FOREWORD

Read this Service Manual before performing maintenance of the breaker!
It contains the information you need to correctly use and maintain the breaker.

The Delivery Card and Warranty registration record is supplied with each breaker, which describes the warranty we provide for the product. The delivery card must always be filled in and immediately sent to Odin Hammer. This is important both for you and for us. The Odin Hammer installation form must be attached.

Odin Hammer has built up an extensive service organization to be able to provide required service for our breaker.

Odin Hammer dealers and service workshops are equipped with the necessary special tools and well dimensioned parts stocks where only genuine parts are used for service and repairs.

Customers should contact Odin Hammer dealer for service and parts, quoting the serial numbers of the breaker.

The maintenance instructions in this book must always be followed.

Odin Hammer reserves the right to make the change to the product without prior notice and without assuming any responsibility to carry out the same changes to products already sold or manufactured.

*****NOTE*****

The descriptions in this book do not apply to any particular specification. Both standard and optional equipment are covered, and each breaker is equipped and set in accordance with each specific order. Consequently, the standard of optional equipment is not marked in the text in this book.

IMPORTANT SAFERY INFORMATION

Most accidents are caused by failure to observe the basic safety rules or precautions. Basic safety precautions are outlined in the description of this book where hazards exist. If these warnings are not heeded, specific hazards could cause bodily injury or death.

1. Service personnel must read and understand this Odin Hammer Service Manual.
2. Keep personnel and bystanders clear of breaker while in operation. Flying debris can cause serious or fatal injury.
3. Do not operate breaker without a suitable shield between the breaker and operator. Also flying debris can cause serious or fatal injury.
4. Do not make hard face or sharpen the rod with a cutting torch. The excessive heating from cutting or welding causes brittleness, breakage, and flying pieces. Re-sharpen only with a lathe or milling machine using sufficient coolant or reforging by accredited blacksmith.
5. Fully extend the rod while charging the breaker with nitrogen gas. Stay clear of the rod while charging.
6. Do not disassemble a breaker before discharging the breaker gas pre-charge to prevent injury or death.
7. Use nitrogen gas only.
8. Operate breaker from operator's seat only.
9. Match breaker size to carrier according to Odin Hammer recommendations.
10. Use proper lifting equipment and tools when handling or servicing the breaker.
11. Wear ear protection if conditions warrant.
12. Wear safety glasses when driving out boom pins. Beware of flying metal chips.
13. Do not alter the breaker without authorization from Odin Hammer.
14. Use only Odin Hammer rods and replacement parts. Odin Hammer specifically disclaims any responsibility for any damage or injury that results from the use of any rod or part that is not sold or approved by Odin Hammer.

INTRODUCTION

This manual contains instructions for servicing, maintenance, and repair so that Odin Hammer hydraulic breakers can be used in the best conditions. Read this manual thoroughly before attempting to disassemble or repair the breaker.

For additional information or help with any complex problem encountered, please contact Odin Hammer.

BASIC OPERATING INSTRUCTIONS

1. Read Operation Manual.
   Do not lift with rod.
   Place the rod against the object at 90 angles.
   Avoid idle strokes or wrong working angle.
   Do not strike in one spot for more than 30 seconds at a time. If object does not break, stop the breaker, and change position of the chisel.
2. Grease chisel every 2~4 hours of working.
   Do not operate with a dry chisel.
3. Perform visual inspections daily.
   Do not operate with loose or missing nuts, fittings, etc.
4. Maintain a clean hydraulic system.
   Keep hoses clean and capped when dismounting or string breaker.
5. Do not submerge breaker underwater.
   Unless modified for underwater operation.

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6. TOOL CLAIM WARRANTY GUIDE

<1> STANDARD SPECIFICATION

DYB SERIES (WITH SILENCE BRACKET)

