CONTENTS

WORKSHOP MANUAL FOR AV16/38/55/65

Part Number: 9789701001

CONTENTS

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of KUBOTA Generator AV Series. It is divided into two parts, "Mechanism" and "Disassembling and Servicing".

■ **Mechanism**

Information on the Features and New Mechanisms are described. This information should be understood before proceeding with troublehooting, disassembling and servicing.

■ **Disassembling and Servicing**

The heading "General" includes general precautions, check and maintenance and special tools. For each Engine and Generator section, there are troubleshooting, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes in all information at any time without notice.

Due to covering many models of this manual, illustration being used, have not been specified as one model.

December '89

CONTENTS

M. MECHANISM

S. DISASSEMBLING AND SERVICING

SPECIFICATIONS

	Model		AV1600		AV2500		AV3800	
Generator	AC	Frequency (Hz)	60	50	60	50	60	50
		Max. output (W)	1600	1400	2500	2100	3800	3200
		Rated output (W)	1400	1200	2200	1800	3300	2800
		Voltage (V)	Standard voltage of each country (See page 3, 4)					
		Amps (A)	Standard ampere of each country (See page 3, 4)					
		Power factor (%)	100					
	DC	Output (W)	120					
		Voltage / Amps (V/A)	12 / 10					
	Generating system		Rotating field type					
	Excitation		Self-excited type					
	Voltage compensation		Condenser Compensation				AVR	
	Insulation class		B					
	Over current protection		AC-circuit breaker, DC-circuit protector					
	No. of phase		Single					
Engine	Type		Air-cooled 4-cycle OHV gasoline engine					
	Model		GH120		GH170		GH250	
	Rated output / Revolution HP/rpm		2.8/3600		4.3/3600		6.0/3600	
	Displacement cc. (cu.in.)		121 (7.4)		169 (10.3)		247 (15.1)	
	Fuel tank capacity ℓ (gal)		14 (3.7)				18 (4.8)	
	Fuel type		Unleaded gasoline					
	Lubricating system		Splash Lubrication					
	Engine oil type		Class SE, SF (API) 10W-30, 10W-40 (5W-20, 5W-30 for cold weather)					
	Engine oil capacity	ℓ U.S. qts. Imp. qts.	0.55 0.58 0.484		0.6 0.63 0.528		0.9 0.95 0.792	
	Compression ratio		8		8.3		8.1	
	Spark plug		BPR6HS (NGK)					
Others	Total dry weight kg (lbs)		40 (88.2)		46 (101.43)		65 (143)	
	AC receptacles		Refer to "RECEPTACLE" column of the chart on page 3, 4					
	Pilot lamp		Std					
	Oil watch		Std					
	Noise elimination		Resistor plug					
	Auto idler		None				Std	
	Auto choke		None					
	Voltage meter		Std					
	Hour meter		None					

NOTE: The letter B in parenthes at the end of model number indicates the model is equipped with Electric starter and Recoil starter. Other models indicate Recoil starter only.

AV4500		AV5500-(B)		AV6500-(B)	
60	50	60	50	60	50
4500	3600	5500	4800	6500	5400
3700	3100	4800	4000	5400	4500
Standard voltage of each country (See page 3, 4)					
Standard ampere of each country (See page 3, 4)					
100					
120					
12 / 10					
Rotating field type					
Self-excited type					
AVR					
B					
AC-circuit breaker, DC-circuit protector					
Single					
Air-cooled 4-cycle OHV gasoline engine					
GH280		GH400			
6.6/3600		9.0/3600			
274 (16.7)		389 (23.7)			
18 (4.8)		20 (5.3)			
Unleaded gasoline					
Splash lubrication		Trochoid pump			
Class SE, SF (API) 10W–30, 10W–40 (5W–20, 5W–30 for cold weather)					
0.9 0.95 0.792		1.1 1.17 0.968			
8.1		8.5			
BPR6HS (NGK)		BPR4HS-10 (NGK)			
68 (150)		89 (196)		94 (207)	
Refer to "RECEPTACLE" column of the chart on page 3, 4					
Std					
Std					
Resistor plug					
Std					
None		Option			
Std		Std			
None		Option	None	Option	None

