

SERVICE MANUAL **ENGLISH**
AIR BALANCE SYSTEM



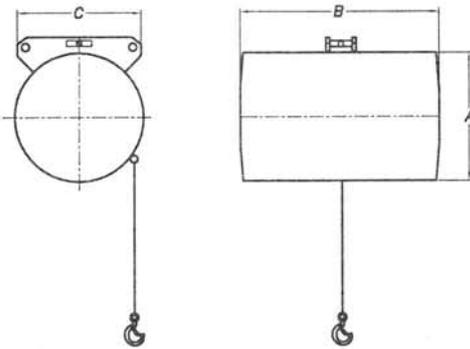
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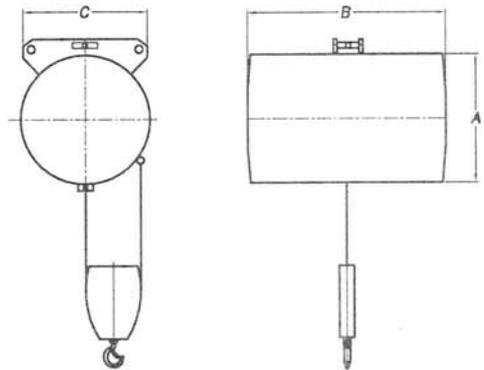
I. Basic Configurations

SINGLE TYPE BALANCE



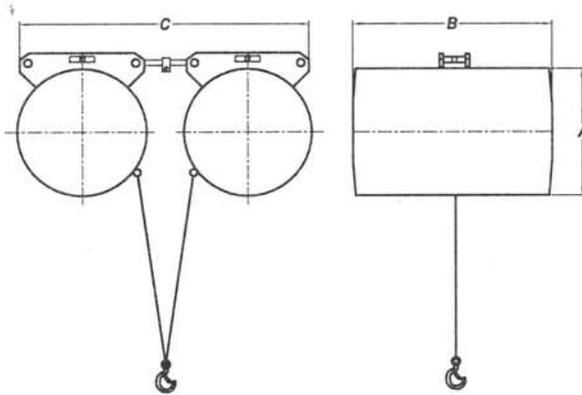
	CAPA. [Kg]	STROKE [M]	WEIGHT [Kg]	DIM.[mm]		
				A	B	C
BH06020	60	2.0	22	165.2	412	190
BH10020	100	2.0	30	216.5	412	220
BH11036	110	3.6	40	267.4	412	220
BH16020	160	2.0	36	267.4	412	220
BH28020	280	2.0	60	355.6	430	270

REEVED TYPE BALANCE



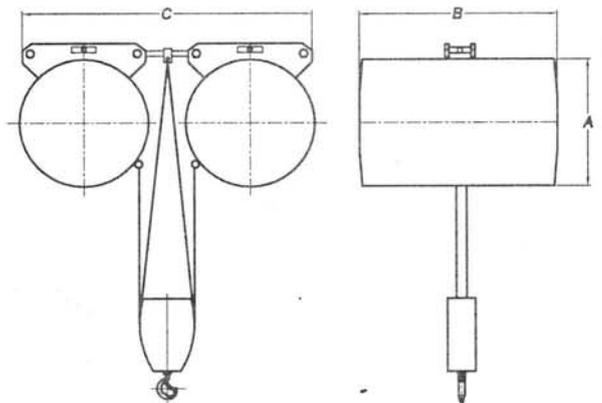
	CAPA. [Kg]	STROKE [M]	WEIGHT [Kg]	DIM.[mm]		
				A	B	C
BH32010	320	1.0	39	267.4	412	220
BH56010	560	1.0	63	355.6	430	270

TANDEM TYPE BALANCE



	CAPA. [Kg]	STROKE [M]	WEIGHT [Kg]	DIM.[mm]		
				A	B	C
BH20020	200	2.0	60	216.5	412	590
BH22036	220	3.6	80	267.4	412	590
BH32020	320	2.0	72	267.4	412	590
BH56020	560	2.0	120	355.6	430	630

REEVED TANDEM TYPE BALANCE

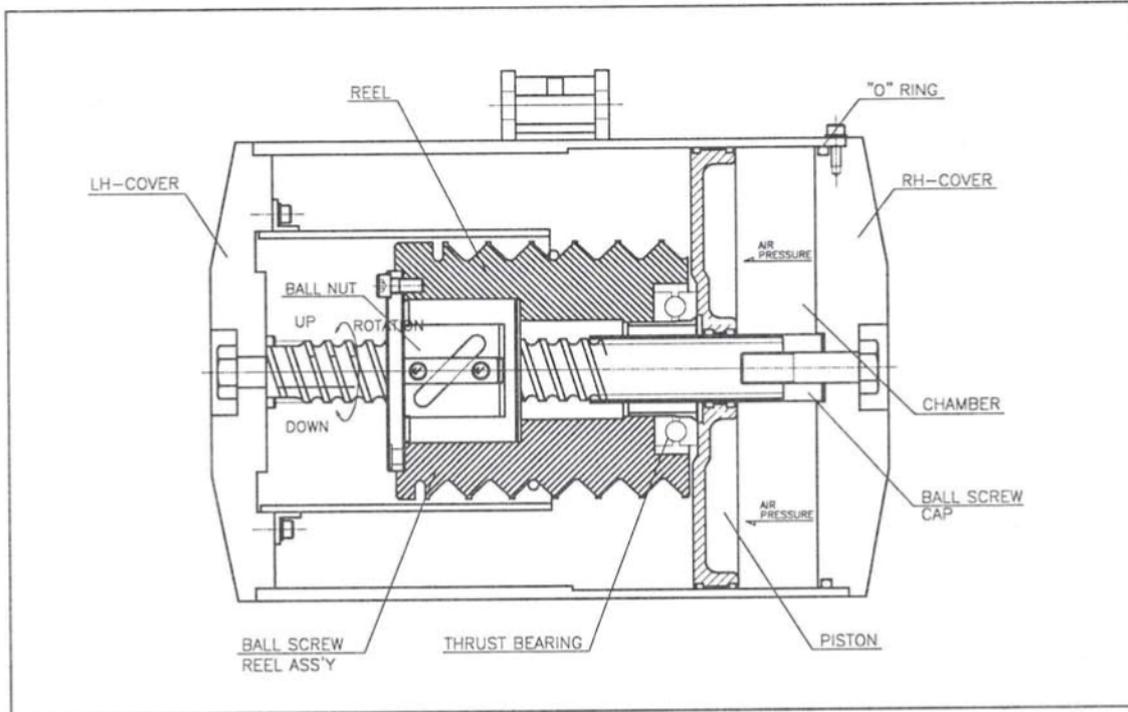


	CAPA. [Kg]	STROKE [M]	WEIGHT [Kg]	DIM.[mm]		
				A	B	C
BH44018	440	1.8	83	267.4	412	590
BH64010	640	1.0	75	267.4	412	590
BH100010	1000	1.0	123	355.6	430	630

* Air Pressure : 100PSI (6.9 Bar)
* Customer's Designed Wellcome !!

II. Operation principles and structure

Typical Basic Unit Cross Section



Purpose

Air balance hoist is used to transport heavy goods to the destination by using compressed air and minimum man power. Dongsung Air Balance Hoist is a new conceptual hoist which is combined with hoist function to lift up heavy goods and principles of spring balance to move a heavy goods up and down with minimum man power.

This feature is called a 'floating' function (more than 400mm)

Operation principles

The basic operation principles to satisfy the above objectives are as follows-when compressed air is supplied into the piston chamber, the pressure of chamber increases and pushes down the piston and reel drum rotates by ball screw as piston moves down and lifts up heavy goods. If chamber pressure is removed, the object descends by its gravity. The hoist is composed of cylinder drum, cover, piston, ball screw and reel drum and controlled by exterior manifold and control kit

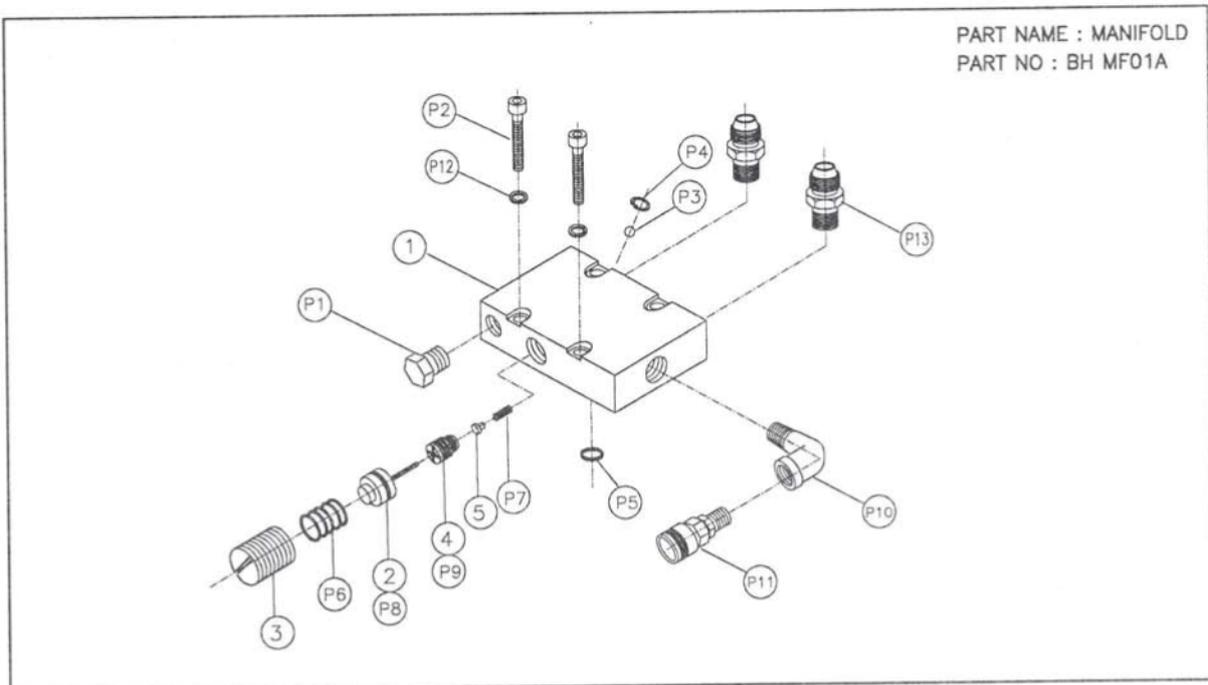
Structure

If compressed air is supplied to the piston chamber through air inlet, piston moves forward and pushes ball screw nut forward through bearing. The reel drum clamped to ball screw nut rotates as ball screw nut moves forward. The rotating drum winds up wire rope and hence lifts up heavy goods. If the compressed air is removed, on the other hand, the heavy goods descend by its gravity and push up piston and the reel drum unwinds wire rope.

