YAMAHA

VMX12 '91

2EN-AE1

SUPPLEMENTARY SERVICE MANUAL

FOREWORD

This Supplementary Service Manual has been prepared to introduce new service and new data for the VMX12 '91. For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with following manuals:

VMX12 '86 Service Manual: 2EN-ME1

VMX12 '91
SUPPLEMENTARY
SERVICE MANUAL
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NOTICE

This manual was written by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha motorcycles have a basic understanding of the mechanical concepts and procedures inherent in motorcycle repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit to use and/or unsafe.
Yamaha Motor Company, Ltd. is continually striving to improve all models manufactured by Yamaha. Modifications and significant changes in specifications or procedures will be forwarded to all Authorized Yamaha dealers and will, where applicable, appear in future editions of this manual.

TECHNICAL PUBLICATIONS
SERVICE DIVISION
MOTORCYCLE GROUP
YAMAHA MOTOR CO., LTD.

HOW TO USE THIS MANUAL

PARTICULARLY IMPORTANT INFORMATION

This material is distinguished by the following notation.

⚠ The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVEDI

⚠ WARNING Failure to follow WARNING instructions could result in severe injury or death to the motorcycle operator, a bystander, or a person inspecting or repairing the motorcycle.

CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the motorcycle.

NOTE: A NOTE provides key information to make procedures easier or cleaer.

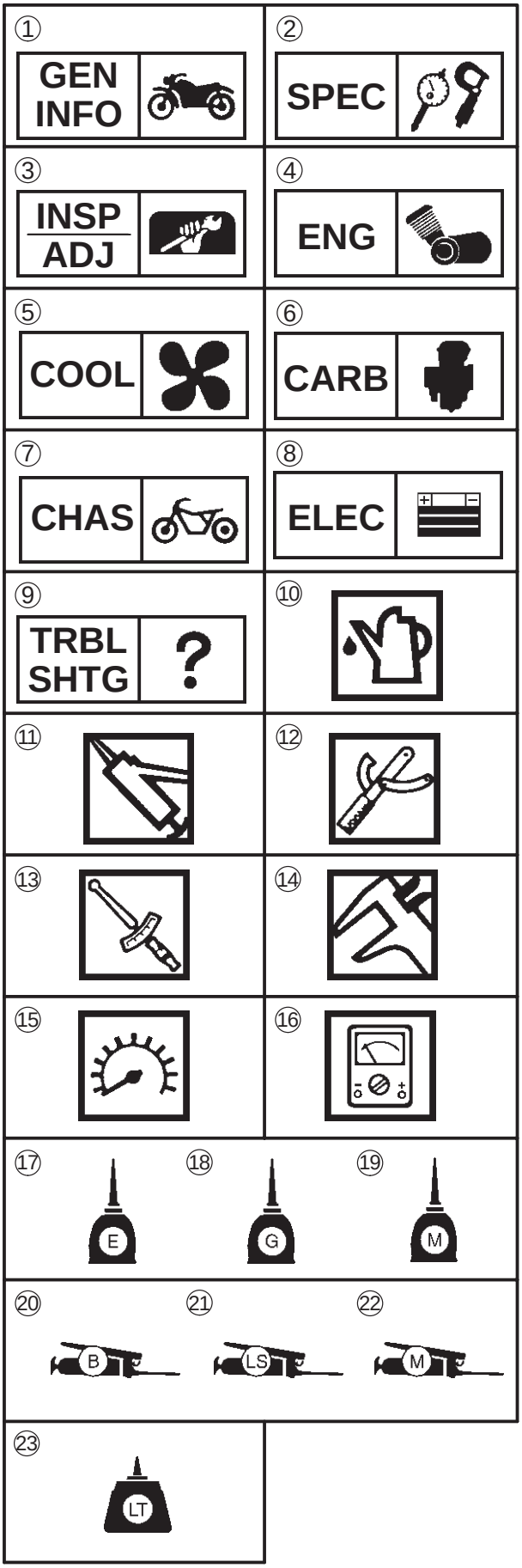
MANUAL FORMAT

All of the procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, and assembly, inspection operations.
In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/Damage → Replace.

EXPLODED DIAGRAM

Each chapter provides exploded diagrams before each disassembly section for ease in identifying correct disassembly and assembly procedures.



ILLUSTRATED SYMBOLS (Refer to the illustration)

Illustrated symbols ① to ⑨ are designed as thumb tabs to indicate the chapter's number and content.

① General information
② Specifications
③ Periodic inspection and adjustment
④ Engine
⑤ Cooling system
⑥ Carburetion
⑦ Chassis
⑧ Electrical
⑨ Troubleshooting

Illustrated symbols ⑩ to ⑯ are used to identify the specifications appearing.

⑩ Filling fluid
⑪ Lubricant
⑫ Special tool
⑬ Tightening
⑭ Wear limit, clearance
⑮ Engine speed
⑯ Ω, V, A

Illustrated symbols ⑰ to ㉓ in the exploded diagram indicate grade of lubricant and location of lubrication point.

⑰ Apply engine oil
⑱ Apply gear oil
⑲ Apply molybdenum disulfide oil
⑳ Apply wheel bearing grease
㉑ Apply lightweight lithium-soap base grease
㉒ Apply molybdenum disulfide grease
㉓ Apply licking agent (LOCTITE®)

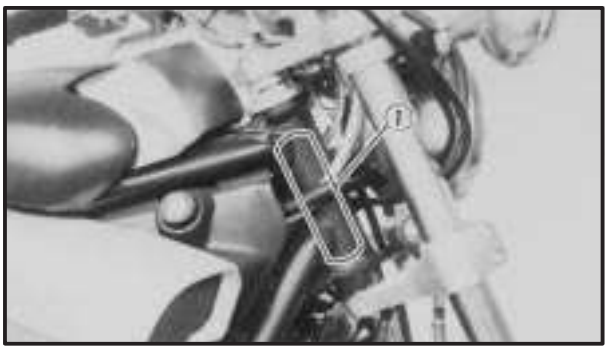
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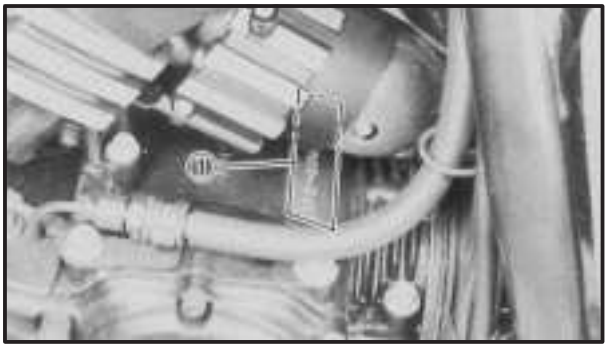
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VMX12 ’91 WIRING DIAGRAM





GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

FRAME SERIAL NUMBER

The frame serial number ① is stamped into the steering head pipe.

ENGINE SERIAL NUMBER

The engine serial number ① is stamped into the left side of the engine.

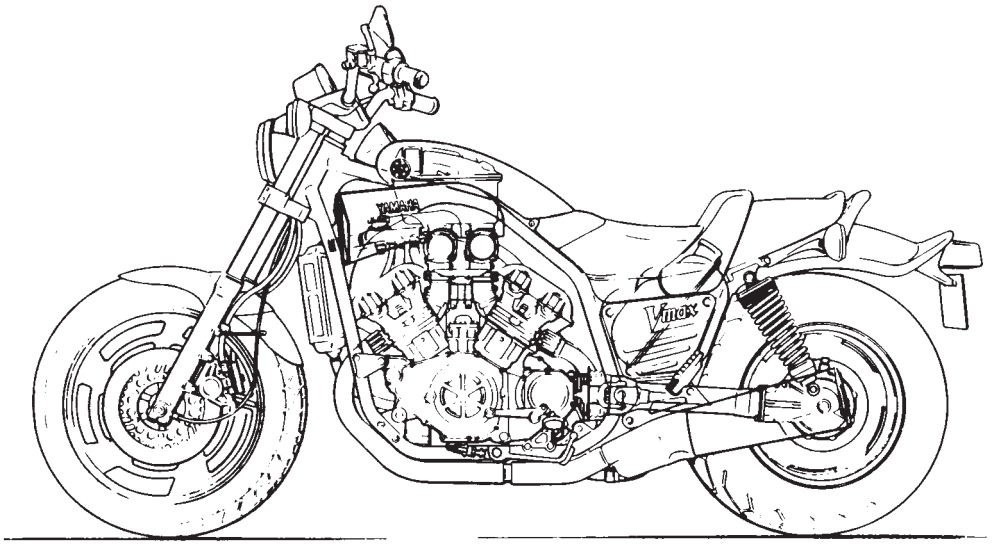
NOTE:

The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.

Starting Serial Number:
VMX12 . . . . . 2EN-010101

NOTE:

Designs and specifications are subject to change without notice.



