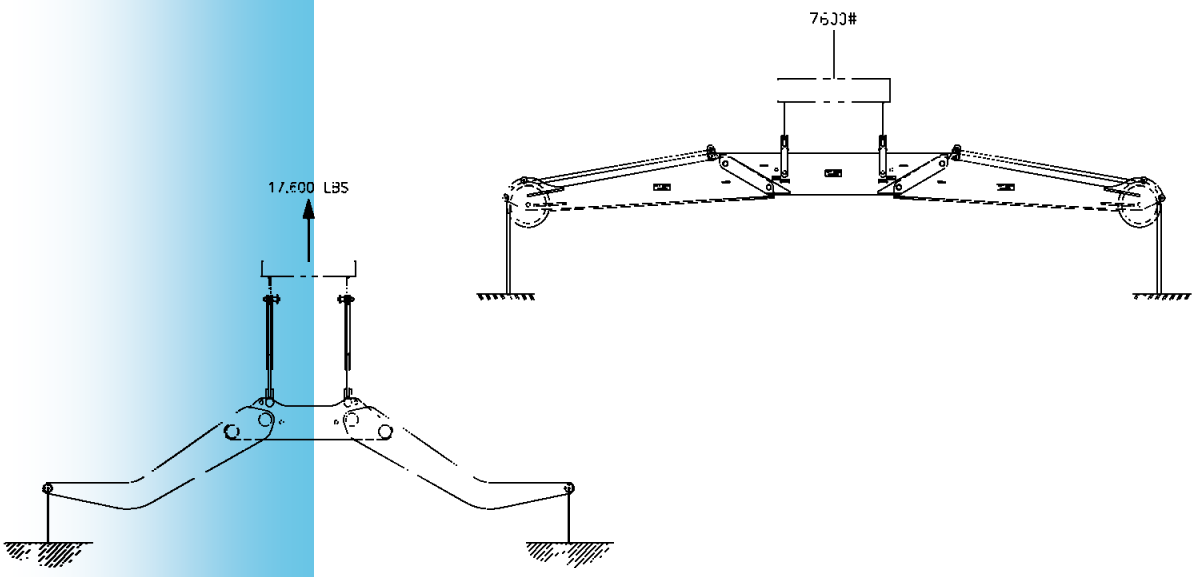
2501 Dallas Street
Aurora, Colorado 80010
USA
Telephone 303.340.5200

OPERATION AND MAINTENANCE MANUAL

BOOTSTRAP HOIST SYSTEM

FOR GE CF6 ENGINES
ON DOUGLAS DC-10 AIRCRAFT

P/N 101968



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Operation and Maintenance Manual

BOOTSTRAP HOIST SYSTEM P/N 101968

RECORD OF REVISIONS

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Revision -/NC-A	Initial release-No record of change
Revision B	Revised IPL
Revision C	Brought to current format

Operation and Maintenance Manual

BOOTSTRAP HOIST SYSTEM P/N 101968

Table of Contents

Operation and Maintenance Manual

BOOTSTRAP HOIST SYSTEM P/N 101968

Section 1 - DESCRIPTION

This manual provides operation and maintenance instructions and the parts list for the part number 101968 Bootstrap Hoist System manufactured by Stanley Aviation, 2501 Dallas St., Aurora, Colorado 80010.

The Bootstrap Hoist System for the General Electric CF6 jet engine consists of forward and aft crossbeams with hangers and pulleys, a forward beam support, an aft wire rope assembly, two aft manual hoists, and two forward manual hoists. This manual outlines the steps required for hoisting a CF6 engine that is installed on a DC-10 aircraft.

The 101968 System is raised and lowered manually with four lever-operated hoists. Lifting eyes for the hoist swivel hooks are provided by pin-connected hoist brackets or cradle lifting eyes. To equalize loading, aft hoists are hung from a balance cable, which is a wire rope assembly supported by pulleys and idlers in the aft beam assembly. This prevents unequal loading from uneven raising or lowering operations of the hoists. See Appendix A for detailed hoist operating instructions.

- There are four configurations: **-1**, **-11**, **-21**, **-101**
- The difference between these is ___

For additional information on this or other aviation ground support applications, we invite you to contact one of our Customer Service Representatives, or visit our website.

S T A N L E Y A V I A T I O N C O R P O R A T I O N
2501 Dallas Street
Aurora, Colorado 80010 USA
303-340-5200
Fax 303-360-8965
GSE@stanleyaviation.com

Section 2 - SAFETY CONSIDERATIONS

- This equipment is heavy and has moving parts. Whenever such a combination exists, there is the potential for serious injury. Work carefully at all times.
- Be alert and pay attention when using this equipment. Careless use, or a casual attitude during operation, may lead to an accident.
- Keep your feet clear of the System during all operations.
- Pay attention to all warnings that are stenciled on the System. They are there for your safety. Do not ignore or violate them.
- Walk around the Hoist System, never over it or under the engine or handling equipment.
- Head protection (hard hats) and safety shoes must be worn at all times.
- An approved safety harness must be worn by anyone utilizing the engine cradle as a work stand during engine removal or installation. The safety harness must be suspended independently of the cradle and bootstrap and should not have excessive slack. If possible, avoid using the cradle for personnel support unless specifically designed for this and equipped with work platforms. Anyone working aloft should be wearing a safety harness.