All these operations are controlled by the exterior control kit.

III. Function of each part and structure

MANIFOLD



Function of manifold

Manifold supplies air into the balance through the control handle

Main function

1. If air tightness is not complete, control valve supplies air from outside and maintains balance. It maintains balancing function by controlling valve

Disassembly

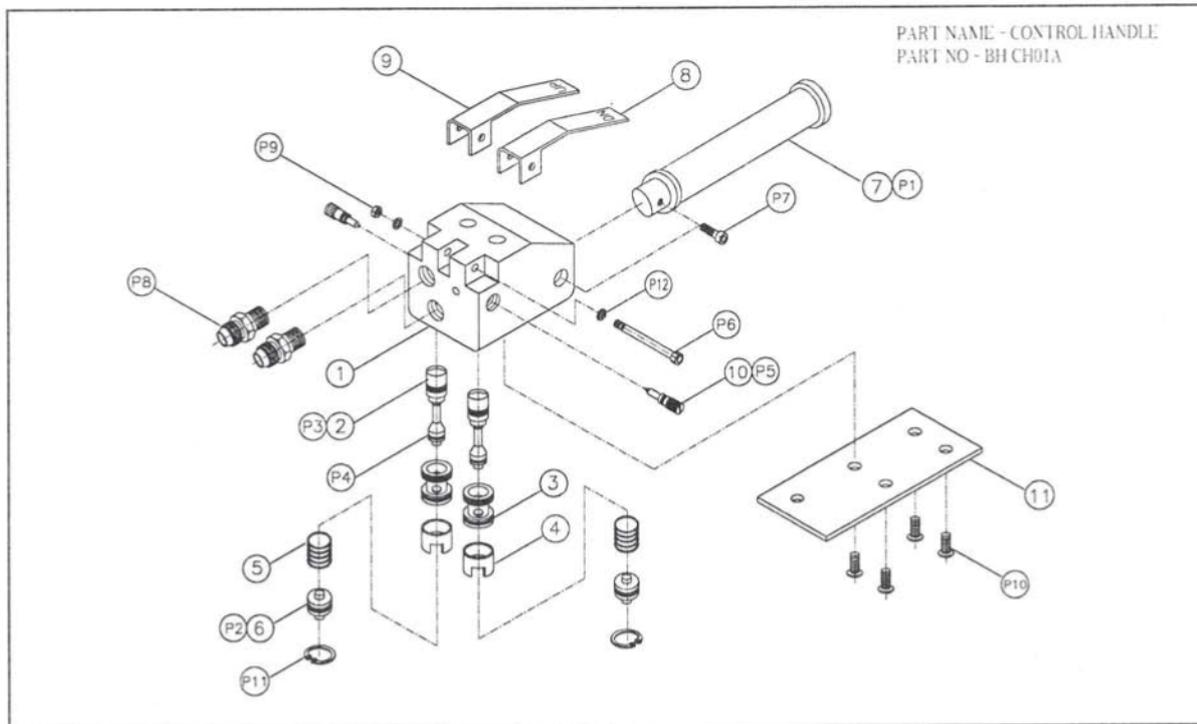
1. Lower the hook to the floor by hanging light weight onto the hook and remove air pressure from the body. Press Dow lever until wire loosens.
2. Remove hose and air pressure from manifold.
3. Remove four screws fixing manifold from end cap and then remove O-Ring from air outlet.
4. Remove control valve (screw, spring, piston and seat) in sequence.
5. Remove nipples mounted on both sides.
6. Remove snap ring and ball.
7. Remove quick coupler and elbow.
8. Remove check valve (screw, O-ring and seat).

Assembly

1. Clean all internal parts and manifold prior to assembly. Replace old parts with new ones.
2. Properly apply lubricant to O-ring, U-cup and adjustment screws prior to assembly.
3. Assemble the parts in reverse order of disassembly.

NO.	REF. NO.	DESCRIPTION	QTY
1	11D01-P	BODY	1
2	11D02-P	PISTON	1
3	11D03-P	SCREW	1
4	11D04-P	VALVE BUSH	1
5	11D05-P	RUB PAD	1
P1	11D09-P	SET SCREW	1
P2	11D10-P	WRENCH BOLT	4
P3	11D11-P	STEEL BALL	1
P4	11D12-P	SNAP RING	1
P5	11D13-P	O-RING	1
P6	11D14-P	SPRING	1
P7	11D15-P	SPRING	1
P8	11D16-P	BACK-UP RING	1
P9	11D17-P	PLUG	1
P10	11D18-P	ELBOW	1
P11	11D19-P	QUICK COUPLER	1
P12	11D20-P	SPRING WASHER	4
P13	11D21-P	NIPPLE	2

CONTROL HANDLE



Function of control handle

Control handle supplies compressed air to the balance or discharges air from the balance and lifts up and lowers the workpiece.

Main function

- Two levers engraved as 'UP' and 'DN' perform up and down function respectively. UP lever supplies compressed air to balance and hence lifts up workpiece. DN lever discharges compressed air from the balance and lowers down the workpiece by its gravity
- SP-CON-PIN adjusts the air quantity of the outside. If the levers are controlled when a pressure of the outside is excessive or weight is light, jumping phenomena may occur. In such case, this function is applied

Disassembly

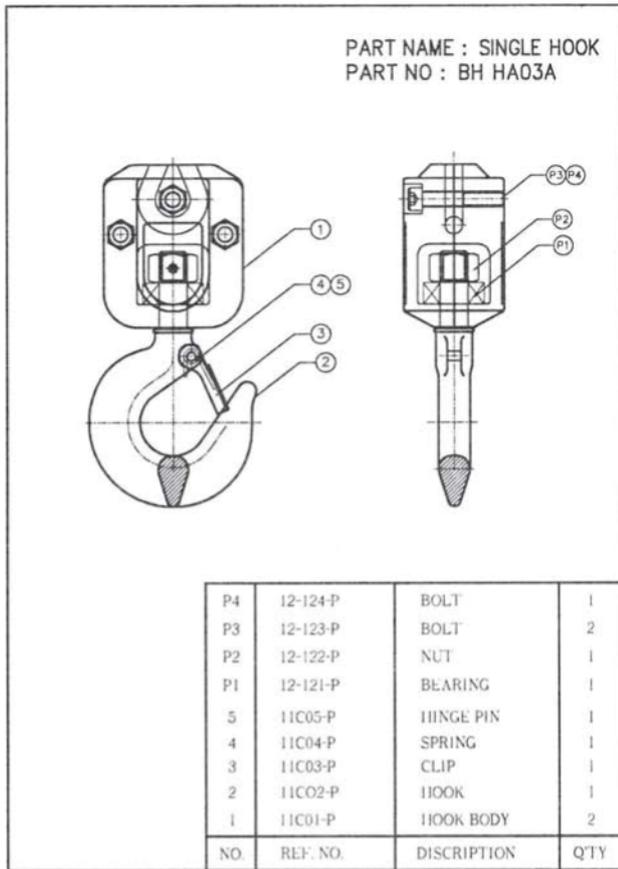
- Lower the hook to the floor by suspending light weight and remove air pressure from the body. Press Down Lever until wire loosens.
- Remove two hoses.
- Remove pin, UP and DOWN lever
- Remove Valve BKT From the bottom of body.
- Remove the right and left snap rings and air plug.
- Remove spring and piston
- Remove grip and then bolt connected to handle bar and separate handle bar

Reassembly

- Reassembly control handle in the reverse order of disassembly.
- Apply lubricant to parts connected to screw and O-ring prior to reassembly.