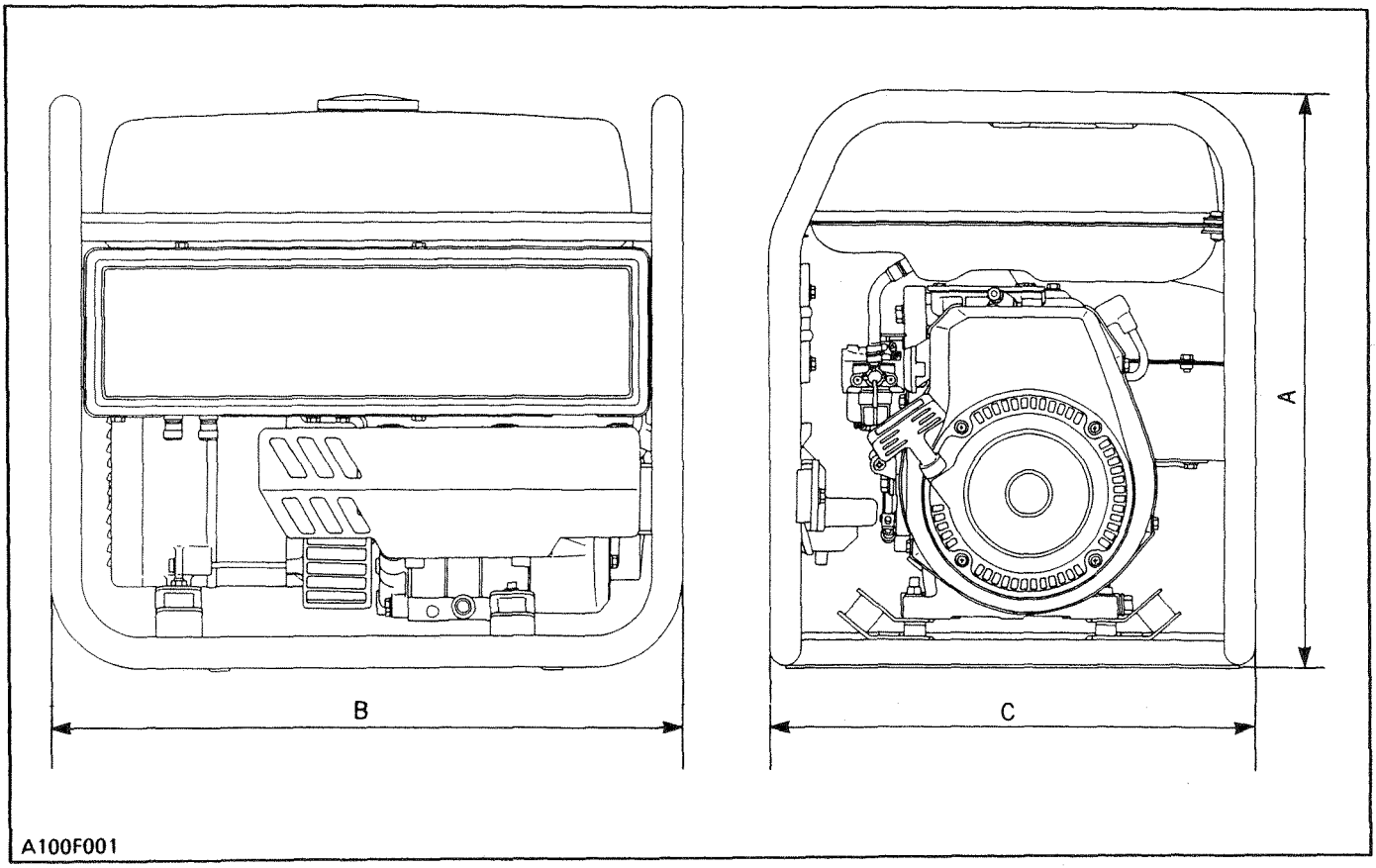
STANDARD VOLTAGE, AMPERE FREQUENCY AND RECEPTACLE OF EACH COUNTRY

COUNTRY	FREQUENCY	MODEL	VOLTAGE (V)	AMPERE (A)	RECEPTACLE
U.S.A.	60	AV1600	120	11.7	NEMA 5-15R x 2 pieces NEMA L5-20R
		AV2500		18.3	
		AV3800	120/240	27.5 / 13.8	NEMA 5-15R x 2 pieces NEMA L5-30R NEMA L14-20R
		AV4500		30.8 / 15.4	
		AV5500-(B)		40 / 20	
		AV6500-(B)		45 /22.5	NEMA 5-15R x 2 pieces NEMA L5-30R NEMA L14-30R
CANADA	60	AV1600	120	11.7	NEMA 5-15R x 2 pieces
		AV2500		18.3	NEMA L5-20R
		AV3800	120/240	27.5 / 13.8	NEMA 5-15R x 2 pieces NEMA L5-30R NEMA L14-30R
		AV4500		30.8 / 15.4	
		AV5500-(B)		40 / 20	
		AV6500-(B)		45 /22.5	
U.K.	50	AV1600	120/240	10 / 5	16 A – 120 V
		AV2500		15 / 7.5	16 A – 240 V
		AV3800		23.3 / 11.7	16 A – 120 V x 2 pieces
		AV4500		25.8 / 12.9	16 A – 240 V
		AV5500-(B)		33.3 / 16.7	16 A – 120 V 32 A – 120 V 16 A – 240 V
		AV6500-(B)		37.5 / 18.8	16 A – 240 V x 2 pieces 16 A – 120 V 32 A – 120 V
AUSTRALIA	50	AV1600	240	5	15 A x 2 pieces
		AV2500		7.5	
		AV3800		11.7	
		AV4500		12.9	
		AV5500-(B)		16.7	
		AV6500-(B)		18.8	
PHILIPPINES	60	AV1600	220	6.4	*
		AV2500		10	
		AV3800		15	*
		AV4500		16.8	
		AV5500-(B)		21.8	*
		AV6500-(B)		24.5	
SOUTH ASIA	50	AV1600	220	5.5	*
		AV2500		8.2	
		AV3800		12.7	*
		AV4500		14.1	
		AV5500-(B)		18.2	*
		AV6500-(B)		20.5	

COUNTRY	FREQUENCY	MODEL	VOLTAGE (V)	AMPERE (A)	RECEPTACLE
SAUDI ARABIA	60	AV1600	127 / 220	11 / 6.4	*
		AV2500		17.3 / 10	
		AV3800		28.2 / 15	*
		AV4500		29.1 / 16.8	
		AV5500-(B)		37.8 / 21.8	*
		AV6500-(B)		42.5 / 24.5	
MIDDLE NEAR EAST COUNTRIES	50	AV1600	220	5.5	*
		AV2500		8.2	
		AV3800		12.7	*
		AV4500		14.1	
		AV5500-(B)		18.2	*
		AV6500-(B)		20.5	
SOUTH AFRICA	50	AV1600	220	5.5	*
		AV2500		8.2	
		AV3800		12.7	*
		AV4500		14.1	
		AV5500-(B)		18.2	*
		AV6500-(B)		20.5	
SWEDEN	50	AV1600	220	5.5	*
		AV2500		8.2	
		AV3800		12.7	*
		AV4500		14.1	
		AV5500-(B)		18.2	*
		AV6500-(B)		20.5	

NOTE : * A value is not fixed yet.

DIMENSIONS



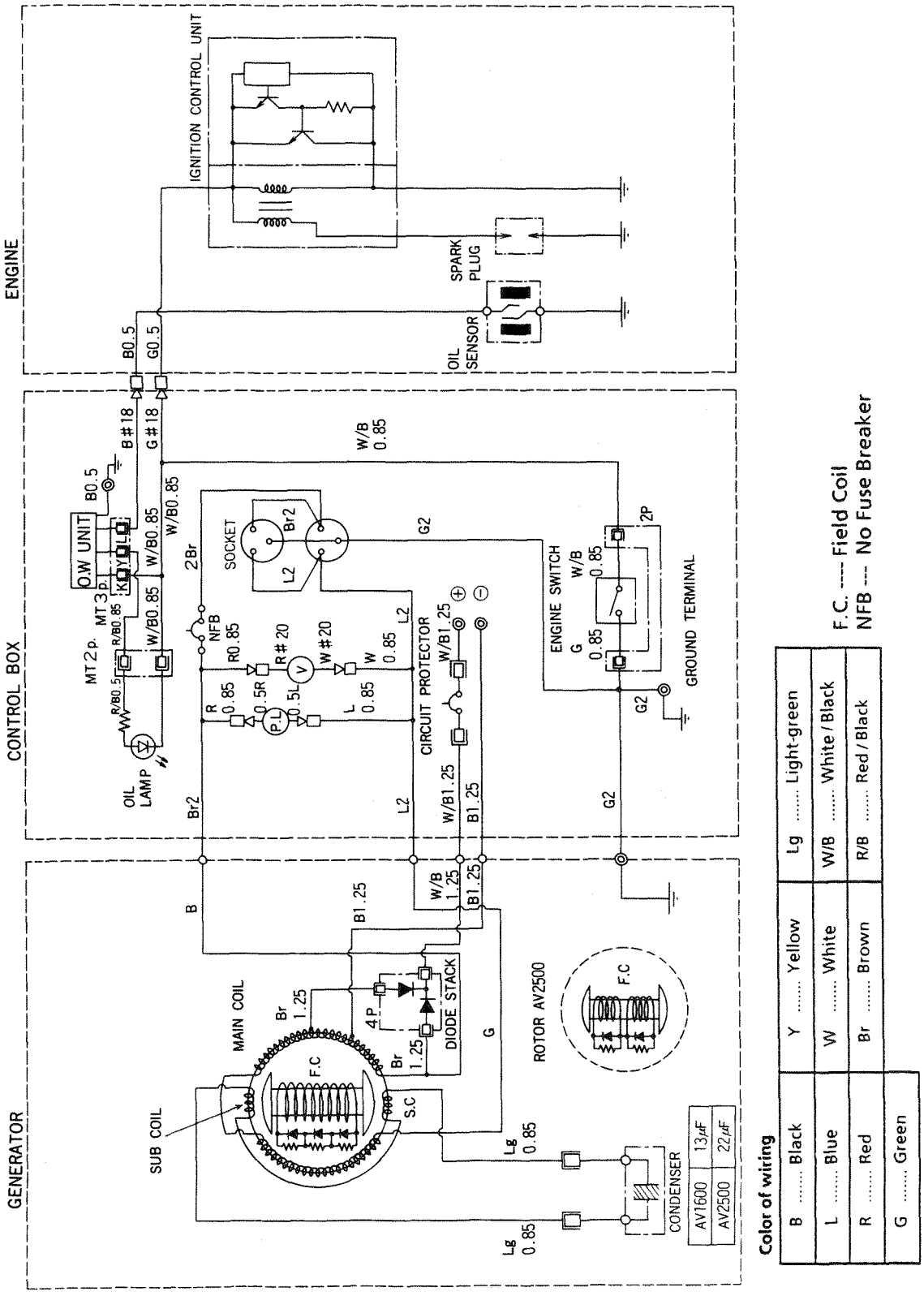
A100F001

Unit : mm (in.)