SPECIFICATIONS

GENERAL SPECIFICATIONS

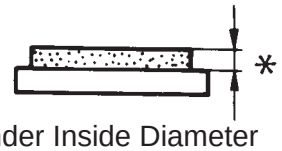
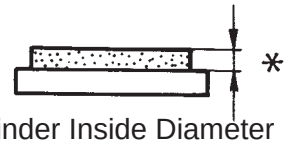
Model	VMX12 '91	
Model Code Number Engine Starting Number Frame Starting Number	3LR3 2EN-010101 2EN-010101	
Fuel: Type Tank Capacity: Total Reserve	 Regular unleaded gasoline with a research octane number of 91 or higher 15.0 L (3.3 Imp gal, 4.0 US gal) 3.0 L (0.66 Imp gal, 0.80 US gal)	
Transmission: Primary Reduction System Primary Reduction Ratio Secondary Reduction System Secondary Reduction Ratio Transmission Type Operation Gear Ratio: 1st 2nd 3rd 4th 5th	 Spar gear 87/49 (1.776) Shaft drive 21/27 × 33/10 (2.567) Constant mesh, 5-speed Left foot operation 43/17 (2.529) 39/22 (1.773) 31/23 (1.348) 28/26 (1.077) 26/28 (0.929)	
Tire Pressure (Cold Tire): Basic Weight: With Oil and Full Fuel Tank Maximum Load* Cold tire Pressure: Upto 90 kg (198 ld) Load* 90 kg (198 ld)* ~ maximum Load* High Speed Riding	 281 kg (619 lb) 208 kg (456 lb) Front 225 kpa (2.25 kg/cm^2, 32 psi) 225 pa (2.25 kg/cm^2, 32 psi) 225 kpa (2.25 kg/cm^2, 32 psi) * Load is the total weight of cargo, rider, passenger, and accessories.	 Rear 225 kpa (2.25 kg/cm^2, 32 psi) 250 kpa (2.5 kg/cm^2, 36 psi) 250 kpa (2.5 kg/cm^2, 36 psi)
Electrical: Ignition System Generator System Battery Type or Model Battery Capacity	 T.C.I. (Digital) A.C. magneto generator YB16AL-A2 12 V 16 AH	

MAINTENANCE SPECIFICATIONS

ENGINE

Model		VMX12 '91
Carburetor:		
I.D. Mark		3LR00
Main Jet	(M.J.)	#150
Main Air Jet	(M.A.J.)	ø2.0
Jet Needle	(J.N.)	5DZ19-3
Needle Jet	(N.J.)	Y-0
Pilot Jet	(P.J.)	#42.5
Pilot Air Jet	(P.A.J.1)	#95
	(P.A.J2)	#170
Pilot Screw	(P.S.)	2 and 1/2 turns out
Pilot Outlet	(P.O.)	0.9
Bypass	(B.P.1)	0.8
	(B.P.2)	0.8
	(B.P.3)	0.9
Valve Seat Size	(V.S.)	1.5
Starter Jet	(G.S.1)	#45
	(G.S.2)	#0.8
Fuel Level (with special tool)	(F.L.)	15 ~ 17 mm (0.59 ~ 0.67 in)
Engine Idling Speed		950 ~ 1,050 r/min
Vacuum Pressure at Idling Speed		Above 170 mm Hg (6.69 in Hg)
Vacuum Synchronous Difference		Below 20 mm Hg (0.79 in Hg)

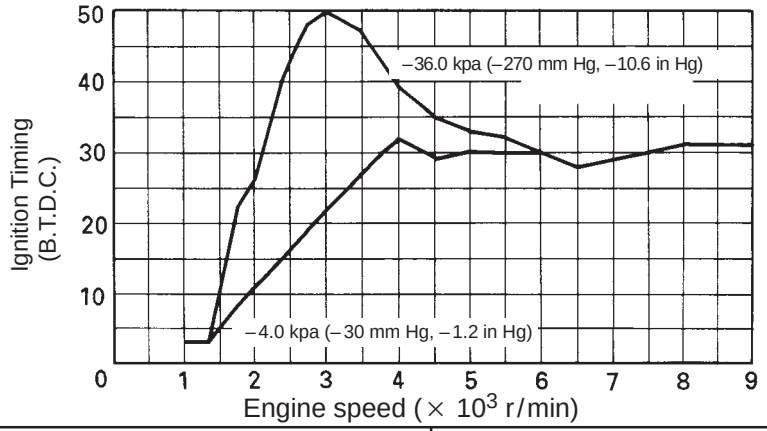
CHASSIS

Model		VMX12 '91
Front Disc Brake:		
Type		Dual
Disc Outside Diameter × Thickness		282 × 7.5 mm (11.1 × 0.30 in)
Pad Thickness	Inner	5.5 mm (0.22 in)
<Limit> *		<0.5 mm (0.02 in)>
Pad Thickness	Outer	5.5 mm (0.22 in)
<Limit> *		<0.5 mm (0.02 in)>
		
Master Cylinder Inside Diameter		15.87 mm (0.63 in)
Caliper Cylinder Inside Diameter		45.4 mm (1.79 in)
Brake Fluid Type		DOT #4 or DOT #3
Rear Disc Brake:		
Type		Single
Disc Outside Diameter × Thickness		282 × 7.5 mm (11.1 × 0.30 in)
Pad Thickness	Inner	5.5 mm (0.22 in)
<Limit> *		<0.5 mm (0.02 in)>
Pad Thickness	Outer	5.5 mm (0.22 in)
<Limit> *		<0.5 mm (0.02 in)>
		
Master Cylinder Inside Diameter		12.7 mm (0.05 in)
Caliper Cylinder Inside Diameter		42.85 mm (1.69 in)
Brake Fluid Type		DOT #4 or DOT #3

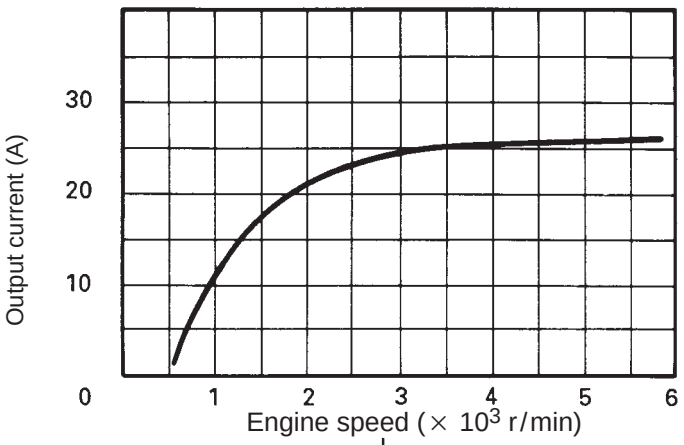
Model	VMX12 '91
Clutch:	
Master Cylinder Inside Diameter	15.87 mm (0.63 in)
Release Cylinder Inside Diameter	38.1 mm (1.50 in)
Brake Fluid Type	DOT #4 or DOT #3

ELECTRICAL

Model	VMX12 '91
Voltage:	12 V
Ignition System:	
Ignition Timing (B.T.D.C.)	3° at 1,000 r/min
Advanced Timing (B.T.D.C.)	31° at 9,000 r/min
Advancer Type	Vacuum and electrical



T.C.I.:	
Pickup Coil Resistance (Color)	81.0 ~ 121.0 Ω at 20°C (68°F) (Black – Orange)
T.C.I. Unit-Model/Manufacturer	TCI14-93/HITACHI
Charging System/Type:	A.C. magneto generator
A.C. Generator:	
Model/Manufacturer	FL130-07/HITACHI
Nominal Output	14 V, 25 A at 5,000 r/min



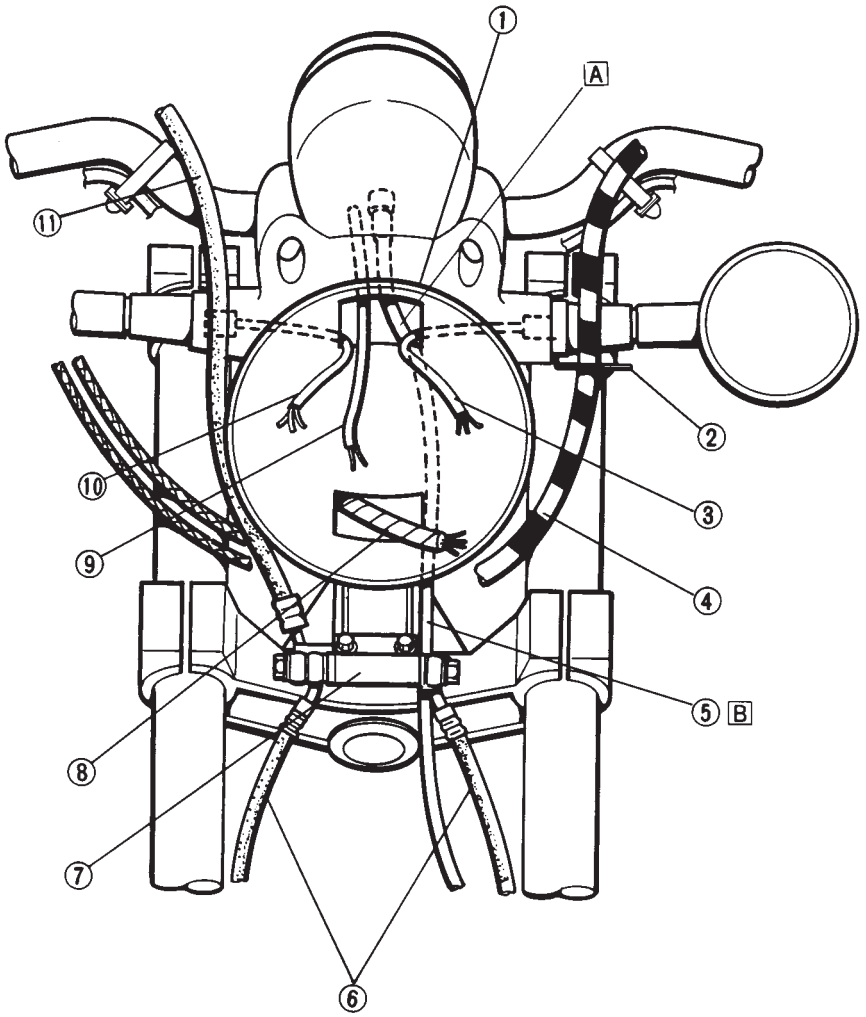
Stator Coil Resistance (Color)	0.26 ~ 0.35 Ω at 20°C (68°F) (White/White)