NO.	REF. NO.	DESCRIPTION	QTY
1	11C01-P	VALVE BODY	1
2	11C02-P	PISTON PIN	2
3	11C03-P	SEAL	2
4	11C04-P	GUIDE	2
5	11C05-P	SPRING	2
6	11C06-P	AIR PLUG	2
7	11C07-P	HANDE BAR	1
8	11C08-P	DN-LEVER	1
9	11C09-P	UP-LEVER	1
10	11C10-P	SP-CON-PIN	2
11	11C11-P	VALVE BKT	1
P1	11C01-B	GRIP	1
P2	11C02-B	O-RING	4
P3	11C03-B	O-RING	2
P4	11C04-B	O-RING	2
P5	11C05-B	O-RING	2
P6	11C06-B	HINGE BOLT	1
P7	11C07-B	SOCKET BOLT	1
P8	11C08-B	NIPPLE	2
P9	11C09-B	NYLON NUT	1
P10	11C10-B	SOCKET BOLT	4
P11	11C11-B	SNAP-RING	2
P12	11C12-B	PLAIN WASHER	2

HOOK & REEVED BLOCK



HOOK is

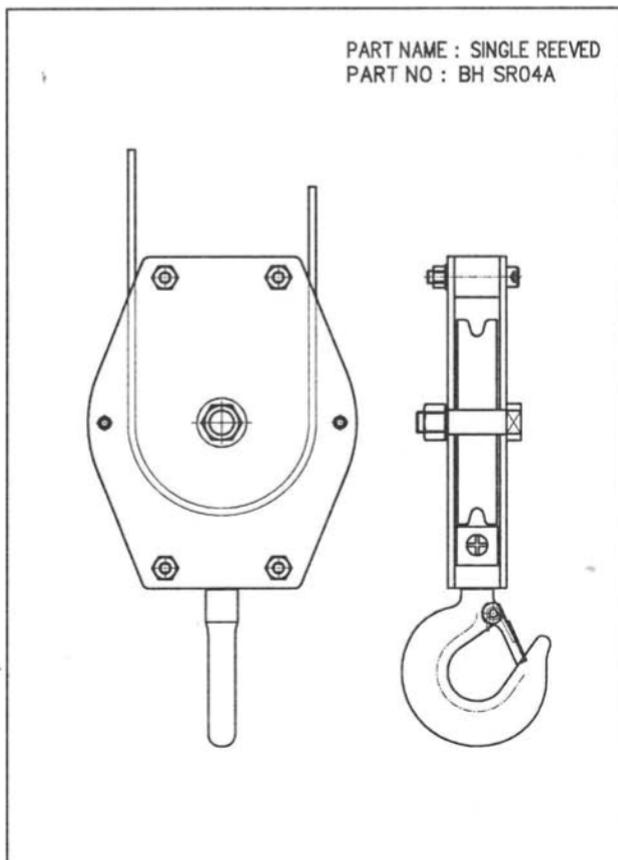
made of high strenght forged steel and ensures an excellent durability

Disassembly

1. Remove three bolts.
2. Disassemble clamp.
3. Disassemble thimble and wire.

Assembly

1. Wind wire tighten with clamp.
2. Insert hook assembly to the inside of hook body.
4. Tighten the right and left hook body with three bolts.



Function of reeved block

Reeved block is used when the applied weight is two times as much as the standard weight. In this case, the stroke distance is reduced to a half.

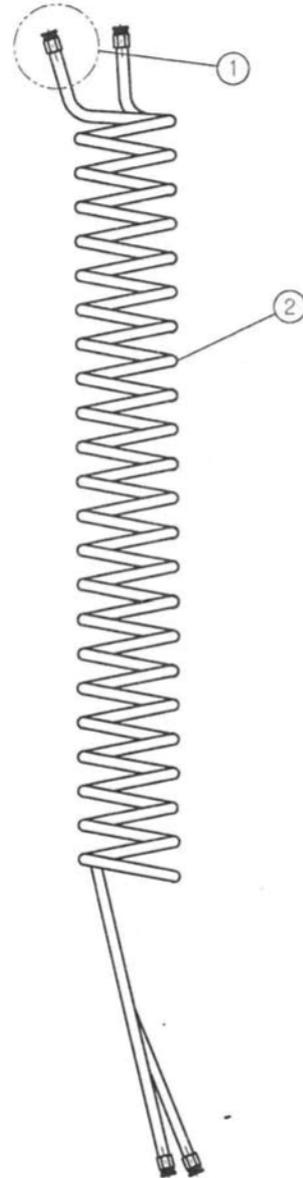
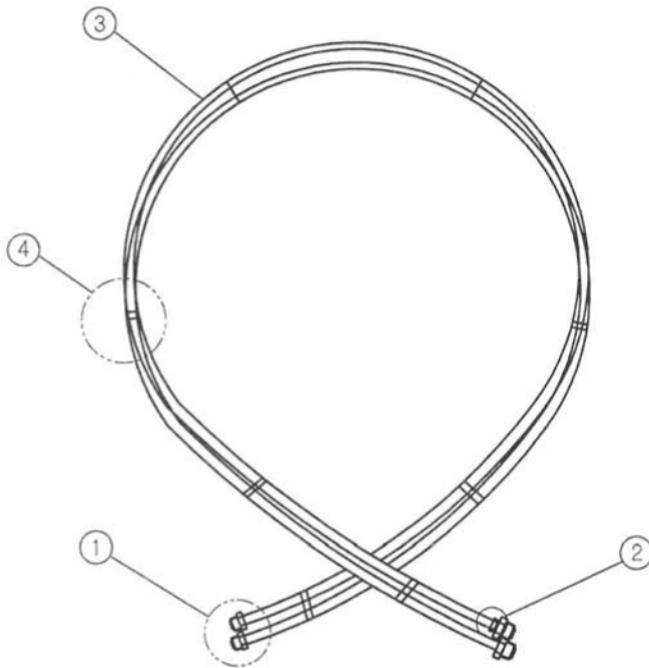
Installation of reeved block

1. Wind wire or chain around pulley of reeved block.
2. Install balancer eye bolt in th remaining wire.
3. Install clamp and tighten wire.

HOSE ASS'Y

PART NAME : STRAIGHT HOSE(STD)
 PART NO : BH H006A
 LENGTH : 4000 mm

PART NAME : COIL HOSE
 PART NO : BH H007A
 LENGTH : 5000 mm

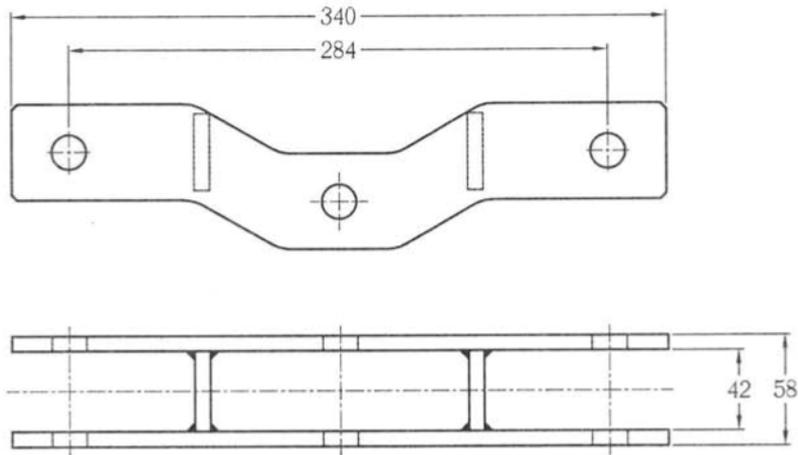


4	11C04-P	HOSE CLIP	6
3	11C03-P	STRAIGHT HOSE	1
2	11C02-P	HOSE BAND	4
1	11C01-P	NIPPLE	4
NO.	REF. NO.	DISCRIPTION	Q'TY

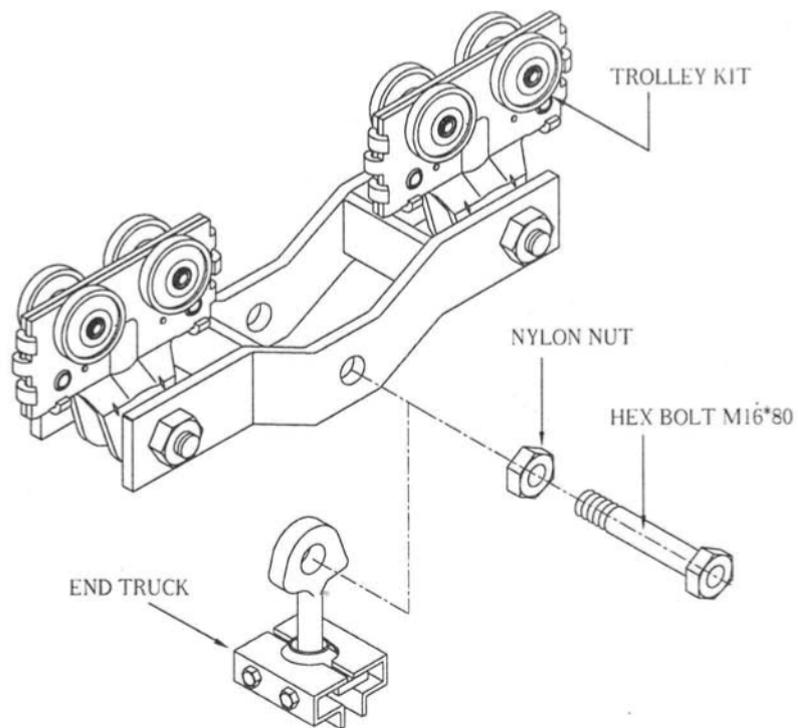
2	11C02-P	COIL HOSE	1
1	11C01-P	ONE-TOUCH FITTINGS	4
NO.	REF. NO.	DISCRIPTION	Q'TY

