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INSTRUCTION MANUAL  
FOR  
MODEL CM-144  
WIRE FEEDER FOR TRANSISTOR PULSED MIG

DAIHEN Corporation

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## 1. GENERAL

Thank you for your purchase of OTC Model CM-144 wire feeder. The CM-144 is intended for MIG welding of aluminum and stainless steel, and MAG welding of mild steel as combined with Model TRANSISTER PULSE AUTO 350 or COMPUTER MIG 500 welding power source. The CM-144 features not only high wire feeding power but also high accuracy owing to use of tachogenerator for feeding speed detection. Before using the CM-144, please read this INSTRUCTION MANUAL carefully, at least section "OPERATION". The section "MAINTENANCE" should be referred to as necessary when checking or repairing the CM-144.

## 2. CONSTITUTION

### 2.1 Specification

Model	CM-144 (Air-cooled type)	
Applicable wire dia.	Aluminum	1.2mm $\phi$
	Stainless steel	(0.8)(1.0) 1.2mm $\phi$
	Mild steel	(0.8)(0.9)(1.0) 1.2mm $\phi$
Wire feed speed	0.9~18m/min.	
Applicable wire reel	Shaft dia.	50mm $\phi$
	Max. outside dia.	300mm $\phi$
	Width	103mm
Weight of wire mounted	Max. 25kg	
Weigh	10kg	

### 2.2 Combination power source

TRA-350 (PULSED AUTO 350)

TRA-500 (PULSED AUTO 500)

### 2.3 Combination torch

Rated curr.	for Aluminum MIG	for Stainless steel MIG Mild steel MAG	Remarks
250A	WTCA-2501	WTCS-2501	curved

2.4 Standard accessories

Table 1

Description	Part No.	Q'ty	Remarks
Feed roll (for Aluminum 1.2φ)	K1821G00	(1)	built in body
Pressure roll (for Aluminum 1.2φ)	K1821H00	(2)	
Gas hose	U2878H00	1	3m
Torch side cable	U1997H00	1	60mm <sup>2</sup> × 1.6m
Base metal side cable	U1997J00	1	60mm <sup>2</sup> × 1.8m
Feed roll (for Steel 1.2φ)	K1376H01	1	
Feed roll (for Steel)	K1821M00	1	
Hex. wrench	No.5	1	M6
	No.6	1	M8

2.5 Optional accessories

Table 2 Extension cables and hoses

5m	M o d e l		BTRA-3505
	Welding cable	1	K1131F
	Control cable (5P)	1	K1837B
	Gas hose	1	K1838B
	Remote control cable (6P)	1	K1136B
10m	M o d e l		BTRA-3510
	Welding cable	1	K1131G
	Control cable (5P)	1	K1837C
	Gas hose	1	K1838C
	Remote control cable (6P)	1	K1136C
15m	M o d e l		BTRA-3515
	Welding cable	1	K1131H
	Control cable (5P)	1	K1837D
	Gas hose	1	K1838D
	Remote control cable (6P)	1	K1136D
20m	M o d e l		BTRA-3520
	Welding cable	1	K1131J
	Control cable (5P)	1	K1837E
	Gas hose	1	K1838E
	Remote control cable (6P)	1	K1136E

Table 3 Others

Description	Parts No.	Q'ty	Remarks
Feed roll (1.0 $\phi$ )	K1821R00	1	for brazing
Pressure roll (1.0 $\phi$ )	K1821S00	1	for brazing
Feed roll (0.8 , 1.0 $\phi$ )	U1376H02	1	for steel
Feed roll (0.9 , 1.0 $\phi$ )	U1376H07	1	for steel
Feed roll (0.9 , 1.2 $\phi$ )	U1376H08	1	for steel
Argon gas flow meter regulator	RF-16	1	Max. flow 28 $\ell$ /min
CO2 gas flow meter regulator (with heater)	FCR-8032	1	Max. flow 25 $\ell$ /min.
CO2 gas flow meter regulator (without heater)	NP-201	1	Max. flow 20 $\ell$ /min.
Caster	U1997G	1	

\* When use of Stainless, Mild steel for pressure roll, use a for steel (K1821M00) of standard accessories.

OPERATION

3. INSTALLATION

3.1 Installation place

Select a place of less humidity, dirt and dust as far as possible. Place the PULL Feeder and other application on stable floor such as concrete, taking care so that they are not exposed to direct sun light, wind and rain.

