WINCO®

WG 225 WELDER/GENERATOR
INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS

INDEX

ILLUSTRATIONS

GENERAL INFORMATION

This manual is designed to provide operation and maintenance instruction for the WINCO WG-225 welder/generator. Unless otherwise indicated, it covers only the generator and control, not the engine. A separate operator's manual should be consulted for information concerning engine care and operation.

Before generators are shipped from the factory, they are loaded to full capacity, and the voltage, current, and frequency are carefully checked. A test card with each unit's serial number and pertinent data has been filed at the factory. The rated output of the generator is based on factory tests of sample units, and is subject to, and limited by, the temperature, altitude, fuel, and other conditions specified by the manufacturer of the applicable engines.

The engine used in the weider generator is built by a highly reputable manufacturer and world-wide engine service is available. Contact your WINCO dealer for the nearest authorized engin service dealer.

DEFINITIONS AND SYMBOLS

Notes, Cautions, and Warning are used throughout this manual with the following definitions and symbols.

NOTE: Notes indicate an area or subject of special merit, emphasiszing either the product's capabilities or common errors in operation or maintenance.

CAUTION — Possible damage to equipment

Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the equipment.

▲ WARNING: Parsonal danger
▲▲▲ Warning notes indicate any condition or practice, which if not strictly observed
▲▲▲▲▲ could result in personal injury or possible death.

CAUTION AND SAFETY PROCEDURES

Despite the safe design of this welder/generator, operating it imprudently, neglecting its maintenance, or being careless with it can cause serious injury
▲▲▲▲▲ or death. The generator is powerful enough to deliver a fatal electric shock. The following safety information should be read carefully and the suggested precautions implemented.

Ignorance or careless behavior can result in serious injury. Only responsible, trained individuals, alert to all possible, should operate and maintain this machine.

Be sure the welding work cable is connected to the work as close to the welding area as practical. Work cables connected to the building framework or other locations some distance frome the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

Normal safety precautions must always be employed. Avoid hazardous welding positions and keep all equipment safety guards, covers and devices in place and in good repair. Keep hands, hair, clothing and tools away from moving parts when starting, operation or repairing this equipment. Protect yourself from pieces of molten slag and metal which are constantly falling from the welding arc. Wear oil free protective garments such as leather gloves, a heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses when in a welding area. Use glasses with side shields when near slag chipping operations.

ELECTRIC SHOCK PRECAUTIONS

This generator produces voltages capable of causing a lethal shock.

NEVER •touch live terminals or receptacles. •make or break electrical receptacle connections under load.

ALWAYS •use only grounded receptacles and extension cords of adequate wire gauge to handle the electrical loads. •ground the work table through an external ground rod. •properly ground the welder/generator. •insulate yourself from the work and ground with dry insulation. •follow welding safety precautions(ANSI Standard Z49.1).

ARC RAY PROTECTION

Severe eye and skin injuries may occur if these areas are not shielded from the arc rays.

NEVER •allow nearby personnel to watch the arc or expose themselves to the arc rays, hot weld spatter or hot weldments.

ALWAYS •use a welding shield or mask with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. •use clothing made from durable, flame-resistant material to protect your skin from the arc rays. •provide protection for any assistants. •use welding mask filter lens that conform to ANSI Z87.1 standards.

WELDING FUME SAFEGUARDS

Vapors and gases from welding can be poisonous.

NEVER •breathe fumes and gases produced from welding. •weld in location near hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The head and rays of the arc can react with solvent vapors to from phosgens, a highly toxic gas, or other irritating products.

ALWAYS •use enough ventilation and/or exhaust at the arc to keep fumes and gases from the breathing zone. •use extreme care when welding galvanized, lead or cadmium plated steel and other metals which produce toxic fumes when welded.

EXPLOSION AND FIRE PREVENTION

Property damage, injury, and even death from fire and explosion are preventable.

NEVER •store bulk fuel near the welder/generator. Gasoline and other fuel vapors in the air in and around the engine welder could cause an explosion. •heat, cut or weld tanks, drums or containers until properly prepared to eliminate any flammable or toxic vapors from substances inside. These can cause an explosion even though they have been "cleaned." For additional information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping that Have Held Hazardous Substances", AWS F4.1-80 from the American Welding Society, Miami, Florida 33135.

ALWAYS •keep fire hazards well away from the engine or welding area. If this is not possi ble, cover hazards in the welding area to prevent the welding sparks from starting a fire. •confine welding sparks to prevent them from going through small cracks and opening into adjacent areas. •use special precautions when compressed gases are to be used at the job site. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating manuals for the equipment being used. •vent hollow causings or containers before heating, cutting or welding to prevent an explosin. •keep a fire extinguisher rated ABC by the NFPA readily available. (Questions concerning the extiguisher rating can be answered by your local fire department.) •keep the extinguisher properly maintained and know how to use it.

ENGINE SAFETY

Special safety precautions must be taken while troubleshooting, or operating the engine.

NEVER ●add fuel near an open flame or when the engine is running!! The engine must be stopped and allowed to cool. ●spill fuel when filling tank. If fuel is spilled, wipe it up PROMPTLY to prevent it from igniting on contact with hot engine parts or electrical sparks. ●restart the engine until after all fumes have been eliminated.