Model	A	B	C
AV1600	490 (19.29)	540 (21.26)	415 (16.34)
AV2500	490 (19.29)	540 (21.26)	415 (16.34)
AV3800	553 (21.77)	595 (23.43)	440 (17.32)
AV4500	553 (21.77)	595 (23.43)	440 (17.32)
AV5500-(B)	598 (23.54)	695 (23.36)	470 (18.50)
AV6500-(B)	598 (23.54)	695 (23.36)	470 (18.50)

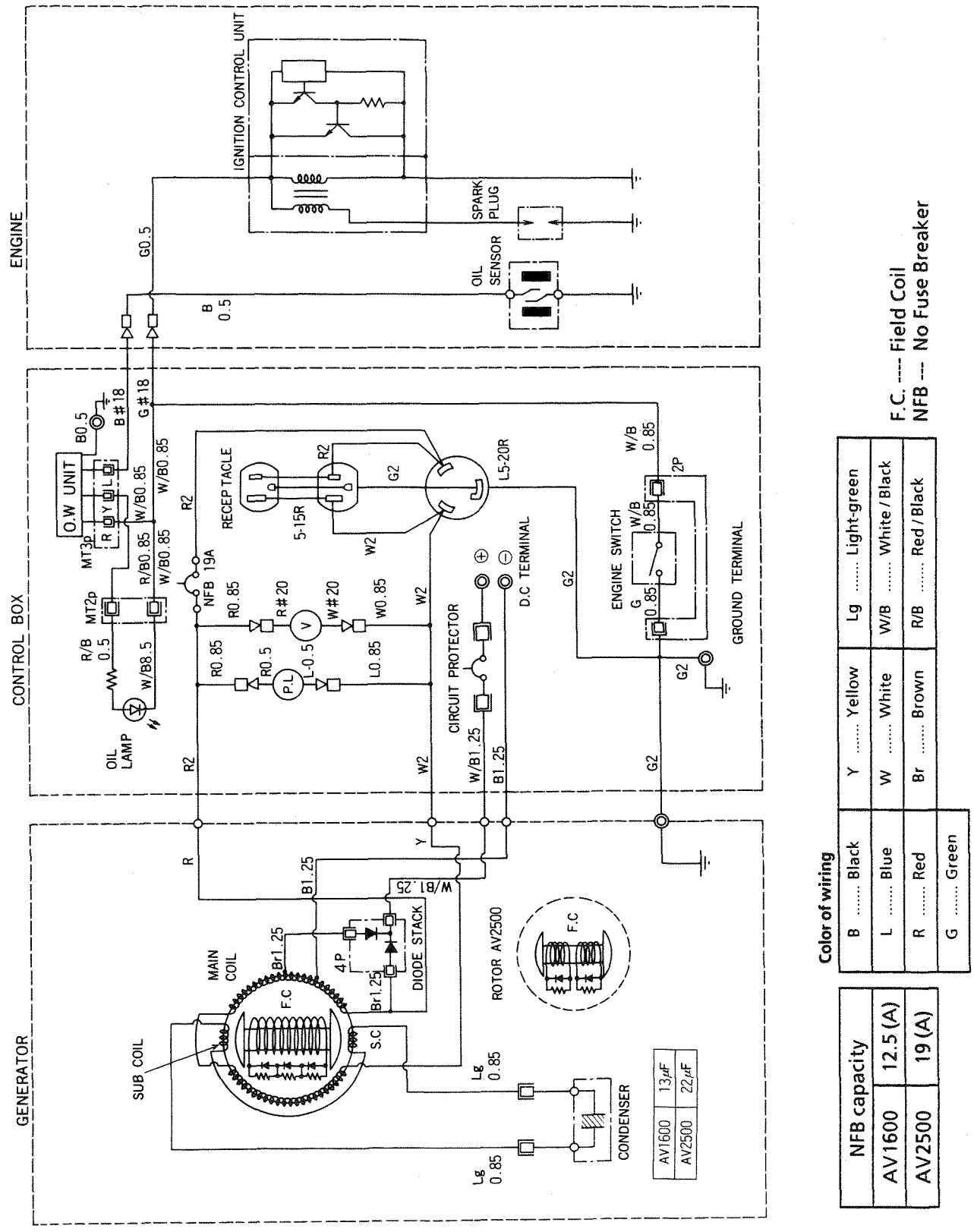
WIRING DIAGRAM

FOR GENERAL, AV1600·AV2500 SINGLE VOLTAGE TYPE



A100F002

FOR USA, AV1600-AV2500 SINGLE VOLTAGE TYPE



F.C. ---- Field Coil
NFB --- No Fuse Breaker

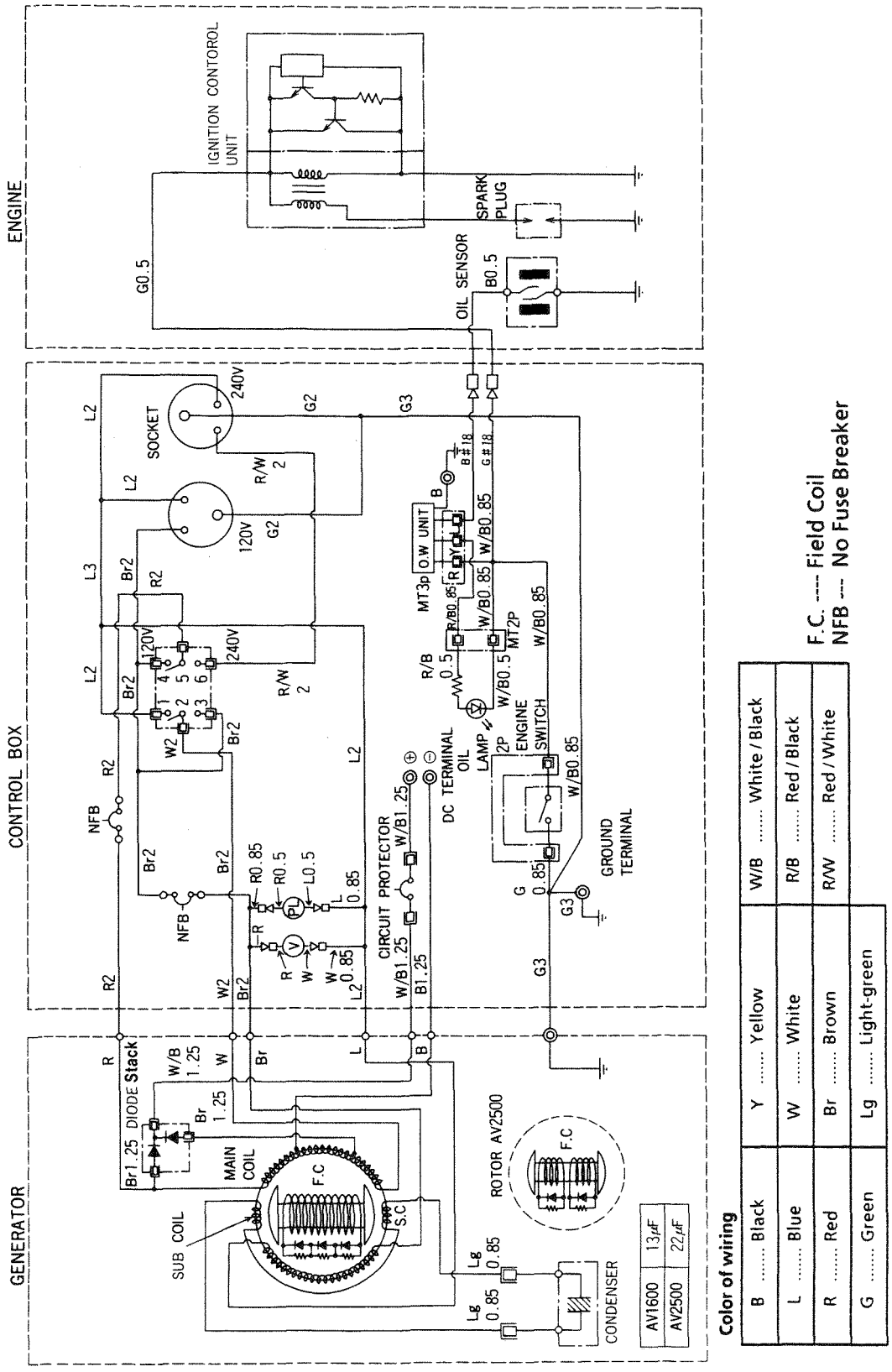
Color of wiring

B	Black	Y	Yellow	Lg	Light-green
L	Blue	W	White	W/B	White / Black
R	Red	Br	Brown	R/B	Red / Black
G	Green				

NFB capacity	
AV1600	12.5 (A)
AV2500	19 (A)