SUSPENSION KIT

PART NAME : SUSPENSION KIT
PART NO : BH SK07A

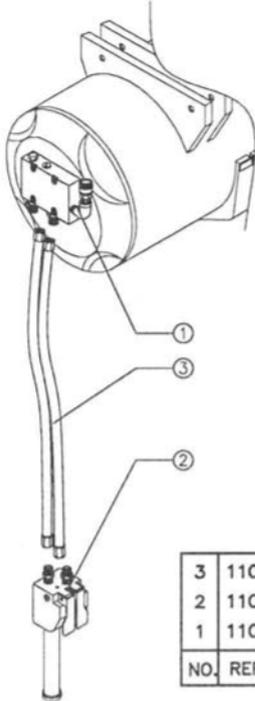


INSTALLATION



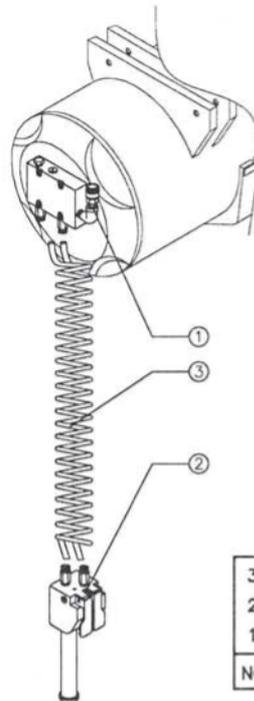
CONTROL KIT

PART NAME : CONTROL KIT-A
PART NO : BH CK01A



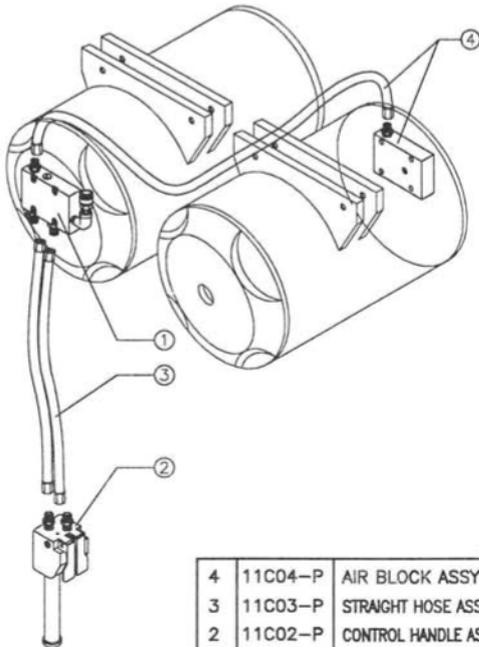
3	11C03-P	STRAIGHT HOSE ASSY	1
2	11C02-P	CONTROL HANDLE ASSY	1
1	11C01-P	MANIFOLD ASSY	1
NO.	REF. NO.	DISCRIPTION	Q'TY

PART NAME : CONTROL KIT-B
PART NO : BH CK01B



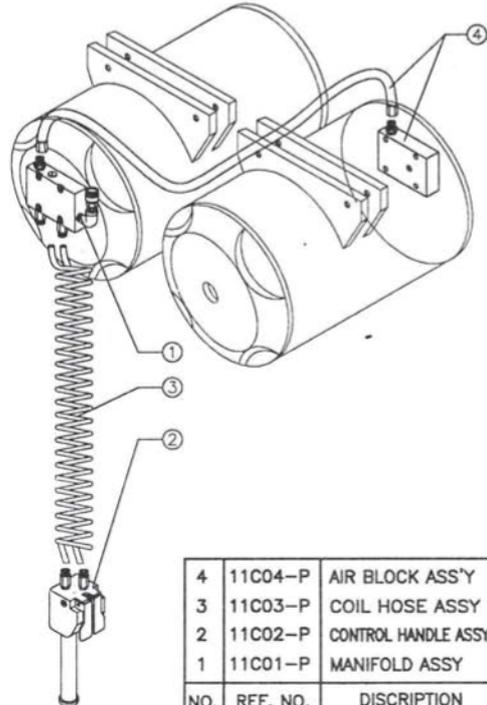
3	11C03-P	COIL HOSE ASSY	1
2	11C02-P	CONTROL HANDLE ASSY	1
1	11C01-P	MANIFOLD ASSY	1
NO.	REF. NO.	DISCRIPTION	Q'TY

PART NAME : CONTROL KIT-C
PART NO : BH CK12A



4	11C04-P	AIR BLOCK ASSY	1
3	11C03-P	STRAIGHT HOSE ASSY	1
2	11C02-P	CONTROL HANDLE ASSY	1
1	11C01-P	MANIFOLD ASSY	1
NO.	REF. NO.	DISCRIPTION	Q'TY

PART NAME : CONTROL KIT-D
PART NO : BH CK12B



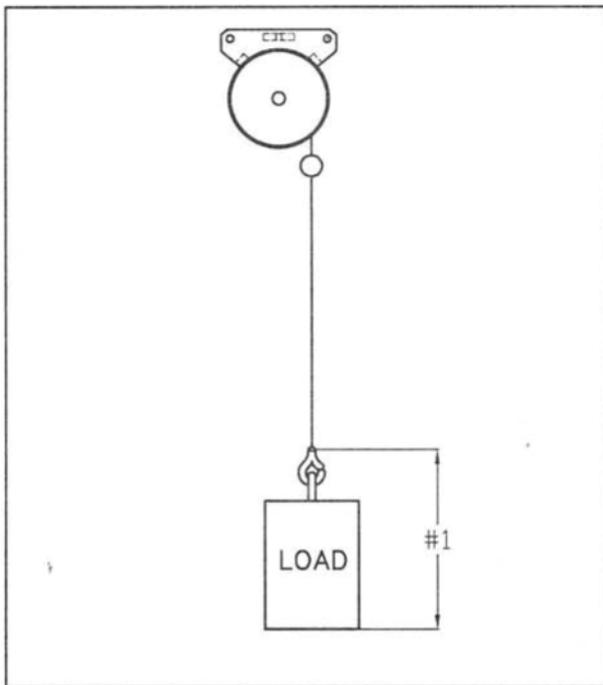
4	11C04-P	AIR BLOCK ASS'Y	1
3	11C03-P	COIL HOSE ASSY	1
2	11C02-P	CONTROL HANDLE ASSY	1
1	11C01-P	MANIFOLD ASSY	1
NO.	REF. NO.	DISCRIPTION	Q'TY

Lash up & Deflection

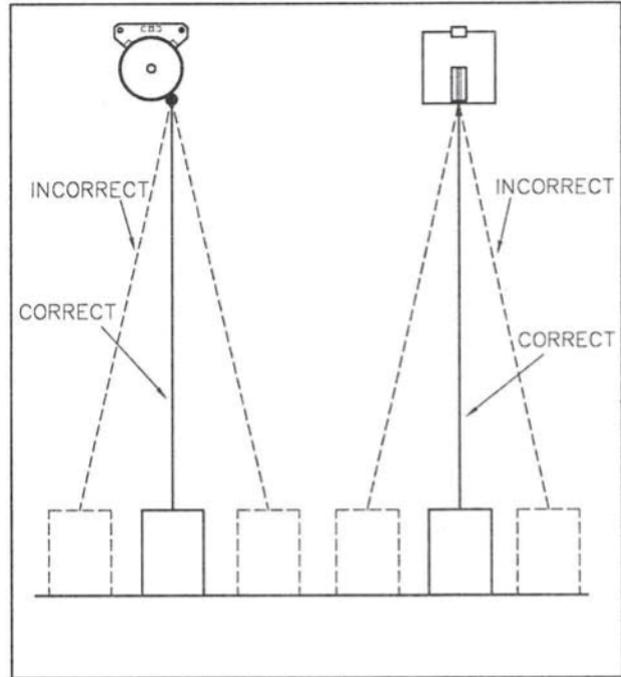
LASH-UP

The followings shall be measured to install hook and wire.

1. Measure the distance from the bottom of load to neck of hook.
2. Measure the distance from floor to the upper limit.
3. Fix the wire length from the above 1 and 2.



DEFLECTION



Note

Do not operate balance when load is not balanced.
Deflection of wire reduces the life span of wire
wire increases wear of internal parts, which can not be compensated.

1. Cable removal and replacement

Warning

Before separating a part from the equipment, remove the goods from the hook and shut down the air supply

1. Separate the machine in the air and put cable guide surface facing upward.
2. Remove clamp and stopper and separate wire and hook
3. Remove two bolts and separate fixed plate.
4. Remove cable guidel.
5. Pull wire so that anchor hole can be seen through the open window of cable guide.
6. Pull swaged fitting part and separate it from hole and pull cable in opposite direction and separate it from reel.
7. Replace cable with new one.



Fig.1-1. Unit Basic

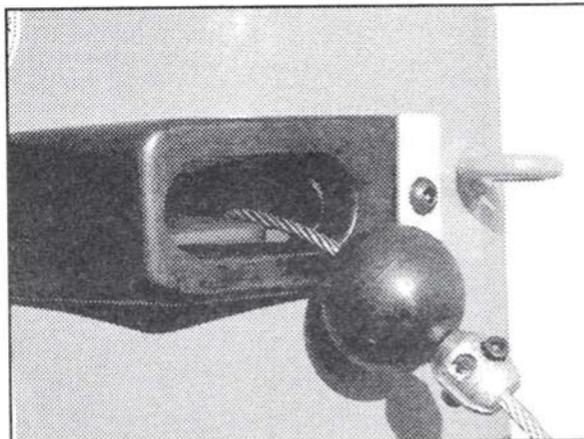


Fig.1-2. Removal of clamp and stopper

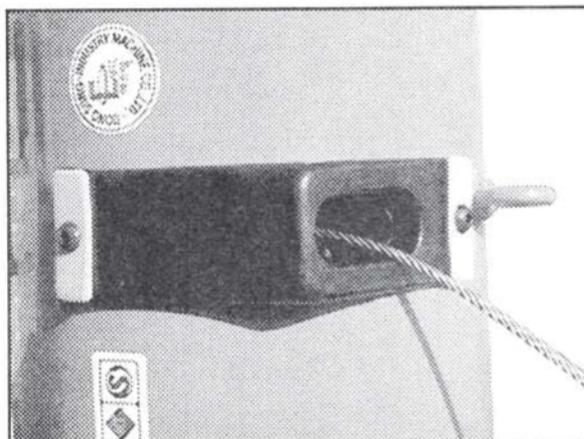


Fig.1-3. Removal of guide

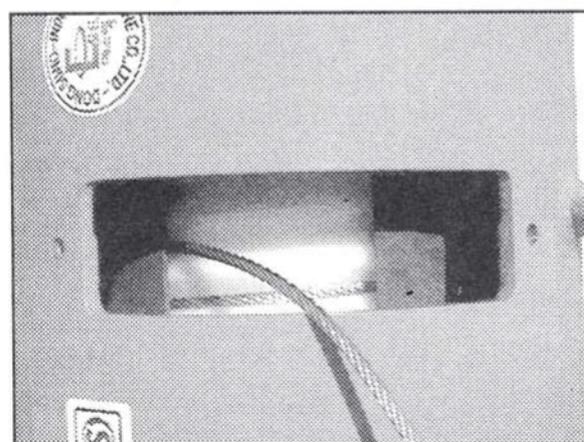


Fig.1-4. Removal and replacement of cable

2.UNIT DISASSEMBLY

Warning

Before separating a part from the equipment remove the goods from the hook and shut down the air supply.