ALWAYS ●turn the engine off before troubleshooting and maintenance work unless the maintenance work ABSOLUTELY requires it to be running. ●provide adequate ventilation for the engine exhaust gases. Operate ALL internal combustion engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

REGULAR MAINTENANCE

Only qualified electrical technicians should maintain and service this generator. They should perform regularly scheduled service checks and repair defects in cables and the welder/generator immediately with factory approved repair parts.

PRODUCT DESCRIPTION

SPECIFICATIONS

The following specifications apply to the WG225

ENGINE

Manufacturer·····Kawasaki Heavy Industries, LTD.
Model·····KF150D-SX(1 cylinder)
Displacement·····35.45 CID(581 cc)
Lube Oil Capacity·····2.2 quarts of HD diesel grade
Fuel Consumption·····0.7 gallons/hour

WELDER

Rated Output·····5,200 watts(5.2 KW)
Rated Voltage·····26 volts DC
Rated Current·····200 amps DC
No Load Voltage·····72 volts DC
Current Range·····60 to 225 amps
Duty Cycle(see below) ·····60%
Welding Rod Diameter·····3/32" to 1/4"

GENERATOR

Rated Output·····5,000 watts (5 KW)
Rated Voltage·····120/240 volts
Rated Current·····41.7/20.8 amps
Phase/P.F./Hertz·····1/1.0/60 Hz

DUTY CYCLE

The duty cycle implies a load time of 10 minutes in percentage. For example, a duty cycle of 50% represents five minutes of loading (welding) and five minutes of no-load operation (not welding). The welder is rated at a 60% duty cycle at 200 amps. However, the duty cycle depends upon the welding current. Select the appropriate duty cycle from the table below to prevent overload.

Welder Current	Duty Cycle %		
	100%	80%	60%
Below 100 Amps	X		
Up to 150 Amps		X	
Up to 200 Amps			X

DESCRIPTION AND FEATURES

This multi-purpose generator set is designed for DC welding and AC electrical loads on construction sites, farms, factories, and recreation areas. **Where electrical power is unavailable or** inconvenient, selfcontained WINCO DC/AC welder/generator will provide your repair, maintenance, and power needs. Typical applications are welding repair and construction, temporary lighting and power for small hand tools.

The nominal DC are voltage is 26 volts DC.

The AC generator voltage is maintained at ± 2 1/2 % no load to full reted load by an automatic voltage regulator. No harm to the welder/generator results if it is run with no load connected.

PREPARATION AND OPERATION

UNPACKING

Carefully remove the packing crate. Inspect the set promptly after receiving it. Check to ensure that the entire unit has been delivered and examine the set for damage. Keep all packing materials on hand until you are completely satisfied that the welder/generator has been delivered in good condition. This unit was in good order when it was shipped so if damage is found, notify the transportation company immediately. Ask them to write a description of the damage on the freight bill so that a claim can be filed if necessary.

Carefully read the entire instruction manual before proceding with the initial start up. Failure to read and follow the instructions could lead to equipment damage or personal injury!