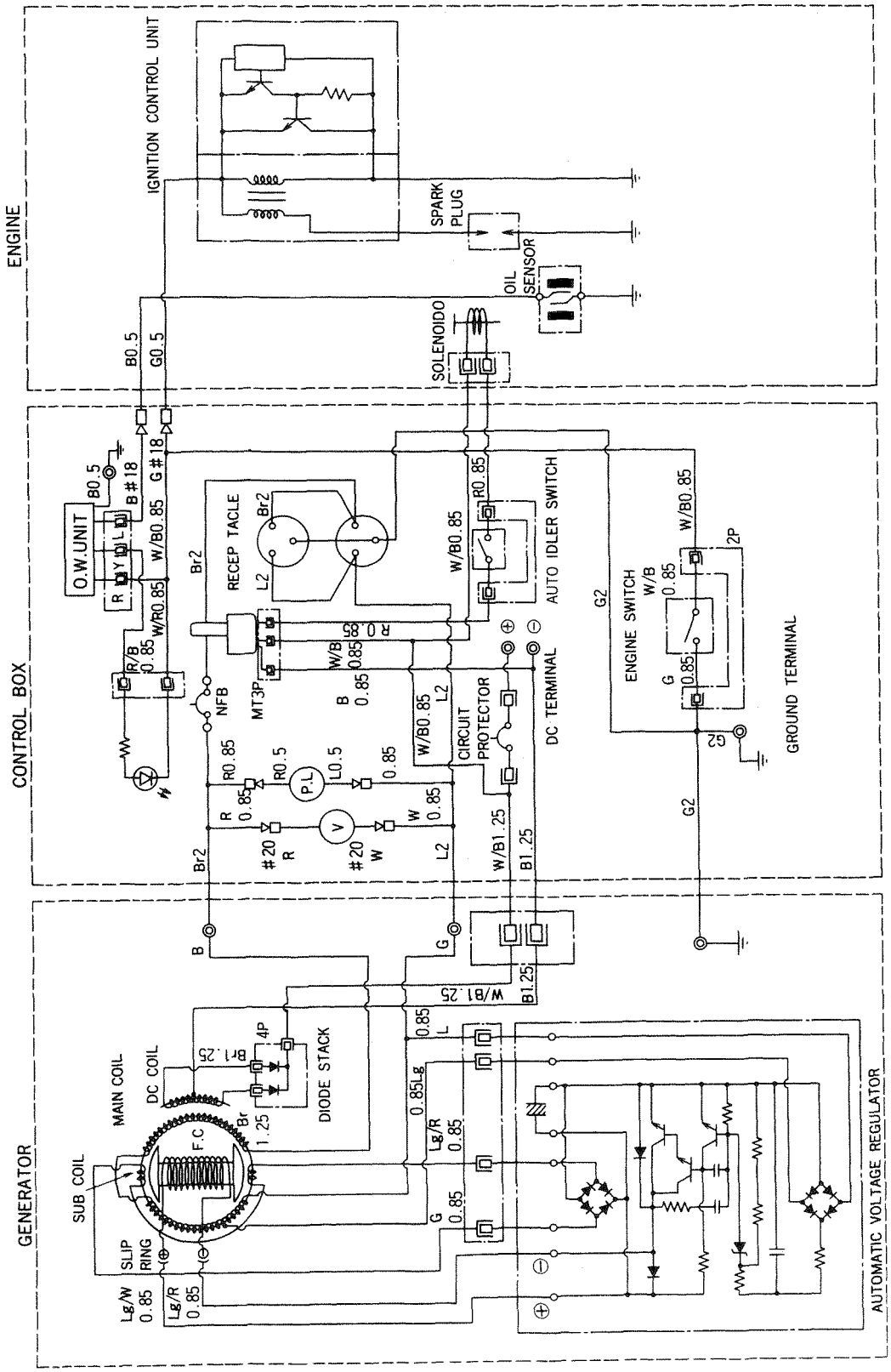
A100F003

FOR GENERAL, AV1600-AV2500 DUAL VOLTAGE TYPE



A100F004

FOR GENERAL, AV3800·AV4500 SINGLE VOLTAGE TYPE



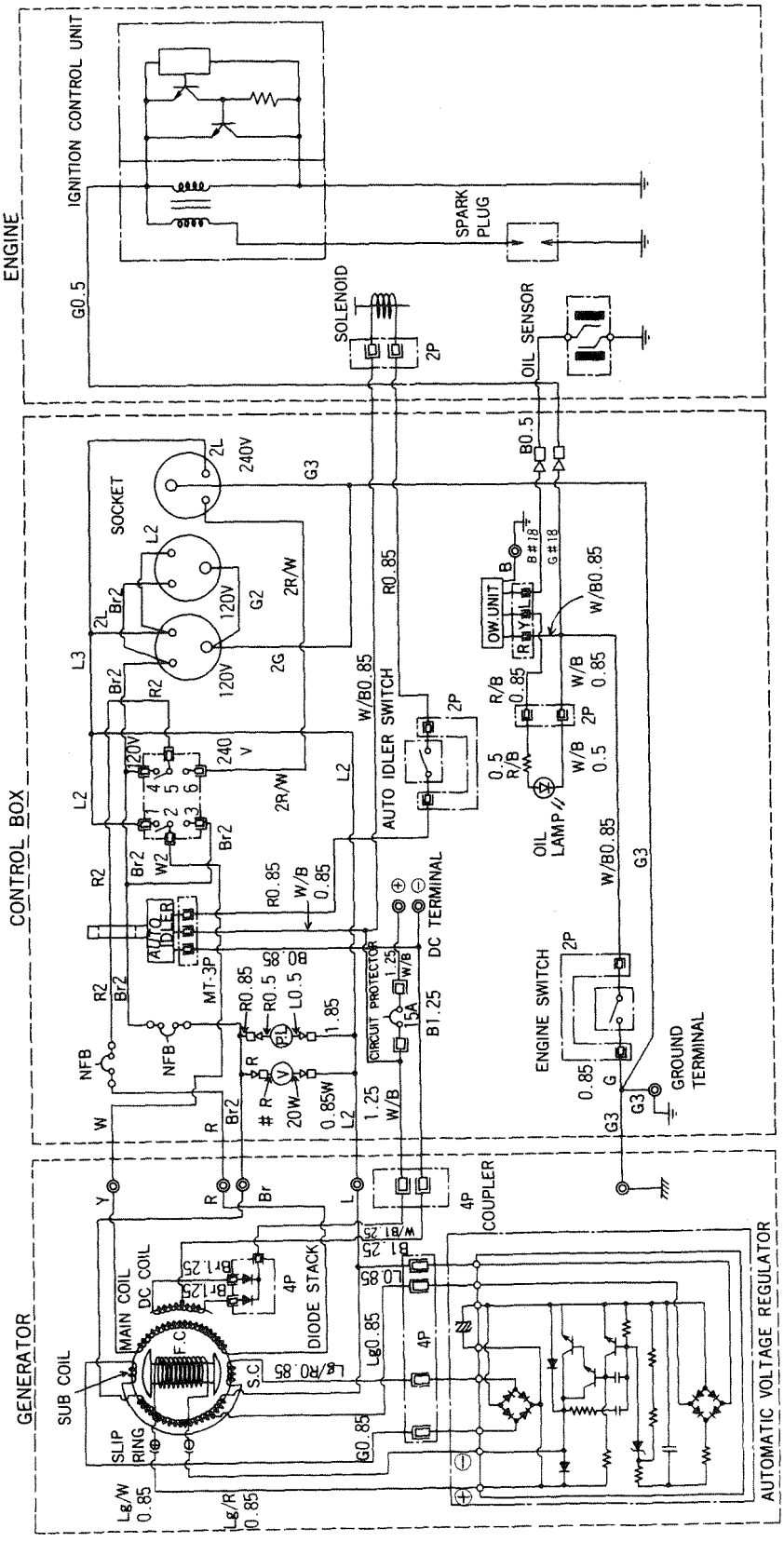
F.C. ---- Field Coil
NFB --- No Fuse Breaker

Color of wiring

B ..... Black	Y ..... Yellow	W/B ..... White / Black
L ..... Blue	W ..... White	R/B ..... Red / Black
R ..... Red	Br ..... Brown	Lg/R ..... Light-green / Red
G ..... Green	Lg ..... Light-green	Lg/W ..... Light-green / White

