Portable Automatic Gas Cutter

BEA00B07

IK-54D

Pattern Cutter

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

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. 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.
7. Always turn the power off when not in use.
8. 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. Firmly secure the balance weight.
8. Secure the upper and No.2 arms with a curved handle so that they will not fall off the shaft.
9. Secure the upper, No.1, and No.2 arms when carrying the machine. Exercise special care 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.

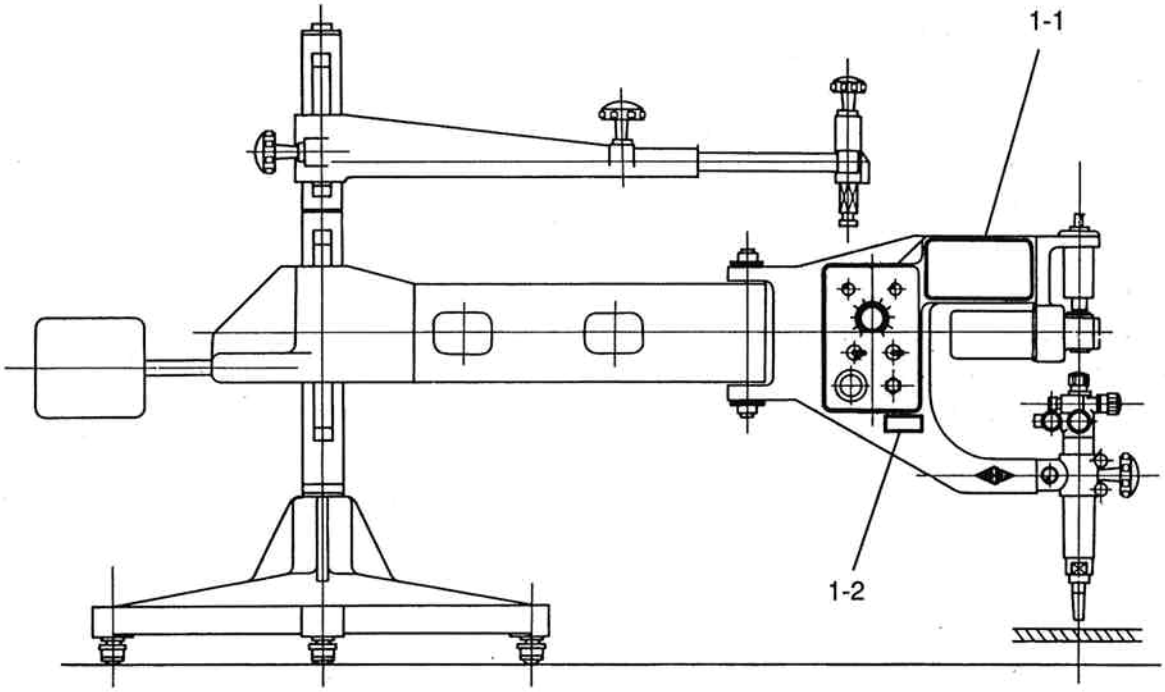
1.2.6 Safety precautions for skin burns 

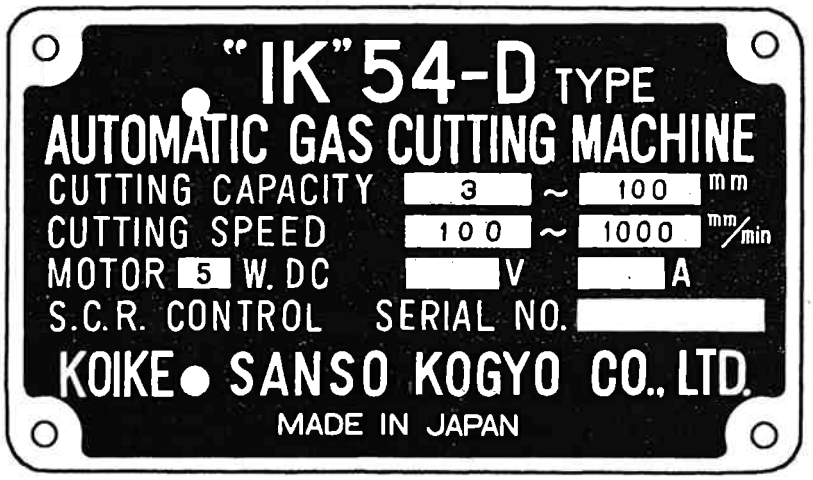
Observe the safety precautions to prevent skin burns. Ignoring heat, spatter, and sparks during operation could cause a fire or burned skin.

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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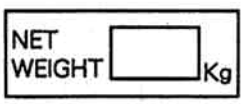

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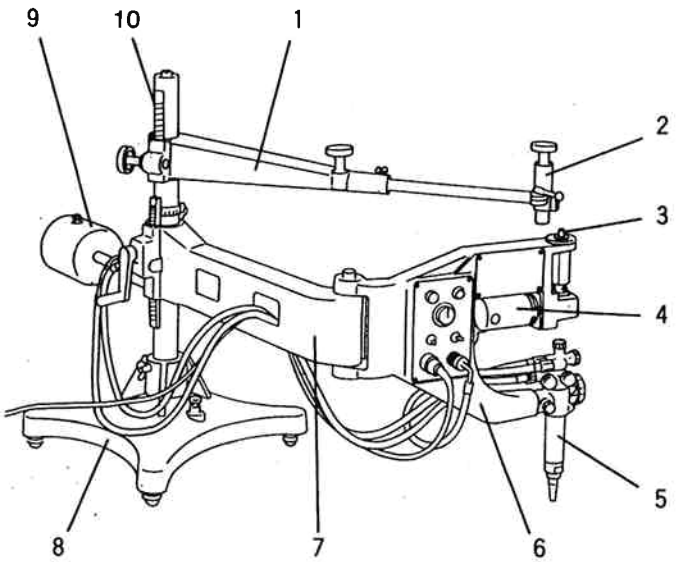
3 Outline of machine

3.1 Features of machine

The IK-54D is equipped with the following 8 features.

1. The machine is stable.
   The fixed type main shaft ensures stability of the machine.
2. The cutting range has been further enlarged.
   The arm turns 360 degrees around the main spindle. Put a tracing pattern is on the main shaft, and cutting operation up to 1,700 dia. is possible.
3. The traveling speed range has been widened to improve the traveling performance.
   A DC shunt motor is used for driving, and the SCR control system has been adopted for wider speed change range and stabler traveling speed.
4. The tip and torch can be changed easily.
   A rotary torch holder is adopted, and the high-accuracy stability has been ensured by a special pin. Therefore, torch change and tip cleaning are very easy.
5. Distinguished operability
   Operation switches are collected in the No.1 arm section for very easy operation.
6. Several types of magnets can be attached.
   In addition to the standard 10 dia. magnet roller, 6, 8, 15, and 20 dia. magnet rollers are provided. They can be changed easily. These strong magnets ensure stable tracing.
7. Lightweight stand
   A light alloy is used for reduction in weight.
8. A pattern is unnecessary for circle cutting.
   Use of a circle cutting attachment (option) permits cutting 60-400 dia. circles without a pattern.