1. Put the equipment on a clean and flat surface so that cable guide surface faces upward as shown in Fig.2-1.
2. Remove 4 bolts and then control module from from end cap.
3. Remove O-ring from air inlet of end cap.
4. Remove center bolt from the end cap with wrench. Remove 4 bolts fixes to the outer rim as shown in Fig. 2-2.



Fig.2-1. Unit Basic

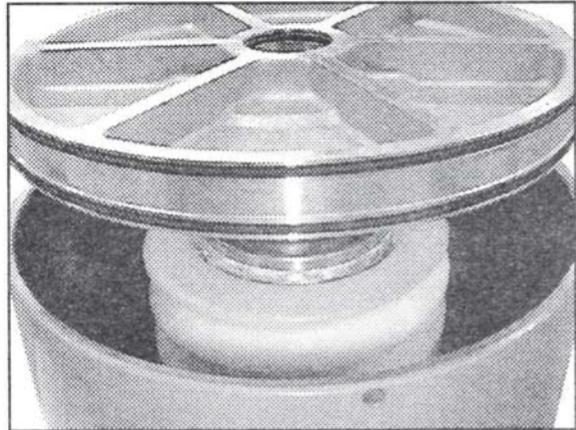


Fig.2-3. Removal of piston

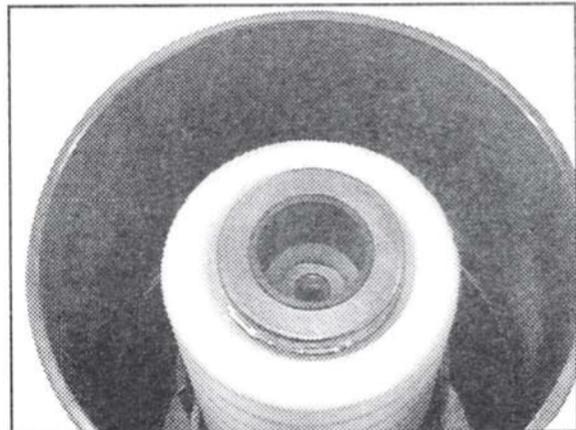


Fig.2-4. Removal of Leak-guide

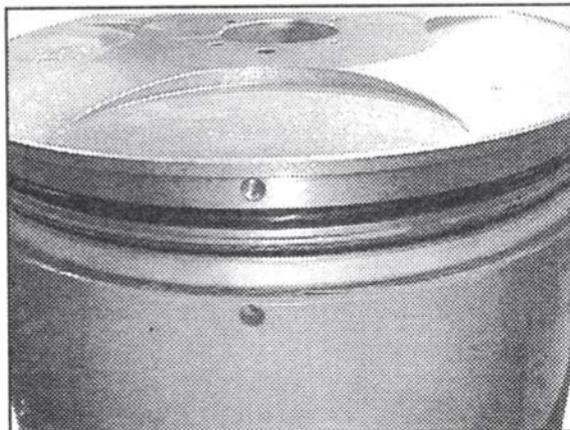


Fig.2-2. Removal of piston and cover

5. Leak washer shall be seen when end cap is completely removed. Removed leak washer.
6. Rotate ball screw by pulling cable.
7. Stop reel if piston and leak guide move up together and remove piston and leak guide
8. Let the ball screw descend by releasing cable.
9. Remove clamping bolts of cylinder drum and cover and remove cylinder drum.

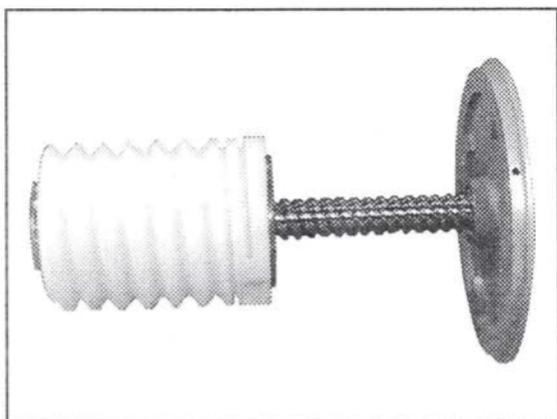


Fig.2-5. Removal drum groove

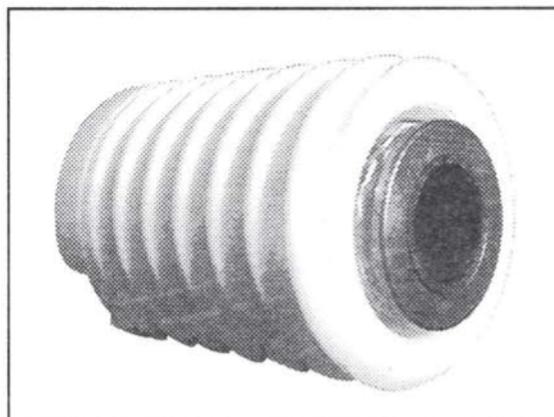


Fig.2-7. Removal of ball nut

10. Separate guide drum from LH cover.
11. Pull out swaged fitting from anchor hole.
12. Remove cable from reel by rotating it.
13. Remove tension bolt from cover center hole and plain washer.
14. Reel drum assembly and LH cover shall be separated as shown in the following Fig.
15. Remove 4 bolts clamped to reel and separate ball screw from reel.
16. Remove 4 bolts clamped to reel and separate ball nut from reel.

3. REASSEMBLY

1. Bearing assembly - Insert bearing holder into.
 - Hold the latter engraved part of bearing facing

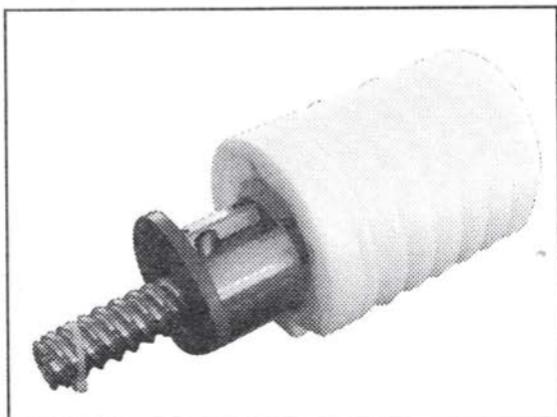


Fig.2-6. Removal of ball screw

- downward and insert the bearing holder into the top of bearing and hammer holder until holder and bearing surfaces closely contact.
2. Combine bearing assembly to reel drum
 - Stand reel drum so that bearing assembly combining parts face upward and then hammer drum until they closely contact.
3. Combine leak drum and ball nut
 - Stand leak drum in opposite direction to the above process.
 - Clamp 4 bolts and make ball nut and leak drum to closely contacted.
4. Assemble reel cover
 - Fit the pin groove of reel drum assembly ball screw end to the central basic of relevant cover and insert plain washer into the tension bolt and fasten them with impact wrench until they completely contact.
 - Clamp LH cover and guide drum with bolts.
 - Insert cable into the anchor hole of leak drum and wind to the end of leak drum.
 - Adjust guide drum so that cable from groove is located at middle of guide at middle.

