Portable Automatic Gas Cutter

BBE00B19

IK-93 HAWK

OPERATION MANUAL

For every person who will be engaged in operation and maintenance supervision, It is recommended to read through this manual before any operations, so as to permit optimum operation of this machine.

KOIKE SANSO KOGYO CO.,LTD.

INTRODUCTION

Thank you very much for purchasing this product. Read this instruction manual thoroughly to ensure correct, safe and effective use of the machine. Read the manual first to understand how to operate and maintain the machine.

Cooperation between colleagues in the workplace is essential for safe, smooth operation. Make sure you read, understand and take all necessary safety precautions.

SAFETY PRECAUTIONS

This product is designed to be safe, but it can cause serious accidents if not operated correctly. Those who operate and repair this machine must read this manual thoroughly before operating, inspecting and maintaining the machine. Keep the manual near the machine so that anyone operates the machine can refer to it as necessary.

■Do not use the machine carelessly without following the instructions in the manual.

■Use the machine only after you have completely understood the contents of the manual.

■If an explanation in the manual is difficult to understand, contact our company or sales service office.

■Keep the manual to hand at all times and read it as many times as is necessary for a complete understanding.

■If the manual becomes lost or damaged, place an order with our company or sales service office for a new one.

■When transferring the machine to a new owner, be sure to hand over this instruction manual as well.

QUALIFICATIONS FOR MACHINE OPERATOR

Operators and repair staff of this machine must completely understand the contents of the instruction manual and have either of the following qualifications:

1. Gas welding foremen's license
2. Completion of gas welding training course
3. Approval by the Minister of Labor

Symbol	Title	Meaning
	General	General caution, warning, and danger.
	Be careful not to get your fingers caught.	Possible injury to fingers if caught in the insertion port.
	Caution: Electric shock!	Possible electric shock under special conditions.
	Ground this equipment.	Operators must ground the equipment using the safety grounding terminal.
	Pull out the power plug from the outlet.	Operators must unplug the power plug from the outlet when a failure occurs or when there is a danger of lightning damage.
	Caution against bursting	Possible bursting under certain conditions.
	General	General warning.
	Caution: Hot!	Possible injury due to high temperature under certain conditions.
	Caution: Ignition!	Possible ignition under certain conditions.

CONTENTS

1. Safety Information 1
   1.1 General machine safety precautions 1
   1.2 Gas cutting safety precautions 3
2. Locations of safety labels 5
3. Outline of machine 6
   3.1 Name and function of each section 6
   3.2 Specifications 7
4. Preparation for operation 8
   4.1 Contents of package 8
   4.2 Machine assembly 9
5. Cutting operation 10
   5.1 Safety measures prior to operation 10
   5.2 Ignition and flame adjustment 10
   5.3 Cutting and piercing method 11
   5.4 Procedures for starting cutting operation and extinguishing the flame 11
   5.5 Safety measures against backfire and flashback 11
   5.6 Cutting operation 12
   5.7 Optional equipment 15
6. Periodic Inspection and Maintenance 16
   6.1 Disassembly of the machine body 16
   6.2 Maintenance of the gear case 17
   6.3 Periodical inspection and maintenance 18
7. Trouble shooting 19
8. Wiring diagram 21
9. Assembly drawing 21
10. Parts list 22
   10.1 Drive unit 22
   10.2 Main body and electric components 24
   10.3 Holder and distributing components unit 26
   10.4 Option List 28
11. Cutting Data 29

1 Safety information

Many accidents are caused by operation, inspection, and maintenance which disregard the basic safety rules. Carefully read, understand, and master the safety measures and precautions described in this instruction manual and on the machine before operating, inspecting, and maintaining the machine.

The safety messages are classified as indicated on the machine safety labels:

■WARNING

This word is used in a warning message and a warning label is positioned at places that could cause injury or serious accident.

■CAUTION

This word is used in a caution message and a caution label is positioned at places that could cause slight injury or machine damage. This is also used as a caution for frequent dangerous actions.

■NOTICE SIGNS

This is a sign to show machine operators and maintenance engineers items that relate directly to damage of machines and surrounding facilities and equipment.

1.1 General machine safety precautions

Read and fully understand the following important safety information:

1.1.1 Machine safety

1.The machine casing is mainly made of aluminum alloy to reduce weight. For this reason, be careful not to drop a heavy item on the machine, or not drop the machine when carrying it, since the alloy is not designed to withstand such impact.

2.When mounting hoses to the torch and distributor, tighten the nut with the attached wrench. After mounting, be sure to check there is no gas leak with a detection liquid. If a gas leak is found, retighten the nut firmly.

3.When fixing a tip to the torch, tighten the nut with the two wrenches attached. In addition, avoid damaging the taper part of the tip since this may cause backfire.

4.Never disassemble the machine other than during maintenance and inspection. Otherwise, malfunction will result.

5.Never remodel the machine. Remodeling is very dangerous.

6. Always turn the power off when not in use.

7. Never use the machine outdoors when the weather is wet. This will cause failure of the machine and could cause a fatal accident by electric shock.

1.1.2 Safety clothing

1.Be sure to wear protector’s gauntlets, goggles, helmet, and safety shoes during operation.

2.Avoid operating the machine with wet clothes or hands in order to prevent electric shock.

1.1.3 Operation and handling safety precautions

1. Read this instruction manual before operating the machine.
2. Mount and center the machine correctly and confirm correct motion before operation.
3. Before connecting the power plug to the outlet, make sure that the power switch is in the OFF position (or the normal/reverse changeover switch is in the stop position).
4. Prior to operating the machine, check the safety of the surroundings to avoid accidents.
5. Never move the machine while the preheat flame is on.
6. Take great care of spatters and dross when operating the machine at a high position. They may injure people below.
7. Completely secure the casters with screws for cutting on the rail.
8. Correctly fix the head shield so that it will not touch the rail.
9. When connecting rails, be careful not to get your hand or fingers caught between them.
10. Remove the machine from the rail when moving the rail.
11. Be sure to hold the handle when carrying the machine.

1.1.4 Electrical system precautions

1. Be sure to check the input power voltage of the machine before operation. The input power voltage should be in the range of ±10% of the rated voltage. The machine should not be operated out of this range.
2. The metal plugs are screw-threaded, therefore, fully tighten them so that they will not come loose during operation.
3. The ground pin is attached to the rubber plug of a cabtyre cord. Please use a power receptacle with a ground pin opening.
4. **Stop operation and turn off the power in the following cases, and ask a qualified electrician to repair the machine.**

   1)Broken or abraded cables
   2)When the machine has been in contact with water, or in case of liquid damage to the machine.
   3)Abnormal machine operation despite operating the machine according to the instruction manual
   4)Machine breakdown
   5)Poor machine performance that requires repair
5. Periodically inspect the electrical system.

1.1.5 Maintenance and inspection precautions

1. Ask a qualified electrician to perform repair and inspection service.
2. Disconnect the power plug before inspecting and repairing the machine.
3. Maintain the machine periodically.

1.2 Gas cutting safety precautions

Strictly observe the safety rules and precautions to ensure the safety of gas cutting operations.
Operators and supervisors MUST keep safety in mind.

1.2.1 Prevention of explosion

1. Never cut pressurized cylinders or hermetically sealed containers.
2. Ensure sufficient ventilation for gas cutting to prevent the air from becoming stale.

1.2.2 Pressure regulator safety precautions

1. Before starting operation, check that all pressure regulators are operating correctly.
2. Ask a skilled repair engineer to perform maintenance and inspection service.
3. Do not use pressure regulators from which gas is leaking, nor malfunctioning pressure regulators.
4. Do not use pressure regulators smeared with oil or grease.

1.2.3 High Pressure gas cylinder safety precautions

1. Never use broken cylinders or cylinders from which gas are leaking.
2. Install cylinders upright and take measures to prevent them from falling.
3. Use cylinders only for specified purposes.
4. Do not smear container valves with oil or grease.
5. Install cylinders in a place free from heat, sparks, slag, and open flame.
6. Contact the distributor if the container valves will not open.
   Never use a hammer, wrench, or other tools to forcibly open container valves.

1.2.4 Safety precautions for hoses

1. Use the oxygen hose for oxygen gas only.
2. Replace cracked hoses or other hoses damaged by sparks, heat, unshielded fire, etc.
3. Install hoses without twisting.
4. To prevent breakage of hoses, take great care during operation and transportation.
5. Do not hold the hoses when moving the machine.
6. Periodically check the hoses for damage, leakage, fatigue, loose joints, etc, to ensure safety.
7. Cut hoses to the minimum possible length. Short hoses reduce hose damage and pressure drop, as well as reduce the flow resistance.

1.2.5 Safety precautions for fire

Take safety precautions to prevent fire prior to gas cutting.
Ignoring hot metal, sparks, and slag could cause a fire.

1. Keep a fire extinguisher, fire extinguish sand, bucket full of water, etc. ready on the site where gas cutting is performed.
2. Keep flammables away from the cutting area to avoid exposure to sparks.
3. Always cool down steel plates that have become hot after cutting, as well as hot cut parts or scrap, before bringing them close to flammables.
4. Never cut containers to which flammable materials are stuck.

1.2.6 Safety precautions for skin burns

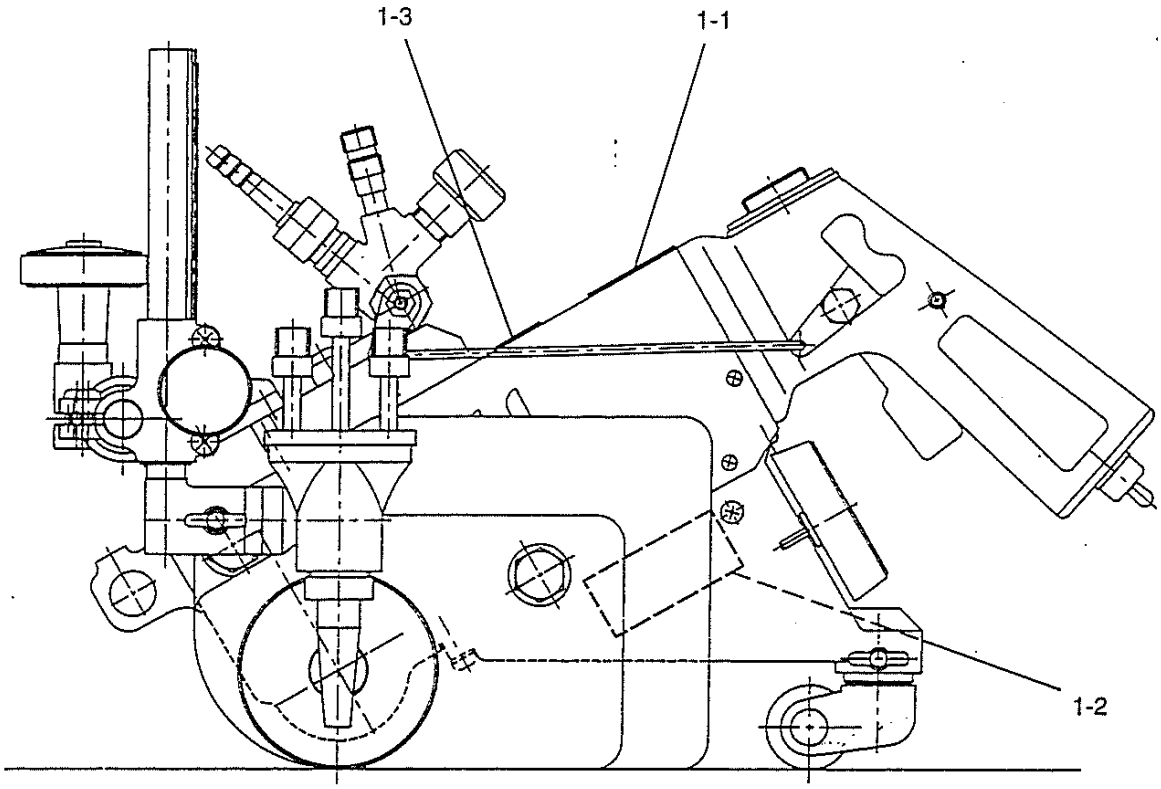
Observe the safety precautions to prevent skin burns. Ignoring heat, spatter, and sparks during operation could cause a fire or burned skin.