3.2 Wind shielding

When welding is performed in open air where wind blows, or when fan is used during welding in summer, use a wind shield to protect arc from wind, otherwise blow hole may be caused.

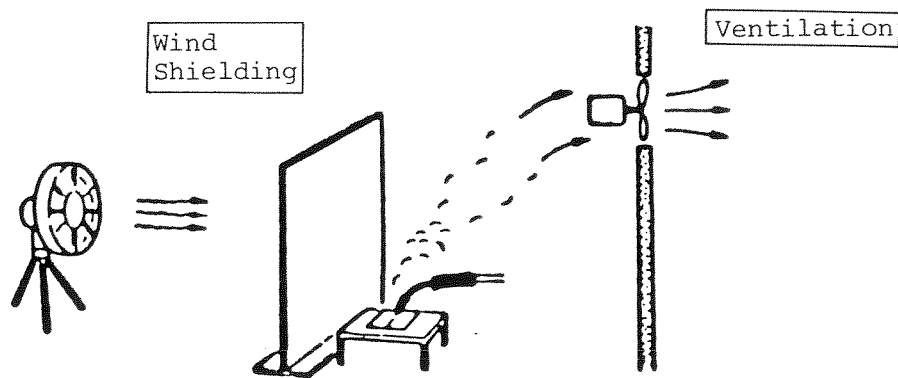


Fig . 1 Ventilation and Wind Shielding

3.3 Light shielding

The welding arc emits particularly intensive ultraviolet rays. Therefore, for welding use a helmet or hand shield with sufficient light shut-off effect without fail. In addition, do not fail to protect your neck, face, hands and feet against arc light and spatter completely.

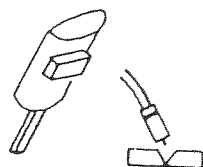


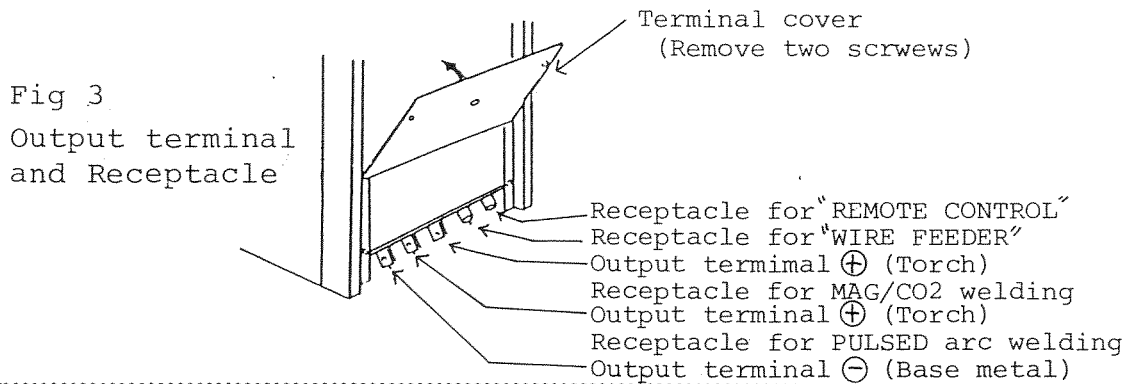
Fig . 2 Light Shielding

#### 4. EXTERNAL CONNECTION

- \* Be sure to turn OFF the line disconnect switch before connection.
- \* Securely tighten connecting parts of cable and hoses.

##### 4.1 Secondary side connection

- Open terminal cover (Fig. 3) and be sure to connect. (See Fig. 4)



The plus (+) side output terminal to be used for short arc welding is different from that for pulse arc welding. Perform connection correctly for the respective welding processor.