3.2 Name and function of each section



1. Upper arm
Used for setting the cutting direction.

2. Template holder
Used for attaching a tracing pattern.

3. Magnet roller
Turns along a tracing pattern.

4. Motor

5. Torch

6. No.1 arm

7. No.2 arm

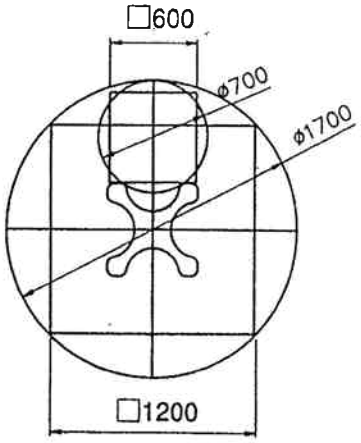
8. Stand

9. Weight

10. Main spindle

3.3 Specifications

Weight :	33 kg (with out weight)
Machine size :	1,260 x 695 x 550mm
Power :	±10%
Motor :	DC 15W 5000rpm
Speed control :	Control with dial operation
Cutting thickness :	3-100 mm
Cutting speed :	100-1000 mm/min
Cutting accuracy :	with in ±0.5 at ø500mm
Magnet roller :	ø10
Cutting range	
for circle	ø30 ~ ø700
for circle (when main spindle rotate)	ø600 ~ ø1700
for square	□30 ~ □600
for square (when main spindle rotate)	□500 ~ □1200
Tip :	102 (for acetylene) or 106 (for propane)
Gas :	Oxygen, acetylene gas, or LPG gas



● Accessories

Tip 102 (for acetylene) or 106 (for propane) #0,1,2 1pc each

Power cable :	1set
Tip cleaner :	1set
Bush	1set
Spanner :	1pc
Center :	1set
Ruler :	1pc
Fuse (1A) :	2pcs

● Option

Magnet roller ø6, ø8, ø15, ø20

Template set plate (used for setting template to main spindle)

Circle cutting unit

4 Preparation for operation

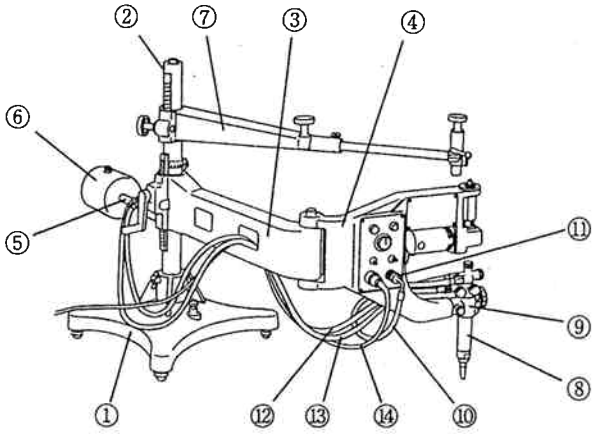
4.1 Contents of package

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

- Stand :.....1 set
- Main spindle :.....1 set
- No.2 arm: .....1 set
- No.1 arm: .....1 set
- Operation panel: .....1 set
- Tracing drive unit
  (motor, reduction gear, magnet roller): .....1 set
- Torch unit (torch, torch holder):.....1 set
- Upper arm (slide bar) : .....1 set
- Template holder (template set bolt): .....1 set
- Weight (weight bar): .....1 set
- Power cable (3P x 5M):.....1 set
- Tip 102 (for acetylene) or 106 (for propane) #0,1,2
  :.....1 pc each
- Tip cleaner: .....1 set
- Brush:.....1 pc
- Spanner : .....1 pc
- Center : .....1 pc
- Ruler : .....1 pc
- Fuse : .....2 pcs

4.2 Machine assembly

1. IK-54D is packed in three corrugated cardboard boxes. Open the respective boxes and take out the parts.
   - IK-54D machine .....1 pack
   - IK-54D stand .....1 pack
   - IK-54D weight .....1 pack
2. Place the stand (1) on a flat floor, and insert the main spindle (2) into the stand.
3. Insert the No.1 and No.2 arms into the main spindle (2).
   Note: Fold the No.1 and No.2 arms and then insert them.
4. Insert the weight bar (5) into the hole in the No.2 arm, attach the weight (6), extend the arm, and secure it in an appropriate position with a bolt so that the arm will be well balanced.
5. Insert the upper arm (7) into the main spindle (2).
6. Insert the torch (8) into the torch holder (9).
7. Connect the hose (10) with the pressure switch (11)
8. Put the hoses (12) and (13) through under the arm to connect them with the torch.
9. Like the hoses (12) and (13), connect the power cable (14) with the metal receptacle.
10. Firmly tighten respective screws.



4.3 Preparation for operation

4.3.1 Connecting the power cable

1. Connect the power cable to the body.
2. Before plugging the metal plug on the cabtire cord side into the socket on the machine side, check there is no dust inside.
3. The metal plugs are screw-threaded, therefore, fully tighten them so that they will not come loose during operation.

4.3.2 Connecting the gas supply hose

1. Connect the respective gas supply hoses to the primary hose.
2. Securely tighten the joints and check there is no gas leak.

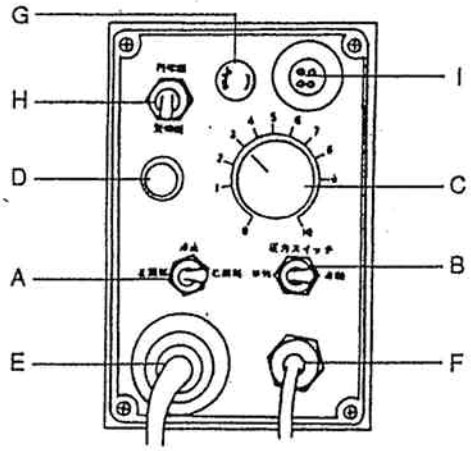
4.3.3 Connecting the tip

1. Select a proper tip according to the thickness of the steel plate and attach it to the torch. (To select a tip, refer to the table of cutting data.)
   - 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.
   - In addition, avoid damaging the taper of the tip since this may cause backfire.

4.3.4 Operation method

1. Method of electrical operation

Cutting operation is controlled by the switches and speed setting knob incorporated in the operation panel of the No.1 arm. The layout of the electrical operation unit is shown below.



A. Drive switch.....Left/Stop/Right

Three-position switch. When the switch is in the center, the motor stops, and when it is on the left side, the motor runs for counterclockwise turning. Set it in the right position for clockwise turning. (Set the pressure switch in the "individual" position.)

B. Pressure switch .....Individual/interlock

Two-position switch. Set it in the "interlock" position to operate the pressure switch, and when the cutting oxygen is emitted from the torch, the motor turns (when the drive switch is in either right or left position). When it is set in the "individual" position, the pressure switch will not operate, and the motor can be turned ON or OFF by the drive switch alone.

C. Speed setting dial

The dial with a 0-10 scale is used for setting the drive motor speed. The scale 1 corresponds to approx. 100 mm/min (for the 10-dia. magnet roller) and the scale 2 corresponds to approx. 200 mm/min.

D. Pilot lamp

When the power cable connector is connected, the pilot lamp will come on, indicating that the power is on.

E. Connector

Power connector

F. Oxygen hose end connection

For pressure switch

G. Fuse

1A

H. Change over switch for snape / Circle cutting

I . Connector

Circle cutting motor

4.3.5 Manufacture of tracing template

The magnet roller center and the torch center are concentric. The radius of the roller and the cutting width of the tip must be taken into consideration when making a tracing template. Make a tracing template based on the following:

1. As shown in the figure, the cut product and template are similar to each other, but not the same. The template becomes smaller in proportion to the roller diameter, and it becomes larger in inverse proportion to the cutting width of the tip.

Mold correction table					
Tip No.	#1	#2	#3	#4	
Cutting oxygen hole dia.	1.2 mm	1.4 mm	1.6 mm	1.8 mm	
Cutting width (dia.)	1.8 mm	2.1 mm	2.4 mm	2.7 mm	
Mold correction dimension (one side)	4.1 mm	3.95 mm	3.8 mm	3.65 mm	Roller dia ϕ 10

1) Outer tracing (When tracing the outside of the tracing pattern)
The value from which the correction value has been subtracted is the dimension of the tracing template.

2) Inner tracing (When tracing the inside of the tracing template)
The value to which the correction value has been added is the dimension of the tracing template.