Model	VMX12 '91
Electric Starter System:	
Type	Constant mesh type
Starter Motor:	
Model/Manufacturer	SM-229C/MITSUBA
Output	0.6 kW
Brush:	
Overall Length	12.5 mm (0.49 in)
<Limit>	<5.5 mm (0.22 in)>
Spring Pressure	560 ~ 680 g (19.7 ~ 23.9 oz)
Commutator:	
Outside Diameter	28 mm (1.1 in)
<Wear Limit>	<27 mm (1.06 in)>
Mica Undercut	0.7 mm (0.028 in)
Starter Relay:	
Model/Manufacturer	MS5D-191/HITACHI
Amperage Rating	100 A
Coil Winding Resistance	3.9 ~ 4.7 Ω at 20°C (68°F)
Flasher Relay:	
Type	Semi transister type
Model/Manufacturer	FB257H/NIPPONDENSO
Self Cancelling Device	Yes.
Flasher Frequency	75 ~ 95 cycle/min
Wattage	21 W × 2 + 3.4 W
Self Cancelling Unit:	
Model/Manufacturer	FB257H/NIPPONDENSO

CABLE ROUTING

① Headlight body
② Hose guide
③ Front flasher light lead (Left)
④ Clutch hose
⑤ Speedometer cable
⑥ Front brake hose
⑦ Brake joint
⑧ Wireharness
⑨ Speedometer light lead
⑩ Front flasher light lead (Right)
⑪ Front brake hose

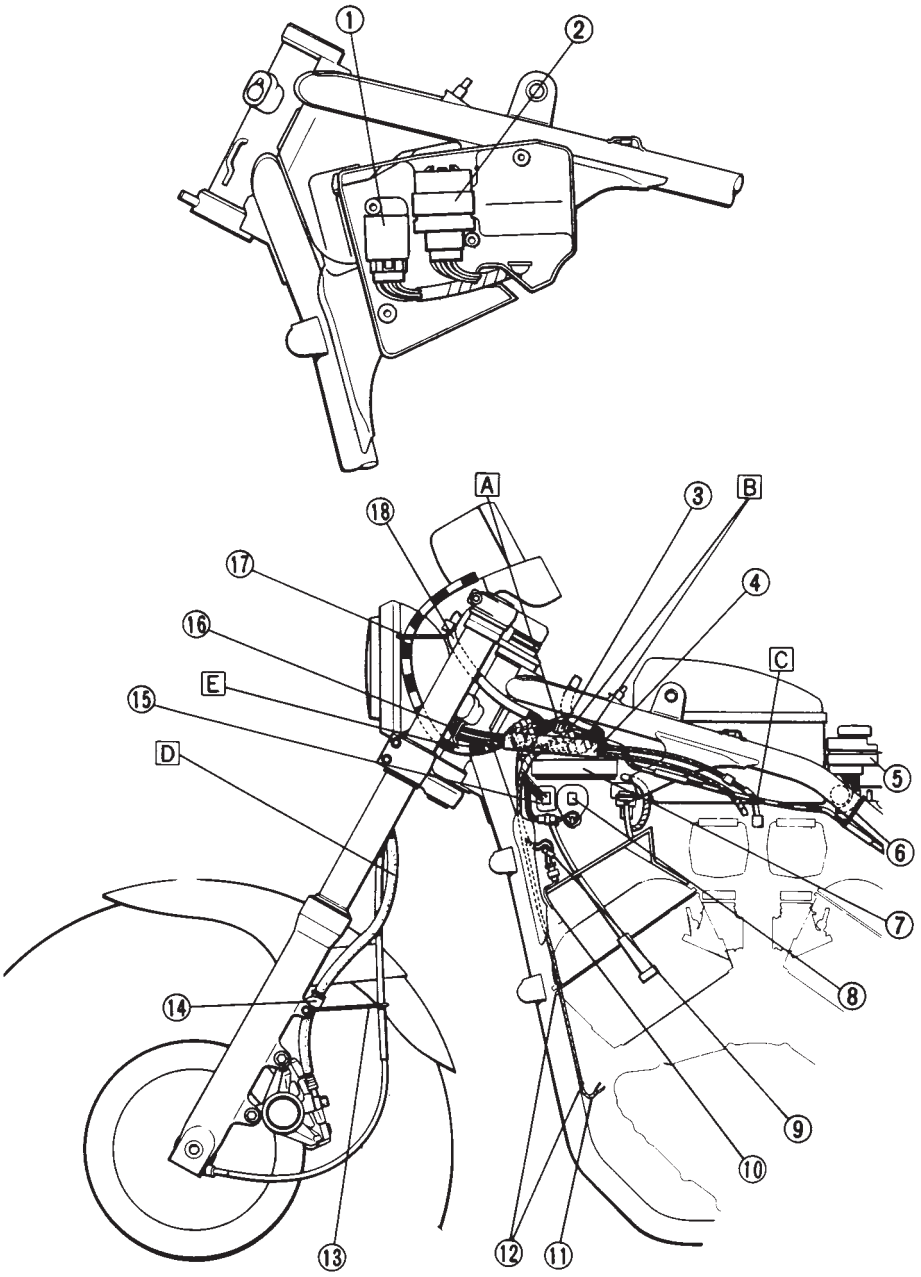
A Position the speedometer cable so that it's metal caseing is touching the inside of the headlight installation bracket.
B Pass the speedometer cable between the brake joint and under bracket.



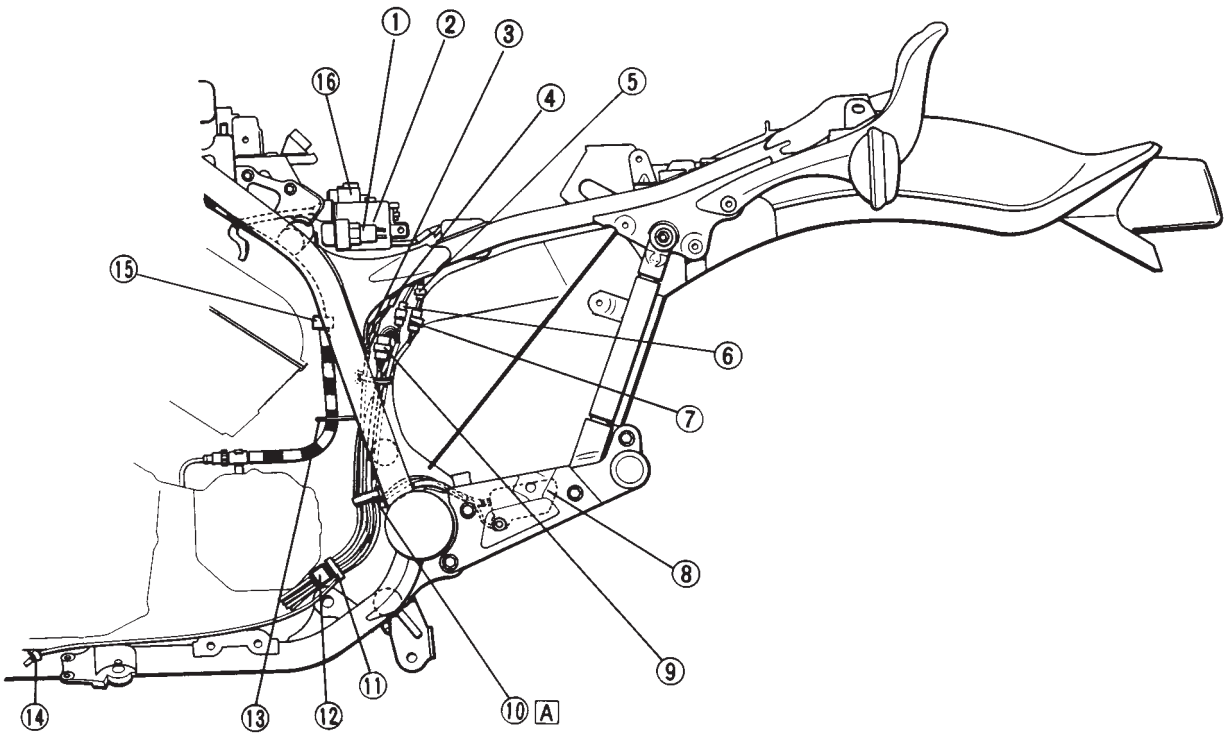
CABLE ROUTING

① Fuel pump control unit
② Flasher relay unit
③ Clutch hose clamp
④ Throttle cable joint
⑤ Fuse box
⑥ Band
⑦ Ignitor unit
⑧ Ignition coil
⑨ Clamp
⑩ Readiator fan lead
⑪ Horn lead
⑫ Clamp
⑬ Guide (For speedometer cable)
⑭ Clamp (For brake hose)
⑮ Starter circuit cut-off relay
⑯ Guide (For throttle cable)
⑰ Guide (For clutch hose)
⑱ Handlebar switch lead (Left)

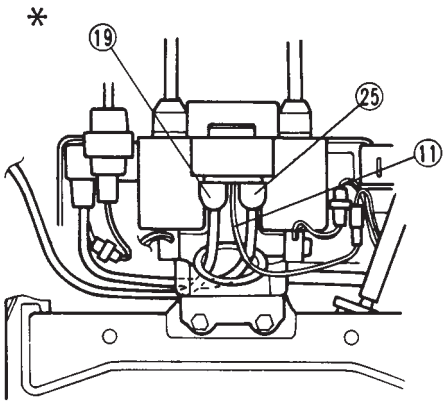
A Pass the handlebar switch lead inside the clutch hose.
B Pass the meter lead outside the clutch hose.
C Pass the clutch hose outside the throttle cable.
D Pass the brake hose outside the speedometer cable.
E Pass the clutch hose under the throttle cable guide.

