

PARTS AND OPERATION MANUAL

MQ POWER

Model DCA-15SPX3

WHISPERWATT™

GENERATOR

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Revision #2 (09/03/01)



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WARNING



CALIFORNIA--Proposition 65 Warning

Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

HERE'S HOW TO GET HELP

*PLEASE HAVE THE MODEL AND SERIAL NUMBER
ON-HAND WHEN CALLING*

PARTS DEPARTMENT

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- Dealer account number
- Dealer name and address
- Shipping address (if different than billing address)
- Return fax number
- Applicable model number
- Quantity, part number and description of each part
- Specify preferred method of shipment:
 - UPS Ground
 - UPS Second Day or Third Day*
 - UPS Next Day*
 - Federal Express Priority One (please provide us with your Federal Express account number)*
 - Airborne Express*
 - Truck or parcel post

**Normally shipped the same day the order is received, if prior to 2PM west coast time.*

Earn Extra Discounts when you order by FAX!

All parts orders which include complete part numbers and are received by fax qualify for the following extra discounts:

<u>Number of line items ordered</u>	<u>Additional Discount</u>
1-9 items	3%
10+ items**	5%

Get special freight allowances when you order 10 or more line items via FAX!**

- UPS Ground Service at no charge for freight
- PS Third Day Service at one-half of actual freight cost

No other allowances on freight shipped by any other carrier.

**Common nuts, bolts and washers (all items under \$1.00 list price) do not count towards the 10+ line items.

DISCOUNTS ARE SUBJECT TO CHANGE

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RULES FOR SAFE OPERATION

CAUTION:



Failure to follow instructions in this manual may lead to serious injury or even death! This equipment is to be operated by trained and qualified personnel only! This equipment is for industrial use only.

The following safety guidelines should always be used when operating the DCA-15SPX3 portable generator:

GENERAL SAFETY

- **DO NOT** operate or service this equipment before reading this entire manual.



- This equipment should not be operated by persons under 18 years of age.



- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, steel-toed boots and other protective devices required by the job.

- **NEVER** operate this equipment when not feeling well due to fatigue, illness or taking medicine.



- **NEVER** operate this equipment under the influence of drugs or alcohol.



- **NEVER** use accessories or attachments, which are not recommended by MQ Power for this equipment. Damage to the equipment and/or injury to user may result.

- Manufacture does not assume responsibility for any accident due to equipment modifications.

- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.

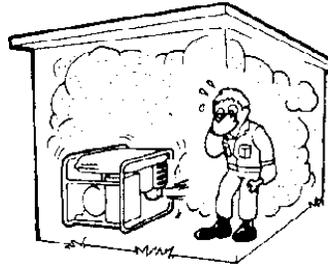
- Always check the machine for loosened threads or bolts before starting.

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing engine or generator.



- **High Temperatures** – Allow the engine to cool before adding fuel or performing service and maintenance functions. Contact with *hot* components can cause serious burns.

- The engine of this generator requires an adequate free flow of cooling air. Never operate the generator in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause serious damage to the generator or engine and may cause injury to people. Remember the generator engine gives off **DEADLY** carbon monoxide gas.



CAUTION:



Always refuel in a well-ventilated area, away from sparks and open flames.



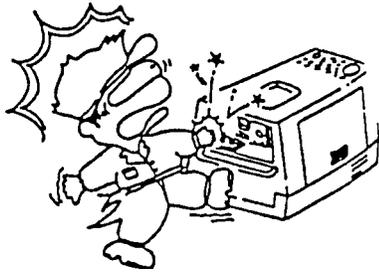
Always use extreme caution when working with **flammable** liquids. When refueling, **stop the engine** and allow it to cool. **DO NOT smoke** around or near the machine. Fire or explosion could result from fuel vapors, or if fuel is spilled on a hot engine.

- **NEVER** operate the generator in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe *bodily harm or even death*.

- Topping-off to filler port is dangerous, as it tends to spill fuel.

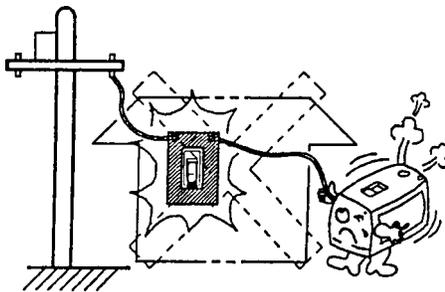
RULES FOR SAFE OPERATION

CAUTION:



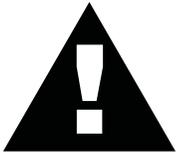
■ **NEVER** touch output terminals during operation. This is extremely dangerous. Always stop the machine when contact with the output terminals is required.

CAUTION:



■ **Backfeed** to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is opened.

CAUTION:



■ **Never** use damaged or worn cables when connecting power tools or equipment to the generator. Make sure power connecting cables are securely connected to the generator's output terminals, insufficient tightening of the terminal connections may cause damage to the generator and electrical shock.

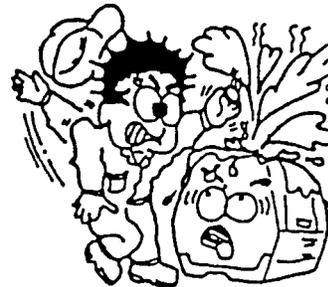
CAUTION:



DO NOT touch or open any of the below mentioned components while the generator is running. Always allow sufficient time for the engine and generator to cool before performing maintenance.

Radiator

1. **Radiator Cap** - Removing the radiator cap while the engine is hot will result in high pressurized, boiling water to gush out of the radiator, therefore causing severe scalding to any persons in the general area of the generator.



2. **Coolant Drain Plug** - Removing the coolant drain plug while the engine is hot will result in hot coolant to gush out of the coolant drain plug, therefore causing severe scalding to any persons in the general area of the generator.
3. **Engine Oil Drain Plug** - Removing the engine oil drain plug while the engine is hot will result in hot oil to gush out of the oil drain plug, therefore causing severe scalding to any persons in the general area of the generator.

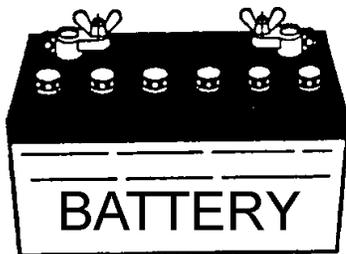
CAUTION:

Battery



- Never over fill the battery with water above the upper limit.

The battery has acids that can cause injury to the eyes and skin. To avoid eye irritation, always wear safety glasses. Use well insulated gloves when picking up the battery. Use the following guidelines when handling the battery:



1. **DO NOT** drop the battery. There is the possibility of risk the battery may explode.
 2. **DO NOT** expose the battery to open flames, sparks, cigarettes etc. The battery contains combustible gases and liquids. If these gases and liquids come in contact with a flame or spark, an explosion could occur.
 3. Always keep the battery charged. If the battery is not charged, a buildup of combustible gas will occur.
 4. Always keep battery charging and booster cables in good working condition. Repair or replace all worn cables.
 5. Always recharge the battery in an open air environment, to avoid risk of a dangerous concentration of combustible gases.
 6. In case the battery liquid (dilute sulfuric acid) comes in contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.
 7. In case the battery liquid (dilute sulfuric acid) comes in contact with your **eyes**, rinse eyes immediately with plenty of water, then contact the nearest doctor or hospital, and seek medical attention.
- **NEVER** Run engine without air filter. Severe engine damage may occur.
 - Always service air cleaner frequently to prevent carburetor malfunction.
 - Always disconnect the battery before performing service on the generator.
 - Always be sure the operator is familiar with proper safety precautions and operations techniques before using generator.
 - Always store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children.
 - **DO NOT** leave the generator running in the manual mode unattended.
 - **DO NOT** allow unauthorized people to operate this equipment.
 - Always read, understand, and follow procedures in Operator's Manual before attempting to operate equipment.
 - Always be sure the operator is familiar with proper safety precautions and operations techniques before using generator.
 - Refer to the ***Kubota Engine Owner's Manual*** for engine technical questions or information.

Loading and Unloading (Crane)

- Before lifting, make sure the generator's lifting hook is secure and that there is no apparent damage to the generator itself (loose screws, nuts and bolts). If any part is loose or damaged, please take corrective action before lifting.
- Always drain fuel prior to lifting.
- Always make sure crane or lifting device has been properly secured to the hook of guard frame on generator.
- **NEVER** lift the machine while the engine is running.
- Use adequate lifting cable (wire or rope) of sufficient strength.
- When lifting the generator, always use the balanced center-point suspension hook and lift straight upwards.
- **NEVER** allow any person or animal to stand underneath the machine while lifting.
- When loading the generator on a truck, be sure to use the front and back frame bars as a means to secure the generator during transport.

Transporting

- Always shutdown engine before transporting.
- Tighten fuel tank cap securely.
- Drain fuel when transporting generator over long distances or bad roads.
- Always tie-down the generator during transportation by securing the generator.
- If generator is mounted on a trailer, make sure trailer complies with all local and state safety transportation laws. See page 10 for basic towing procedures.

Emergencies

- Always know the location of the nearest **fire extinguisher** and **first aid kit**. Know the location of the nearest telephone. Also know the phone numbers of the nearest **ambulance**, **doctor** and **fire department**.

Maintenance Safety

- **NEVER** lubricate components or attempt service on a running machine.
- Always allow the machine a proper amount of time to cool before servicing.
- Keep the machinery in proper running condition.
- Fix damage to the machine immediately and always replace broken parts.
- Dispose of hazardous waste properly. Examples of potentially hazardous waste are used motor oil, fuel, and fuel filters.
- **DO NOT** use plastic containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil or fuel directly onto the ground, down a drain or into any water source.

Towing Safety Precautions

CAUTION :



- Check with your county or state safety towing regulations department before towing your generator.

To reduce the possibility of an accident while transporting the generator on public roads, always make sure the trailer that supports the generator and the towing vehicle are in good operating condition and both units are mechanically sound.

The following list of suggestions should be used when towing your generator:

- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer "gross vehicle weight rating" (GVWR).
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains etc.
- Check the tire air pressure on both the towing vehicle and the trailer. Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a "Safety Chain".
- **ALWAYS** attach trailer's safety chain to bumper of towing vehicle.
- **ALWAYS** make sure that the vehicle and trailer directional, backup, brake, and trailer lights are connected and working properly.
- The maximum speed (unless otherwise posted) for highway towing is **45 M.P.H.**. Recommended off-road towing is not to exceed **10 M.P.H.** or less depending on type of terrain.
- Place *chocked blocks* underneath wheel to prevent **rolling**, while parked.
- Place *support blocks* underneath the trailer's bumper to prevent **tipping**, while parked.
- Use the trailer's hand winch to adjust the height of the trailer, then insert locking pin to lock wheel stand in place, while parked.
- Avoid sudden stops and starts. This can cause skidding, or jackknifing. Smooth, gradual starts and stops will improve gas mileage.
- Avoid sharp turns to prevent rolling.
- Remove wheel stand when transporting.
- **DO NOT** transport generator with fuel in tank.

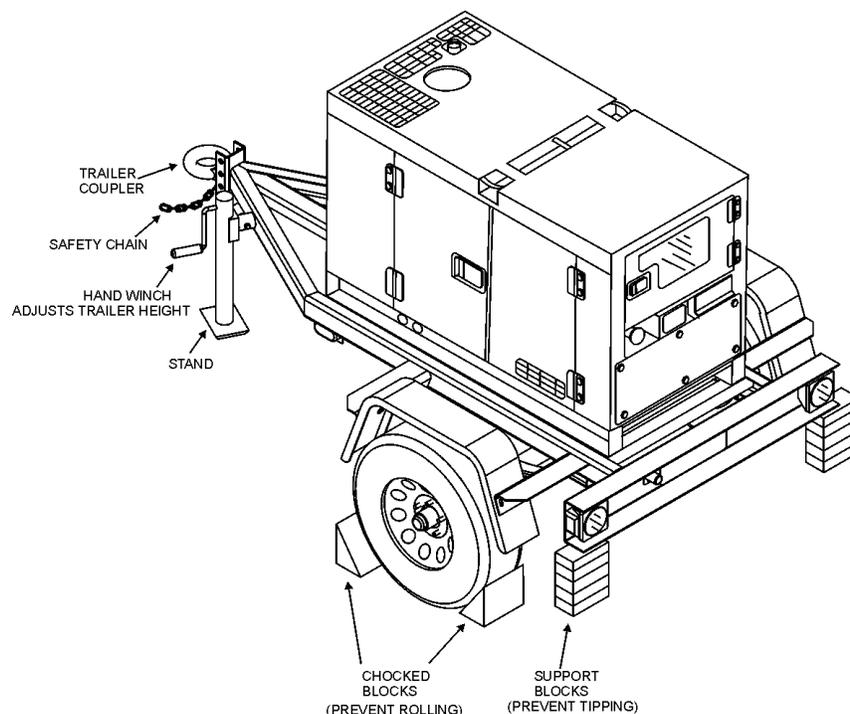


Figure 1. DCA-15SPX3 and Towing Trailer

CAUTION :



ALWAYS make sure the trailer is in good operating condition. Check the tires for proper inflation and wear. Also check the wheel lug nuts for proper tightness.

Explanation of Chart:

This section is intended to provide the user with trailer service and maintenance information. The service and maintenance guidelines referenced in this section apply a wide range of trailers. Remember periodic inspection of the trailer will ensure safe towing of the equipment and will prevent damage to the equipment and personal injury.

It is the purpose of this section to cover the major maintenance components of the trailer. The following trailer components will be discussed in this section:

- Brakes
- Tires
- Lug Nut Torquing
- Suspension
- Electrical
- Brake Troubleshooting Tables

Use the following definitions with reading Table 1.

1. **Fuel Cell** - Provides an adequate amount of fuel for the equipment in use. Fuel cells must be empty when transporting equipment.
2. **Braking System** - System employed in stopping the trailer. Typical braking systems are electric, surge, hydraulic, hydraulic-surge and air.
3. **GVWR**- Gross Vehicle Weight Rating (GVWR), is the maximum number of pounds the trailer can carry, including the fuel cell (empty).
4. **Frame Length** - This measurement is from the ball hitch to the rear bumper (reflector).
5. **Frame Width** - This measurement is from fender to fender.
6. **Jack Stand** - Trailer support device with maximum pound requirement from the tongue of the trailer.
7. **Coupler** - Type of hitch used on the trailer for towing.
8. **Tire Size** - Indicates the diameter of the tire in inches (10,12,14, etc.), and the width in millimeters (175,185,205, etc.). The tire diameter must match the diameter of the tire rim.
9. **Tire Ply** - The tire ply (layers) number is rated in letters; 2-ply,4-ply,6-ply, etc.
10. **Wheel Hub** - The wheel hub is connected to the trailer's axle.
11. **Tire Rim** - Tires mounted on a tire rim. The tire rim must match the size of the tire.
12. **Lug Nuts** - Used to secure the wheel to the wheel hub. Always use a torque wrench to tighten down the lug nuts. See Table 4 and Figure 3 or lug nut tightening and sequence.
13. **Axle** - Indicates the maximum weight the axle can support in pounds, and the diameter of the axle expressed in inches (see Table 3). Please note that some trailers have a double axle. This will be shown as 2-6000 lbs., meaning two axles with a total weight capacity of 6000 pounds.
14. **Suspension** - Protects the trailer chassis from shocks transmitted through the wheels. Types of suspension used are leaf, Q-flex, and air ride.
15. **Electrical** - Electrical connectors (looms) are provided with the trailer so the brake lights and turn signals can be connected to the towing vehicle.
16. **Application** - Indicates which units can be employed on a particular trailer.

DCA-15SPX3 —TRAILER-SPECIFICATIONS

Table 1. Specifications

MODEL	APPLICATION	FUEL CELL	BRAKE SYSTEM	GVWR	FRAME LENGTH	FRAME WIDTH	JACK STAND
TRLR-10W	SDW225, SGW250,TLW300	NO	NO	1900LBS	96"	50"	800LB. FULL TILT WHEEL
TRLR-10	DCA10, TLG12, DCA-15	NO	NO	1900LBS	96"	50"	800LB. FULL TILT WHEEL
TRLR-10XF	DCA10, TLG-12, DCA15, TLW-300	52 GAL	NO	1900LBS	96"	50"	800LB. FULL TILT WHEEL
TRLR-225W	WELDERS, DA7000SS	NO	NO	2200LBS	85"	42"	800LB. FULL TILT WHEEL
TRLR-BLW400	BLW-400	NO	ELECTRIC	2700LBS	W/MAST 154" W/O 124"	55" (78" TALL)	800LB. FULL TILT WHEEL
TRLR-50X	DCA-25	NO	NO	2700LBS	124"	55"	800LB. FULL TILT WHEEL
TRLR-50XF	DCA-25	41 GAL	NO	2700LBS	124"	55"	800LB. FULL TILT WHEEL
TRLR-70W	DCA-45, -60, 70	NO	SURGE	7000LBS	186"	77"	2000LB. FLAT PAD
TRLR-70X	DCA-45, -60, 70	OPT	SURGE	7000LBS	138"	66"	2000LB. FLAT PAD
TRLR-70XF	DCA-45, -60, 70	53 GAL	SURGE	7000LBS	138"	66"	2000LB. FLAT PAD
TRLR-100XF	DCA-100, 125	150 GAL	HYDRAULIC SURGE	7000LBS	190"	76"	2000LB. FLAT PAD
TRLR-85/125	DCA-85, 100, 125	145 GAL	HYDRAULIC	10000LBS	186"	77"	2000LB. FLAT PAD
TRLR-150XF	DCA-150, 180	200 GAL	HYDRAULIC SURGE	11160LBS	204"	84"	5000 LB. FLAT PAD
TRLR-220XF	DCA-220	250 GAL	HYDRAULIC SURGE	14000LBS	222"	83"	5000 LB. FLAT PAD
TRLR-300XF	DCA-300	250 GAL	HYDRAULIC SURGE	18000LBS	238"	83"	5000 LB. FLAT PAD
TRLR-400XF	DCA-400	350 GAL	ELECTRIC	18000LBS	238"	83"	5000 LB. FLAT PAD
TRLR-600XF	DCA-600, 800	550 GAL	AIR	30000LBS	384"	96"	5000 LB. FLAT PAD
TRLR-800SX	DCA-600, 800	550 GAL	AIR	30000LBS	384"	96"	5000 LB. FLAT PAD

DCA-15SPX3 —TRAILER-SPECIFICATIONS

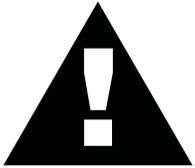
Table 1. Specifications (Con't)

MODEL	COUPLER	TIRES	WHEELS	AXLE	HUBS	SUSPENSION	ELECTRICAL
TRLR-10W	2" BALL CLASS 2 ADJUSTABLE	175-13C	13"X4.50"	2200# 2X2	5 LUG	3 LEAF	4 WIRE LOOM W/ 4 POLE FLAT
TRLR-10	2" BALL CLASS 2 ADJUSTABLE	175-13C	13"X4.5"	2200#2X2	5 LUG	3 LEAF	4 POLE FLAT
TRLR-10XF	2" BALL CLASS 2 ADJUSTABLE	175-13C	13"X4.5"	2200#2X2	5 LUG	3 LEAF	4 POLE FLAT
TRLR-225W	2" BALL CLASS 2 ADJUSTABLE	175-13B	13X4.5"	2200#2X2	5 LUG	Q FLEX	4 POLE FLAT
TRLR-BLW 400	2" BALL CLASS 2 ADJUSTABLE	175-13C	13 X 4.5"	2200#2X2	5 LUG	3 LEAF	4 POLE FLAT
TRLR-50X	2" BALL CLASS	B78-13LRC	13"X4.50"	3500lbs. 2-3/8"	5 LUG	4 LEAF	4 POLE RUBBER FLAT
TRLR-50XF	2" BALL CLASS	B78-13LRC	13"X4.50"	3500lbs. 2-3/8"	5 LUG	4 LEAF	4 POLE RUBBER FLAT
TRLR-70W	2" BALL CLASS 3" ADJUSTABLE	205-14C BIAS (4)	14"X5"	3500lbs. 3"	5 LUG	5 LEAF	4 POLE RUBBER FLAT
TRLR-70X	2" BALL CLASS 3" ADJUSTABLE	205-14C BIAS (4)	14"X5"	3500lbs 3"	5 LUG	5 LEAF	4 POLE RUBBER FLAT
TRLR-70XF	2" BALL CLASS 3" ADJUSTABLE	205-14C BIAS (4)	14"X5"	3500lbs. 3"	5 LUG	5 LEAF	4 POLE RUBBER FLAT
TRLR-100XF	ADJUSTABLE 2-5/6 OPT 3" EYE	205-15C BIAS (4)	14"X5.5"	3500lbs 3"	5 LUG	5 LEAF	4 WIRE LOOM
TRLR-85/125	ADJUSTABLE 2-5/6 OPT 3" EYE	ST225/75R15D RADIAL (4)	14"x6"	(2)-6000lbs	6 LUG	7 LEAF	4 WIRE LOOM
TRLR-150XF	3" BALL EYE	750-16 E BIAS (4)	16"X7"	(2)-6000lbs	8 LUG	7 LEAF	4 WIRE LOOM
TRLR-220XF	3" EYE ADJUSTABLE	ST235/85R16E RADIAL(4)	16"X7"	(2)-7000lbs	8 LUG	Q FLEX	4 WIRE LOOM
TRLR-300XF	3" EYE ADJUSTABLE	ST235/85R16E RADIAL(6)	16"X7"	(2)-6000lbs	8 LUG	Q FLEX	4 WIRE LOOM
TRLR-400XF	3" EYE ADJUSTABLE	ST235/85R16E RADIAL(6)	16"X7"	(3)-7000lbs.	8 LUG	Q FLEX	4 WIRE LOOM
TRLR-600XF	5TH WHEEL	ST215/75R17.5H RADIAL (8)	16"X7"	(3)-10000lbs	8 LUG	7 LEAF	6 WIRE LOOM
TRLR-800AR	5TH WHEEL	ST215/75R17.5H RADIAL (8)	16"X7"	(3)-10000lbs	8 LUG	AIR-RIDE	6 WIRE LOOM

Tires/Wheels/Lug Nuts

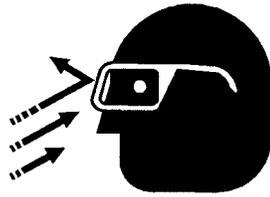
Tires and wheels are a very important and critical components of the trailer. When specifying or replacing the trailer wheels it is important the wheels, tires, and axle are properly matched.

CAUTION:



DO NOT attempt to repair or modify a wheel. DO NOT install in inner tube to correct a leak through the rim. If the rim is cracked, the air

pressure in the inner tube may cause pieces of the rim to explode (break off) with great force and cause serious eye or bodily injury.

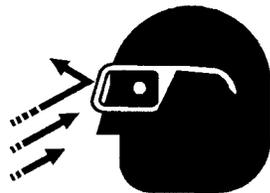


Tire Wear/Inflation

Tire inflation pressure is the most important factor in tire life. Pressure should be checked cold before operation DO NOT bleed air from tires when they are hot. Check inflation pressure weekly during use to insure the maximum tire life and tread wear.

Table 2 (Tire Wear Troubleshooting) will help pinpoint the causes and solutions of tire wear problems.

CAUTION:



NOTE

ALWAYS wear safety glasses when removing or installing force fitted parts. Failure to comply may result in serious injury.

TABLE 2. TIRE WEAR TROUBLESHOOTING

WEAR PATTERN	CAUSE	SOLUTION
Center Wear	Over Inflation.	Adjust pressure to particular load per tire manufacturer.
Edge Wear	Under Inflation.	Adjust pressure to particular load per tire manufacturer.
Side Wear	Loss of camber or overloading.	Make sure load does not exceed axle rating. Align wheels.
Toe Wear	Incorrect toe-in.	Align wheels.
Cupping	Out-of-balance.	Check bearing adjustment and balance tires.
Flat Spots	Wheel lockup & tire skidding.	Avoid sudden stops when possible and adjust brakes.

Suspension

The leaf suspension springs and associated components (Figure 2) should be visually inspected every 6,000 miles for signs of excessive wear, elongation of bolt holes, and loosening of fasteners. Replace all damaged parts (suspension) immediately. Torqued suspension components as detailed in Table 3.

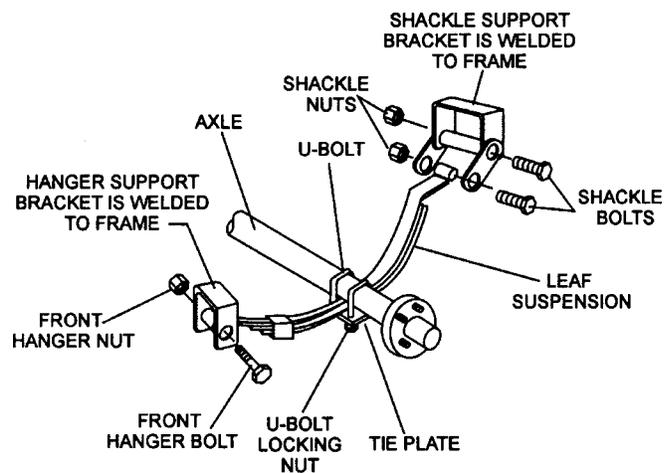


Figure 2. Major Suspension Components

Table 3. Suspension Torque Requirements

Item	Torque (Ft.-Lbs.)
3/8" U-BOLT	MIN-30 MAX-35
7/16" U-BOLT	MIN-45 MAX-60
1/2" U-BOLT	MIN-45 MAX-60
SHACKLE BOLT SPRING EYE BOLT	SNUG FIT ONLY. PARTS MUST ROTATE FREELY. LOCKING NUTS OR COTTER PINS ARE PROVIDED TO RETAIN NUT-BOLT ASSEMBLY.
SHOULDER TYPE SHACKLE BOLT	MIN-30 MAX-50

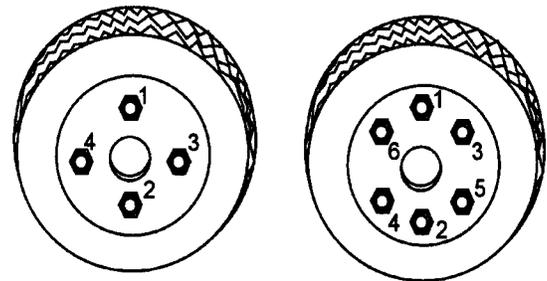
Lug Nut Torque Requirements

It is extremely important to apply and maintain proper wheel mounting torque on the trailer. Be sure to use only the fasteners matched to the cone angle of the wheel. Proper procedure for attachment of the wheels is as follows:

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts in sequence. See Figure 3. **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table 4.
3. After first road use, retorque all lug nuts in sequence. Check all wheel lug nuts periodically.

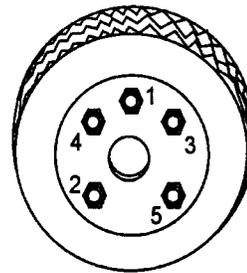
Table 4. Tire Torque Requirements

Wheel Size	First Pass FT-LBS	Second Pass FT-LBS	Third Pass FT-LBS
12"	20-25	35-40	50-65
13"	20-25	35-40	50-65
14"	20-25	50-60	90-120
15"	20-25	50-60	90-120
16"	20-25	50-60	90-120

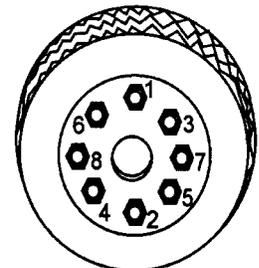


4-LUG NUTS

6-LUG NUTS



5-LUG NUTS



8-LUG NUTS

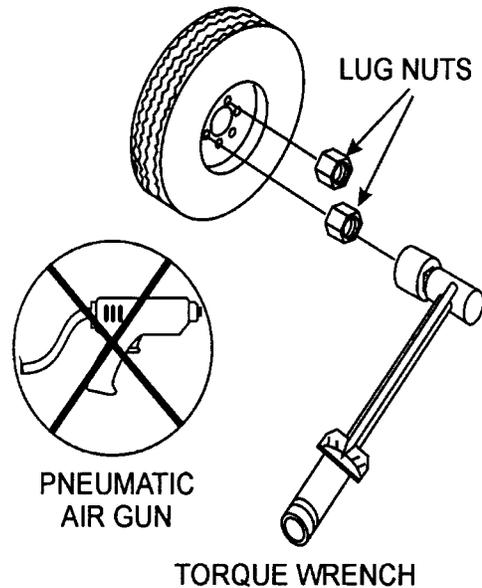


Figure 3. Wheel Lug Nuts Tightening Sequence

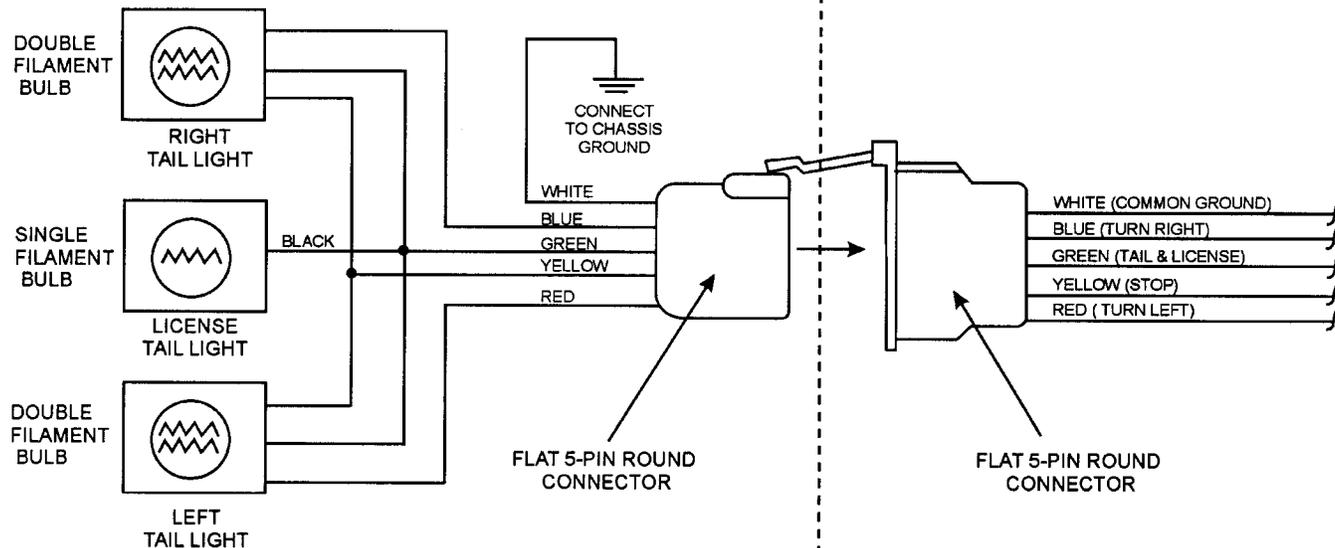
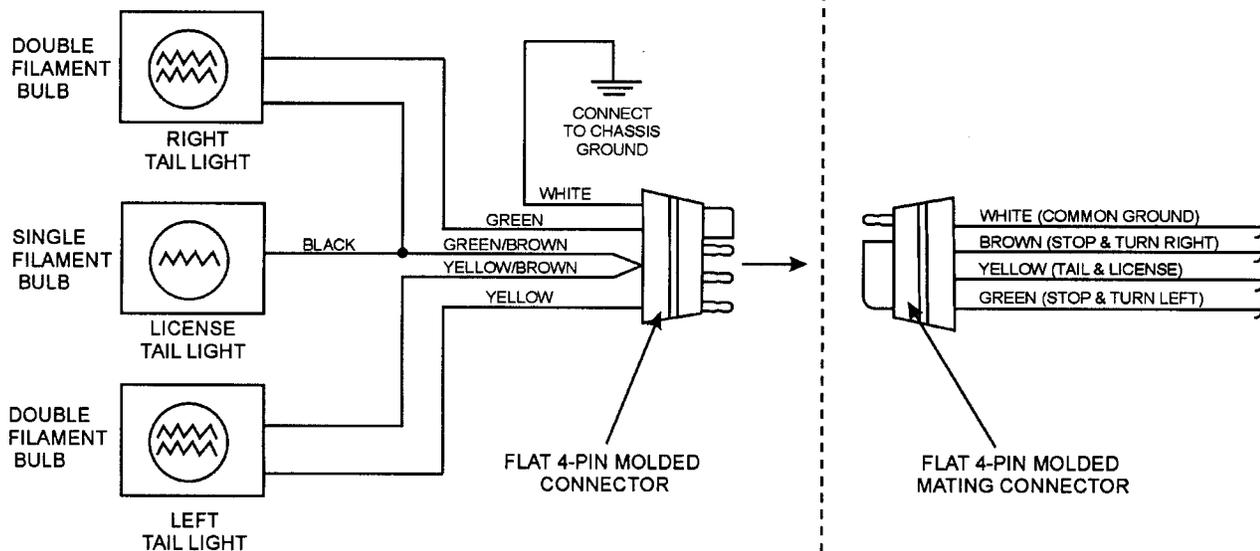
NOTE

NEVER use an pneumatic air gun to tighten wheel lug nuts.

DCA-15SPX3 —TRAILER WIRING DIAGRAM

TRAILER SIDE

TOWING VEHICLE SIDE



NOTE:
LIGHTS ARE ORIENTED FROM THE DRIVER'S SEAT

DCA-15SPX3 — OPERATION AND SAFETY DECALS

Machine Safety Decals

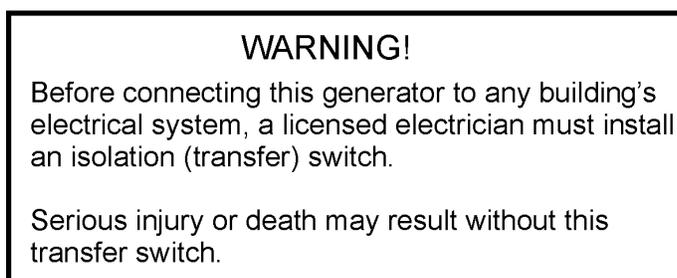
The DCA-15SPX3 generator is equipped with a number of safety decals. These decals are provided for operator safety and maintenance information. The illustration below and on the preceding pages show these decals as they appear on the machine. Should any of these decals become unreadable, replacements can be obtained from your dealer.



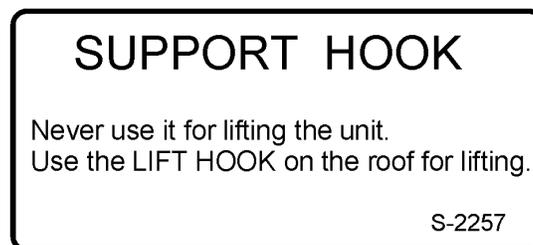
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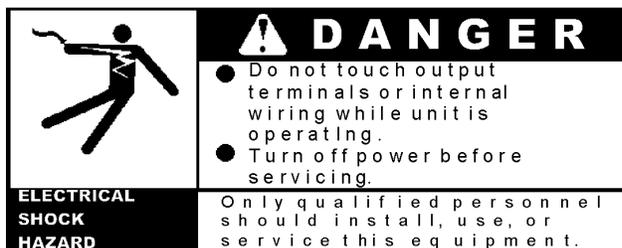
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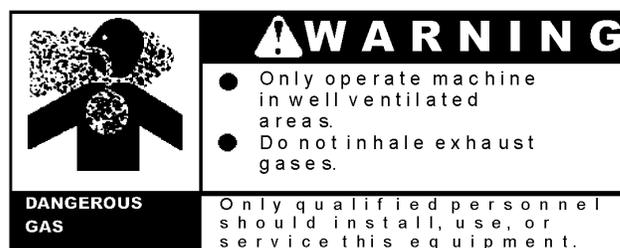
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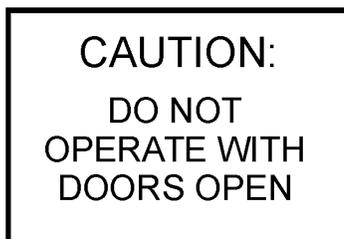
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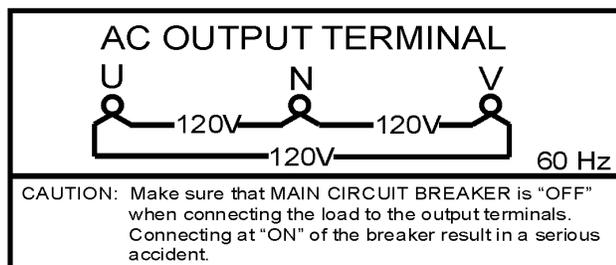
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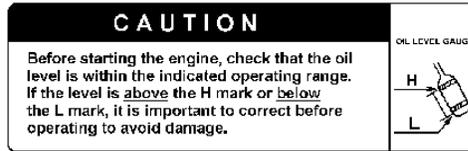
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DCA-15SPX3 — OPERATION AND SAFETY DECALS

Machine Safety Decals



P/N M0000001020Q



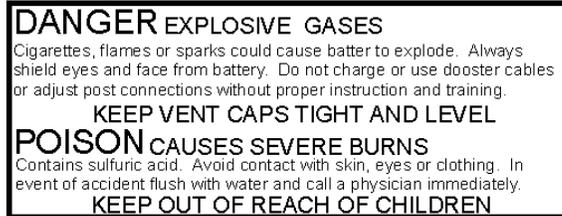
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P/N 0820650604



P/N 0800628504



P/N 7670650004



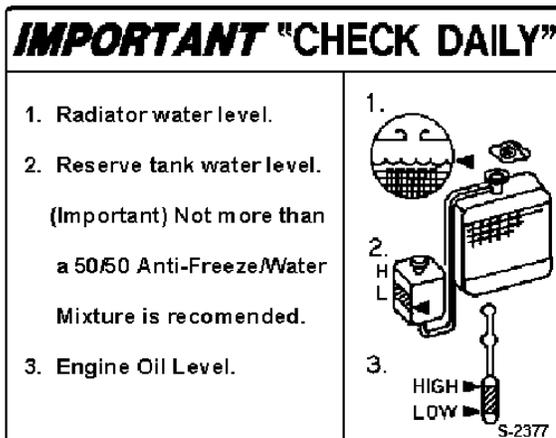
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P/N 0800689404



P/N 0800689504



P/N 6390671104

**CIRCUIT
BREAKER**

S-3031

P/N 0840624504

GROUND

For G.F.C.I.