(Example)

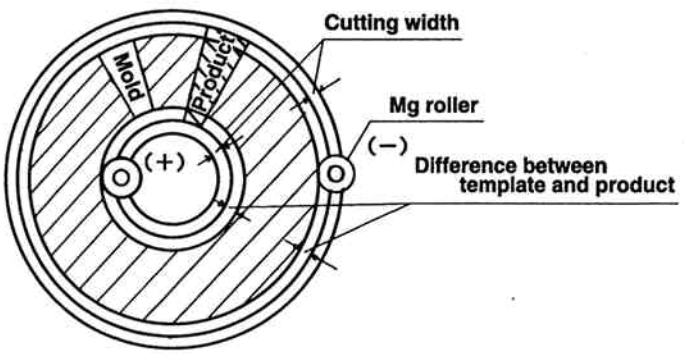
When cutting a 100-dia. work with a tip #1 by the outer tracing method:

The template dimension: 100 - 4.1 x 2 (both sides) = 91.8 dia.

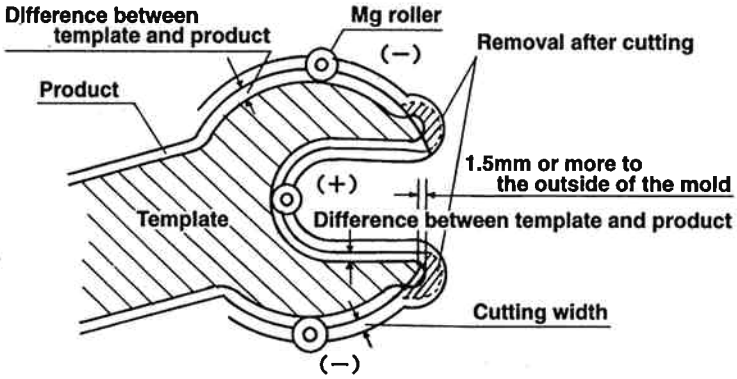
When the product dia. is 100, use a template of 4.1 mm-inside type.

When cutting a 100-dia. work with a tip #1 by the inner tracing method:

The template (hole) dimension: 100 + 4.1 x 2 = 108.2 dia.



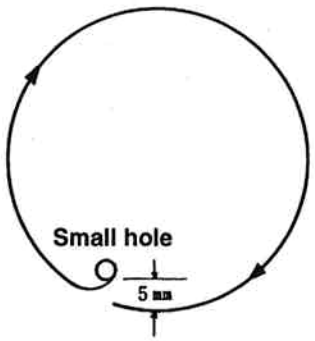
2. The template thickness shall be 3 mm or more. It shall be 6 mm or more when especially detailed cutting is necessary.
   As the template becomes thicker, the magnetism becomes stronger, permitting smoother movement; therefore, use as thick a template as possible.
3. When acute-angle cutting needs high accuracy, simple finishing and machining after cutting as shown below is recommended.



4.3.6 Template positioning and alignment

When the cut piece is necessary, cut the steel sheet from its end to minimize scraps. However, when the remaining steel sheet is required after cutting, the template positioning is very important, and sufficient practice is necessary. Skill is especially important when cutting the same holes in specified positions.

1. When cutting a circle, make a small hole at a location 5 mm or more to the inside from the circumference for easier and quicker cutting.
   (Make a hole with a drill or by piercing with the cutting tip.)
   Place the center exactly on the steel sheet. Lift the template and then lower it so that the end of the magnet roller will be inserted into the template mounting bolt hole, and the center of the template will be aligned with the center of the tip. Under such conditions, move the template back and forth or turn the template holding arch clockwise and counterclockwise so that the center of the tip will be placed at the location of the center on the steel sheet. Now a correct circle can be cut in the concentric position. Affix the attached center rest to the tip for easier operation.



2. When cutting an irregular curve, alignment of the center of the pattern and that of the template is the first step for centering. When the curved line includes a straight section, place the template in parallel with that section while checking the position from above the template, and centering and alignment will be completed instantly. When the curve does not include any straight line, mark the center and axis in the cutting section, and make a straight slit in parallel with the axis in advance on the template. After centering, determine the direction by placing the line observed through the slit in parallel with the axis. Firmly fix the template arm to the spindle to complete the positioning and centering.

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.

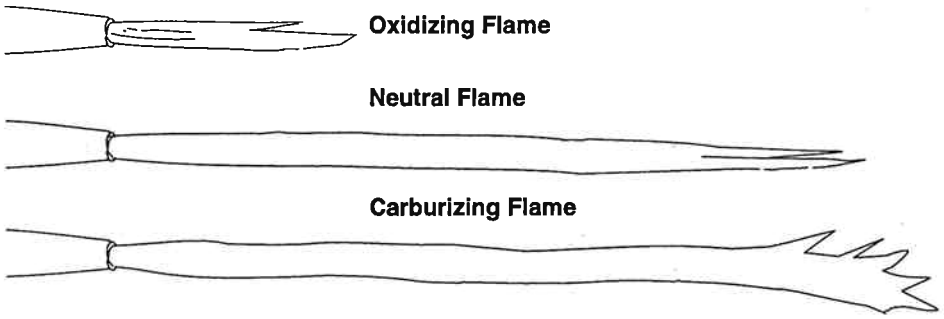
5.2 Ignition and flame adjustment

- 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

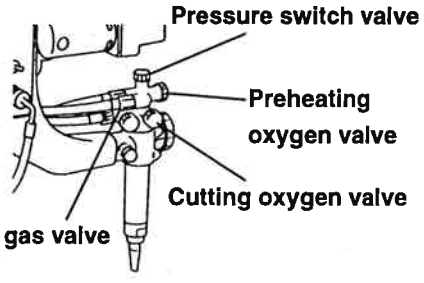
1. Cut in from the end of steel plate.
2. Pierce steel plate before cutting.
3. Drill a hole before cutting.

■ 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 Procedure for starting cutting and the method of extinguishing fire (Pattern cutting)

1. Set the pressure switch in the interlocked position.
2. Set the drive switch in the left or right position.
3. Open the pressure switch valve of the torch.
4. Open the gas valve, slightly open the preheating oxygen valve, and ignite the gas with a lighter. Then fully open the gas valve immediately. (The gas valve may not be opened fully in some cases high-quality cutting). Make a neutral flame by controlling the preheating oxygen valve.
5. Control the distance between the tip from the steel sheet. Keep the tip of the white point 2-3 mm away from the steel sheet.
6. After sufficiently preheating the edge of the steel sheet or the small hole made in advance for starting cutting, open the cutting oxygen valve. When the valve is opened, the pressure switch is activated simultaneously, and the motor turns to drive the magnet roller.
7. Move the magnet roller by hand to the template (while cutting), bring the roller in close contact with the template, and begin cutting.
8. After beginning cutting, carefully check the cutting condition to find the optimum cutting speed.
9. When the cutting tip returns to the starting point, immediately close the cutting oxygen valve, and the magnet roller stops simultaneously. Then close the gas valve and preheating oxygen valve in this order, and return the drive switch to the stop position. (It is not necessary to return to the stop position when cutting operation is to be continued.)