DESCRIPTION	UNIT	OD 150	OD 190	OD 220	OD 400	OD 600	OD 900
Operating Weight	Kg	100	134	148	186	304	405
	Lb	220	295	326	409	625	891
Height [Incl. Tool]	mm	1180	1200	1245	1280	1590	1683
	Inch	46.5	47.2	49.0	50.4	62.6	69.3
Operating pressure	Bar	80~100	100~120	100~120	110~130	140~160	140~160
	Psi	1160~1450	1450~1740	1450~1740	1595~1885	2031~2321	2031~2321
Operating oil flow	ℓ/min	10~20	15~25	25~40	25~45	30~45	40~70
	gal/min	2.6~5.3	4.0~6.6	6.6~10.6	6.6~11.9	7.9~11.9	10.8~18.4
Impact rate	bpm	700~1200	700~1200	550~1000	500~900	500~800	400~800
Impact energy	joule	180	254	286	447	620	945
Hose diameter	mm	Ø9	Ø12	Ø12	Ø12	Ø12	Ø12
	inch	3/8	3/8	1/2	1/2	1/2	3/4
Rod Diameter & Weight	mm	Ø 36	Ø 45	Ø 53	Ø 60	Ø 68	Ø 75
	inch	Ø 1.4	Ø 1.8	Ø 2.0	Ø 2.2	Ø 2.7	Ø 3.0
	kg	4	6	10	14	18	26
Applicable Carrier	m^3	Under 0.04	0.03~0.07	0.06~0.1	0.08~0.2	0.15~0.25	0.2~0.4
	Ton	0.8~2.5	1.2~3.0	2.5~4.5	3.0~5.5	4.0~7.0	6~9
	ft^3	Under 1.4	Under 2.5	2.2~3.5	2.5~7	5.3~8.8	7.0~14.1

DESCRIPTION	UNIT	OD 1100	OD 2000	OD 2800	OD 4200	OD 5500	OD 8800
Operating Weight	Kg	528	880	1307	1903	2495	3957
	Lb	1162	1936	2750	4187	5410	8763
Height [Incl. Tool]	mm	1940	2320	2410	2860	3170	3775
	Inch	76.4	91.3	95	112.6	125	148.6
Operating pressure	Bar	140~160	150~170	150~180	160~180	160~180	160~180
	Psi	2031~2321	2176~2466	2176~2610	2321~2611	2310~2610	2321~2611
Operating oil flow	ℓ/min	45~85	80~120	100~140	130~170	170~230	200~300
	gal/min	11.9~22.5	21.1~31.7	26~36	34.3~44.9	45~62	52.8~79.3
Impact rate	bpm	400~700	400~700	400~600	400~600	300~400	250~350
Impact energy	joule	1490	2630	4740	6380	10920	14210
Hose diameter	mm	Ø19	Ø19	Ø25	Ø25	Ø32	Ø31
	inch	3/4	3/4	1	1	11/4	11/4
Rod Diameter & Weight	mm	Ø 90	Ø 100	Ø125	Ø140	Ø155	Ø175
	inch	Ø 3.5	Ø 3.9	Ø4.9	Ø5.4	Ø6.1	Ø6.9
	kg	43	60	97	133	180	247
Applicable Carrier	m^3	0.25~0.5	0.45~0.6	0.6~0.7	0.7~0.9	0.9~1.1	1.4~2.0
	Ton	7~11	11~16	14~18	19~26	28~40	42~55
	ft^3	8.8~17.7	16~21.2	18~24	25~32	27~34	42.4~60

<2> **MAINTANENCE TOOL KIT**

DYB Series

Description	Size	OD 150			OD 190			OD 220			OD 400		
		side	top	silence	side	top	silence	side	top	silence	side	top	silence
Toolbox (mm)	350 x 175 x 125	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	420 x 190 x 190										✓	✓	✓
	500 x 230 x 240												
Grease gun	350 cc	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	500 cc												
L-wrench (mm)	5 mm												
	8 mm												
	10 mm												
	12 mm												
	14 mm												
	17 mm												
	19 mm												
Double spanner (mm)	17 x 19										✓		
	19 x 22	✓	✓	✓	✓	✓	✓	✓		✓			✓
	27 x 30							✓	✓	✓	✓	✓	✓
	30 x 32				✓		✓						
Single spanner (mm)	13	✓	✓	✓	✓	✓	✓	✓		✓			
	19								✓			✓	
	22												✓
	24									✓			
	30	✓	✓	✓		✓							
	32												
	36												
	41												
	46												
	50												
Hammer spanner (mm)	30	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	32							✓	✓		✓	✓	✓
	36											✓	✓
	41												
	46												
	55												
	65												
	70												
	75												
	85												