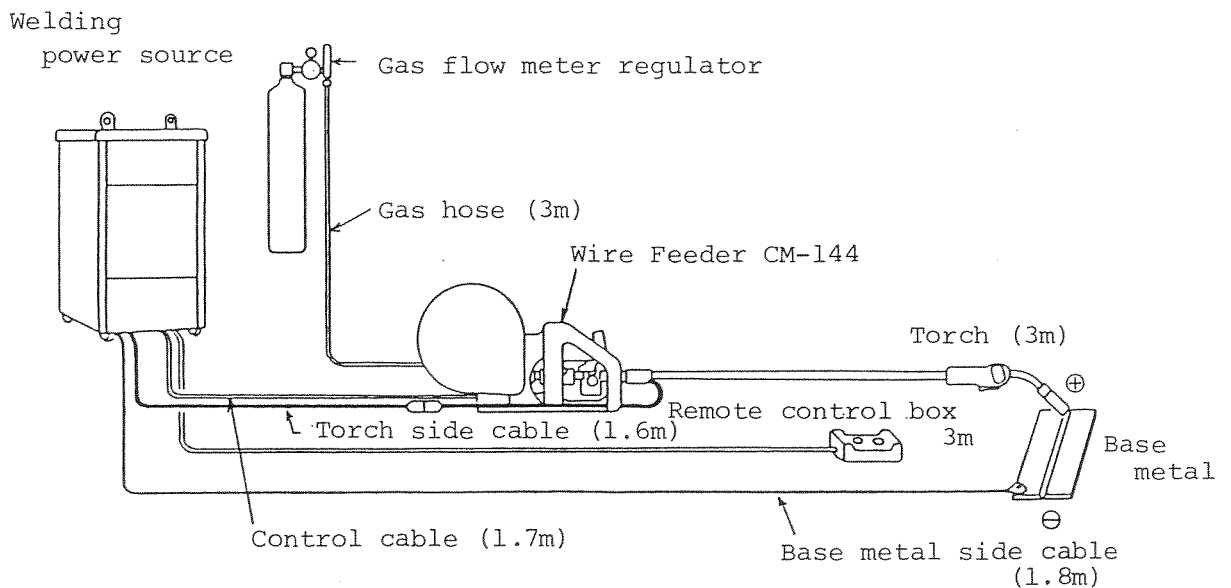


Fig 4 Secondary side connection

##### 4.2 Gas cylinder

Please select according to welding method.

Welding method	Wire	Gas	Gas flow meter regulator	Torch
MIG Pulse	Aluminum	Ar	RF-16	WTCA-2501
	Stainless steel	Ar + O <sub>2</sub> (2%)		WTCS-2501
MAG Pulse	Mild steel	Ar + CO <sub>2</sub> (5~20%)		WTCS-2501
CO <sub>2</sub>	Mild steel	CO <sub>2</sub>	FCR-8032	WTCS-2501

### 4.3 Connection of torch

① Connect torch power cable and welding cable from "+" terminal of the welding power source. Connect torch switch cable and gas hose to the respective connectors provided on the front face of the wire feeder.



Torch power cable's make connector connects to the female connector with welding cable (+ side) after through the insulation bush fitted feeder front, and locked up the cable by cable clamp.

② Connect torch cable to the connector on the front face of the wire feeder.



Push down press spring provided by feed roll, and remove guide adaptor. Connect the guide adaptor to the torch cable with outlet guide fitted in. Then, connect the guide adaptor to the wire feeder in the revers sequence to that of the removal.

Completion of connection

### 5. PREPARATION FOR WELDING

① Set feed roll of size suitable for diameter of welding wire to be used.



The CM-144 is delivered with feed roll for "1.2 $\phi$  aluminum wire" installed. When using wire of other kind of size for welding, replace the feed roll referring to Table 4 below.

Table 4 Roll list

Material	Wire size	Feed roll	Press roll	Remarks
Aluminum	1.2	K1821G00	K1821H00	Standard
Brazing	1.0	K1821R00	K1821S00	Optional
Stainless steel, Mild steel	1.0-1.2	K1376H01	K1821M00	Standard
	0.8-1.0	U1376H02		Optional
	0.9-1.0	U1376H07		
	1.0-1.2	U1376H08		

The feed roll for steel or stainless steel have two size of groove, therefore they usable two size of welding wires. In case of setting the feed roll, set to this side the wire size hallmark.



② Adjust wire pressing force.

→ Turning the pressure handle, and apt wire pressure.

Table 4 Recommended wire pressing force

Aluminum		Stainless steel, Mild steel	Pressure handle scale
Hard	Soft		
1.6	-	1.2	5~6
1.2	1.6	1.0, 0.9	3~4
-	1.2	0.8	2~3

Increase the pressing force setting a little from the above-mentioned graduation if welding torch conduit is bent sharply.

③ Install wire reel on spool shaft.