Section 3 - SPECIFICATIONS AND CAPABILITIES

3.1 Applications

3.2 Dimensions

Length: ___" (___ cm)
Width: ___" (___ cm) is the distance between the rails.
Height: ___" (___ cm)

3.3 Capacities

Section 4 - OPERATION

4.1 Preparation for Bootstrapping

This procedure is used to either raise an empty cradle in preparation for removing an engine, or raise a cradle with engine in preparation for installing an engine.

4.1.1 Assemble the forward and aft beams and attach to the aircraft per the Aircraft Manufacturer's instructions.

4.1.2 OPTIONAL: Attach dynamometers to forward beam (2 locations) and aft beam (1 location) for load indication. Check the Aircraft Maintenance Manual for dynamometer requirements.

4.1.3 Attach hoists to forward and aft beams, lowering the lifting hooks and chains to the ground. Hoists with lower lifting capacity shall be used on the aft only.

4.1.4 Attach the hoist brackets to the cradle with T-handle pins and safety pins, which are provided. Attach the hooks through the lifting eyes and remove slack from each hoist lead, as required.

4.2 Raising the Cradle

4.2.1 Raise the cradle by operating all hoists while maintaining a level attitude on the cradle at all times.

4.2.2 Attach the cradle to the engine per the procedures outlined in the cradle Operational and Maintenance Manual.

4.3 Lowering the Cradle

Lower the cradle onto an approved engine stand or trailer by reversing the hoists and operating, while maintaining a level attitude at all times.

Section 5 - SHIPPING

The Bootstrap Hoist System may be shipped by any preferred method without special preparation.

Section 6 - STORAGE

The Bootstrap Hoist System requires no special storage treatment, as it has been suitably protected from normal environmental deterioration. For long-term storage, however, the unit should be stored in a humidity-controlled environment

Section 7 - CLEANING

7.1 Clean all metal parts with a clean cloth moistened with degreasing solvent.

7.2 Dry parts using a clean, lint-free cloth or low pressure compressed air.

7.3 See Appendix A for Hoist lubrication requirements.

NOTE	DO NOT USE COMPRESSED AIR TO DRY AREAS NEAR BEARINGS, GEARS, OR OTHER MOVING PARTS.

Section 8 - INSPECTION

To ensure efficient and reliable operation, the Stanley Bootstrap Hoist System must be maintained through regular preventive maintenance practices. These practices include inspection, cleaning, and lubrication. All preventive maintenance must be performed at least once every six months. The manufacturer recommends more frequent maintenance under conditions of heavy service or extreme weather. Replace any parts that do not meet inspection standards.

Routine inspection should include the following items:

8.1 Clean the Hoist System per Section 7. Afterward, pack the pulley bearings with Aeroshell 17 or an equivalent grease.

8.2 Inspect all parts for dirt and signs of wear or damage.

8.3 Inspect all structural members for distortion, breaks, cracks, or other signs of damage.

8.4 Inspect load-bearing surfaces and the threads of all bolts for small cuts, scoring, distortion, galling, elongation, or other signs of wear or damage.

8.5 Inspect all bolted parts for looseness and tighten as necessary.

8.6 Inspect the paint and plating for cuts or chips and repair as required per Section 9.2

8.7 Check hoists for proper operation (See Appendix A).

8.8 Check the sheaves for proper operation.

Section 9 - MINOR REPAIRS

9.1 Replace all parts that do not meet the minimum inspection requirements and that cannot be economically repaired.

9.2 Minor corrosion and surface blemishes may be repaired by feathering the paint edges around the damaged area with crocus cloth or 400/600 grit wet or dry sandpaper. Clean thoroughly and dry. Repaint with phosphate ester-resistant paint.

9.3 Replace all fasteners that show signs of damage to threads or wrenching surfaces.

CAUTION	**DO NOT paint rubber, plated surfaces or aircraft-attaching hardware.**

Section 10 - MAJOR REPAIRS

No major repair is possible in the field. This unit must be returned to the manufacturer for overhaul, proof load testing and recertification following any major damage.

Section 11 - ILLUSTRATED PARTS LIST

11.1 How to use this Parts List

Turn to the Assembly Figure and identify the part by location and appearance. Note the Item Number assigned to the illustrated part. Locate the Item Number in the appropriate parts list. The line entry for that Item Number provides the, Part Number, Description, and Quantity required Per Assembly.

11.2 Units Per Assembly

Quantities specified in the Units Per Assembly column are the total number of each part required for the indicated assembly, if the part is included in a higher-level assembly. The total quantity required is a product of the quantities indicated at each level, up to the Top Assembly.

11.3 How to order Replacement Parts

Replacement parts and/or spare parts listed in this manual may be ordered by specifying the Top Assembly Part Number, the Subassembly Part Number (if any), the Item Number, Description, and the Quantity Required.

Example:

TOP ASSEMBLY P/N 215030-1 TOWBAR ASSEMBLY
SUBASSEMBLY ITEM 20, ADAPTER KIT

Item number	Part number	Description	Quantity Req'd/ Units Per Assembly
4	101715-75	washer	2

In the above example, there are two washers per adapter kit, and one adapter kit per towbar, so to replace all washers on the adapter kit bolt, a quantity of 2 is specified.