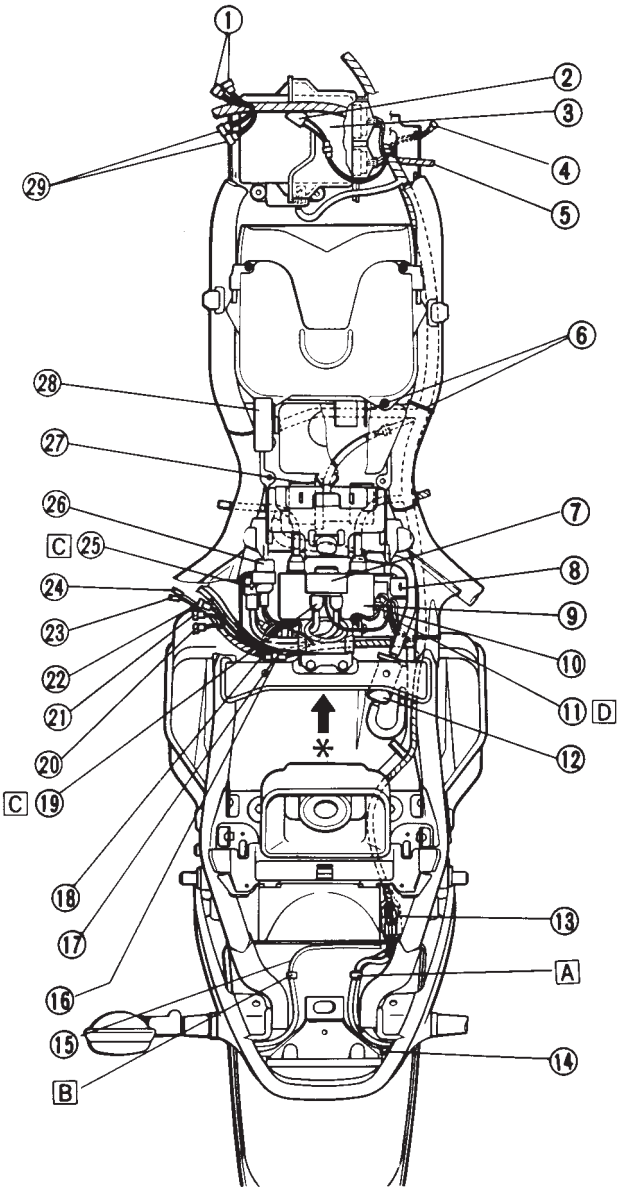


① Main fuse
② Ignition coil
③ Oil level switch lead
④ Neutral switch lead
⑤ Regulater lead
⑥ Earth lead (Regulater)
⑦ Side stand switch lead
⑧ Rectifier/Regulater
⑨ A.C. generator lead
⑩ Band (For engine lead, side stand switch lead and regulater lead)
⑪ Band (For engine lead and side stand switch lead)
⑫ Clamp (For engine lead)
⑬ Guide (For clutch hose)
⑭ Clamp (For side stand switch lead)
⑮ Clamp (For clutch hose)
⑯ Starter relay
[A] Pass the band through the guide on frame.



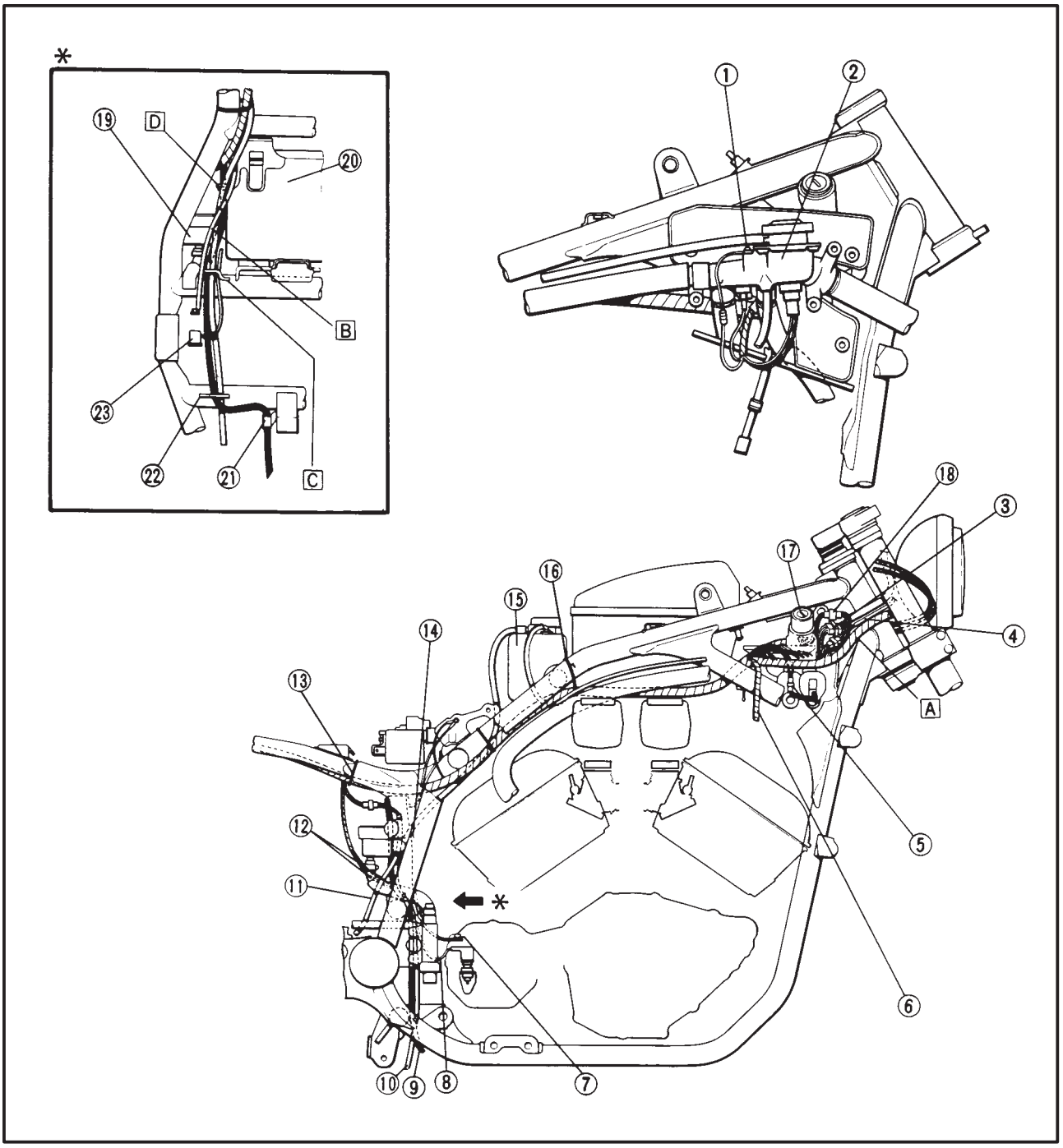
① Handlebar switch lead (Left)
② Diode
③ Ignitor unit
④ Ignition coil lead
⑤ Conduit lead
⑥ Band
⑦ Starter relay
⑧ Battery negative (–) lead
⑨ Ignition coil
⑩ Ignition coil lead
⑪ Starter relay lead
⑫ Fuel filter
⑬ Boot cover
⑭ Taillight lead
⑮ Rear flasher light lead (Left)
⑯ Ignition coil lead
⑰ Pick up coil lead
⑱ Starter relay lead
⑲ Starter motor lead
⑳ Regulater earth lead
㉑ Side stand switch lead
㉒ Regulater lead
㉓ Oil level switch lead
㉔ Neutral switch lead
㉕ Battery positive (+) lead
㉖ Main fuse
㉗ Fuel pump
㉘ Frse box
㉙ Meter lead
[A] Clamp the taillight lead and rear flasher light lead (Right).
[B] Clamp the rear flasher light lead (Left).
[C] Pass the battery positiv lead (Red) and starter motor lead (Black) through the bracket hole. Do not pinch the battery positiv lead and starter motor lead.
[D] Position the starter relay lead above the bracket.