Description	Size	OD 600			OD 900			OD 1100			OD 2000		
		side	top	silence	side	top	silence	side	top	silence	side	top	silence
Toolbox (mm)	350 x 175 x 125												
	420 x 190 x 190	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	500 x 230 x 240												
Grease gun	350 cc	✓	✓	✓									
	500 cc				✓	✓	✓	✓	✓	✓	✓	✓	✓
L-wrench (mm)	5 mm												
	8 mm										✓	✓	✓
	10 mm												
	12 mm												
	14 mm												
	17 mm												
	19 mm												
Double spanner (mm)	17 x 19												
	19 x 22			✓	✓		✓	✓		✓	✓	✓	✓
	27 x 30	✓	✓	✓	✓		✓	✓		✓			
	30 x 32												
Single spanner (mm)	13												
	19	✓	✓										
	22												
	24												
	30										✓	✓	✓
	32												
	36							✓		✓	✓	✓	✓
	41												
	46												
	50												
Hammer spanner (mm)	30			✓					✓	✓		✓	✓
	32												
	36												
	41	✓	✓	✓	✓	✓							
	46				✓	✓		✓	✓	✓			
	55										✓	✓	✓
	65												
	70												
	75												
	85												

Description	Size	OD 2800			OD 4200				OD 5500			OD 8800		
		side	top	silence	side	top	silence (A)	silence	side	top	silence	side	top	silence
Toolbox (mm)	350 x 175 x 125													
	420 x 190 x 190													
	500 x 230 x 240	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
Grease gun	350 cc													
	500 cc	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
L-wrench (mm)	5 mm				✓	✓	✓		✓		✓	✓		✓
	8 mm													
	10 mm	✓	✓	✓	✓	✓	✓	✓						
	12 mm								✓		✓	✓		✓
	14 mm				✓		✓		✓		✓			
	17 mm											✓		✓
	19 mm				✓		✓		✓		✓	✓		✓
Double spanner (mm)	17 x 19													
	19 x 22	✓	✓	✓			✓	✓	✓		✓	✓		✓
	27 x 30	✓		✓	✓		✓	✓						
	30 x 32								✓		✓			
Single spanner (mm)	13													
	19				✓									
	22													
	24				✓		✓	✓				✓		✓
	30											✓		✓
	32													
	36													
	41	✓	✓	✓	✓		✓	✓						
	46													
	50								✓		✓	✓	✓	✓
Hammer spanner (mm)	30													
	32													
	36			✓										
	41						✓	✓						
	46										✓			✓
	55			✓										
	65	✓		✓			✓	✓			✓			
	70													
	75				✓		✓	✓	✓		✓			✓
	85											✓		✓

<3> WEARING TOLERANCE

The chisel and related parts are worn away by the action of the piston on the chisel when breaking an object, and the heat generated by friction of the chisel on the related parts. When these parts are used beyond their wear limits, the piston and chisel may be damaged critically.

Replacement of the parts below due to wear is not covered by the warranty.

1. Chisel, Chisel bushing and Front bushing.

Check the chisel and chisel bush/front bush for wear every 50 hours of hydraulic hammer use or monthly. If the hydraulic hammer has too much clearance between the chisel and both bushes, this can lead to damage, or breakage of the chisel through irregular piston contact.

Chisel

Original diameter(D_1) for the chisel is indicated below.

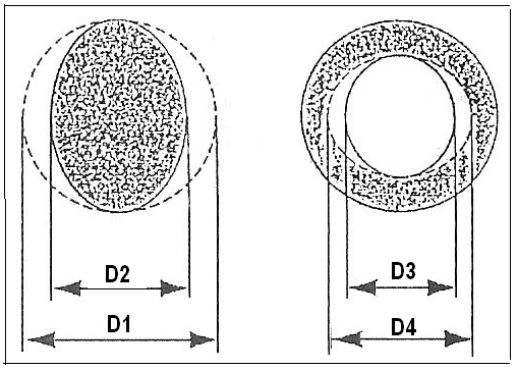
Replace the chisel if the diameter(D_2) is exceeded lower limit specified in the table.

Chisel bushing and front bushing.

The diameters of the chisel bushing and the front bushing for a model, if they are new, are the same.

The specified diameter(D_3) for chisel bushing and front bushing is indicated below.

Replace both bushings if the diameter(D_4) is exceeded upper limit specified in the table.



D_1: Original diameter of chisel
D_2: Minimum diameter of chisel worn out.
D_3: Original diameter of bush
D_4: Maximum diameter of bushing worn out.