A100F005

FOR GENERAL, AV3800-AV4500 DUAL VOLTAGE TYPE

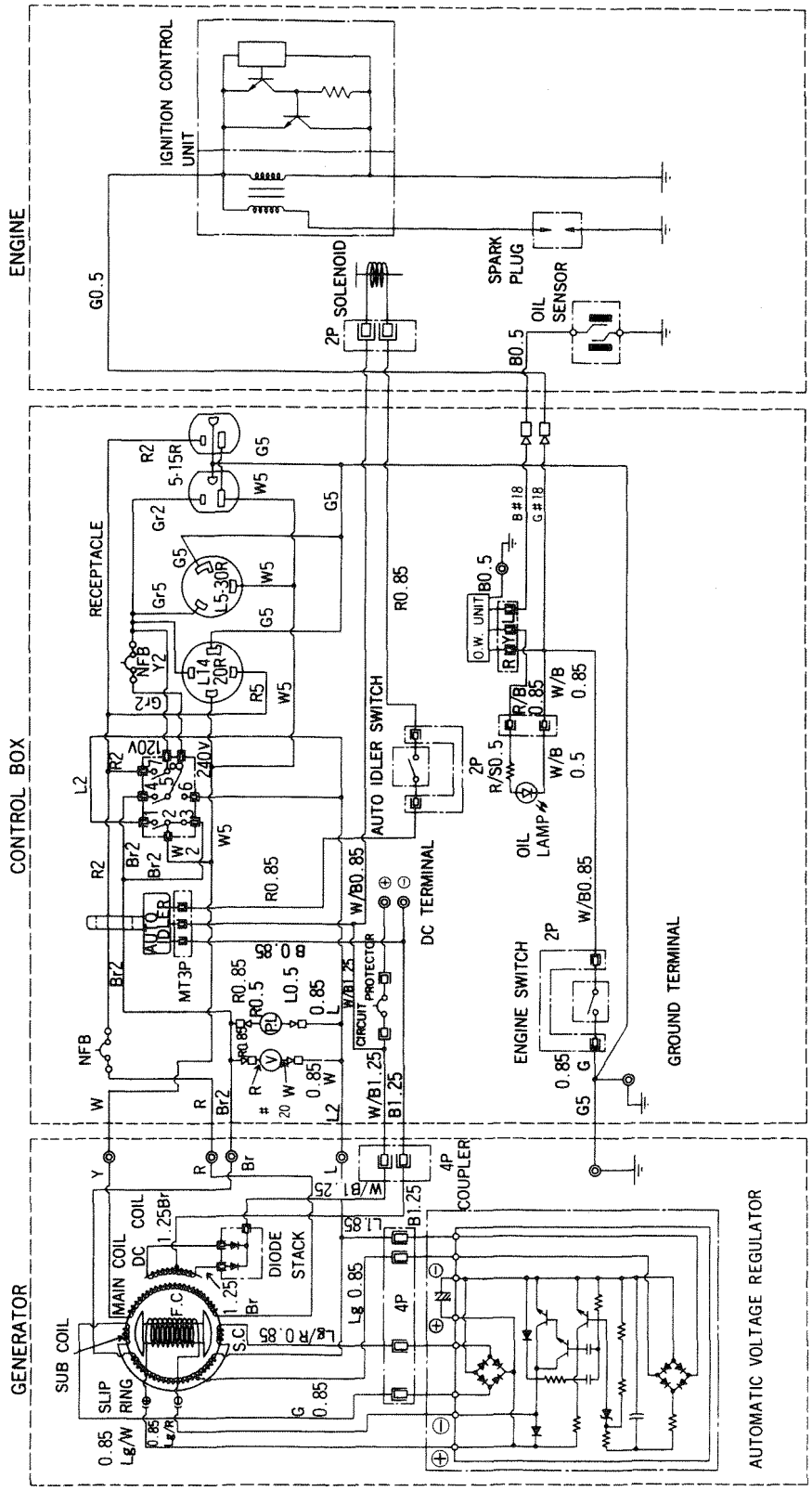


Color of wiring

B ..... Black	W ..... White	R/B ..... Red / Black	
L ..... Blue	Br ..... Brown	Lg/R ..... Light-green / Red	
R ..... Red	Lg ..... Light-green	Lg/W ..... Light-green / White	
G ..... Green	W/B ..... White / Black	R/W ..... Red / White	
Y ..... Yellow			

A100F006

FOR USA, AV3800·AV4500 DUAL VOLTAGE TYPE



Color of wiring

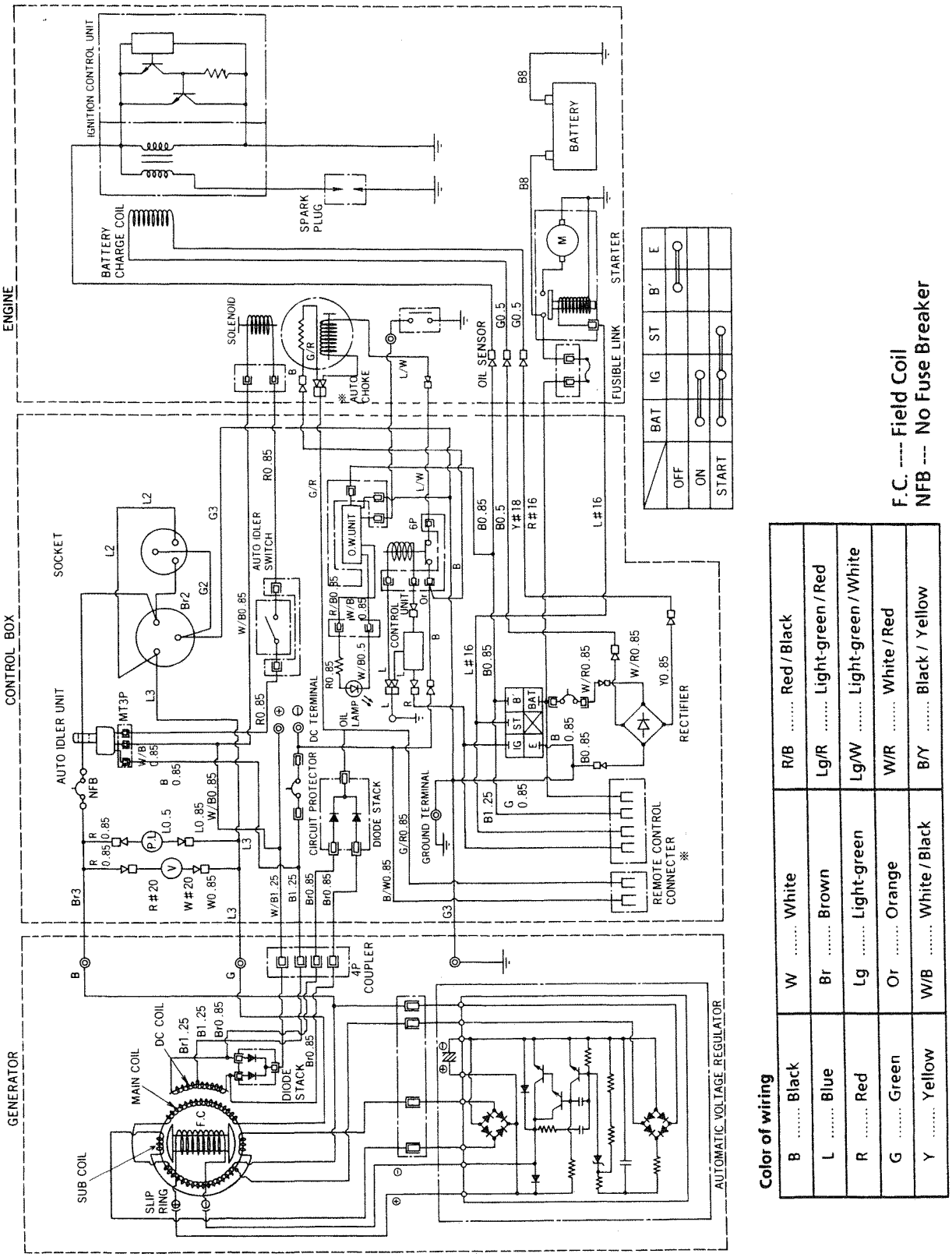
B ..... Black	Y ..... Yellow	W/B ..... White / Black
L ..... Blue	W ..... White	R/B ..... Red / Black
R ..... Red	Br ..... Brown	Lg/R ..... Light-green / Red
G ..... Green	Lg ..... Light-green	Lg/W ..... Light-green / White
Gr ..... Grey		

NFB capacity	
AV3800	14.5 (A)
AV4500	16.5 (A)

A100F007

FOR GENERAL, AV5500-B·AV6500-B SINGLE VOLTAGE TYPE

* Indicates optional automatic choke and remote start.