1. Do not perform cutting near flammables. (Move flammables well away from the sparks.)
2. Do not cut containers filled with flammables.
3. Do not keep lighters, matches, and other flammables nearby.
4. Flames from the torch will burn the skin. Keep your body away from the torch and tip, and check the safety before operating the switches and valves.
5. Wear the correct protectors to protect your eyes and body.
6. Correctly tighten the tip to prevent backfire.
   - ●When fixing a tip to the torch, tighten the nut with the two wrenches attached.
   - ●If the tip is tightened excessively, it will be heated during cutting and tightened still more, making it difficult to remove the tip.
   - ●Avoid damaging the taper of the tip since this may cause backfire.
7. Check with soapsuds for any leakage of gas from the connection part of the distributor, hose and torch.
   Never use oil or grease on the connection of the oxygen pipe to avoid backfire which may lead to explosion.
8. Be sure to check the following when igniting:
   - ●Place the torch on the torch holder before igniting.
   - ●Always wear the required protectors (gauntlets, helmet, goggles, etc.)
   - ●Check for any obstacles, dangerous materials and flammables near or in the direction of cutting. Determine the gas pressure.
   - ●The gas pressure must be within the appropriate range. (For the gas pressure, refer to the Cutting Data.)
9. The torch, tip and heat shield are heated to a very high temperature. Always wear gauntlets when handling them. Also the surface after cutting is very hot so do not touch it even while wearing gauntlets.
10. Never move the machine while the preheat flame is on.

2 Locations of safety labels

Safety labels and other labels for correct operation are affixed to the machine.

- Carefully read the labels and follow the instructions on them when operating the machine.
- Never remove the labels. Keep them clean and legible at all times.



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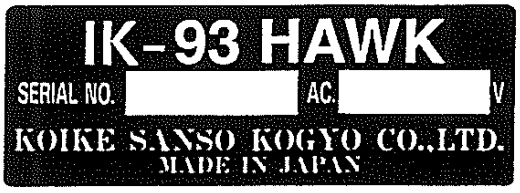

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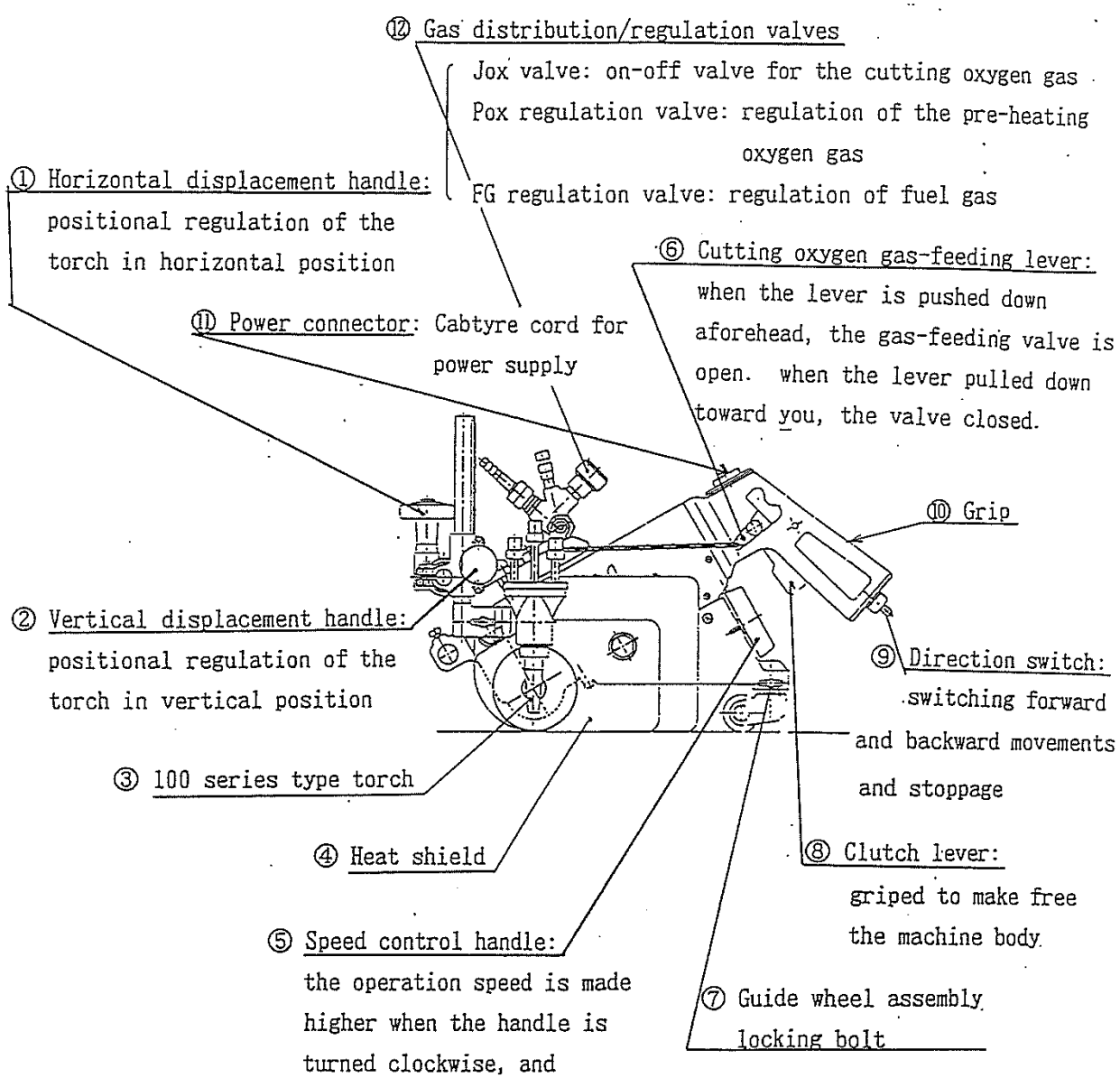
3 Outline of machine

3.1 Name and function of each section



3.2 Specifications

1) Cutting thickness	5 to 30mm
2) Cutting speed	100 to 1000 mm/min
3) Clutch	trigger type clutch
4) Speed control	control IC (dial tuning)
5) Heat shield	doubled thermal protection board
6) Forward/Backward change-over	forward and backward movements
7) Gas control	Jox lever type
8) Circular cutting	attachment (optional)
9) Power source	
10) Motor	DC 24V
11) Weight	7.5 kg

<Optional Parts>

1) Counter weight and weighting rods: 1 set
2) Grip : 1 pc.
3) Circular cutting attachment : 1 set
4) Straight cutting rail : 1 sheet

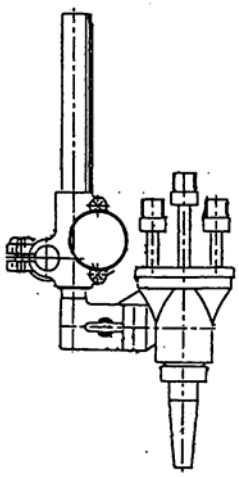
4 Preparation for operation

4.1 Contents of package

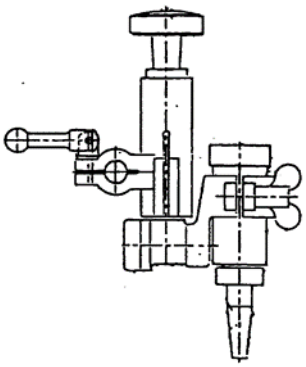
The contents of the standard package are shown below. Check them carefully before assembling the machine.

Type	A type holder	B type holder	C type holder	D type holder
Body	○	○	○	○
Gas distributor	○	○	○	○
Torch holder	A type holder	B type holder	C type holder	D type holder
Torch	100 type	100 type	300 type	300 type
Hose	3pcs set：600L	3pcs set：600L	3pcs set：600L	3pcs set：600L
Power cable(3P×5M)	○	○	○	○
Tip	100 type NO.0,1,2	100type NO.0,1,2	301 type NO.0,1,2,3,4 302 or 306 type	301 type NO.0,1,2,3,4 302 or 306 type
Tip cleaner	○	○	○	○
Screw driver	○	○	○	○
Spanner(A,B,C)	○	○	○	○
Hexagon wrench(M5)	○	—	—	—
Hexagon wrench(M6)	—	○	○	○

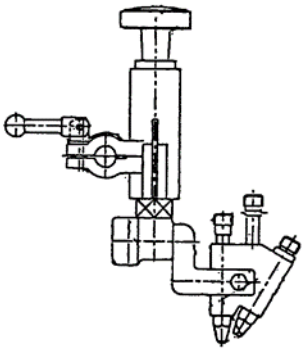
A type holder



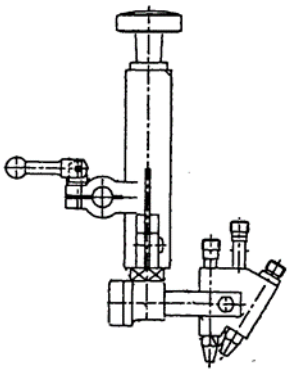
B type holder



C type holder

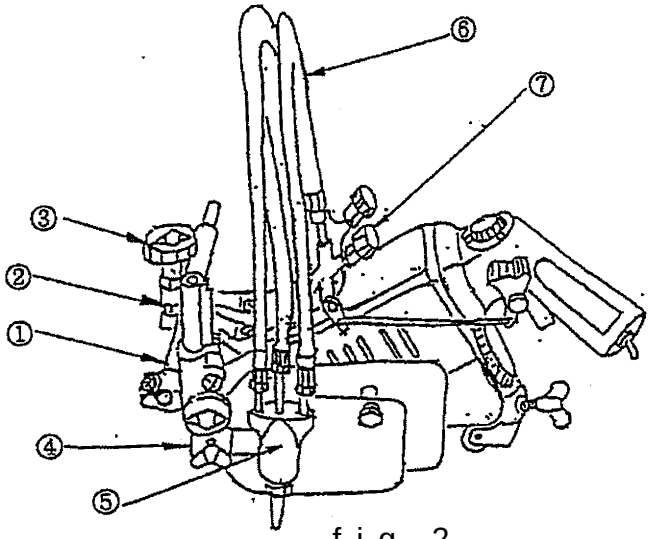


D type holder



4.2 Machine assembly

1) Insert the cross bar ① into the support ② on the main body and engage the bar with the pinion by rotating the horizontal displacement handle ③.
2) Set the torch ⑤ to the torch holder ④.
3) Connect the distribution hoses ⑥ to the distributors ⑦, as shown in Fig, 2,3, without mistakes in connection.
4) In order to ensure smooth operation, the hoses or power cables shall be grouped and handled with tapes, etc.