Specified diameter of chisel, chisel bushing and front bushing

Hammer model	Nominal diameter of Chisel and bushing (D_1, D_3)	Lower limit of Chisel (D_2)	Upper limit of Chisel Bushing & Front Bushing (D_4)
OD 150	36	34	39
OD 190	45	43	48
OD 220	53	50	56
OD 400	60	57	63
OD 600	68	65	71
OD 900	75	72	78
OD 1100	90	88	93
OD 2000	100	97	104
OD 2800	125	122	128
OD 4200	140	137	143
OD 5500	155	152	158
OD 8800	175	172	178

2. Chisel pin

Check the chisel pin for wear, every 50 hours of hydraulic hammer use or monthly as each time the chisel is changed.
Any burr and swelling on the chisel pin must be smoothed off burrs.

■ The chisel of the OD 150 – OD 900 is assembled by only circular type chisel pin.
The specified diameters(D_2) of the chisel pins are indicated below.

Replace the chisel pin, if the diameter(D_1) is 2mm, less than the original diameter(D_2).

■ The chisel of the OD 1100 – OD 8800 is composed of two plate type chisel pins.
The specified width(D_4) for the chisel pin is indicated below.

If wear on one-side "A" exceeds 1.5mm, the chisel pin must be turned to use the other side "B".
Replace the chisel pin, if the width (D_3= "A" + "B") is 3mm, less than specified width(D_4)

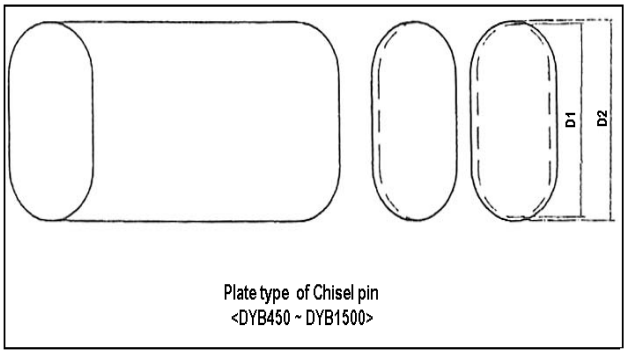
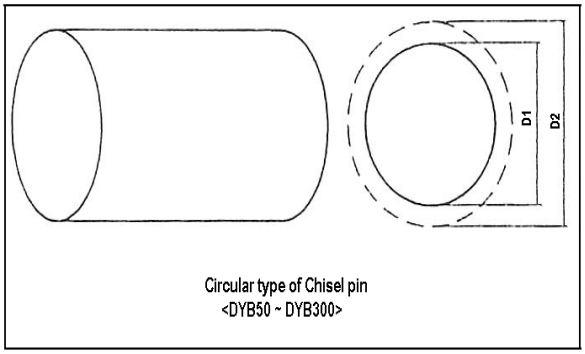


Plate type of Chisel pin
<DYB450 ~ DYB1500>



Circular type of Chisel pin
<DYB50 ~ DYB300>

Unit: mm

Hammer Model	Original Dimensions (D1)	Lower Limits (D2)	Pin shape
OD 150 - 190	25	23	Circular
OD 220	30	28	
OD 400	30	28	
OD 600	38	36	
OD 900	38	36	
OD 1100	40	38	plate
OD 2000	60	58	
OD 2800	75	73	
OD 4200	89	86	
OD 5500	100	98	
OD 8800	100	98	

<4> TORQUE CHART

On percussive tools such as hydraulic hammer, the screw couplings are subjected to particularly high loads.
During the first 50 operating hours the screw couplings on the hammer must be checked daily and there after once a week. Tighten any loose connections taking care not to exceed the prescribed tightening torque.

■ **The following bolts/couplings must be checked regularly.**

Application	Hex. size(mm)	Torque(kgf.m)	Hammer
Through bolt	30	40 ~ 45	OD 150, 190, 220
	36	45 ~ 50	OD 400
	41	80 ~ 85	OD 600 - 900
	46	100 ~ 120	OD 1100
	55	150 ~ 160	OD 2000
	65	170 ~ 200	OD 2800
	70	250 ~ 300	OD 4200
	75	300 ~ 350	OD 5500
	80	350 ~ 380	OD 8800
Side bolt	30	30 ~ 35	OD 150, 190, 220
	36	40 ~ 45	OD 400
	41	60 ~ 65	OD 600
	46	70 ~ 75	OD 900 - 1100
	55	140 ~ 150	OD 2000
	60	160 ~ 180	OD 2800
	65	220 ~ 240	OD 4200
	75	270 ~ 300	OD 5500
	85	300 ~ 320	OD 8800
Adapter	27	45 ~ 50	OD 600
	30	55 ~ 60	OD 900, 1100, 2000
	36	70 ~ 75	OD 2800
	41	80 ~ 100	OD 4200
	46	100 ~ 120	OD 5500, 8800

