enrichment solenoid
RD/VI	DPM fuses, compressor and discharge plunger supply
GN	Coolant temperature (gauge)
VI	Coolant temperature, DPM coolant temperature (binary)
VI/WH	Air intake temperature

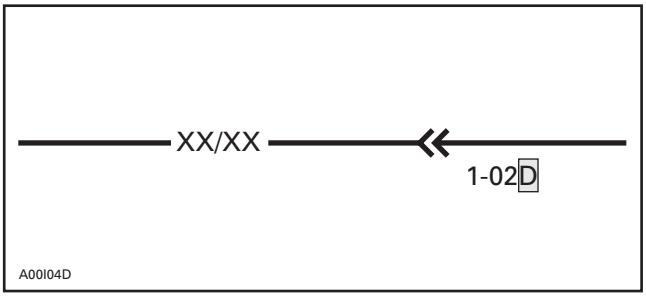
CONNECTOR HOUSING AREA

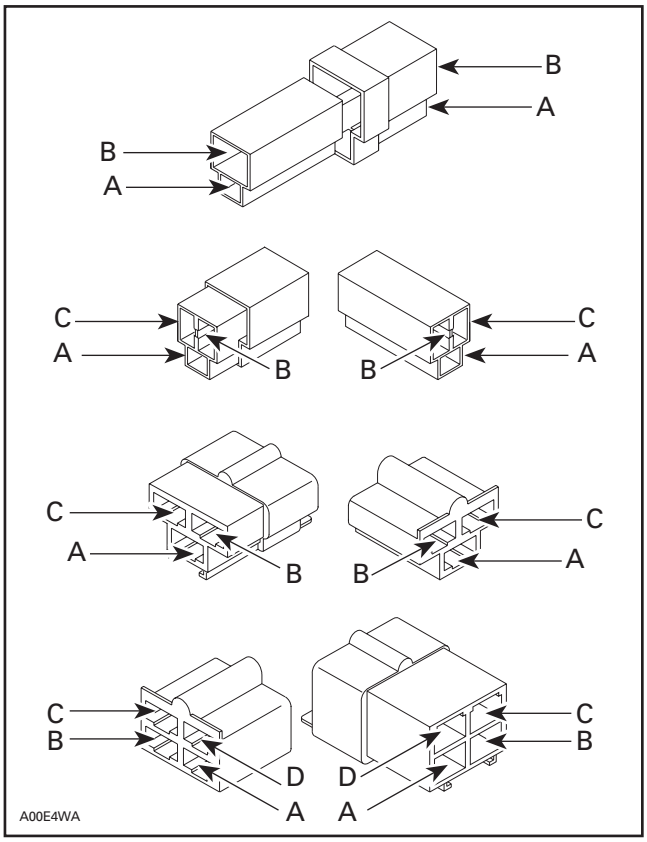




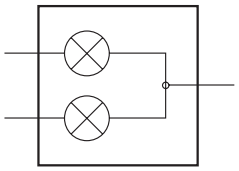
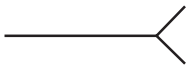
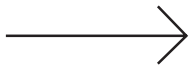
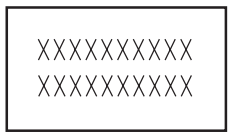
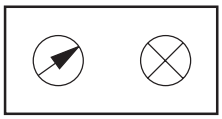
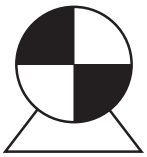
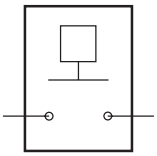
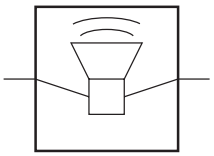
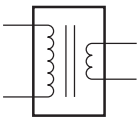
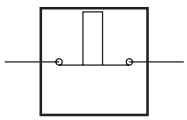
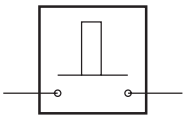
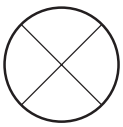
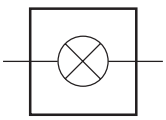
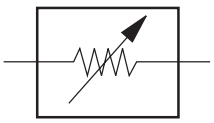
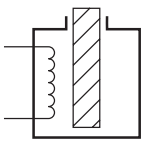
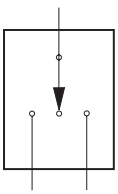
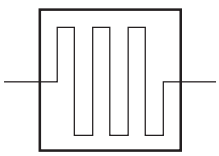
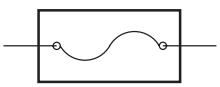
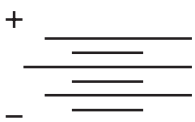
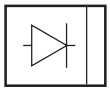
AREA	LOCATION
1	Frame and hood junction
2	Magneto
3	Carburetors
4	Rear of intake silencer
5	Near driven pulley
6	Under handlebar
7	Under hood
8	Near fuel tank
9	Rear of seat