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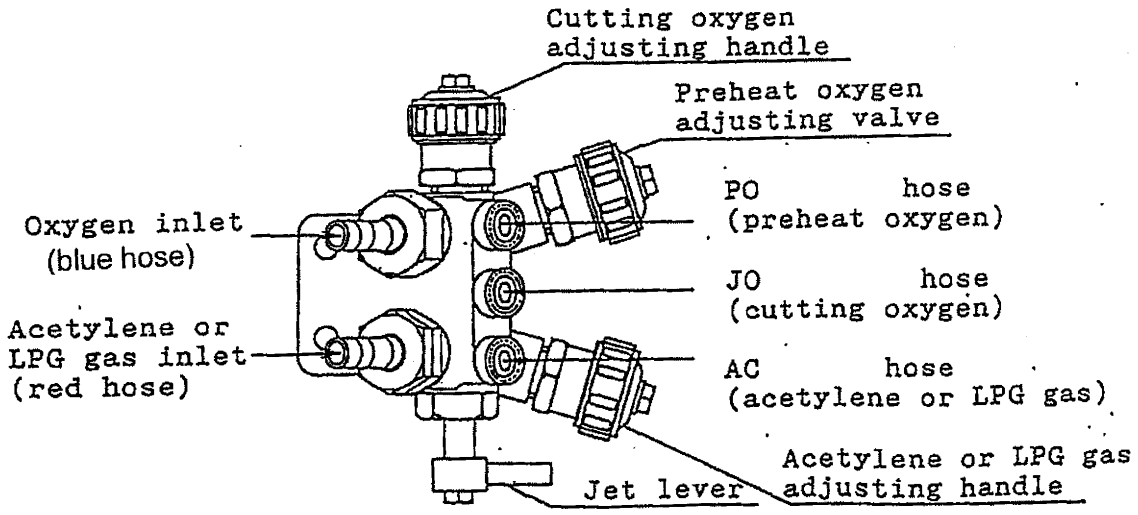

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5 Cutting operation ⚠

5.1 Safety measures prior to operation

5.1.1 Grounding the machine

The cable of this machine is equipped with a grounding wire. For safety, be sure to ground the wire as follows, in addition to checking the connection of the power cable.

■ Method to ground the machine

- The ground pin is attached to the rubber plug of a cabtyre cord. Please use a power receptacle with a ground pin opening.

5.1.2 Selection of tip

Referring to the Cutting Data, select the suitable tip according to the plate thickness.

For a heavily rusted plate or for a bevel cutting angle of more than 20°, select the tip one grade higher than the one shown in the Cutting Data.

5.1.3 Operation of running direction changeover switch ⚠

- By changing the direction switch, the machine can move forward and backward. The neutral position on the switch is the stop position of the machine.
- When changing the direction, make sure that the direction switch is in the neutral (stop) position, and operate the direction switch after the machine has stopped.
- Be sure that the switch is in the neutral position before starting the machine.
- Make sure that the switch is in the neutral position before turning the power on. If the switch is in the forward or backward position, the machine will start as soon as the power is turned on, which could cause serious accidents.
- Never put your hands in the space between the guide roller and rail, as well as between the body and the rail, while the machine is running, otherwise, your hands may be caught.

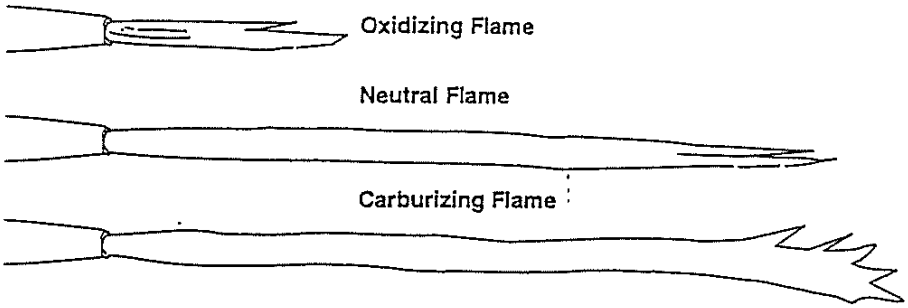
5.2 Ignition and flame adjustment

- Adjust the gas pressure according to the Cutting Data. The data shows the pressure when all the valves are open. Readjust the pressure after ignition.

■ Flame adjustment method

1. Open the fuel gas valve 1/4 to 1/2 a turn, and light the torch with an igniter.
2. Then, open the preheating oxygen valve gradually until a white cone of the standard flame has been obtained. (The incandescent area should be uniform and about 5-6 mm (3/16-1/14") in length.)
3. Open the jet oxygen valve fully. Readjust the flame if its condition has changed. A disorderly flow of the jet oxygen will adversely affect the quality of the cutting surface. In such a case, clean the tip with a suitable cleaning needle while the jet oxygen is flowing.
4. Appropriate distance between the tip end and cutting surface:
   - Acetylene gas ·····8-10 mm
   - LPG gas ·····5-8 mm

5. Neutral flame ensures good quality cut surfaces. (Oxygen flame may be used for bevel cutting.) Oxygen flame causes short cutting-oxygen current, allowing slugs to adhere, melting the upper edge of the cutting surface, and causing other adverse effects on the cut surface. Similar defects will result when the cutting oxygen pressure is too high.



5.3 Cutting and piercing method

1. Cut in from the end of steel plate.
2. Pierce steel plate before cutting.
3. Drill a hole before cutting.

Piercing method

1) Ignite and adjust the flame.
2) Thoroughly preheat the cut-in point until it is white hot.
3) Open the cutting oxygen valve to pierce the steel plate. The tip should be about 15-20 mm from the plate to prevent slag from splashing onto the tip and adhering there, which will shorten the working life of the tip.

5.4 Procedures for starting cutting operation and extinguishing the flame

1. Align the tip with the cutting start point, ignite, and then adjust the flame.
2. Hold the clutch to free the machine and turn on the power switch.
3. After preheating, supply oxygen and simultaneously turn on the motor switch or the turning direction switch to start cutting.
4. After heating, incline the JOX lever to let the cutting oxygen out and release the machine simultaneously to run the machine.
5. Extinguish the flame after cutting as follows:
   1) Turn off the motor switch (or turning direction switch).
   2) Close the cutting oxygen valve.
   3) Close the preheating oxygen valve.
   4) Close the fuel gas valve.

5.5 Safety measures against backfire and flashback

5.5.1 Prevention of backfire

Backfires may cause serious accidents or fires. Be careful to prevent such disaster. When a backfire occurs, find the cause and inspect and maintain the machine correctly before using the machine again. The following are causes of backfire:

1) Improper gas pressure adjustment
2) Overheated tip
3) Slag clogged in tip
4) Damage to the tapered section of the tip or torch will cause backfire.

5.5.2 Prevention of flashback

Flashback could cause fire and break the machine. Should there be a hissing sound in the torch, quickly take the following
action:

1) Close the preheating oxygen valve.
2) Close the fuel gas valve.
3) Close the cutting oxygen valve.

:Should flashback occur, find the cause and take appropriate action before using the machine again.

5.6 Cutting operation

1. Attach the rail to the cutting position, and align the tip with the cutting start point.
2. Hold the clutch to free the machine and turn on the power switch.
3. Simultaneously with opening the cutting oxygen valve, turn on the switch to start cutting.
4. Incline the JOX lever to let the cutting oxygen out and release the machine simultaneously to run the machine.
5. After cutting, turn off the switch and close the cutting oxygen valve, fuel gas valve, and preheating oxygen valve in this order.

* Thereafter, repeat operations from step 1.

5.6.1 Straight cutting

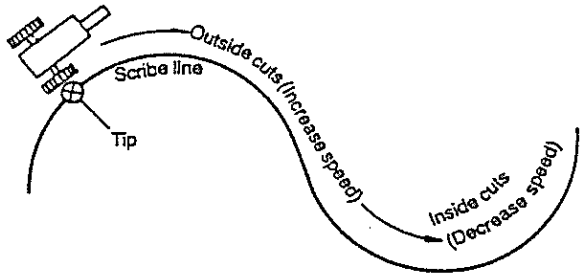
Optional rails are used in most of the cases. Align the rail parallel to the planned cutting line,aprox. 80~100mm(3-1/8~4")away from it.Pinch both sides of the rail by the two wheels of the machine on. Turn the guide wheel toward the resister and fit it to the center groove of the rail.
Set the torch to the starting point of the cutting.Ignite it and adjust the flame. Heat the starting point thoroughly and push the jet oxygen lever and the power switch with the thumb. adjust the cutting speed by the speed adjustment dial according to the cutting station.
The jet oxygen valve should be open completely in advance when its actuated. When the gas pressure is high to cut a thin plate, use this valve to reduce the pressure in order to make the cutting operation easy.

With extension rails, cutting length can be extended freely.If there's any large dust or spatter on the rail, the machine will suffer from knocking there,and it will cause the damage of the cutting surface. Therefor be sure not to leave any dust, and if there's any, remove them immediately. Besides , be careful not to allow the hoses catch on the plates edge.

5.6.2 Manual-guide cutting

Do the marking-off on the plate surface and make a punch mark wherever curved and straight lines join. Shifting the machine handle, approach the tip to the position 30~50mm(1-3/16~2")away from the side of the drive wheel. Free the guide wheel by pulling the clutch lever with a forefinger, and move the machine to the cutting starting point. Arrange hoses so that they will not bother the cutting operation. Heat the starting point thoroughly and then open the jet oxygen lever by the thumb. Turn the power switch immediately by the thumb and guide the machine by hand so that the tip trace the marking off line. Let the machine run only by the drive motor,(do not pull or push the machine forward) and give the machine only the direction by the hand. Smooth cutting surface will not be achieved if the machine is handled abruptly. Be watchful to obtain the contrast smooth cutting surface.

When the cutting operation is over, shut the valves-Jet oxygen valve, Fuel gas valve,and Pre-heat oxygen valve in that order.