④ Set wire on the feed roll.

→ Turn the pressing handle this side to release pressing roll holder. Then, pass the wire through straight roll, outlet guide, and ensure that the wire is fitted into the groove in the feed roll snugly.

⑤ Press wire.

→ Turn the pressing roll holder toward this side, and set the pressing handle.

⑥ Adjust wire straightener.

→ Turn straightener. adjusting knob to the indicated graduation.

⑦ Depressing "INCHING" switch on remote control box, feed wire to the torch tip.

→ Feed the wire until it protrudes about 10mm from the tip.

⑧ Adjust gas flow rate.

The diagram shows a rectangular box containing the text '⑧ Adjust gas flow rate.'. A vertical arrow points down from the top center of the box to the top center of the page. Another vertical arrow points down from the bottom center of the box to the text 'Finish of welding preparation.' below.

Set "GAS CHECK" switch on the front face of welding power source to "CHECK" position and adjust knob of gas flow meter regulator fitted to gas flow rate suitable for welding condition. Set "GAS CHECK" switch to "WELDING" position after adjusting.

Finish of welding preparation.

Note: As for welding operation, refer to the instruction manual of welding power source.

MAINTENANCE

The maintenance work comprises of periodical inspection for prevention of troubles and repair of damages. Since it is impossible to cover both of them in full details, please perform maintenance and checking work by fully grasping the construction of the Model CM-144 Wire Feeder.

## 6. PERIODICAL INSPECTION

As to periodical inspection of welding, power source and torch, please refer to respective instruction manuals.

### 6.1 Daily checking

- 1) Clean groove of the wire feed roll once every three pieces of wire consumed. When the slots are worn to the extent to cause unstable wire feeding, replace the feed roll.

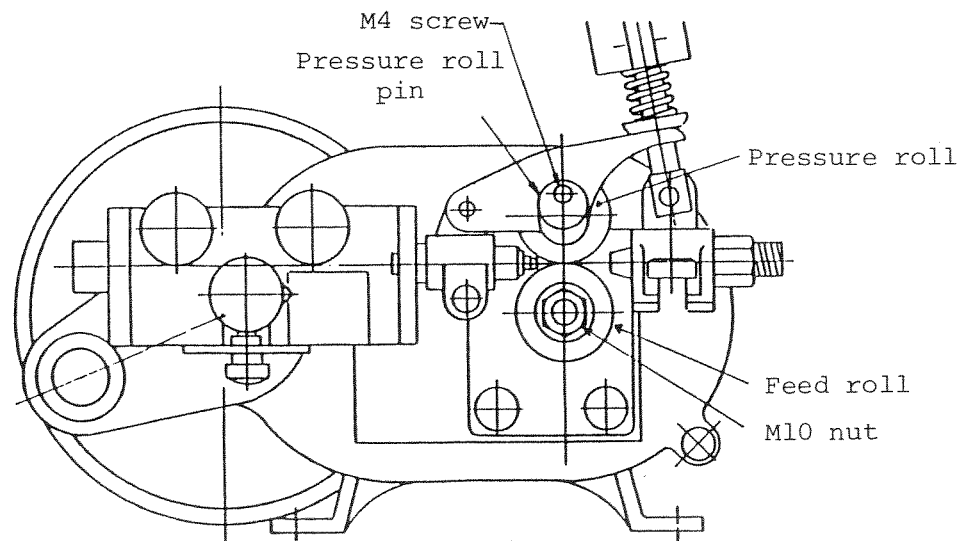


Fig.5 Roll replacement

Replacement of wire feed roll and pressure roll

- (1) Remove M10 nut and pull out wire feed roll.
- (2) Remove M4 screw, and pull out wire pressure roll pin.



Replace the wire feed roll and pressure roll with new ones.

- 2) Check to see that oil or dust is not stuck to the wire passage on the wire straightener or other parts.
- 3) Check for abnormal heating of wire connections.
- 4) Check to see that cables are duly connected and insulated.
- 5) Check for cables which are about to be broken.

## 6.2 Yearly inspection

### 1) Wire feed motor

Usually service life of brush is about 4,000 hour (about two years, if it works six hours a day), though it may vary a little with loading condition and ambient temperature.