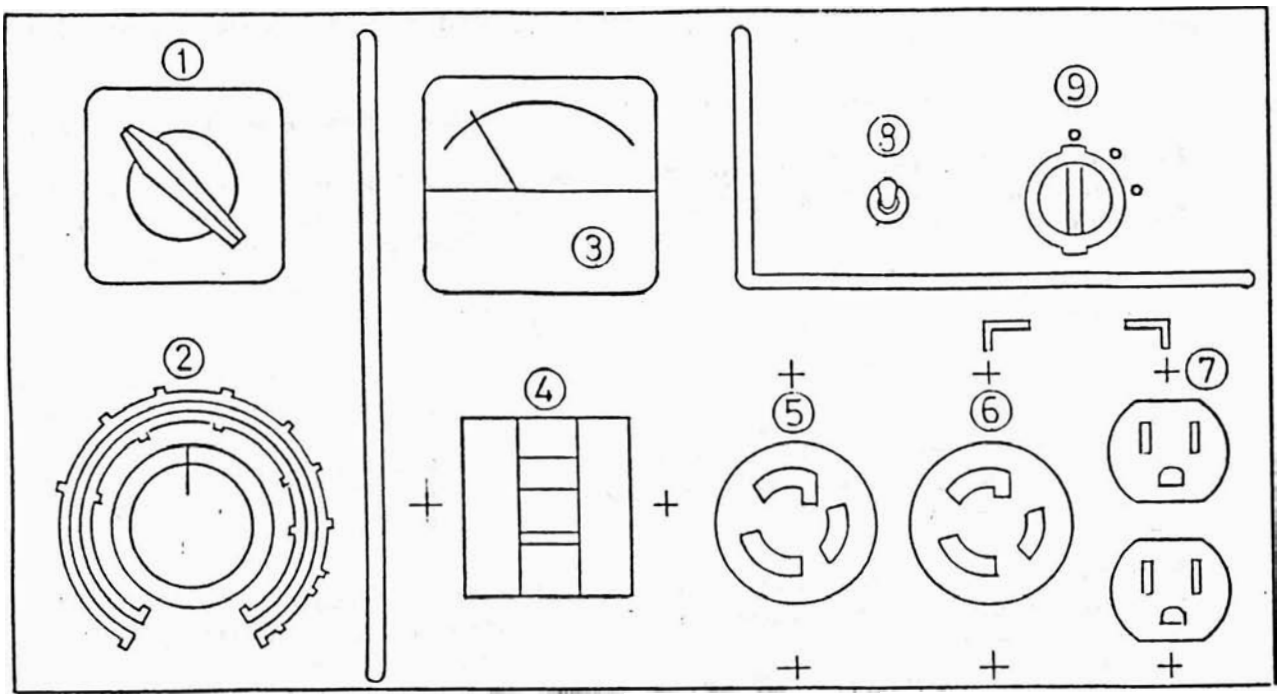
SITE SELECTION

Careful site selection and prope installation are essential to ensure personal safety and to maintain the welder/generator in peak operating condition. **Locate the unit as close to the work** station (load) as possible to minimize the voltage drop in the welder and generator power cables. However, as a safety precaution, avoid installing the welder/generator directly under the welder table.

For either permanent or portable installation, select a location that has adequate ventilation yet is protected from the elements and free from excessive moisture, humidity, dust or other abrasive materials. Generally, skid and trailer or vehicle mounted units are outside and ventilation is adequate provided the unit has clearance around the housing cooling inlets and outlets. **In a confined area, the units must be provided with adquate, fresh, cool air for engine** combustion and cooling, and the engine exhaust must ba safety directed away ventilated area. The discharged hot air from the engine and generator must be dissipated to prevent. recirculation and engine overheating. The engine exhaust outlet, unless located outside, must be plumbed to a safe and well ventilated area. **If external exhaust plumbing is not used, adequate** forced ventilation must be employed to clear the area of toxic and hazardous fumes.

Both permanent and portable skid, trailer or vehicle mounted units should be placed to allow sufficient service and repair access on all sides of the set. A stationary unit should be bolted to a flat and firm foundation such as a concrete slab or a substantial structural framework. A portable unit should be set up on an elevated, flat and firm foundation such as a level driveway or parking lot.

INSTRUMENTATION AND CONTROLS



1. **Welding Current Range Selector Switch**
   This switch is used to select the range of welding current-either LOW range(60A-120A max.) or HIGH range (100A-225A max.).
2. **Ampere Regulator** -This infinitely variable welder current control is used to adjust the welding current to regulate the 'Arc Heat'. The precise setting of this control will allow the welding of different types and thickness of materials. First, select and set either the HIGH or LOW range on the welding current range selector. Then adjust the ampere regulator for proper current.
3. **AC Voltmeter** -The needle pointer indicates the output voltage of the welder/generator. Check and always maintain the rated voltage on the voltmeter.
4. **Main Line Circuit Breaker**-The main line circuit breaker(MLCB) serves as a switch to feed power to load and also provides overcurrent or short circuit protection for the welder/generator. **When the MLCB trips, correct the overload condition, then turn the MLCB** to the OFF position before trying to turn it to ON.
5. **AC Receptacles** -One (1) duplex (120 volt/20 amp.)
6. **AC Receptacle**-One (1) twist-lock NEMA L5-20R(120 volt/20 amp.)
7. **AC Receptacle**-One (1) twist-lock NEMA L6-20R(240 volt/20 amp.)

   Receptacles are provided for single phase, 120 and 240 volt electrical loads such as lighing or electric tools.
8. **Idle Control Switch**-This switch controls the automatic idle circuit for idling the engine when not welding or using the AC power. Set the idle control switch to the ON position whenever you plan to weld intermittently. Only set the switch to the OFF position when you do not want the engine to idle during short breaks in electrical use.
9. **Key Start Switch** -This is the main engine control switch. The key is removable to prevent unauthorized use of the unit. **The normal switch position is OFF** or RUN. Rotating the key clockwise from the OFF position to the first step operates the RUN circuits. **The second position clockwise from OFF operates the START** circuit. The START position is momentary, spring loaded to return to the RUN position when released. This switch provides convenient, simple, centralized control of the engine.

START-UP PROCEDURES

To ensure safety and best performance, always check the following points before starting each day's operation. **Refer to the engine manual for reference and assistance in locating and making** engine related checks.

Fuel-Be sure the fuel tank is filled with the regular grade gasoline, fresh fuel.

Lubricating Oil -Check the lube oil level before you start the engine, both at the initial start-up and at each refueling. Be sure to change oil contaminated by dirt or grit. The table below indicates recommended engine oil according to the ambient temperature.

Lube oil Table

Temperature	Lube Oil Grade and Spec.
50°F or above	SAE 30
Below 50°F(For all season use)	SAE10W 30

Battery -Chack and maintain the electrolyte at the specified level. Always use the proper safety equipment(apron, gloves, and goggles) when handling the battery.

▲ Never remove the battery from the unit while the engine is running.
▲▲▲ The battery is constantly under charge, giving off explosive hydrogen gas.
▲▲▲▲▲ Disconnecting the cables under these conditions will produce a spark that could explode the battery and spray battery acid on you.