Replacement and/or spare parts may be ordered from:

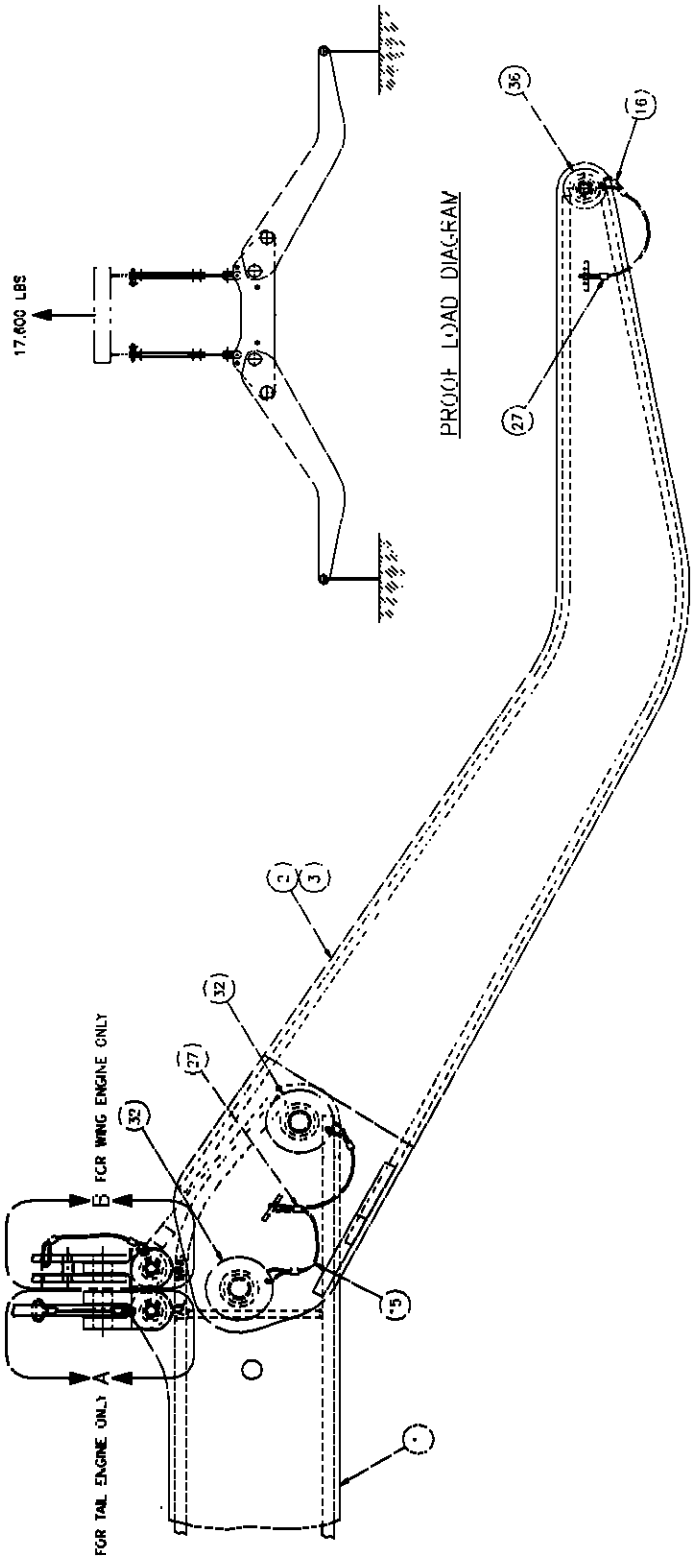
S T A N L E Y A V I A T I O N C O R P O R A T I O N
2501 Dallas Street
Aurora, Colorado 80010 USA
303-340-5200
Fax 303-360-8965
GSE@stanleyaviation.com

Section 11 - ILLUSTRATED PARTS LIST (cont'd)

Section 11 - ILLUSTRATED PARTS LIST (cont'd)

QUANTITY REQUIRED				ITEM NO.	PART NO.	DESCRIPTION
-101	-21	-11	-1			
3	3	3	3	11	103890-3	DYNAMOMETER
-	-	-	4	10	110112-1	BRACKET ASSEMBLY (4" X 6" FRAME)
-	-	4	-	9	110125-1	BRACKET ASSEMBLY (5" X5 " FRAME)
2	2	2	2	8	104061-2-10	HOIST, 2-TON
2	2	2	2	7	104061-3-10	HOIST, 3-TON
2	2	2	2	6	104044-3	LINK
1	1	1	1	5	101785-21	CABLE ASSEMBLY
-	1	1	1	4	101793-2	DC-10 WING SUPPORT (RT)
-	1	1	1	3	101793-1	DC-10 WING SUPPORT (LT)
1	1	1	1	2	101969-1	AFT BEAM ASSEMBLY
1	1	1	1	1	102609-1	FORWARD BEAM ASSEMBLY

Section 11 - ILLUSTRATED PARTS LIST (cont'd)