S-3821

P/N 7670624004

DCA-15SPX3 — SPECIFICATIONS

Table 5. Specifications

Generator Specifications	
Model	DCA15SPX3
Type	Rotating-Field, Protection Type, Synchronous
Excitation	Brushless Type (With A.V.R)
Phase	Single Phase
Frequency	60 Hz
Wires	3-Wires (Neutral Grounded)
Max. Rated Output	16.5 kW
Continuous Rated Output	15 kW
Single Phase Output Voltage	120/240 Volts
Frequency	60 Hz
Power Factor	100%
Speed	1800 rpm
Engine Specifications	
Model	KUBOTA V2203
Type	Vertical, 4-Cycle
No. of Cylinders	4
Displacement	134.08 cu. in. (2.197 liters)
Bore X Stroke	3.43 in. X 3.64 in. (87 mm X 92.4 mm)
Cooling System	Water-Cooled
Starting System	Electric Start
Cooling Water Capacity	1.94 gal (7.4L)
Lube Oil Capacity	16.2 pints (7.6 L)
Battery	12V-70Ah
Fuel	Diesel Fuel Oil No. 2-D
Fuel Consumption	1.37 gal/hr. (5.18 L/hr) At full load 1.08 gal/hr. (4.08 L/hr.) At 3/4 load 0.83 gal/hr. (3.14L/hr.) At 1/2 load 0.62 gal/hr. (2.34 L/hr.) At 1/4 load
Sound At Full Load	62 dbA (distance = 23 feet)

DCA-15SPX3 3 FAMILIARIZATION

Generator

The MQ Power Model DCA-15SPX3 is a 15 kW **generator** that has been designed as a high quality portable (requires a trailer for transport) power source for telecom sites, lighting facilities, power tools, submersible pumps and other industrial and construction machinery.

Control Panel

The control panel is provided with the following:

- One GFCI 120 volt receptacle, 20 amp (single-phase)
- 15 kW Output Terminal (UNV)
- Main Circuit Breaker 65 amps
- GFCI Circuit Breaker 20 amps
- AC Ammeter Indicator
- AC Voltmeter Indicator
- Output Voltage Adjustment Knob
- Engine Warning Indicator
- Engine Speed Control Lever
- Hour Meter
- Ground Terminal

Open Delta Excitation System

The DCA-15SPX3 generator is equipped with the state of the art "**Open-Delta**" excitation system. The open delta system consist of an electrically independent winding wound among stationary windings of the AC output section.

There are four Leads: A, B, C and D. During light loads, the power to the **Automatic Voltage Regulator (AVR)** is supplied from the leads of B & C, when loads increase, the AVR switches and accepts power from leads A & D. The output of leads A & D increase proportionally with load. This has the effect of adding the voltages of each phase to provide better voltage response during heavy loads.

The connections of the AVR to the AC output windings are for the sole purpose of sensing only. No power is required from these windings.

The open-delta design provides virtually unlimited excitation current due to its independent power supply offering maximum motor starting capabilities. The excitation does not have a "**fixed ceiling**" and responds according the demands of the required load.

Engine

The **DCA-15SPX3** is powered by a 4-cylinder KUBOTA Model V2203 **diesel** engine. This engine is designed to meet every performance requirement for the generator. Reference Table 5, page 19 for engine specifications.

In keeping with MQ Power's policy of constantly improving its products, the specifications quoted herein are subject to change without prior notice.

The basic controls and indicators for the DCA-15SPX3 generator are addressed on the following pages.

DCA-15SPX3 — MAJOR COMPONENTS

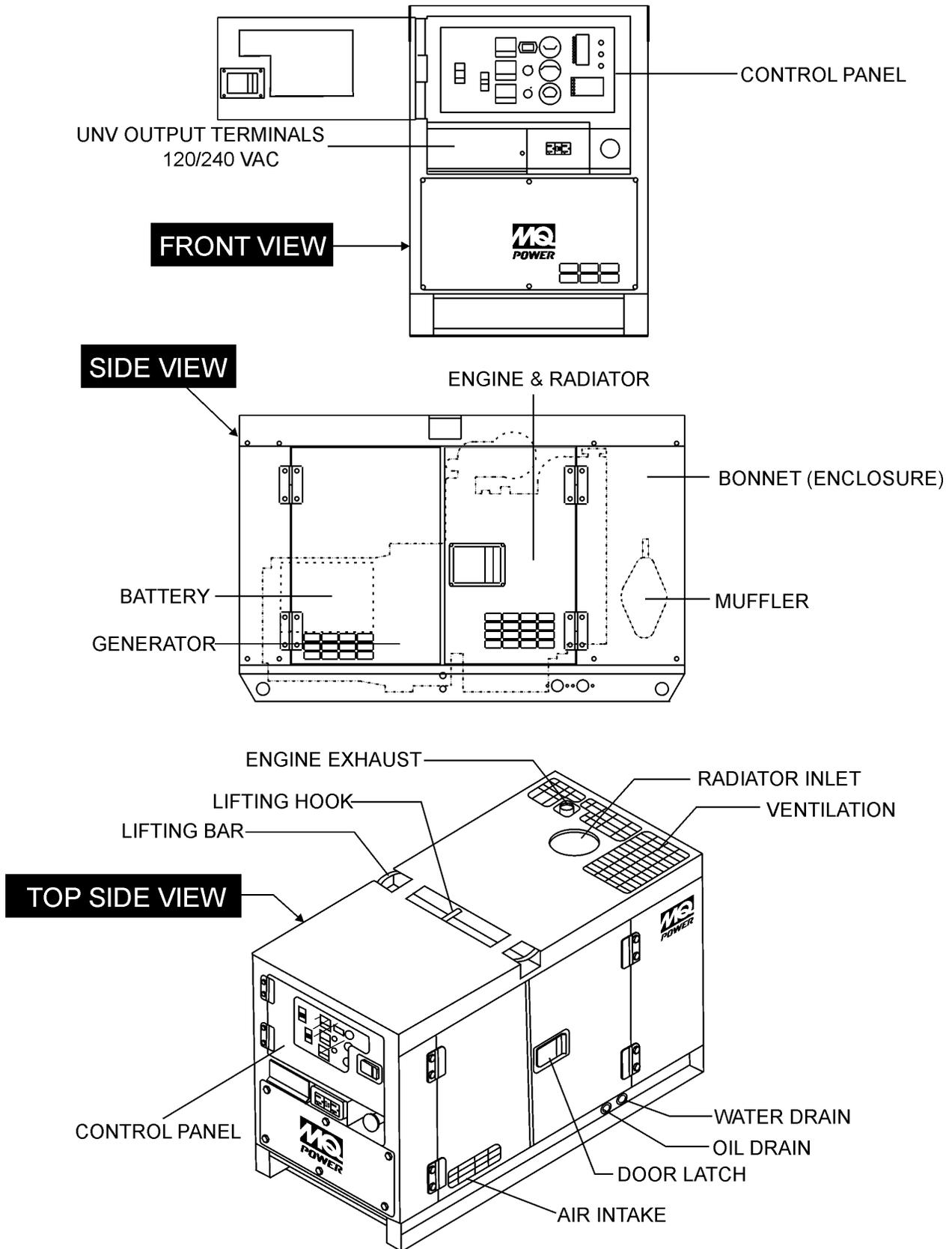


Figure 4. DCA-15SPX3 Generator Major Components

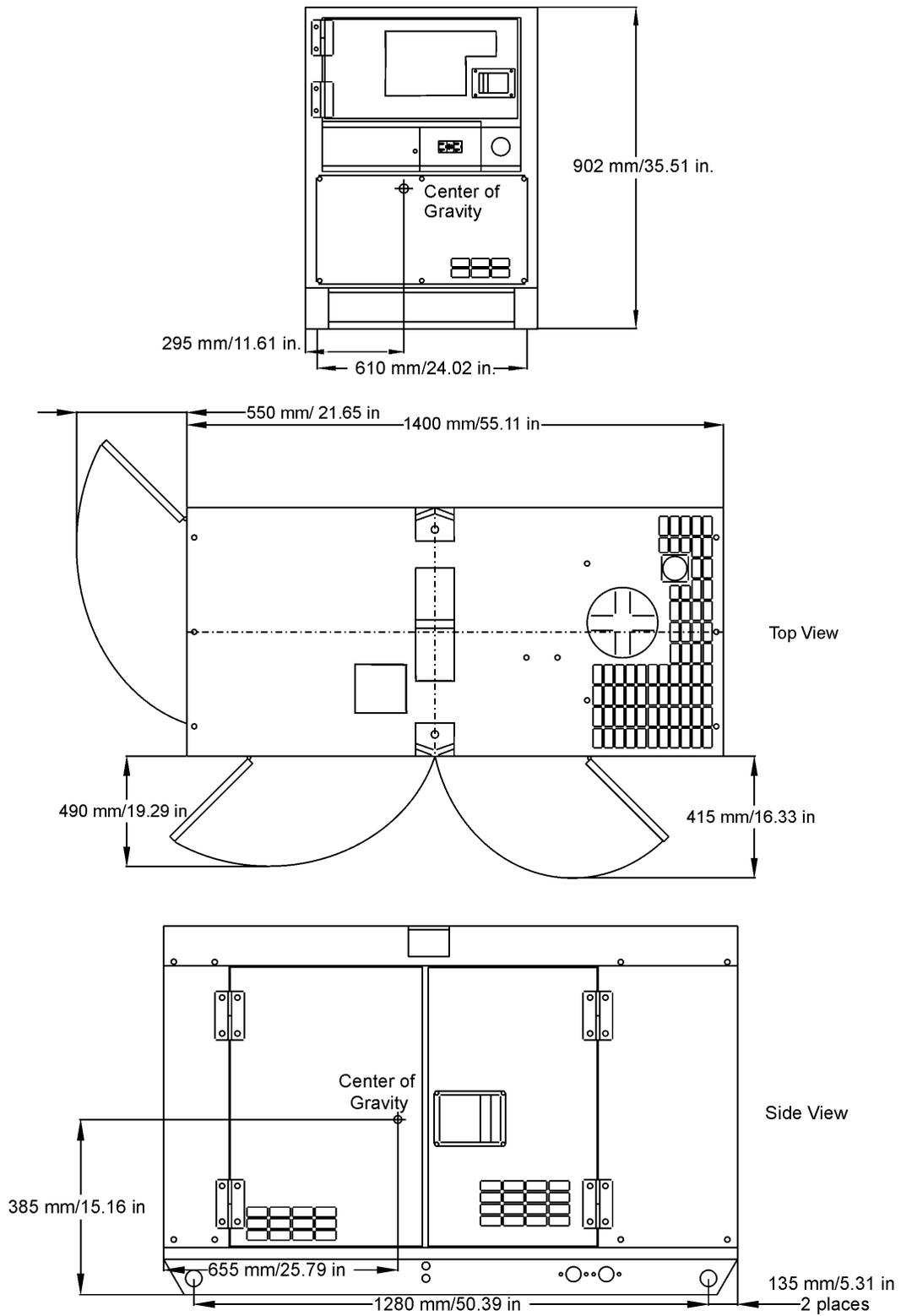
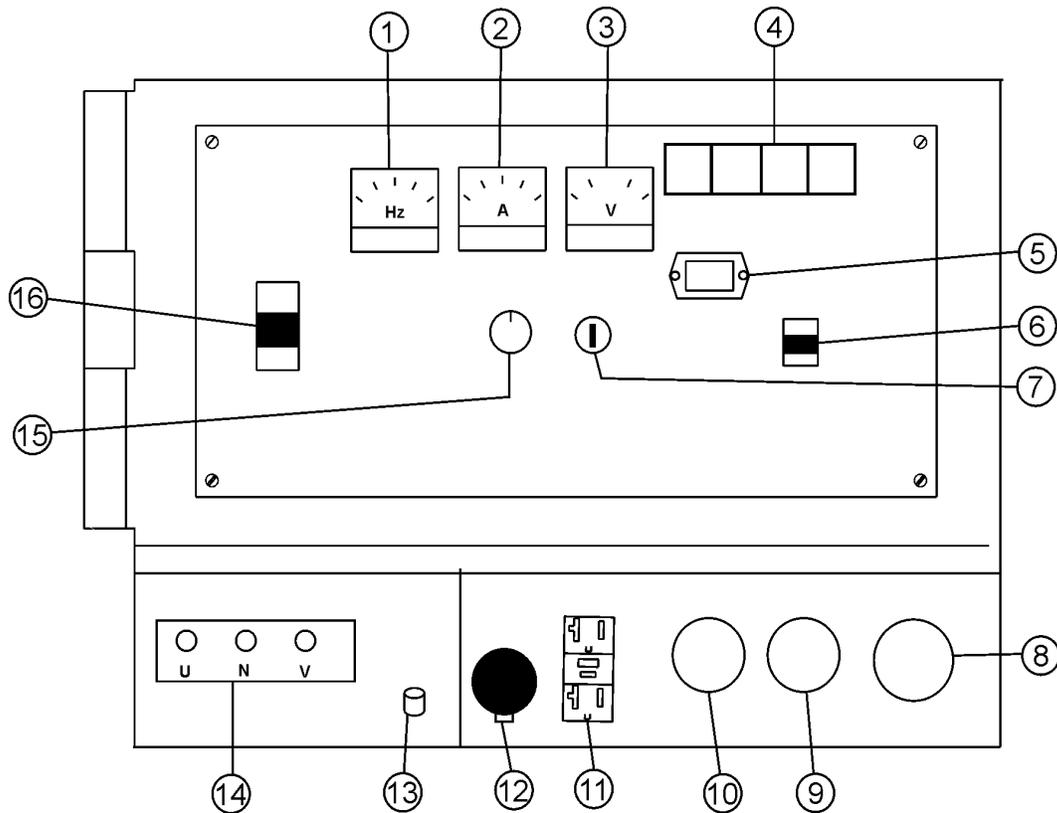


Figure 5. Dimensions



NO.	DESCRIPTION
1	FREQUENCY METER
2	AC AMMETER
3	AC VOLTMETER
4	ENGINE WARNING INDICATOR
5	HOUR METER
6	AC CIRCUIT BREAKER FOR CS6369
7	STARTER SWITCH
8	AC POWER OUTPUT 120/240 50A
9	AC POWER OUTPUT 240V 30A
10	AC POWER OUTPUT 120V 30A
11	AC POWER OUTPUT 120V 20A
12	ENGINE SPEED CONTROL LEVER
13	GROUNDING TERMINAL
14	OUTPUT TERMINAL CONNECTORS
15	VOLTAGE REGULATOR
16	MAIN CIRCUIT BREAKER

Figure 6. Control Panel

The definitions below describe the controls and functions of the DCA-15SPX3 " **Control Panel** "(Figure 6).

1. **Frequency Meter** – Indicates the output frequency in hertz (Hz). Normally 60 Hz \pm 1 Hz.
2. **AC Ammeter** – Indicates the amount of current the load is drawing from the generator.
3. **AC Voltmeter** – Indicates the single phase output voltage present at the U & V terminals.
4. **Engine Warning Indicator**- This engine warning indicator will notify possible damage before it occurs:
 - A. **Oil Pressure** - the light will go on during initial start, but will go out once the engine is warm. If the oil pressure light comes on during operation, this may indicate critical low oil level.
 - B. **Charge Light** - This light indicates the battery is not charging.
 - C. **Water Temperature Light** - This light indicates the coolant temperature is abnormally high.
 - D. **Engine Protection** - This will shut down the engine if there is an abnormal event that may have occurred. This prevents damage to the engine.
5. **Hour Meter** – Indicates the amount of hours the generator has been in operational use.
6. **GFCI Circuit Breaker** – This single-pole, 20 amp breaker is provided to protect the 120 VAC GFCI receptacle from overload.
7. **Starter Switch** - This is to turn on and off the engine with a key.
8. **CS6369 Receptacle** - This locking type receptacle provides 240/120VAC single output voltage, for equipment not exceeding 50 amps.
9. **240 VAC Receptacle** – Provides 240 VAC single phase output voltage, normally used for small power tools that do not exceed 20 amps.
10. **120VAC Receptacle** – Provides 120 VAC single phase output voltage, normally used for small power tools that do not exceed 20 amps.
11. **120VAC Receptacle (GFCI)**- Provides 120 VAC single phase output voltage, normally used for small power tools that do not exceed 20 amps.
12. **Engine Speed Control Lever** - This lever controls the speed of the engine speed from idle to high for maximum rpm.
13. **Ground Terminal** – If required this ground terminal is to be used in conjunction with the GFCI receptacle only.
14. **AC Output Terminals** – These three output terminals (UNV), provide the single phase output voltage to the load source. **NEVER** connect a load to these output terminals when the main circuit breaker is "ON" and the engine is running.
15. **Voltage Adjust Control Knob** – Used to adjust the generator's single phase output voltage at the UNV output terminals. This control knob is to be used in conjunction with the AC voltmeter.
16. **Main Circuit Breaker** – This three-pole, 65 amp main breaker is provided to protect the single phase UNV voltage output from overload.

DCA-15SPX3 — OUTPUT TERMINAL INFORMATION

DCA-15SPX3 FAMILIARIZATION

The Output Terminal panel is provided with the following:

- One GFCI 120 Volt Receptacle, 20 Amp (single-phase)
- 15 kW Output Terminal (UNV)
- Ground Terminal
- Main Circuit Breaker 65 amps
- GFCI Circuit Breaker 20 amps

120 Volt Receptacle

One GFCI Duplex Nema 5-20R (120V, 20 Amp) receptacle is provided on the output terminal. This receptacle can be used anytime the generator is in operation. The receptacle is controlled by the circuit breaker located on the control panel.

Pressing the reset button resets the receptacle after being tripped. Pressing the "Test Button" (See Figure 7) in the center of this receptacle will check the GFCI function. The receptacle should be tested at least once a month.

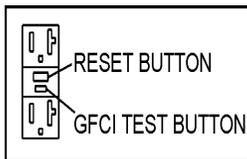


Figure 7. GFCI Test Button

NEMA L5-30R Output Receptacle

The L5-30R receptacle supplies 30 amps at 120 volts. A 30 amp circuit breaker helps protect any load that it is feeding.

NEMA L6-30R Output Receptacle

The L6-30R supplies 30 amps at 240 volts. A 30 amp circuit breaker helps protect any load that it is feeding.

NEMA CS-6369 Output Receptacle

The CS-6369 supplies 50 amps at 120/240 volts. A 50 amp circuit breaker helps protect any load that it is feeding.

Connecting Load

Loads can be connected to the generator by the UNV Lugs or the duplex receptacle (See figure 3). Make sure to read the operation manual before attempting to connect a load to the generator.

Circuit Breakers

The DCA-15SPX3 has a main 65 amp circuit breaker and receptacle circuit breakers that are listed above. The main purpose of the circuit breakers is to protect the load the generator is powering.

Maximum Output

The entire load connected to the UNV Lugs and both slots in the duplex receptacle must not exceed 16.5 kW in standby or 15 kW in prime output.

Maximum Amps

The generator will provide a maximum total amps of 62.5.
Do not exceed the maximum allowed amperage!

DCA-15SPX3 — OUTPUT TERMINAL INFORMATION

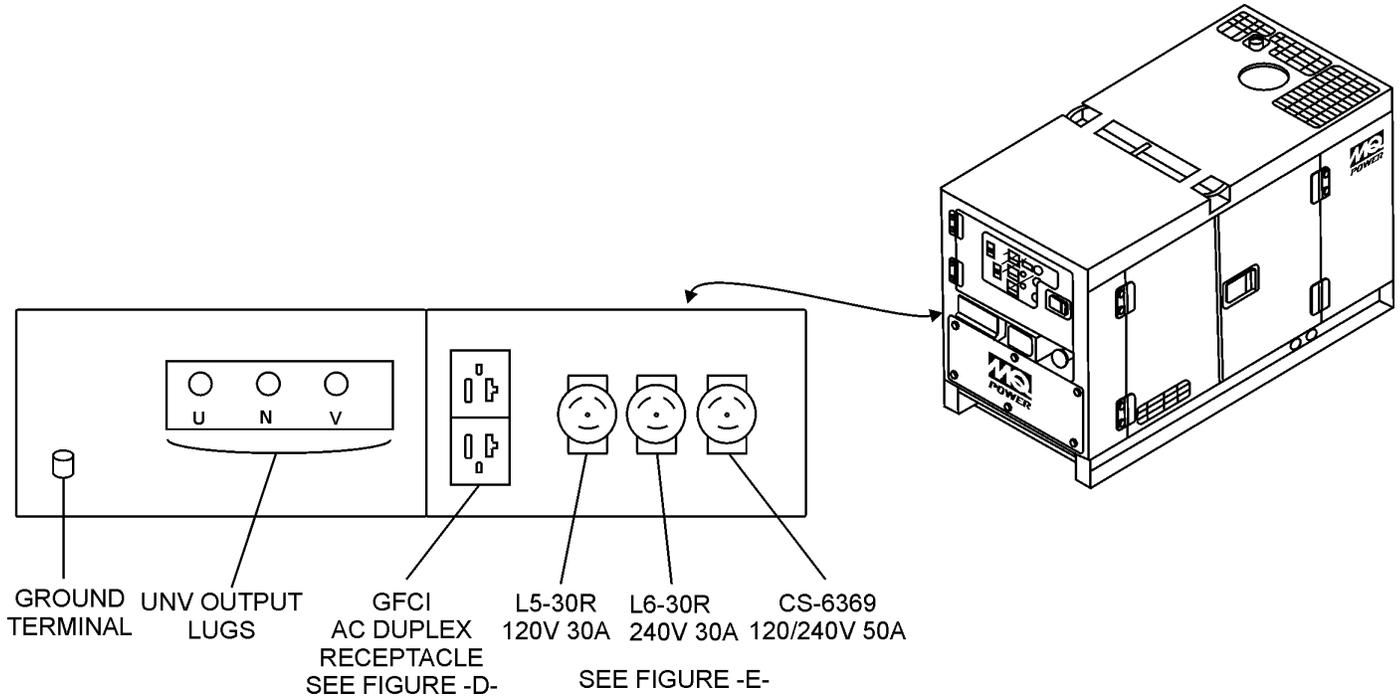


Figure 8. Receptacle Location on Generator

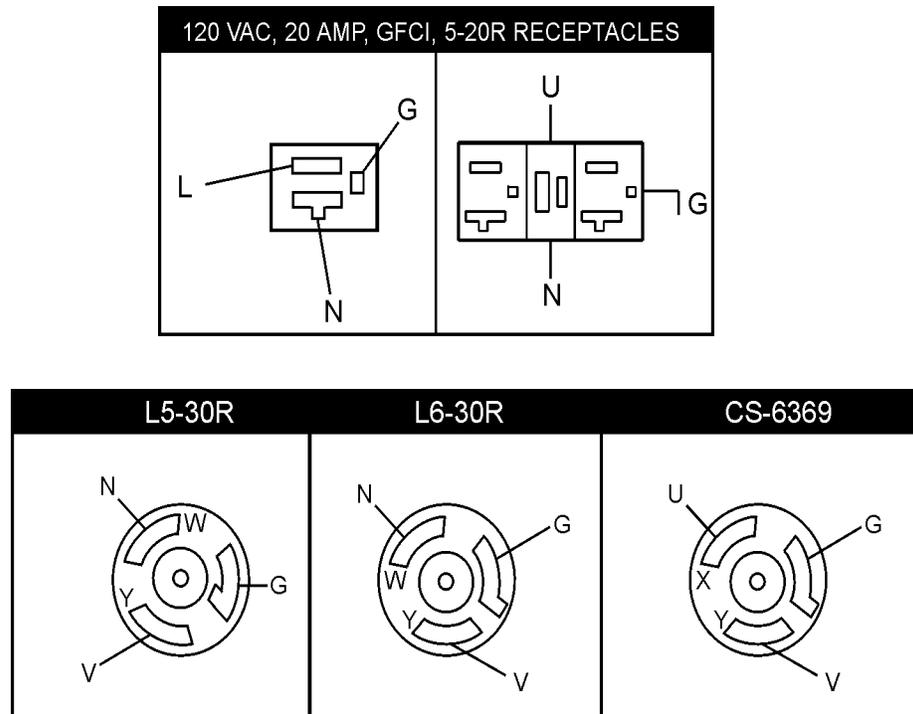


Figure 9. Receptacle Details

DCA-15SPX3 — OUTPUT TERMINAL INFORMATION

120V Hard Wire Hookup

The output terminal panel, when supplying single phase 120 volts, will provide two circuits available at 62.5 amps with any two wires plus the ground. (See Figure 10 below.)

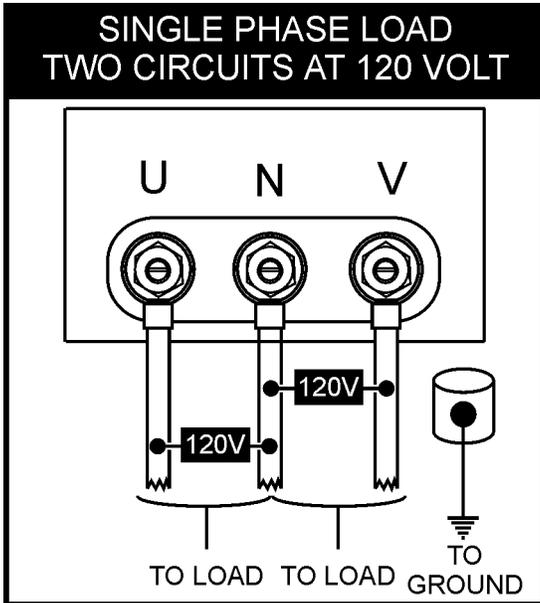


Figure 10. Hard Wire Hookup for 120 Volt

240V Hard Wire Hookup

The output terminal panel, when supplying single phase 240 volts, will provide one circuit available at 62.5 amps with two wires plus the ground. (See Figure 11 below.)

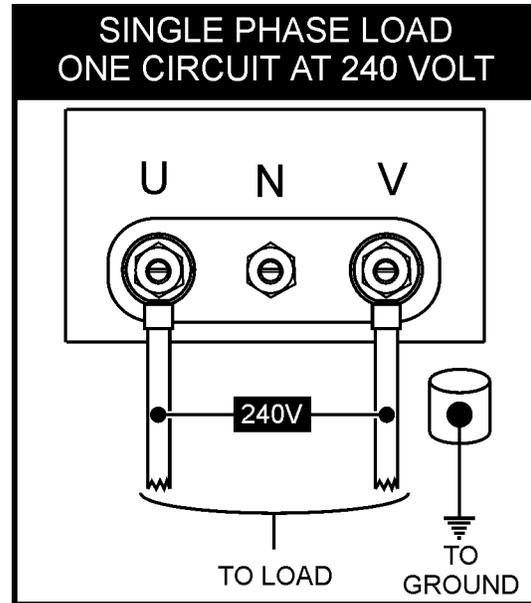


Figure 11. Hard Wire Hookup for 240 Volt

NOTE

When using plural single phase voltages, make sure to balance the load on each of the single phase legs.

Outdoor Installation

Install the generator in a location where it will not be exposed to rain or sunshine. Make sure the generator is on secure level ground so that it cannot slide or shift around. Also install the generator in a manner so that the exhaust will not be discharged in the direction of nearby homes.

The installation site must be relatively free from moisture and dust. All electrical equipment should be protected from excessive moisture. Failure to do will result in deterioration of the insulation and will result in short circuits and grounding.

Foreign materials such as dust, sand, lint and abrasive materials have a tendency to cause excessive wear, to the engine and alternator parts.

CAUTION :



Pay close attention to ventilation when operating the generator inside tunnels and caves. The engine exhaust contains noxious elements. Engine exhaust must be routed to a ventilated area.

Indoor Installation

Exhaust gases from diesel engines are extremely poisonous. Whenever an engine is installed indoors the exhaust fumes must be vented to the outside. The engine should be installed at least two feet from any outside wall. Using an exhaust pipe which is too long or too small can cause excessive back pressure which will cause the engine to overheat.

Eliminate the danger of deadly carbon monoxide gas. Remember that exhaust fumes from any diesel engine are very poisonous if discharged in a closed room, but harmless if allowed to mix with the outside air. If the generator is installed indoors, you must make provisions from venting the engine exhaust to the outside of the building.

DO NOT cover ventilation areas on the enclosure. Covering the ventilation grids will cause the engine to overheat.

CAUTION :



An electric shock is apt to happen when vibrators are used. Pay close attention to handling when operating vibrators and always use rubber boots and gloves to insulate the body from electrical shock.

Generator Grounding

To guard against electrical shock and possible damage to the equipment, it is important to provide a good EARTH ground.

Article 250 (Grounding) of the National Electrical Code (NEC) provides guide lines for proper grounding and specifies the cable ground shall be connected to the grounding system of the building as close to the point of cable entry as practical.

NEC articles 250-64(b) and 250-66 set the following grounding requirements:

1. Use one of the following wire types to connect the generator to earth ground.
 - a. Copper - 10 AWG (5.3 mm²) or larger.
 - b. Aluminum - 8 AWG (8.4 mm²) or larger.
2. When grounding the generator (Figure 12) connect the ground cable between the lock washer and the nut on the generator and tighten the nut fully. Connect the other end of the ground cable to earth ground.
3. NEC article 250-52(c) specifies that the earth ground rod should be buried a minimum of 8 ft. into the ground.

NOTE

When connecting the generator to any buildings electrical system **ALWAYS** consult with a licensed electrician.

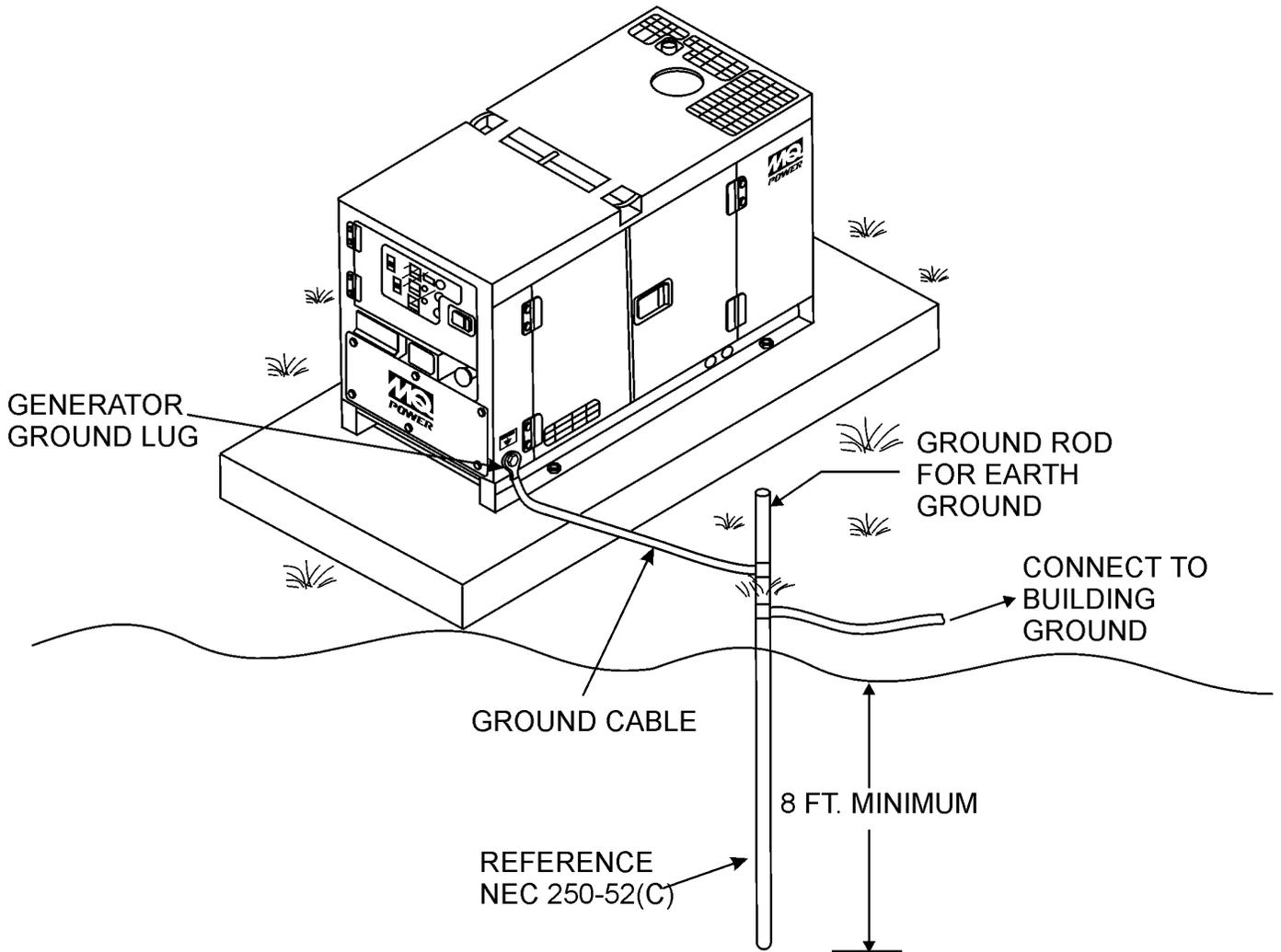


Figure 12. Typical Generator Grounding Application

CAUTION :



Always check local codes for proper grounding codes and laws.

General Inspection Prior to Operation

The DCA-15SPX3 generator has been thoroughly inspected and accepted prior to shipment from the factory. However, be sure to check for damaged parts or components, or loose nuts and bolts, which could have occurred in transit.

Extension Cable

When electric power is to be provided to various tools or loads at some distance from the generator, extension cords are normally used. Cables should be sized to allow for distance in length and amperage so that the voltage drop between the generator and point of use (load) is held to a minimum. Use Table 6 (cable selection guide) as a guide for selecting proper cable size.

Circuit Breaker

To protect the generator from an overload, a 3-pole, 65 amp, **main** circuit breaker is provided to protect the UNV output from overload. In addition a 2-pole, 20 amp **GFCI** circuit breaker is provided to protect the GFCI receptacle from overload. Make sure to switch both circuit breakers to the "OFF" position prior to starting the engine.

NOTE

ALWAYS consult with a licensed electrician for correct extension cord wire size.

Table 6. Cable Selection (60 Hz, Single Phase Operation)

Current in Amperes	Load In Watts		Maximum Allowable Cable Length			
	At 120 Volts	At 240 Volts	#10 Wire	#12 Wire	#14 Wire	#16 Wire
2.5	300	600	1000 ft.	600 ft.	375 ft.	250 ft.
5	600	1200	500 ft.	300 ft.	200 ft.	125 ft.
7.5	900	1800	350 ft.	200 ft.	125 ft.	100 ft.
10	1200	2400	250 ft.	150 ft.	100 ft.	
15	1800	3600	150 ft.	100 ft.	65 ft.	
20	2400	4800	125 ft.	75 ft.	50 ft.	
CAUTION: Equipment damage can result from low voltage.						

Lubrication Oil

Fill the engine crankcase with lubricating oil through the filler hole, but do not overfill. Make sure the generator is level. With the dipstick inserted all the way, but without being screw into the filler hole, verify that the oil level is maintained between the two notches (Figure 13) on the dipstick. See Table 7 for proper selection of engine oil.