INITIAL START-UP PROCEDURES

Step 1—Make sure that load switches are OFF and that the main line circuit breaker(MLCB) is turned to the OFF position to disconnect the entire AC load.
Step 2—Set the idel control switch to the ON position.
Step 3—Open the manual fuel valve.
Step 4—Insert the key into the start switch. Put the choke to the open position when the engine is cold.
Step 5—Turn the start key to the START position.
Step 6—After the engine starts, allow it to warm up for about five(5) minutes.

NOTE: During the warm-up operation and against while actually operating the unit, check for any evidence of malfunction.

During warm-up of this unit, check for ●abnormal noise, vibration, and odor. ●abnormal exhaust emission color. ●oil or fuel leaks.
During operation of this unit check ●fuel leakage and fuel level. ●lubricating oil circulation. ●air cleaner in place, hoses and element sealed. ●voltmeter reading. ●abnormal noise. ●color of exhaust gases. ●vibration.

NOTE: You must STOP and DISABLE the engine for repair, inspection, service, or oiling.

STOP PROCEDURES

Follow the procedure below to stop the engine.
Step 1-Discontinue welding operations.
Step 2-Turn off the AC main line circuit breaker (MLCB).
Step 3-Turn on the idle control switch (if not already on).
Step 4-The engine will begin to idle in approximately 10 seconds. Run the engine at IDLE speed with no load for about five minutes.
Step 5-Turn the starter key switch to OFF.

DC GENERATOR-DUAL RANGE WELDING

All welding cables should be terminated in soldered or crimped lugs. Check these terminals periodically to ensure reliable operation and maximum performance. In the interest of safety, never make direct connections to the welder terminals with bare wire.

Choose the proper welding polarity according to the type of material to be worked and the rod manufacturers' recommendations. Generally, normal polarity is used for deep penetration-welding heavy steel and steel alloy. Reverse polarity is used for light penetration-welding thin metal, stainless steel, or built-up welding.

Always use the shortest cable possible to ensure the best performance. The cable resistance increases as its length increases. The resistance also increases with smaller diameter wire. Higher cable resistance will result in excessive voltage drop in the cable and in extreme cases this can lead to heat deterioration of the cable. **The table below shows the relationship between** cable length, current and the required cable wire gauge (diameter) and it is calculated to allow no more than a 3 volt drop. **Always check the cable chart when using the welder/generator to ensure** that the correct size of welder cable is selected for the job.

Welding Current	Cable Length-Multi-Strand Copper(Feet) 25	50	100	150	200	250	300
60 AMP	#4 Ga	#4 Ga	#3 Ga	#2 Ga	#2 Ga	#2 Ga	#1 Ga
100 AMP	#4 Ga	#3 Ga	#3 Ga	#2 Ga	#1 Ga	#1/0	#2/0
150. AMP	#4 Ga	#2 Ga	#2 Ga	#1/0	#2/0	#3/0	#3/0
200 AMP	#3 Ga	#1 Ga	#1/0	#2/0	#3/0	#4/0	250MCM

CAUTION Make sure the engine is running at full speed whenever welding.

NOTE: If the engine stops, check the engine immediately for lubricating oil pressure and correct it.

The following table lists the amperages of the low and high range settings of the welder and the corresponding electrode diameters to be used with each.

Welder Current "Heat" Ranges	Electrode Diameter
LOW Range 60A to 120A	1/16" to 5/32"
HIGH Range 100A to 225A	1/8" to 1/4"

AC GENERATOR LOADS

The AC output receptacles are located on the right side of the control panel. One(1) 120 volt, 20 amp duplex receptacles is for normal 120 volt electrical loads such as tools and lights. In addition, twe(2) twist-lock receptacles have been provided to allow longer cords to be used without being pulled out. **All AC loads are protected by a main line circuit breaker** (MLCB) that can also serve as a load disconnect switch.

AC VOLTAGE AND WELDING CURRENT ADJUSTMENT PROCEDURES.

If the AC voltage or welding current are not rated, adjust the Automatic Voltage Current Regulator (AVCR) according in the control panel to the following.

AC VOLTAGE

1) Make sure that the engine is shut off.
2) Set the idle control switch on the control panel to the OFF position.
3) Turn the rating voltage adjustor of the AVCR to maximum position.
4) Start the engine.
5) Adjust the output voltage to 270 volts by boosting voltage adjustor of the AVCR.
6) Readjust the output voltage to 240 volts by rating voltage adjustor.

WELDING CURRENT

Maximum Current in High Range

1) Set the ampere regulator on the control panel to maximum position.
2) Turn the range selector switch on the control panel to High position.
3) Over welding, gradually adjust the High max. of welding current range adjustor on the AVCR to maximun current.

Minimum Current in High Range

1) Reset the ampere regulator to minimum position.
2) Range selector switch is High position.
3) Over welding, adjust the High min. of welding current range adjust or on the AVCR to 100 amperes.