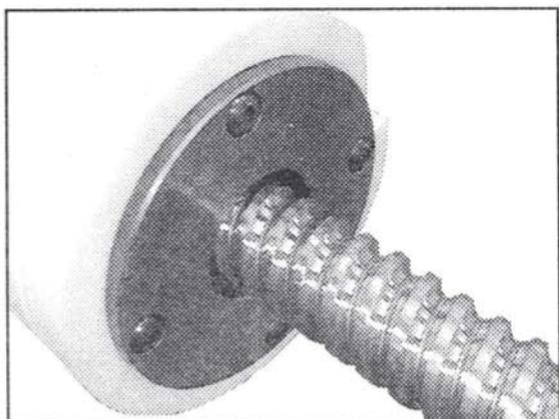


Fig.3-1. Ball screw clamping

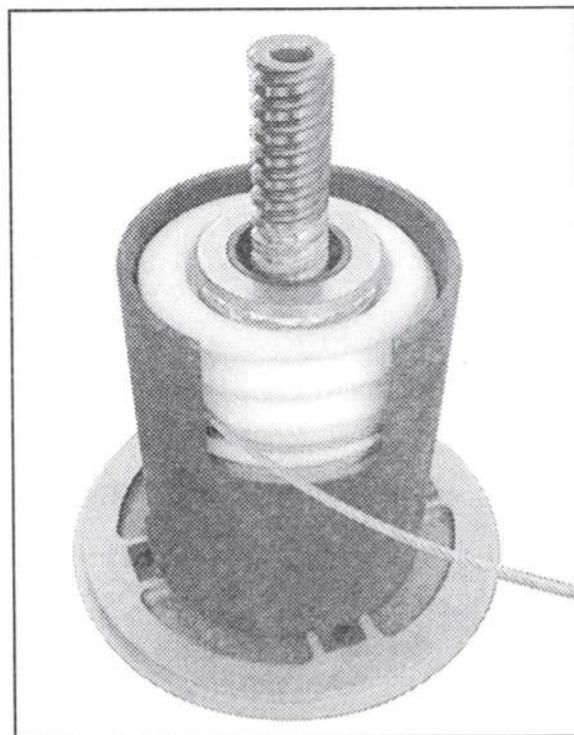


Fig.3-4. Guide drum clamping

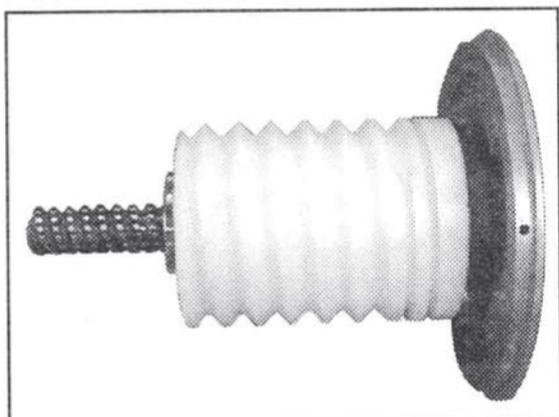


Fig.3-2. LH cover clamping

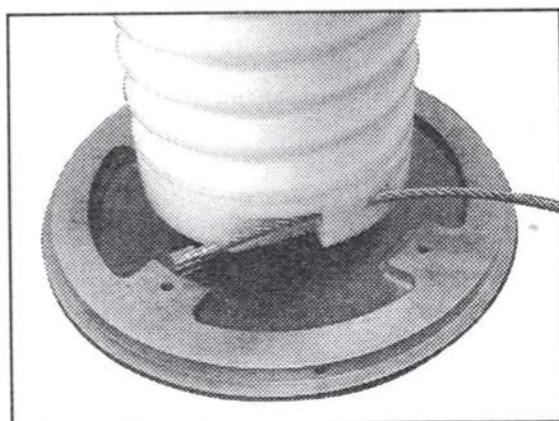


Fig.3-3. Cable insertion

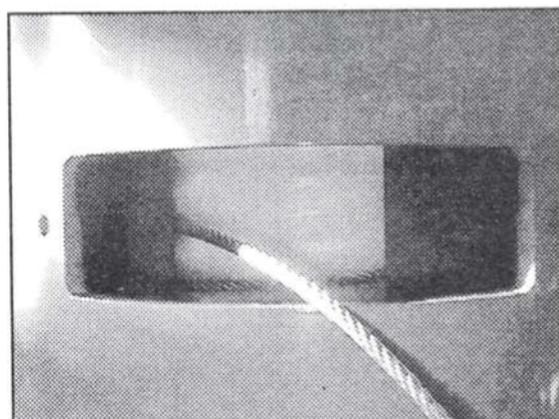


Fig.3-5. Cable installation

5. Combine reel cover assembly to cylinder drum.
 - Stand reel cover assembly so that bearing parts face upward.
 - Hold the cylinder drum polished part facing upward and insert the cable below cylinder drum and pull out the cable through square hole of cylinder drum.
 - Adjust cylinder drum so that square hole of cylinder drum fits to guide drum groove.
 - Combine cylinder drum and cover.
6. Apply Hivac-G of Moligora Co. or similar air tight grease onto the cylinder polisher parts.
6. Apply Hivac-G of Moligora Co. or similar air tight grease onto the top parts of leak guide.

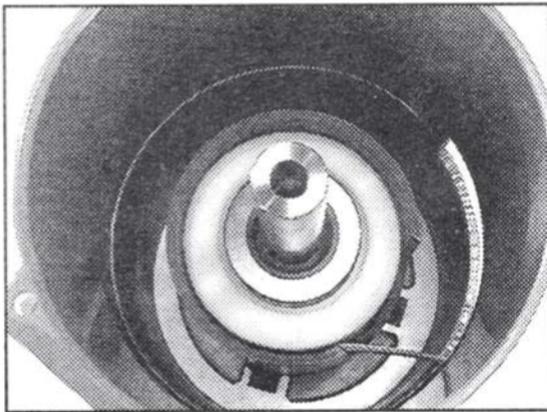


Fig.3-6. Leak guide insertion

8. Insert piston into the cylinder drum so that iron core parts face downward.
9. Put leak washer onto the top parts of leak guide.
10. Insert O-ring into the RH cover groove and apply Hivac-g of Moligora Co. or similar air tight grease.
11. Combine cover with cylinder drum tension bolts.
 - Combine the cover so that air inlet on the cover faces left hand side of cylinder drum.
 - Fit the cylinder drum bolt holes to the cover thread hole and then fasten the bolts to contact them closely

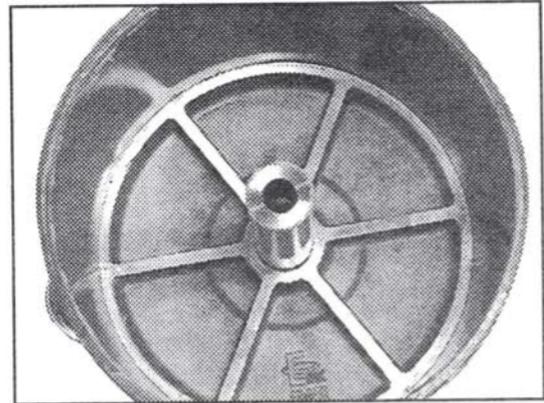


Fig.3-7. Piston, leak washer insertion

- Insert plain washer into the tension bolt and fasten it with impact wrench until they closely contact.
12. Combine cable guide with cylinder drum.
 - Pull out cable through cable guide hole and put the hole to face the cylinder bottom.
 - Combine it with fixed plate and bolts.
 13. Fasten the cable with stopper bolts.
 14. Control parts assembly - combine manifold and control valve assembly with hose.



Fig.3-8. RH Cover clamping

15. Assemble control parts and hook assembly into air balance hoist body.

- Fit manifold air outlet into RH cover air inlet on air balance hoist body and fasten the bolts until they contact closely.
- Inset cable into hook assembly eye nut and fasten with spanner until they completely combine.

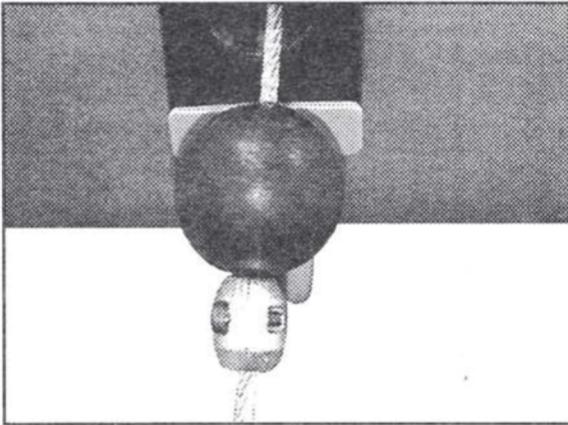


Fig.3-9. Hook Ass'y combination

- Note -

- Regular lubrication is not required in this. However apply lubricants after it was disassembled or repaired.
- The company does not guarantee the damage due to disassembly by user without consent of the company.