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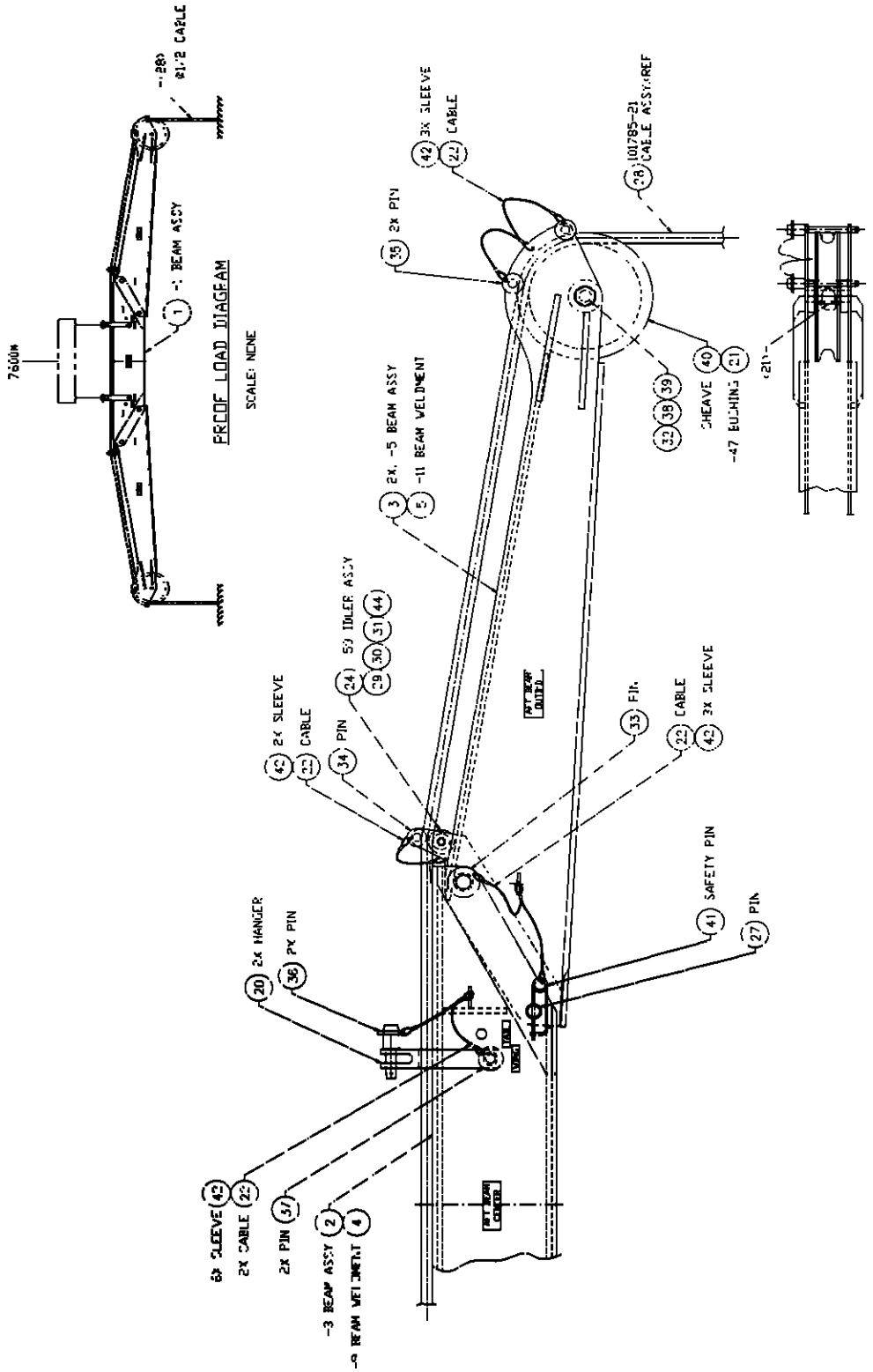
Section 11 - ILLUSTRATED PARTS LIST (cont'd)

	36	CL-9-B_P3-3.0	PIN, BALL LOCK
	32	CL-16-B_PB-3.3	PIN, BALL LOCK
	27	28-1C	SLEEVE
2	18	-37	HANGER ASSY
2	17	-35	HANGER ASSY
	16	-33	CABLE
	15	-31	CABLE
	3	7	OUTBOARD BEAM ASSY
2	2	-5	BEAM ASSY
1	1	-3	CENTER BEAM ASSY
	-	-2	ENG. HOIST BEAM ASSY
	-	-1W	ENG. HOIST BEAM ASSY
√	-	-1	ENG. HOIST BEAM ASSY
-1 QTY REQD	ITEM NO	PART NO	DESCRIPTION

▲ P/N 102609-1

Section 11 - ILLUSTRATED PARTS LIST (cont'd)



▲ P/N 101969-1

Section 11 - ILLUSTRATED PARTS LIST (cont'd)

		44	MS24665 151	COTTER PIN
		42	28-2G	SLEEVE
		41	102892-1	SAFETY PIN
		40	101786-1	SHEAVE
		39	NAS1103-32	BOLT
		38	NAS1032A8	NUT
		37	MS17984-731	PIN
		36	MS17984-710	PIN
		35	MS17984 421	PIN
		34	MS17984-418	PIN, QUICK REL
		33	MS17984-1030	PIN
		32	AN960-816L	WASHER
		29	AN320-4	NUT
	1	28	101785-21 (REF)	CABLE ASSY
		22	101809-09	CABLE
		21	-47	BUSHING
	2	20	-45	HANGER
		5	-11	BEAM WELDMENT
		4	-9	BEAM WELDMENT
	2	3	-5	BEAM ASSY, OUTB'D
	1	2	-3	BEAM ASSY, CENTER
	-	1	-1	BEAM ASSY
	-1	ITEM	PART NO	DESCRIPTION
QTY	REQD	NO		

HANDLING AND PARTS MANUAL FOR LB SERIES LEVER HOIST (MODEL L4)

BEEBE INTERNATIONAL, INC

BEEBE INTERNATIONAL, INC
2724 SIXTH AVENUE SOUTH, SEATTLE, WASHINGTON 98134
PHONE (206) 624-0466, TELEX: 328795, P.O. BOX 24046

IMPORTANT

When ordering replacement parts, please specify the following points.