Maximum Current in Low Range

1) Set the ampere regulator to maximum position.
2) Return the range selector switch to Low position.
3) Over welding, adjust the Low max. of welding current range adjustor on the AVCR to 120 amperes.

Maximum Current in Low Range

1) Reset the ampere regulator to minimum position.
2) Range selector switch is Low position.
3) Over welding, adjust the Low min. of welding current range adjustor on the AVCR to 60 amperes.

UNDER FREQUENCY PROTECTION

1) Set the idle control switch on the control panel to the ON position.
2) After engine speed go down, adjust the output voltage to 145 volts by under frequency protection adjustor on the AVCR.

SPECIAL FEATURES

AUTOMATIC IDLE CONTROL

The idle control circuit automatically reduces the engine speed whenever BOTH the welding is interrupted and the AC load is turned off. This idle control circuit automatically restores the engine to rated speed when either the welding is resumed or the AC load or tool is turned on. When you interrupt the load (DC or AC), the welder/generator automatically waits ten seconds before energizing the idle solenoid. This delay feature is of primary benefit when welding.

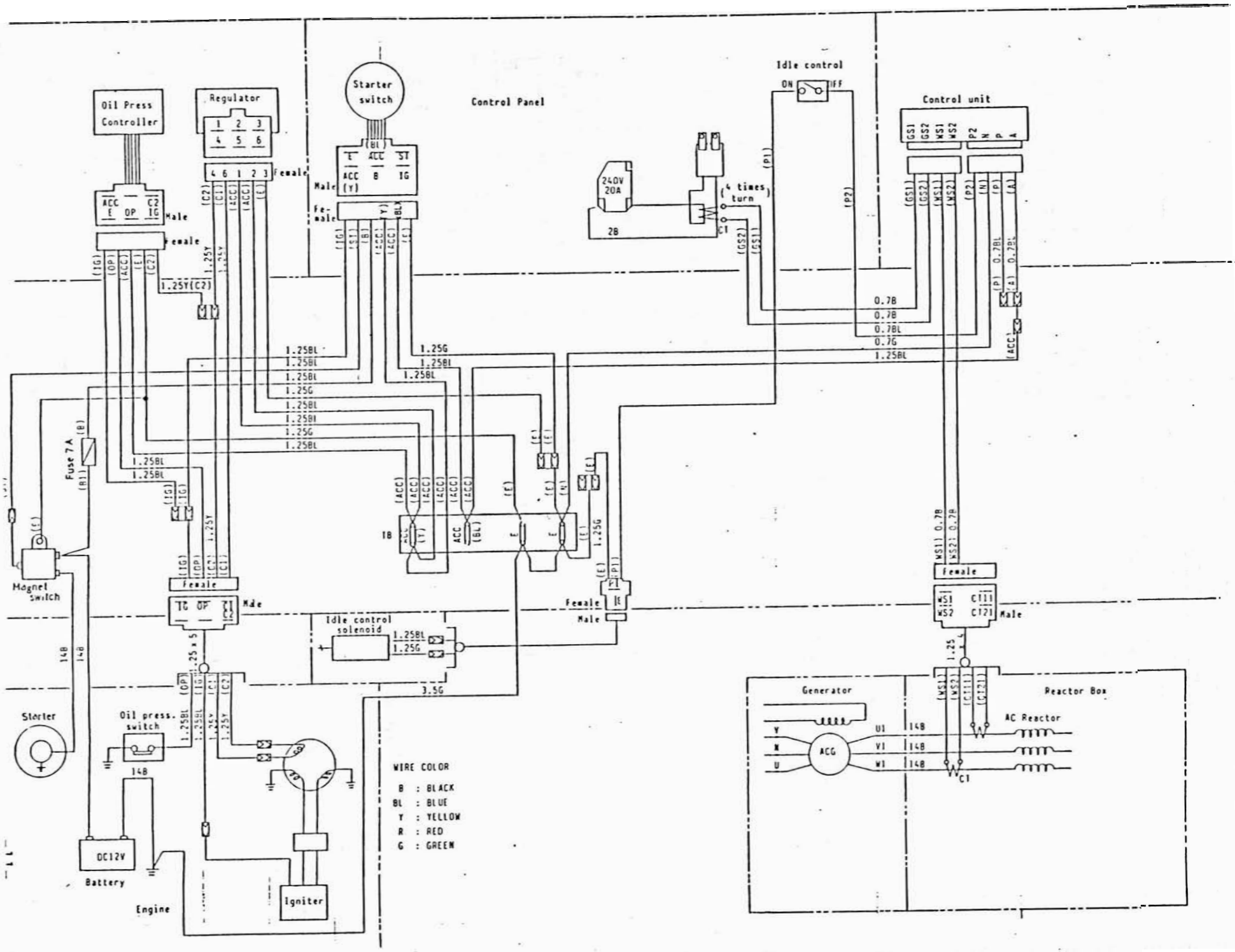
AUTOMATIC SAFETY SHUTDOWN CIRCUIT

This unit has a unique automatic shutdown circuit. In the event of lubricating systemtem malfunction, the engine will stop automatically.