5.5 Cutting operation

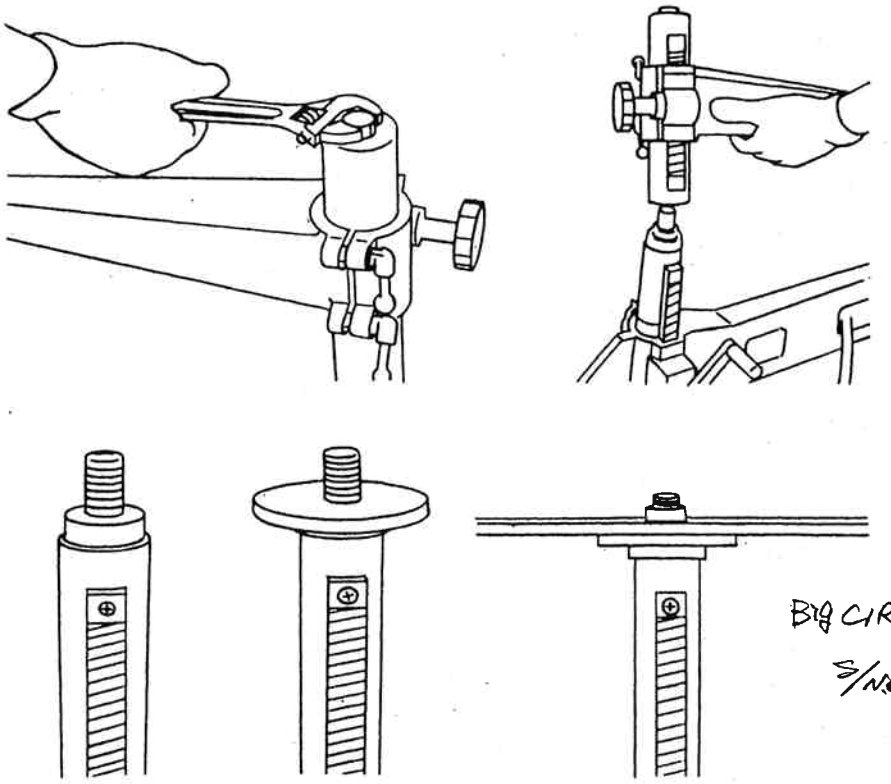
1. Attach the machine to the cutting section, and align the tip with the cutting start-up point.
2. Ignite the gas from the tip, and conduct preheating sufficiently.
3. Open the cutting oxygen valve, and the pressure switch will be activated simultaneously. Then the magnet roller is driven, and cutting operation begins.
4. Check the cutting condition, and control the cutting speed by means of the speed control knob so that it will be optimum.
5. After cutting, close the cutting oxygen valve, fuel gas valve, and preheating oxygen valve in this order.

※Then repeat operation from the beginning.

5.6 Option

5.6.1 Large pattern cutting

When cutting a large pattern (600-1700 dia.), attach a tracing template to the main spindle for pattern cutting all around the main spindle. When attaching a tracing template to the main spindle, loosen the bolt atop the main spindle, and remove the upper part of the main spindle. Then remove the nut, place the template mounting plate on the bearing retainer, and secure the tracing template with the nut.



BIG CIRCLE cutting Attachment
S/NO 60030799

5.6.2 Changing magnet roller

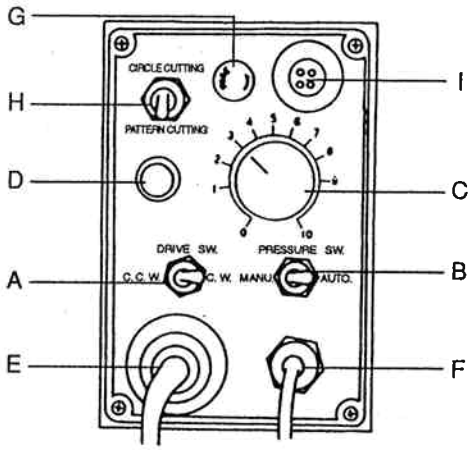
When the dimension of the same shape is slightly different (due to change in thickness or tip) or when sharp corner is necessary, change magnet rollers. A 10-dia. magnet roller is attached to the machine as standard equipment, and 6-, 8-, 15-, and 20-dia. rollers are provided as well. When changing rollers, hold the aluminum magnet case by hand, and turn the hexagonal section of the magnet roller with a spanner.

5.6.3 Circle cutting attachment

This attachment is composed of a motor for turning, clutch mechanism, and circle diameter control holder. The attachment is to be mounted on the end of the arm in the upper section of the IK-54.

A rotary holder is connected to the rotary center of the No.1 arm and the MG roller, and the rotary motion is transmitted to the No.1 arm for circle cutting.

Effective cutting dia. ... 60-400 dia.



H. Changeover swith .....Circle/pattern cutting

When the two-position changeover switch is in the pattern cutting position, the No.1 arm drive unit rotates for pattern cutting. The circle cutting position is used when a circle cutting attachment is mounted on the upper arm.

I. Circle cutting receptacle

For power supply to the circle cutting attachment.

6 Maintenance and inspection

Refer to the following points for maintaining and inspecting the machine in order to use the machine under the best conditions.

6.1 Daily inspection

1. Clean the magnet roller with a brush at all times, because iron powder tends to adhere to it.
2. Always clean the tip to ensure satisfactory cutting oxygen flow and flame.

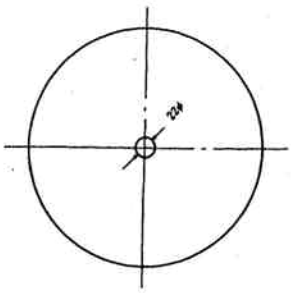
6.2 Monthly inspection

1、Check respective screws for loosening.

2、Oiling condition of the sliding and rotary sections (excl. torch section).

6.3 3-month inspection

1. Inspection of the magnet roller (abrasion)



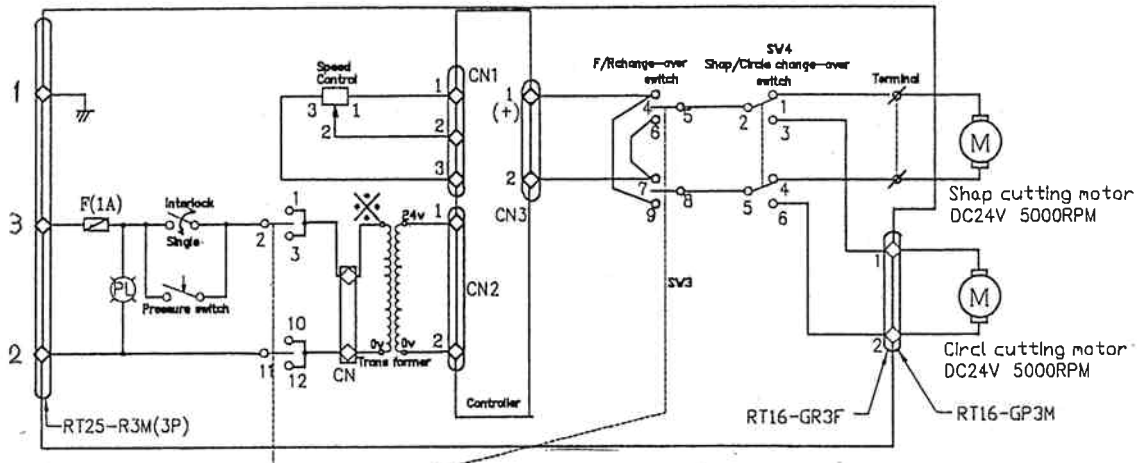
A large cutting template (a circle for example as shown in the figure) needs a 22-dia. hole in the center of the template.

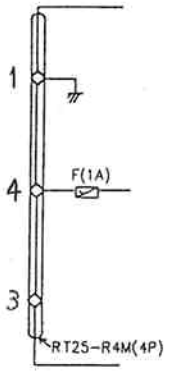
7 Troubleshooting

Phenomenon	Cause	Correction
The drive unit will not turn	1) Defective receptacle	Check the wire soldering condition
	2) Defective switch	Check the wire connection, and check the switch with a tester
	3) Defective connection	Check the soldered section
	4) Disconnected lead wire	Check the lead wire with a tester
	6) Switch operation error	The pressure switch is not operating. (Oxygen is not supplied to the pressure switch.)
Poor accuracy	1) Poor arm accuracy	Trace the circular tracing plate (Repair)
	2) Curved torch	Replacement
	3) Eccentric magnet roller	Trace the straight ruler to check the accuracy. (Replace)
	4) Improper tightening of the template holding arm and excessive clearance	Check the cause of excessive clearance. Replace it when abraded
	5) Improper tightening of the template holder and excessive clearance	Check the cause of excessive clearance. Replace it when abraded
	6) Improper template dimensions or mounting	Correction
	7) Improper way of placing the cut material	Check that the cut material is placed at right angles to the torch
Defective cut surface	1) Improper motor rotation	Check or replace the control unit
	2) Excessive play of drive gear	Repair
	3) Improper cutting data	Decrease the cutting speed lower than specifications in the Cutting Data
	4) External vibration	Eliminate the vibration

Note:
Protection of the over load.
When the motor was locked by any reason, the motor rotation will be stopped after about four second.
(Recovery:Please turn on the power supply again.)