1. Part name and hoist capacity.
2. Correct fig. number and part number.
3. Any lift of chains available on request. Kito load chain is heat treated. No addition to the chain to increase the length is possible. The chain must be replaced with a new one of desired length. Specify the length of chain when ordering. Also, include following lineal surplus length to secure sufficient lift desired.

LB008	0.21m
LB015	0.22m
LB030	0.30m
LB060	0.62m
LB090	0.79m

Section 12 - APPENDIX– LB SERIES LEVER HOIST

This leaflet describes basic safety requirements for LEVER BLOCK.
Though LEVER BLOCK is of the best quality and performance, accidents may occur if they are not handled correctly.

Please make doubly sure of the followings during operation.

1) HOW TO OPERATE NEW FREE CHAIN ADJUSTING SYSTEM

The new free chain adjusting system is developed on model L4 with brake and idle springs, which is very convenient for adjusting chains to any desired length for immediate engagement of the load. Before high-speed winding, free chain adjusting operations or return operations, check first that there is no load on Lever hoist.

1. High-speed winding

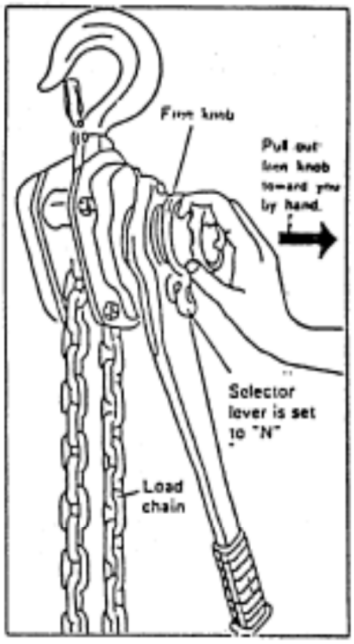
When removing slack from load chains, turn the selector lever to "N" (central position) or "UP", and turn the free knob clockwise, so that the load chain can be wound up rapidly.

2. Free chain adjusting

When rapidly adjusting long length of load chain, turn the selector lever to "N" (central position). Then, by pulling out the free knob toward you, the load chain can be moved freely by hand (Refer to the figure on the right.).

< Notes when adjusting load chain length >
Take note following points, as free chain adjusting system may not be operated.

(1) Do not touch free knob or Lever assembly by hand.
(2) Do not move load chain so that the shock is added.
(3) The chain can not be moved freely under the pulling out condition of free knob if the brake is tightened. In this case, operate the Lever assembly for lowering down operation to loosen the brake. Then pull out free knob assembly.



3. Free chain adjusting system-Return operation

By lightly pulling the load chain with the hook with the left hand and by turning the free knob clockwise with the right hand, the free knob is returned to its original position, ready for the next operation.

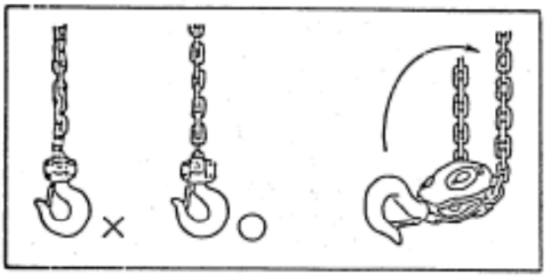
Note: Do not return the free knob by force. If the free knob does not return to its original position, check that there is no abnormality.

Operation and Maintenance Manual

BOOTSTRAP HOIST SYSTEM P/N 101968

Section 12 - APPENDIX– LB SERIES LEVER HOIST

1 • *No twisting. No capsizing for double type chains.

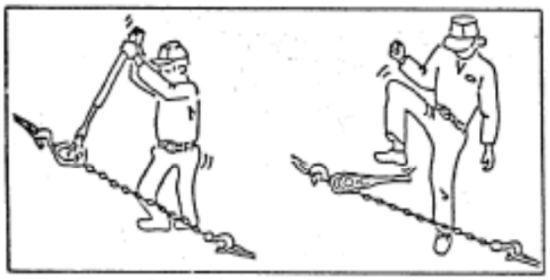


2 • *Hang the load in the dead-center of the hook.

3 • *When hanging the load, do not touch it with the load chain and freely suspend

4 • *No overloading. Lengthening the lever will mean overloading.