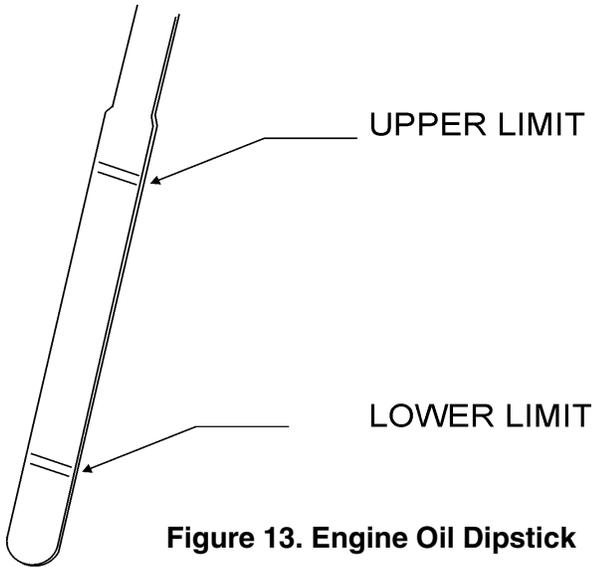


Figure 13. Engine Oil Dipstick

When checking the engine oil, be sure to check if the oil is clean and viscous. If the oil is not clean, drain the oil by removing the oil drain plug, and refill with the specified amount of oil as outlined in the Kubota Engine Owner's Manual.

Fuel

Fill the fuel tank with clean and fresh **diesel fuel**. **DO NOT** fill the tank beyond capacity.

Pay attention to the fuel tank capacity when replenishing fuel. Refer to the fuel tank capacity listed on page 19 Specification Table 5.

The fuel tank cap must be closed tightly after filling. Handle fuel in a safety container. If the container does not have a spout, use a funnel. Wipe up any spilled fuel immediately.

CAUTION :



Never fill the fuel tank while the engine is running or in the dark. Gasoline spillage on a hot engine can cause a fire or explosion. If gasoline spillage occurs, wipe up the spilled gasoline completely to prevent fire hazards.

Coolant

Use only drinkable tap water. If hard water or water with many impurities is used, the inside of the engine and radiator may become coated with deposits and cooling efficiency will be reduced. See maintenance section on page XX and XX on instructions to flush out radiator.

An anticorrosion additive added to the water will help prevent deposits and corrosion in the cooling system.

Table 7. Recommended Motor Oil

Temperature Range	Type Oil
104° F ~ 23° F (40° C ~ -5°C)	SAE 30
23° F ~ 5° F (-5° C ~ -15°C)	SAE 20 or SAE 10W-30
Below 5° C (-15°)	SAE 10W or SAE 10W-30

CAUTION :



When adding coolant or antifreeze to the radiator, do not remove the radiator cap until the unit has completely cooled.

Day-to-day addition of coolant is done from the reserve tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 8. for engine, radiator, and reserve tank coolant capacities. Make sure the coolant level in the reserve tank is always between the "H" and the "L" markings.

Table 8. Coolant Capacity

Engine and Radiator	1.11 Gal. (4.2L)
Reserve Tank	0.26 Gal. (1L)

Operation in Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze (Table 9) has been added.

Table 9. Anti-Freeze Operating Temperatures

Vol % Anti-Freeze	Freezing Point		Boiling Point	
	°C	°F	°C	°F
40	-24	-12	106	222
50	-37	-34	108	226

NOTE

When the antifreeze is mixed with water, the antifreeze mixing ratio must be less than 50%.

Cleaning the Outer Radiator

The engine may overheat if the radiator fins become overloaded with dust or debris. Periodically clean the radiator fins with compressed air. Cleaning inside the radiator is dangerous, so clean only with the engine turned off and the battery disconnected.

Air Cleaner

Periodic cleaning/replacement is necessary. Inspect it in accordance with the **Kubota Engine Owner's Manual**.

Fan Belt Tension

A slack fan belt may contribute to overheating, or to insufficient charging of the battery. Inspect the fan belt for damage and wear and adjust it in accordance with the **Kubota Engine Owner's Manual**.

The fan belt tension is proper if the fan belt bends 10 to 15 mm (Figure 14) when depressed with the thumb as shown below. Never place hands near the belts or fan while the generator is running.

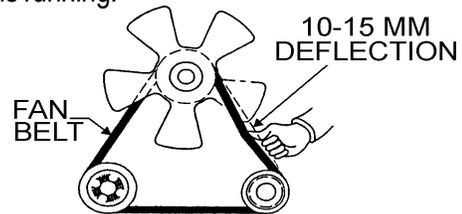


Figure 14. Fan Belt Tension

CAUTION :



Never place hands near the belts or fan while the generator set is running.

Adjusting Fan Belt

If the fan belt does not have the 10 to 15mm deflection follow the procedure below to adjust:

Loosen the alternator adjusting plate and alternator mounting bolt.

Pivot the alternator at the mounting bolt toward the engine left or right until the belt reflects the proper tension.

Tighten the mounting bolt and the adjusting bolt.

Battery

This unit is of negative ground. **DO NOT** connect in reverse. Always maintain battery fluid level between the specified marks. Battery life will be shortened, if the fluid level is not properly maintained. Add only distilled water when replenishment is necessary. **DO NOT** over fill.

The battery is sufficiently charged if the specific gravity of the battery fluid is 1.28 (at 68° F). If the specific gravity should fall to 1.245 or lower, it indicates that the battery is dead and needs to be recharged or replaced.

Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions. Always keep the terminals firmly tightened. Coating the terminals with a thin film of grease will help to inhibit corrosion.

Battery Cable Installation

ALWAYS be sure the battery cables (Figure 15) are properly connected to the battery terminals as shown below. The **RED** cable is connected to the positive terminal of the battery, and the **BLACK** cable is connected to the negative terminal of the battery.

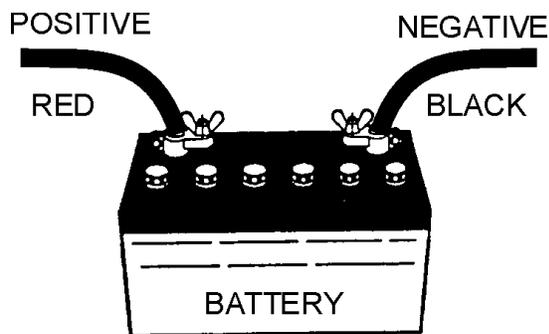


Figure 15. Battery Connections

CAUTION :



If the battery cable is connected incorrectly, damage to the generator will occur. Pay close attention to the polarity of the battery when connecting the battery.

When connecting battery do the following:

1. **DO NOT** connect the battery cables to the battery terminals when the key is in the ignition and is set in 'START' mode. **ALWAYS** remove the key from the ignition and the ignition switch is in the OFF position when connecting the battery.
2. Place a small amount of grease around both battery terminals. This will ensure a good connection and will help prevent corrosion around the battery terminals.

CAUTION :



Inadequate battery connections may cause poor starting of the generator, and create other malfunctions.

Wiring

Inspect the entire generator for bad or worn electrical wiring or connections. If any wiring or connections are exposed (insulation missing) replace wiring immediately.

Piping and Hose Connection

Inspect all piping, oil hose, and fuel hose connections for wear and tightness. Tighten all hose clamps and check hoses for leaks.

If any hose (fuel or oil) lines are defective replace them immediately.

Single Phase, Load

Always be sure to check the nameplate on the generator and equipment to insure the wattage, amperage and frequency requirements are satisfactorily supplied by the generator for operating the equipment.

Generally, the wattage listed on the nameplate of the equipment is its rated output. Equipment may require 130—150% more wattage than the rating on the nameplate, as the wattage is influenced by the efficiency, power factor and starting system of the equipment.

NOTE

If wattage is not given on the equipment's name plate, approximate wattage may be determined by multiplying nameplate voltage by the nameplate amperage.

$$\text{WATTS} = \text{VOLTAGE} \times \text{AMPERAGE}$$

The power factor of this generator is 1.0. See Table 10. below when connecting loads.

Type Of Load	Power Factor
Single-phase induction motors	0.4 - 0.75
Electric heaters, incandescent lamps	1.0
Fluorescent lamps, mercury lamps	0.4 - 0.9
Electronic devices, communication equipment	1.0

CAUTION:



Motors and motor-driven equipment draw much greater current for starting than during operation.

An inadequate size connecting cable which cannot carry the required load can cause a voltage drop which can burn out the appliance or tool and overheat the cable.

- When connecting a resistance load such as an incandescent lamp or electric heater, a capacity of up to the generating set's rated output (kW) can be used.
- When connecting a fluorescent or mercury lamp, a capacity of up to the generating set's rated output (kW) multiplied by 0.6 can be used.
- When connecting an electric drill or other power tools, pay close attention to the required starting current capacity.

When connecting ordinary power tools, a capacity of up to the generating set's rated output (kW) multiplied by 0.8 can be used.

CAUTION:



Before connecting this generator to any building's electrical system, a licensed electrician must install an isolation (transfer) switch. Serious injury or death may result without this transfer switch.

DCA-15SPX3 — GENERATOR START-UP PROCEDURE

WARNING:



The engine's exhaust contains harmful emissions. **ALWAYS** ventilate the exhaust when operating inside tunnels, excavations or buildings. Direct exhaust away from nearby personnel.

Before Starting

Engine

1. Check the lubricating oil level prior to starting the engine. Make sure the generator is level. The oil level must be maintained between two notches on the dipstick.
2. When there is not enough lubricating oil, fill the crankcase with high grade motor oil. Use a high quality detergent oil classified CC or higher (See Table 7 on page 29).
3. Check the coolant level in the radiator and subtank. Replenish with antifreeze as necessary. Always maintain the coolant level between the **FULL** and **LOW** markings on the coolant container. Be sure that the radiator cap is fastened securely.
4. Check the fuel level on the fuel gauge. If fuel is low, fill the fuel tank with clean fresh unleaded automotive diesel fuel. If fuel spillage occurs, clean immediately.

Before Starting

Generator and Control Panel

CAUTION:



NEVER start the engine with the *main* or *GFCI* circuit breakers in the **ON** position.

1. Be sure to disconnect the electrical load and switch the *main* and *G.F.C.I.* circuit breakers (Figure 16) to the "OFF" position prior to starting the engine.

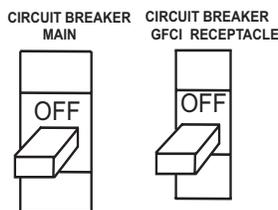


Figure 16. Main and GFCI Circuit Breakers

2. Connect the load to the UNV terminals as shown in Figure 17. These terminals can be found on the front of the generator by lifting the UNV lug cover. It may be necessary to remove the retaining lug that secures the cover. Make sure to tighten terminal nuts securely to prevent load wires from slipping out.

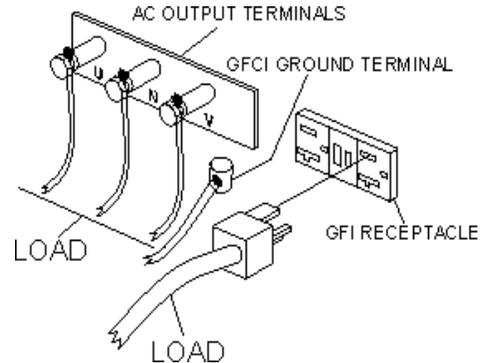


Figure 17. UNV Terminal Lugs (Load)

3. After attaching the load wires to the AC output terminals, secure the UNV cover by inserting the retaining screw (Figure 18) back into the cover.

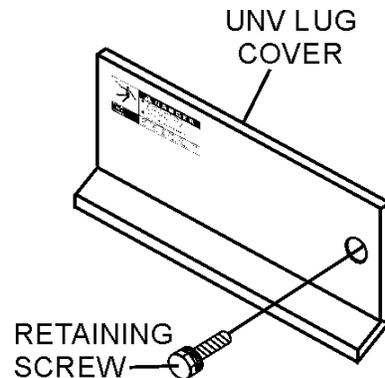


Figure 18. UNV Lug Cover

DCA-15SPX3 — GENERATOR START-UP PROCEDURE

4. Connect the negative battery cable (BLACK) to the negative post on the battery (Figure 19).

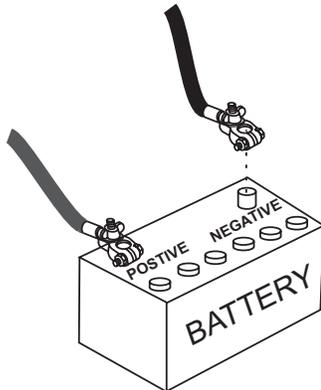


Figure 19. Battery Connections

5. Close all engine enclosure doors (Figure 20).

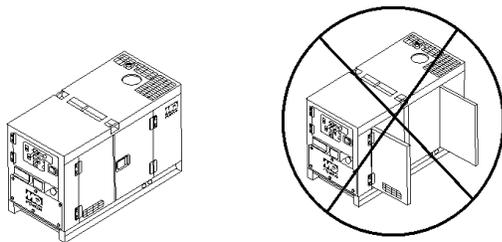


Figure 20. Engine Enclosure Doors

6. Check the engine speed throttle lever is pushed in (low speed) (Figure 21).

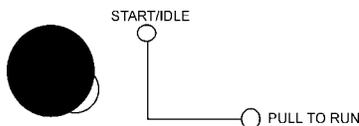


Figure 21. Engine Throttle Lever (LOW)

7. Turn the key to preheat until the engine warms up (for 3-5 minutes). Then turn the key to the right until the engine starts. Release the key to the 'run' mode (Figure 22).

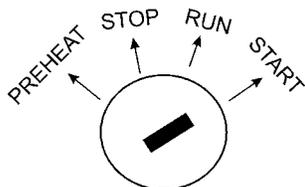


Figure 22. Ignition Switch (START)

8. Pull the lever and turn to the right to increase the engine speed. (Figure 23).

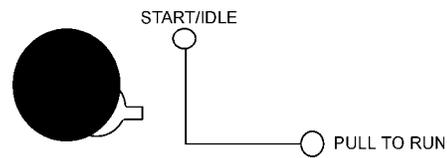


Figure 23. Engine Throttle Lever (HIGH)

9. The generator's voltage meter (Figure 24) displays the 120 VAC in **VOLTS**. If the voltage is not within the specified frequency tolerance, use the voltage adjustment control knob to the right of voltage meter to bring the voltage within range.

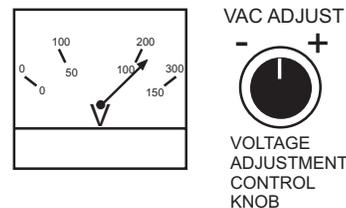


Figure 24. Voltage Meter/ Adjustment Control Knob

10. The ammeter (Figure 25) will indicate zero amps with no load applied. When a load is applied, this meter will indicate the amount of current that the load is drawing from the generator.

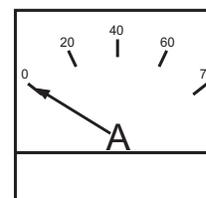


Figure 25. Ammeter (No Load)

DCA-15SPX3 — GENERATOR START-UP PROCEDURE

11. If there are no abnormal problems shown on the engine indicator, turn both the MAIN and GFCI circuit breakers to their ON position (Figure 26).

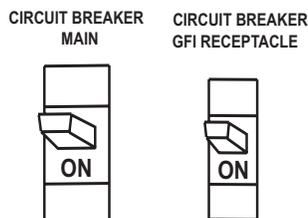


Figure 26. Main and GFCI Circuit Breakers

12. Observe the generator's ammeter (Figure 27) and verify that it reads the anticipated amount of current with respect to the load. Remember the ammeter will only display a current reading if the load is in use.

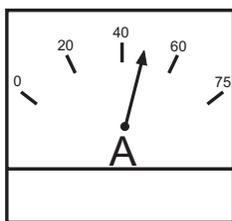


Figure 27. Ammeter (Load)

13. The generator will run until manually stopped or an abnormal condition occurs.

Engine Shutdown

To shutdown the generator use the following procedure:

1. Place both the **MAIN** and **GFCI** circuit breakers to the "OFF position"
2. Turn the engine throttle lever to the left and push in to decrease the engine speed.
3. Let the engine run 3-5 minutes with no load applied.
4. Turn the key to the left to stop the engine (Figure 28).

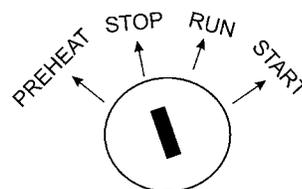


Figure 28. Ignition Switch (STOP)

5. Remove the load from the UNV terminal strip (Figure 14).

General Inspection

Prior to each use, the generator should be cleaned and inspected for deficiencies. Check for loose, missing or damaged nuts, bolts or other fasteners. Also check for fuel, oil, and coolant leaks.

Engine Side (Refer to the Engine Instruction Manual)

Air Cleaner

Every 50 hours: Remove air cleaner element and clean heavy duty paper element with kerosene, or foam element with liquid detergent and hot water. Wrap foam element in a cloth and squeeze dry. For heavy duty paper element, wipe excess kerosene with towel.

Fuel Addition

Add diesel fuel (the grade may vary according to season and locations). Always pour through the mesh filter.

Removing Water from the Fuel Tank

After prolonged use, water and other impurities accumulate in the bottom of the tank. Occasionally remove the drain cock and drain the contents. During cold weather, the more empty volume inside the tank, the easier it is for water to condense. This can be reduced by keeping the tank full as much as possible.

Air Removal

If air enters the fuel injection system of a diesel engine, starting becomes impossible. After running out of fuel, or after disassembling the fuel system, bleed the system according to the following procedure.

To restart after running out of fuel, turn the switch to the "ON" position for 15-30 seconds. Try again, if needed. This unit is equipped with an automatic air bleeding system.

Service Daily

If the engine is operating in very dusty or dry grass conditions, a clogged air cleaner will result. This can lead to a loss of power, excessive carbon buildup in the combustion chamber in high fuel consumption.

Cleaning the Fuel Strainer

Clean the fuel strainer if it contains dust or water. Remove dust or water in the strainer cap and wash it in gasoline. Securely fasten the fuel strainer cap so that fuel will not leak. Check the fuel strainer every 200 hours of operation or once a month.

Check Oil Level

Check the crankcase oil level prior to each use, or when the fuel tank is filled. Insufficient oil may cause severe damage to the engine. Make sure the generator is level. The oil level must be between the two notches on the dipstick as shown in Figure 8, page 29.

Replacing Oil Filter

- Detach the oil filter cartridge with a filter wrench.
- Apply a film of oil to the gasket for the cartridge.
- Screw in the cartridge by hand. When the gasket is in contact with the seal surface, tighten the cartridge one or two more times by hand.
- After the oil cartridge has been replaced, the engine oil will drop slightly. Run the engine for a while and check for leaks before adding more oil if needed. Clean excessive oil from engine.

Replacing Fuel Filter

- Replace the fuel filter cartridge with new one every 400 hours or so.
- Apply fuel oil thinly over the gasket and hand-tighten the cartridge into position.
- Vent any air.

Flushing Out Radiator and Replacing Coolant

- Open both cocks located at the crankcase side and at the lower part of the radiator and drain coolant. Open the radiator cap while draining. Remove the overflow tank and drain.
- Check hoses for softening and kinks. Check clamps for signs of leakage.
- Flush the radiator by running clean tap water through radiator until signs of rust and dirt are removed. **DO NOT** clean radiator core with any objects, such as a screwdriver.
- Tighten both cocks and replace the overflow tank.
- Replace with coolant (see page 30, Table 5 for mixture).
- Close radiator cap tightly.

CAUTION :



Allow engine to cool when flushing out radiator. Flushing the radiator while hot will damage radiator.

Generator Storage

For storage of the generator for over 30 days, the following is required:

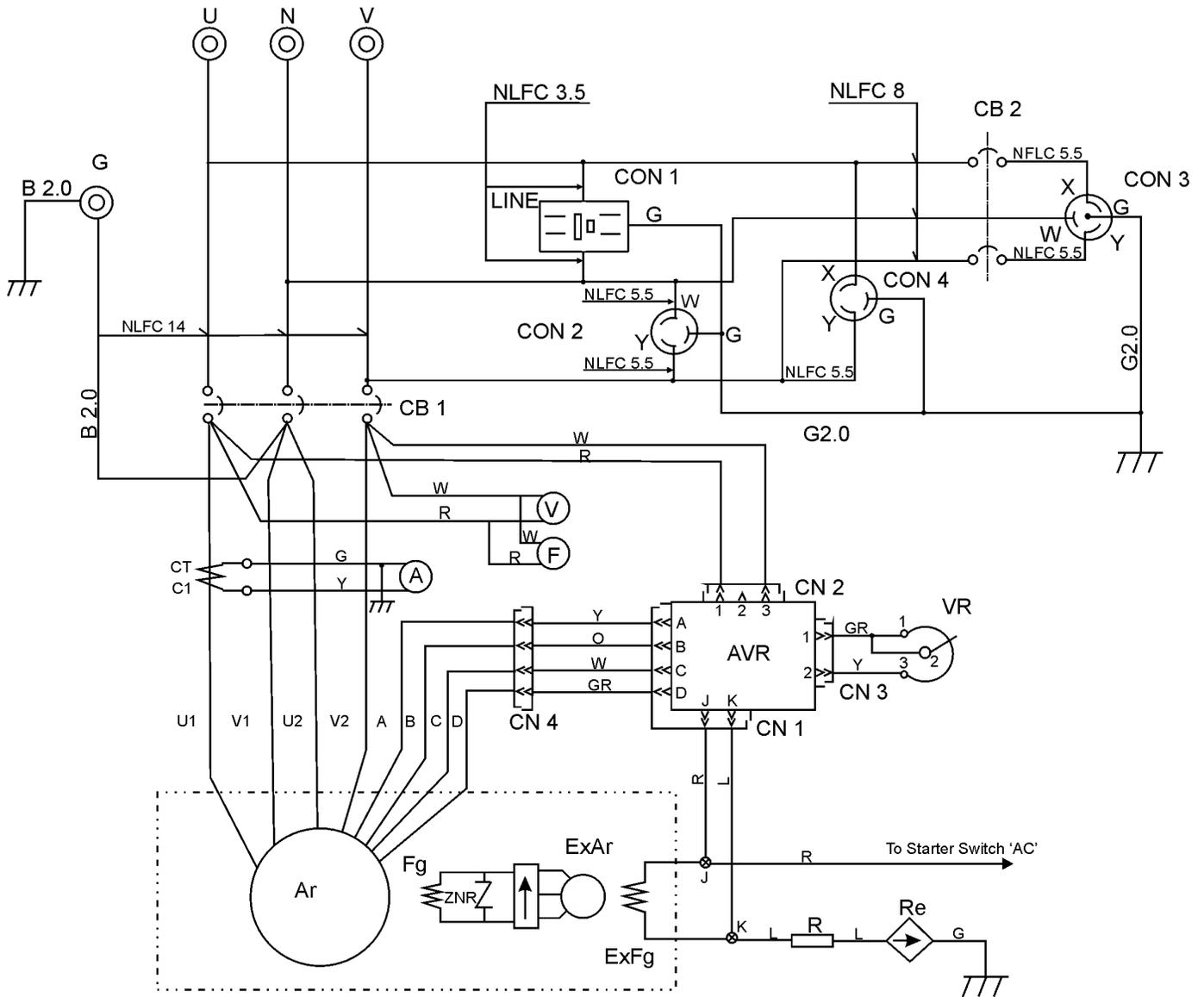
- Fill the fuel tank completely.
- Completely drain the oil from the crankcase and refill with fresh oil.
- Clean all external parts of the generator with a cloth.
- Cover the generating set and store in a clean, dry place.

INSPECTION / MAINTENANCE		10 Hrs DAILY	250 Hrs	500 Hrs	1000 Hrs
ENGINE	Check Engine Fluid Levels	X			
	Check Air Cleaner	X			
	Check Battery Acid Level	X			
	Check Fan Belt Condition	X			
	Check for Leaks	X			
	Check for Loosening of Parts	X			
	Replace Engine Oil and Filter *1		X		
	Clean Air Filter		X		
	Drain Bottom of Fuel Tank		X		
	Clean Unit, Inside and Outside		X		
	Change Fuel Filter *2			X	
	Clean Radiator and Check Coolant Protection Level			X	
	Replace Air Filter Element				X
	Change Corrosion Resistor				X
	Check all Hoses and Clamps				X
Clean Inside of Fuel Tank				X	
GENERATOR	Measure Insulation Resistance Over 3M ohms		X		

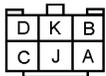
*1 Replace engine oil and filter at 100 hours, first time only.

*2 Replace fuel filter at 250 Hours, first time only.

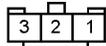
DCA-15SPX3 —GENERATOR WIRING DIAGRAM



Connector
(View at Wiring Side)



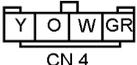
CN 1



CN 2



CN 3



CN 4

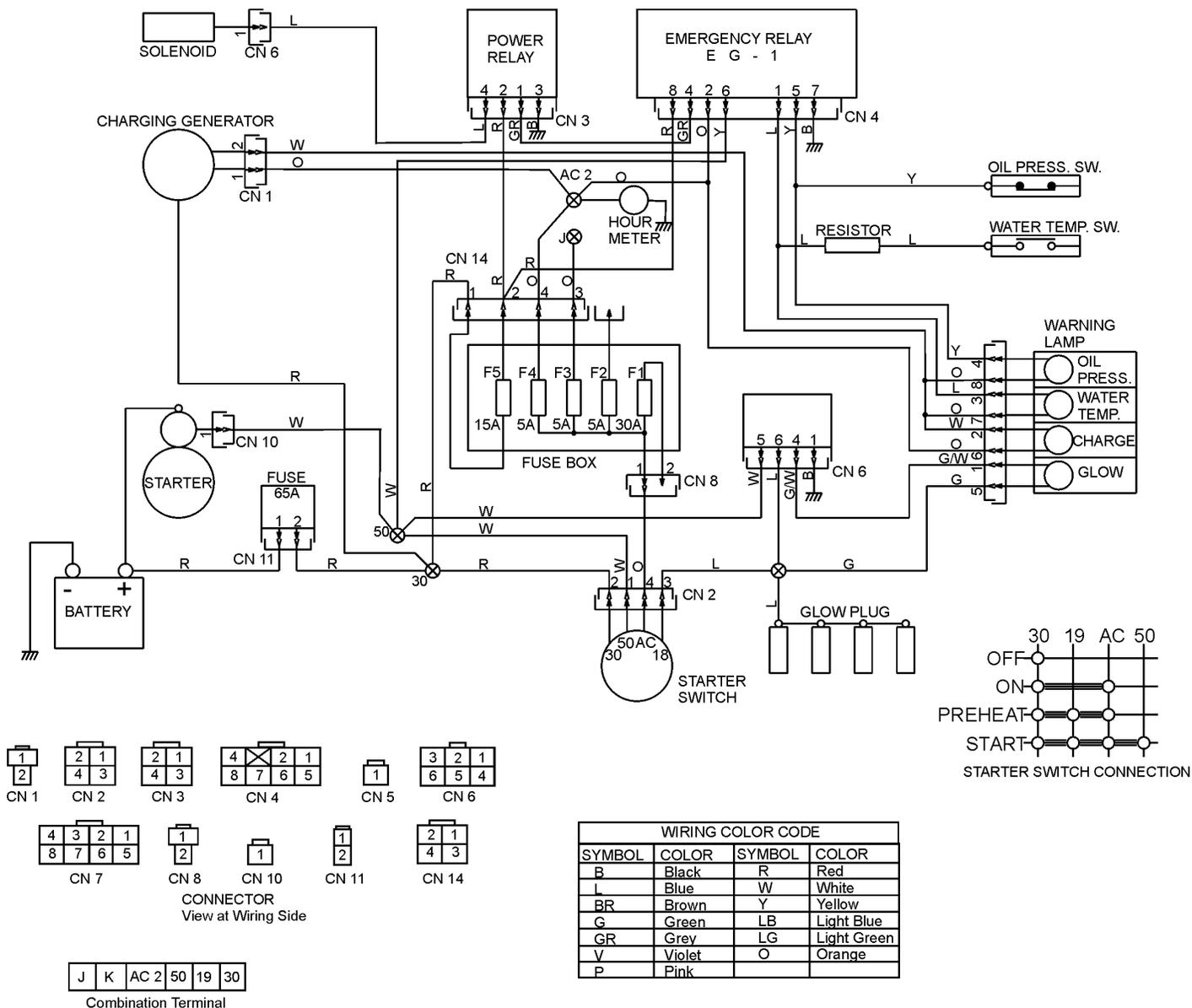
WIRING COLOR CODE			
SYMBOL	COLOR	SYMBOL	COLOR
B	Black	R	Red
L	Blue	W	White
BR	Brown	Y	Yellow
G	Green	LB	Light Blue
GR	Grey	LG	Light Green
V	Violet	O	Orange
P	Pink		

J	K	AC	50	19	30
---	---	----	----	----	----

Combination Terminal

SYMBOL	PARTS NAME
Ar	Armature Coil
Fg	Field Coil
ExAr	Armature Exciter
ExFg	Field Exciter
Re	Rectifier
R	Resistor
Y	AC Voltmeter
A	AC Ammeter
F	Frequency Meter
CT	Current Transformer, Ammeter
CB1,2	Circuit Breaker
CON1,2,3,4	Output Receptacle
AVR	Automatic Voltage Regulator
VR	Voltage Regulator
⊙ U,V,W,O	Output Terminal
⊗ J,K	Combination Terminal
⊙ G	Ground Terminal

DCA-15SPX3 —ENGINE WIRING DIAGRAM



DCA-15SPX3 — TROUBLESHOOTING (ENGINE)

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, please take a remedial action following the

diagnosis based on the Engine Troubleshooting (Table 11) information shown below and on the preceding page. If the problem cannot be remedied, please consult our company's business office or service plant.

TABLE 11. ENGINE TROUBLESHOOTING

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Engine does not start.	No fuel?	Replenish fuel.
	Air in the fuel system?	Bleed system.
	Water in the fuel system?	Remove water from fuel tank.
	Fuel pipe clogged?	Clean fuel pipes.
	Fuel filter clogged?	Clean or change fuel filter.
	Excessively high viscosity of fuel or engine oil at low temperature?	Use the specified fuel or engine oil.
	Fuel with low cetane number?	Use the specified fuel.
	Fuel leak due to loose injection pipe retaining nut?	Tighten nut.
	Incorrect injection timing?	Adjust.
	Fuel cam shaft worn?	Replace.
	Injection nozzle clogged?	Clean injection nozzle.
	Injection pump malfunctioning?	Repair or replace.
	Seizure of crankshaft, camshaft, piston, cylinder liner or bearing?	Repair or replace.
	Compression leak from cylinder?	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder.
	Improper valve timing?	Correct or replace timing gear.
Piston ring and liner worn?	Replace.	
Excessive valve clearance?	Adjust.	
Engine will not crank.	Battery discharged?	Charge battery.
	Starter malfunctioning?	Repair or replace.
	Wiring disconnected?	Connect wiring.

TABLE 11. ENGINE TROUBLESHOOTING (CONTINUED)

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Engine revolution is not smooth.	Fuel filter clogged or dirty?	Clean or change.
	Air cleaner clogged?	Clean or change.
	Fuel leak due to loose injection pipe retaining nut?	Tighten nut.
	Injection pump malfunctioning?	Repair or replace.
	Incorrect nozzle opening pressure?	Adjust.
	Injection nozzle stuck or clogged?	Repair or replace.
	Fuel over flow pipe clogged?	Clean.
	Governor malfunctioning?	Repair.
Either white or blue exhaust gas is observed.	Excessive engine oil?	Reduce to the specified level.
	Piston ring and liner worn or stuck?	Repair or replace.
	Incorrect injection timing?	Adjust.
	Deficient compression?	Adjust top clearance.
Either black or dark gray exhaust gas is observed.	Overload?	Lessen the load.
	Low grade fuel used?	Use the specified fuel.
	Fuel filter clogged?	Clean or change.
	Air cleaner clogged?	Clean or change.
	Deficient nozzle injection?	Repair or replace the nozzle.
Deficient output.	Incorrect injection timing?	Adjust.
	Engine's moving parts seem to be seizing?	Repair or replace.
	Uneven fuel injection?	Repair or replace the injection pump.
	Deficient nozzle injection?	Repair or replace the nozzle.
	Compression leak?	Replace head gasket, tighten cylinder head bolt, glow plug and nozzle holder.

DCA-15SPX3 — TROUBLESHOOTING (GENERATOR)

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, please take a remedial action following the

diagnosis based on the Generator Troubleshooting (Table 12) information shown below and on the preceding page. If the problem cannot be remedied, please consult our company's business office or service plant.

TABLE 17. GENERATOR TROUBLESHOOTING

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
No Voltage Output	AC Voltmeter defective?	Check output voltage using a voltmeter.
	Is wiring connection loose?	Check wiring and repair.
	Is AVR defective?	Replace if necessary.
	Defective Rotating Rectifier?	Check and replace.
Low Voltage Output	Is engine speed correct?	Turn engine throttle lever to "High".
	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short Circuit in load?	Check load and repair.
	Over current?	Confirm load requirements and reduce.
	Defective circuit breaker?	Check and replace.
	Over current Relay actuated?	Confirm load requirement and replace.

EXPLANATION OF CODE IN REMARKS COLUMN

How to read the marks and remarks used in this parts book.

Items Found In the “Remarks” Column

Serial Numbers-Where indicated, this indicates a serial number range (inclusive) where a particular part is used.

Model Number-Where indicated, this shows that the corresponding part is utilized only with this specific model number or model number variant.

Items Found In the “Items Number” Column

All parts with same symbol in the number column, *, #, +, %, or ■, belong to the same assembly or kit.

Note: If more than one of the same reference number is listed, the last one listed indicates newest (or latest) part available.

NOTE

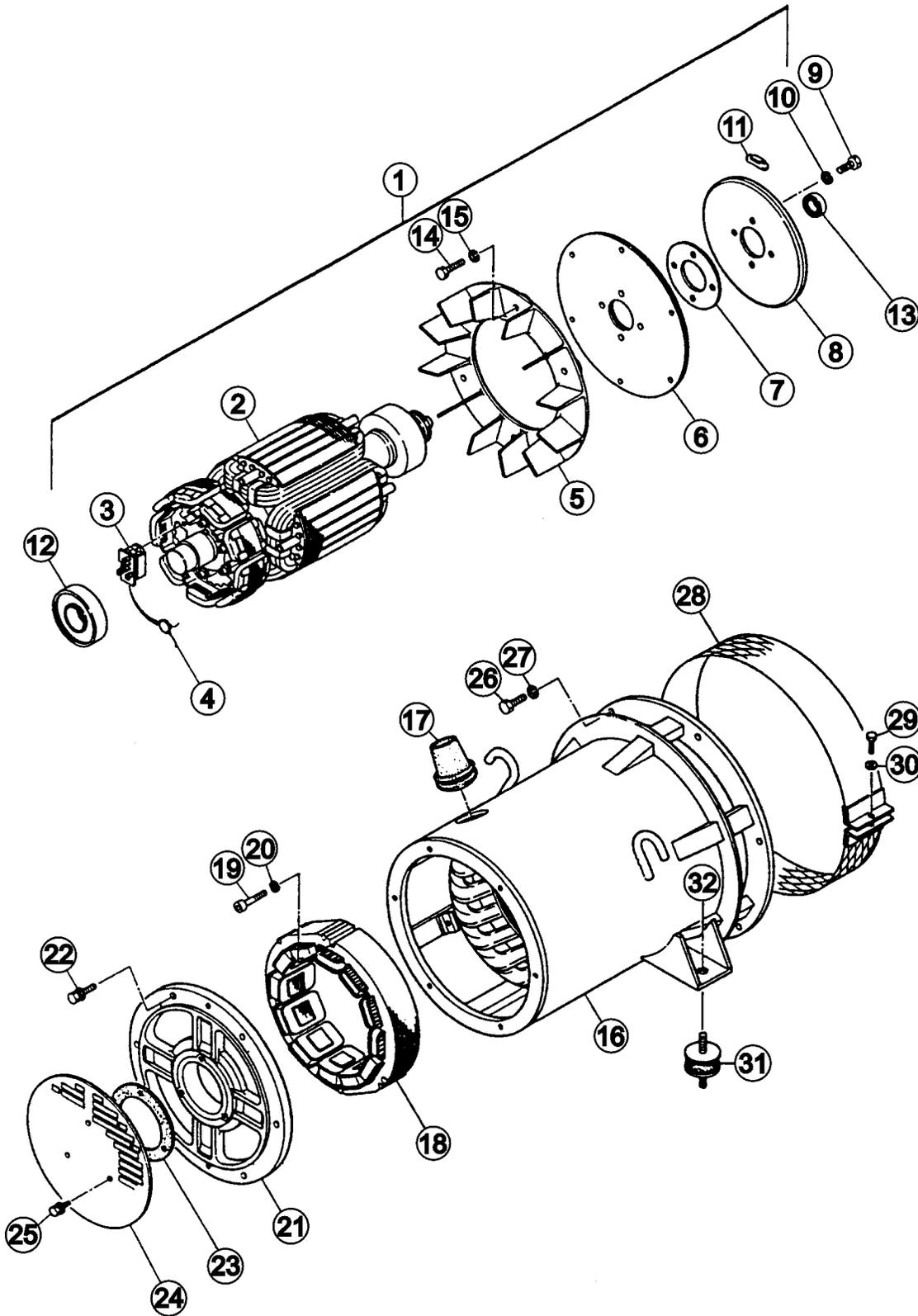
The contents of this parts catalog are subject to change without notice.