1.Small radius corner cuttin

Bring the torch close to the drive wheel and keep a forefinger on the speed adjustment dial in order to increase or decrease the speed whenever the torch approaches the corner.When the torch runs through out of the corner, re-set the speed to the previous one.On the inside cutting of the corner with Radius less than 50mm(2"), reduce a speed until the motor stops at the starting point of the curve. Then guide the machine by the hand and start the motor again at the ending point of the curve.

2.Sharp corner cutting

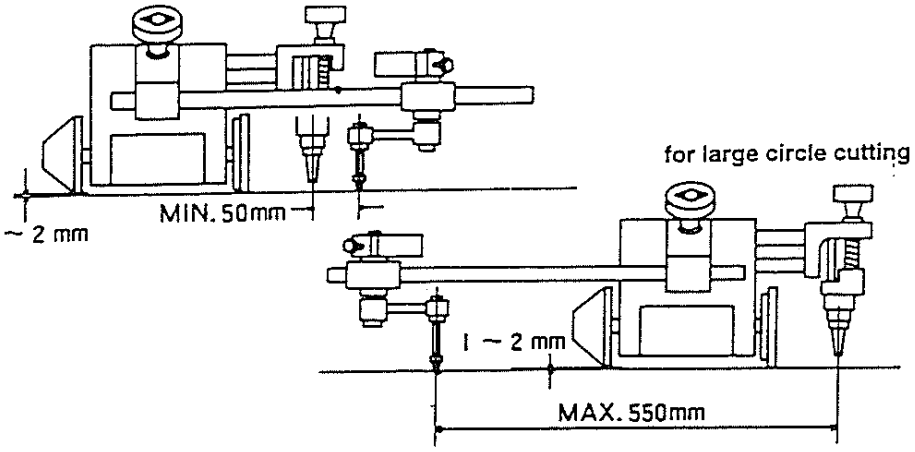
When the torch reaches the corner, close the jet oxygen lever and pull the clutch lever at the same time. Turn the machine to the new direction so that the tip center fits the making-off line. Pre heat again, open the jet oxygen lever, release the clutch and resume the cutting.

Note :Manual guide cutting requires a certain period to be skilled. If preferred, to fix the guide wheel is another method for easier tracking of the marking-off line. Anyhow please exercise to be skilled in performing the hand-guide cutting.

5.6.3 Circle cutting (option)

Setting of the machine is different in large and small circle cutting. See the diagram and set the optional equipment as follows.

for small circle cutting



N.B. Set the corner so that it lies on the prolongation of the driving wheel axis.

1.Fix the circle cutting bar in the hole provided in front of the gear case.

2.Attach the pivot pin to the circle cutting bar and fix it on the center punch mark of the plate. Adjust the center screw so that the idle wheel floats 1~2mm(3/64~5/64')above the plate and tighten the lock nut firmly.

3.The balance weight on the pivot pin will insure the stability of the pivot pin.

4.Fix the torch vertically and set the tip above the marking-off line. Release the clutch and pull the machine to see if the neutral flame is obtained. Then tighten the guide wheel by the wing screw.

Ordinary circle cutting is performed as follows.

For the hole cutting, follow the diagram Ⅰ,and for the circumference cutting, diagram Ⅱ.For both operations, pierce the point P first and cut forward by the cross bar handle until the tip reaches the marking-off line.

CAUTION

For the small circle cutting, increase the speed. But it may not be possible to cut a very thin plate because of the speed limitation.radius limit of the machine with the standard equipment is; minimum 50mm(2") maximum 550(21-58")

How to pierce

Ignite a torch and adjust the flame. After heating the point until it has become quite incandescent, push the jet oxygen valve to get the cutting oxygen, and the hole will be produced quickly.To avoid the slag fouling the tip, use the up and down handle of the torch holding bracket to arise the torch about 10mm(3/8")

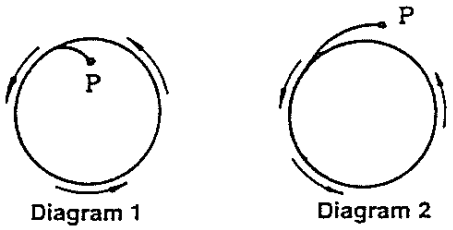
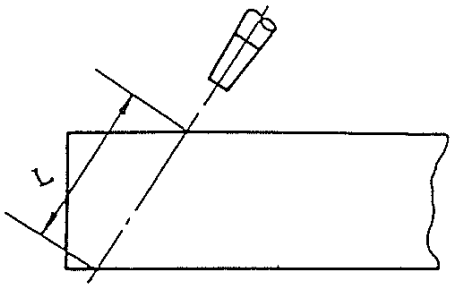


Diagram 1 Diagram 2

5.6.4 Bevel Cutting

On bevel cutting, use the inclination indicator of the torch holder(graduated by 5°)to fix the torch at the required inclination.When selecting a tip for the bevel cutting, the length L in the diagram below regarded as the thickness. Use the tip one grade above than that in the table to compensate for increased heat loss.Flame enriched with oxygen to a little extent will improve cutting efficiency.



5.7. Optional equipment

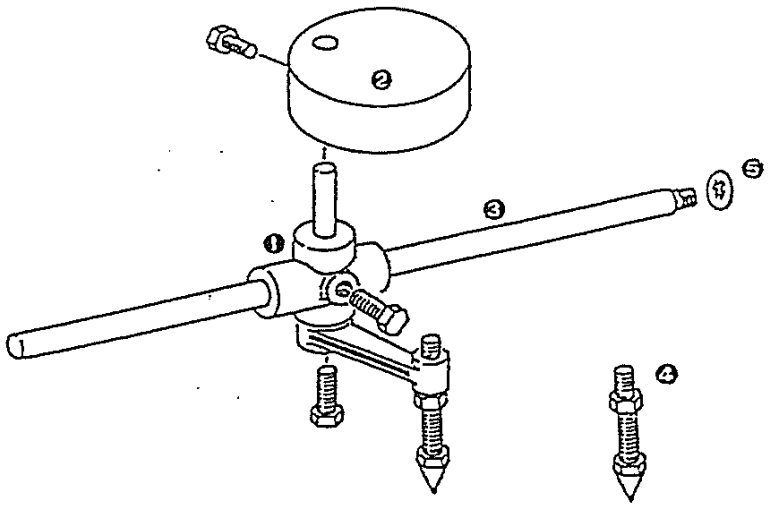
5.7.1 Circle cutting attachment

(See the OPERATION(5) in detail)

This option provides an easy cut of a circle in any size, from small to large.

●To attach this equipment, remove the machine handle.Be sure to let the idle wheel float. Balance it by the balance weight.

N.B.On circle cutting operation, make a rather deep punch mark on the plate center of a plate.



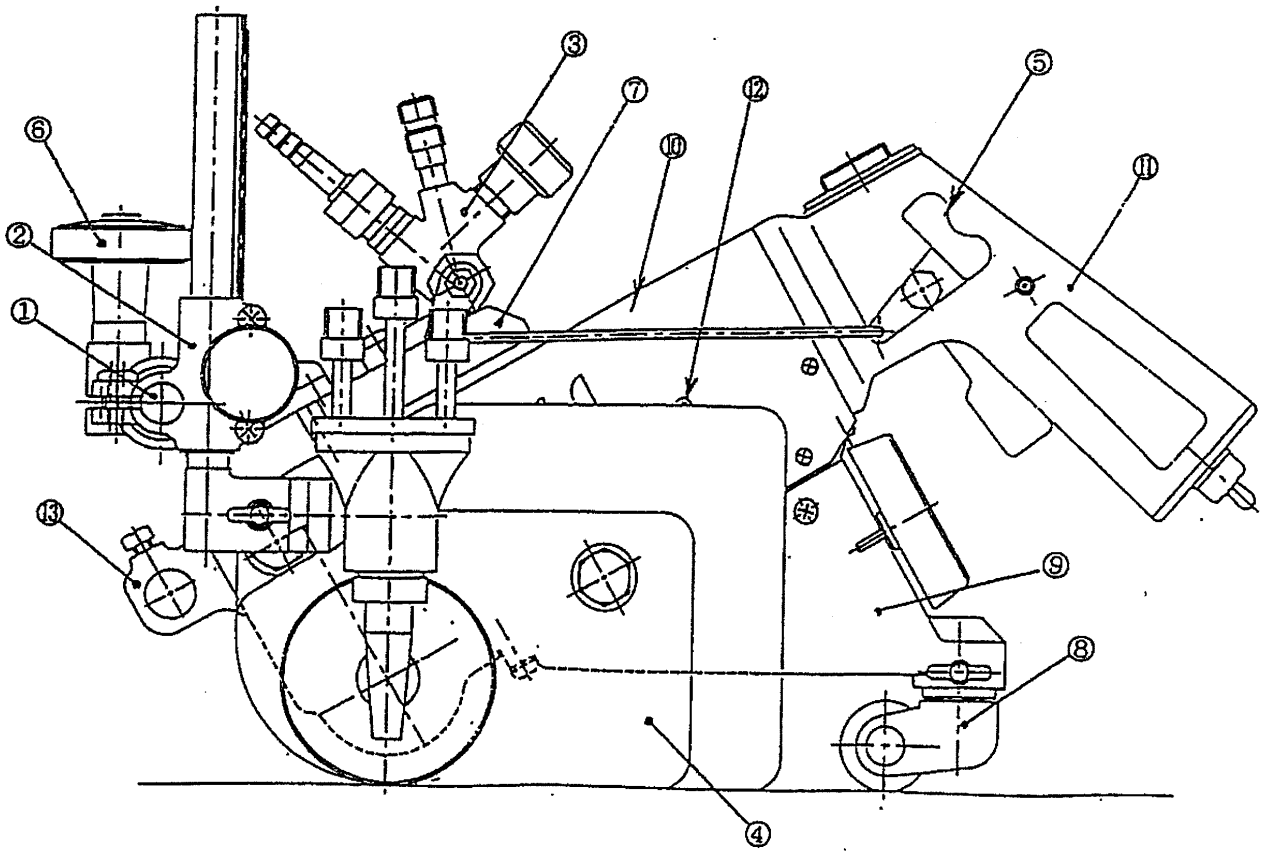
Item No.	Part name	Q'ty	Stock No.	Remarks
1	Bar fixing base	1set	60030441	
2	Weight	1	60030381	
3	Circular cutting bar	1	60030385	
4	Pivot pin	1	60030384	
5	Toothed lock Washers	1	WH-10	
6	Circular cutting attachment	1set	60033353	

6 Periodic Inspection and Maintenance

6.1 Disassembly of the machine body

1) Remove the vertical holder ② from the cross bar ① and disconnect the distribution hoses from the distributor ③
2) Loosen the hexagonal bolt to remove the heat shields ④ (two sheets).
3) Loosen the locking bolt to remove the jet oxygen lever ⑤.
4) Disconnect the cross-feed table (ass'y) and gear case lid ⑦ from the main body.
5) Loosen the guide wheel locking bolt to remove the guide wheel ⑧.
6) Remove the screws to disconnect the lower casing ⑨ from the main body.
7) Remove the three screws on the body cover ⑩ at the grip side to disconnect the connectors (6 pcs.). Detach the grip ⑪ from the main body.
8) Remove two screws ⑫ to separate the controller from the body cover ⑩.
9) Disconnect the fan connection terminals on the body casing.
10) Disconnect lead wires of the motor from the connectors.
11) Remove the body cover ⑩ from the gear case ⑬.