① Earth lead
② Conduit
③ Handlebar switch lead (Left)
④ Fuel switch lead
⑤ Ignition coil lead
⑥ To conduit
⑦ Earth lead
⑧ Rear brake switch lead
⑨ Battery breather hose
⑩ Coolant reservoir tank breather hose
⑪ Fuel sender lead
⑫ Rear brake switch lead
⑬ Band
⑭ Battery negative (–) lead
⑮ Coolant reservoir tank
⑯ Band
⑰ Main switch
⑱ Main switch lead
⑲ Rear brake reservoir tank
⑳ Battery box
㉑ Clamp (For battery breather hose)
㉒ Guide (For reservoir tank breather hose and Battery breather hose)
㉓ Rear brake switch

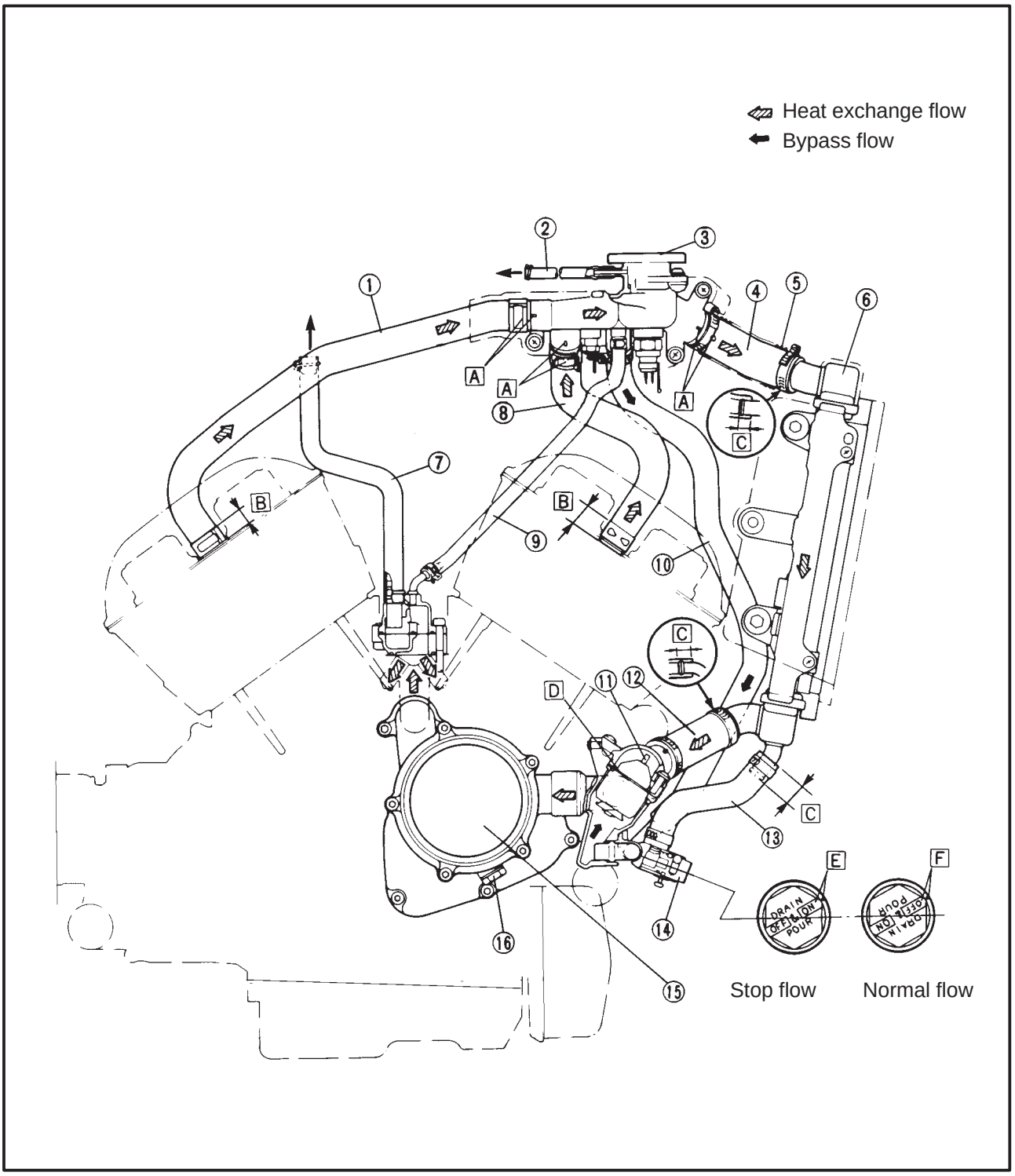
A Pass the wireharness outside the main switch stay.
B Earth lead:
Pass the earth lead outside the reservoir tank breather hose.
C Guide (For battery breather hose, reservoir tank breather hose and rear brake switch lead).
D Position the battery breather hose rubber ring above the guide on battery case.



COOLANT DIAGRAM

① Hose 2
② Hose (to coolant reservoir tank)
③ Radiator cap
④ Hose 4
⑤ Compression spring
⑥ Radiator assembly
⑦ Breather hose (to air cleaner)
⑧ Hose 1
⑨ Hose 6
⑩ Bypass hose
⑪ Thermostatic valve
⑫ Hose 3
⑬ Hose 5
⑭ Coolant drain cock
⑮ Water pump
⑯ Drain bolt

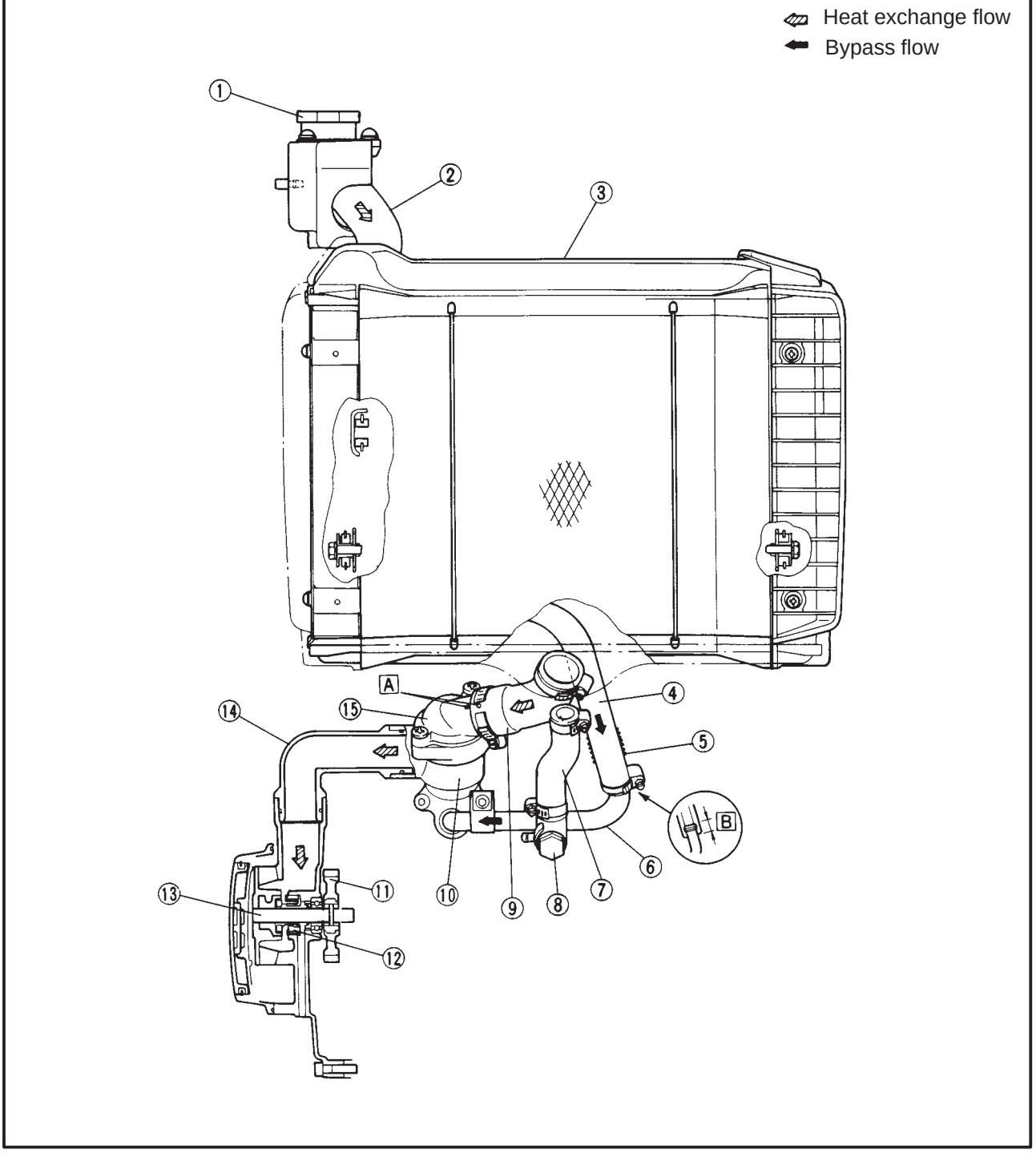
A Match marks
B 18 ~ 20 mm (0.71 ~ 0.79 in)
C 18 ~ 22 mm (0.71 ~ 0.87 in)
D Install the thermostat with the relief valve positioned upward. When installing the thermostat seal, place it's cut-away portion over the relief valve.
E Match mark (Stop flow)
F Match mark (Normal flow)