DCA-15SPX3 W/KUBOTA V2203 DIESEL ENGINE 1 TO 3 UNITS

<u>Qty.</u>	<u>P/N</u>	<u>Description</u>
1	0601820626	AUTOMATIC VOLTAGE REGULATOR
1	0601806592	MAIN CIRCUIT BREAKER
1	0601802609	RECEPTACLE CIRCUIT BREAKER
1	0601840073	VOLTAGE REGULATOR (RHEOSTAT)
3	700003209	OIL FILTER
1	1584139010	OIL SWITCH
1	1726697011	FAN BELT
3	113043002	AIR FILTER
3	7000043081	FUEL FILTER
1	1706372940	RADIATOR HOSE, UPPER
1	1546172851	RADIATOR HOSE, LOWER
1	1949883040	WATER TEMPERATURE SENDING UNIT

DCA-15SPX3 — GENERATOR ASSY.

GENERATOR ASSY.



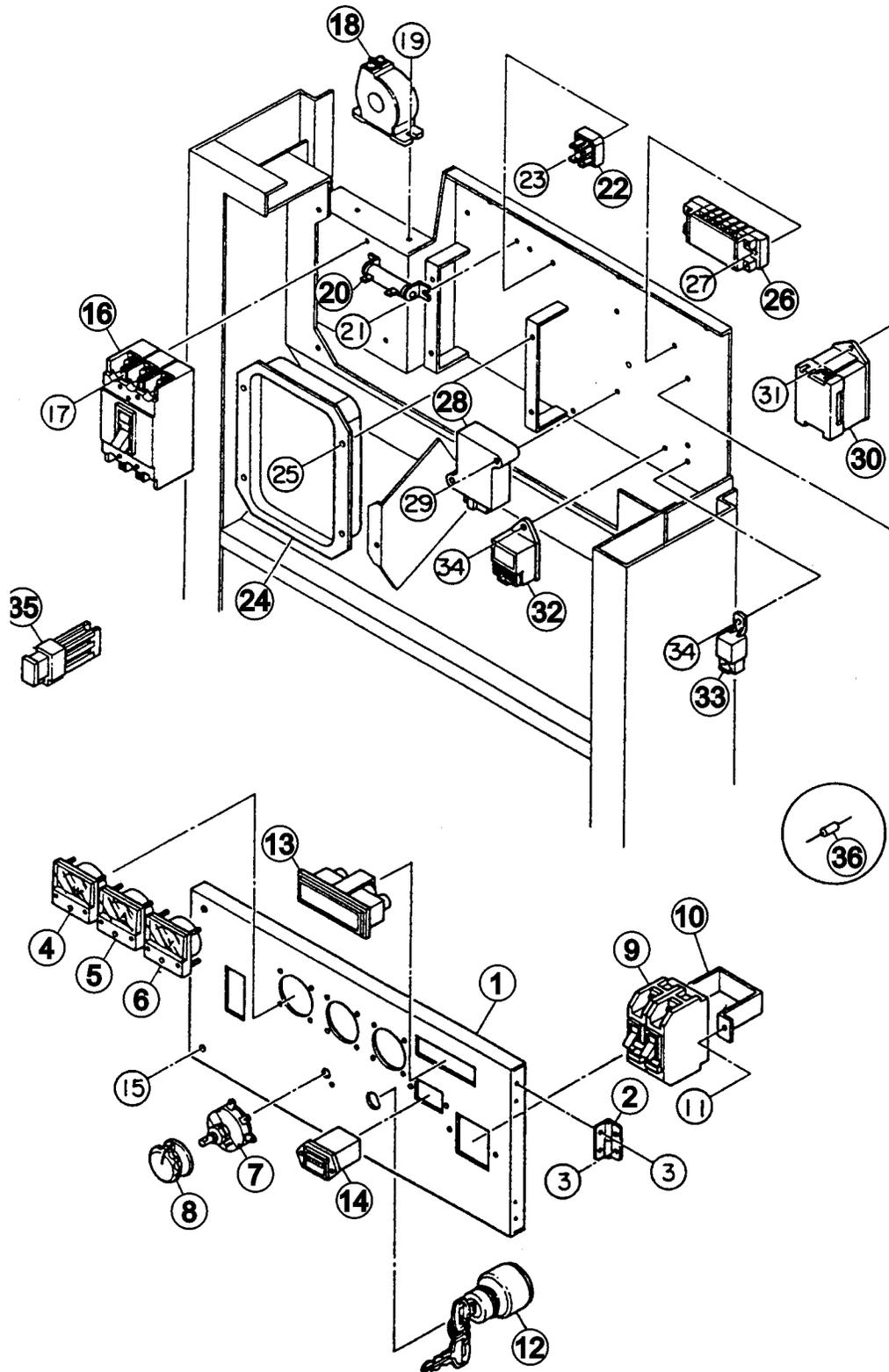
DCA-15SPX3 — GENERATOR ASSY.

GENERATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	7671000102	ROTOR ASSY.	1	
2		FIELD ASSY.	1	
3	7961025004	RECTIFIER	1	
4	0601822643	SURGE ABSORBER	1	TNR23G561K
5	8001070003	FAN	1	
6	8351611004	COUPLING DISK	2	
7	8351612004	WASHER, COUPLING HUB	1	
8	8351615003	BALANCING PLATE	1	
9	0010310025	HEX. HEAD BOLT	4	
10	0042610000	LOCKWASHER	4	
11	0601000209	BALANCING WEIGHT KIT	1	
12	0071906308	BEARING	1	6308DDUC3
13	0070506903	BEARING	1	6903ZZ
14	0012108035	HEX. HEAD BOLT	6	
15	0042508000	LOCKWASHER	6	
16	7671345203	STRATOR ASSY.	1	
17	0845041904	GROMMET	1	
18	8431350003	FIELD ASSY. EXCITER	1	
19	0016008045	HEX. SOCKET HEAD CAP SCREW	3	
20	0042508000	LOCKWASHER	3	
21	8351315003	END BRACKET	1	
22	011208035	HEX.HEAD BOLT	6	REPLACES 0017108035
23	8351312004	PACKING	1	
24	8351331004	COVER, SUCTION	1	
25	0017106016	HEX. HEAD BOLT	3	
26	012010030	HEX. HEAD BOLT	6	REPLACES 0012110030
27	030210250	LOCKWASHER	6	REPLACES 0042510000
28	8401332004	COVER, FAN	1	
29	0010106030	HEX. HEAD BOLT	1	
30	952404470	PLAIN WASHER	1	REPLACES 0041206000
31	0605000006	RUBBER SUSPENSION	2	
32	0207010000	HEX. NUT	2	

DCA-15SPX3 — CONTROL BOX ASSY.

CONTROL BOX ASSY.



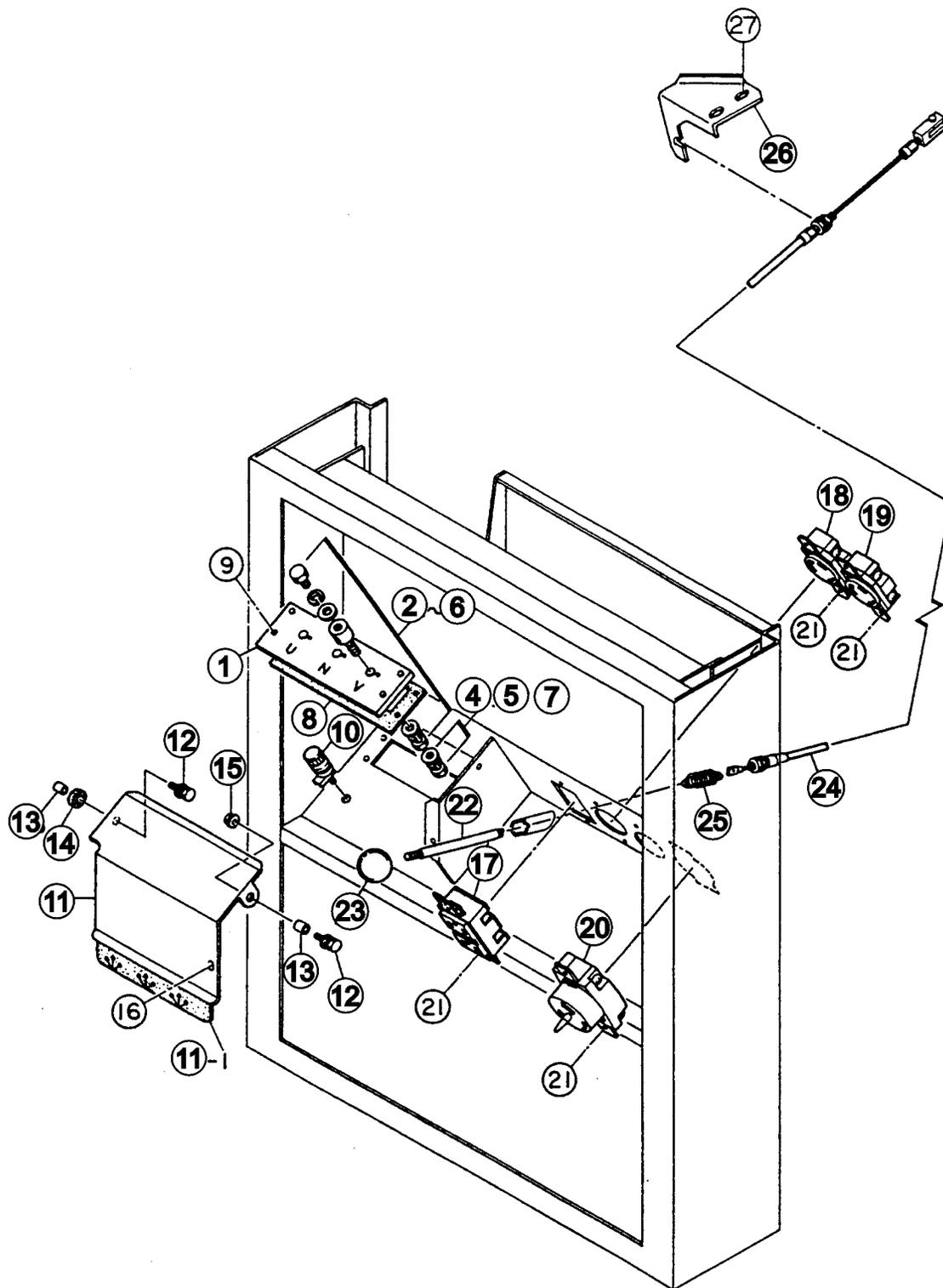
DCA-15SPX3 — CONTROL BOX ASSY.

CONTROL BOX ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	7671821603	CONTROL PANEL	1	
2	0605010060	HINGE	2	B1075L
3	0021103010	MACHINE SCREW	8	
4	0601800455	FREQUENCY METER	1	FCF5 240V 45Hz~65Hz
5	0601805746	AC AMMETER	1	ACF5 0~100A
6	0601800281	AC VOLTMETER	1	SCF5 0~150V 0~300V
7	0601840073	RHEOSTAT (VOLTAGE REGULATOR)	1	RA20A2SE102BJ 2W 1kOHM
8	0601840121	KNOB	1	
9	0601802609	CIRCUIT BREAKER	1	KM2 50A
10	4341817004	BRACKET, CIRCUIT BREAKER	1	
11	0027104020	MACHINE SCREW	2	
	0207004000	HEX. NUT	2	
12	0602100059	STARTER SWITCH	1	3741059113
13	0601810523	INDICATOR ASSY.	1	PLB128Q
	0601810830	BULB	4	
14	0601800682	HOUR METER	1	82014
15	0021806030	MACHINE SCREW	2	
16	0601806592	CIRCUIT BREAKER	1	SC100CS 65A
17	0021004060	MACHINE SCREW	2	
	0040004000	LOCK WASHER	2	
	0041204000	PLAIN WASHER	2	
18	0601801122	CURRENT TRANSFORMER, AMMETER 1	1	COC3 100A/5A
19	0027106016	MACHINE SCREW	2	
20	0601842304	RESISTOR	1	GG20W50OHM
21	0027104012	MACHINE SCREW	2	
22	0601820038	RECTIFIER	1	S15VB60
23	0027104020	MACHINE SCREW	1	
24	0601820626	AUTOMATIC VOLTAGE REGULATOR	1	NTA4A25
25	0017105016	HEX. HEAD BOLT	4	
26	0601815759	TERMINAL BOARD	1	KT206P
27	0027104020	MACHINE SCREW	2	
28	0602200474	EMERGENCY UNIT	1	1714760602
29	0021005045	MACHINE SCREW	2	
	0040005000	LOCK WASHER	2	
	0041205000	PLAIN WASHER	2	
30	8701899004	FUSE BOX	1	FB6PS
	0601806642	FUSE	4	5A
	0601806643	FUSE	2	15A
	0601806644	FUSE	2	30A
31	0027105016	MACHINE SCREW	2	
32	0602201273	TIMER	1	1569465992
33	0602202566	RELAY	1	6888153542
34	0017105016	HEX. HEAD BOLT	2	
35	0601806640	FUSE	1	65A
36	0601842389	RESISTOR	1	8.2OHM 1/2W

DCA-15SPX3 — OUTPUT TERMINAL ASSY.

OUTPUT TERMINAL ASSY.



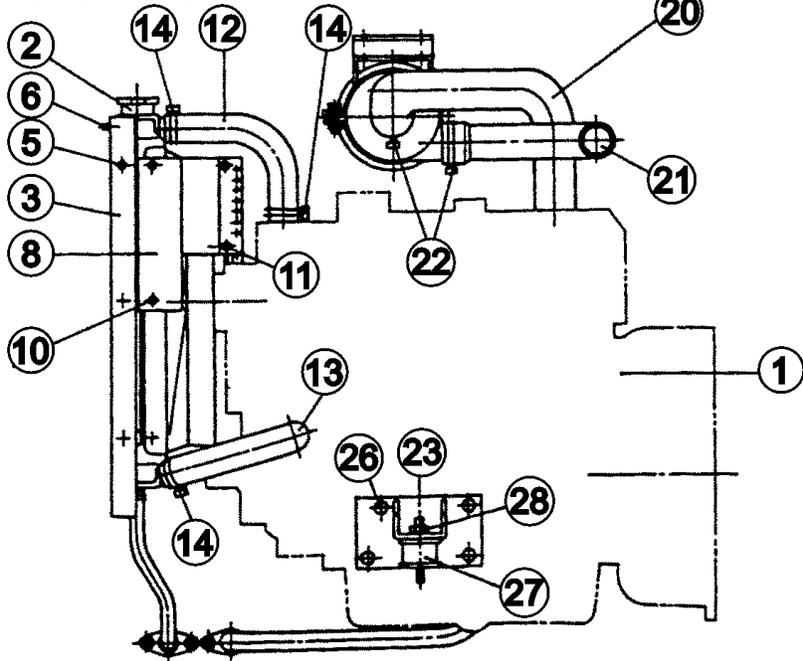
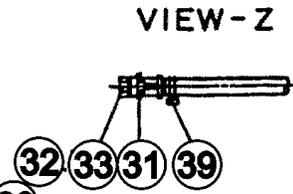
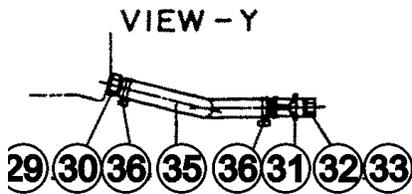
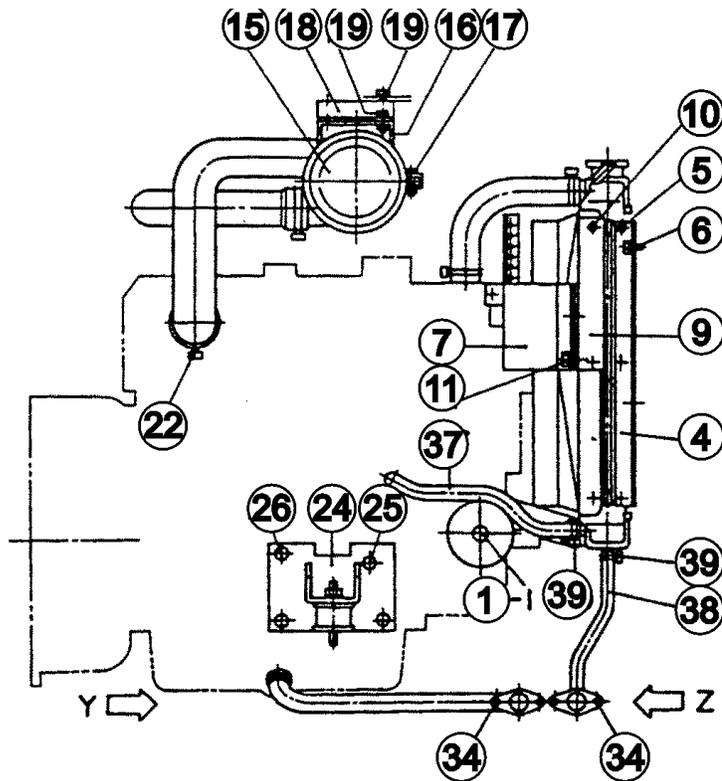
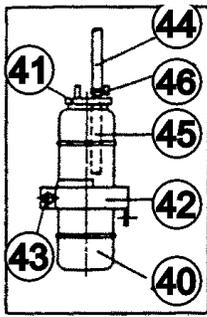
DCA-15SPX3 — OUTPUT TERMINAL ASSY.

OUTPUT TERMINAL ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	7561860104	SET BOARD, OUTPUT TERMINAL	1	
2	1621849004	OUTPUT TERMINAL	3	
3	0019008020	HEX. HEAD BOLT	3	
4	0040008000	LOCK WASHER	9	
5	0041408000	PLAIN WASHER	9	
6	0039508000	HEX. NUT	3	
7	0030008000	HEX. NUT	3	
8	7831860104	RUBBER SEAL	1	
9	0017106025	HEX. HEAD BOLT	4	
10	0601815109	GROUND TERMINAL	1T381
11	7671865403	COVER, GROUND TERMINAL	1	
11-1	7671865804	RUBBER SHEET	1	
12	0017106020	HEX. HEAD BOLT	2	
13	0821800014	COLLAR	2	
14	0805088004	STAY RUBBER	1	
15	0207006000	HEX. NUT	1	
16	0017106016	HEX. HEAD BOLT	1	
17	0601812597	RECEPTACLE	1520R 125V 20A
18	0601811031	RECEPTACLE	1L530R 125V 30A
19	0601811033	RECEPTACLE	1L630R 250V 30A
20	0601812565	RECEPTACLE	1CS6369 125/250V 50A
21	0027104016	MACHINE SCREW	8	
	0207004000	HEX. NUT	8	
22	7672142003	SLIDE LEVER	1	
23	0805012904	KNOB	1	
24	7672144103	THROTTLE CABLE	1	
25	3032143004	SPRING	1	
26	8322145004	BRACKET	1	
27	0017110015	HEX. HEAD BOLT	2	

DCA-15SPX3 — ENGINE & RADIATOR ASSY.

ENGINE & RADIATOR ASSY.



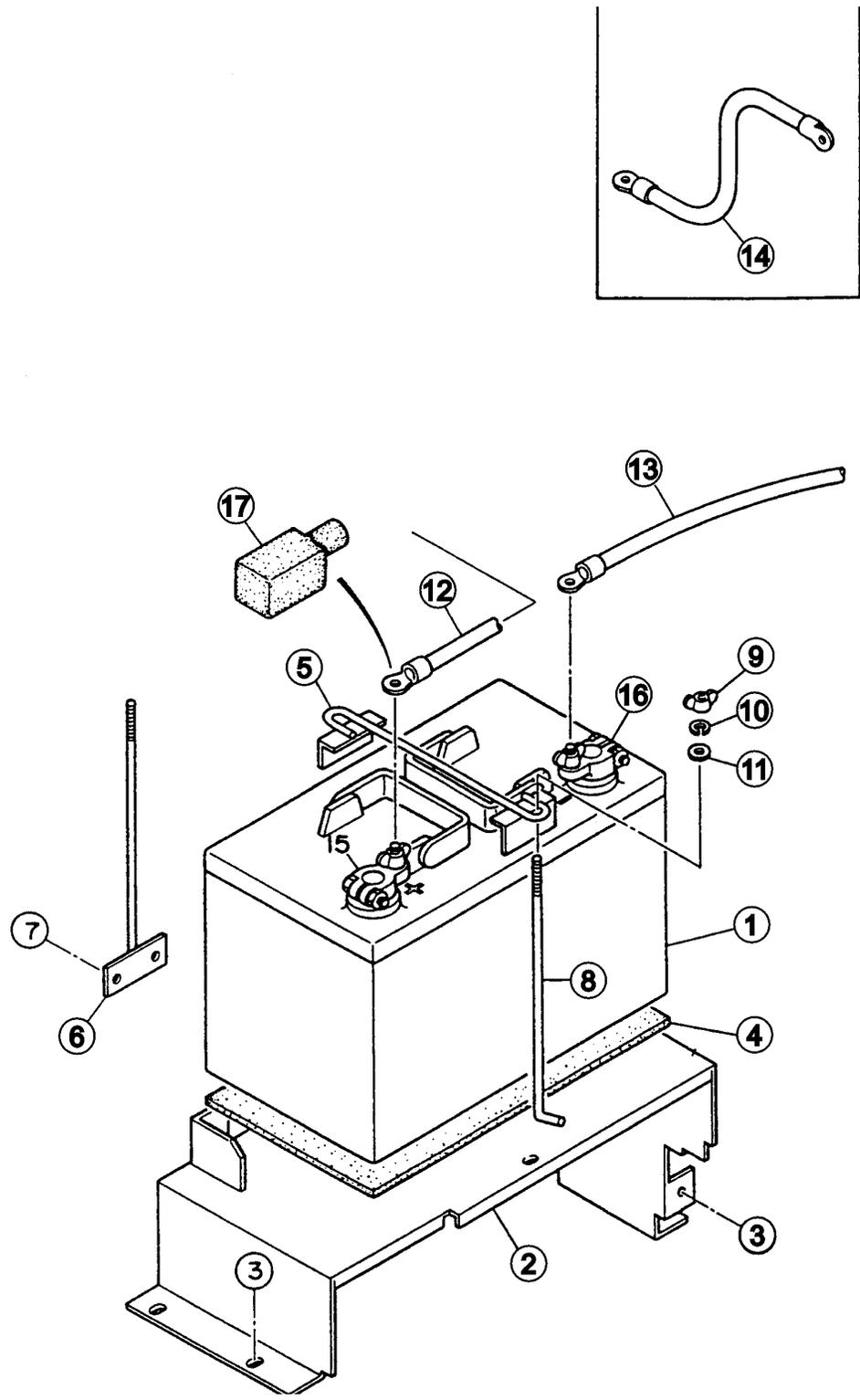
DCA-15SPX3 — ENGINE & RADIATOR ASSY.

ENGINE & RADIATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	7670150204	ENGINE	1	KUBOTA V2203
1-1	1732132432	CARTRIDGE, OIL FILTER	1	REPLACES 0602041173
2	1707972063	RADIATOR	1	REPLACES 0602011877
3	8345112004	BRACKET, RADIATOR	1	
4	8345112204	BRACKET, RADIATOR	1	
5	011006010	HEX. HEAD BOLT	6	REPLACES 0017106010
6	011008020	HEX. HEAD BOLT	4	REPLACES 0017108020
7	8345127103	FAN GUARD	1	
8	8345127504	BRACKET, FAN GUARD	1	
9	8345127604	BRACKET, FAN GUARD	1	
10	011006010	HEX. HEAD BOLT	4	REPLACES 0017106010
11	0017106016	HEX. HEAD BOLT	4	
12	1542872941	RADIATOR HOSE	1	REPLACES 0602014560
13	1542872852	RADIATOR HOSE	1	REPLACES 0602014477
14	1510872873	HOSE BAND	4	REPLACES 0602014372
15	113R60000B	AIR CLEANER	1	REPLACES 0602046268
	113043002	ELEMENT, AIR CLEANER	1	REPLACES 0602046335
16	8722031503	BAND, AIR CLEANER	1	
17	011208030	HEX. HEAD BOLT	1	REPLACES 0017108030
18	8432031104	BRACKET, AIR CLEANER	1	
19	011008020	HEX. HEAD BOLT	4	REPLACES 0017108020
20	8322036103	HOSE, AIR CLEANER	1	
21	8432036103	HOSE, AIR CLEANER	1	
22	0605515001	HOSE BAND	3	
23	8325112114	ENGINE FOOT	1	
24	8325112014	ENGINE FOOT	1	
25	0012410025	HEX. HEAD BOLT	1	
26	0012412025	HEX. HEAD BOLT	7	
27	7605419004	RUBBER SUSPENSION	2	
28	0207010000	HEX. NUT	2	
29	1502025004	DRAIN JOINT	1	
30	0602021193	PACKING	1	SW16
31	1502025103	DRAIN JOINT	2	
32	0802011104	PLUG	2	
33	0150000018	O RING	2	AP18
34	0017106016	HEX. HEAD BOLT	4	
35	0192200430	DRAIN HOSE	1	
36	0605515003	HOSE BAND	2	
37	1546173341	HOSE	1	REPLACES 0602014476
38	1718273341	DRAIN HOSE	1	REPLACES 0602014661
39	0605515014	HOSE BAND	4	
40	0802081403	RESERVE TANK	1	
41	0802081104	CAP, RESERVE TANK	1	
43	0017106035	HEX. HEAD BOLT	1	
44	1559672711	HOSE	1	REPLACES 0602014173
45	7222016304	HOSE	1	
46	0605515094	HOSE BAND	3	

DCA-15SPX3 — BATTERY ASSY.

BATTERY ASSY.

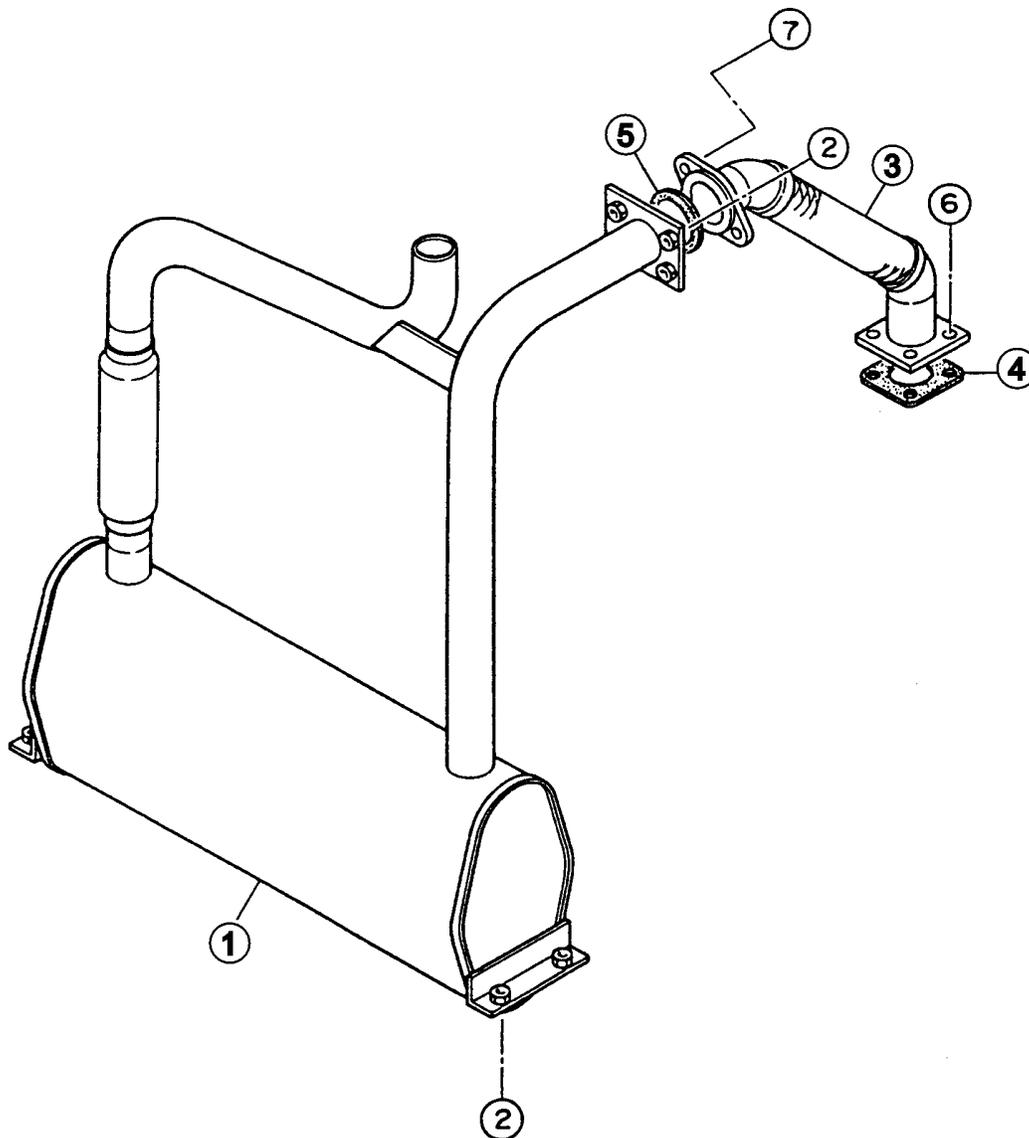


BATTERY ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0167306531	BATTERY	1	65D31R
2	8452250003	BATTERY FRAME	1	
	8345967004	LINING	1	
3	0017106016	HEX HEAD BOLT	5	
4	7612251004	BATTERY SHEET	1	
5	8432255024	BATTERY BAND	1	
6	8432256024	BATTERY BOLT	1	
7	0017106016	HEX HEAD BOLT	2	
8	8432256104	BATTERY BOLT	1	
9	0037806000	WING NUT	2	
10	0040006000	SPRING WASHER	2	
11	952404470	PLAIN WASHER.....	2.....	REPLACES 0041206000
12	N012CABLE10SPX3	BATTERY CABLE	1	
13	N013CABLE10SPX3	BATTERY CABLE	1	
14	EARTH10SPX3	EARTH CABLE	1	
15	0602220310	TERMINAL ASS'Y.....	1.....	NO.9P
16	0602220311	TERMINAL ASS'Y.....	1.....	NO.9N
17	0602220600	TERMINAL CAP.....	1.....	7C7R

DCA-15SPX3 — MUFFLER ASSY.

MUFFLER ASSY.



DCA-15SPX3 — MUFFLER ASSY.

MUFFLER ASSY.

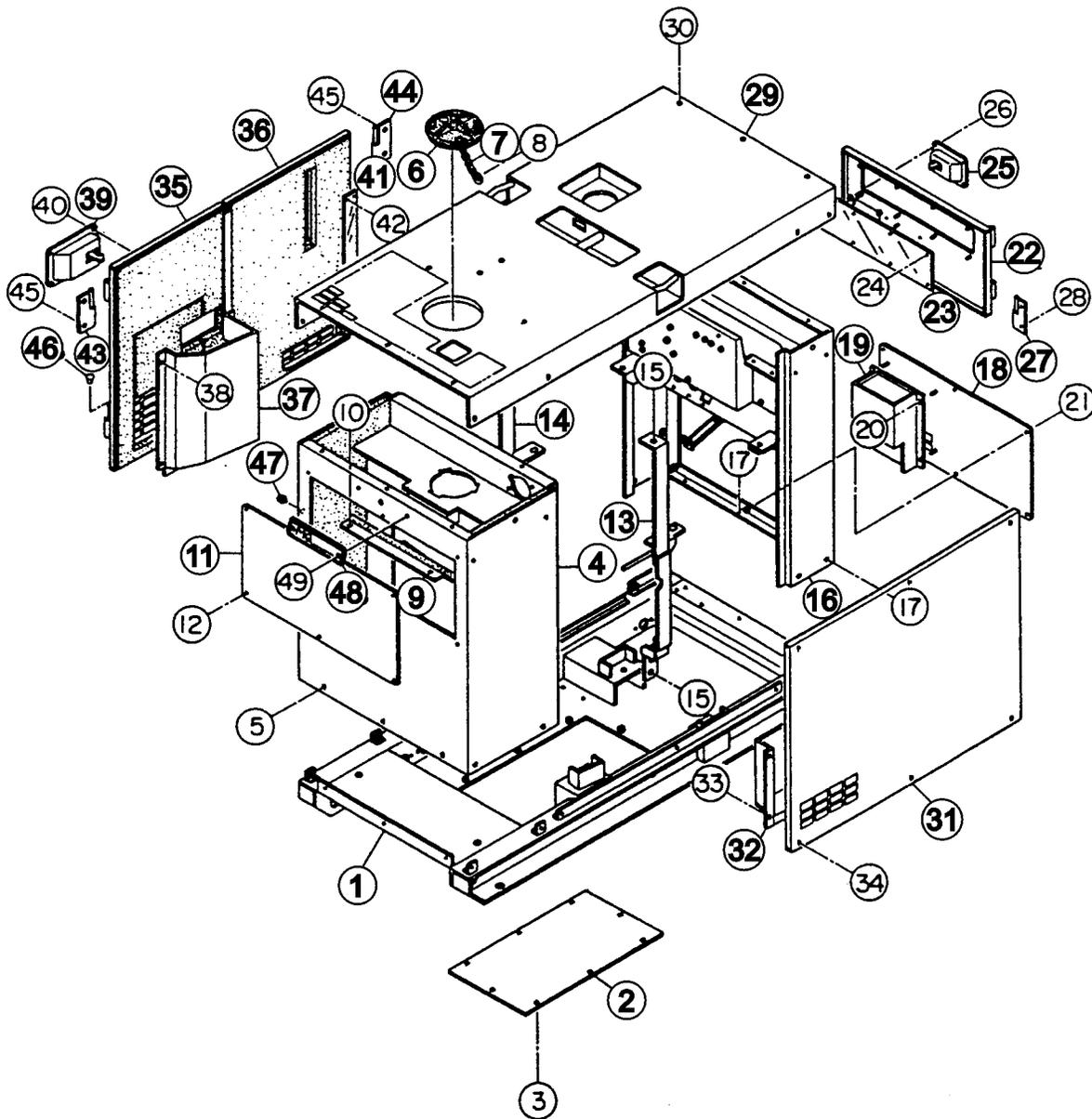
<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	8342311003	MUFFLER	1	
2	011008020	HEX HEAD BOLT	6	REPLACES 0017108020
3	8342350103	EXHAUST PIPE	1	
4	T007016420	GASKET	1	REPLACES 0602320150
5	1502336004	GASKET	1	
6	020108060	HEX NUT	4	REPLACES 0207008000
7	011208035	HEX HEAD BOLT	2	REPLACES 0017108035

FUEL TANK ASSEMBLY

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	7675510703	FUEL TANK	1	
1-1	0810105800	CAP, FUEL TANK	1	
1-2	0810105900	FUEL FILTER	1	
1-3	0267700245	HOSE, FUEL GAUGE	1	
1-4	0605515191	HOSE BAND	2	
2	8435525003	BRACKET, FUEL TANK	1	
3	011008020	HEX. HEAD BOLT	4.....	REPLACES 0017108020
4	1555527004	TANK SHEET	2	
5	8435523014	TANK BAND	2	
6	0805003404	PAD, TANK BAND	4	
7	011008020	HEX. HEAD BOLT	2.....	REPLACES 0017108020
8	0207308000	HEX. NUT	2	
9	7812014003	DRAIN JOINT	1	
10	0802011104	PLUG	1	
11	0150000018	O RING	1.....	AP18
12	0017106016	HEX. HEAD BOLT	2	
13	019900640	DRAIN HOSE	1	
14	0605515094	HOSE BAND	2	
15	1522143016	FUEL FILTER	1.....	REPLACES 0602042462
	1522143172	ELEMENT, FUEL FILTER	1.....	REPLACES 0602042551
16	7675528004	BRACKET, FUEL FILTER	1	
17	0017108035	HEX. HEAD BOLT	2	
18	0017108025	HEX. HEAD BOLT	2	
	0207008000	HEX. NUT	2	
19	0603325013	FUEL COCK, 3/8	1	
20	0602022708	HOSE, JOINT	1.....	WHN8
21	0966180180	SUCTION HOSE	1.....	REPLACES 0605513116
22	0966180340	SUCTION HOSE	1.....	REPLACES 0605513117
23	0966140180	RETURN HOSE	1.....	REPLACES 0605514026
24	1491142751	HOSE BAND	4.....	REPLACES 0605515070
25	1497142751	HOSE BAND	1.....	REPLACES 0605515072
26	1615511204	RUBBER SEAL	1	

DCA-15SPX3 — ENCLOSURE ASSY.