F.C. ---- Field Coil
NFB --- No Fuse Breaker

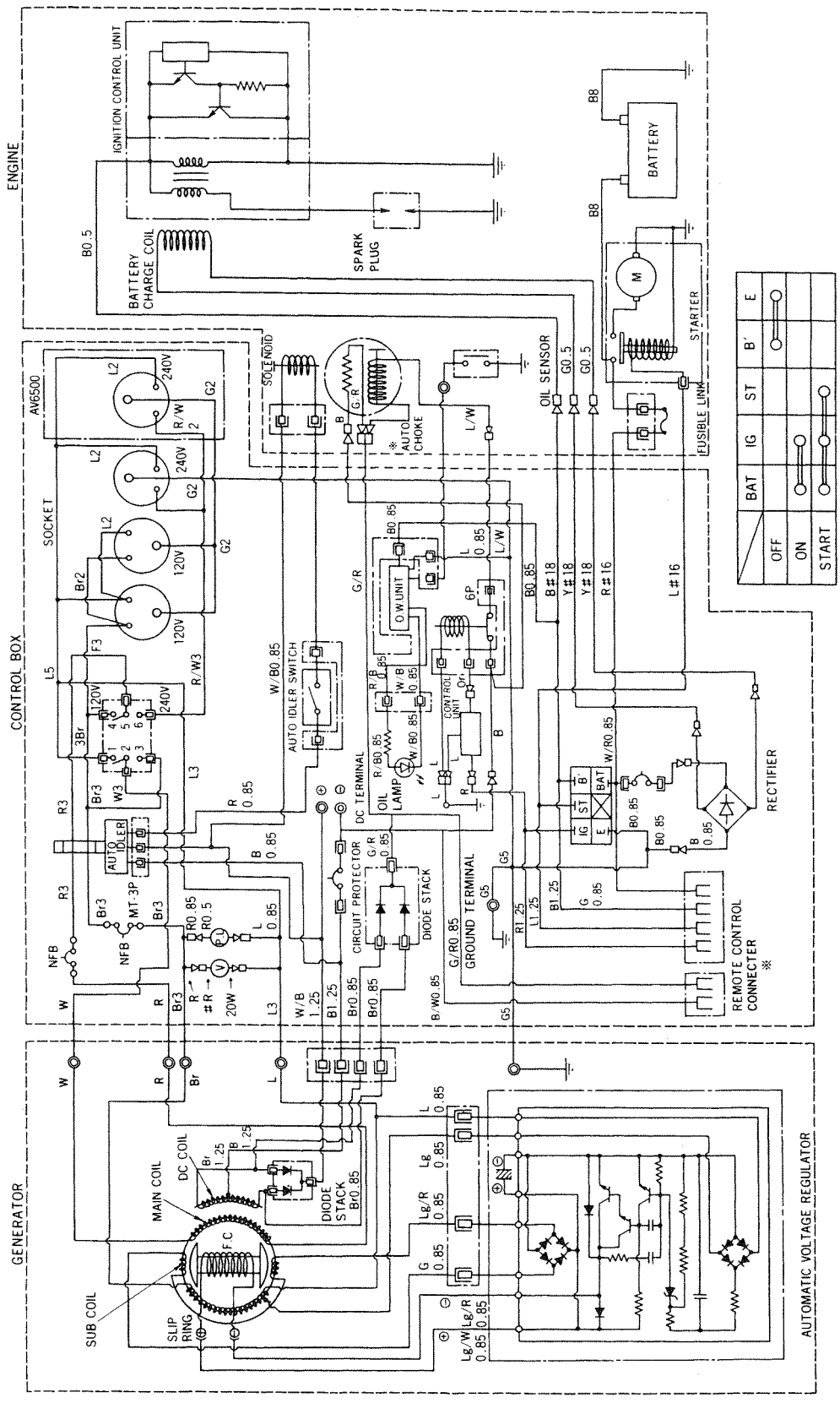
Color of wiring

B ..... Black	W ..... White	R/B ..... Red / Black	
L ..... Blue	Br ..... Brown	Lg/R ..... Light-green / Red	
R ..... Red	Lg ..... Light-green	Lg/W ..... Light-green / White	
G ..... Green	Or ..... Orange	W/R ..... White / Red	
Y ..... Yellow	W/B ..... White / Black	B/Y ..... Black / Yellow	

A100F008

FOR GENERAL, AV5500-B·AV6500-B DUAL VOLTAGE TYPE

* Indicates optional automatic choke and remote start.



F.C. ---- Field Coil
NFB --- No Fuse Breaker

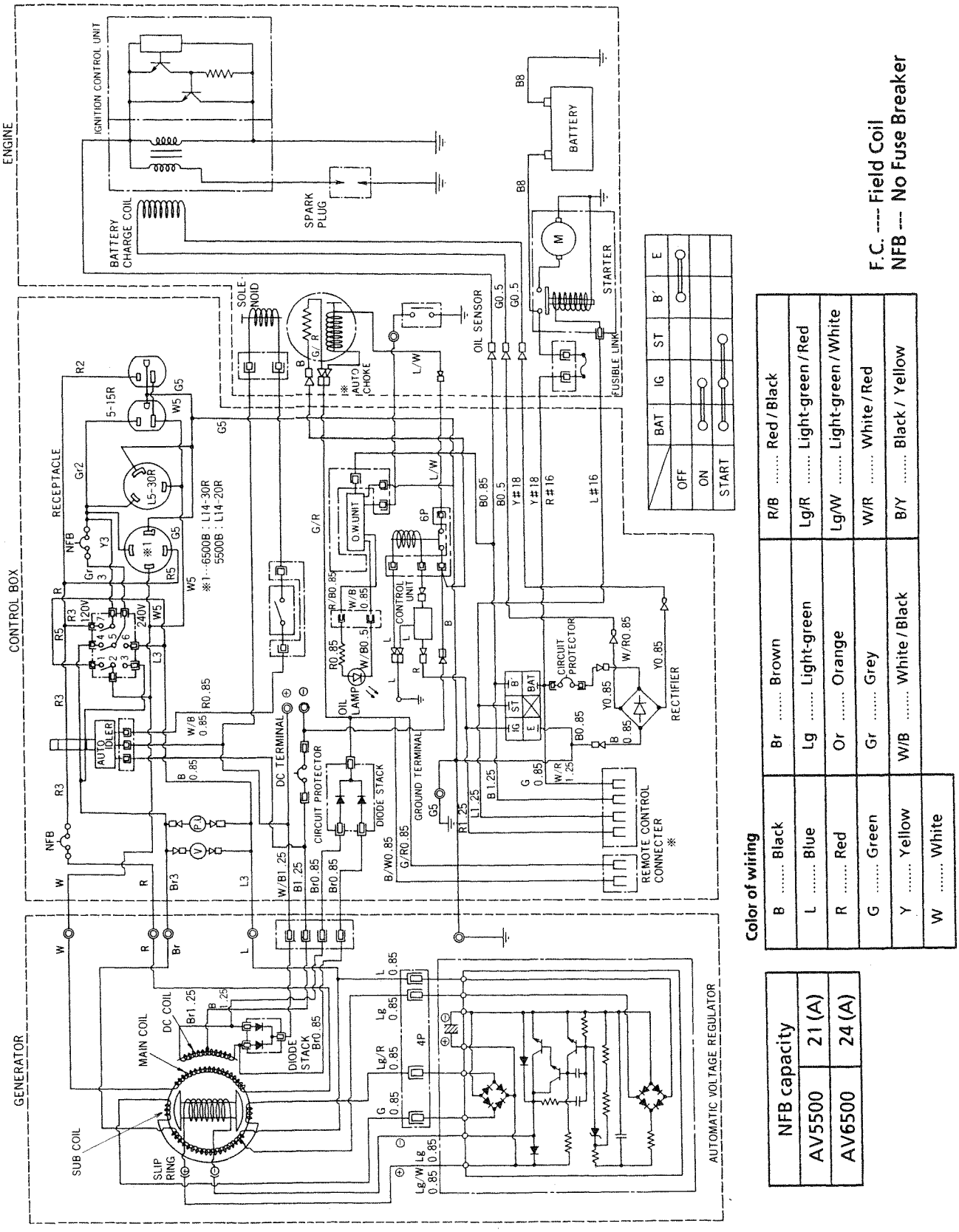
Color of wiring

B ..... Black	Br ..... Brown	Lg/R ..... Light-green / Red
L ..... Blue	Lg ..... Light-green	Lg/W ..... Light-green / White
R ..... Red	Or ..... Orange	W/R ..... White / Red
G ..... Green	W/B ..... White / Black	R/W ..... Red / White
Y ..... Yellow	R/B ..... Red / Black	B/Y ..... Black / Yellow
W ..... White		

A100F009

FOR USA, AV5500-B·AV6500-B DUAL VOLTAGE TYPE

* Indicates optional automatic choke and remote start.