That is all for disassembling the machine body. Assemble the same orderly after completion of maintenance.



6.2 Maintenance of the gear case

1) Loosen the set screws for the clutch joint (A) inside the gear case to remove the clutch shaft ① and clutch joint (A) from the gear case.

2) Detach the spring holder ② to remove the spring ③.

3) Remove the screw ④ securing the worm gear.

4) Remove the screws ⑤ securing the motor and draw the motor ⑥ and the gear head ⑦.

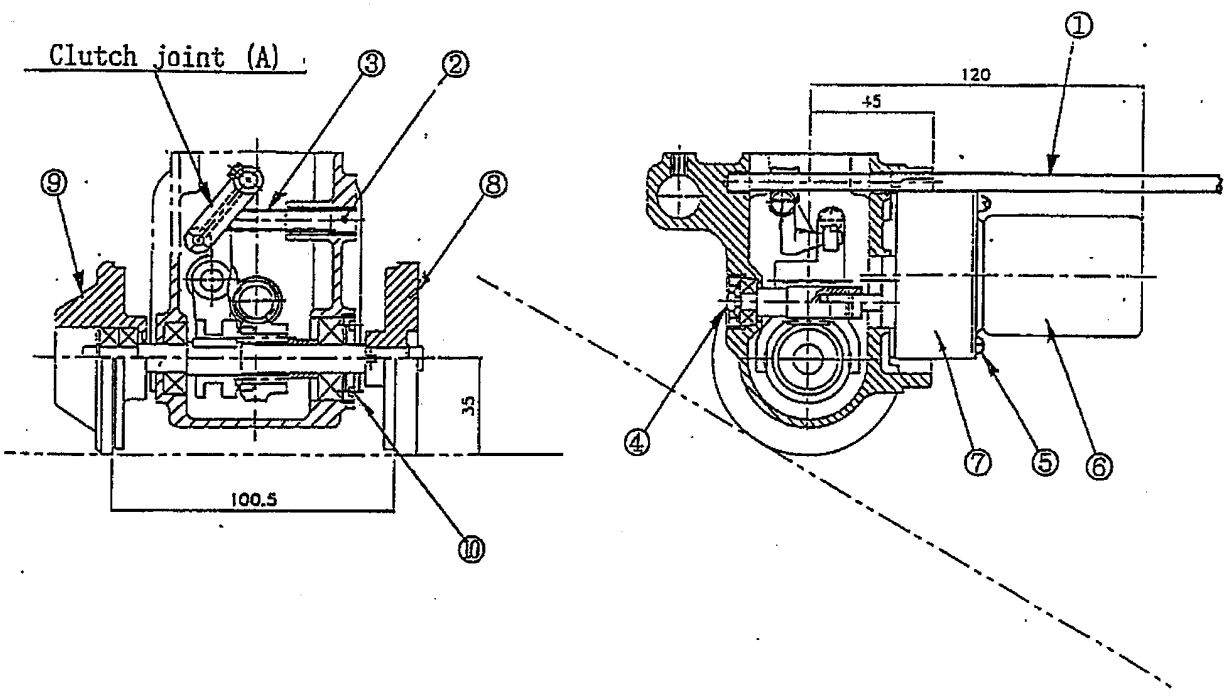
5) Take off the bolts fixing the drive wheel ⑧ and guide wheel ⑨ and remove the wheels.

6) Remove the bearing retainer ⑩ by tapping the retainer softly with a punch or harmer while turning the retainer counter-clockwise.

7) Draw out the drive wheel with the gears mounted thereon.

8) Wash the inside of the gear case with a rinsing oil sufficiently.

9) When assembling, follow the steps reversely from ⑧ to ① and ensure that the clutch lever is fit into the clutch groove.



6.3 Periodical inspection and maintenance

Perform the inspection and care of this machine referring to the instructions given below, and use it in the best condition:

1) Daily inspection and care

1. Brush off all dust and iron powder on the rack of the cross bar and the cross feed handle pinion.
2. Feed the shaft of the guide wheel with machine oil.

.

2) Inspection every 6 months or every 1000 hours.

1. Remove with a brush the dust sticking to the control board and transformer.
2. Confirm there is enough grease in the gear case.

   If not sufficient, supplement.

3) Yearly inspection or inspection every 2000 hours

1. Dismount, clean and grease the gear case appropriately (use the specified greases).
2. When assembling, be sure that the clutch lever is correctly put in the clutch groove.

7 Troubleshooting

1) The machine will not move. (The motor will not run.)

Possible Cause	Procedure	Remedy
1) No erectrical power	Check power circuit.	Ensure good connection.
2) Broken power cord	Use a circuit tester to check the cord.	Repair or replace the cord.
3) Bad connection	See that all lead wires are property attached to their terminals.	Repair faulty lead connections.
4) Bad switch	Remove the switch adapter plate and test across each terminal with a tester.	Replace faulty switch.
5) Bad resistor	Check if the resistance is 5 KΩ using a tester.	Replace faulty resistor.
6) Bad resistor bush contact	Connect the tester to any two resistor terminals and turn the handle. Poor resistor is indicated by unsteady indicator needle.	Replace faulty resistor.
7) Broken read wire	Test each lead with a tester.	Replace faulty leads.
8) Bad motor windings	A faulty motor is indicated if all the above test results are normal.	Repair or replace the motor.

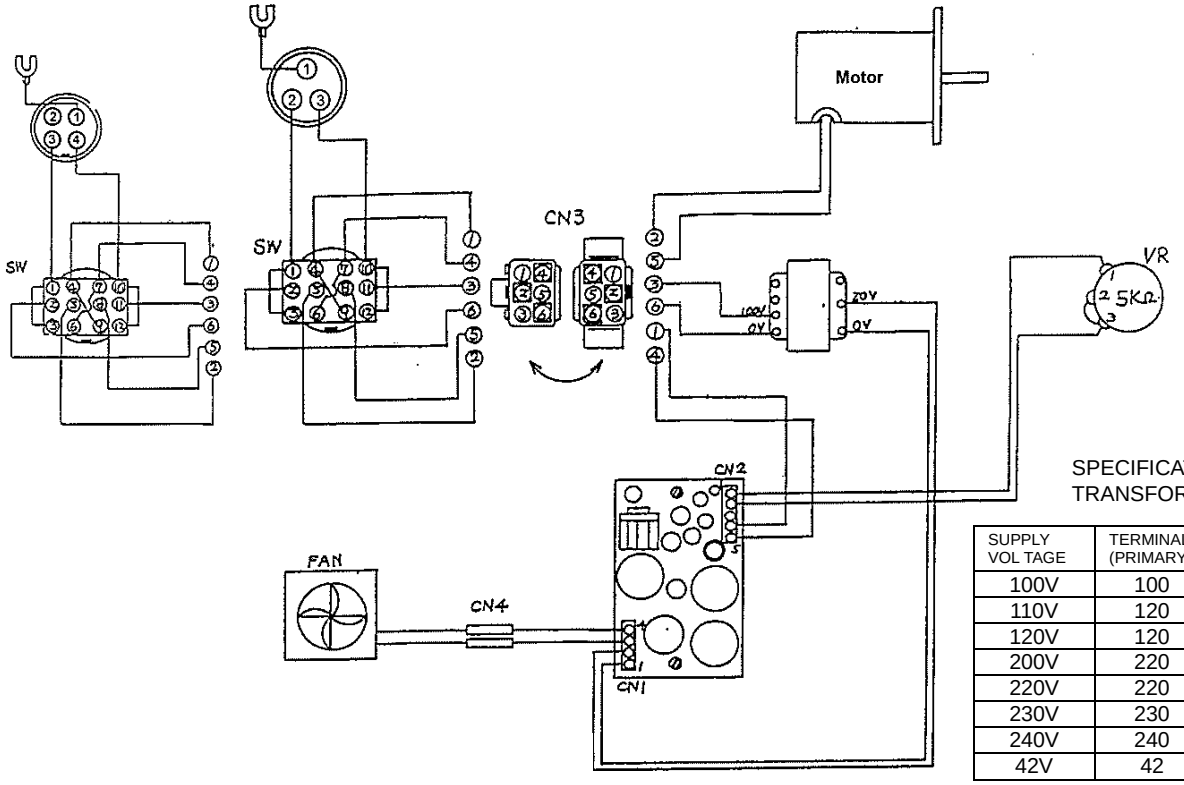
2) The machine will not move. (The motor runs.)

Possible Cause	Procedure	Remedy
1) Faulty clutch	Remove the gear box lid and check the clutch.	Disassemble and clean the clutch and repair it if faulty.
2) Reduction gear slips	Pull the clutch rod and free the clutch. Tum on the power switch and stop the drive gear by hand. Reduction gear is faulty if the motor continues to run.	Gear is loose. Dissemble and repair.

3) Abnormal carriage

Problem	Possible Cause	Inspection and Repair
1) Runs too fast.	100V machine connected to 200V power source.(Take every precaution to prevent this from happening.)	Check power source.
2) Will not run slowly.	a) Faulty resistor b) Faulty wiring. c) Faulty motor.	Replace resistor. Repair wiring. Repair or replace motor.
3) Will not run fast.	Inadequate voltage of power source.	Check power source with tester.
4) Speed uneven	Damaged gear.	Replace faulty gears or recondition them. Note: Avoid damaging the gears during stripping.
5) Knocks	a) Gear worn	Replace worn gears.
	b)Clutch A and B do not engage properly.	Replace faulty parts.
	c) Clutch key worn.	Repair or replace worn key.
	d) Loose shaft or drive wheel.	Repair or replace.
	e) Damaged rail or foreign objects on rail.	Use caution. Repair any damage.
	f) Hoses or power cord interferes with carriage movement.	Exercise caution during operation.
	g) Faulty guide wheel.	Replace or repair.
	h) Foreign matter is attached to drive or idle wheel, or these wheels are damaged.	Replace or repair.