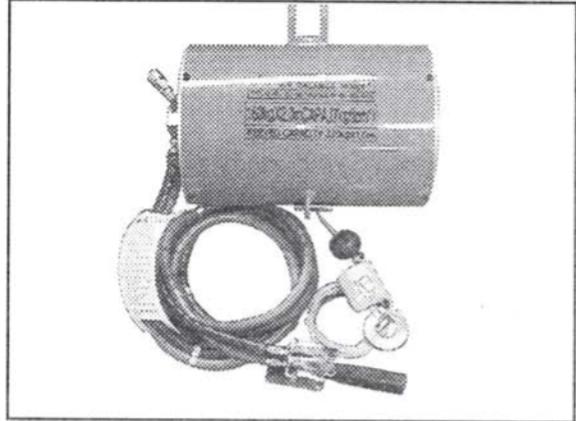


Fig.3-10. Air balance hoist

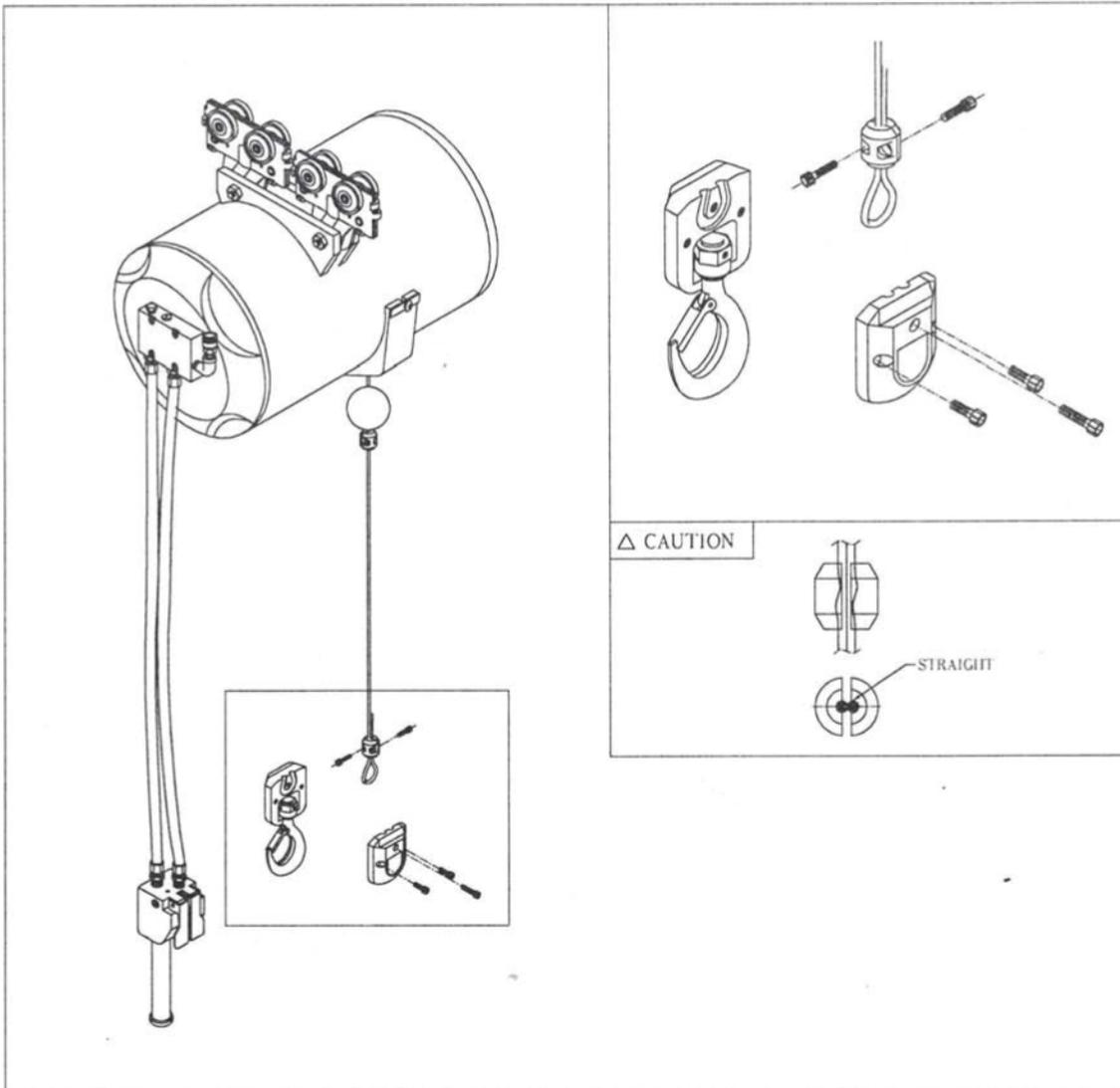
Installation and initial test

• Disassembly of Hook

1. Remove three bolts.
2. Disassemble clamp.
3. Disassemble thimble and wire.

• Assembly of Hook

1. Wind wire tighten with clamp.
2. Insert hook assembly to the inside of hook body.
3. Tighten the right and left hook body with three bolts.



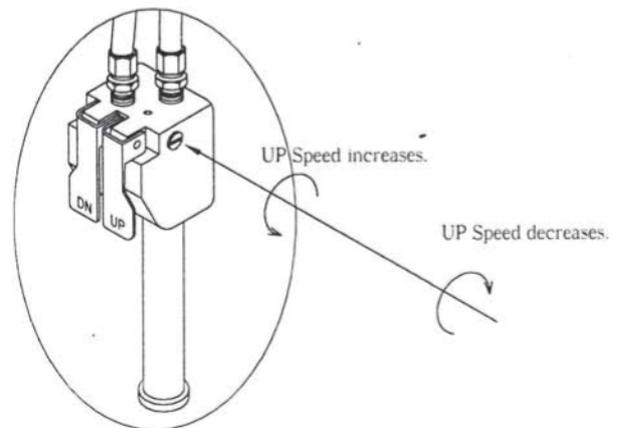
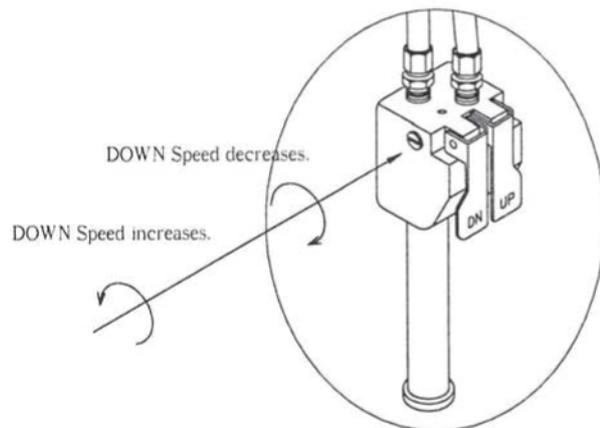
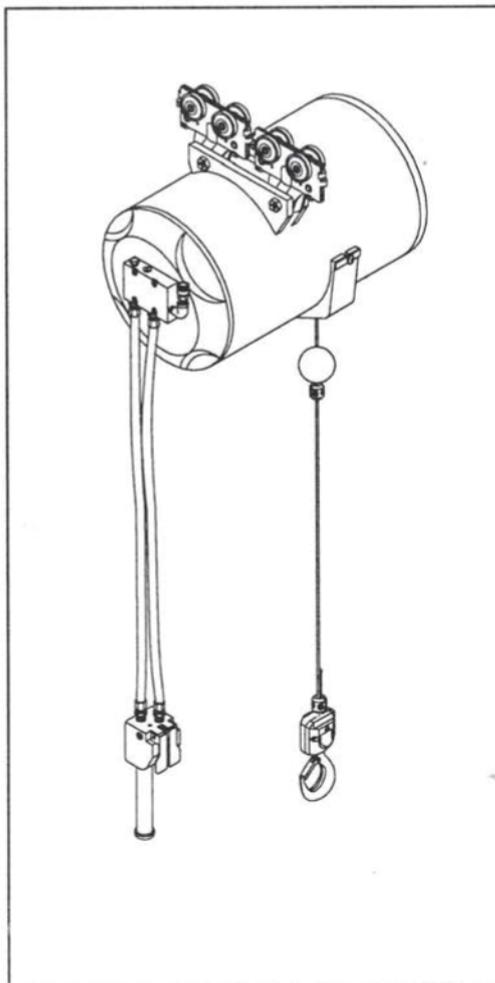
Installation and initial test

• Operation adjustments

- Warning -

Stop supply of compressed air prior to the adjustment of unit.
Press DN lever until wire loosens.

1. Turn off air supply.
2. Rotate counterclockwise up and down screw of control valve
3. Turn on air supply.
4. Adjust up and down speed by rotating control valve.
 - Counterclockwise - speed increases.
 - Clockwise - speed decreases.
5. After installation, suspend weight and perform up and down operation for then times.
The weight must not run down or be hung for 10 minutes.
6. The weight can freely move in X, Y and Z direction without any interruption.



Packing & Transport condition

- Quality of packing

1. Tapping - the cover of box shall not be separated from the box and they shall not be dropped during transportation and storage.
2. Marking - marking on the outside of box shall be consistent with the contents in the box.

- Packing method

1. Assemble outside packing box and tap on the bottom cover.
2. Assemble profile packing box and insert its lower part into the outside packing box.
3. Lift up air balance hoist by hand and put it on the profile packing box.
4. Cover air balance hoist with upper part of profile packing box.
5. Assemble packing box of control part and tap on the bottom cover.
6. Wrap control part with embossing vinyl and put it in the packing box of control part.
Then tap it after closing cover.
7. Put the packing box of control part into the profile packing box of outside packing box.
Then close cover and tap.
8. Mark product name in the name plate on the outside packing box.

- Packing material

Packing materials are as follows.

Name	Use	Q'ty	Name	Use	Q'ty
Outside packing box	Exterior packing (common use)	1	Corresponding profile box	Prevention of vibration (DAB-70 or DAB-160)	1SET
Packing box of control part	Packing of control part (common use)	1	Corresponding profile box	Protection of control part	Properly

- Transportation method

1. Products shall not be stacked more than five layers.
2. The maximum loading weight shall be 200 kg.
3. There should be no severe vibration or swing during transportation
4. There should be no severe shock against the products during transportation.

Operation

1. Operation

This equipment is operated (move up and down) by control valve and transports relatively heavy goods with air balance hoist hanging on the rail by an operation.

- 1) Hook moves up when UP lever of control valve is pressed down.
- 2) Hook moves down when DN lever of control valve is pressed down.
- 3) It is possible to move heavy goods up and down with hands in any heights after the hook was set by control valve. (float function)

2. Troubleshooting

This equipment is manufactured under strict quality control system. Therefore no troubles are expected during its operation. However refer to the followings if you have any problems on this equipment.

- 1) Hook does not move even lever of control valve operates.
 - No compressed air → Supply compressed air
 - Air hose is connected to a wrong place → Change connections.
 - Hook is above and below the upper and lower limits respectively
→ Operate opposite lever.
- 2) Hook speed is not normal.
 - The pressure of compressed air is not normal → Set the pressure of compressed air to 100 psi
 - The speed control of control valve is not normal → Readjust
- 3) Hook moves up and down without operation of control valve.
 - Compressed air leaks → Adjust by using compensation circuit of manifold.
 - Compressed air flows in → Hook moves up when manifold valve is closed of foreign materials are stuck into the piston at upside of control valve.
Adjust the valve with blade driver for the former case and contact with technical department for after sales service for the latter case.
* Do not disassemble at user's pleasure *
- 4) Float function does not properly work.
 - Hook is not fixed at proper location. → Readjust the location of hook.
 - When hook is at upper or lower limit, float function does not smoothly work.

* Please contact with out technical department for after sales service if the above troubleshooting does not properly work.*

VI. Safety precautions

- Use clean air. -Air should be free from moisture and oil - Use air filter.
- Air pressure should not be more than 100 PSI
- Do not lift up more than the specified max. weight.
- Stop hoist if wire is severely twisted and damaged. The wire should be repaired.
- Do not operate damaged air balance hoist.
- Do not lift up human being and transport goods above them.
- Do not lift up goods until it is well balanced.
- Do not fix goods with unsafe hook and tool.
- Do not remove goods from the hook until the wire rope is released from load.
- Regularly check wire rope and hook and replace them if they are damaged.
- Be well informed of how to operate thd equipment before use.