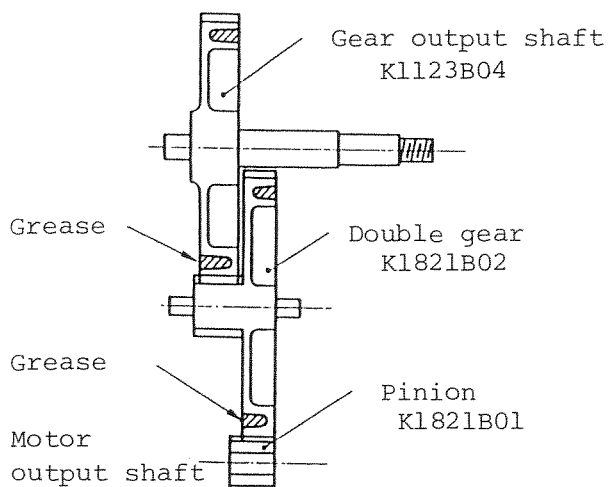
Since construction of the motor does not allow easy access to the brush for checking of wear or replacement, periodically replace the whole motor.

### 2) Grease replacement of reduction gear

After removing aged grease, apply new one to the gear tooth surface and side faces as shown in Fig. 6.

When delivered, the reduction gear is greased with "Sun Light Grease No.1" of Shell Oil Co., Ltd., use grease of this brand name.

If this grease is not available, use lithium grease No.1 of each manufacturer.



Note: Apply grease on the side face of gear as shown in Fig. 6. Never fill the gear box with grease, otherwise motor will be burnt.

Fig.6

## 6.3 Precautions for checking speed reduce (See Fig. 9)

- 1) Do not remove pinion of print motor except for replacement.
- 2) It is recommended to clean the parts by brushing with use of benzine, except plastic gear for which due care should be taken not to damage it.
- 3) Be careful not to give impact to the print motor output shaft, otherwise the armature in the motor may be put into contact with magnet to result in its damage.
- 4) After overhauling the speed reducers, check it for abnormal meshing noise, and also ensure that motor current is not higher than 1.4A in the condition where wire is not fed with the current adjusting knob.

#### 6.4 Precautions for checking speed reduce (See Fig.7,9)

##### 1) Tachogenerator for speed detection

Service life of the tachogenerator brush is about 1,500 hours when used in the rated conditions (approximately one year with daily operation of 6 hours), although the actual service life may vary considerably depending on operating conditions and ambient temperature. Since it is very difficult to check the brush for extent of wear because of structure of the tachogenerator, replace the tachogenerator periodically.

##### 2) Precautions for replacement of timing belt

- If used in wet conditions, the timing belt may be damaged easily because of properties of the core wires. So, do not fail to protect it, if it is used in environment where the belt may be exposed to water drops or splashes.
- The timing belt is soft but not elastic. Therefore, do not attempt to apply it, passing it over flange of toothed pulley forcibly, otherwise it may be damaged. Reduce shaft center distance when applying the timing belt.
- If the timing belt should be bent to small radius, its core wires may be bent to result in significant spoiling of their properties. So, sufficiently be careful not to bent it sharply when handling.
- The outer faces and faces constituting pressure angle of the toothed pulley play an important role in power transmission. Therefore, use utmost care not to damage those faces when handling the pulley.

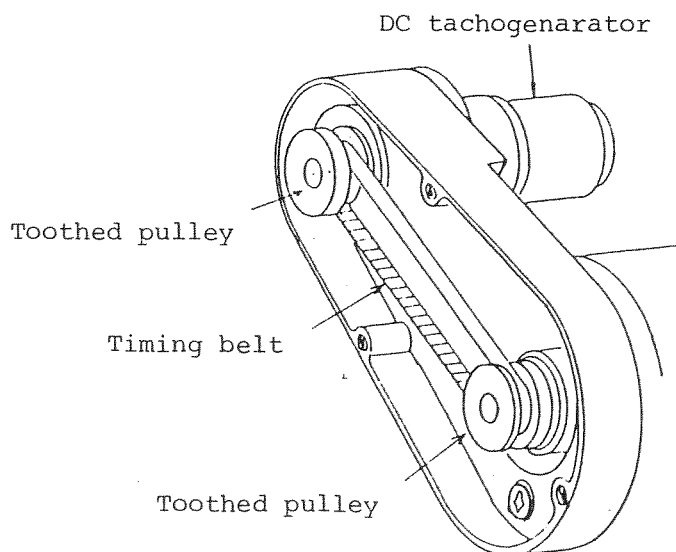


Fig.7

## 7. TROUBLESHOOTING

In many cases, cause of trouble in welding relates to control system and mechanical system of the welding equipment. Therefore, as for the comprehensive welding power source. Below is given troubleshooting guide only for, and related to the wire feeder.