ENCLOSURE ASSEMBLY



ENCLOSURE ASSEMBLY

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	7675111602	BASE	1	
2	8445116114	FLOOR PANEL	1	
3	0017106016	HEX. HEAD BOLT	8	
4	7675121202	FRONT FRAME	1	
	8345921204	ACOUSTIC SHEET	1	
	8345924004	ACOUSTIC SHEET	1	
5	011008020	HEX. HEAD BOLT	7	REPLACES 0017108020
6	1625165103	FILLER COVER	1	
7	1625165204	CHAIN	1	
8	011008020	HEX. HEAD BOLT	1	REPLACES 0017108020
9	8342313003	COVER, MUFFLER	1	
	8345925004	ACOUSTIC SHEET	1	
10	011008020	HEX. HEAD BOLT	4	REPLACES 0017108020
11	8435125004	COVER, FRONT FRAME	1	
	8345923004	ACOUSTIC SHEET	1	
12	011008020	HEX. HEAD BOLT	6	REPLACES 0017108020
13	8345130203	HANGER	1	
14	8435132113	HANGER	1	
15	012212030	HEX. HEAD BOLT	6	REPLACES 0017112030
16	7675141802	REAR FRAME	1	
17	011008020	HEX. HEAD BOLT	7	REPLACES 0017108020
18	8345144604	COVER, REAR FRAME	1	
19	8345143203	DUCT	1	
	8345943004	ACOUSTIC SHEET	1	
20	0207006000	HEX. NUT	4	
21	011008020	HEX. HEAD BOLT	6	REPLACES 0017108020
22	7675146103	DOOR, REAR FRAME	1	
23	8435149004	WINDOW PLATE	1	
24	0207006000	HEX. NUT	8	
25	0605010230	DOOR HANDLE	1	
26	0021805012	MACHINE SCREW	4	

ADD THE FOLLOWING DIGITS AFTER THE PART NUMBER
WHEN ORDERING ANY PAINTED PANEL TO INDICATE

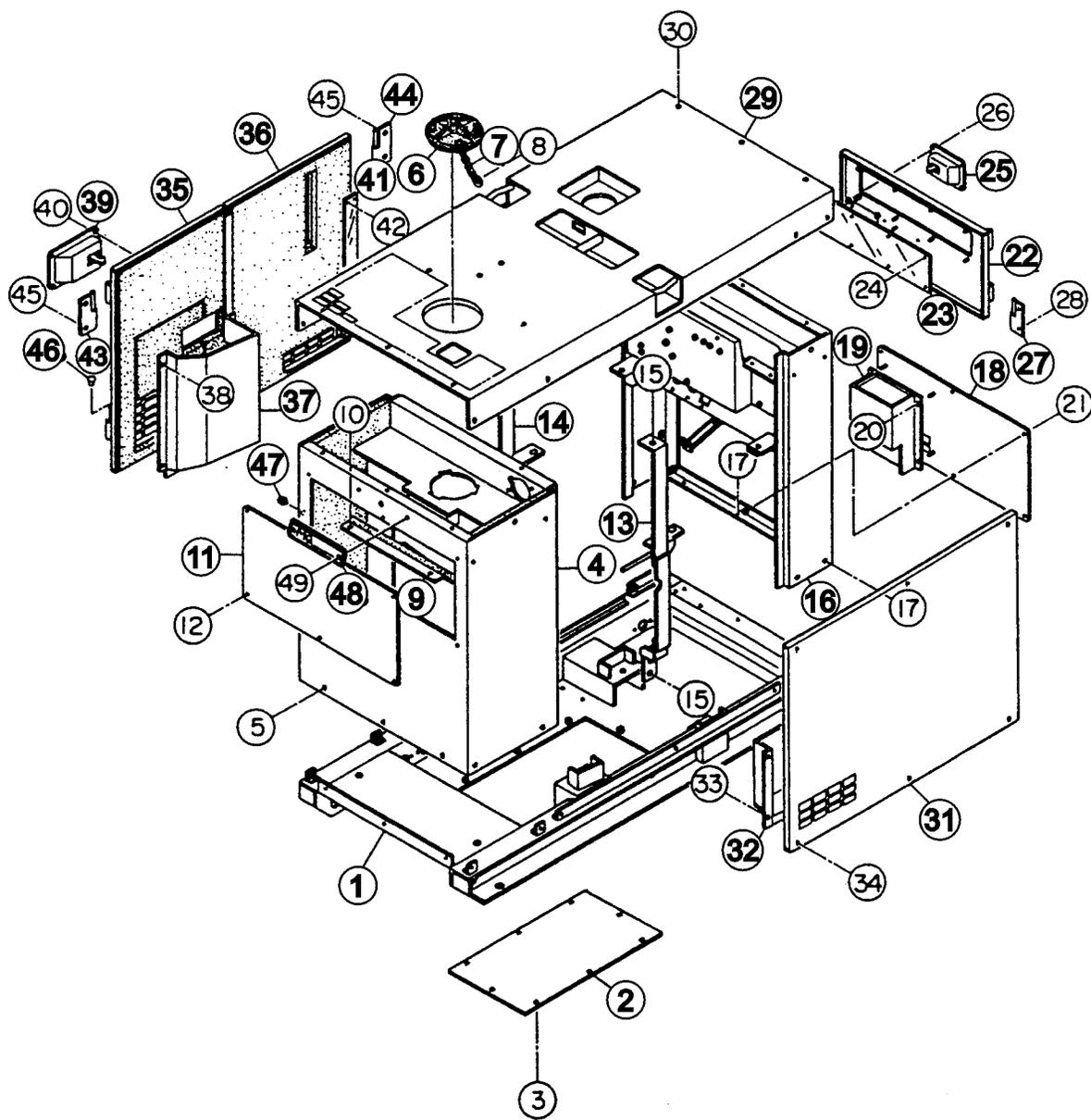
COLOR OF UNIT:

1- ORANGE	5 -BLACK
2- WHITE	6 -CATERPILLAR YELLOW
3 -SPECTRUM GRAY	7 -CATO GOLD
4 -SUNBELT GREEN	8 -RED

THE SERIAL NUMBER MAY BE REQUIRED.

DCA-15SPX3 — ENCLOSURE ASSY.

ENCLOSURE ASSEMBLY



DCA-15SPX3 — ENCLOSURE ASSY.

ENCLOSURE ASSEMBLY

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
27	0810015204	HINGE	2	
	0810015504	WASHER	2	
28	0017106016	HEX. HEAD BOLT	4	
29	8345161302	ROOF PANEL	1	
	8345961304	ACOUSTIC SHEET	1	
30	011008020	HEX. HEAD BOLT	16	REPLACES 0017108020
31	8345172103	SIDE PANEL	1	
	8345972204	ACOUSTIC SHEET	1	
32	8345173104	DUCT	1	
33	0207006000	HEX. NUT	5	
34	011208035	HEX. HEAD BOLT	6	REPLACES 0017108035
35	8345170203	SIDE DOOR	1	
	8345970504	ACOUSTIC SHEET	1	
36	8435170203	SIDE DOOR	1	
	8345970404	ACOUSTIC SHEET	1	
37	8345171114	DUCT	1	
38	0207006000	HEX. NUT	7	
39	B9114000002	DOOR HANDLE	1	
40	0021806016	MACHINE SCREW	4	
41	8435149104	WINDOW PLATE	1	
42	0027103010	MACHINE SCREW	4	
	0207003000	HEX. NUT	4	
43	M9110100304	HINGE	2	REPLACES 0845047204
	0845045004	WASHER	2	
44	M911B110204	HINGE	2	REPLACES 0845047104
	0845045004	WASHER	2	
45	011008020	HEX. HEAD BOLT	8	REPLACES 0017108020
46	0845031504	CAP	4	
47	0601851613	STOPPER	2	CP30FF15A
48	0600500090	EMBLEM	1	
49	0021106016	MACHINE SCREW	2	

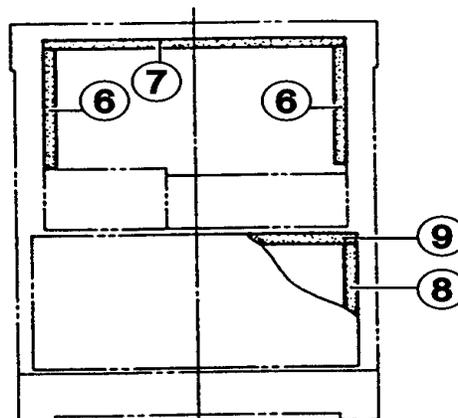
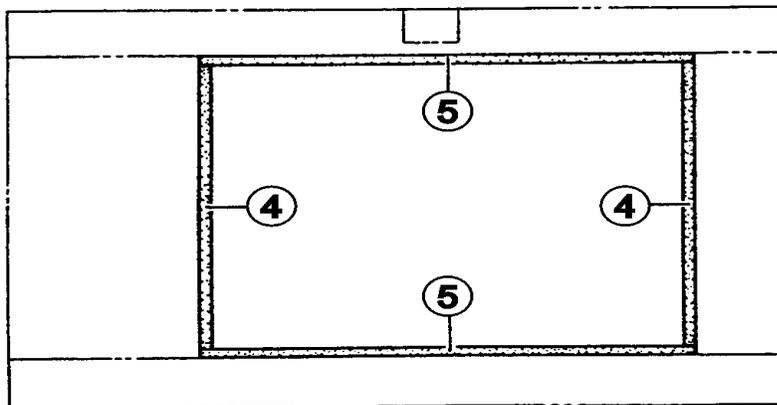
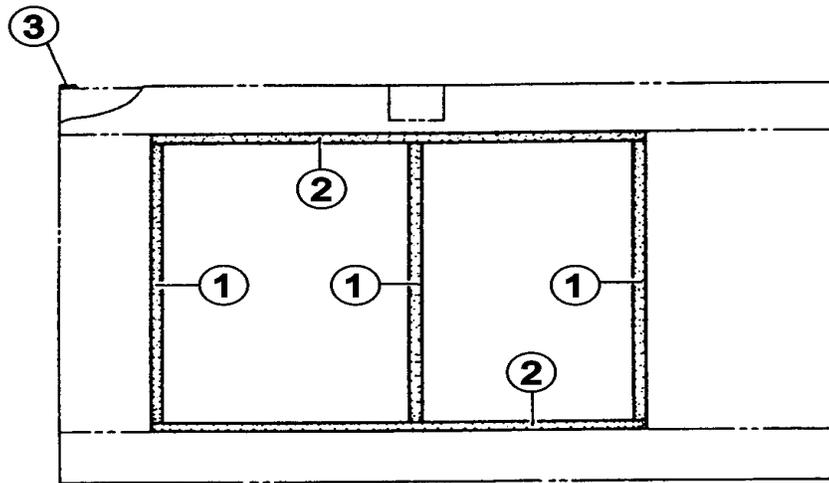
ADD THE FOLLOWING DIGITS AFTER THE PART NUMBER
WHEN ORDERING ANY PAINTED PANEL TO INDICATE
COLOR OF UNIT:

1-ORANGE	5-BLACK
2-WHITE	6-CATERPILLAR YELLOW
3-SPECTRUM GRAY	7-CATO GOLD
4-SUNBELT GREEN	8-RED

THE SERIAL NUMBER MAY BE REQUIRED.

DCA-15SPX3 — ENCLOSURE (RUBBER SEALS) ASSY.

ENCLOSURE (SEALS)ASSY.



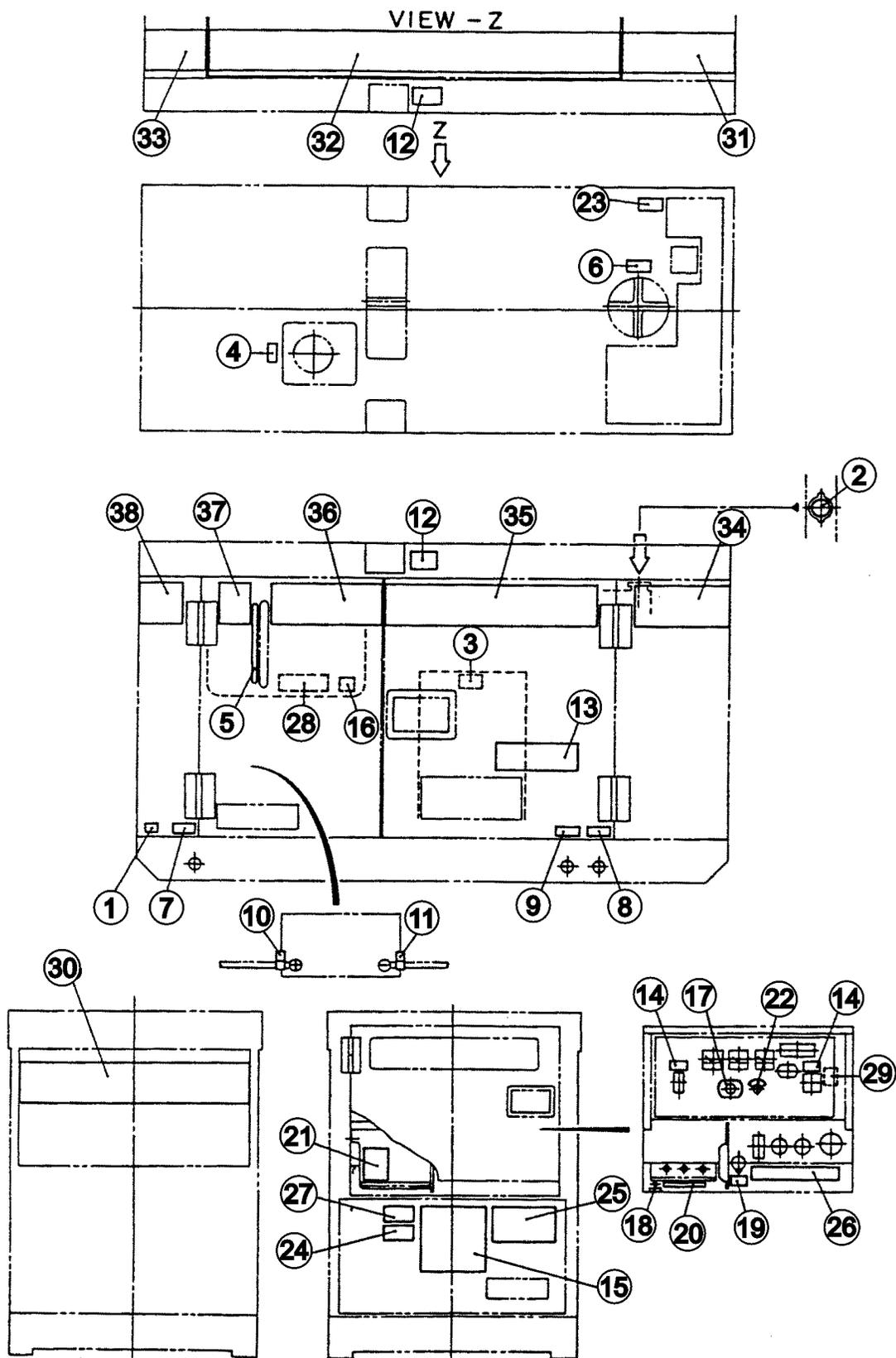
DCA-15SPX3 — ENCLOSURE (RUBBER SEALS) ASSY.

ENCLOSURE (RUBBER SEALS)ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0229400650	RUBBER SEAL	3	
2	0229400895	RUBBER SEAL	2	
3	0229200650	RUBBER SEAL	1	
4	0220400650	RUBBER SEAL	2	
5	0227600895	RUBBER SEAL	2	
6	0229400265	RUBBER SEAL	2	
7	0229400550	RUBBER SEAL	1	
8	0229200580	RUBBER SEAL	2	
9	0229200245	RUBBER SEAL	2	

DCA-15SPX3 — NAME PLATE AND DECALS

NAME PLATE AND DECALS



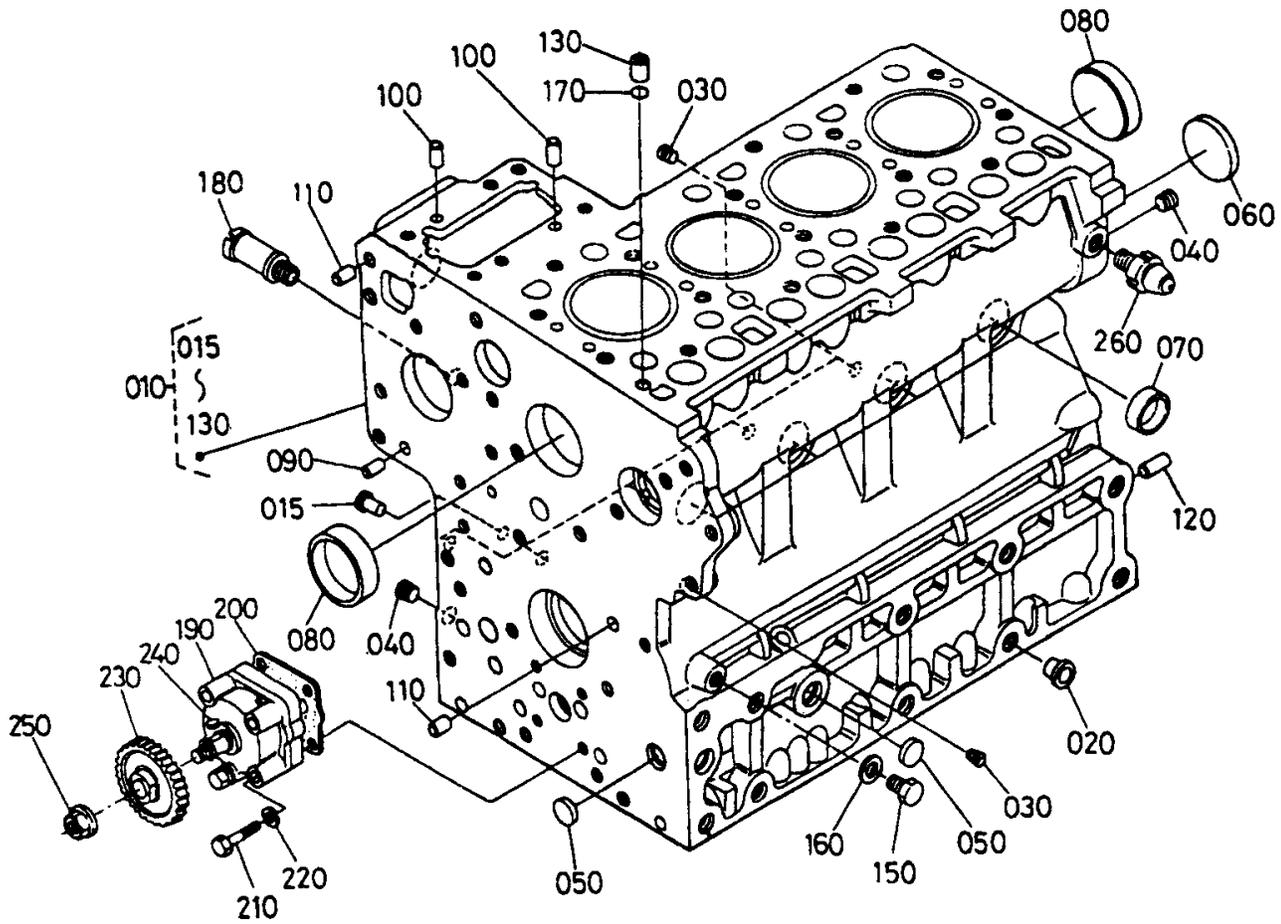
DCA-15SPX3 — NAME PLATE AND DECALS

NAME PLATE AND DECALS

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
1	0800628504	DECAL; GROUND	1	S1123
2	1630610304	DECAL; DANGER	1	S1405
3	1630610504	DECAL; CAUTION	1	S1409
4	1320620904	DECAL; DIESEL FUEL	1	S1756
5	0800650804	DECAL; FUEL GAUGE	1	S1765
6	6360610304	DECAL; WATER	1	S1880
7	6360620004	DECAL; FUEL DRAIN PLUG	1	S1883
8	6360620104	DECAL; WATER DRAIN PLUG	1	S1884
9	6360620204	DECAL; OIL DRAIN PLUG	1	S1884
9	6360620204	DECAL; OIL DRAIN PLUG	1	S1885
10	0800689404	DECAL; +	1	S2090
11	0800689504	DECAL; -	1	S2091
12	1320621504	DECAL; SUPPORT HOOK	2	S2257
13	6390671104	DECAL; IMPORTANT "CHECK DAILY" ...	1	S2377
14	0840624504	DECAL; CIRCUIT BREAKER	2	S3031
15	0840625902	DECAL; MQ	1	S3057
16	1980680004	DECAL; FUEL COCK	1	S3704
17	7670623004	DECAL; VOLTAGE REGULATOR	1	S3737
18	7670624004	DECAL; GROUND FOR GFCI	1	S3821
19	7670622004	DECAL; SPEED CONTROL HANDLE	1	S3822
20	7670654004	DECAL; AC OUTPUT TERMINAL	1	S3823A
21	7670650004	DECAL; DANGER HIGH VOLTAGE	1	S3956
22	7560615004	DECAL; STARTER SWITCH	1	S4547
23	8700611804	DECAL; WARNING	1	S4984
24	8700611904	DECAL; DANGER	1	S4985
25	7670630103	DECAL; AC POWER OUTPUT	1	S5272
27	0820610404	DECAL; WARNING	1	
28	0820650604	DECAL; DANGER	1	
29	8700625504	DECAL; FUSE BOX	1	
30	7670633003	STRIPE	1	
31	7670633104	STRIPE	1	
32	7670633604	STRIPE	1	
33	7670633704	STRIPE	1	
34	7670633204	STRIPE	1	
35	7670633504	STRIPE	1	
36	7670633404	STRIPE	1	
37	7670633304	STRIPE	1	
38	7670633804	STRIPE	1	

KUBOTA V2203 - ENGINE — CRANKCASE ASSY.

CRANKCASE ASSY.



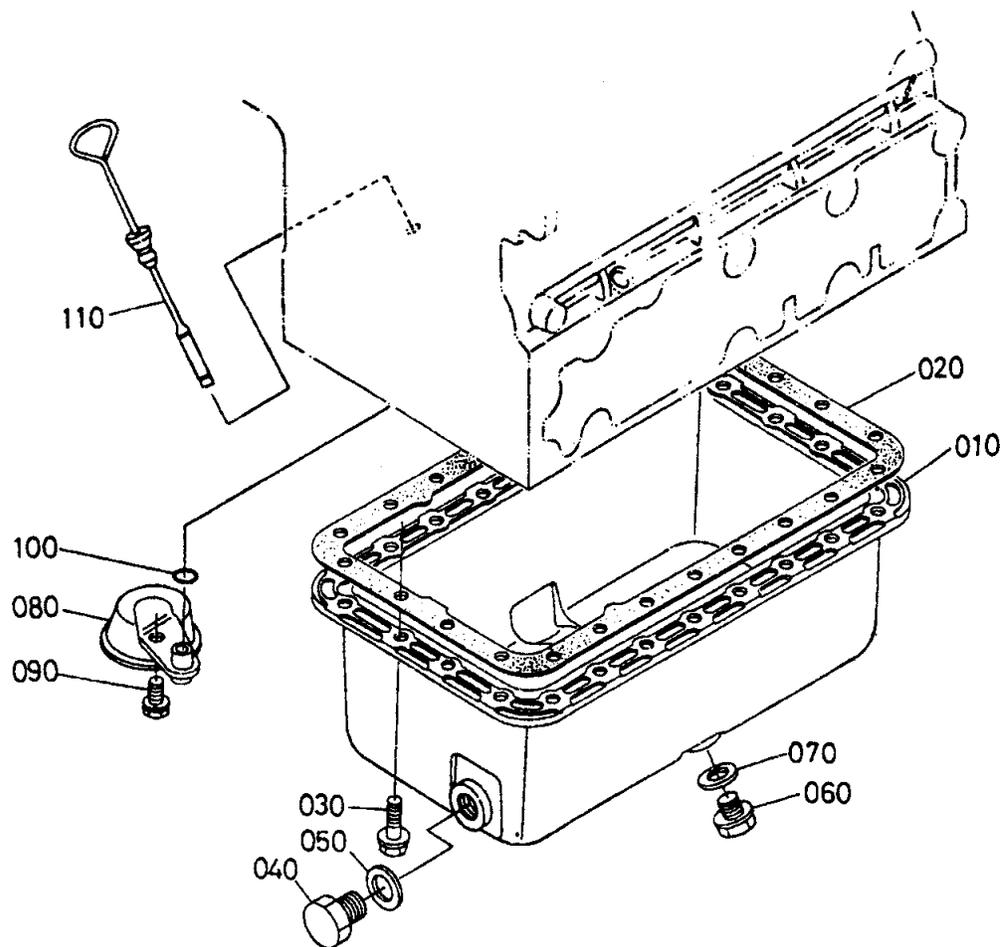
KUBOTA V2203 - ENGINE — CRANKCASE ASSY.

CRANKCASE ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1649401010	COMP. CRANKCASE	1	INCL. ITEMS W/#
015#	3415027580	PLUG	1	
020#	3221027580	PLUG	2	
030#	1552196020	PLUG	6	
040#	1552196030	PLUG	2	
050#	1739196160	EXPANSION PLUG	3	
060#	0631175045	EXPANSION PLUG	1	
070#	1522103380	SEALING CAP	6	
080#	1522103390	SEALING CAP	2	
090#	0501200408	STRAIGHT PIN	2	
100#	0501200609	STRAIGHT PIN	2	
110#	0501200512	STRAIGHT PIN	2	
120#	0501201018	STRAIGHT PIN	1	
130#	1522133650	PIPE PIN	1	
150	1522133610	PLUG	1	
160	1502133660	GASKET	1	
170	1522133700	O RING	1	
180	1532173340	WATER RETURN PIPE	1	
190	1547135010	OIL PUMP ASSY.	1	
200	1520635150	OIL PUMP GASKET	1	
210	0105350650	BOLT	4	
220	0451260060	SPRING WASHER	4	
230	1920235660	OIL PUMP DRIVE GEAR	1	
240	0571200410	FEATHER KEY	1	
250	1522135682	FLANGE NUT	1	
260	1584139010	OIL SWITCH	1	

KUBOTA V2203 - ENGINE — OIL PAN ASSY.

OIL PAN ASSY.



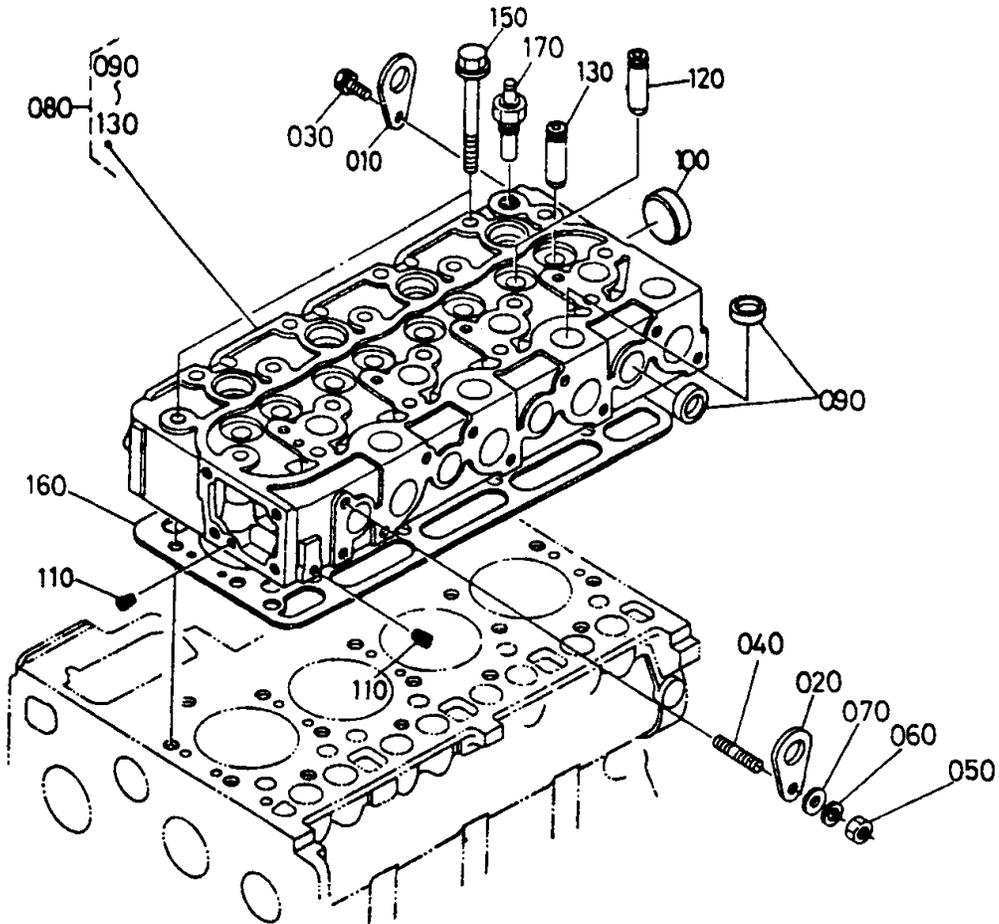
KUBOTA V2203 - ENGINE — OIL PAN ASSY.

OIL PAN ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1543401613	OIL PAN	1	
020	1922801620	OIL PAN GASKET	1	
030	1733391010	FLANGE BOLT	24	
040	1522133750	PLUG	1	
050	1510933660	GASKET	1	
060	1595133750	DRAIN PLUG	1	
070	0472400160	GASKET	1	
080	1562832110	OIL FILTER	1	
090	0112360816	BOLT	1	
100	0481100160	O RING	1	
110	1711136410	OIL GAUGE	1	

KUBOTA V2203 - ENGINE — CYLINDER HEAD ASSY.

CYLINDER HEAD ASSY.



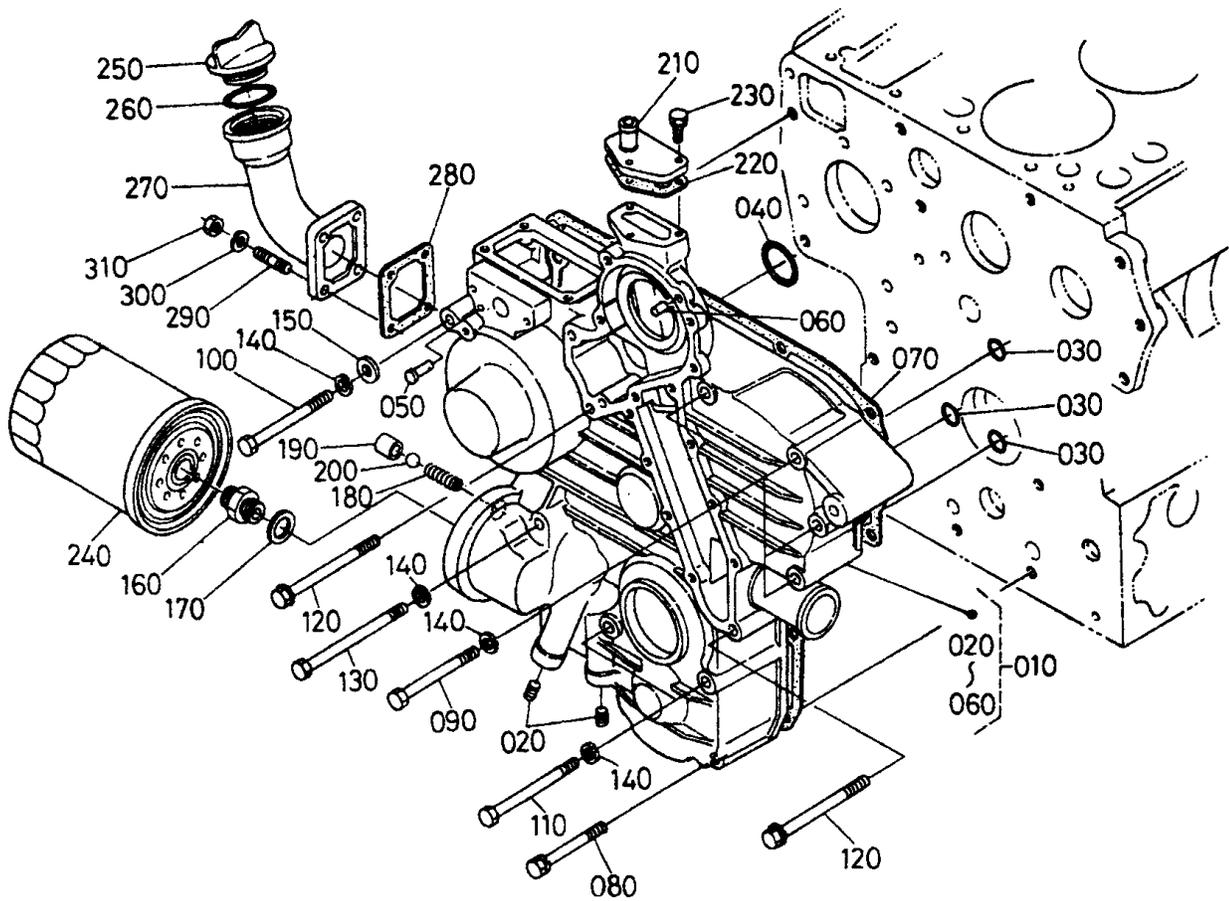
KUBOTA V2203 - ENGINE — CYLINDER HEAD ASSY.

CYLINDER HEAD ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1641501752	ENGINE HOOK	1	
020	1522101750	ENGINE HOOK	1	
030	0112360816	BOLT	1	
040	1522191530	STUD	1	
050	0215650080	NUT	1	
060	0451260080	SPRING WASHER	1	
070	0401250080	PLAIN WASHER	1	
080	1907703045	COMP. CYLINDER HEAD	1 INCL. ITEMS W/#
090#	1522103370	SEALING CAP	12	
100#	1522103490	SEALING CAP	1	
110#	1526196010	PLUG	2	
120#	1732113580	INLET VALVE GUIDE	4	
130#	1732113560	EXHAUST VALVE GUIDE	4	
150	1901303450	CYLINDER HEAD BOLT	18	
160	1907703310	CYLINDER HEAD GASKET	1	
170	1949883040	THERMOSWITCH, ASSY.	1	

KUBOTA V2203 - ENGINE — GEAR CASE ASSY.

GEAR CASE ASSY.



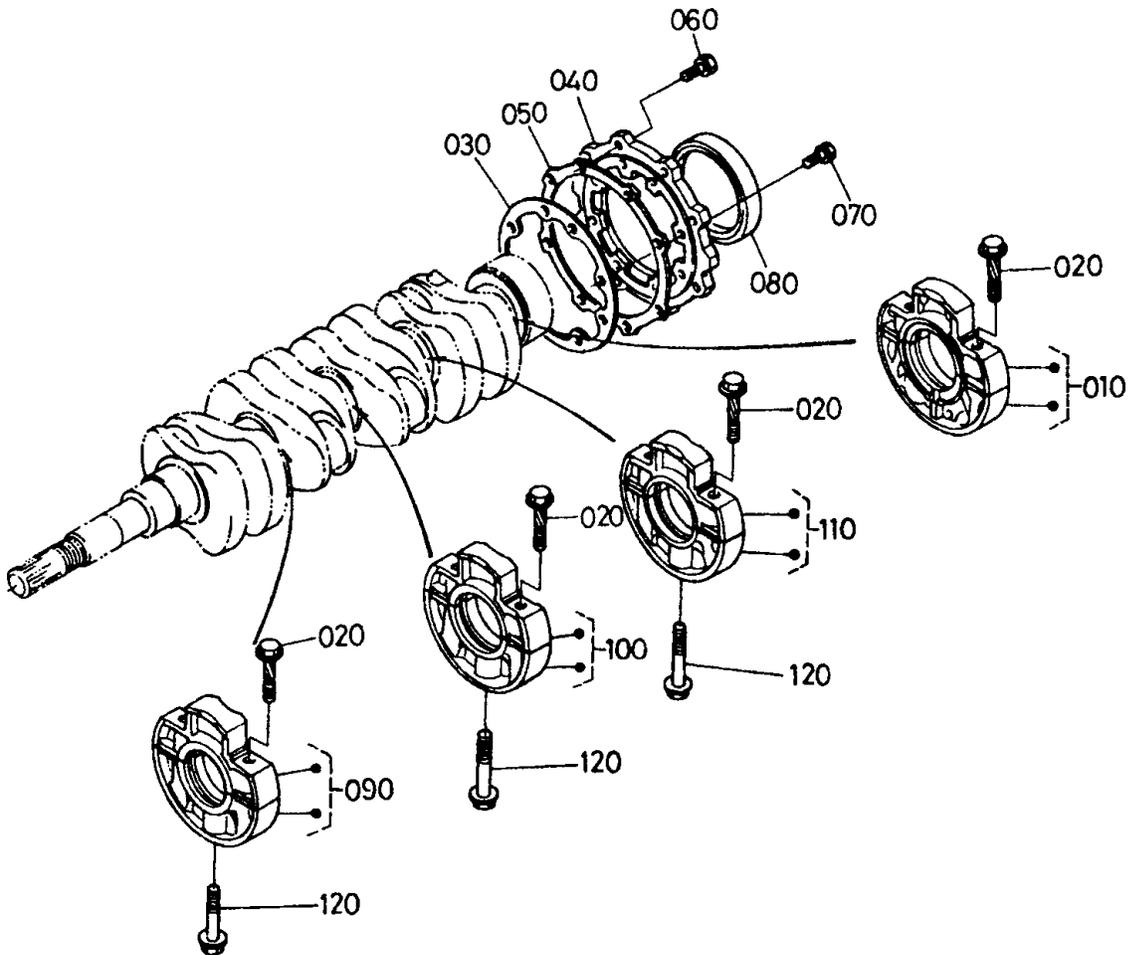
KUBOTA V2203 - ENGINE — GEAR CASE ASSY.