COOLANT DIAGRAM

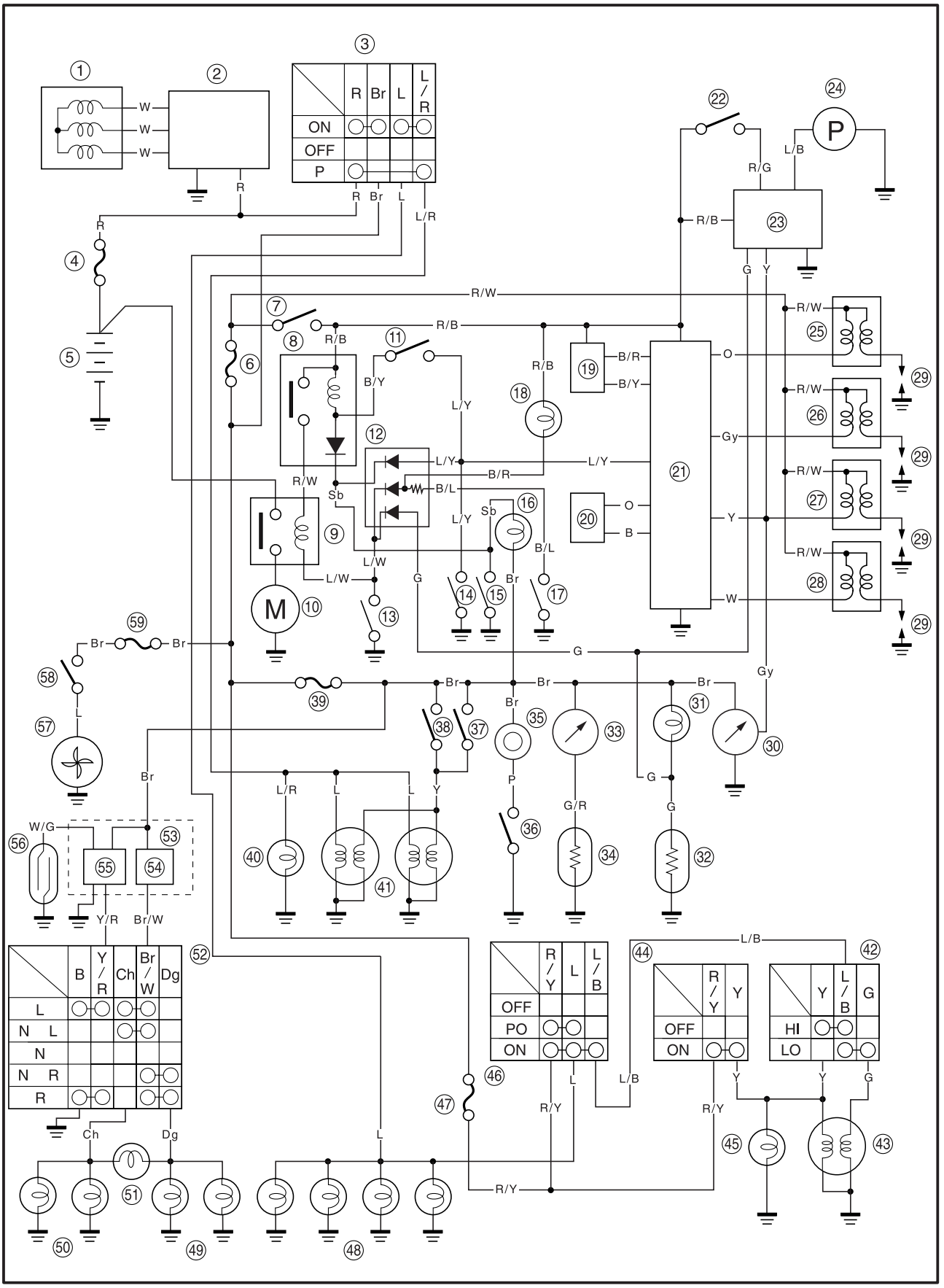
① Radiator cap
② Hose 4
③ Radiator assembly
④ Bypass hose
⑤ Compression spring
⑥ Pipe 1
⑦ Hose 5
⑧ Coolant drain cock
⑨ Hose 3
⑩ Thermostat housing
⑪ Impeller shaft gear
⑫ Mechanical seal
⑬ Impeller shaft assembly
⑭ Joint
⑮ Thermostat cover

Ⓐ Match marks
Ⓑ 18 ~ 22 mm (0.72 ~ 0.87 in)



ELECTRICAL

VMX12 '91 CIRCUIT DIAGRAM



① A.C. Magneto generator
② Rectifier/Regulator
③ Main switch
④ Main fuse
⑤ Battely
⑥ Fuse (IGNITION)
⑦ "ENGINE STOP" switch
⑧ Starter circuit cut-off relay
⑨ Starter relay
⑩ Starter motor
⑪ Clutch switch
⑫ Diode
⑬ "START" switch
⑭ Side stand switch
⑮ Neutral switch
⑯ "NEUTRAL" indicator light
⑰ Oil level gauge
⑱ "OIL LEVEL" warning indicator light
⑲ Pressure sensor
⑳ Pick up coil
㉑ Ignitor unit
㉒ "FUEL (RESERVE)" switch
㉓ Fuel pump relay
㉔ Fuel pump
㉕ Ignition coil #1
㉖ Ignition coil #2
㉗ Ignition coil #3
㉘ Ignition coil #4
㉙ Spark plug
㉚ Tachometer
㉛ "FUEL" indicator light
㉜ Fuel sender unit
㉝ Temperature meter
㉞ Thermo unit
㉟ Horn
㊱ "HORN" switch
㊲ Front stop switch
㊳ Rear stop switch
㊴ Fuse (SIGNAL)
㊵ Auxiliary light
㊶ Tail/Brake light
㊷ "LIGHTS" (Dimmer) switch
㊸ Head light
㊹ "PASS" switch
㊺ "HIGH BEAM" indicator light
㊻ "LIGHTS" switch
㊼ Fuse (HEAD)
㊽ Meter light
㊾ Flasher light (Right)
㊿ Flasher light (Left)
(51) "TURN" indicator light
(52) "TURN" switch
(53) Flasher relay unit
(54) Flasher relay
(55) Cancelling unit
(56) Reed switch
(57) Fan motor
(58) Thermo switch
(59) Fuse (FAN)

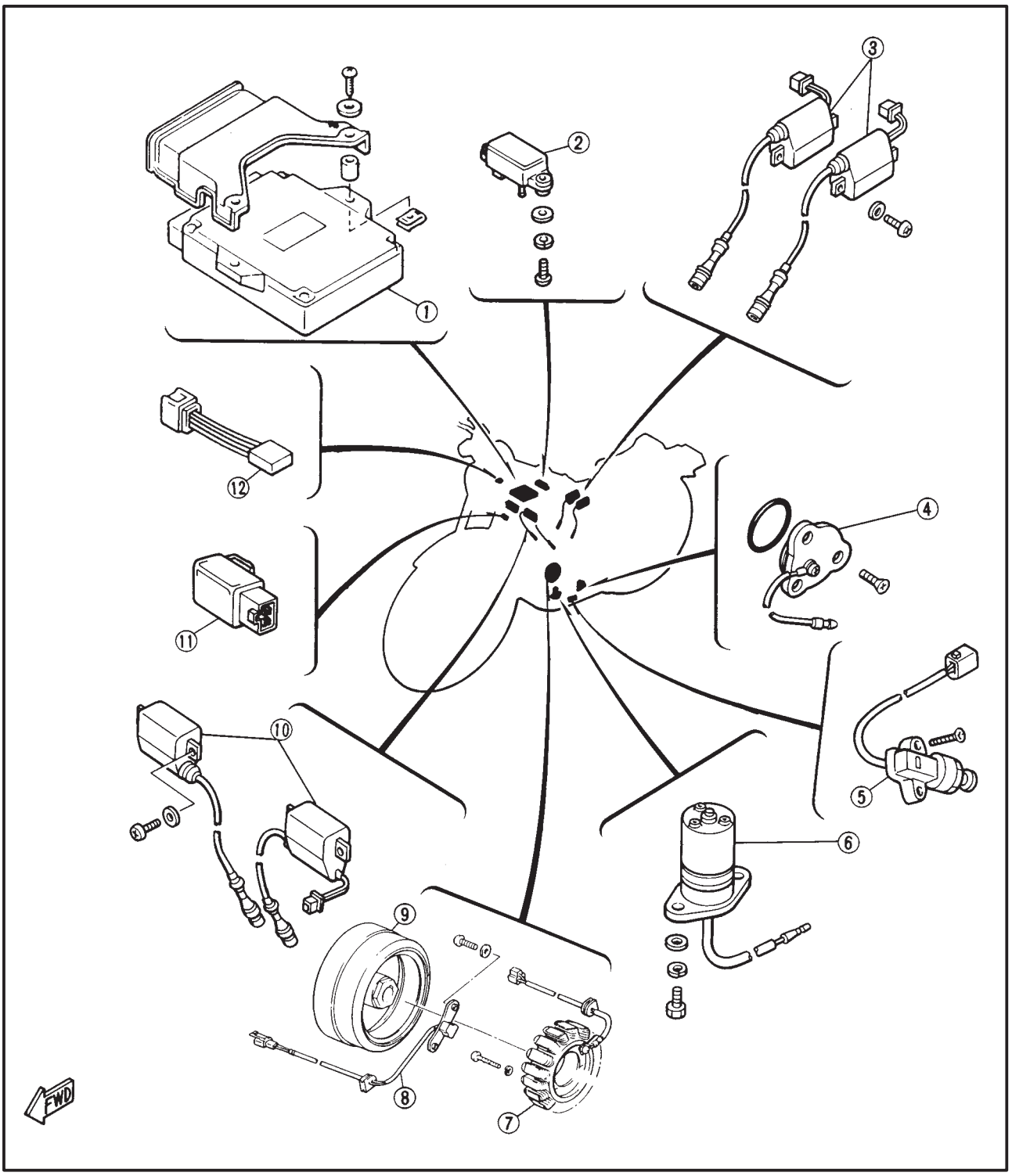
COLOR CODE

B	Black	B/Y	Black/Yellow
Br	Brown	Br/W	Brown/White
Ch	Chocolate	G/R	Green/Red
Dg	Darkgreen	G/Y	Green/Yellow
G	Green	L/B	Blue/Black
Gy	Gray	L/R	Blue/Red
L	Blue	L/W	Blue/White
O	Orange	L/Y	Blue/Yellow
P	Pink	R/B	Red/Black
R	Red	R/G	Red/Green
Sb	Sky blue	R/W	Red/White
W	White	R/Y	Red/Yellow
Y	Yellow	W/G	White/Green
B/R	Black/Red	Y/R	Yellow/Red