Complaint	Cause	Correction
1) Wire is not fed out.	Pressure roll is not set.	Press wire.
	Motor is not running.	Check motor lead wire connection to terminal strip for loosening. Replace motor if defective.
2) Wire is not fed smoothly.	Wire slipping between wire feed roll and pressure roll.	Tighten pressure handle.
	Wire feed roll assembled in is not suitable for wire size.	Replace wire feed roll to one suitable for diameter of wire used. (See Table 4.)
	Torch cable bent too sharply.	Correct too sharp bend of torch cable.
	Dust or dirt accumulated in liner.	Clean or replace liner.
	Tip liner faces roughene	Replace tip.
3) Shielding gas is not fed out.	Main cock closed.	Open.
	Gas pressure too high.	Reduce gas pressure to 5 kg / cm <sup>2</sup> or less than.
	Gas solenoid valve is trouble.	Replace.
4) Wire comes out as bent. adjusted.	Wire straightener is not adjusted.	Adjust properly.
	Torch cable bent too sharply.	Straighten torch cable.

## 8. PARTS LIST

~~It parts are required for replacement, direct order involving description and part number our sales agent or OTC's office directly.~~

## 8.1 Wire reduction gear unit (See Fig. 9)

Item No.		Description	Q'ty	Remarks
1	K1821B03	Gear case	1	
2	4802-006	Print motor	1	PMEE-12CBB
3	K1821B01	Pinion	1	
3-1		Screw	1	M5-5
4	K1821B02	2-step gear	1	
5	K1123B04	Geared output shaft	1	
6		Key	1	4×4×8
7	K1123B05	Bush	2	
8	K1123B06	Insulating spacer	1	
9	3311-001	Radial ball bearing	1	No.6000ZZ
10	K1821C01	Gear case	1	
11	K1821C02	Insulating board	1	
12	K1123C04	Insulating sleeve	1	
13	3311-008	Radial ball bearing	1	No.6001ZZ
14	K1821F00	Bracket assembly	1	
15	K1821C03	Pressure roll holder	1	
16	K1821C04	Pressure roll pin	1	
17	K1821C05	Fulcrum pin	1	
18		E-type snap ring	2	for $\phi 5$
19	K1123B07	Spacer	1	
20	K1821G00	Feed roll(1.2-1.6)	1	for Aluminum
21	U1821H00	Pressure roll(1.2-1.6)	1	for Aluminum
22	U2344B09	Gulde adaptor	1	

Item No.	Part No.	Description	Q'ty	Remarks
23	U785C09	Plate spring	1	
24	U785C11	Protection cover	1	
25	K1123C08	Remote stopper	1	
26		Washer	1	
27		Spring washer	1	
28		Nut	1	
29	K1821D00	Pressure handle	1	
30		E-type snap ring	1	for 6 $\phi$
31	K1821E01	Tachogenerator bracket	1	
32	K1821E02	Tooth pooly	2	for Aluminum
33		Timing belt	1	
34	K1821E03	Generator adaptor	1	
35	K1821E04	Shaft	1	
36		Micro bearing	2	RF-1560ZZ
37	K1821E05	Oldam joint	1	
38	K1821E06	Coupling	1	
39		D.C tachogenerator	1	2225U4.3G9
39-1		Screw	2	M2-5
40	K1821E07	Cup	1	
41	K1821E08	Cover	1	
	K1821J00	Wire straightener assembly	(1)	
42	K1821J01	Wire straightener body	1	
43	K1821J02	Fit plate	1	
44	K1821J03	Control screw	1	
45	U2344C04	Roller shaft	2	
46		Radial ball bearing	2	No.629ZZ



Item No.	Part No.	Description	Q'ty	Remarks
47		E-type snap ring	3	for $\phi 7$
48	U2344C05	Slide shaft	1	
49	U69C02	Radial ball bearing	1	
50	U2344C07	Adapter	1	
51	U2344C08	U2344C08	1	
52		Narld knob	1	KN15
53	U2344C10	Inlet guide	1	