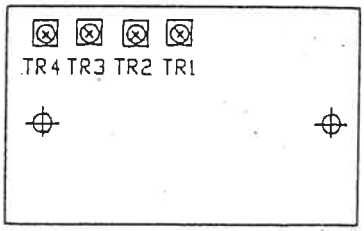
8 Wiring diagram



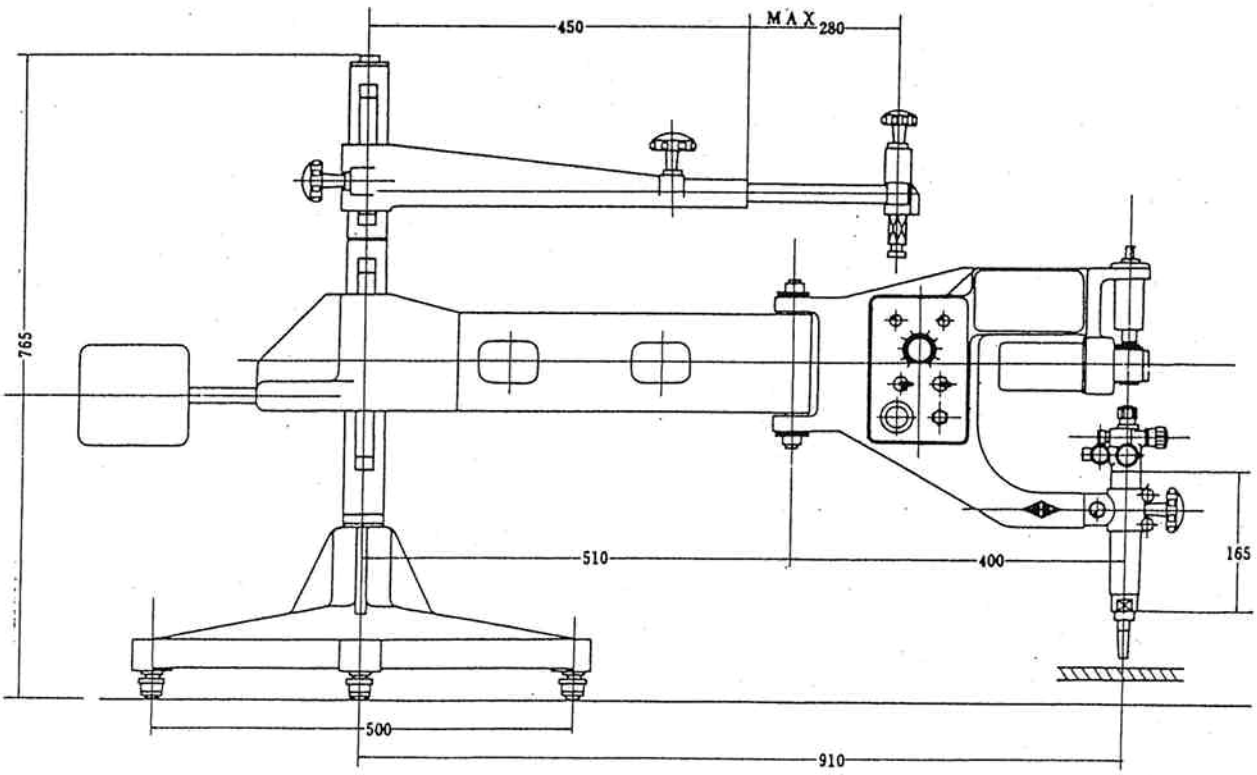


SUPPLY VOLTAGE	TRANSFORMER Connection PRIMART	SECONDARY
100V	100V	24V
110V	120V	
120V	120V	
200V	220V	
220V	220V	
230V	230V	
240V	240V	

Controller adjust
TR1 : SPEED MAX.
TR3 : SPEED MINI.