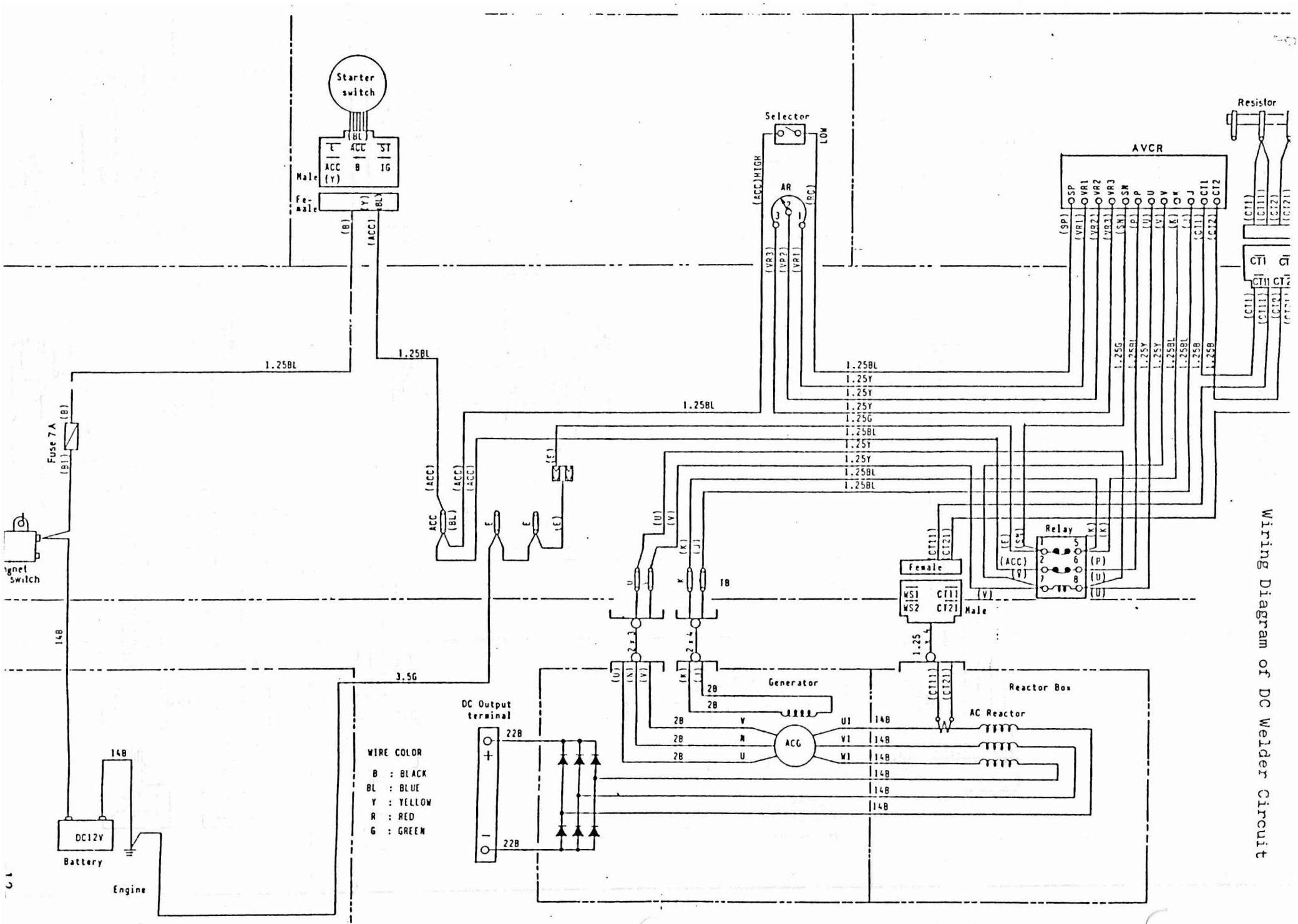
TROUBLESHOOTING TABLE

Symptom	Possible Cause	Remedy
No power generated in AC generator	Stator coil open or shortcircuited	Replace
	Field coil open or shortcircuited	Replace
	Poor brush contact/worn brush	Replace brush
	Dirty slip rings	Polish with sandpaper
	Worn slip rings	Turn in lathe
	Field/armature core abrasion	Replace bearings
No power generated in controls	Broken field coil lead wire	Repair and connect
	Defective AVCR	Replace
	Open wiring to AVCR	Replace and connect
	Loose connections	Fasten,repair,connect
No DC welding	Low output or rotation	Reset speed lever set screw to the designated position; check and replace worn or defective parts
	Overloading enigne	Use smaller welding rod
	Too long and wider size cable	Replace with heavier cable
	Imperfect ground contact	Clean rust and paint
	Change in AVCR adjustment	Adjust
	Field coil partial shortcircuit	Repair or replace
Starting failure-starting motor not turning	Open fues	Replace
	Discharged battery	Recharge or replace
	Defective start solenoid	Replace
	Defective starting motor	Replace
	Broken leads	Repair
Starting failure-starting motor turns	Empty fuel tank	Refuel
	Other problems	Repair engine
Engine starts but remains at low speed	Idle control switch is ON	Turn it OFF
	Defective idle control circuit	Repair
	Air in fuel line	Draw it out
	Clogged fuel strainer	Clean strainer
	Clogged air cleaner	Clean elements
No DC welding possible; no power	Broken leads	Replace
Poor welding; low AC voltage	Defective AVCR	Replace or repair
	Insufficient engine RPM	Adjust or repair engine
	Short in excitor winding	Replace
	Short in generator's stator	Replace
Welding possible but weak arc; AC power source usable	Poorly adjusted AVCR	Re-adjust
	Improper cable length and size	Change to proper one
	Defective rectifiers (RF)	Replace
	Broken leads	Replace
Welding possible; AC power not available	Power contact in carbon brush	Replace or repair
	Defective circuit breaker	Replace
	Broken leads	Repair
Battery discharges	Defective alternator or voltage regulator	Replace
	Broken lead wires	Replace
Engine exhibits overload condition	Short in generator stator leads	Repair
	Short in rectifiers (RF)	Replace
	Defective generator bearing	Replace