8.2 Others (See Fig. 4)

Item No.	Part No.	Description	Q'ty	Remarks
54	U3569B00	Frame body	1	
55		Gas solenoid valve	1	W-31156 D.C25V
56	U2878D00	Gas hose assembly	1	
57-1	U3569E00	5P plug	1	DCPC25-5A
58	K536A00	Spindle type wire reel	1	with brake
59	U2878F00	Wire reel cover assembly	1	
59-1	U2884E00	Wire reel cover	1	
59-2	U2878F01	Wire reel cover	1	
59-3	U2878F02	Seal rubber	2	
60	U1997C01	Cable clamp	1	

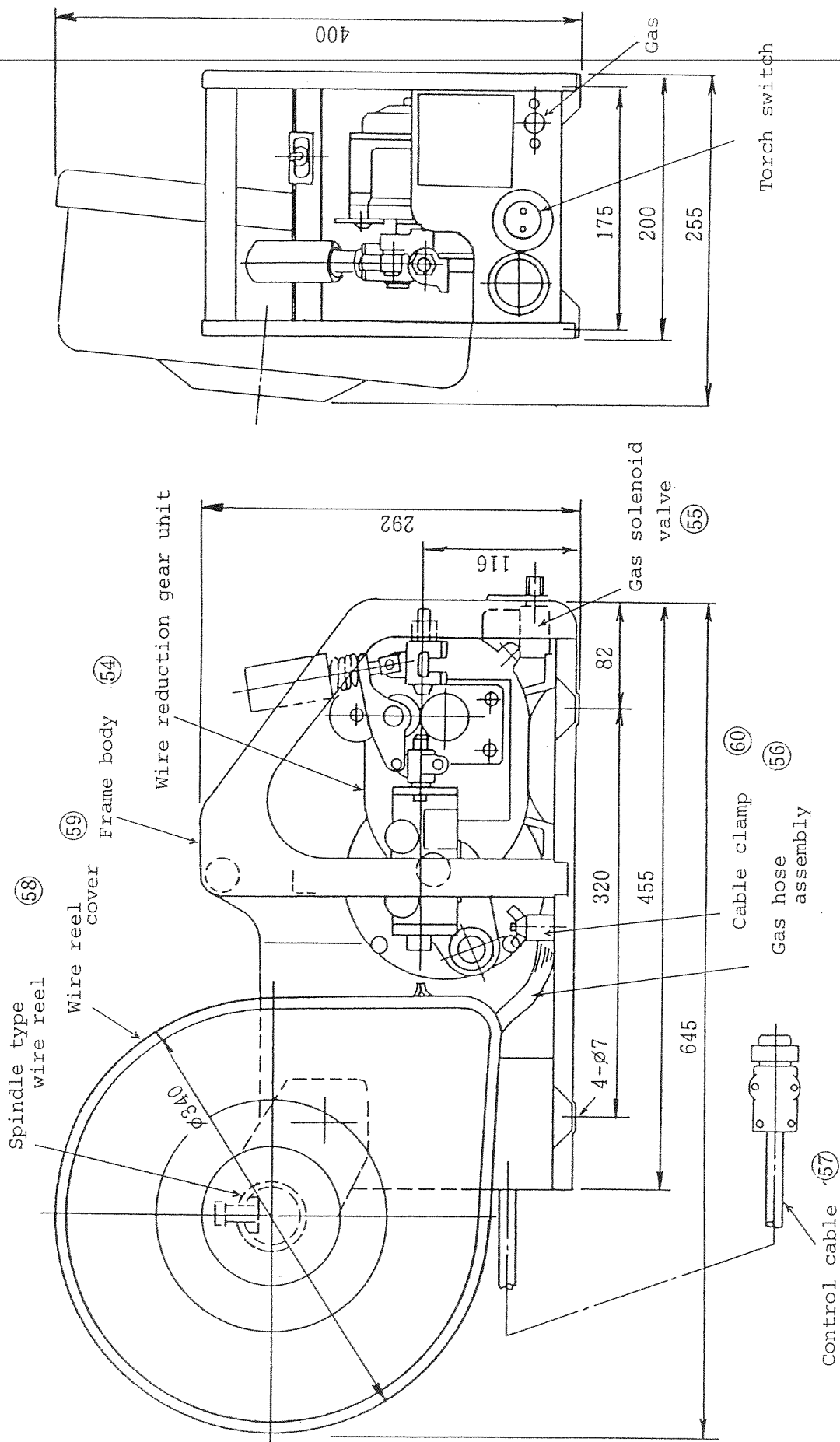


Fig. 8 External view of Model CM-144 Wire Feeder

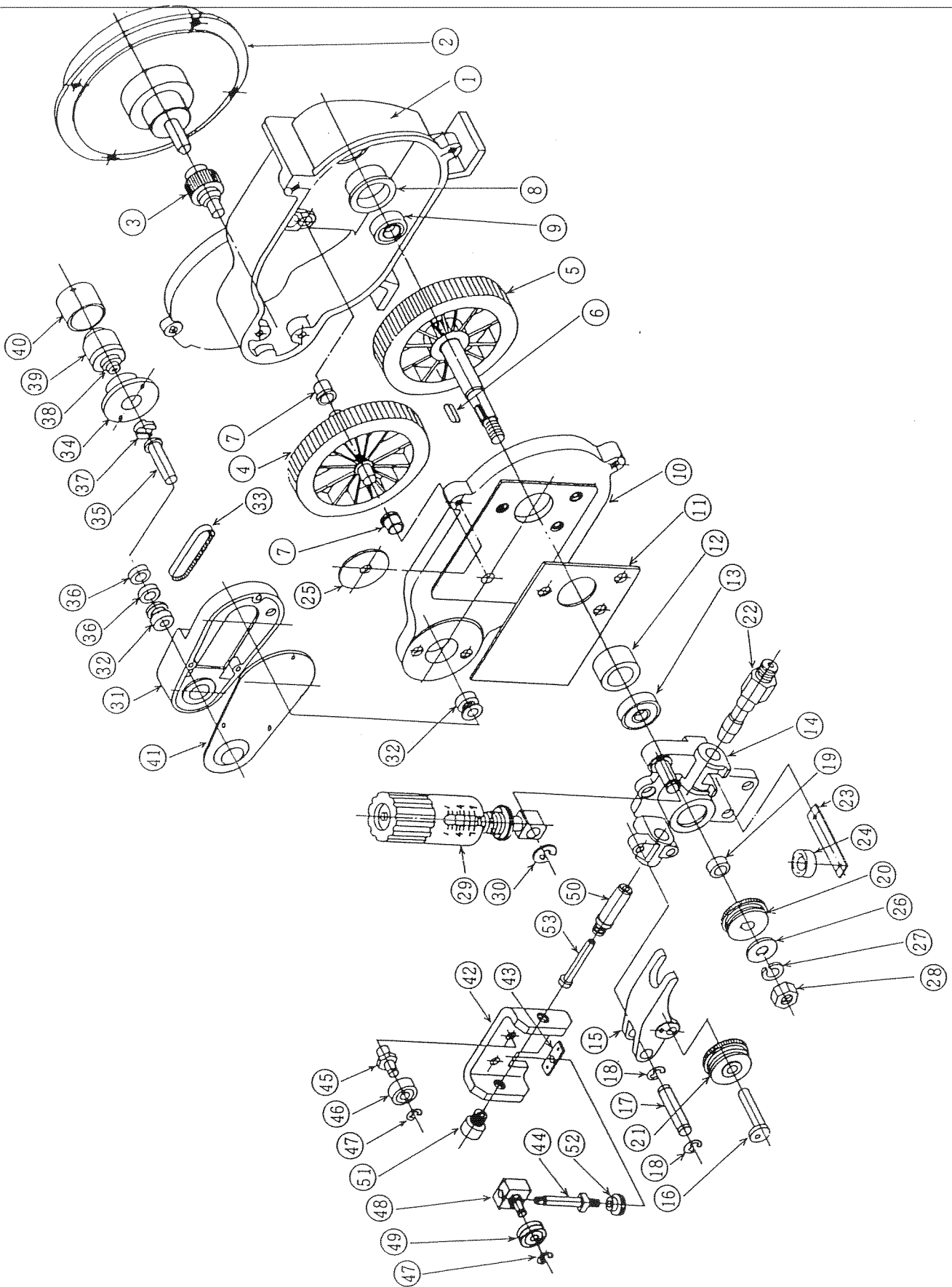


Fig. 9 Disassembly drawing of Wire reduction gear unit