Color of wiring

B	Black	Br	Brown	R/B	Red / Black		
L	Blue	Lg	Light-green	Lg/R	Light-green / Red		
R	Red	Or	Orange	Lg/W	Light-green / White		
G	Green	Gr	Grey	W/R	White / Red		
Y	Yellow	W/B	White / Black	B/Y	Black / Yellow		
W	White						

NFB capacity	
AV5500	21 (A)
AV6500	24 (A)

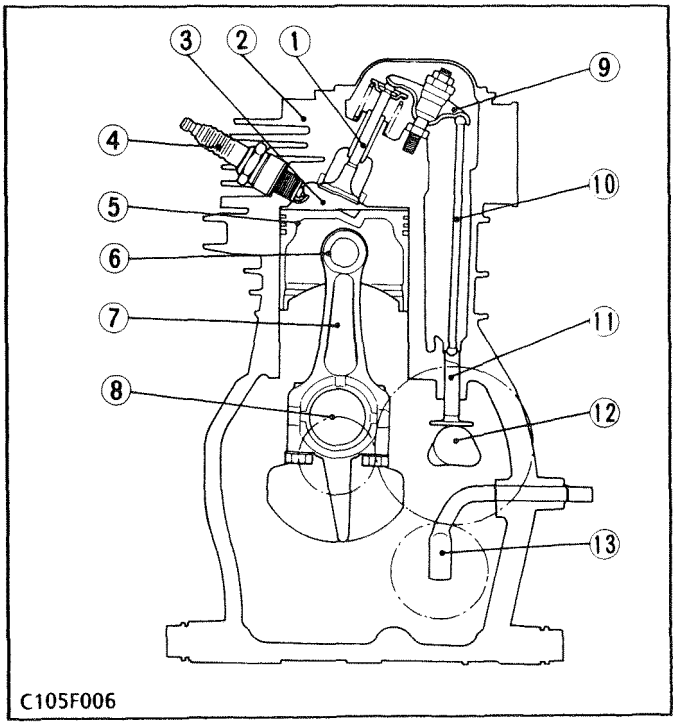
A100F010

M.MECHANISM

F FEATURE

[1] ENGINE BODY

(1) Cross Section



C105F006

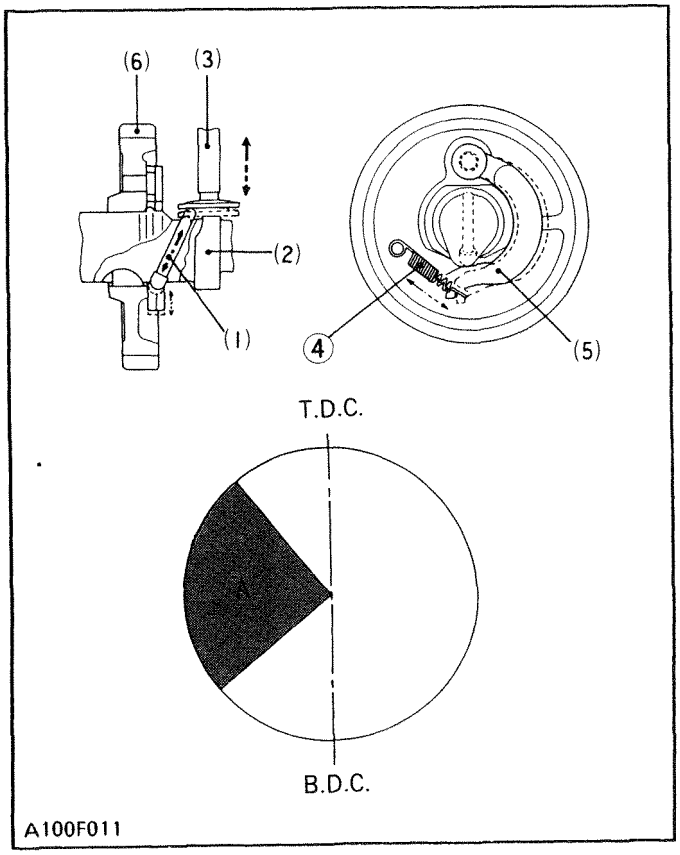
This engine is an OHV type vertical air-cooled, 4 cycle, single cylinder gasoline engine with horizontal shaft. The OHV (Over Head Valve) type refers to one in which the intake and exhaust valve are located directly above the piston.

It is somewhat more complicated in construction than the conventional SV (Side Valve) type in that a push rod, rocker arm, etc. are required, but it is more advantageous in performance, as described below.

1. High output and low fuel consumption.
2. Low vibration and low noise.
3. Lightweight, and compact.

(1) Valve
(2) Cylinder Head
(3) Combustion Chamber
(4) Spark Plug
(5) Piston
(6) Piston Pin
(7) Connecting Rod
(8) Crankshaft
(9) Rocker Arm
(10) Push Rod
(11) Tappet
(12) Camshaft
(13) Governor Lever Shaft

(2) Mechanical Decompression System



A100F011

A mechanical decompression system is provided so that the recoil rope can be pulled with a small effort at engine start up.

This system is such that a decompression pin (1) mounted on the camshaft (2) moves the tappet up at engine startup before the piston reaches the top dead center of compression whereby to open the exhaust valve momentarily [A] for engine decompression.

■ **At engine start (←)**

1. Flyweight (5) being pulled by spring (4) pushes the decompression pin (1).
2. The decompression pin pushes up and opens the exhaust valve momentarily. This reduces the effort required to pull the recoil rope.

■ **At engine running (◄···)**

1. As the engines starts and run faster, the flyweight (5) pushing the decompression pin (1) is forced outward by centrifugal force and the decompression pin moves down.
   As a result, the exhaust valve is restored to the specified timing.

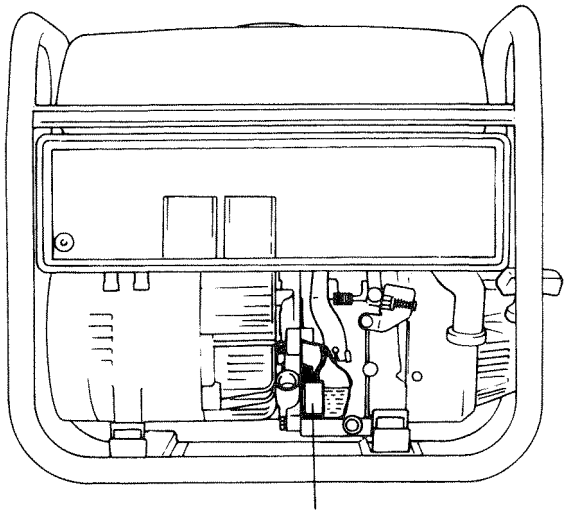
(1) Decompression Pin
(2) Camshaft
(3) Tappet
(4) Spring
(5) Flyweight
(6) Cam Gear

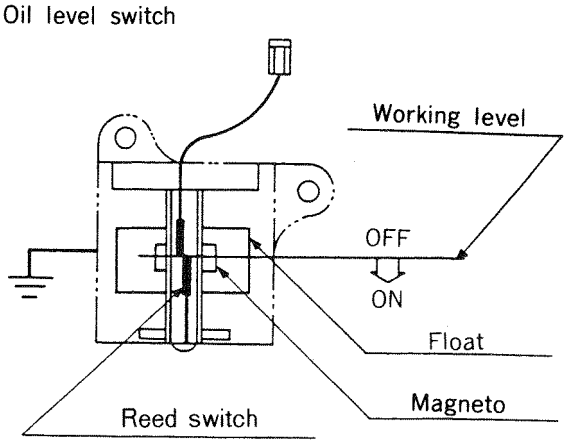
[2] OIL WATCHING SYSTEM

When the engine oil level drops below the specified level, the oil watching system makes the lamp light up to signal lack of oil and also stop the engine immediately to protect the engine.