CONNECTOR LOCATION IN HOUSING

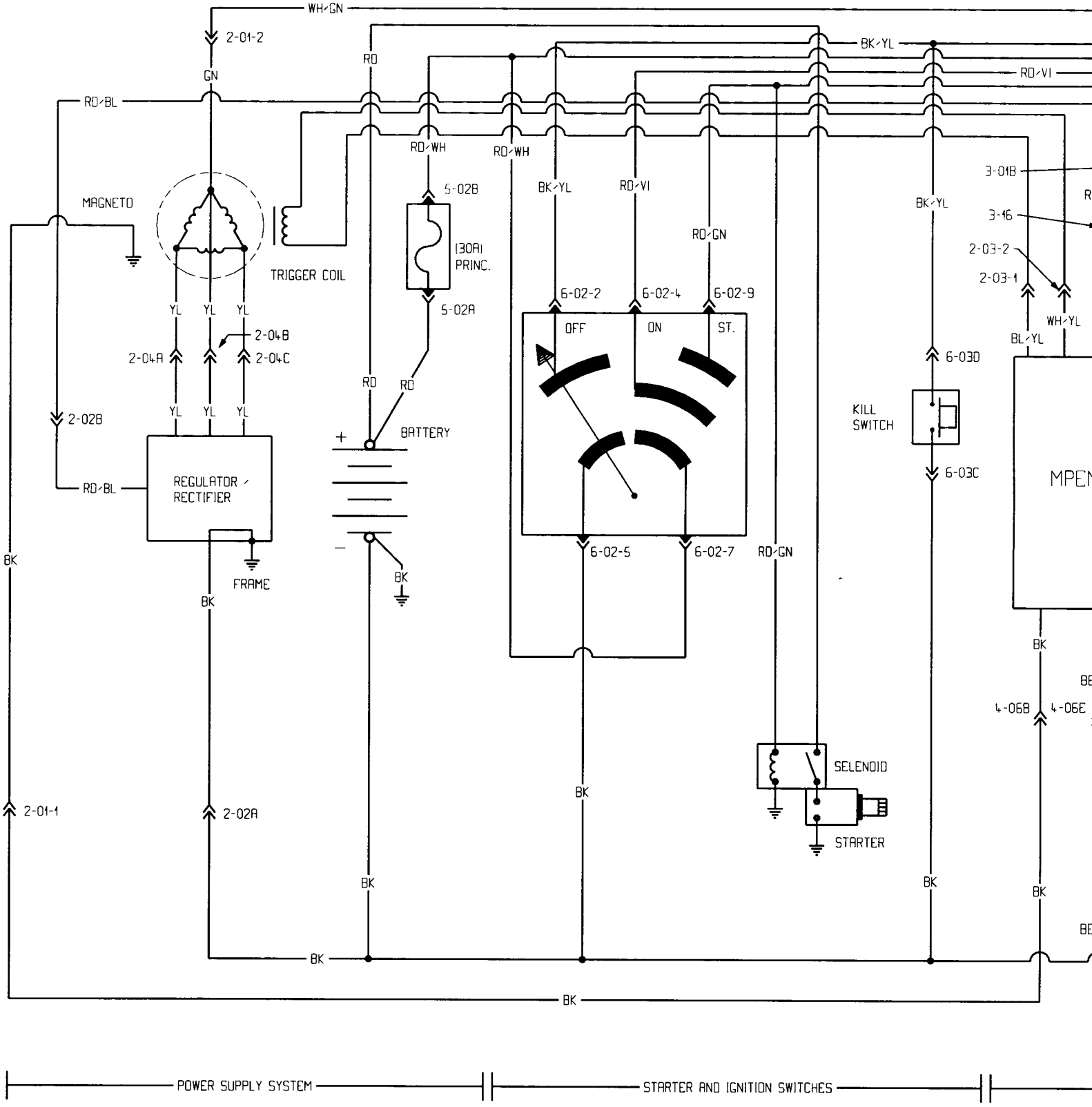




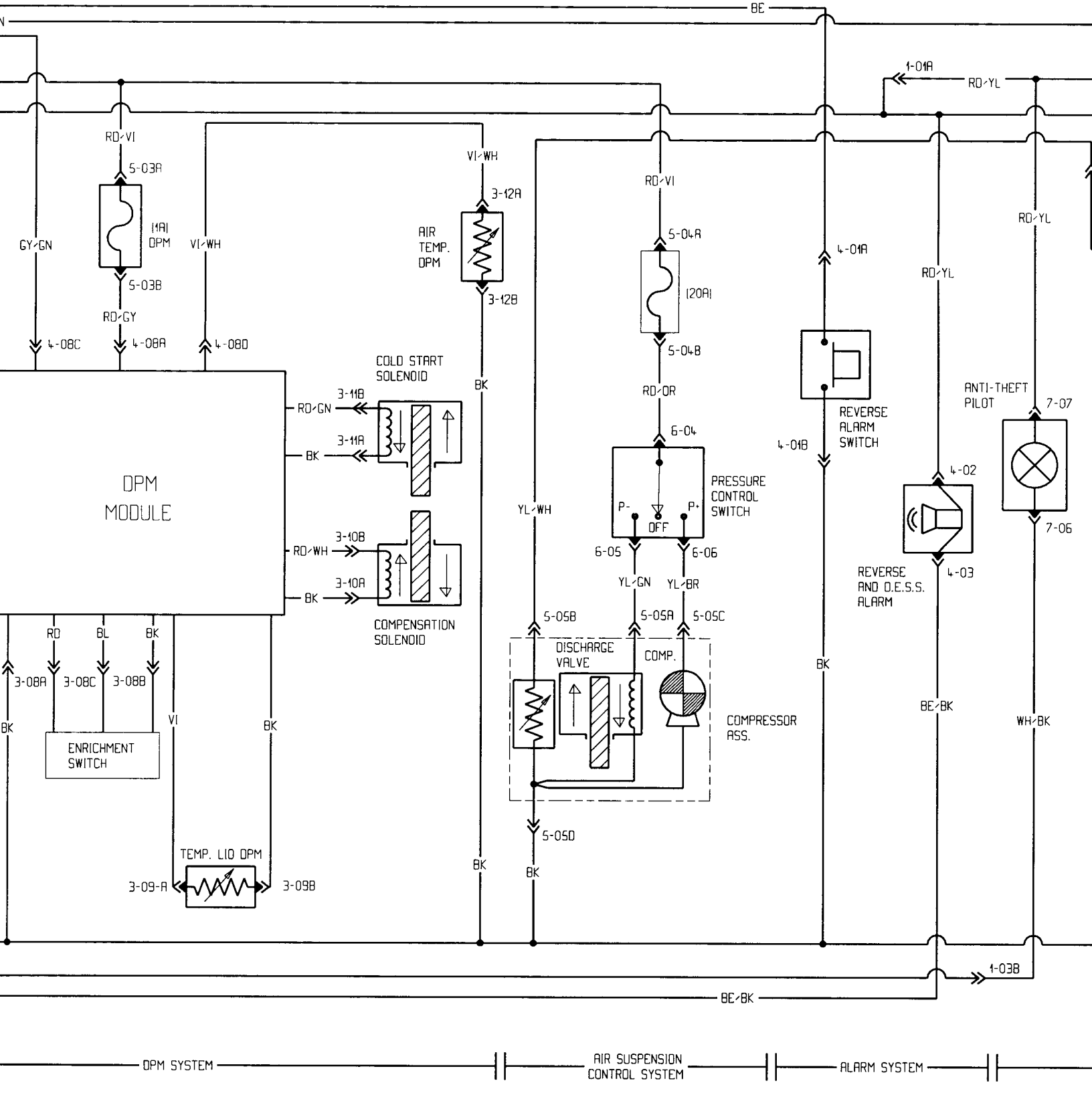
SYMBOLS DESCRIPTION

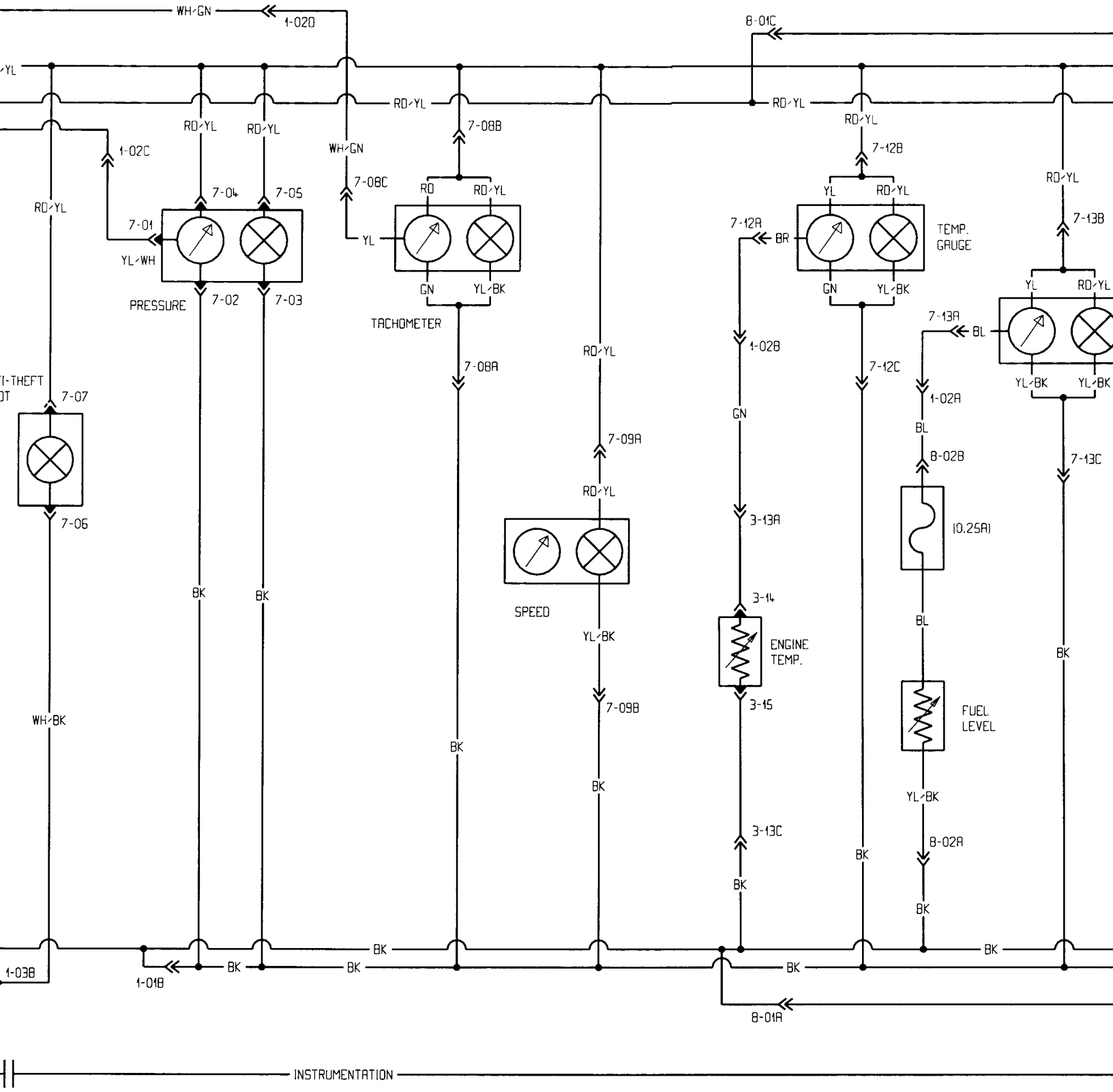
Beam and tail light 	Female terminal 	Male terminal 	Electronic module 
Meter 	Electric motor 	Low level sensor 	Buzzer 
Ignition coil 	Normally close switch 	Normally open switch 	Male terminal on instrument 
Engine ground 	Frame ground  Frame	Spark plug 	Meter movement 
Bulb 	Pilot light 	Analog sensor 	Solenoid valve 
Magneto 	3 position switch 	Heating element 	Fuse 
Trigger coil 	Battery 	Diode 	