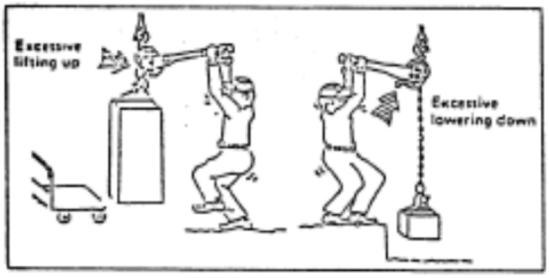
• *Do not step on the lever, as the shock will increase the load.



5 • *Do not hit the load chain with any corner of the good.

6 • *No rough handling.

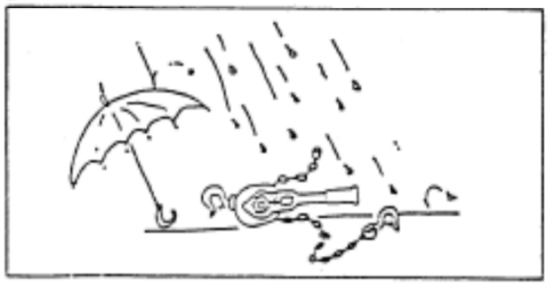
7 • *Do not lift up or lower down excessively.



8 • *After use, oil the load chain, the hook joints and idle sheave shaft (6 & 9 ton) after removing any dirt and moisture. Then store the hoist into storage.

9 • *Keep dry. Do not oil to friction plates.

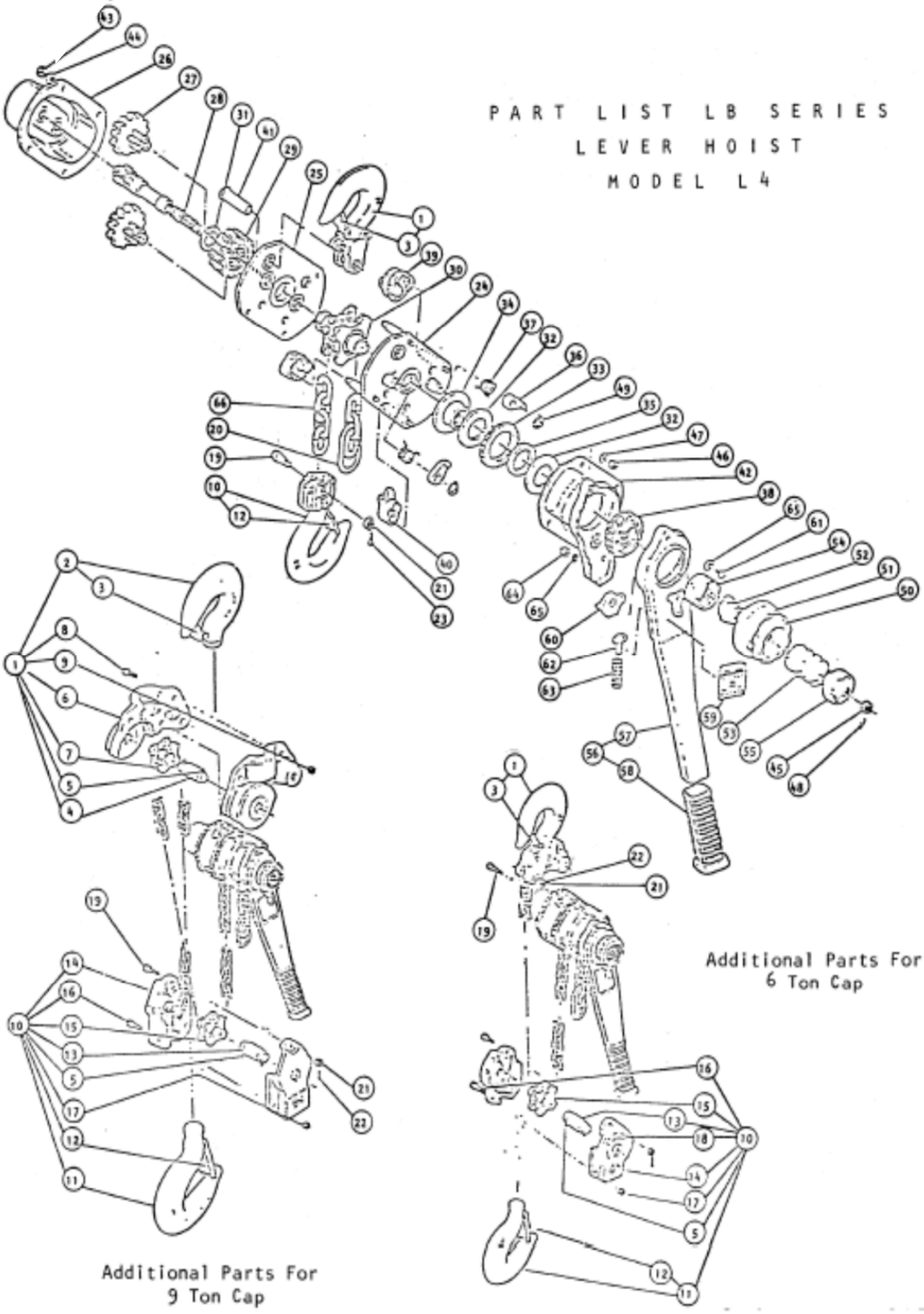
10 • *Do not expose rain water, damp or excessive humidity.



Use LEVER BLOCK with NO anti-corrosion chains in the environment which is likely to cause rust.