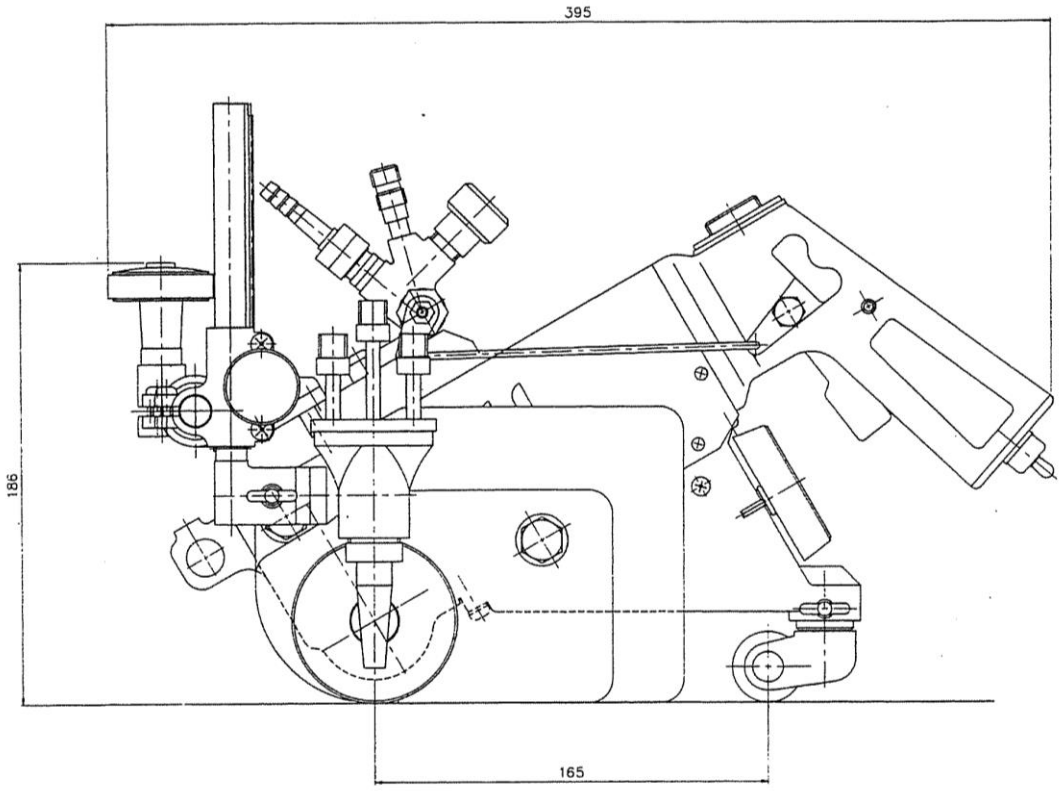
8 Wiring diagram



SPECIFICATION OF TRANSFORMER

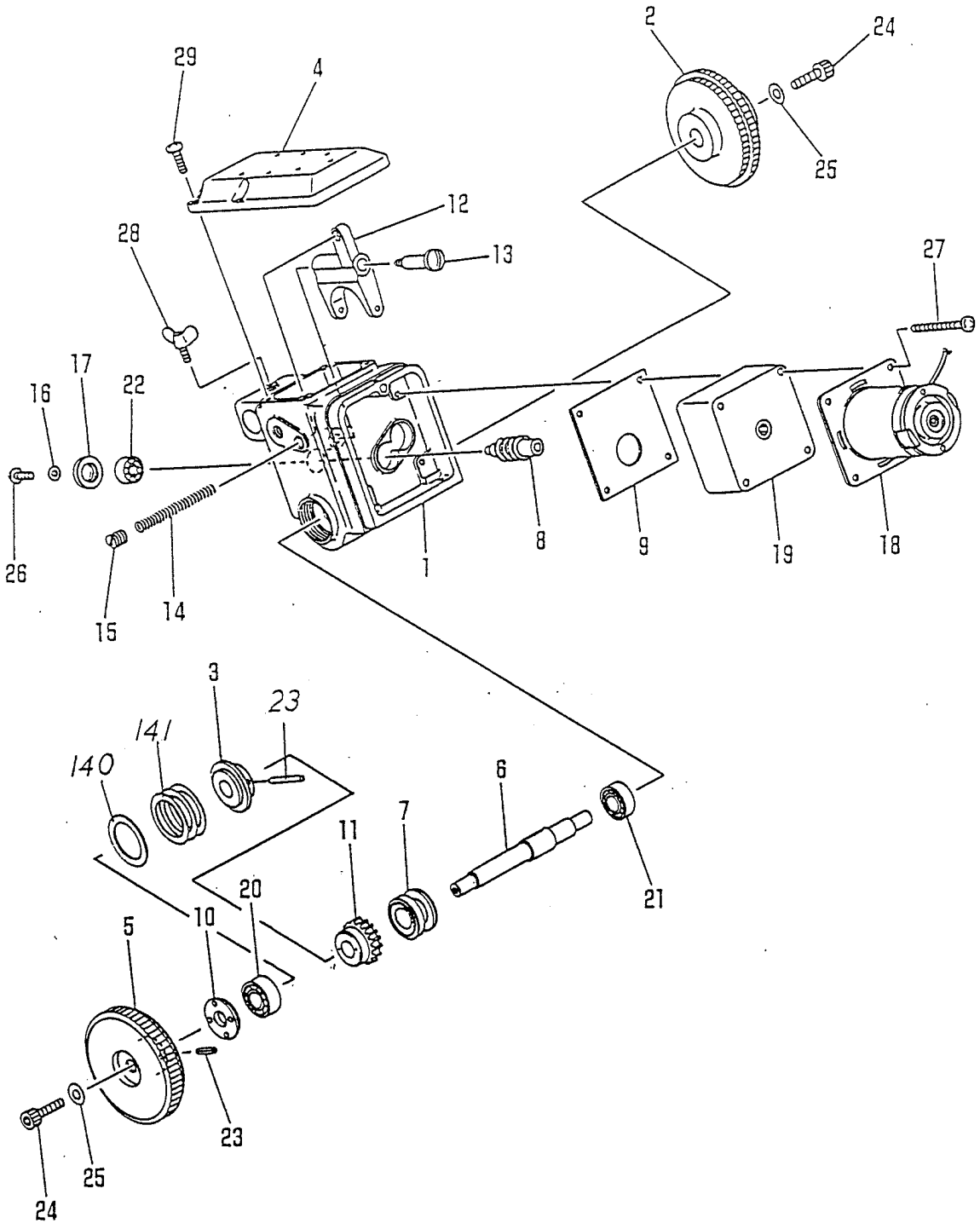
SUPPLY VOL TAGE	TERMINAL (PRIMARY)	TERMINAL (SECONDARY)
100V	100	20
110V	120	22
120V	120	20
200V	220	22
220V	220	20
230V	230	20
240V	240	20
42V	42	20

9 Assembly drawing



10 Parts List

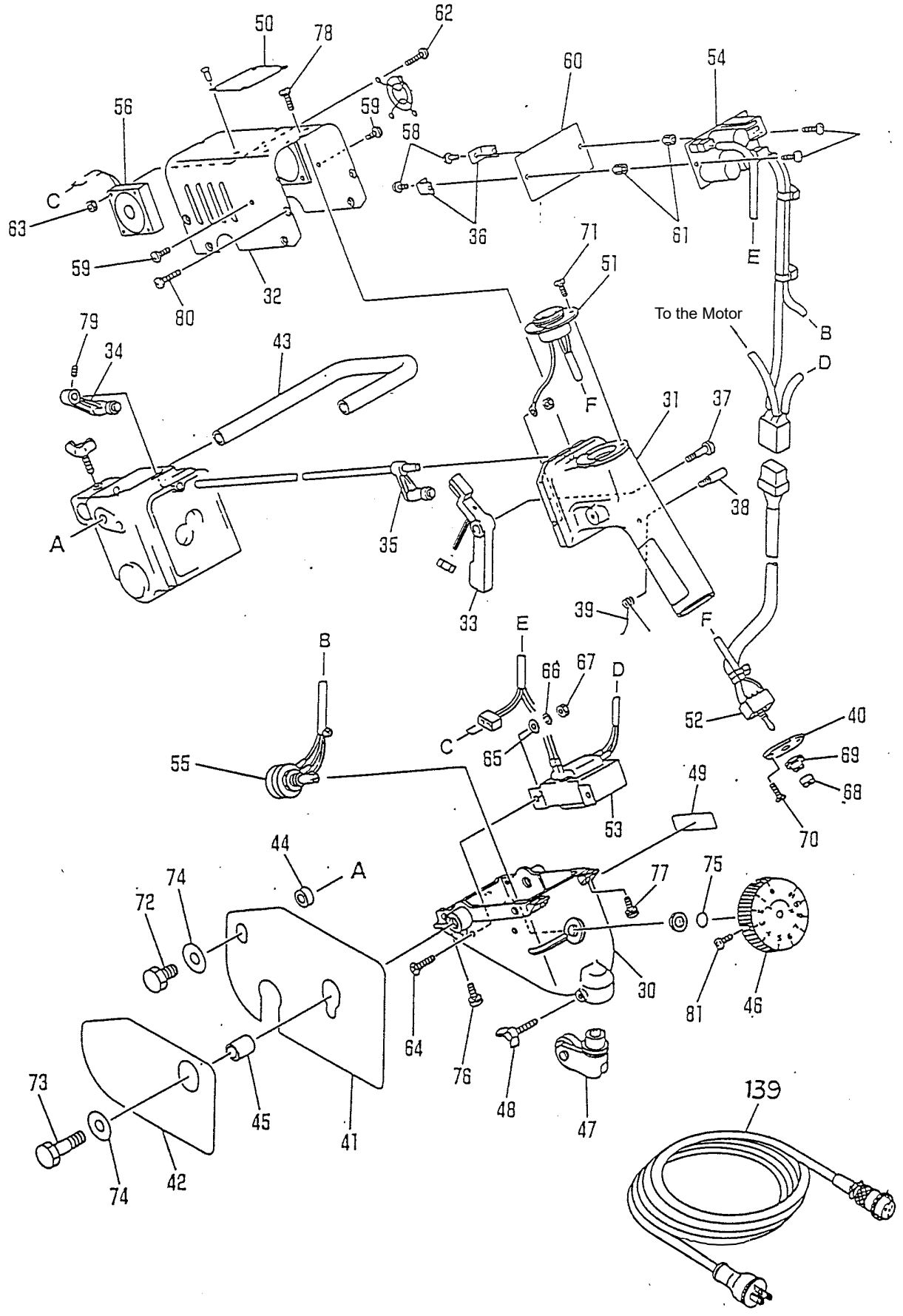
10.1 Drive unit



Drive unit

Item No.	Part name	Q'ty	Stock No.	Remarks
1	Gear box	1	60036801	
2	Idle wheel A'ssy	1	60036804	
3	Collar	1	60036806	
4	Gear box cover	1	20542256	★
5	Drive wheel	1	60036401	
6	Drive shaft A'ssy	1	61005717	with key
7	Clutch (A)	1	60036404	
8	Worm gear	1	60036406	
9	Teflon packing	1	60036409	
10	Bearing retaining screw	1	60030516	
11	Worm Wheel A'ssy	1	60030518	
12	Clutch lever	1	60030528	
13	Clutch lever shaft	1	60030534	
14	Lever spring	1	60030530	
15	Spring retainers	2	60030531	
16	Washer	1	60031015	
17	Bearing retainer	1	60032591	
18	Motor	1	61002409	DME446HPB
19	Gear head	1	60036437	6H90
20	Bearing	1	6A036200	6200ZZ
21	Bearing	1	6A036000	6000ZZ
22	Bearing	1	6A030606	606ZZ
23	Spring pin	1	6B022518	PR-2.5x18
24	Hexagon bolt	2	6C030508	BC-5x8
25	Washer	2	6D500050	WF-5
26	Screw	1	6C520406	SP-4x6
27	Screw	4	6C530440	SP-4x40(WS)
28	Wing bolt	1	6C110612	BS-6x12
29	Screw	4	6C530412	SP-4x12(WS)
140	Washer	1	60036807	
141	Wave washer	2	60036966	