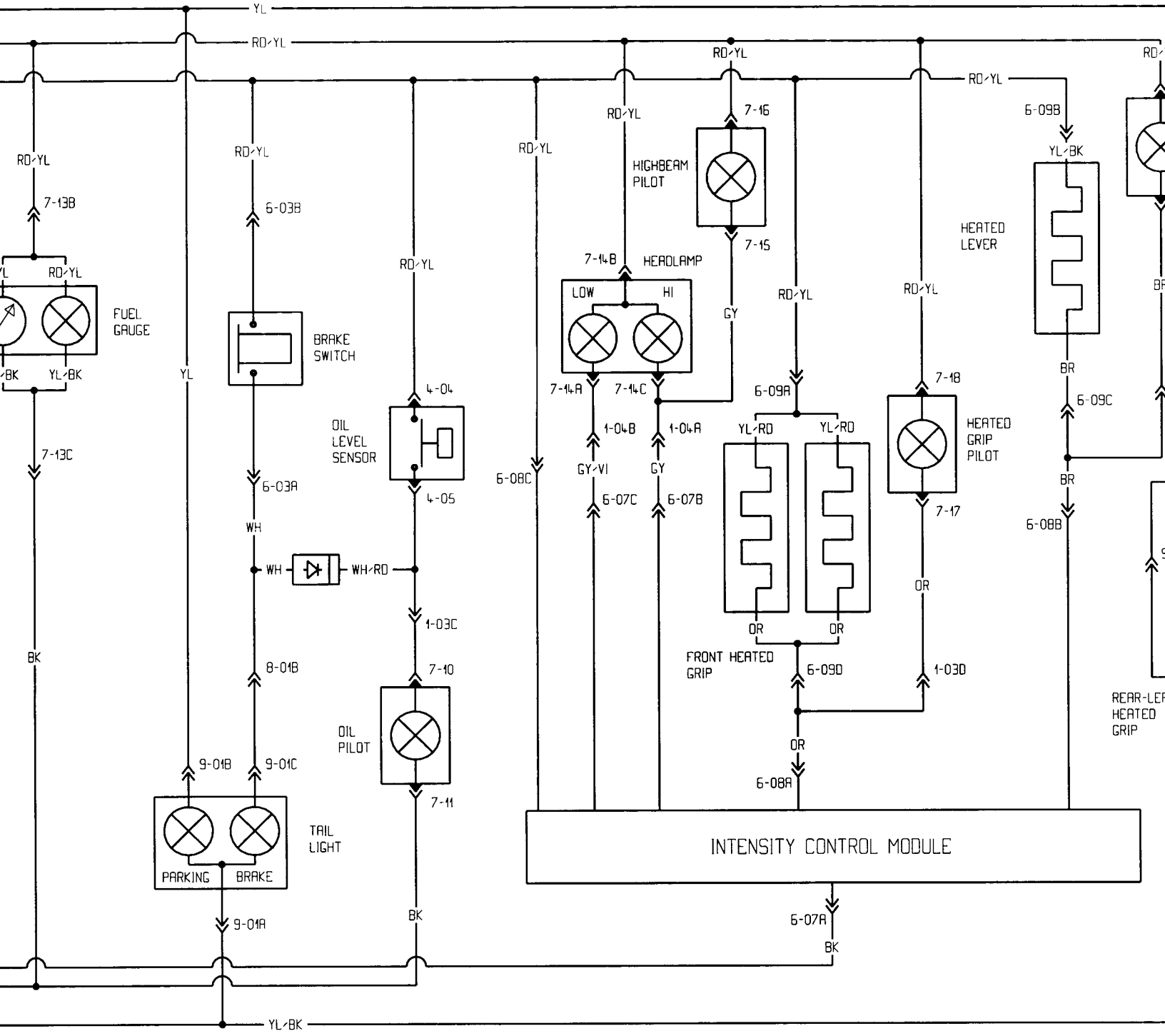
A00E52S


WH/GN
2-01-2
GN
RD/BL
RD
BK/YL
RD/VI
RD/WH
RD/WH
5-02B
MAGNETO
TRIGGER COIL
(30A) PRINC.
5-02A
BK/YL
RD/VI
RD/GN
6-02-2
6-02-4
6-02-9
OFF
ON
ST.
6-02-5
6-02-7
RD/GN
3-01B
3-16
2-03-2
2-03-1
WH/YL
BL/YL
6-03D
KILL SWITCH
6-03C
YL
YL
YL
2-04B
2-04A
2-04C
2-02B
RD/BL
REGULATOR / RECTIFIER
FRAME
RD
RD
BATTERY
+
–
BK
BK
BK
BK
BK
BK
BK
BK
2-01-1
2-02A
SELENOID
STARTER
4-06B
4-06E
POWER SUPPLY SYSTEM
STARTER AND IGNITION SWITCHES

BE
WH/GN
GY/GN
RD/VI
RD/YL
5-01A
5-01B
120A)
LOAD
RD/BL
GY/GN
BK/YL
RD/WH
3-01B
RD/GN
3-16
4-06A
RD/BL
2-03-2
4-06C
2-03-1
4-06D
3-01A
WH/YL
BK/YL
BL/YL
BE
GY/GN
RD/WH
6-03D
6-03C
MPEM
DESS
IGNITION
MODULE
3-03-1
WH/BL
BK
3-03-2
3-04-1
WH/BL
BK
3-04-2
3-05-1
WH/BL
BK
3-05-2
2-05B
BK
COMMUNICATION
PORT
2-05A
WH/GY
(ONLY FOR
MANUFACTURER)
BK
WH/BK
BE/BK
4-07B
4-07C
4-07A
4-06B
4-06E
4-06F
BK/WH
BK/GN
WH/GY
ROM
TETHER
CUT-OFF
SWITCH
6-01B
6-01C
6-01A
4-08B
3-08
BK
BK
WH/BK
BE/BK
BK
WH/BK
BE/BK
D.E.S.S. IGNITION SYSTEM