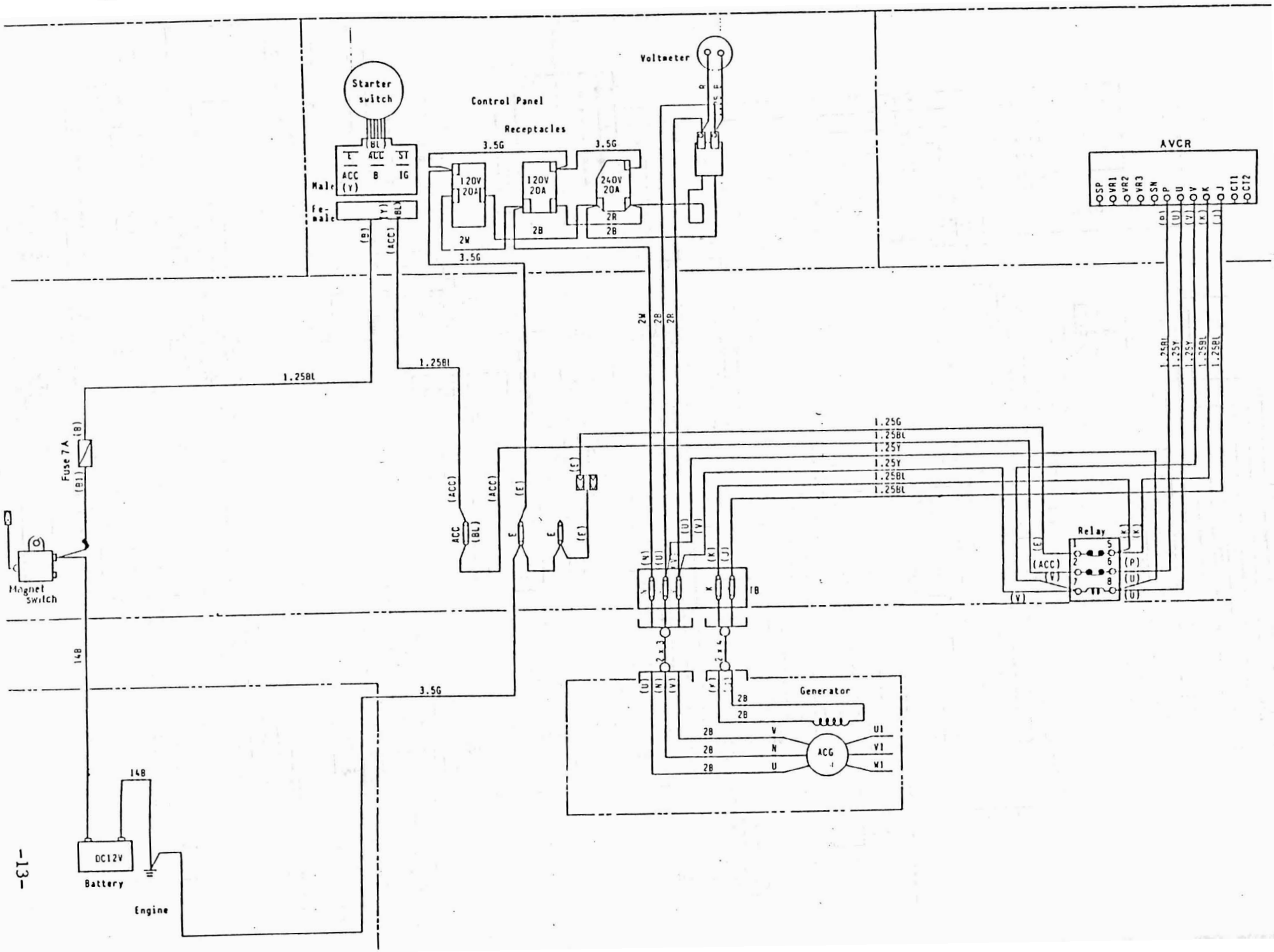
Symptom	Possible Cause	Remedy
Excessive vibration	Engine malfunction shock mount failure	
Abnormal noise	Noise from engine	Repair
	Defective bearing in generator	Replace
	Loose bolts in generator	Retighten
	Noise from protective cover	Repair
Idle control switch ON but no drop in RPM	Defective idle control	Replace
	Defectiver solenoid	Replace
	Broken lead wires	Repair
With idle control switch ON, weld arc starts but no rise in RPM	Defective idle control	Replace
	Adjustment of idle control solenoid switch defective	Adjust
	Broken lead wires	Repair
With idle control switch ON, 60 watt or larger load is connected, but no rise in RPM	Defective idle control switch	Replace
	Defective current transformer (CT) in control panel	Replace
	Broken lead wires	Repair