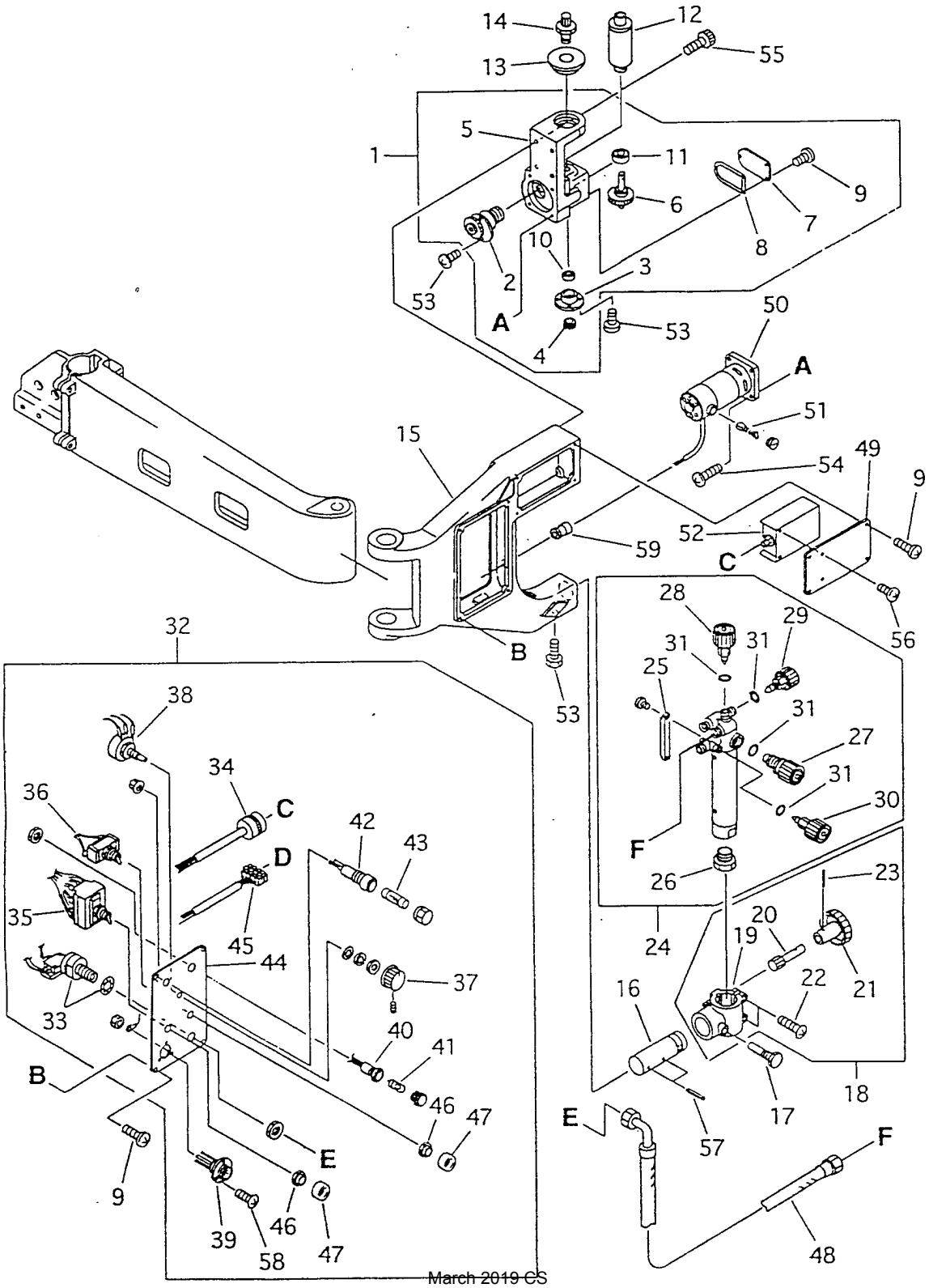


9 Assembly drawing of IK-54D



10 Parts list

10.1 Gear case, No.1 arm unit

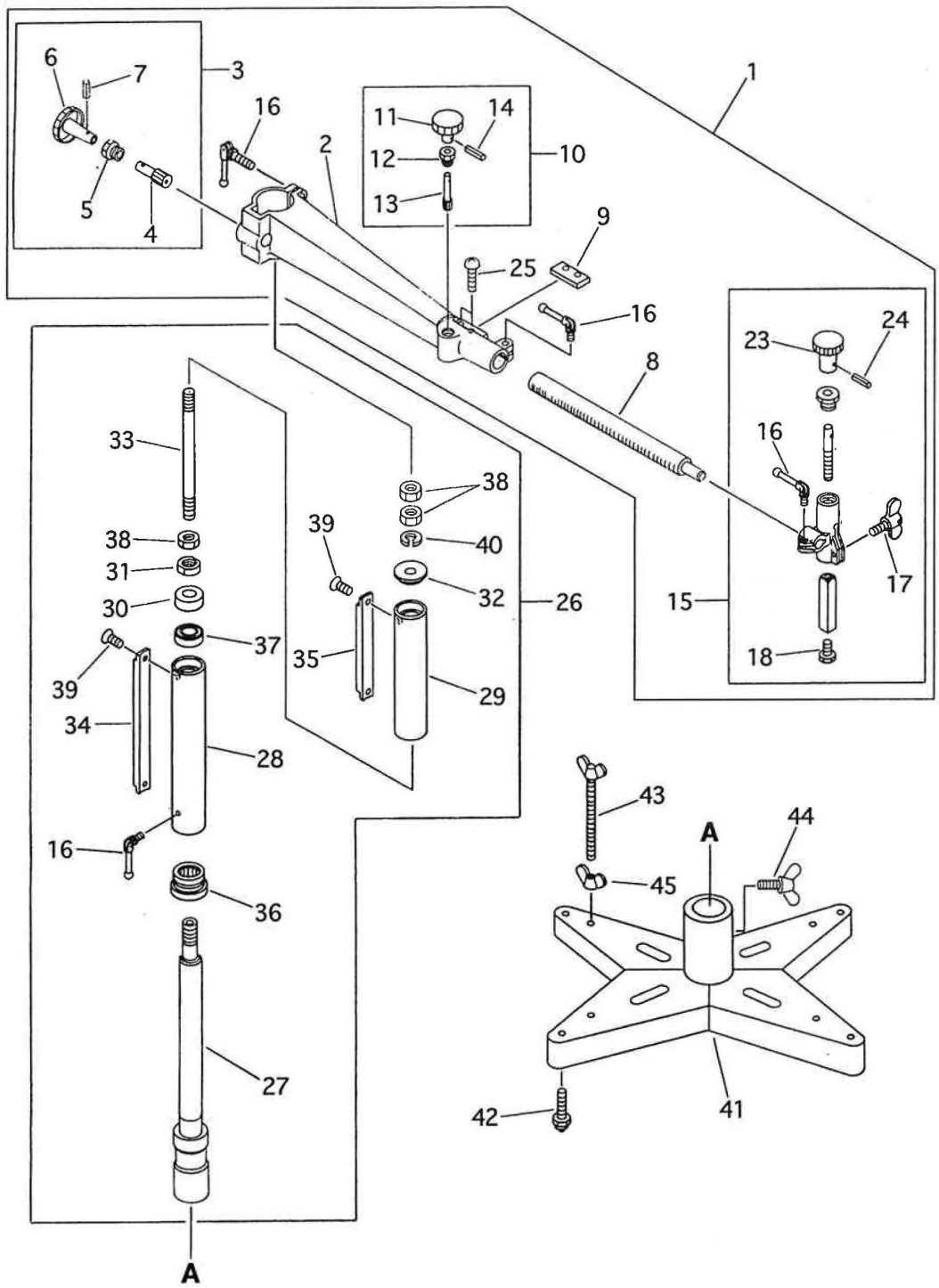


ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
1	GEAR CASE ASSEMBLY (A)	1	ZS32200	
2	GEAR CASE	1	ZS30712	
3	FLANGE	1	ZS30713	
4	BEARING RETAINER	1	ZS30714	
5	GEAR CASE	1	ZS30715	
6	WORM WHEEL ASSEMBLY	1	ZS30716	
7	GEAR COVER	1	ZS30719	
8	PACKING	1	ZS30720	
9	SCREW	11	9968172500	SP-3X10
10	BEARING	1	ZS30750	606ZZ
11	BEARING	1	1138352500	608ZZ
12	MAGNET BOBBIN	1	ZS30717	WITH SCREWS
13	MAGNET BRACKET ASSEMBLY	1	ZS30718	
14	MAGNET ROLLER	1	ZS30721	STANDARD, 10MM/.393”
	MAGNET ROLLER	1	ZS30722	6MM/.236”
	MAGNET ROLLER	1	ZS30723	8MM/.314”
	MAGNET ROLLER	1	ZS30724	15MM/.590”
	MAGNET ROLLER	1	ZS30725	20MM/.787”
15	NO.1 ARM	1	60030726	
16	TORCH HOLDER BAR	1	ZS30728	
17	HOLDER BOLT	1	ZS30729	
18	TORCH HOLDER ASSEMBLY	1	ZS32203	
19	TORCH HOLDER	1	ZS30727	35MM DIAMETER
20	PINION	1	ZS30732	
21	HANDLE	1	ZS30317	
22	SCREW	2	9968177800	SP-5X18
23	SPRING PIN	1	9968204300	PR-2.5X16
24	TORCH	1	ZS10802	
25	TORCH RACK	1	ZS10803	WITH SCREWS
26	TIP FIXING NUT	1	ZS05020	
27	JET OXYGEN VALVE	1	ZS15416	
28	PRESSURE VALVE	1	ZS15354	
29	PREHEAT OXYGEN VALVE	1	ZS15355	

ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
30	GAS VALVE	1	ZS15356	
31	O-RING	4	ZS05026	
32	OPERATION PANEL ASSEMBLY	1	61004238	120V
	OPERATION PANEL ASSEMBLY	1	61004252	220V
33	PRESSURE SWITCH	1	ZS30737	
35	SWITCH	1	ZS31458	S43
36	SWITCH	1	ZS30743	BS-140
37	KNOB	1	ZS30744	WITH SCREW
38	VARIABLE RESISTOR	1	ZS30745	
39	METAL SOCKET	1	ZS30273	3P
	METAL SOCKET	1	ZS30274	4P
40	LAMP HOLDER	1	ZS30746	
	LAMP BULB	1	ZS30747	100V-120V
42	FUSE HOLDER	1	ZS30749	
43	FUSE	1	ZS30707	1AMP
44	OPERATION PANEL	1	60030834	
45	TERMINAL	1	ZS31666	
46	DUST PROTECTIVE NUT	3	ZS32480	
47	DUST PROTECTIVE CAP	3	ZS32431	
48	PRESSURE SWITCH HOSE	1	ZM30731	
49	NAME PLATE	1	ZS30734	
50	MOTOR	1	61001094	24V, 5000RPM
	100V MOTOR REPLACEMENT KIT	1	61004496	WITHOUT CIRCLE ATTACHMENT
	100V MOTOR REPLACEMENT KIT	1	61001493	WITH CIRCLE ATTACHEMENT
51	PCV CAP	1	64000128	
53	SCREW	6	9968174900	SP-4X10
54	SCREW	6	9968175300	SP-4X15
55	SCREW	4	9968130500	BC-6X25
56	SCREW	2	9968174800	SP-4X8
57	SPRING PIN	2	9968211200	PR-4X40
58	SCREW	6	9968153000	SF-3X6
59	BUSHING	1	60032575	

ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
60	BRACKET	1	61001083	
61	CONTROLLER	1	69000105	
62	SPACER	2	6R020001	
63	ISOLATION WASHER	2	60036374	
64	SCREW	2	9968172500	SP-3X10
65	SCREW	2	9968172100	SP-3X4
66	TRANSFORMER	1	61000472	100V-220V
	TRANSFORMER	1	61000672	230V-240V
67	SPACER	1	61001107	
68	SWITCH	1	ZS30822	S-332
69	METAL SOCKET	1	6N100049	3-P
70	CAP	1	ZS30824	

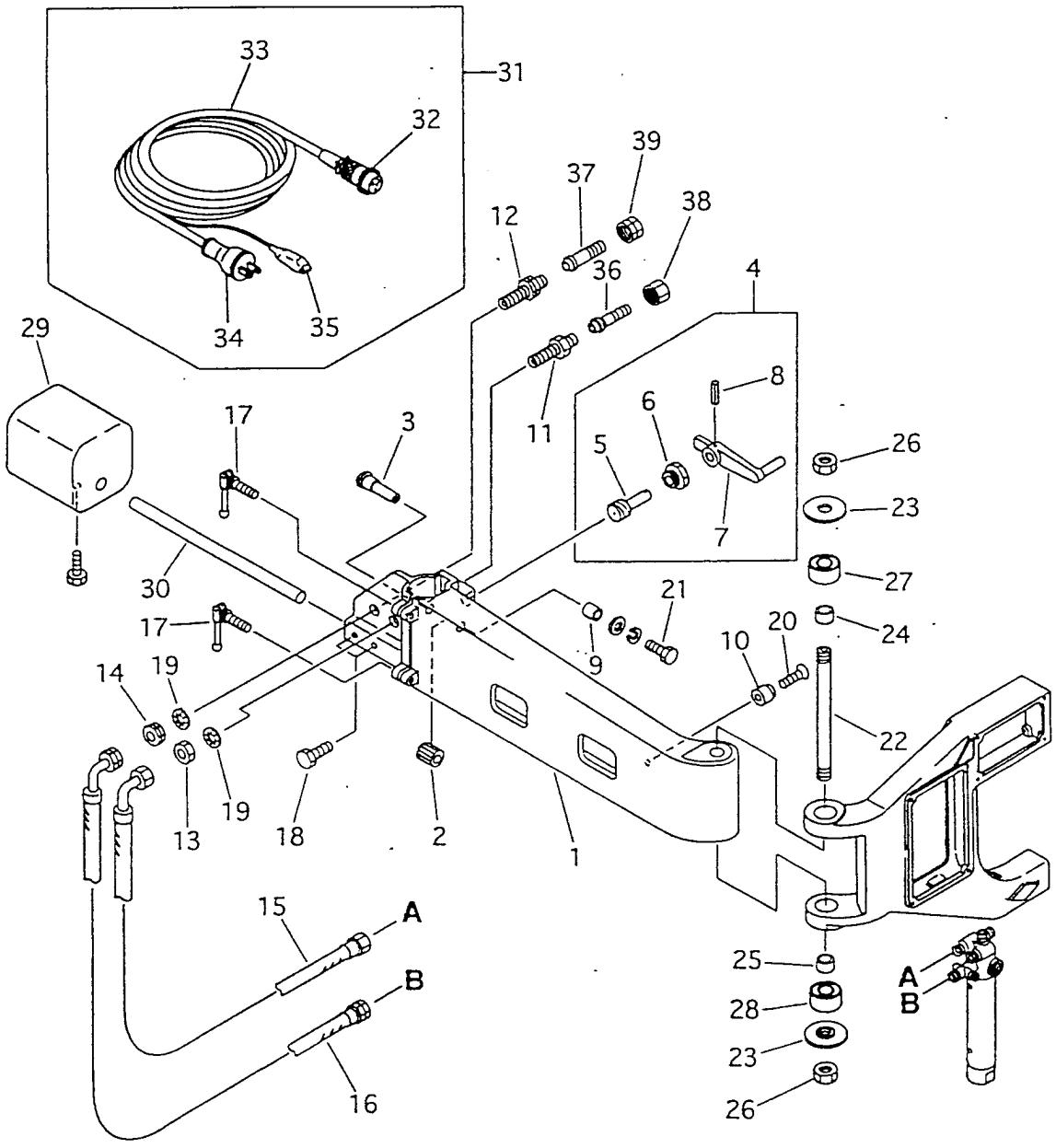
10.2 Upper arm · Main spindle unit



ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
1	UPPER ARM ASSEMBLY	1	ZM30701	
2	UPPER ARM BASE	1	ZS30767	
3	HANDLE ASSEMBLY	1	ZS32202	
4	PINION	1	ZS30768	
5	PINION METAL	1	ZS30769	
6	HANDLE	2	ZS30317	
7	SPRING PIN	3	9968204300	PR-2.5X16
8	SLIDE BAR	1	ZS30770	
9	KEY	1	ZS30771	
10	HANDLE HOLDER	1	ZS30772	
11	HANDLE	2	ZS30317	
12	PINION METAL	1	ZS30909	
13	PINION	1	ZS30910	
14	SPRING PIN	3	9968204300	PR-2.5X16
15	TEMPLATE HOLDER UNIT	1	61004812	
16	CRANK HANDLE	5	ZS30313	
17	WING BOLT	1	ZS30392	
18	TEMPLATE SET BOLT	1	ZS30773	
19	VERTICAL SLIDE BASE	1		UNAVAILABLE, USE ASSEMBLY #61004812
20	SLIDE BAR	1		UNAVAILABLE, USE ASSEMBLY #61004812
21	SLIDE SCREW	1		UNAVAILABLE, USE ASSEMBLY #61004812
22	PINION METAL	1		UNAVAILABLE, USE ASSEMBLY #61004812
23	SPEED ADJUSTING HANDLE	1	ZS30223	
24	SPRING PIN	3	9968204300	PR-2.5X16
25	SCREW	2	9968173100	SP-3X30
26	MAIN SPINDLE ASSEMBLY	1	ZS30702	
27	MAIN SPINDLE	1	ZS30778	
28	ROTARY PIPE	1	ZS30779	
29	SET PIPE	1	ZS30780	