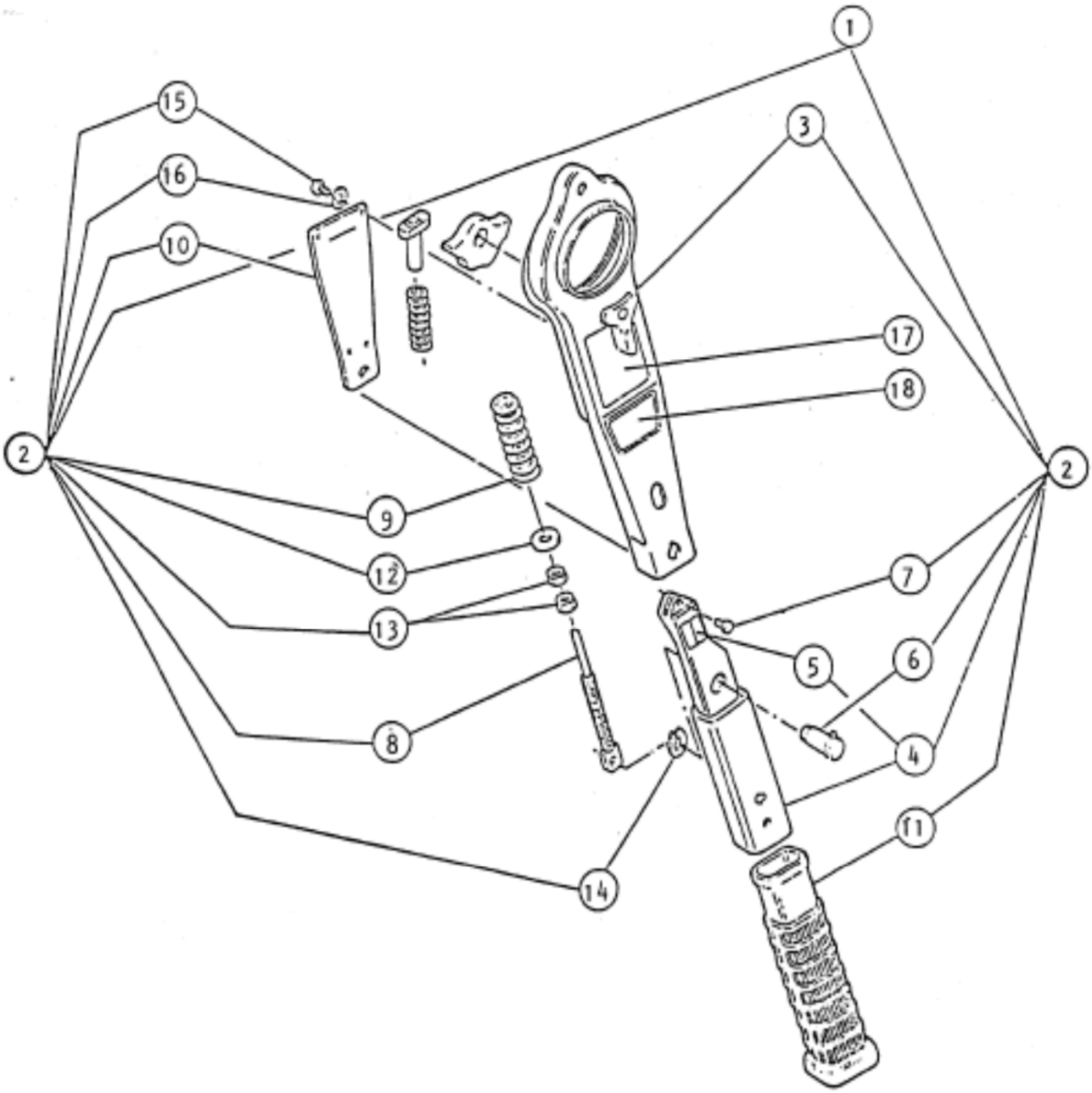
GROUND SUPPORT EQUIPMENT

Section 12 - APPENDIX– LB SERIES LEVER HOIST



Section 12 - APPENDIX– LB SERIES LEVER HOIST

LEVER ASSEMBLY FOR LOAD SIGNAL TYPE



Section 12 - APPENDIX– LB SERIES LEVER HOIST

ROUSTABOUT II

LEVER CHAIN HOIST PARTS

ITEM NO.	DESCRIPTION	QTY	PART NO.				
			3/4 TON	1-1/2 TON	3 TON	6 TON	9 TON
1	HOOK, TOP ASSY	1	3472445	3472446	3472447	3472448	3472449
2	HOOK, TOP	1	---	---	---	---	3472450
3	LATCH, SAFETY	1	3472451	3472452	3472453	3472454	3472455
4	SHAFT	1	---	---	---	---	3472456
5	PIN, STOPPER	4	---	---	---	3472457	
6	YOKE, TOP SET	1	---	---	---	---	3472458
7	SHEAVE, IDLE	1	---	---	---	---	3472459
8	BOLT, SOCKET	3	---	---	---	---	3472460
9	NUT, LEVER	3	---	---	---	---	3472461
10	HOOK, BOT. ASSY	1	3472462	3472463	3472464	3472465	3472466
11	HOOK, BOT.	1	---	---	---	3472467	3472450
12	LATCH, SAFETY	1	3472451	3472452	3472453	3472454	3472455
13	SHAFT	1	---	---	---	3472456	
14	YOKE, BOT. SET	1	---	---	---	3472469	3472470
15	SHEAVE, IDLE	1	---	---	---	3472459	
16	BOLT, SOCKET	3 (2)	---	---	---	3472471	3472460
17	NUT, LEVER	3 (2)	---	---	---	3472472	3472461
18	NAMEPLATE C	1	---	---	---	3472473	3472587
19	PIN, CHAIN	1	3472474	3472475	3472476	3472477	
20	LINK, STOPPER	1	3472479	3472480	3472481		
21	NUT, SLOTTED	1	3472482	3472483	3472484	3472485	
22	PIN, SPLIT	1	---	---	---	3472486	
23	PIN, SPLIT	1	3472487	3472488	3472489	---	---
24	SIDE PLATE A	1	3472490	3472491	3472492		
25	SIDE PLATE B	1	3472493	3472494	3472495		
26	CASE, GEAR	1	3472496	3472497	3472498		
27	GEAR # 2	2	3472499	3472500	3472501		
28	PINION	1	3472502	3472503	3472504		
29	GEAR LOAD	1	3472505	3472506	3472507		
30	SHEAVE LOAD	1	3472508	3472509	3472510		
31	WASHER	1	3472511	3472512	3472513		
32	PLATE, FRIC.	2	3472514	3472515			
33	DISC, RATCHET	1	3472516	3472517			
34	DISC, FRIC.	1	3472518	3472519			
35	BUSHING	1	3472520	3472521			
36	PAWL	2	3472522	3472523	3472524		
37	SPRING, PAWL	2	3472525	3472526			
38	WHEEL,CHANGEOVER	1	3472527	3472528			
39	GUIDE, CHAIN	2	3472529	3472530	3472531		
40	STRIPPER	1	3472532	3472533	3472534		