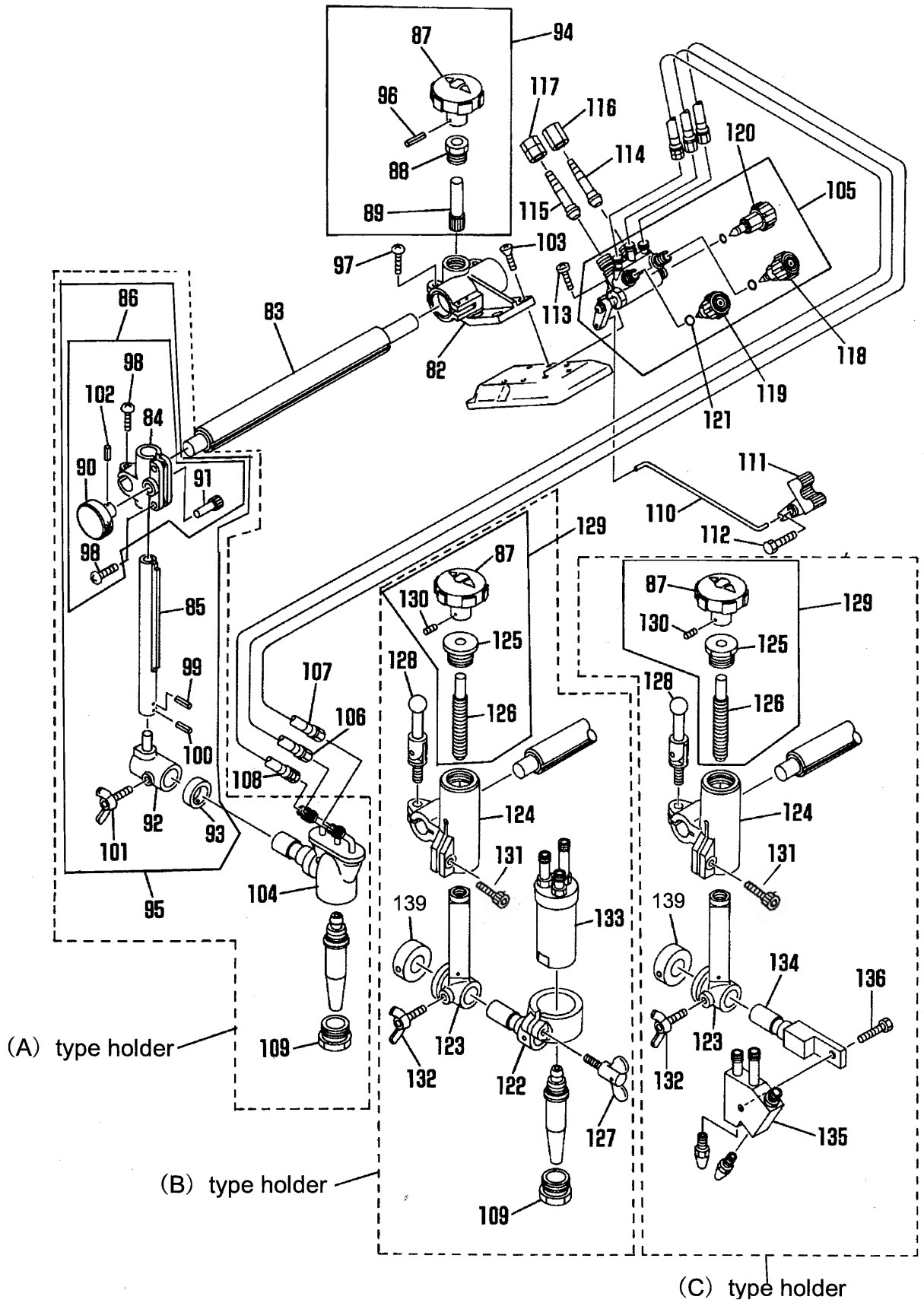
10.2 Main body and electric components



Main body and electric components

Item No.	Part name	Q'ty	Stock No.	Remarks
30	Lower casing	1	20542258	★
31	Grip	1	60036812	
32	Cover	1	60036813	
33	Clutch lever	1	60036825	
34	Clutch joint A'ssy (A)	2	60036827	
35	Clutch joint A'ssy (B)	2	60036828	
36	Base plate mounting brackets	2	60036908	
37	Lever shaft	1	60036819	
38	Spring shaft	1	60036820	
39	Spring	1	60036821	
40	Switch mounting plate	1	60036822	
41	Inner heat shield	1	60036823	
42	Outer heat shield	1	60036824	
43	Handle	1	60036829	Option
44	Collar (I)	1	60036417	
45	Collar (II)	1	60036418	
46	Resistor handle	1	60036442	
47	Guide wheel A'ssy	1	60036870	
48	Wing bolt	1	6C110615	BS-6x15
49	Machine face plate	1		
50	Name plate	1		
51	Receptacle	1	6N100061	NCS-253-R
		1	6N100062	NCS-254-R
52	Power normal/reverse change-over switch	1	60036910	
53	Transformer	1	60036435	For 100V-220V
		1	60036441	For 42V
		1	60036439	For 230V-240V
54	Controller	1	60036436	KO-0907
55	Speed-setting VR	1	60036440	RV24YN20SB55K
56	93 Fan assembly	1	61002410	With fan Guard
58	Screw	4	6C520305	SP-3x5
	Washer	4	6D500030	WS-3
59	Screw	2	6C630306	SP-3x6
60	Guard plate	1	60036909	
61	Spacers	2	60036469	★
62	Screw	4	6C520312	SP-3x12
63	Nut	4	6D010030	NH-3
64	Screw	2	6C520415	SP-4x15
65	Washer	2	6D500040	WF-4
66	Washer	2	6D510040	WS-4
67	Nut	2	6D010040	NH-4
68	Dust protective cap	1	60032431	
69	Dust protective nut	1	60032480	
70	Screw	2	6C510310	SM-3x10
71	Screw	3	6C510306	SM-3x6
72	Hexagon bolt	1	6C011015	BH-10x15
73	Hexagon bolt	1	6C011030	BH-10x30
74	Washer	1	6D500100	WF-10
75	O-ring	1	60036472	P-6
76	Screw	2	6C530515	SP-5x15(WS)
77	Screw	2	6C530412	SP-4x12(WS)
78	Screw	9	6C670406	SM-4x6
79	Screw	1	6C540405	SS-4x5
80	Screw	2	6C520408	SP-4x8
81	Screw	1	6C670406	SM-4x6
139	Cabtyre cord A'ssy(3P)	1	61004264	
	Cabtyre cord A'ssy(4P)	1	61004265	
	Cabtyre cord A'ssy(4P)	1	61004271	DIN type
	Cabtyre cord A'ssy(3P)	1	61004272	No plug type
	Cabtyre cord A'ssy(4P) CEtype	1	61005384	KE only DIN type
	Cabtyre cord A'ssy(3P) CEtype	1	61005385	KE only No plug type

10.3 Holder and distributing components



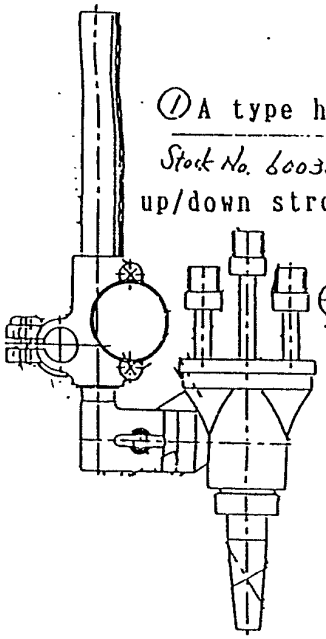
Holder and distributing components

Item No.	Part name	Q'ty	Stock No.	Remarks
82	Cross-feed table A'ssy	1	60036848	
83	Cross-bar	1	60036849	
84	Vertical holder	2	60036845	
85	Vertical piping A'ssy	1	60036851	
86	Vertical holder A'ssy	1	60036850	(A) type holder
87	ϕ40 handle	1	60030223	
88	ϕ14 pinion metal	1	60030557	
89	Cross-feed pinion	1	60030558	
90	Handle	1	60031628	
91	Pinion	1	60031627	
92	Torch holder	1	60031624	
93	Calibration collar	1	60030906	
94	Cross-feed handle A'ssy	1	60030556	
95	Torch holder A'ssy	1	60036852	(A) type holder
96	Spring pin	1	6B022516	PR-2.5x16
97	(+) Pan head small Phillips screws	2	6C520514	SP-5x14
98	Hexagon bolt	3	6C030515	BC-5 x15
99	Spring pin	1	6B022013	PR-2x13
100	Spring pin	1	6B022013	PR-2x13
101	Wing bolt	1	6C110512	BS-5x12
102	Spring pin	1	6B022013	PR-2x13
103	Oval countersunk screws	4	6C510515	SF-5x15
104	Torch	1	60010301	
		1	60010303	For KE
105	Distributor A'ssy	1	60036880	
			60036883	For KE
106	J.OX hose (Blue)	1	60030305	600L
107	P.OX hose (Blue)	1	60030305	600L
108	FG hose (Red)	1	60030307	600L
	FG hose (Orange)	1	61001810	600L
109	Nozzle tightening nut	1	60005020	
110	Lever rod	1	60036881	
111	Jet lever	1	60030561	
112	Jet lever shaft	1	60030562	SP-5 x15
113	(+) round screws	3	6C520515	
114	Hose entry (OX)	1	60015003	
115	Hose entry (Gas)	1	60015004	
116	Nut (OX)	1	60015001	
117	Nut (GAS)	1	60015002	
118	P.OX valve A'ssy	1	60015255	
		1	60015258	For KE
119	Gas valve A'ssy	1	60015256	
		1	60015256	For KE
120	J.OX valve A'ssy	1	60015254	
		1	60015258	For KE
121	O-rings	3	60005026	
122	Torch holder	1	60036924	
123	Holder support	1	60036925	
124	Support base	1	60030566	
125	Square thread metal	1	60030564	
126	Square thread	1	60030565	
127	Wing bolt	1	60030392	
128	Bent handle	1	60030313	
129	Vertical handle A'ssy	1	60030563	
130	Spring pin	1	6B022516	PR-2.5x16
131	Hexagon bolt	1	6C030615	BC-6 x15
132	Wing bolt	1	6C110615	BS-6 x15
133	Torch	1	60010601	
			60010606	For KE
134	German torch support	1	60036944	
135	torch	1	60010604	Propane gas
136	Hexagon head bolt	1	6C010616	BH-6 x16
137	Torch holder A'ssy	1	60036926	※ 1
138	German torch holder A'ssy	1	60036942	※ 2
139	Calibration collar	1	60030568	

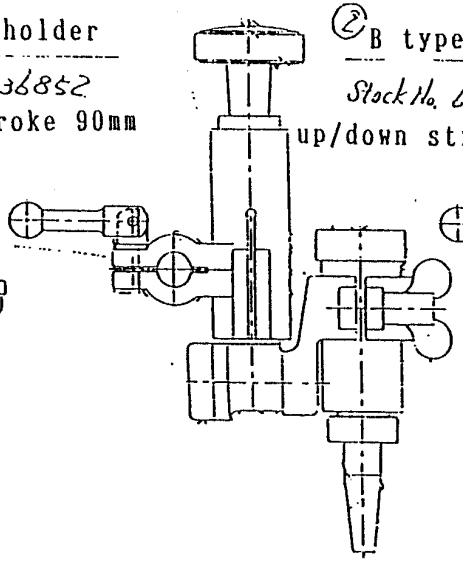
※1. The item No. 137 (Torch holder A'ssy, Stock No. 60036926) is the same as the (B) type holder shown in the exploded view but not including the items Nos. 109 and 133.