GEAR CASE ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1718204010	GEAR CASE ASSY	1	INCL. ITEMS W/#
020#	1685196010	PLUG	2	
030#	0481100150	O RING	3	
040#	0481100360	O RING	1	
050#	1981856280	START SPRING PIN	1	
060#	0501200612	STRAIGHT PIN	2	
070	1708904130	GEAR CASE GASKET	1	
080	0112350860	BOLT	2	
090	0115350870	BOLT	5	
100	1736791030	BOLT	1	
110	0115350880	BOLT	2	
120	1736791020	BOLT	3	
130	0115350895	BOLT	2	
140	0451260080	SPRING WASHER	10	
150	0401250080	PLAIN WASHER	1	
160	1552132290	PIPE JOINT	1	
170	0401150180	PLAIN WASHER	1	
180	1524136950	SPRING	1	
190	1552136930	VALVE SEAT	1	
200	0771503213	BALL	1	
210	1552173320	WATER RETURN FLANGE	1	
220	1576673330	GASKET	1	
230	0102350620	BOLT	3	
240	1732132430	OIL FILTER CARTRIDGE	1	
250	1585233140	OIL FILTER PLUG	1	
260	0481150300	O RING	1	
270	1718233110	OIL FILTER FLANGE	1	
280	1547154550	BOOST BASE C. GASKET	1	
290	1718291510	STUD	4	
300	0451260060	SPRING WASHER	4	
310	0205650060	NUT	4	

KUBOTA V2203 - ENGINE — MAIN BEARING CASE ASSY.

MAIN BEARING CASE ASSY.



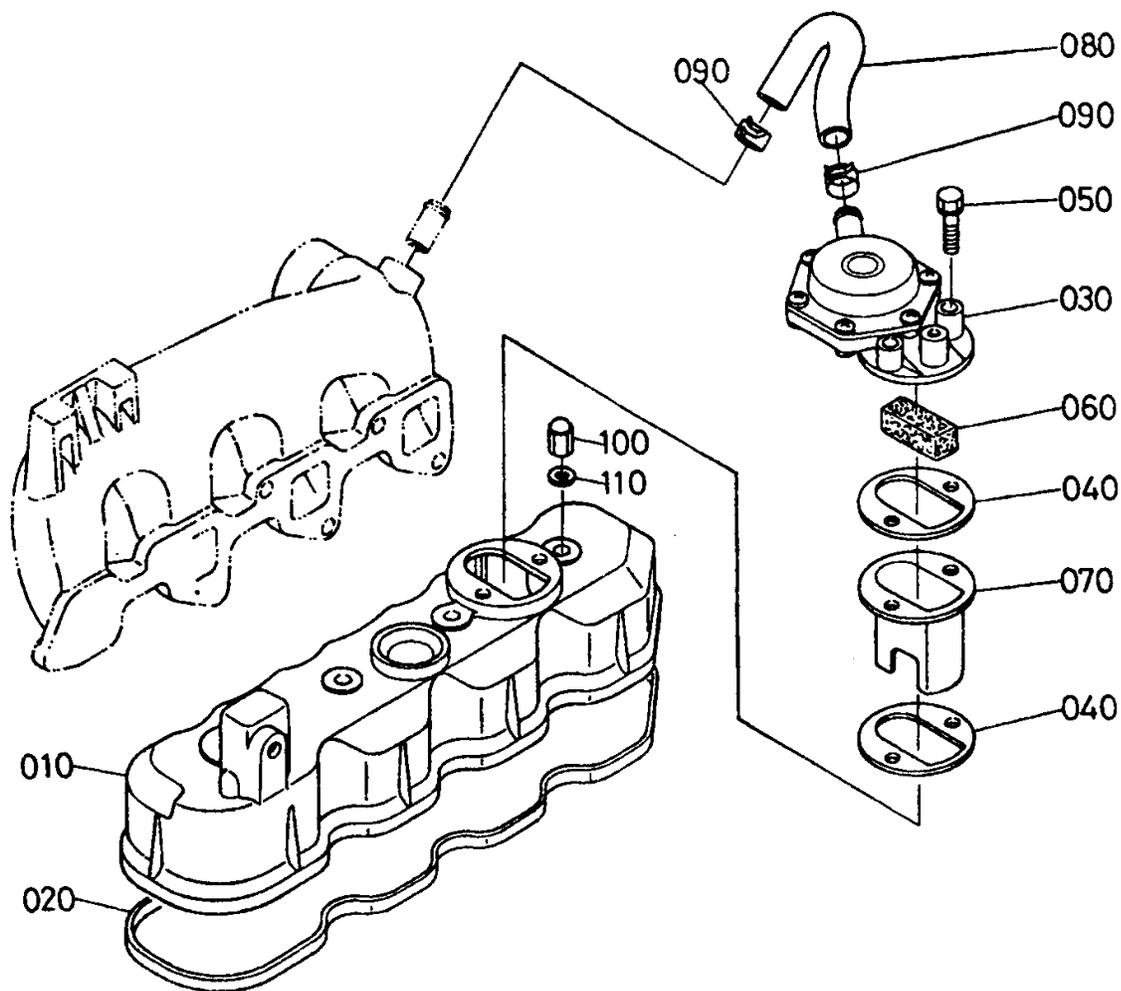
KUBOTA V2203 - ENGINE — MAIN BEARING CASE ASSY.

MAIN BEARING CASE ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1901304090	MAIN BEARING CASE ASSY.	1	
020	1901304540	BEARING CASE BOLT	8	
030	1907704360	BEARING CASE GASKET	1	
040	1901304813	BEARING CASE COVER	1	
050	1711804830	CASE COVER GASKET	1	
060	0112350825	BOLT	8	
070	0112350828	BOLT	8	
080	1920204460	OIL SEAL	1	
090	1901304040	MAIN BEARING CASE ASSY.	1	
100	1901304050	MAIN BEARING CASE ASSY.	1	
110	1901304060	MAIN BEARING CASE ASSY.	1	
120	1560104560	BEARING CASE BOLT	3	

KUBOTA V2203 - ENGINE — HEAD COVER ASSY.

HEAD COVER ASSY.



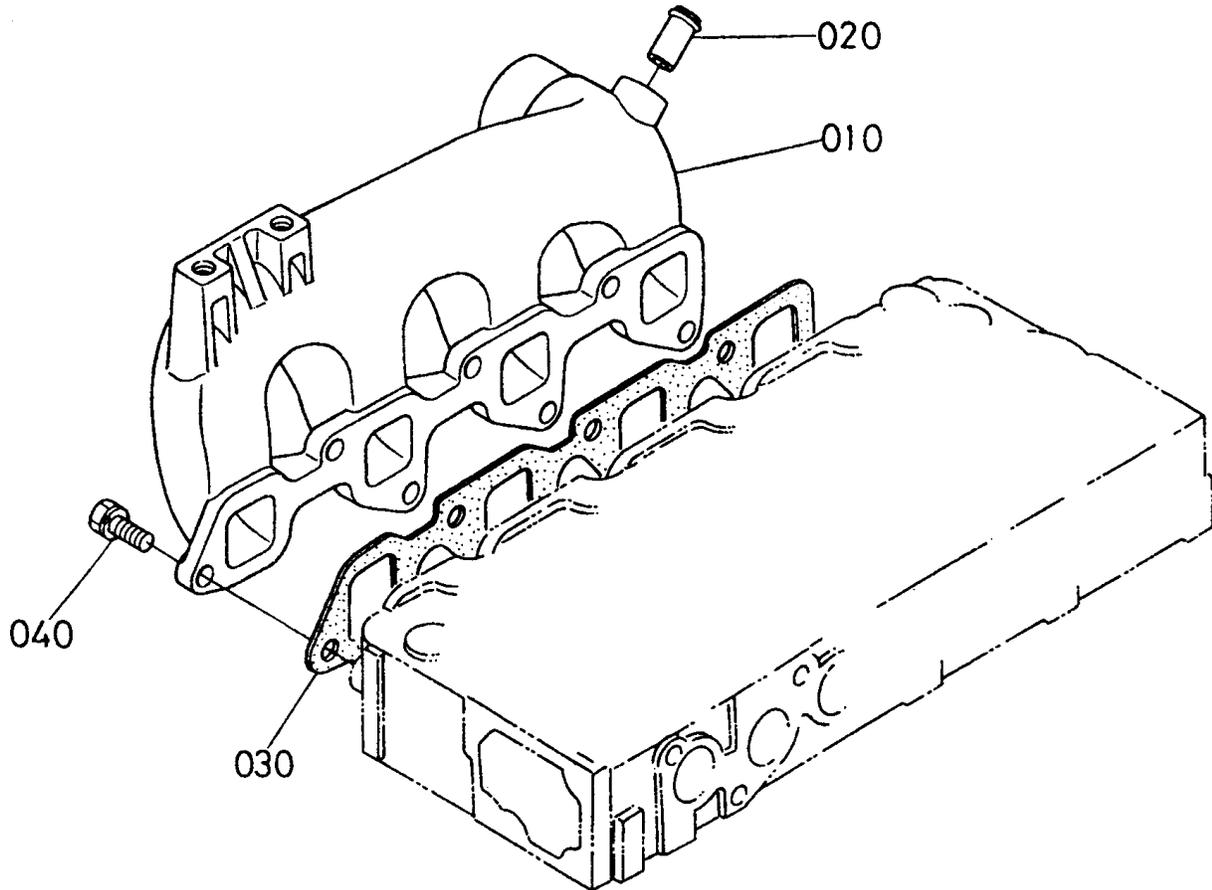
KUBOTA V2203 - ENGINE — HEAD COVER ASSY.

HEAD COVER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1711414510	HEAD COVER	1	
020	1547114520	HEAD COVER GASKET	1	
030	1718205020	COMP BREATHER	1	
040	1711405130	GASKET	2	
050	0112350840	BOLT	2	
060	1624105670	BREATHER ELEMENT	1	
070	1718214490	PLATE	1	
080	1718205510	BREATHER TUBE	1	
090	0931888200	HOSE CLAMP	2	
100	1545192330	CAP NUT	4	
110	1502133660	GASKET	4	

KUBOTA V2203 -ENGINE — INLET MANIFOLD ASSY.

INLET MANIFOLD ASSY.



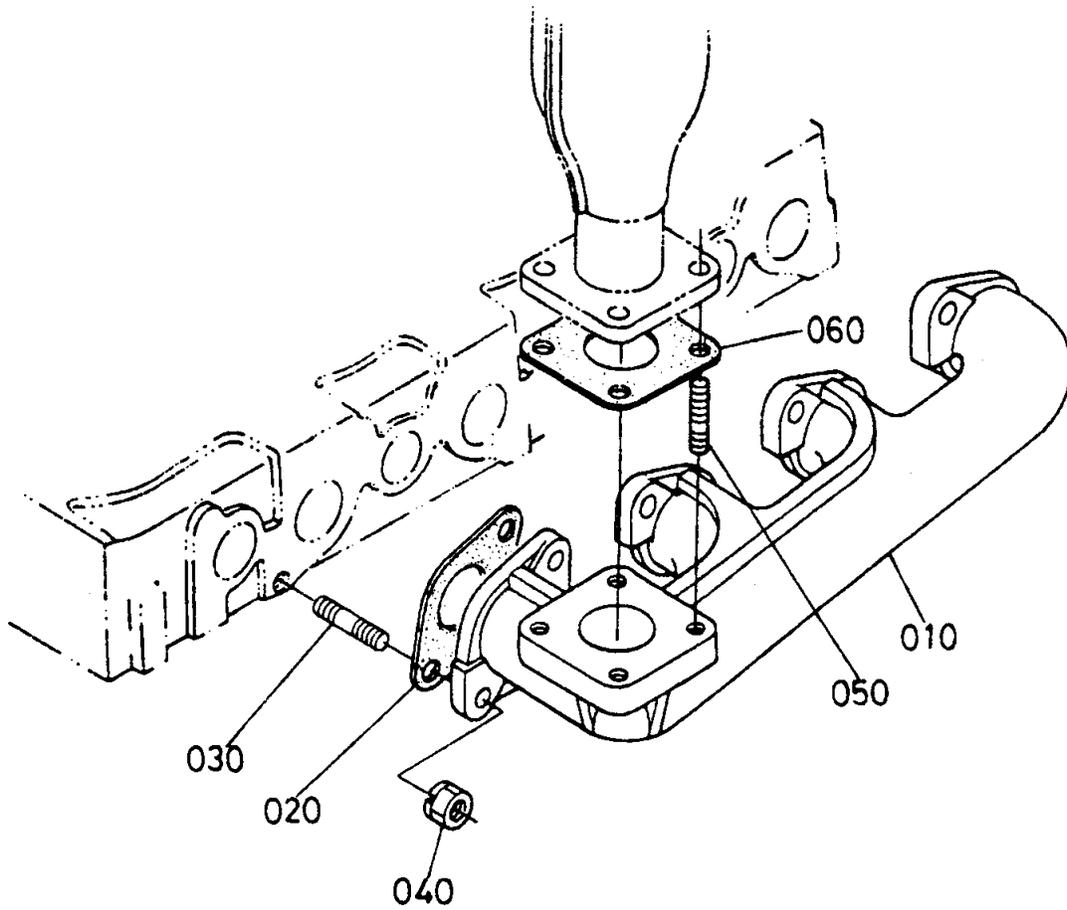
KUBOTA V2203 -ENGINE — INLET MANIFOLD ASSY.

INLET MANIFOLD ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1711411760	INLET MANIFOLD	1	
020	1718205550	BREATHER JOINT	1	
030	1642311820	IN - MANIFOLD GASKET	1	
040	0112350822	BOLT	7	

KUBOTA V2203 - ENGINE — EXHAUST MANIFOLD ASSY.

EXHAUST MANIFOLD ASSY.



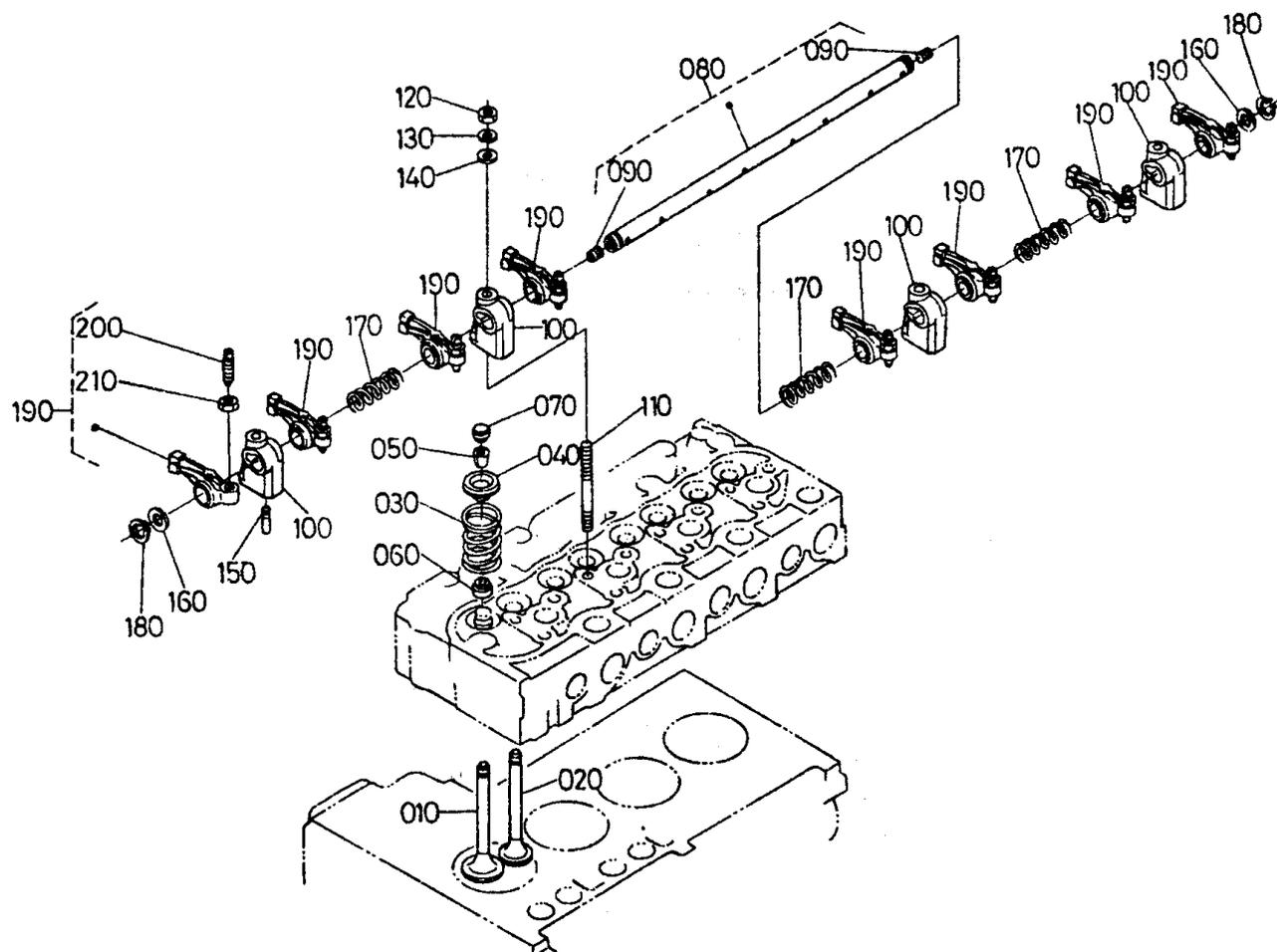
KUBOTA V2203 - ENGINE — EXHAUST MANIFOLD ASSY.

EXHAUST MANIFOLD ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1737712312	EXHAUST MANIFOLD	1	
020	1552212350	EX-MANIFOLD GASKET	4	
030	1522191530	STUD	8	
040	1642992010	NUT	8	
050	0151350822	STUD	4	
060	T007016420	MUFFLER GASKET	1	

KUBOTA V2203 -EB ENGINE — VALVE AND ROCKER ASSY.

VALVE AND ROCKER ASSY.



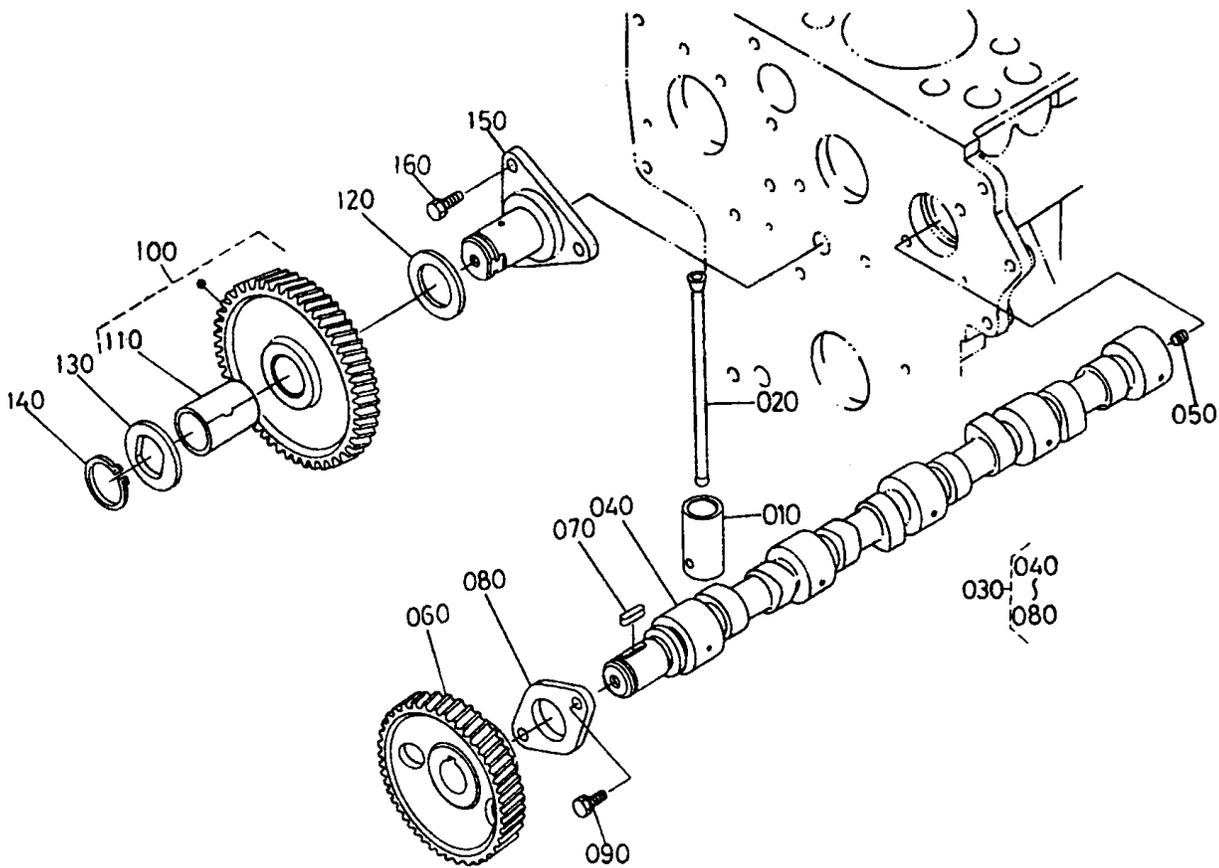
KUBOTA V2203 -EB ENGINE — VALVE AND ROCKER ASSY.

VALVE AND ROCKER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1648413110	INLET VALVE	4	
020	1648413120	EXHAUST VALVE	4	
030	1522113240	VALVE SPRING	8	
040	1522113330	VALVE SPRING RETAINER	8	
050	1522113360	VALVE SPRING COLLAR	8	SET
060	1522113150	VALVE STEM SEAL	8	
070	1522113280	VALVE CAP	8	
080	1540114052	ROCKER ARM SHAFT ASSY.	1	
090#	0341000808	SET SCREW	2	INCLUDES ITEM W/#
100	1522114350	ROCKER ARM BRACKET	4	
110	1552191500	STUD	4	
120	0215650080	NUT	4	
130	0451260080	SPRING WASHER	4	
140	0401250080	PLAIN WASHER	4	
150	0541100528	SPRING PIN	1	
160	1522114430	ROCKER ARM SHAFT WASHER	2	
170	1522114310	ROCKER ARM SPRING	3	
180	0461200140	EXTERNAL CIR CLIP	2	
190	1562114030	ROCKER ARM ASSY.	8	INCLUDES ITEM W/*
200*	1552114230	ADJUSTING SCREW	8	
210*	1502114240	NUT	8	

KUBOTA V2203 - ENGINE — CAMSHAFT ASSY.

CAMSHAFT ASSY.



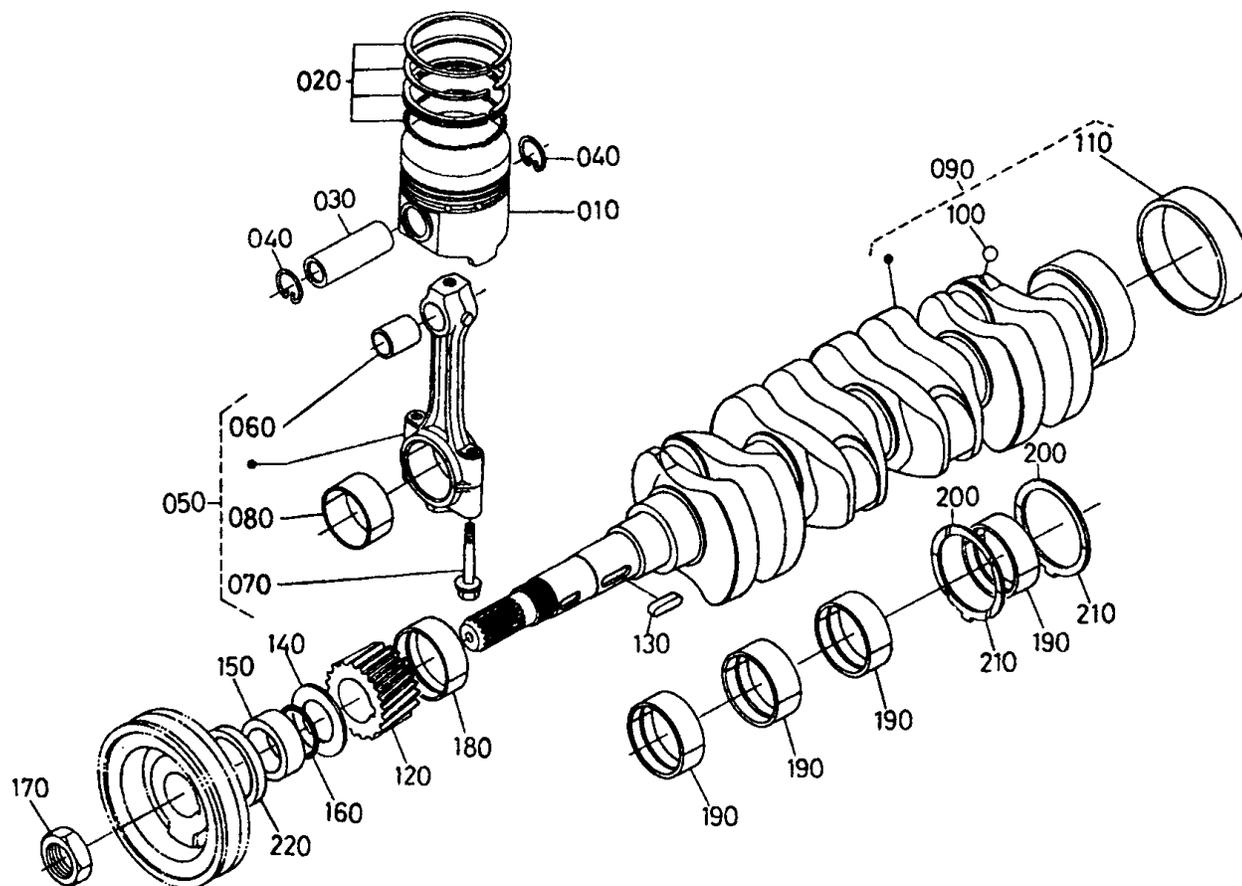
KUBOTA V2203 - ENGINE — CAMSHAFT ASSY.

CAMSHAFT ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1560115550	TAPPET	8	
020	1901315110	PUSH ROD	8	
030	1734316010	CAMSHAFT ASSY.	1	INCLUDES ITEMS W/#
040#	1734316150	CAMSHAFT	1	
050#	1552193610	SET SCREW	1	
060#	1552116510	CAM GEAR	1	
070#	0571200720	FEATHER KEY	1	
080#	1522116270	CAMSHAFT STOPPER	1	
090	0112350818	BOLT	2	
100	1522124010	IDLE GEAR COMP.	1	INCLUDES ITEMS W/*
110*	1733124980	IDLE GEAR BUSH	1	
120	1552124360	COLLAR	1	
130	1552124370	COLLAR	1	
140	1522124320	IDLE GEAR CIR CLIP	1	
150	1981824250	IDLE GEAR SHAFT	1	
160	0112350818	BOLT	3	

KUBOTA V2203 - ENGINE — PISTON AND CRANKSHAFT ASSY.

PISTON AND CRANKSHAFT ASSY.



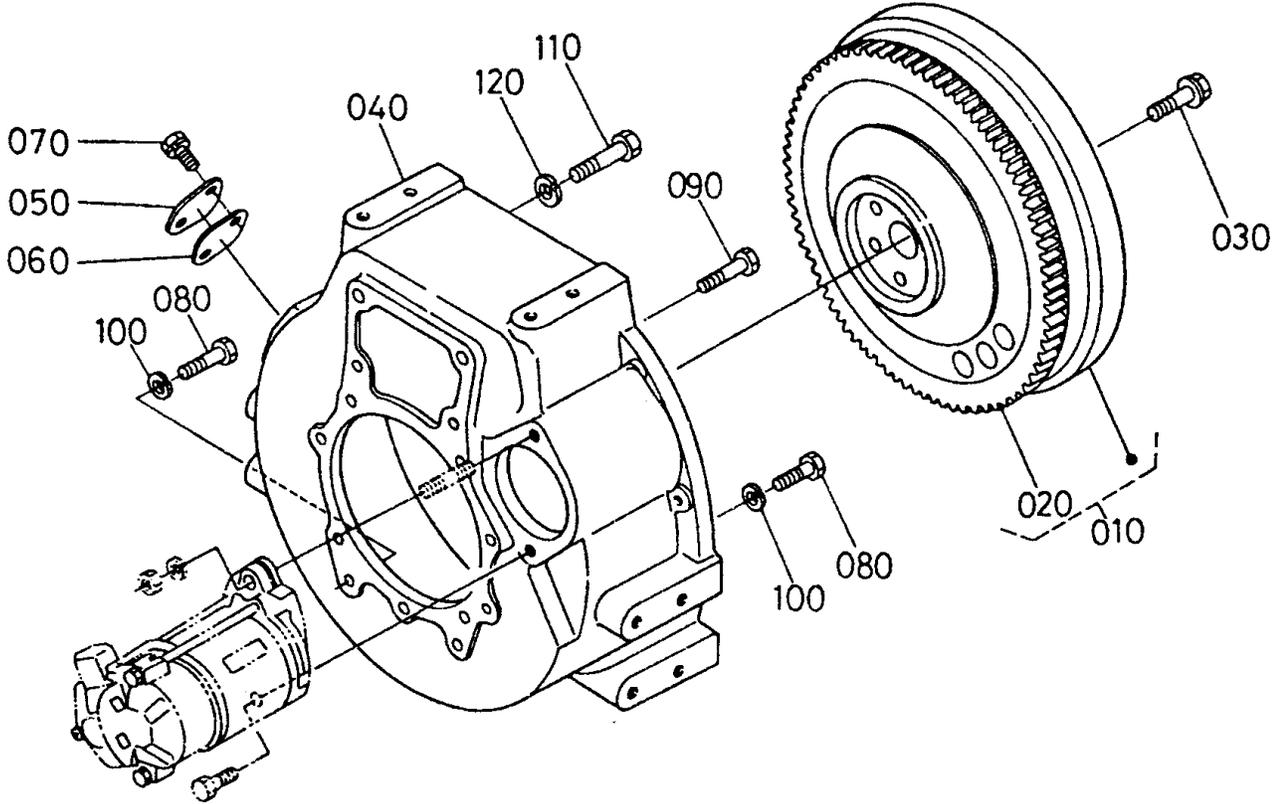
KUBOTA V2203 - ENGINE — PISTON AND CRANKSHAFT ASSY.

PISTON AND CRANKSHAFT ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1907721110	PISTON	4	ST D
010	1907721910	PISTON	4	+ 0.5 M M
020	1733121050	PISTON RING ASSY.	4	
030	1490121310	PISTON PIN	4	
040	1410921330	PISTON PIN CLIP	8	
050	1731122010	CONNECTING ROD ASSY.....	4	INCLUDES ITEMS W/*
060*	1733121980	PISTON PIN BUSH	4	
070*	1552122142	CONNECTING ROD BOLT	8	
080*	1731122310	CRANKPIN METAL	4	STD SET
080	1733122970	CRANKPIN METAL	4	- 0.20 M M SET
080	1733122980	CRANKPIN METAL	4	- 0.40 M M SET
090	1664123010	COMP. CRANKSHAFT	1	INCLUDES ITEMS W/#
100#	0771500401	BALL	4	
110#	1920223280	CRANKSHAFT BUSHING	1	
120	1547124110	CRANK GEAR	1	
130	0571200720	FEATHER KEY	1	
140	1547123312	OIL SLINGER	1	
150	1920223250	CRANKSHAFT COLLAR	1	
160	0481110300	O RING	1	
170	1522123360	CRANKSHAFT NUT	1	
180	1731123470	CRANKSHAFT METAL	1	STD
180	1731123910	CRANKSHAFT METAL	1	- 0.20 M M
180	1731123920	CRANKSHAFT METAL	1	- 0.40 M M
190	1731123480	CRANKSHAFT METAL	4	STD SET
190	1731123930	CRANKSHAFT METAL	4	- 0.20 M M SET
190	1731123940	CRANKSHAFT METAL	4	- 0.40 M M SET
200	1552123530	SIDE METAL	2	STD
200	1522123950	SIDE METAL	2	+ 0.20 M M
200	1522123960	SIDE METAL	2	+ 0.40 M M
210	1920223540	SIDE METAL	2	STD
210	1920223970	SIDE METAL	2	+ 0.20 M M
210	1920223980	SIDE METAL	2	+ 0.40 M M
220	1920204140	OIL SEAL	1	

KUBOTA V2203 -ENGINE — FLYWHEEL ASSY.

FLYWHEEL ASSY.



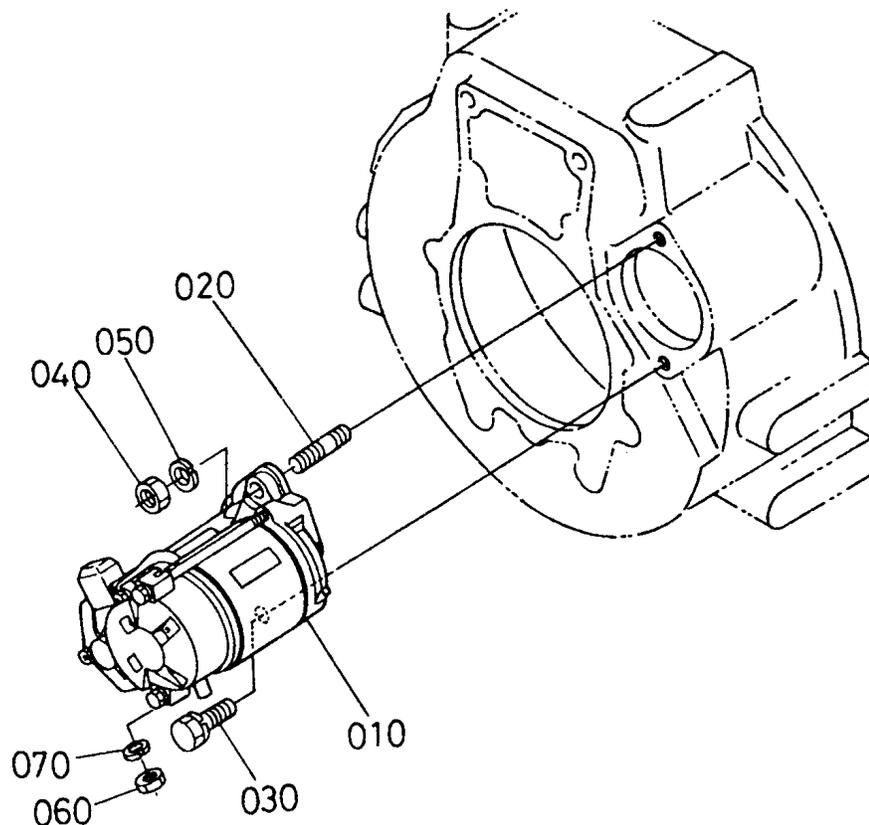
KUBOTA V2203 - ENGINE — FLYWHEEL ASSY.

FLYWHEEL ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1747525010	COMP. FLYWHEEL	1	INCLUDES ITEMS W/*
020*	1560263820	RING GEAR	1	
030	1532125163	FLYWHEEL BOLT	6	
040	1747504610	FLYWHEEL HOUSING	1	
050	1552104680	COVER	1	
060	1552104790	COVER PACKING	1	
070	0112360816	BOLT	2	
080	0107351032	BOLT	11	
090	0107351042	BOLT	3	
100	0451260100	SPRING WASHER	11	
110	0107351250	BOLT	2	
120	0451260120	SPRING WASHER	2	

KUBOTA V2203 - ENGINE — STARTER ASSY. AND MOUNTING

STARTER ASSY.