41	PIN, TOP	1	3472535	3472536	3472537		
42	COVER, BRAKE	1	3472538	3472539	3472540		
43	NUT	4	3472541		3472542		
44	SPRING WASHER	4	3472543		3472544		
45	NUT, SLOTTED	1	3472545		3472546		
46	NUT	4	3472547		3472548		

Figures in parentheses show the number for 9 Ton Capacity (Items 16, 17)

Section 12 - APPENDIX– LB SERIES LEVER HOIST

ROUSTABOUT II

LEVER CHAIN HOIST PARTS

ITEM NO.	DESCRIPTION	QTY	PART NO.				
			3/4 TON	1-1/2 TON	3 TON	6 TON	9 TON
47	SPRING WASHER	4	3472549		3472550		
48	PIN, SPLIT	1	3472551	3472552			
49	SNAP RING	2	3472553	3472554			
50	KNOB, FREE	1	3472555	3472556			
51	NAMEPLATE U	1	3472557				
52	GUIDE, GM	1	3472558	3472559			
53	SPRING, IDLE	1	3472560	3472561			
54	SPRING, BRAKE	1	3472562	3472563			
55	HOLDER, SPRING	1	3472564	3472565			
56	LEVER ASSY.	1	3472566	3472567			
57	LEVER	-	NOT FOR SALE/ NOT SOLD SEPARATELY				
58	GRIP	1	3472568	3472569			
59	NAMEPLATE	1	3470406	3470407	3470408	3470409	3470410
60	PAWL, CHANGEOVER	1	3472575	3472576			
61	SCREW, MACHINE	1	3472577	3472578			
62	SHAFT SPRING	1	3472579	3472580			
63	SPRING,CHANGEOVR	1	3472581	3472582			
64	NUT	2	3472583	3472584			
65	SPRING WASHER	2 (3)	3472585	3472586			
66	LOAD CHAIN	-	LCL4B008	LCCF015	LCCF025		

Figures in parentheses show number for 3/4 Ton (Item 65)

ROUSTABOUT® II

SIGNAL LEVER ASSEMBLY PARTS

ITEM NO.	DESCRIPTION	QTY	PART NO.				
			3/4 TON	1-1/2 TON	3 TON	6 TON	9 TON
1	LEVER ASSEMBLY	1	3471401	3471402			
2	LEVER	-	NOT FOR SALE/ NOT SOLD SEPARATELY				
3	LEVER	-	NOT FOR SALE/ NOT SOLD SEPARATELY				
4	HANDLE	-	NOT FOR SALE/ NOT SOLD SEPARATELY				
5	SIGNAL PLATE	-	NOT FOR SALE/ NOT SOLD SEPARATELY				
6	SHAFT A ASSY.	1	3471403	3471404			
7	SHAFT B	1	3471405	3471406			
8	SPRING AXLE	1	3471407	3471408			
9	SPRING, COIL	1	3471409	3471632			
10	COVER, INNER	1	3471633	3472468			
11	GRIP	1	3472570				
12	DISC	1	3472571				
13	NUT	2	3472572				
14	U-RETAINER	1	3472573				
15	SCREW	4	3472574				
16	SPRING WASHER	4	3471901				
17	NAMEPLATE	1	3470406	3470407	3470408	3470409	3470410
18	NAMEPLATE B	1	3471902				

Section 12 - APPENDIX– LB SERIES LEVER HOIST