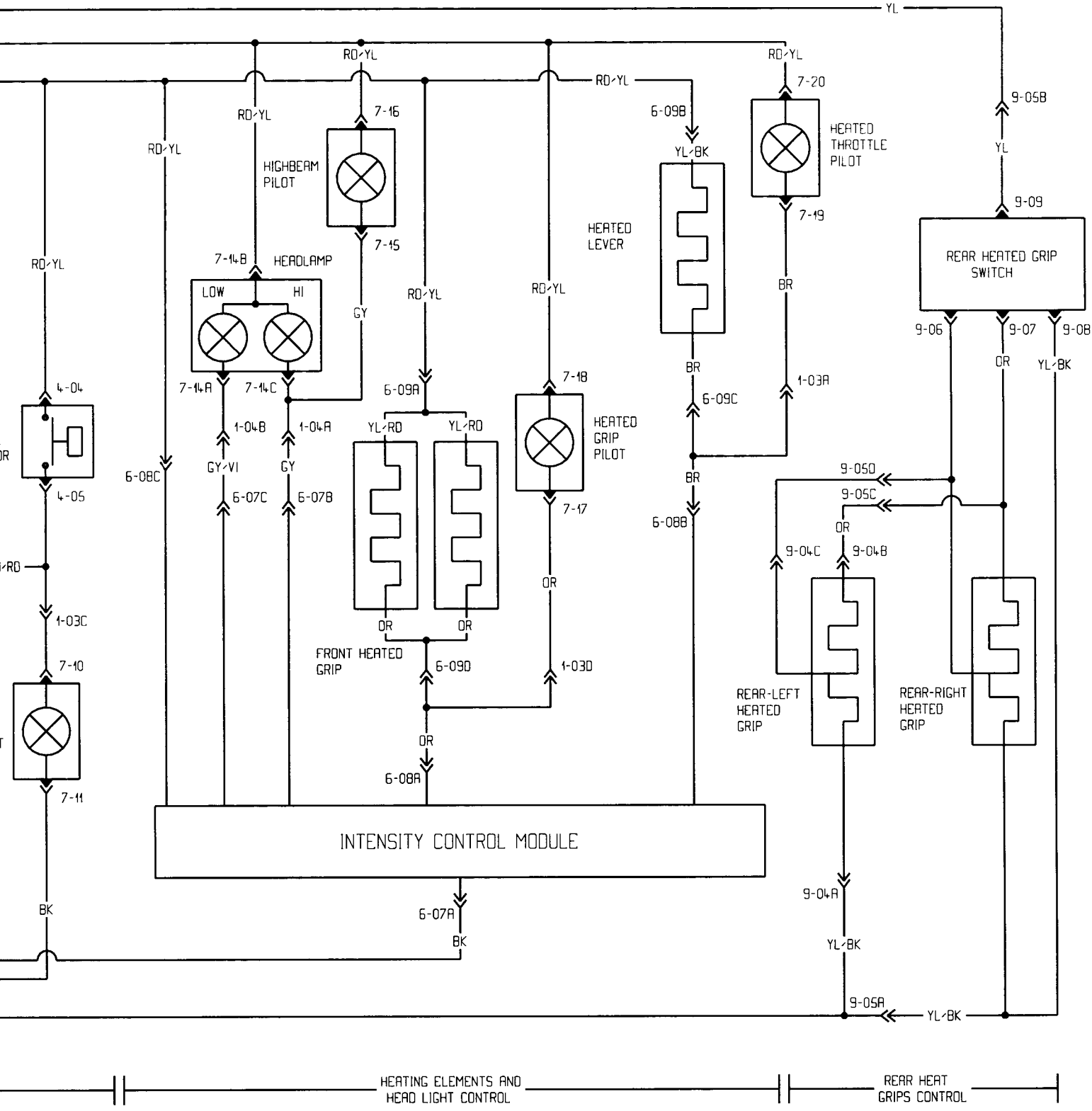

BE
1-01A
RD/YL
RD/VI
5-03A
(1A)
DPM
5-03B
RD/GY
GY/GN
VI/WH
4-08C
4-08A
4-08D
VI/WH
3-12A
AIR
TEMP.
DPM
3-12B
BK
RD/VI
5-04A
(20A)
5-04B
RD/OR
6-04
PRESSURE
CONTROL
SWITCH
P-
OFF
P+
6-05
6-06
YL/GN
YL/BR
YL/WH
5-05B
5-05A
5-05C
DISCHARGE
VALVE
COMP.
COMPRESSOR
ASS.
5-05D
BK
4-01A
4-01B
REVERSE
ALARM
SWITCH
BK
RD/YL
RD/YL
4-02
REVERSE
AND O.E.S.S.
ALARM
4-03
BE/BK
ANTI-THEFT
PILOT
7-07
7-06
WH/BK
COLD START
SOLENOID
3-11B
RD/GN
3-11A
BK
DPM
MODULE
3-10B
RD/WH
3-10A
BK
COMPENSATION
SOLENOID
RD
BL
BK
3-08A
3-08C
3-08B
BK
ENRICHMENT
SWITCH
VI
BK
TEMP. LIO DPM
3-09-A
3-09B
BK
BK
1-03B
BE/BK
DPM SYSTEM
AIR SUSPENSION
CONTROL SYSTEM
ALARM SYSTEM


WH/GN
1-02D
8-01C
RD/YL
1-02C
7-04
7-05
7-08B
7-08C
7-12B
7-13B
7-01
YL/WH
PRESSURE
7-02
7-03
TACHOMETER
7-08A
TEMP.
GAUGE
7-12A
BR
7-12C
1-02B
GN
3-13A
3-14
ENGINE
TEMP.
3-15
3-13C
8-01A
7-13A
BL
1-02A
8-02B
10.25A)
FUEL
LEVEL
YL/BK
8-02A
7-13C
BK
7-09A
SPEED
7-09B
7-07
7-06
WH/BK
1-03B
1-01B
INSTRUMENTATION



◆ **WARNING:** ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED.

BK - BL
WH - WH
RD - RE
BL - BL
YL - YE



HEATING ELEMENTS AND HEAD LIGHT CONTROL

REAR HEAT GRIPS CONTROL

ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED.

COLOR CODE		
BK - BLACK	GN - GREEN	BE - BEIGE
WH - WHITE	GY - GREY	
RD - RED	VI - VIOLET	
BL - BLUE	OR - ORANGE	
YL - YELLOW	BR - BROWN	