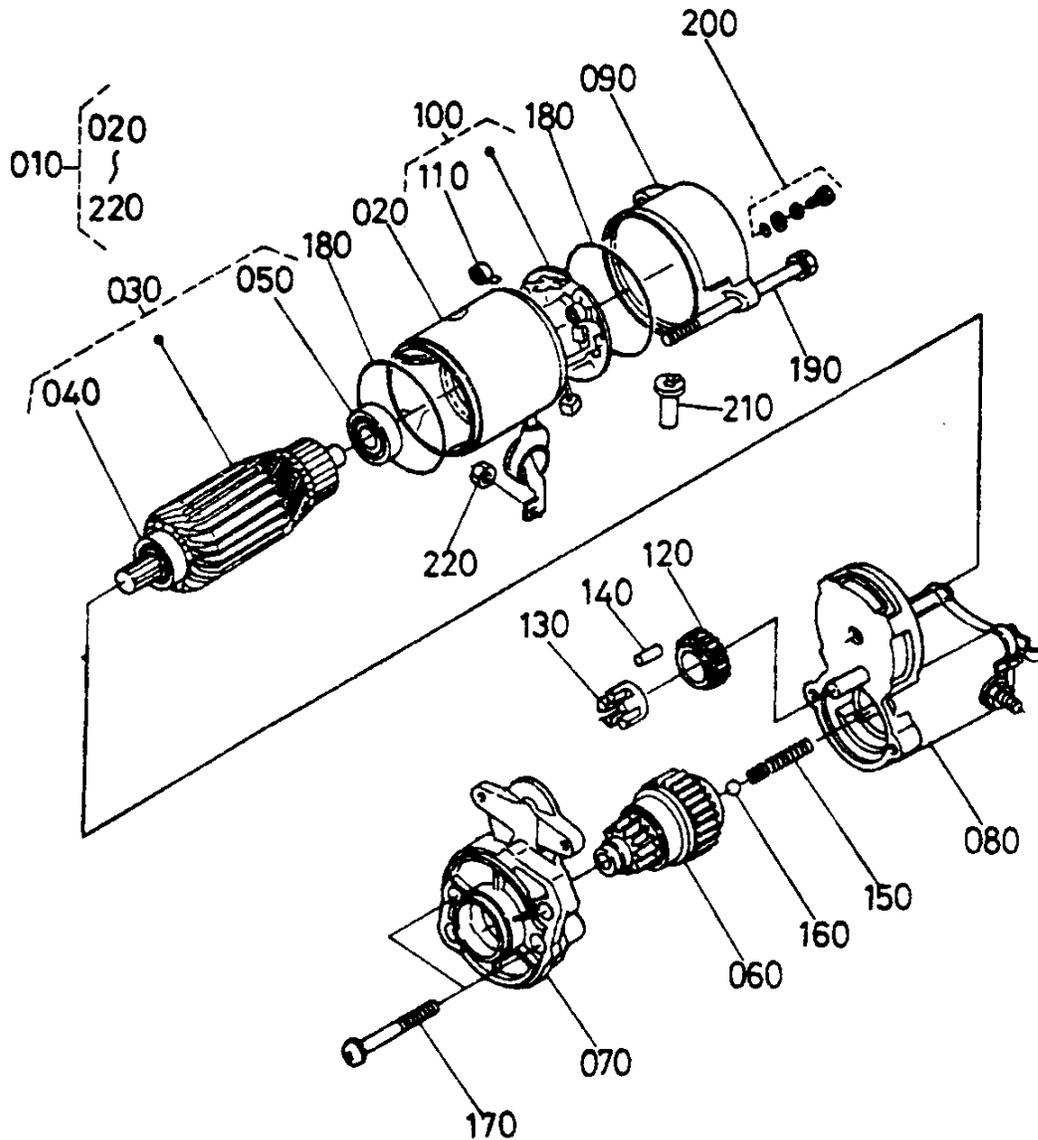
KUBOTA V2203 - ENGINE — STARTER ASSY. AND MOUNTING

STARTER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1738163012	STARTER ASSY.	1	
020	0151751028	STUD	1	
030	0113351030	BOLT	1	
040	0217650100	NUT	1	
050	0451260100	SPRING WASHER	1	
060	0211450080	NUT	1	
070	0451260080	SPRING WASHER	1	

KUBOTA V2203 - ENGINE — STARTER (COMPONENTS) ASSY.

STARTER (COMPONENTS) ASSY.



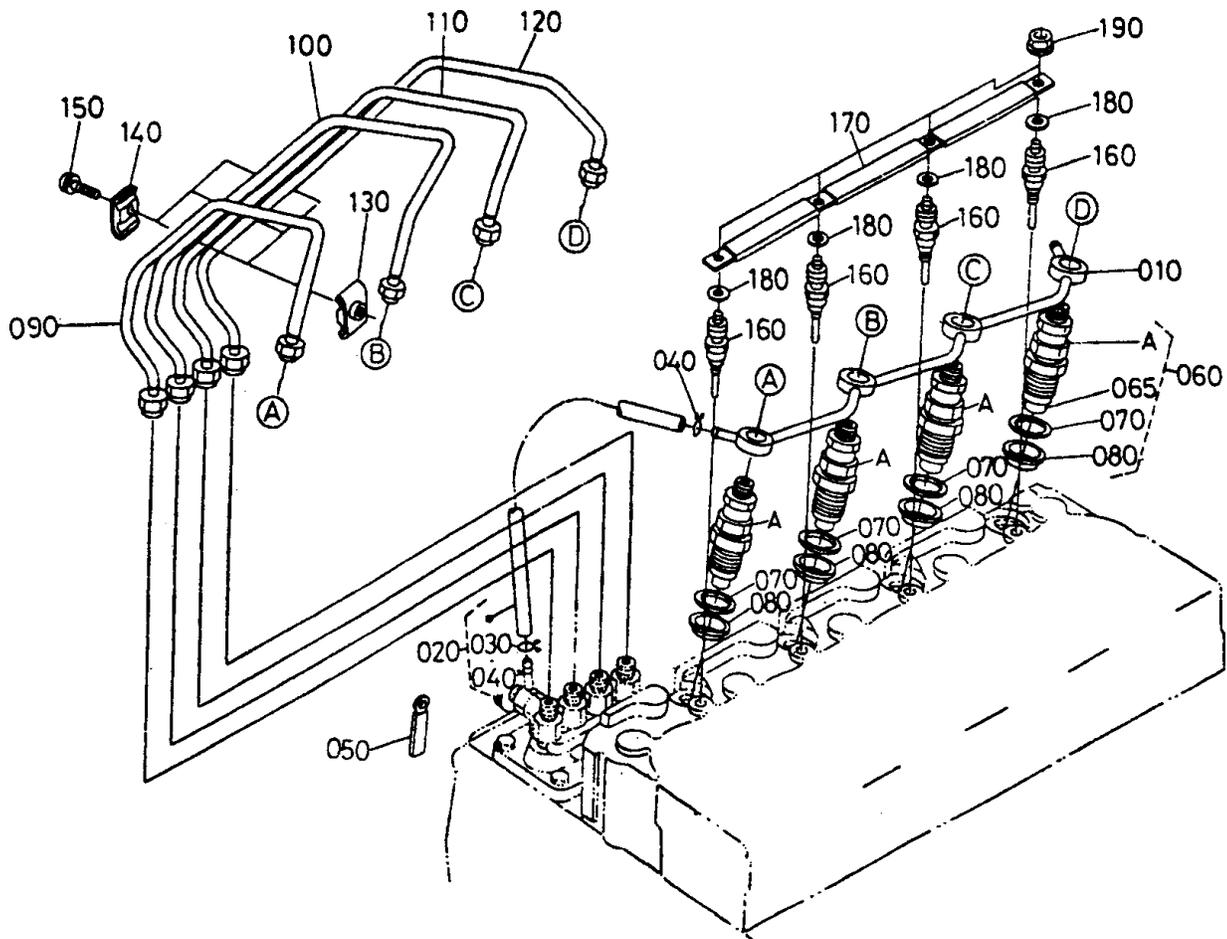
KUBOTA V2203 - ENGINE — STARTER (COMPONENTS) ASSY.

STARTER (COMPONENTS) ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1738163012	STARTER ASSY.....	1	INCLUDES ITEMS W/*
020*	1119763080	YOKE ASSY.	1	
030*	1119763070	ARMATURE ASSY.	1	INCLUDES ITEMS W/#
040*#	1146063500	BEARING	1	
050*#	1146063530	BEARING	1	
060*	1562163040	OVER RUNNING CLUTCH	1	
070*	1648463030	DRIVE END FRAME	1	
080*	1648463020	MAGNETIC SWITCH	1	
090*	1648463200	END FRAME	1	
100*	1738163380	BRUSH HOLDER ASSY.	1	INCLUDES ITEMS W/\$
110*\$	1540163390	BRUSH SPRING	4	
120*	1146063270	GEAR	1	
130*	1146063110	RETAINER	1	
140*	1921263100	ROLLER	5	
150*	1146063120	SPRING	1	
160*	1921297130	BALL	1	
170*	1146093310	BOLT	2	
180*	1551196660	O RING	2	
190*	1119763320	BOLT	2	
200*	1551163760	BOLT ASSY.	2	
210*	1628563570	DRAIN PIPE	1	
220*	1396392010	HEXAGON NUT	1	

KUBOTA V2203 - ENGINE — NOZZLE HOLDER ASSY.

NOZZLE HOLDER ASSY.



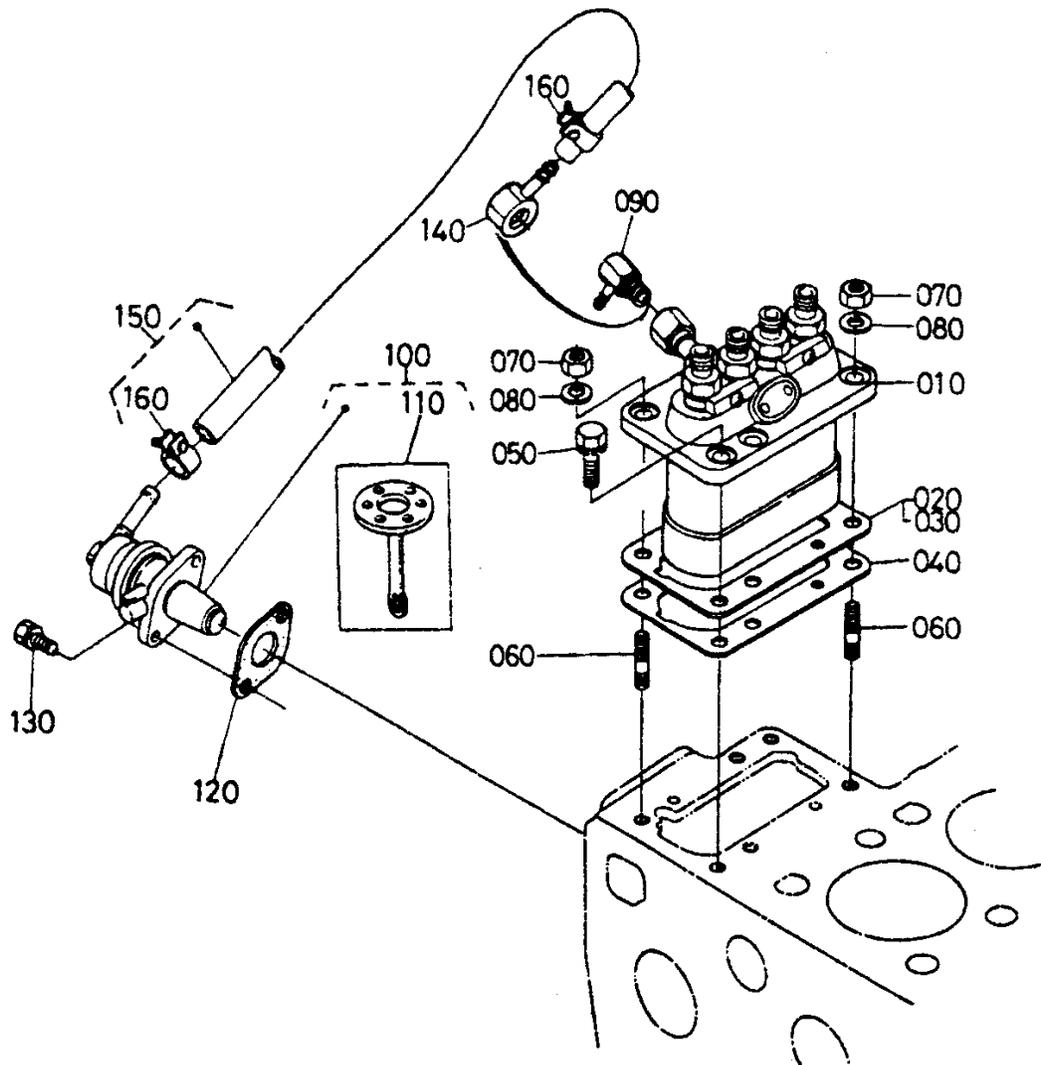
KUBOTA V2203 - ENGINE — NOZZLE HOLDER ASSY.

NOZZLE HOLDER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1645442502	OVER FLOW PIPE ASSY.	1	
020	1733142500	OVER FLOW PIPE ASSY.	1	INCLUDES ITEMS W/*
030*	1497142750	PIPE CLIP	1	
040*	1024442320	PIPE CLIP	1	
050	1524167580	CORD CLAMP	1	
060	1645453900	NOZZLE HOLDER KIT	1	INCLUDES ITEMS W/#
065#	1645453610	NOZZLE PIECE	4	
070#	1584153622	GASKET	4	
080#	1907753650	HEAT SEAL	4	
090	1907753650	INJECTION PIPE	1	
100	1907753723	INJECTION PIPE	1	
110	1907753733	INJECTION PIPE	1	
120	1907753743	INJECTION PIPE	1	
130	1584153850	PIPE CLAMP	3	
140	1584153860	PIPE CLAMP	3	
150	0302450520	WASHER WITH SCREW	3	
160	1907765510	GLOW PLUG	4	
170	1647565560	GLOW PLUG CORD	1	
180	0401360040	PLAIN WASHER	4	
190	0276150040	FLANGE NUT	4	

KUBOTA V2203 - ENGINE — INJECTION PUMP 1 ASSY.

INJECTION PUMP 1 ASSY.



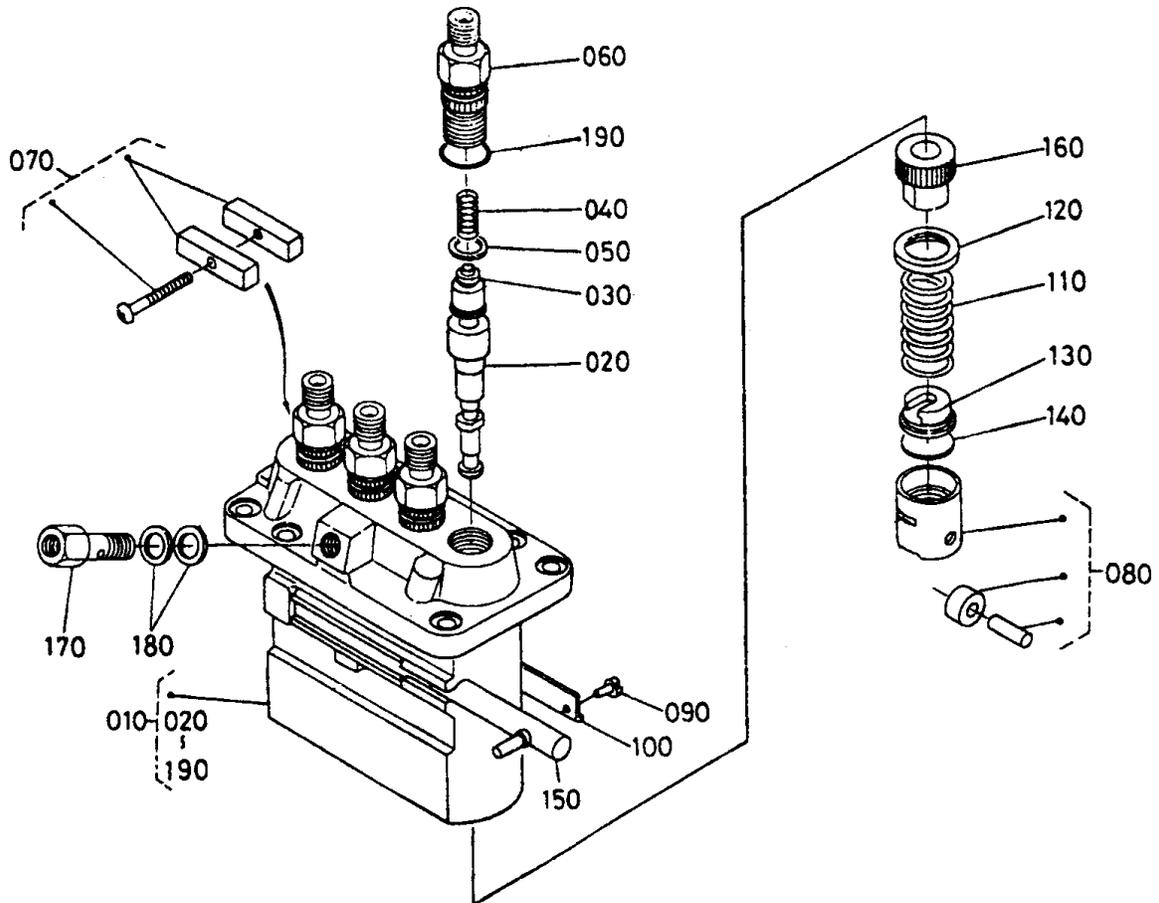
KUBOTA V2203 - ENGINE — INJECTION PUMP 1 ASSY.

INJECTION PUMP 1 ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1667251010	INJECTION PUMP ASSY.	1	
020	1907752090	INJECTION SHIM	1	
030	1907752110	INJECTION SHIM	1	
040	1907752120	INJECTION SHIM	1	
050	0112350822	BOLT	4	
060	1522191530	STUD	2	
070	0215650080	NUT	2	
080	0451260080	SPRING WASHER	2	
090	1574860570	ORIFICE ASSY.	1	
100	1712152030	FUEL PUMP ASSY.	1	
120	1526352140	FUEL PUMP GASKET	1	
130	0102350616	BOLT	2	
140	1540195690	EYE JOINT	1	
150	1468142010	FUEL PIPE ASSY.	1	INCLUDES ITEMS W/#
160#	1430142750	PIPE CLIP	2	

KUBOTA V2203 - ENGINE — INJECTION PUMP 2 ASSY.

INJECTION PUMP 2 ASSY.



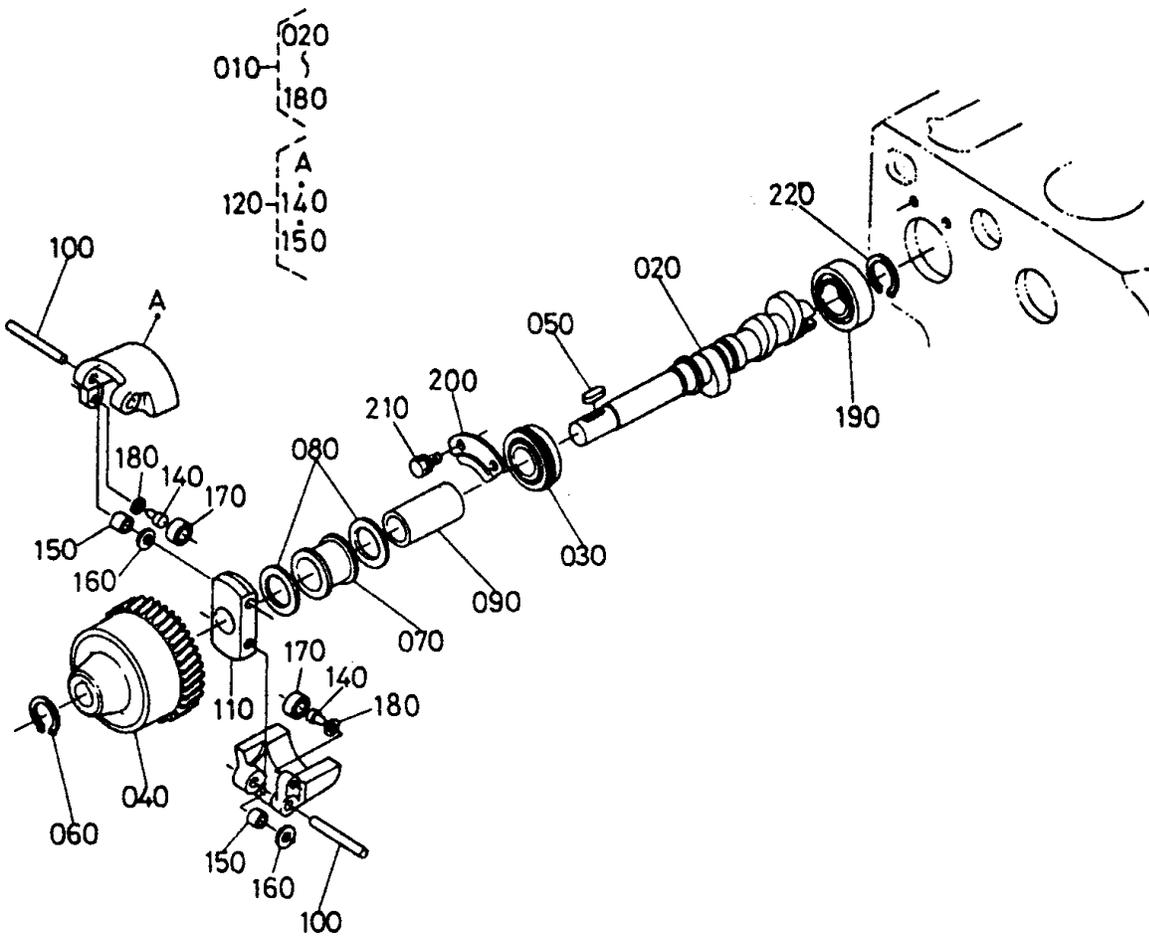
KUBOTA V2203 - ENGINE — INJECTION PUMP 2 ASSY.

INJECTION PUMP ASSY. 2

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1667251010	INJECTION PUMP ASSY.	1	INCLUDES ITEMS W/*
020*	1667251050	PUMP PLUNGER	4	
030*	1647551030	DELIVERY VALVE	4	
040*	1647551230	DELIVERY VALVE	4	
050*	1142051240	DELIVERY VALVE GASKET	4	
060*	1641551220	DELIVERY VALVE HOLDER	4	
070*	1647551610	LOCK PLATE ASSY.	2	
080*	1522151070	TAPPET ASSY.	4	
090*	1461151250	TAPPET GUIDE PIN	4	
100*	1461151440	PLATE	2	
110*	1522151280	PLUNGER SPRING	4	
120*	1522151270	UPPER SPRING SEAT	4	
130*	1522151290	LOWER SPRING SEAT	4	
140*	1907751490	SHIM	4	
150*	1540151060	CONTROL RACK	1	
160*	1522151382	CONTROL SLEEVE	4	
170*	1547151382	FOLLOW SCREW	1	
180*	1540196650	GASKET	2	
190*	1461151200	O RING	4	

KUBOTA V2203 - ENGINE — FUEL CAMSHAFT ASSY.

FUEL CAMSHAFT ASSY.



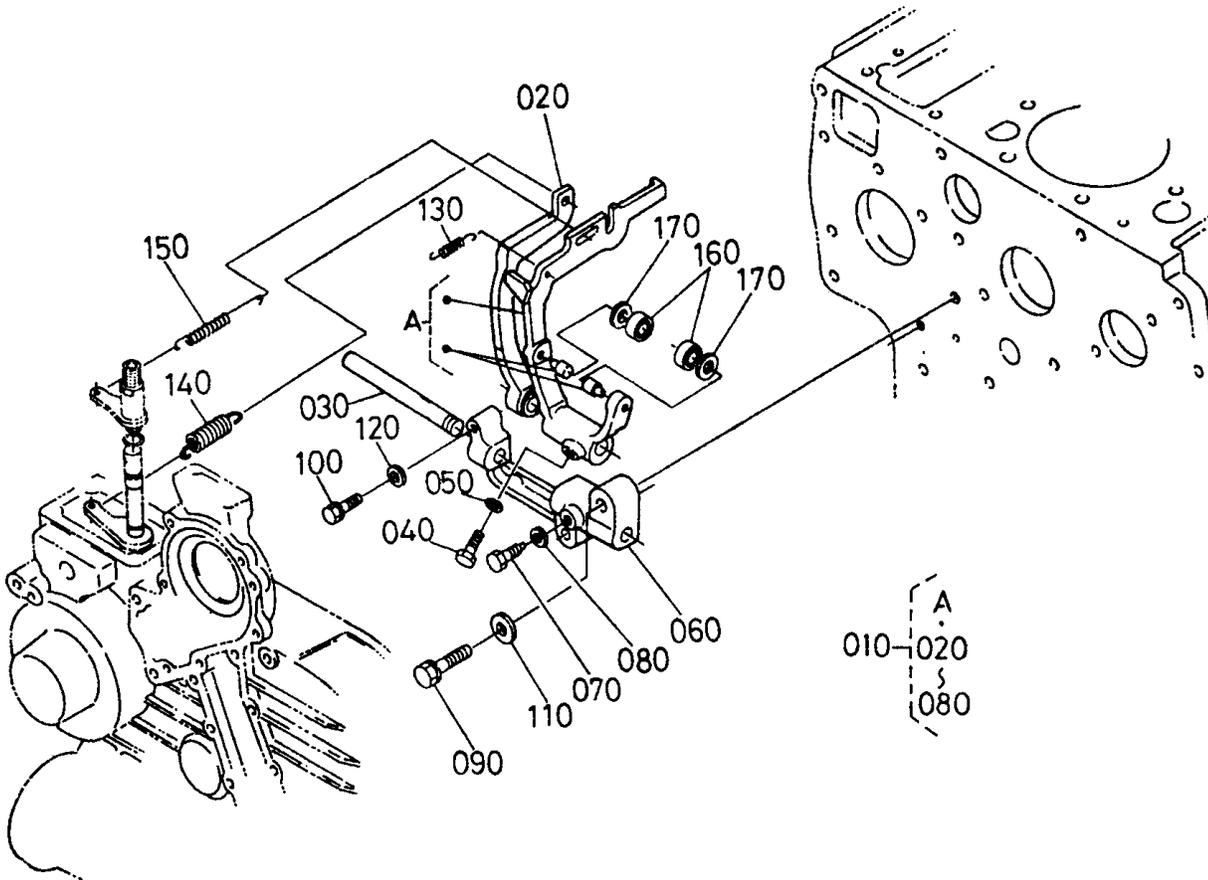
KUBOTA V2203 - ENGINE — FUEL CAMSHAFT ASSY.

FUEL CAMSHAFT ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1666216020	FUEL CAMSHAFT ASSY.	1	INCLUDES ITEMS W/*
020*	1666216170	FUEL CAMSHAFT	1	
030*	0815306205	BALL BEARING	1	
040*	1666251150	INJECTION PUMP GEAR	1	
050*	0571200525	FEATHER KEY	1	
060*	0461200240	EXTERNAL CIR CLIP	1	
070*	1981855450	GOVERNOR SLEEVE	1	
080*	1981855460	THRUST WASHER	2	
090*	1981855510	GOV. WEIGHT COLLAR	1	
100*	1981855260	GOV. WEIGHT SHAFT	2	
110*	1666255270	GOV. WEIGHT HOLDER	2	
120*	1666255060	GOVERNOR COMP. WEIGHT	2	INCLUDES ITEMS W/#
140*#	1982855280	GOVERNOR WEIGHT PIN	2	
150*#	1981855380	GOVERNOR BUSH	4	
160*	1666255620	PLAIN WASHER	4	
170*	1981855600	BEARING	2	
180*	1981855340	WASHER	2	
190	0824000001	BALL BEARING	1	
200	1522116320	FUEL C/SHAFT STOPPER	1	
210	0112360814	BOLT	2	
220	0461200250	EXTERNAL CIR CLIP	1	

KUBOTA V2203 - ENGINE — GOVERNOR ASSY.

GOVERNOR ASSY.



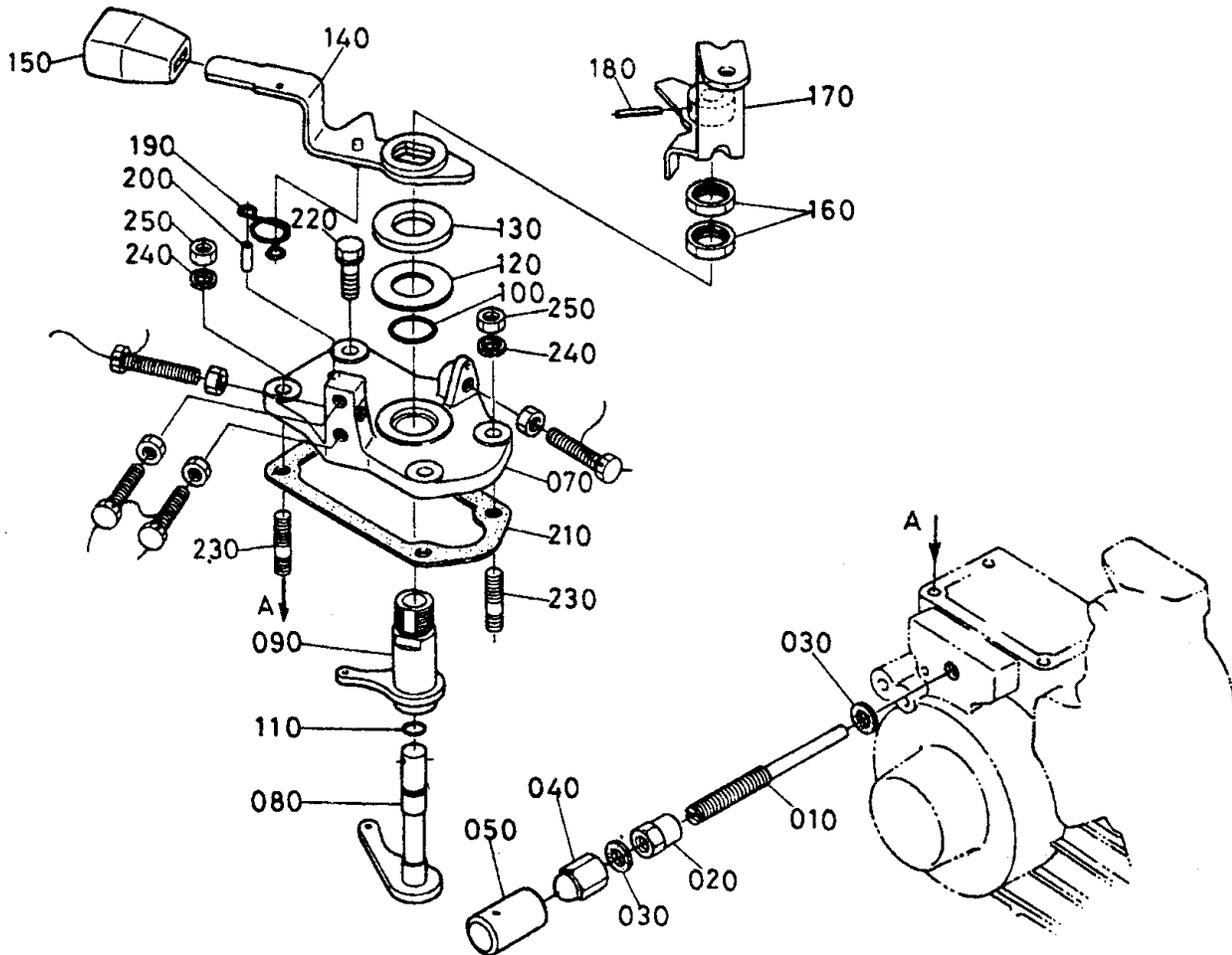
KUBOTA V2203 - ENGINE — GOVERNOR ASSY.

GOVERNOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1718256050	FORK LEVER ASSY.	1	INCLUDES ITEMS W/*
020*	1707656130	FORK LEVER	1	
030*	1981856150	FORK LEVER SHAFT	1	
040*	0105350518	BOLT	1	
050*	0451260050	SPRING WASHER	1	
060*	1707656230	FORK LEVER HOLDER	1	
070*	1522166410	BOLT	1	
080*	0451260060	SPRING WASHER	1	
090	0112350832	BOLT	2	
100	0102350628	BOLT	1	
110	0401250080	PLAIN WASHER	2	
120	0401250060	PLAIN WASHER	1	
130	1981856480	START SPRING	1	
140	1718256412	GOVERNOR SPRING	1	
150	1718256420	GOVERNOR SPRING	1	
160	1981855600	BEARING	2	
170	1981855340	WASHER	2	

KUBOTA V2203 - ENGINE — SPEED CONTROL PLATE ASSY.

SPEED CONTROL PLATE ASSY.



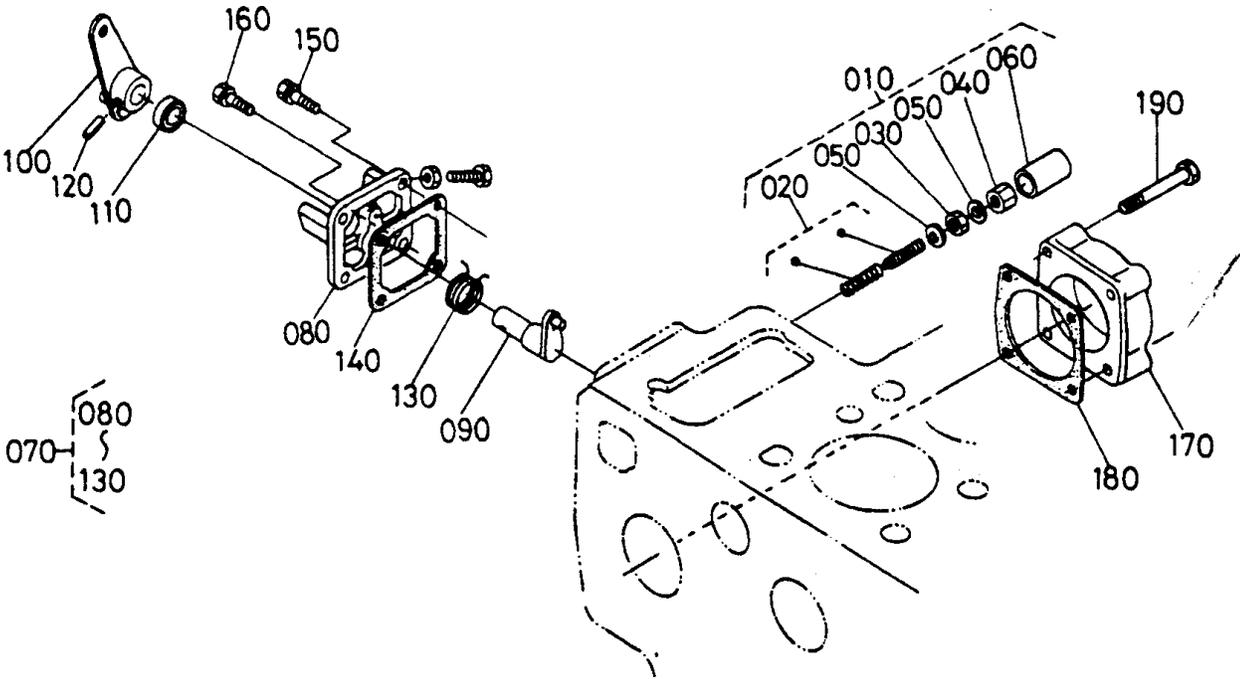
KUBOTA V2203 - ENGINE — SPEED CONTROL PLATE ASSY.

SPEED CONTROL PLATE ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1981854120	ADJUSTING BOLT	1	
020	1560192010	NUT	1	
030	1560196650	GASKET	2	
040	1584114620	CAP NUT	1	
050	1622154420	CAP	1	
070	1707657110	SPEED CONTROL PLATE	1	
080	1707657740	LEVER SHAFT	1	
090	1707656110	GOVERNOR LEVER	1	
100	0481110160	O RING	1	
110	0481110070	O RING	1	
120	1362216670	CAMSHAFT SHIM	1	
130	1707957380	COLLAR	1	
140	1707657162	CHANGE LEVER	1	
150	3691927820	PTO LEVER GRIP	1	
160	1584192010	SPEED CONTROL NUT	2	
170	1707657152	SPEED CONTROL LEVER	1	
180	0541100318	SPRING PIN	1	
190	1707657510	CHANGE SPRING	1	
200	0501200412	STRAIGHT PIN	1	
210	1543957210	GASKET	1	
220	0102350620	BOLT	2	
230	1522188210	STUD	2	
240	0451260060	SPRING WASHER	2	
250	0205650060	NUT	2	

KUBOTA V2203 - ENGINE — ENGINE STOP LEVER ASSY.

ENGINE STOP LEVER ASSY.