※2. The items No.138 (German torch holder A'ssy, Stock No. 60036942) is the same as the (C) type holder shown in the exploded view but not including the item No. 135.

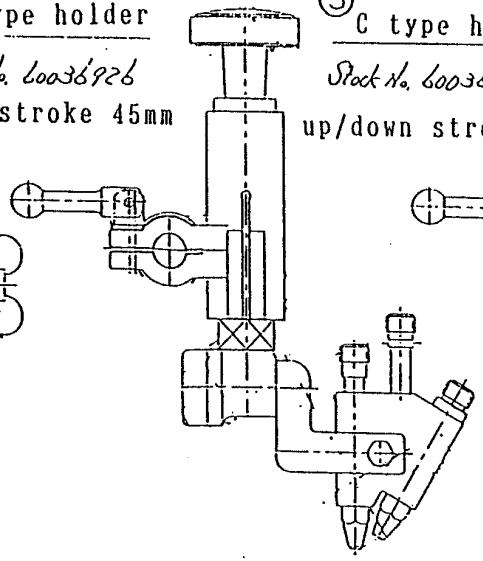
OPTION LIST



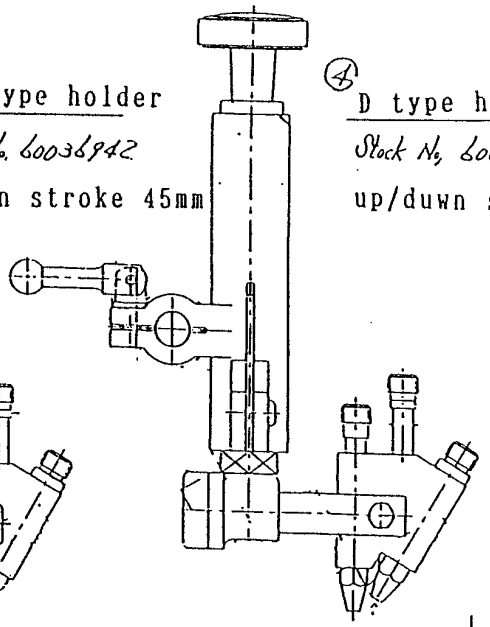
① A type holder
Stock No. 6003685Z
up/down stroke 90mm



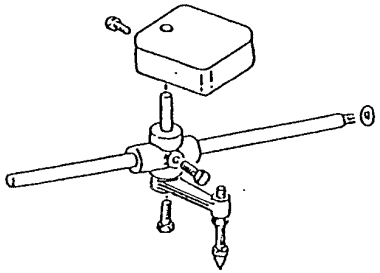
② B type holder
Stock No. 6003692G
up/down stroke 45mm



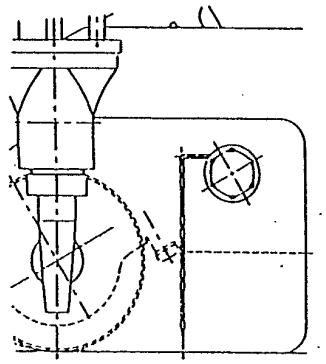
③ C type holder
Stock No. 6003694Z
up/down stroke 45mm



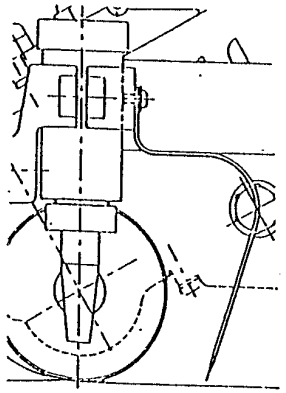
④ D type holder
Stock No. 6003694J
up/duwn stroke 100mm



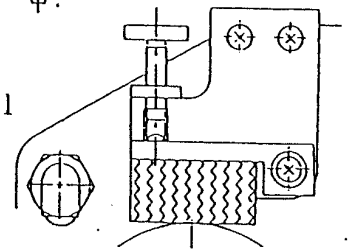
⑤ circle cutting att
Stock No. 60033353



⑥ guide needle
Stock No. 6003695S
(common use for A,B,C)



⑦ guide needle
Stock No. 6003695G
(B type only)



⑧ brush for wheel
Stock No. 6003695J

⑨ weight bar(short)
Stock No. 6003695B

short 65L, long 135L

body side

weight bar

⑩ weight bar(long)
Stock No. 60031855

⑪ weight
Stock No. 60030381

11 Cutting data

11.1 Tip nozzle (Type 100)

102(STANDARD SPEED) For Acetylene

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	680	1.5 / 0.15	1.5 / 0.15	0.2 / 0.02	1.0
6	0	610	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.3
10	0	560	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.5
12.5	1	530	2.5 / 0.25	2.5 / 0.25	0.2 / 0.02	1.8
19	2	460	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.0
25	2	430	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.0
38	3	355	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.3
50	4	320	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.8

102-D7(HIGH SPEED) For Acetylene

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	800	7.0 / 0.7	1.5 / 0.15	0.2 / 0.02	0.8
6	0	740	7.0 / 0.7	2.0 / 0.2	0.2 / 0.02	1.0
10	0	680	7.0 / 0.7	2.0 / 0.2	0.2 / 0.02	1.3
12.5	1	630	7.0 / 0.7	2.5 / 0.25	0.2 / 0.02	1.3
19	2	560	7.0 / 0.7	3.0 / 0.3	0.25 / 0.025	1.5
25	2	510	7.0 / 0.7	3.0 / 0.3	0.25 / 0.025	1.8
38	3	460	7.0 / 0.7	3.0 / 0.3	0.25 / 0.025	2.0
50	4	410	7.0 / 0.7	3.0 / 0.3	0.25 / 0.025	2.6

NOTE

1) All pressures are torch inlet pressures.
2) Oxygen purity is minimum of 99.7%.
3) Depending on the surface condition of the steel plate (scale, paint) either increase the fuel gas pressure or decrease the cutting speed. Also, when precision cutting is required, adjust all data.

106(STANDARD SPEED) For Propane

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	680	1.5 / 0.15	1.5 / 0.15	0.2 / 0.02	1.0
6	0	610	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.3
10	0	560	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.5
12.5	1	530	2.5 / 0.25	2.5 / 0.25	0.2 / 0.02	1.8
19	2	460	3.0 / 0.3	3.0 / 0.3	0.2 / 0.02	2.0
25	2	430	3.0 / 0.3	3.0 / 0.3	0.2 / 0.02	2.0
38	3	355	3.0 / 0.3	3.0 / 0.3	0.2 / 0.02	2.3
50	4	320	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.8

106-D7(HIGH SPEED) For Propane

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	800	7.0 / 0.7	1.5 / 0.15	0.2 / 0.02	0.8
6	0	740	7.0 / 0.7	2.0 / 0.2	0.2 / 0.02	1.0
10	0	680	7.0 / 0.7	2.0 / 0.2	0.2 / 0.02	1.3
12.5	1	630	7.0 / 0.7	2.5 / 0.25	0.2 / 0.02	1.3
19	2	560	7.0 / 0.7	3.0 / 0.3	0.2 / 0.02	1.5
25	2	510	7.0 / 0.7	3.0 / 0.3	0.2 / 0.02	1.8
38	3	460	7.0 / 0.7	3.0 / 0.3	0.2 / 0.02	2.0
50	4	410	7.0 / 0.7	3.0 / 0.3	0.2 / 0.02	2.6

NOTE

1) All pressures are torch inlet pressures.
2) Oxygen purity is minimum of 99.7%, propane is minimum of JIS Grade 3.
3) Depending on the surface condition of the steel plate (scale, paint) either increase the fuel gas pressure or decrease the cutting speed. Also, when precision cutting is required, adjust all data.

11.2 Tip nozzle (Type 300)

301-302 For Acetylene

PLATE THICKNESS (mm)	TIP SIZE		PRESSURE (MPa)/(kg/c ㎡)		Flux (nl/h)			CUTTING SPEED (mm/min)
	CUTTING (301)	PREHEAT (302)	OX	FG	JOX	POX	FG	
3	(00)	12	0.18/1.8	0.020/0.20	1,000	210	190	800
5	0		0.20/2.0		1,500			730
10			0.25/2.5		1,800			600
15	1		0.30/3.0	0.025/0.25	2,900	230	210	520
20	2	13	0.35/3.5	0.030/0.30	4,300	310	280	450
25		14	0.40/4.0		5,000	400	365	400
30		15				440	400	370
35	3		0.45/4.5	0.035/0.35	6,800	470	425	340
40	4	16			8,000	480	435	320
45			0.50/5.0		8,600			300
50								280

301-306 For Propane

PLATE THICKNESS (mm)	TIP SIZE		PRESSURE (MPa)/(kg/c ㎡)		Flux (nl/h)			CUTTING SPEED (mm/min)
	CUTTING (301)	PREHEAT (306)	OX	FG	JOX	POX	FG	
3	(00)	15	0.25/2.5	0.020/0.20	1,100	1,240	310	800
5	0		0.30/3.0		1,800			730
10			0.35/3.5	0.030/0.30	2,100	1,480	370	600
15	1				2,700			520
20	2	16			3,800	1,880	470	450
25		17	0.40/4.0	0.020/0.20	4,200	2,120	530	400
30								370
35	3		0.45/4.5		5,900			340
40	4	18	0.50/5.0	0.015/0.15	7,500	2,400	600	320
45			0.55/5.5		8,200			300
50								280

NOTE

1) All pressures are torch inlet pressures.
2) Oxygen purity is minimum of 99.7%.
3) Depending on the surface condition of the steel plate (scale, paint) either increase the fuel gas pressure or decrease the cutting speed. Also, when precision cutting is required, adjust all data.

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2nd:	Feb.2006
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