ELECTRICAL COMPONENTS (1)

① TCI unit (Digital)
② Pressure sensor
③ Ignition coil (#1 & #3)
④ Neutral switch
⑤ Side stand switch
⑥ Oil level gauge
⑦ Stator coil
⑧ Pick up coil
⑨ A.C. Magneto
⑩ Ignition coil (#2 & #4)
⑪ Starter circuit cut-off relay
⑫ Diode

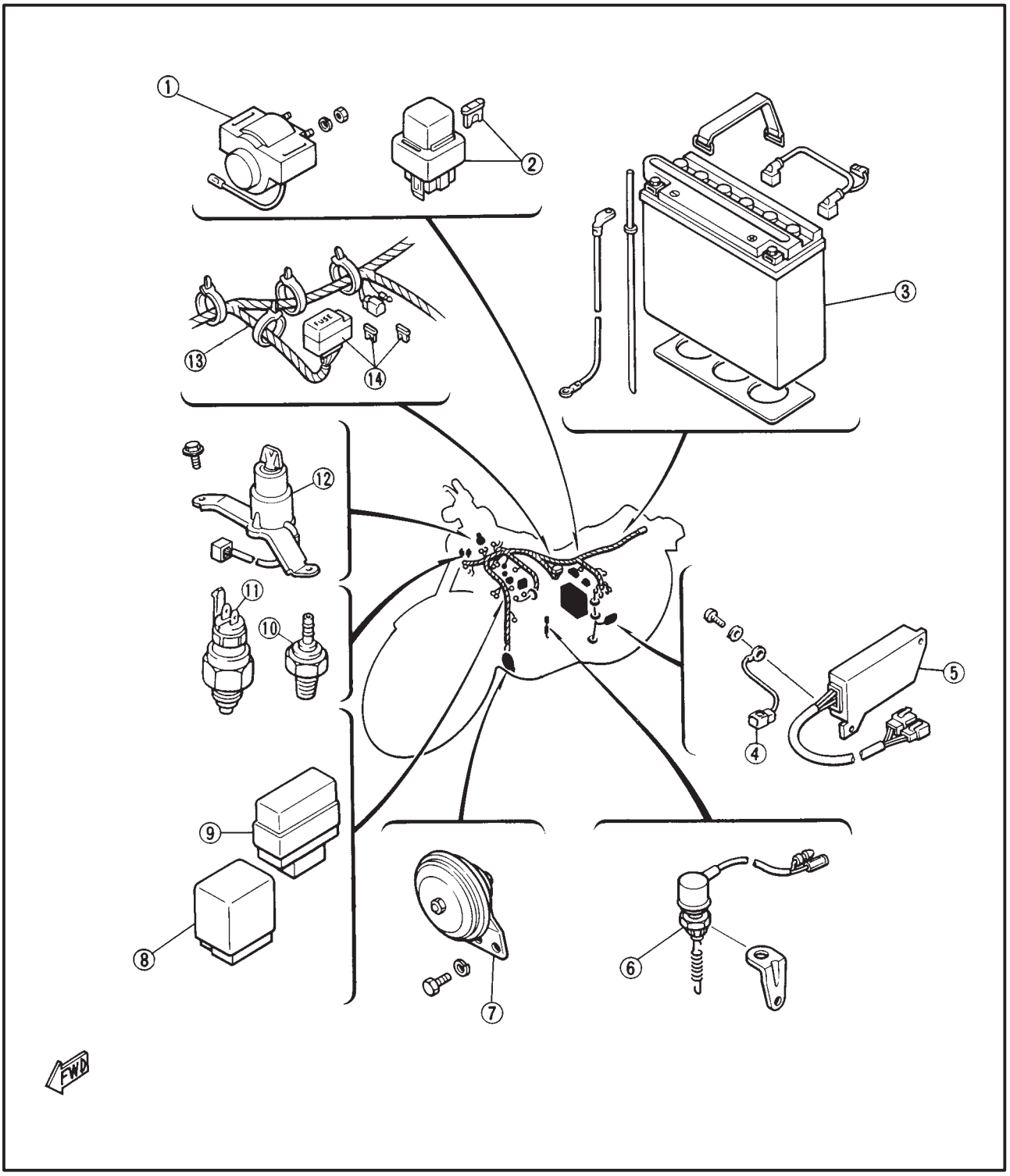
SPECIFICATIONS	RESISTANCE
IGNITION COIL:	
PRIMARY	2.4 ~ 3.0 Ω
SECONDARY	10.6 ~ 15.8 kΩ
PICK-UP COIL:	81.0 ~ 121.0 Ω
STATOR COIL:	0.26 ~ 0.35 Ω

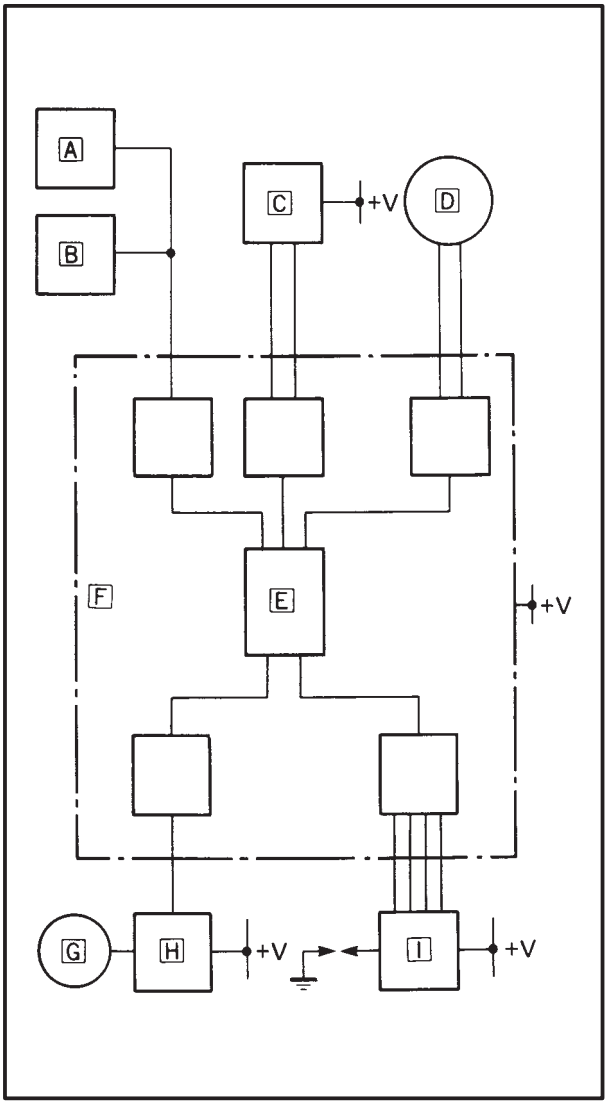


ELECTRICAL COMPONENTS (2)

① Starter relay
② Main fuse
③ Battery
④ Earth lead (Regulater)
⑤ Rectifier/regulator
⑥ Rear brake switch
⑦ Horn
⑧ Fuel pump relay
⑨ Flasher relay unit
⑩ Thermo unit
⑪ Thermo switch
⑫ Main switch
⑬ Wireharness
⑭ Fuse box

BATTERY:
CAPACITY: 12 V, 16 AH
SPECIFIC GRAVITY: 1.280





IGNITION SYSTEM

DIGITAL IGNITION CONTROL SYSTEM DESCRIPTION

The electronic ignition that sparks the engine is computer controlled and operated by the digital CPU (microprocessor). It has a pre-programed ignition advance curve.