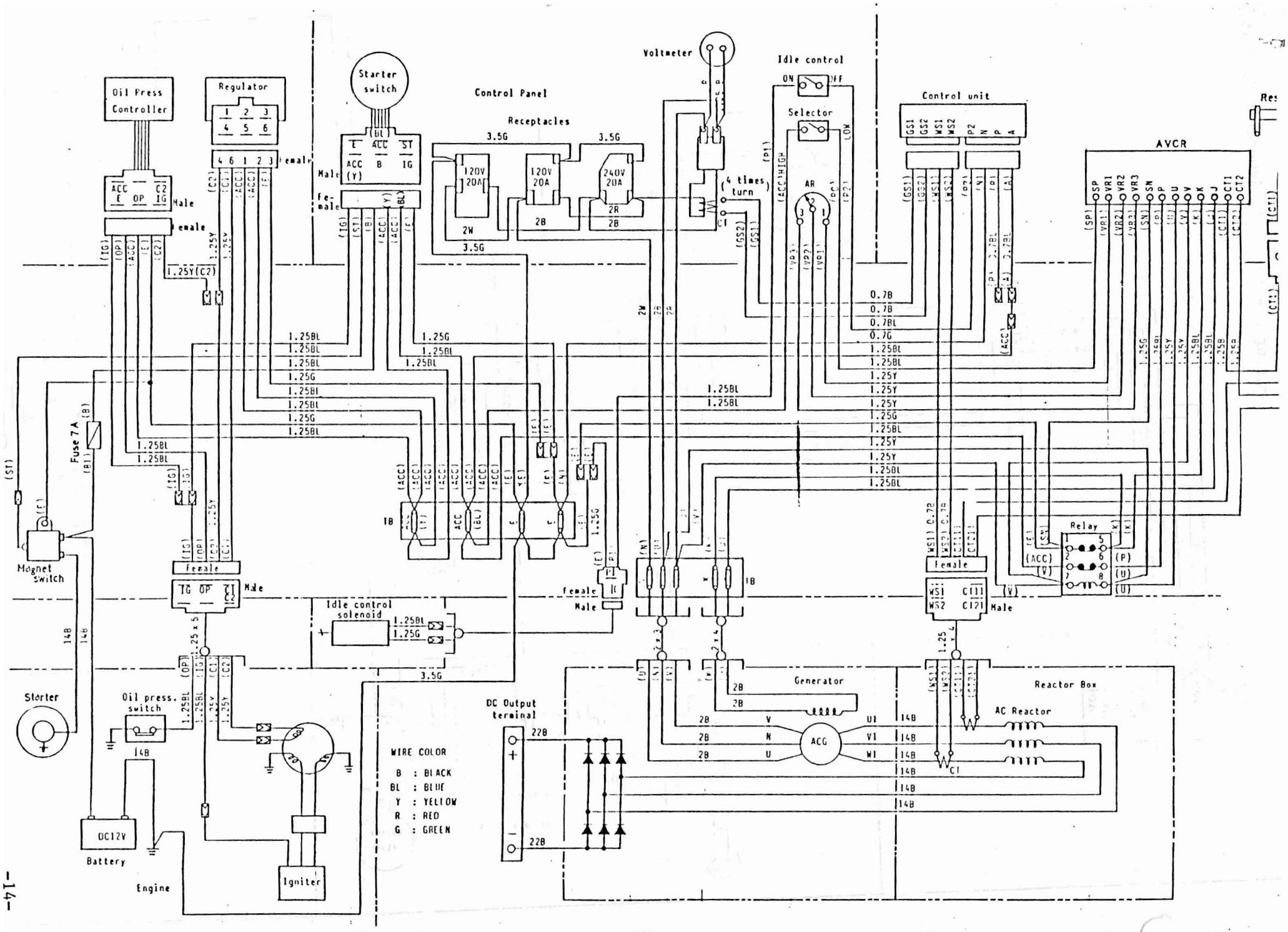
Wiring Diagram of DC Engine Control Circuit



Wiring Diagram of DC Welder Circuit



Wiring Diagram of AC Generator Circuit


Oil Press Controller
Regulator
Starter switch
Control Panel
Receptacles
Voltmeter
Idle control
ON
OFF
Selector
Control unit
AVCR
AR
(4 times turn)
Fuse 7A
Magnet switch
Idle control solenoid
Relay
Starter
Oil press. switch
Battery
DC12V
Engine
Igniter
DC Output terminal
Generator
ACG
Reactor Box
AC Reactor
WIRE COLOR
B : BLACK
BL : BLUE
Y : YELLOW
R : RED
G : GREEN