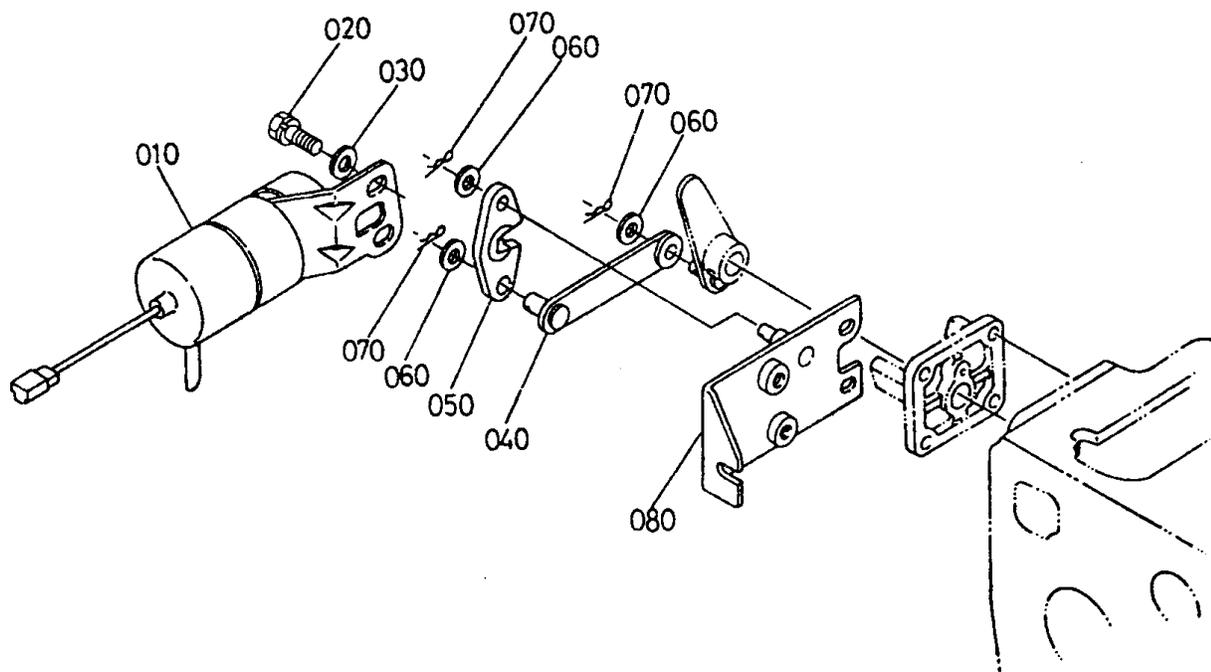
KUBOTA V2203 - ENGINE — ENGINE STOP LEVER ASSY.

ENGINE STOP LEVER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1707654093	IDLING APPARATUS	1	INCLUDES ITEMS W/#
020*	1707654103	ADJUSTMENT BOLT ASSY.	1	
030*	1540192010	NUT	1	
040*	1552192330	CAP NUT	1	
050*	1502133660	GASKET	2	
060*	1552154270	CAP	1	
070	1748257702	ENGINE STOP LEVER ASSY.	1	INCLUDES ITEMS W/#
080#	1718351650	INJECTION PUMP COVER	1	
090#	1733157740	LEVER SHAFT	1	
100#	1748257720	ENGINE STOP LEVER	1	
110#	1547157980	OIL SEAL	1	
120#	0541100420	SPRING PIN	1	
130#	1748257920	RETURN SPRING	1	
140	1529651660	PUMP COVER GASKET	1	
150	0102350618	BOLT	2	
160	0102350622	BOLT	2	
170	1718316210	FUEL CAMSHAFT COVER	1	
180	3539437860	GASKET	1	
190	0115350865	BOLT		

KUBOTA V2203 - ENGINE — STOP SOLENOID ASSY.

STOP SOLENOID ASSY.



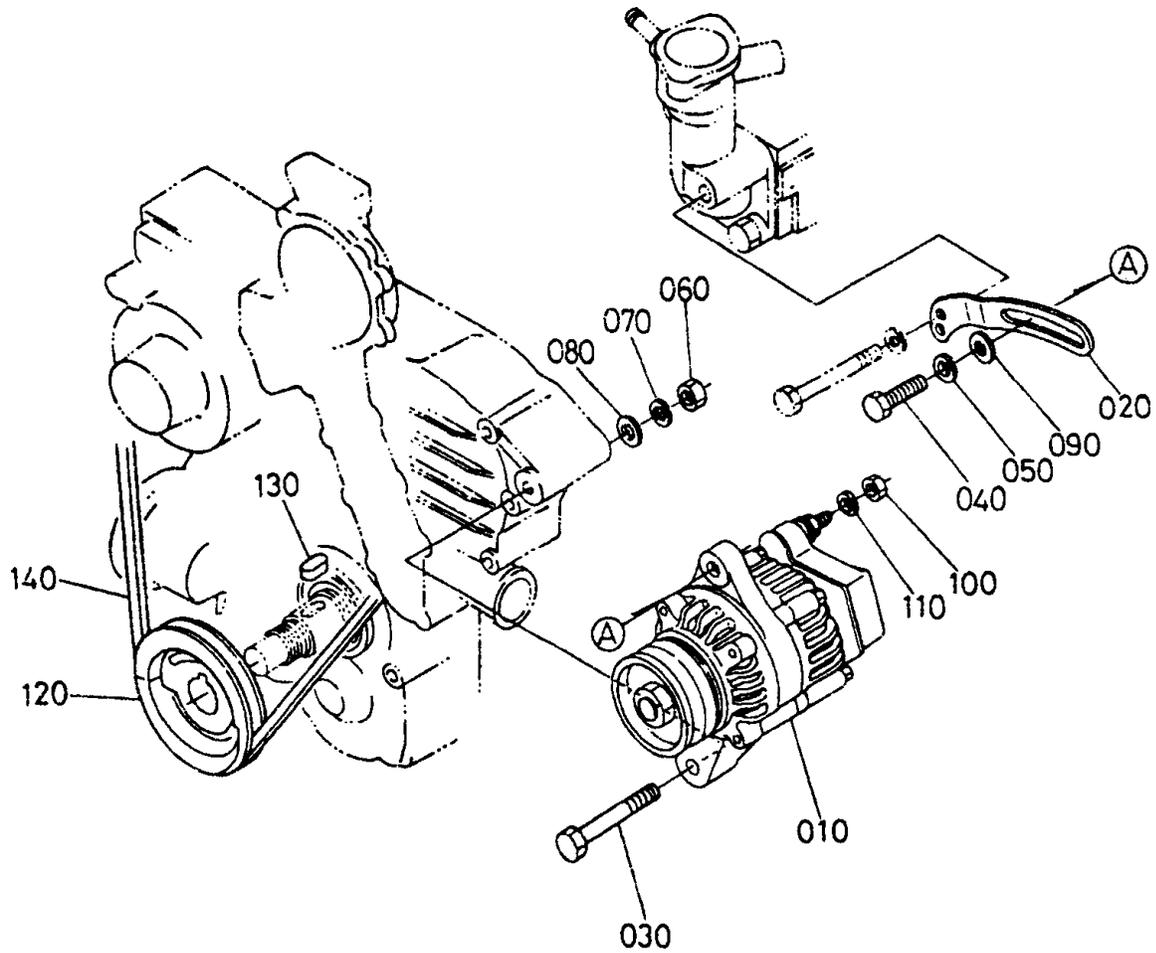
KUBOTA V2203 - ENGINE — STOP SOLENOID ASSY.

STOP SOLENOID ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1547160010	STOP SOLENOID	1	
020	0112360816	BOLT	2	
030	0401250080	PLAIN WASHER	2	
040	1733160150	STOP LEVER	1	
050	1547160162	STOP LEVER	1	
060	0401250060	PLAIN WASHER	3	
070	0552550600	SNAP PIN	3	
080	1718260110	SOLENOID SUPPORT	1	

KUBOTA V2203 - ENGINE — ALTERNATOR ASSY.

ALTERNATOR ASSY.



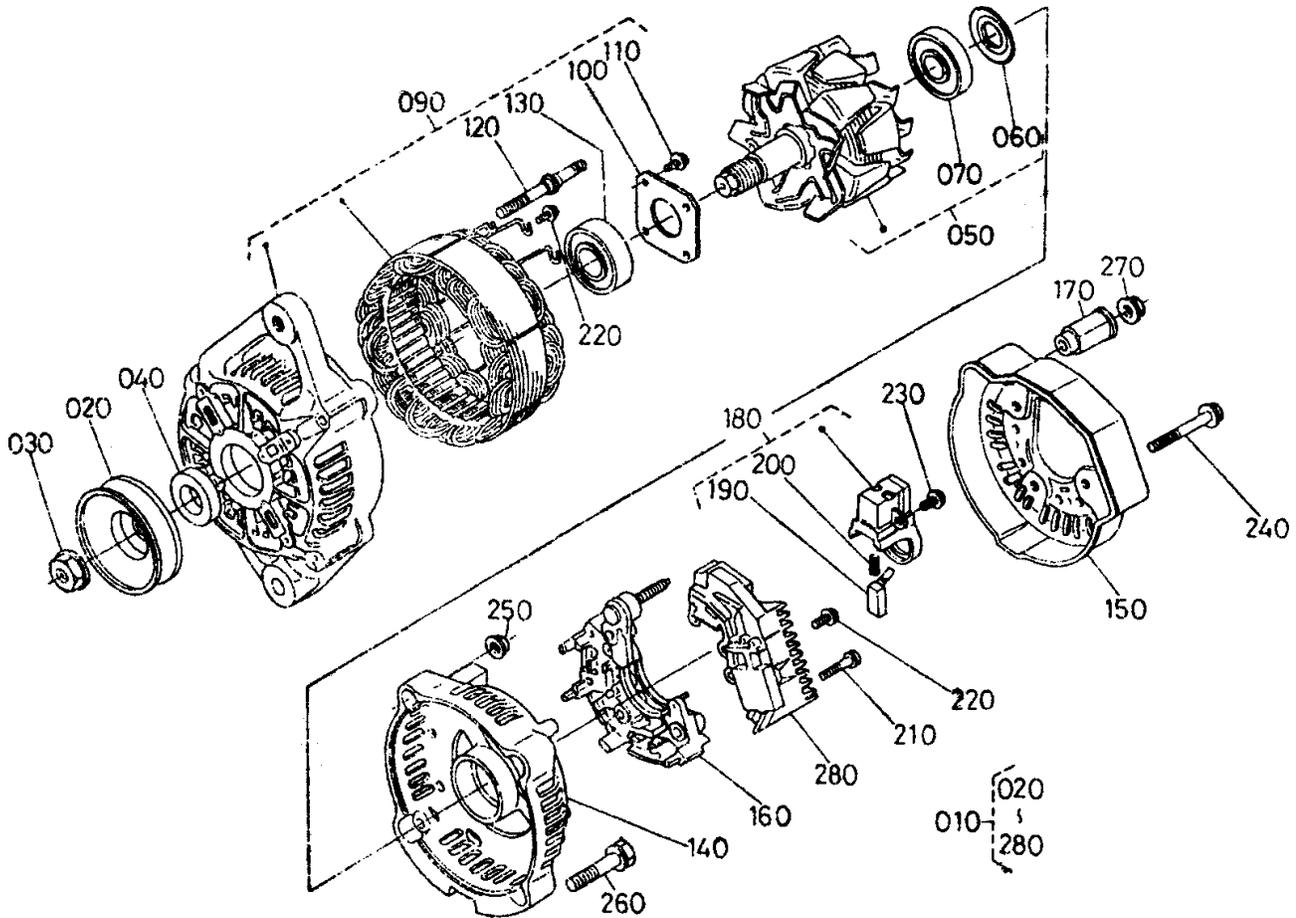
KUBOTA V2203 -EB ENGINE — ALTERNATOR ASSY.

ALTERNATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1642764010	ALTERNATOR ASSY.	1	
020	TA04074020	DYNAMO STAY	1	
030	0117351000	BOLT	1	
040	0115360830	BOLT	1	
050	0451260080	SPRING WASHER	1	
060	0215650100	NUT	1	
070	0451260100	SPRING WASHER	1	
080	0401150100	PLAIN WASHER	1	
090	0401560080	PLAIN WASHER	1	
100	0205650060	NUT	1	
110	0451260060	SPRING WASHER	1	
120	1920274280	FAN DRIVE PULLEY	1	
130	0571200720	FEATHER KEY	1	
140	1712397010	V - BELT	1	

KUBOTA V2203 - ENGINE — ALTERNATOR (COMPONENTS) ASSY.

ALTERNATOR (COMPONENTS) ASSY.

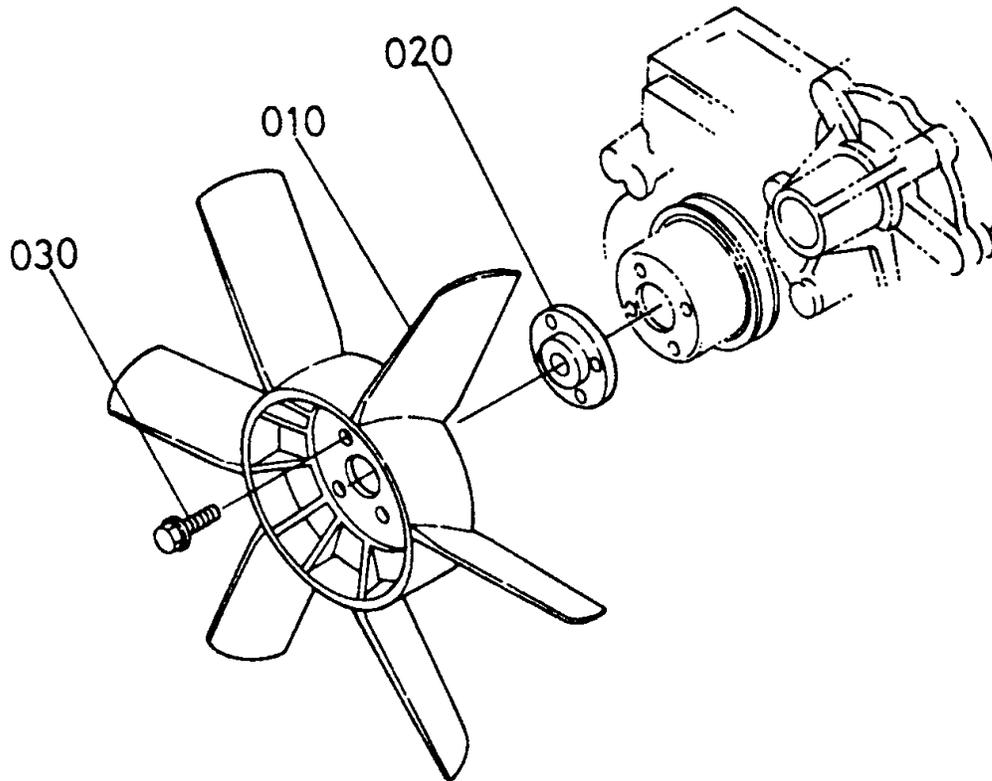


KUBOTA V2203 - ENGINE — ALTERNATOR (COMPONENTS) ASSY.

ALTERNATOR (COMPONENTS) ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1642764010	ALTERNATOR ASSY.	1	INCLUDES ITEMS W/*
020*	1642764110	ALTERNATOR PULLEY	1	
030*	1588192010	NUT	1	
040*	1588164150	COLLAR	1	
050*	1588164040	ROTOR	1	INCLUDES ITEMS W/\$
060*\$	1588164800	BEARING COVER	1	
070*\$	1588164770	BALL BEARING	1	
090*	1642764020	DRIVE END FRAME	1	INCLUDES ITEMS W/#
100*#	1588164710	RETAINER PLATE	1	
110*#	1588193010	ROUND HEAD SCREW	4	
120*#	1588164260	THROUGH BOLT	2	
130*#	1588164780	BALL BEARING	1	
140*	1624164060	END FRAME	1	
150*	1624164230	END COVER	1	
160*	1623164850	RECTIFIER ASSY.	1	
170*	1624164900	INSULATION BUSH	1	
180*	1588164310	BRUSH HOLDER	1	INCLUDES ITEMS W/%
190*%	1588164090	BRUSH	2	
200*%	1588164330	BRUSH SPRING	2	
210*	1588193020	ROUND HEAD SCREW	2	
220*	1588193030	ROUND HEAD SCREW	6	
230*	1588193040	ROUND HEAD SCREW	1	
240*	1588191040	BOLT	3	
250*	1588192020	NUT	2	
260*	1588191050	BOLT	2	
270*	1418292030	NUT	1	
280*	1588164600	REGULATOR ASSY.	1	

FAN ASSY.



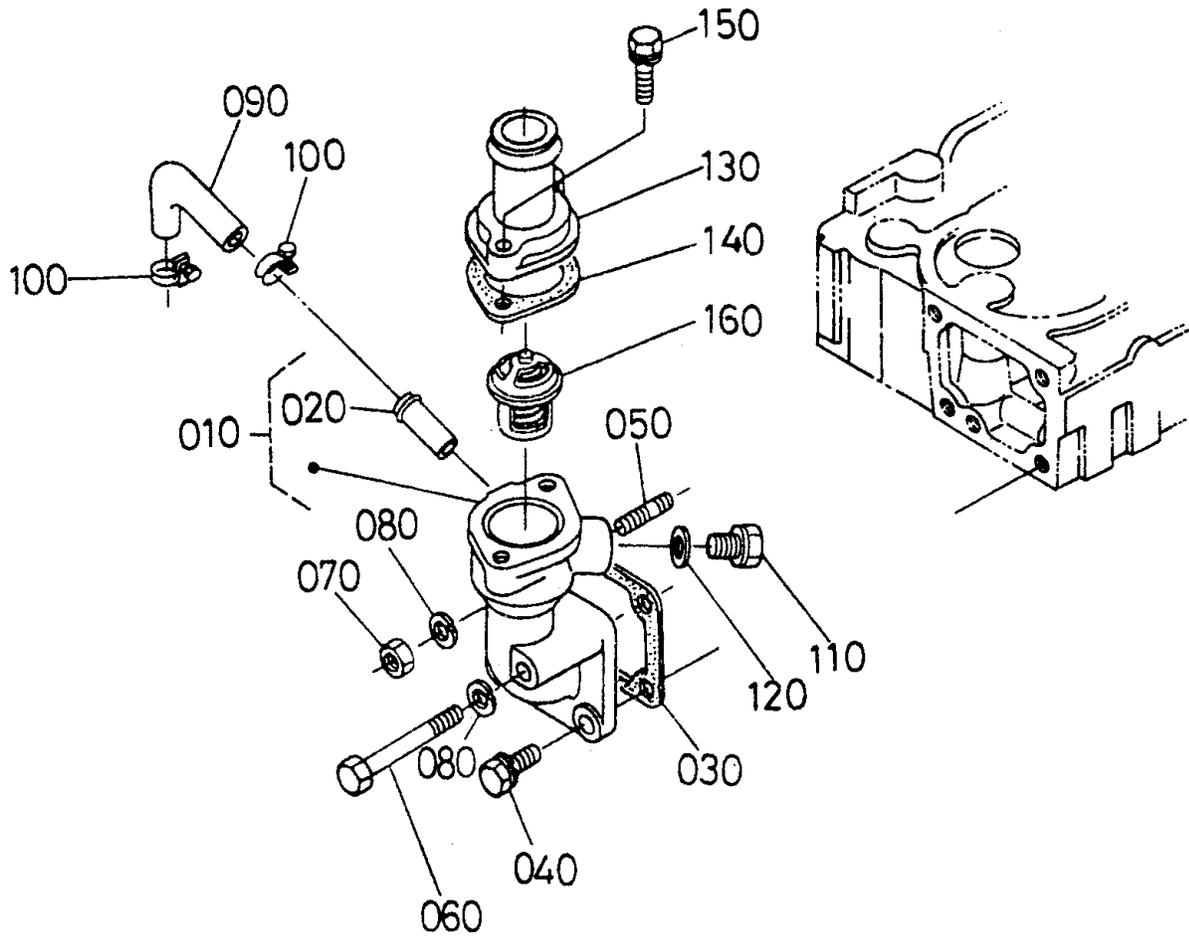
KUBOTA V2203 - ENGINE — FAN ASSY.

FAN ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1737174110	FAN	1	
020	1981874150	FAN COLLAR	1	
030	0175450625	FLANGE BOLT	4	

KUBOTA V2203 ENGINE — WATER FLANGE AND THERMOSTAT ASSY.

WATER FLANGE AND THERMOSTAT ASSY.



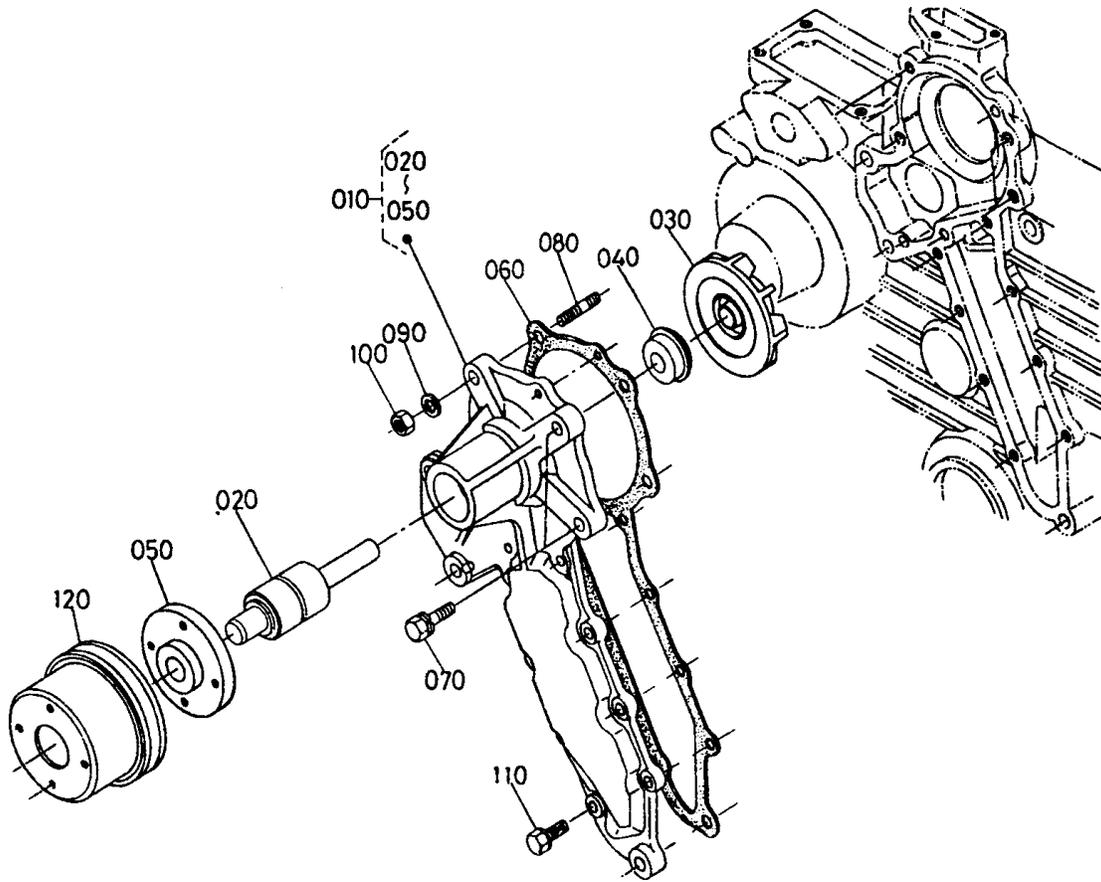
KUBOTA V2203 - ENGINE — WATER FLANGE AND THERMOSTAT ASSY.

WATER FLANGE AND THERMOSTAT ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1551272702	WATER FLANGE COMP.....	1	INCLUDES ITEMS W/#
020#	1733173342	WATER RETURN PIPE	1	
030	1576672920	WATER FLANGE GASKET	1	
040	0112350822	BOLT	2	
050	0151350822	STUD	1	
060	0115350870	BOLT	1	
070	0215650080	NUT	1	
080	0451260080	SPRING WASHER	2	
090	1552173340	WATER RETURN PIPE	1	
100	1510973360	PIPE BAND	2	
110	1551296010	PLUG	1	
120	0471702150	RUBBER WITH WASHER	1	
130	1532173260	THERMOSTAT COVER	1	
140	1531373270	GASKET	1	
150	0112350835	BOLT	2	
160	1943473010	THERMOSTAT ASSY.		

KUBOTA V2203 - ENGINE — WATER PUMP ASSY.

WATER PUMP ASSY.



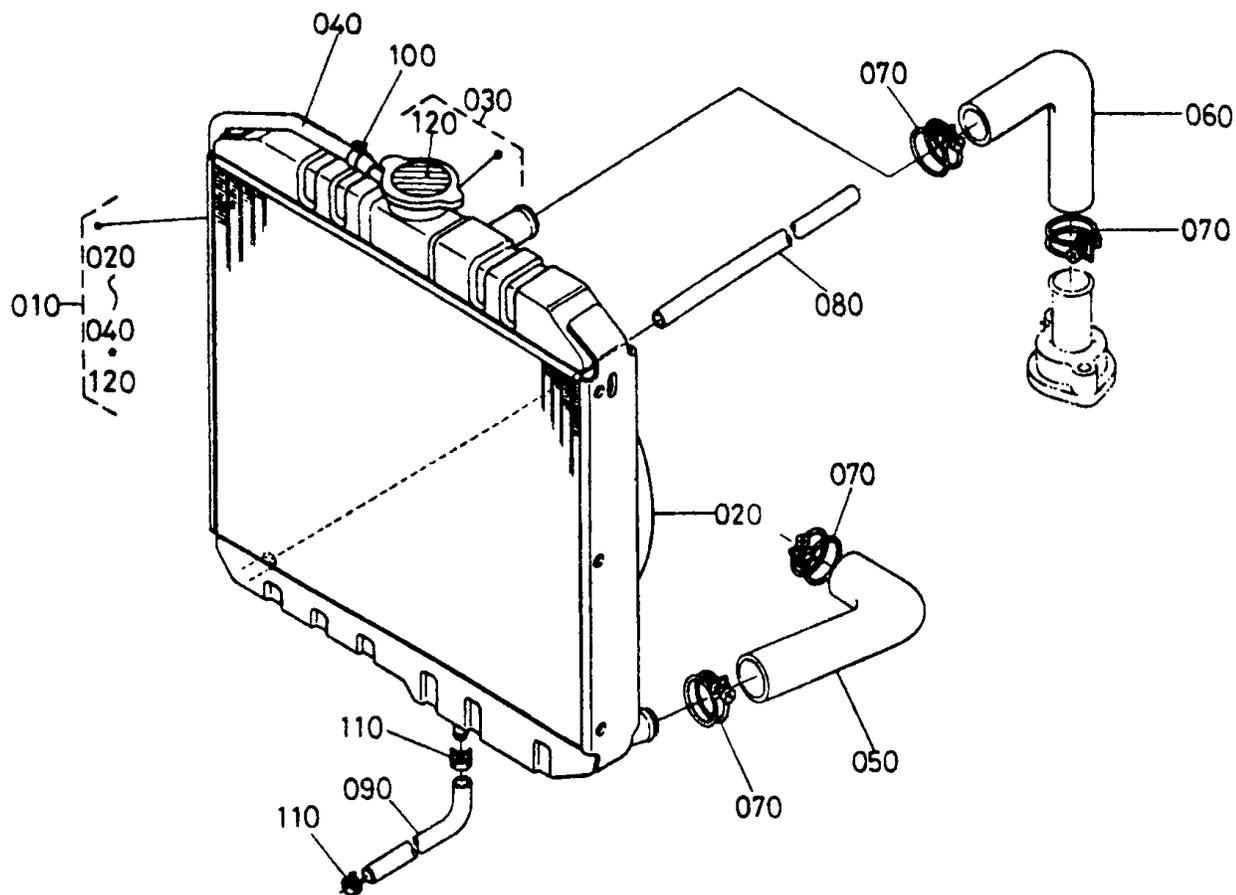
KUBOTA V2203 - ENGINE — WATER PUMP ASSY.

WATER PUMP ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1552173033	WATER PUMP ASSY.	1	INCLUDES ITEMS W/#
020*	1552173550	BEARING	1	
030*	1666173510	IMPELLER	1	
040*	1666173050	MECHANICAL SEAL ASSY.	1	
050*	1552173520	WATER PUMP FLANGE	1	
060	1576673430	WATER PUMP GASKET	1	
070	0112350828	BOLT	2	
080	1552191510	STUD	2	
090	0451260080	SPRING WASHER	2	
100	0215650080	NUT	2	
110	0102350618	BOLT	8	
120	1736574250	FAN PULLEY	1	

KUBOTA V2203 - ENGINE — RADIATOR ASSY.

RADIATOR ASSY.



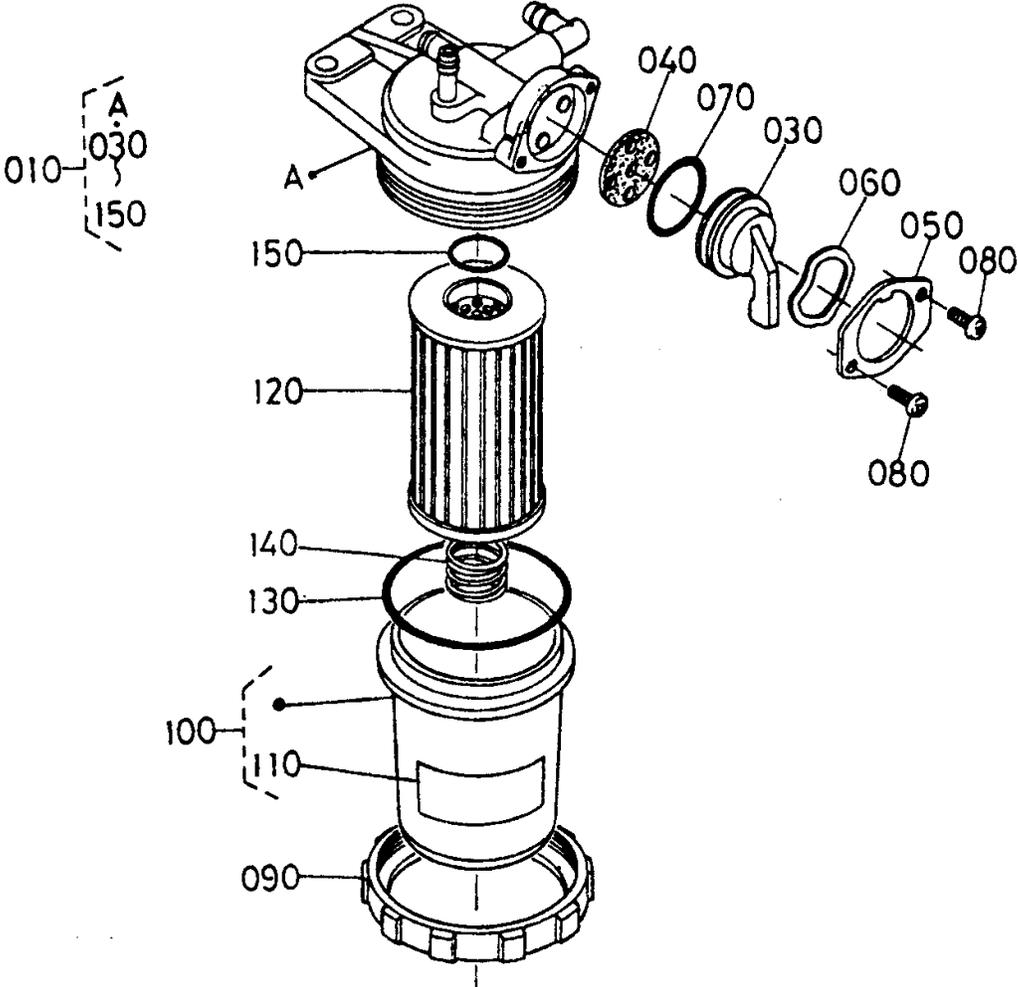
KUBOTA V2203 - ENGINE — RADIATOR ASSY.

RADIATOR ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1707972062	RADIATOR ASSY.	1	INCLUDES ITEMS W/#
020*	1560172330	FAN SHROUD	1	
030*	1527272020	CAP ASSY.	1	
040*	1707972710	WATER OVER FLOW PIPE	1	
050	1560172850	WATER PIPE	1	
060	1542872940	WATER PIPE	1	
070	1510872870	BAND	4	
080	1546173340	WATER RETURN PIPE	1	
090	1718273340	PIPE	1	
100	1540111720	PIPE BAND	2	
110	1430142750	PIPE CLIP	4	
120*	1907787240	CAUTION LABEL	1	

KUBOTA V2203 - ENGINE — FUEL FILTER ASSY.

FUEL FILTER ASSY.



KUBOTA V2203 - ENGINE — FUEL FILTER ASSY.

FUEL FILTER ASSY.

<u>NO.</u>	<u>PART NO.</u>	<u>PART NAME</u>	<u>QTY.</u>	<u>REMARKS</u>
010	1707643012	FUEL FILTER ASSY.....	1	INCLUDES ITEMS W/*
030*	1552143522	FILTER HANDLE	1	
040*	1552143672	GASKET	1	
050*	1552143552	HANDLE RETAINER	1	
060*	1552143542	THRUST PLATE	1	
070*	0481110290	O RING	1	
080*	1552193310	WASHER WITH SCREW	2	
090*	1552143150	RETAINER RING	1	
100*	1552143100	FILTER CUP ASSY.	1	
110*#	1687388430	FUEL LABEL	1	INCLUDES ITEMS W/#
120*	1552143160	FILTER ELEMENT	1	
130*	0481150650	O RING	1	
140*	1552143930	SPRING	1	
150*	0481100160	O RING	1	

PAYMENT TERMS

Terms of payment for parts are net 10 days.

FREIGHT POLICY

All parts orders will be shipped collect or prepaid with the charges added to the invoice. All shipments are F.O.B. point of origin. Multiquip's responsibility ceases when a signed manifest has been obtained from the carrier, and any claim for shortage or damage must be settled between the consignee and the carrier.

MINIMUM ORDER

The minimum charge for orders from Multiquip is \$15.00 net. Customers will be asked for instructions regarding handling of orders not meeting this requirement.

RETURNED GOODS POLICY

Return shipments will be accepted and credit will be allowed, subject to the following provisions:

1. A Returned Material Authorization must be approved by Multiquip prior to shipment.
2. To obtain a Return Material Authorization, a list must be provided to Multiquip Parts Sales that defines item numbers, quantities, and descriptions of the items to be returned.
 - a. The parts numbers and descriptions must match the current parts price list.
 - b. The list must be typed or computer generated.
 - c. The list must state the reason(s) for the return.
 - d. The list must reference the sales order(s) or invoice(s) under which the items were originally purchased.
 - e. The list must include the name and phone number of the person requesting the RMA.
3. A copy of the Return Material Authorization must accompany the return shipment.

4. Freight is at the sender's expense. All parts must be returned freight prepaid to Multiquip's designated receiving point.
5. Parts must be in new and resalable condition, in the original Multiquip package (if any), and with Multiquip part numbers clearly marked.
6. The following items are not returnable:
 - a. Obsolete parts. (If an item is listed in the parts price book as being replaced by another item, it is obsolete.)
 - b. Any parts with a limited shelf life (such as gaskets, seals, "O" rings, and other rubber parts) that were purchased more than six months prior to the return date.
 - c. Any line item with an extended dealer net price of less than \$5.00.
 - d. Special order items.
 - e. Electrical components.
 - f. Paint, chemicals, and lubricants.
 - g. Decals and paper products.
 - h. Items purchased in kits.
7. The sender will be notified of any material received that is not acceptable.
8. Such material will be held for 5 working days from notification, pending instructions. If a reply is not received within 5 days, the material will be returned to the sender at his expense.
9. Credit on returned parts will be issued at dealer net price at time of the original purchase, less a 15% restocking charge.
10. In cases where an item is accepted for which the original purchase document can not be determined, the price will be based on the list price that was effective twelve months prior to the RMA date.
11. Credit issued will be applied to future purchases only.

PRICING AND REBATES

Prices are subject to change without prior notice. Price changes are effective on a specific date and all orders received on or after that date will be billed at the revised price. Rebates for price declines and added charges for price increases will not be made for stock on hand at the time of any price change.

Multiquip reserves the right to quote and sell direct to Government agencies, and to Original Equipment Manufacturer accounts who use our products as integral parts of their own products.

SPECIAL EXPEDITING SERVICE

A \$20.00 to \$50.00 surcharge will be added to the invoice for special handling including bus shipments, insured parcel post or in cases where Multiquip must personally deliver the parts to the carrier.

LIMITATIONS OF SELLER'S LIABILITY

Multiquip shall not be liable here under for damages in excess of the purchase price of the item with respect to which damages are claimed, and in no event shall Multiquip be liable for loss of profit or good will or for any other special, consequential or incidental damages.

LIMITATION OF WARRANTIES

No warranties, express or implied, are made in connection with the sale of parts or trade accessories nor as to any engine not manufactured by Multiquip. Such warranties made in connection with the sale of new, complete units are made exclusively by a statement of warranty packaged with such units, and Multiquip neither assumes nor authorizes any person to assume for it any other obligation or liability whatever in connection with the sale of its products. A part from such written statement of warranty, there are no warranties, express, implied or statutory, which extend beyond the description of the products on the face hereof.

PARTS AND OPERATION MANUAL

HERE'S HOW TO GET HELP

*PLEASE HAVE THE MODEL AND SERIAL NUMBER
ON-HAND WHEN CALLING*

PARTS DEPARTMENT

800/427-1244 or 310/537-3700

FAX: 800/672-7877 or 310/637-3284

SERVICE DEPARTMENT

800/835-2551 or 310/537-3700

FAX: 310/638-8046

WARRANTY DEPARTMENT

800/835-2551, or 310/537-3700

FAX: 310/698-8046

MAIN

800/421-1244 or 310/537-3700

FAX: 310/537-3927

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by
DENYO MANUFACTURING CO., USA



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