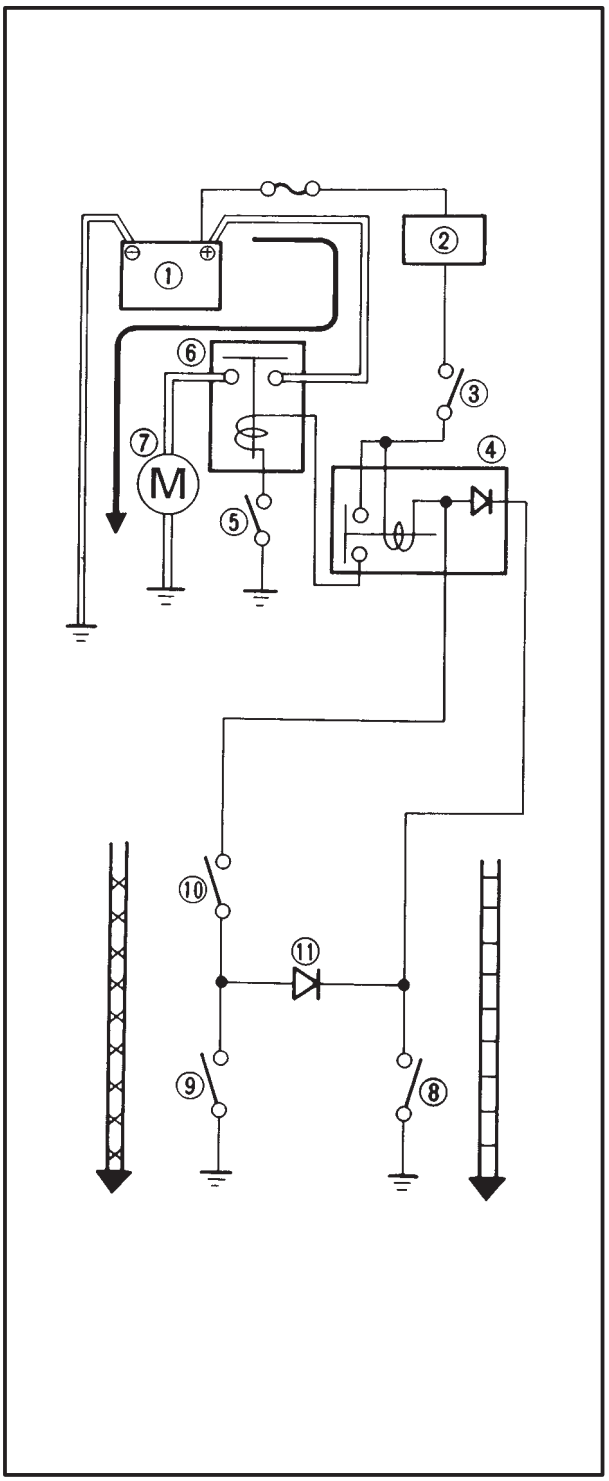
This programed advance curve closely matches the spark timing to the engine's ignition requirements. Only one pickup coil is needed to meet the requirements of the digital ignitor unit. The digital ignitor also includes the control unit for the electric fuel pump.

A Clutch switch
B Side stand switch
C Pressure sensor
D Pick up coil
E CPU (Microprocessor)
F Digital ignitor unit
G Fuel pump
H Fuel pump control relay
I Ignition coil

OPERATION

The following operations are digitally-performed by signal from the pickup coil signal:

1. Determing proper ignition timing.
2. Sensing the engine revolution speed.
3. Determing timing for switching on ignition coil (duty control).
4. Increasing ignition coil primary current for starting the engine.
5. Sensing engine stall.
6. Preventing over-revolution of the engine.



ELECTRICAL STARTING SYSTEM

STARTING CIRCUIT OPERATION

The starting circuit on this model consist of the starter motor, starter relay, and the relay unit (starting circuit cut-off relay). If the “ENGINE STOP” switch and the main switch are both closed, the starter motor can operate only if:

The transmission is in neutral (the neutral switch is closed).

or if

The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed.)

The starting circuit cut-off relay prevents the starter from operating when neither or these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor.

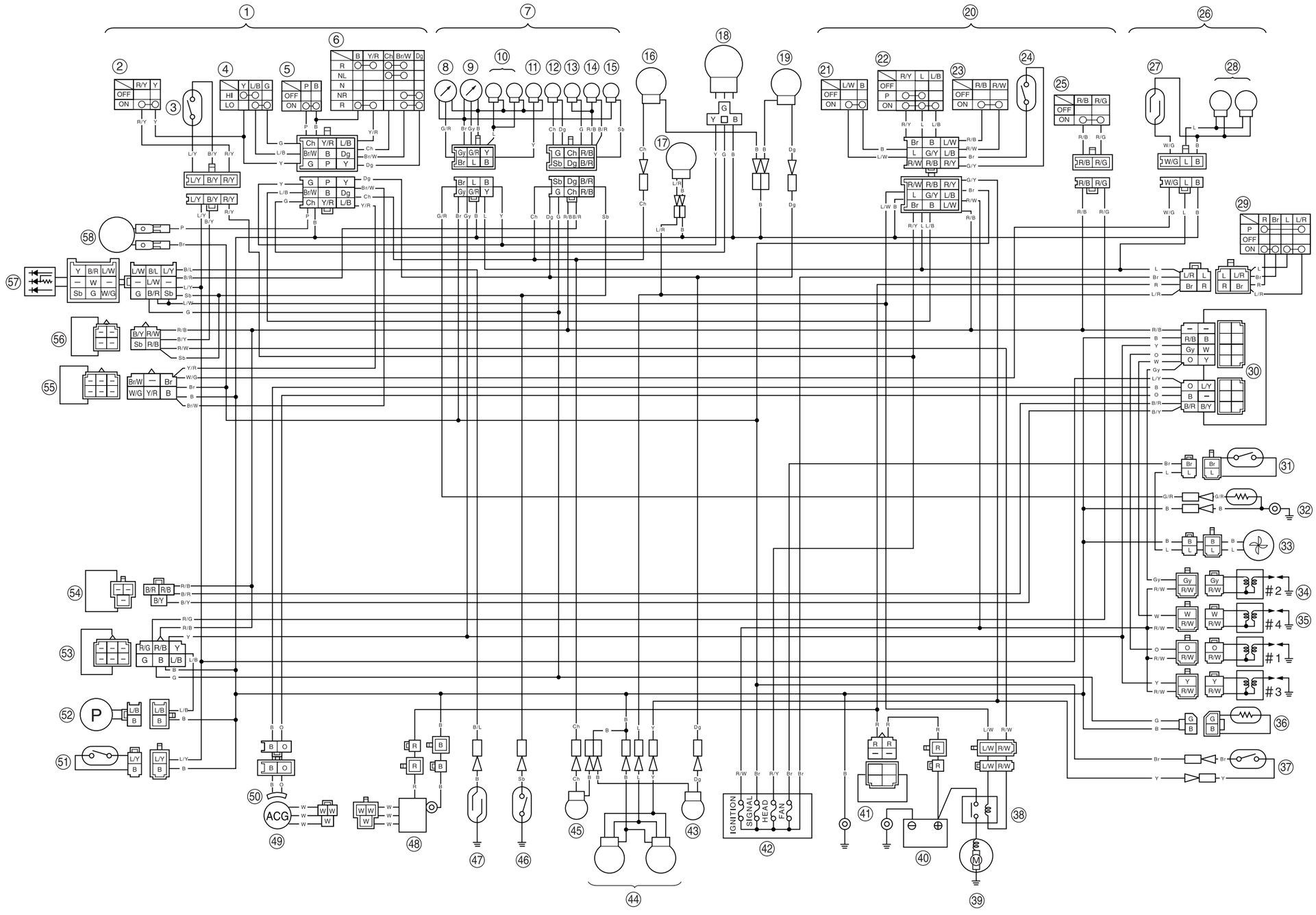
When one of both of the above conditions have been met, however, the starting circuit cut-off relay is closed, and the engine can be started by pressing the starter switch.

WHEN THE TRANSMISSION IN NEUTRAL

WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED IN

① Battery
② Main switch
③ “ENGINE STOP” switch
④ Starting circuit cut-off relay
⑤ “START” switch
⑥ Starter relay
⑦ Starter motor
⑧ Neutral switch
⑨ Side stand switch
⑩ Clutch switch
⑪ Diode

VMX12 ’91 WIRING DIAGRAM



1. Handlebar switch (Left)
2. “PASS” switch
3. Clutch switch
4. “LIGHTS” (Dimmer) switch
5. “HORN” switch
6. “TURN” switch
7. Meter assembly
8. Temperature meter
9. Tachometer
10. Meter light
11. “HIGH BEAM” indicator light
12. “TURN” indicator light
13. “FUEL” warning light
14. “OIL LEVEL” indicator light
15. “NEUTRAL” indicator light
16. Front flasher light (Left)
17. Auxiliary light
18. Headlight
19. Front flasher light (Right)
20. Handlebar switch (Right)
21. “START” switch
22. “LIGHTS” switch
23. “ENGINE STOP” switch
24. Front brake switch
25. “FUEL” (Reserve) switch
26. Speedometer
27. Reed switch
28. Meter light
29. Main switch
30. Ignitor unit
31. Thermo switch
32. Thermo unit
33. Fan motor
34. Ignition coil
35. Spark plug
36. Fuel sender
37. Rear brake switch
38. Starter relay
39. Starter motor
40. Battery
41. Main fuse
42. Fuse
43. Rear flasher light (Right)
44. Tail/Brake light
45. Rear flasher light (Left)
46. Neutral switch
47. Oil level switch
48. Rectifier/Regulator
49. A.C. Magneto generator
50. Pick up coil
51. Side stand switch
52. Fuel pump
53. Fuel pump control unit
54. Pressure sensor
55. Flasher relay unit
56. Starter circuit cut-off relay
57. Diode assembly
58. Horn

COLOR CODE

B	Black	G	Green	P	Pink	Y	Yellow	G/R	Green/Red	L/W	Blue/White	R/W	Red/White
Br	Brown	Gy	Gray	R	Red	B/R	Black/Red	G/Y	Green/Yellow	L/Y	Blue/Yellow	R/Y	Red/Yellow
Ch	Chocolate	L	Blue	Sb	Sky blue	B/Y	Black/Yellow	L/B	Blue/Black	R/B	Red/Black	W/G	White/Green
Dg	Darkgreen	O	Orange	W	White	Br/W	Brown/White	L/R	Blue/Red	R/G	Red/Green	Y/R	Yellow/Red