- GH400 model provides a forced lubricating system so oil level is detected by oil pressure sensor.

1. The oil level switch has a reed switch in the center surrounded with a float which moves up and down as the oil level rises and falls. A permanent magnet insert is embedded in the float. When the oil level is equal to or above the specified level, the magnetic force of the permanent magnet insert magnetizes the contact points of the reed switch and opens the switch.
2. When the oil level falls below the specified level, the contact points differ in polarity and close the switch. As the reed switch closes, the control unit, grounds the ignition primary coil, thus stopping the engine.

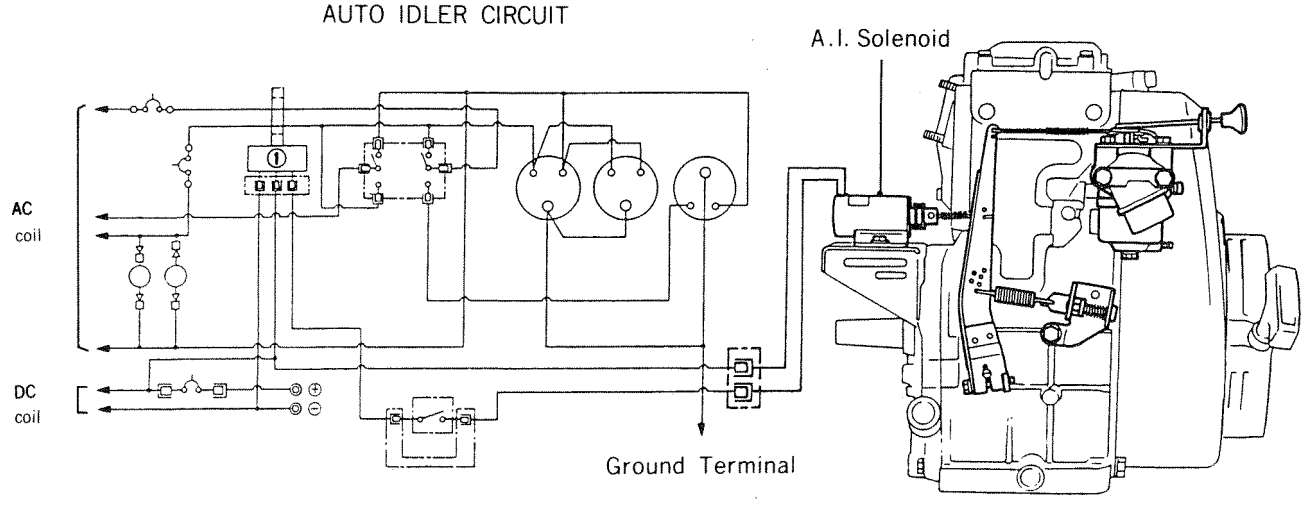




A100F012

[3] AUTO IDLER SYSTEM

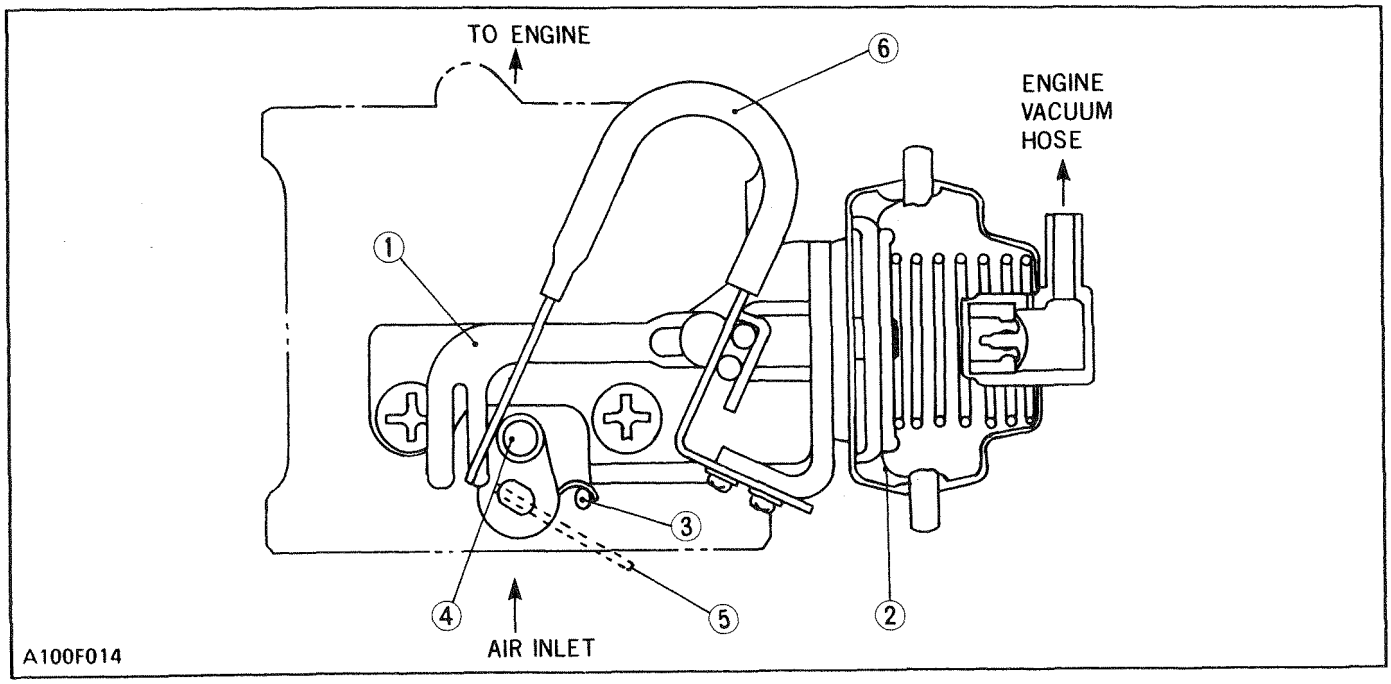
The auto idler unit (1) detects no load current on the generator and operates a solenoid to decrease engine speed, fuel consumption and noise emition. When a load is defected, the A.I. unit releases the solenoid and allows the engine to operate at governed rpm.
AV3800·4500·5500·6500 models are equipped with an auto-idler system.



A100F013

[4] AUTO CHOKE

- **Before starting**
  The engine is stopped, so there is no negative pressure in the diaphragm chamber. Because of this, the plate (1) linked with the diaphragm (2) is pushed to the left by the force of the spring (3), so it does not touch the choke lever pin (4). The tip of the bimetal strip is positioned so that it is in contact with the choke lever pin at ambient temperature. This arrangement ensures that the choke is held open by an appropriate amount according to the temperature characteristics of the bimetal strip.
- **Immediately after starting**
  The negative pressure in the inlet manifold pulls the diaphragm and plate to the right, also pulling the choke lever pin to the right and holding the choke valve (5) half open. The plates movement is larger than the initial movement of the bimetal strip, so the choke lever pin and bimetal strip are no longer in contact.
- **Running**
  After running for a certain period, the heat from the current passing through the heater wires (6) moves the bimetal strip. The bimetal strip has a larger range of movement than the plate, so it pulls the choke lever pin further to the right, resulting in the choke becoming fully open.
- **Stopping**
  When the engine stops, the negative pressure disappears, so the diaphragm and plate are pushed back to the left under the force of the spring, moving them out of the path of the choke lever. The power from the generator to the heater wires also stops, so the bimetal strip cools, slowly moving to the left. As a result, the choke valve is returned to its original closed position by the return spring on the lever.



(1) Plate (Actuating Plate)
(2) Diaphragm
(3) Spring (Choke Return Spring)
(4) Choke Lever Pin
(5) Choke Valve
(6) Heater Wires

S.DISASSEMBLING AND SERVICING