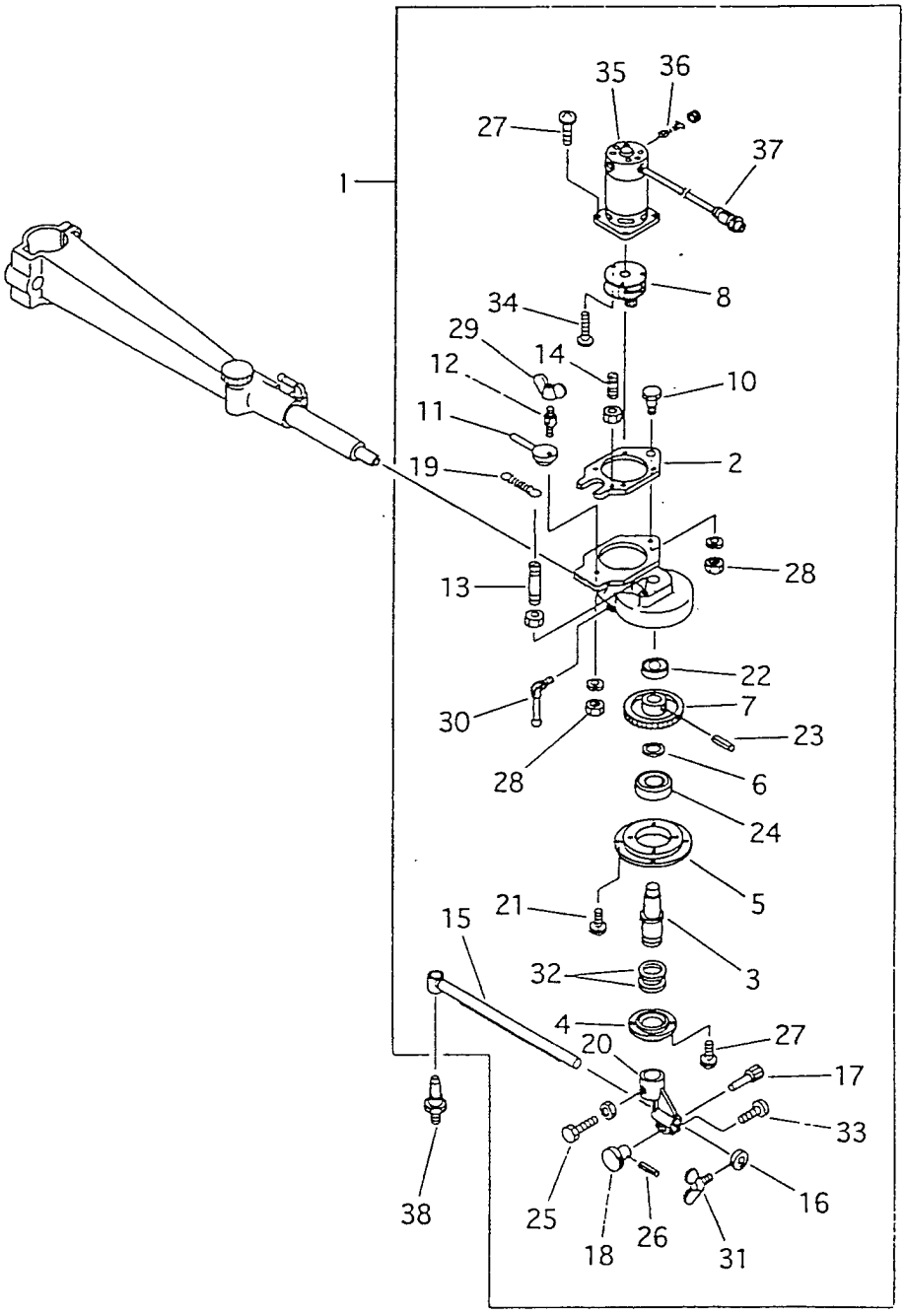
30	BEARING RETAINER	1	ZS30781	
31	NUT	1	ZS30782	
32	PIPE SET PLATE	1	ZS30783	
33	SET BOLT	1	ZS30788	
34	RACK LONG (A)	1	ZS30784	
35	RACK SHORT (B)	1	ZS30785	
ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
36	BEARING	1	ZS30786	NAX3030Z
37	BEARING	1	1138353200	6004ZZ
38	NUT	3	9968123600	NH-12
39	SCREW	4	9968156500	SF-5X8
40	SPRING WASHER	1	9968150600	WS-12
41	STAND ASSEMBLY	1	ZS30708	
42	IDLE WHEEL UNIT	4	ZS30709	
43	WING BOLT	2	6C111130	WITH NUT
44	WING BOLT	1	9968234200	BS-8X25
45	WING NUT	2	9968243100	NB-10

10.3 No.2 arm · Weight



ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
1	NO.2 ARM	1	ZS30753	
2	G-GEAR	1	ZS30945	
3	G-GEAR SHAFT	1	ZS30946	
4	FEED HANDLE ASSEMBLY	1	ZS32133	
5	G-PINION	1	ZS30948	
6	G-PINION METAL	1	ZS30949	
7	HANDLE	1	ZS30950	
8	SPRING PIN	1	9968207600	PR-3X30
9	G-COLLAR	1	ZS30947	
10	RUBBER PACKING	1	ZS30754	
11	OXYGEN NIPPLE	1	ZS30756	
12	GAS NIPPLE	1	ZS30758	
13	OXYGEN NUT	1	ZS61482	
14	GAS NUT	1	ZS61484	
15	OXYGEN HOSE	1	ZM30764	
16	GAS HOSE	1	ZS30766	
17	CRANK HANDLE	2	ZS32211	
18	HEXAGON BOLT	2	9968109200	BH-10X25
19	WASHER	2	9968149200	WF-16
20	SCREW	1	9968175300	SP-4X15
21	HEXAGON BOLT	1	9968107200	BH-8X14
22	ARM SHAFT	1	ZS30794	
23	BEARING RETAINER	2	ZS30795	
24	F-COLLAR	1	ZS30796	
25	H-COLLAR	1	ZS30797	
26	HEXAGON NUT	2	9968123600	M12
27	BEARING	1	ZS30790	6902ZZ
28	BEARING	1	1138357300	6202ZZ
29	WEIGHT	1	ZS30710	WITH BOLT
30	WEIGHT BAR	1	ZS30711	
31	CABTYRE CORD	1	61004264	3P 100V
	CABTYRE CORD	1	ZS30296	4P 200V-240V
32	METAL PLUG	1	ZS60781	3P 100V
	METAL PLUG	1	ZS30276	4P 200V-240V
33	CABTYRE CORD	1	ZM30278	CABLE ONLY
34	RUBBER PLUG	1	9938848900	125V
36	OXYGEN HOSE CONNECTOR	1	1138300100	GLAND #18 B to 3/16”
37	GAS HOSE CONNECTOR	1	1138300100	
38	OXYGEN NUT	1	0866837000	R/H “B”
39	GAS NUT	1	0866836900	L/H “B”

10.4 Circle cutting unit



ITEM NUMBER	PART DESCRIPTION	QUANTITY	PART NUMBER	REMARKS
1	CIRCLE CUTTING UNIT	1	61001299	
2	CLUTCH BASE	1	ZS30803	
3	ROTARY SHAFT	1	ZS30804	
4	FLANGE	1	ZS30805	
5	FLANGE	1	ZS30806	
6	COLLAR	1	ZS30807	
7	GEAR (A)	1	ZS30808	
8	REDUCTION GEAR ASSEMBLY	1	ZS31299	
10	CLUTCH BOLT	1	ZS30811	
11	CLUTCH	1	ZS30812	
12	CLUTCH SHAFT	1	ZS30813	
13	SPRING SHAFT (B)	1	ZS30814	
14	SPRING SHAFT (A)	1	ZS30815	
15	ROTARY BAR ASSEMBLY	1	ZS30816	
16	STOP COLLAR	2	ZS31020	
17	PINION	1	ZS31627	
18	HANDLE	1	ZS31628	
19	SPRING	1	ZS30222	
20	ROTARY BASE	1	ZS30817	
21	SCREW	4	9968172600	SP-3X12
22	BEARING	1	1138353600	6002ZZ
23	SPRING PIN	1	9968210600	PR-4X30
24	BEARING	1	1138350400	6004ZZ
25	HEXAGON BOLT	1	9968103100	BH-5X15
26	SPRING PIN	1	996820200	PR-2X12
27	SCREW	3	9968175000	SP-4X12
28	HEXAGON BOLT	4	9968123300	M6
29	WING NUT	6	9968240400	NB-6
30	CRANK HANDLE	1	ZS32211	
31	WING BOLT	2	9968230000	BS-4X10
32	FP RING	2	ZS30922	
33	SCREW	2	9968175100	SP-4X14
34	SCREW	3	9968173700	SP-3X30
35	MOTOR	1	69000126	DC 24V 5000RPM
37	METAL PLUG	1	6N100065	
38	ROTARY ROLLER	1	ZS30801	

11 Cutting data

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 m²) / (Mpa)		FUEL GAS PRESSURE (kg/c m²) / (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 m²) / (Mpa)		FUEL GAS PRESSURE (kg/c m²) / (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.

IK-54D (Pattern Cutter)

OPERATION MANUAL

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