◆ OPTION ◆

BRAKE SYSTEM

▪ PRINCIPLE

The fingers attached on the Reel drum are opened by excessive centrifugal force to stop the reel from spinning

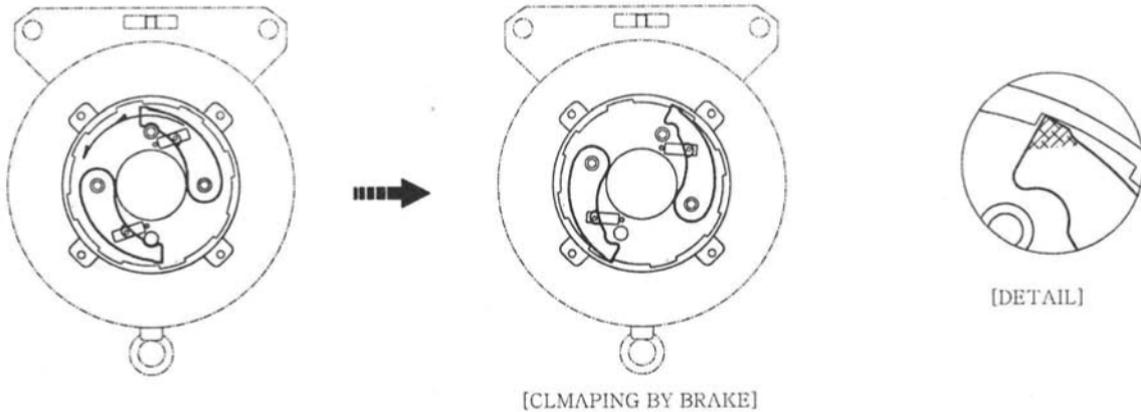
▪ OPERATION

The increased spinning velocity of the reel drum by a sudden wire elevation, which happens when weight falls or 'UP lever' malfunctions, opens the fingers to stop the spinning

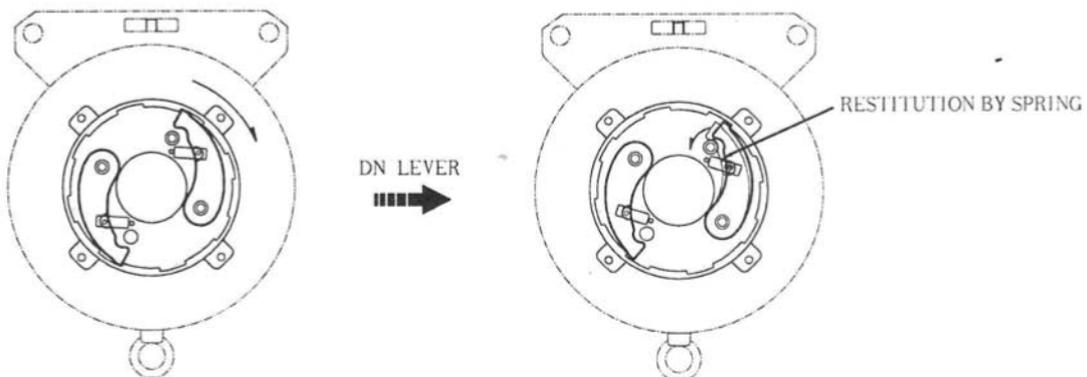
▪ FUNCTION

- Prevents jumping of the wire during 'UP' operation.
- Prevents sudden elevation of wire when the weight falls.

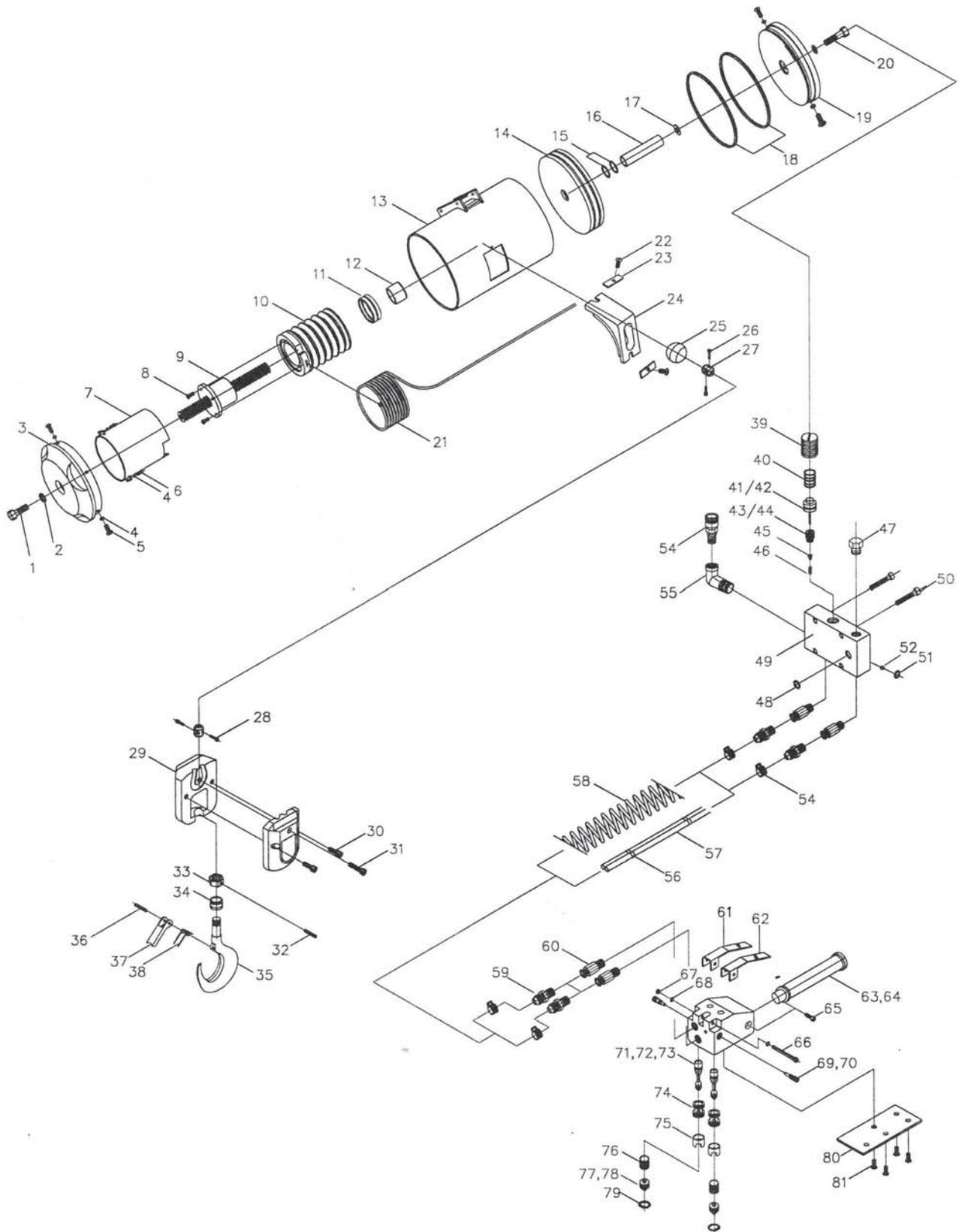
OPERATION



RELEASE



BALANCE PART IDENTIFICATION



BALANCE PART LIST

NO.	DESCRIPTION	QTY
1	TENSION BOLT	1
2	PLAIN WASHER	2
3	LH-COVER	2
4	SPRING WASHER	8
5	WRENCH BOLT	4
6	WRENCH BOLT	4
7	REEL GUIDE	1
8	WRENCH BOLT	1
9	BALL SCREW	1
10	REEL DRUM	1
11	THRUST BEARING	1
12	BEARING HOLDER	1
13	CYLINDER DRUM	1
14	PISTON	1
15	O-RING	2
16	LEAK GUIDE	1
17	PLASTIC WASHER	1
18	O-RING	2
19	RH COVER	1
20	TENSION BOLT	4
21	WIRE	1
22	WRENCH BOLT	2
23	PLATE	2
24	WIRE GUIDE	1
25	RUBBER STOPPER	1
26	WRENCH BOLT	2
27	WIRE CLAMP	2
28	WRENCH BOLT	2
29	HOOK BODY	1
30	WRENCH BOLT	2
31	WRENCH BOLT	1
32	SPRING PIN	2
33	HEX NUT	1
34	THRUST BEARING	1
35	HOOK EAR	1
36	SPRING PIN	1
37	HOOK CLIP	1
38	HOOK SPRING	1
39	SET SCREW	1
40	SPRING	1
41	PISTON	1

NO.	DESCRIPTION	QTY
42	O-RING	1
43	AIR PLUG	1
44	O-RING	1
45	RUBBER PAD	1
46	SPRING	1
47	SET SCREW	1
48	O-RING	1
49	MANIFOLD BODY	1
50	WRENCH BOLT	4
51	SNAP RING	1
52	STEEL BALL	1
53	HOSE CLAMP	2
54	AIR COUPLER	1
55	ELBOW	1
56	HOSE BAND	4
57	STRAIGHT HOSE	1
58	COIL HOSE	1
59	NIPPLE	2
60	ONE TOUCH FITTING	2
61	UP LEVER	1
62	DN LEVER	1
63	RUBBER GRIP	1
64	HANDE BAR	1
65	WRENCH BOLT	1
66	WRENCH BOLT	1
67	HEX NUT	2
68	PLAIN WASHER	1
69	SPEED CONTROLLER	2
70	O-RING	2
71	PISTON	2
72	O-RING	2
73	O-RING	2
74	AIR SEAL	2
75	BS GUIDE	2
76	SPRING	2
77	O-RING	4
78	AIR PLUG	2
79	SNAP RING	2
80	HANDLE BKT	1
81	WRENCH BOLT	4