<5> DISASSEMBLY AND REPAIR

The hydraulic breaker removed from the carrier and sent to the workshop is covered with mud and rock powder, etc. Therefore, wash it with a steam washer. At this time, if the hydraulic hose is connected, cover it with a hose plug, install a union cap, and then wash it. Remove the top bracket right after washing in order to disassemble the breaker easily.

Preparation for disassembly

Prepare the tools shown below in advance for disassembly and repair.

1. Standard tools
2. Optional tools
3. Special tools
4. Seal kit parts
5. For color check(Washing solution, Permeating solution, Developing solution)
6. Wood block, Waste cloth, Nylon sling, Pipe
7. Hoist, Workbench, Vice
8. Compressor, Washer
9. Measuring tools (Sliding calipers, Scale or the like)
10. Hammers (Big hammer, Single-hand hammer, Plastic hammer)
11. Hydraulic oil, Washing oil, Brush
12. Lithium grease, Molybdenum grease, Never seize, Screw lock
13. Oil stone, Abrasive paper, Buffing grindstone
14. General tools, e.g., a snap ring pliers, a minus screw driver

Silence bracket Disassemble

1. Put the breaker on wood blocks using hoist.
   - Caution: Make sure the breaker is stable
2. Remove the cover plate (A & B) using L-wrench.
3. When removing the rubber cap from bracket, insert the long nose ripper to the groove of rubber cap and pull out the rubber cap in slide.
4. Pull out rubber cap using screwdriver or end-pointed instruments.
5. Disassemble Rubber cap
6. Insert the pin into the rubber cap hole and hit the pin using a handle hammer. Remove the stop pin.
7. Use a screwdriver to remove the rubber cap located at the bottom of the tool retainer.
8. Push up the tool retainer using pin, and take out the tool retainer.
9. Set the nylon sling in the center of the tool and lift it a little and remove the tool slowly.
10. Remove the oval rubber cap using a screwdriver.
11. Disassemble bolts and nuts of cover plate using spanner and pipe. Remove the cover plate. Take out upper damper.
12. Loosen the four (4) hex bolts and nuts of the guide plate.
13. Disassemble the guide plate form bracket, and remove the urethane plate from disassembled guide plate using a screwdriver.
14. For separation of main body and bracket, lift topside of breaker and stand the breaker vertically.
15. Install the eye bolt on the back head and lift the main body.
16. Remove the urethane upper plate and check the status of the parts.
17. Remove the urethane lower plate and check the status of the plate.
18. Remove the bottom damper installed and check the status of the damper.

Main Body Disassembles

19. Place the main body on wood blocks stably. The main adapter should be upside.

Back Head Gas Remove

20. Remove the plug on the charging valve of the back head using L-wrench (5mm). Push the spool inside the charging valve with Ø5 of pin to discharge N_2 gas.

- Warning: If the N_2 gas is not discharged completely, it can be a cause of fatal trouble. .

Tie Rod Disassembles

21. Loosen all four (4) hex nuts of tie rods using power wrench (hammer spanner) and pipe.
22. After loosen the nuts, take out three (3) tie rods from main body firstly. In order to stand the main body, remain one tie rod a little bit loosened.
23. Set the nylon sling to the hex bolts or eye bolts and lift the breaker body. Later on, stand the main body vertically.
24. Remove the remaining one tie rod.

Back Head Disassembly

25. Lift the back head using eye bolt and remove it.

Piston Disassembly

26. Install a eye bolt to the upper end of the piston and lift the piston with a hoist slowly and remove the piston fully.
27. Stand the piston on a clean place safely. And wipe the hydraulic oil sticking on it with a waste cloth.

Seal Retainer Disassemble

28. Remove the seal retainer by tapping it up with a rubber hammer slowly.

Valve Set Disassemble

29. Lift up the valve plug using eye bolt and pin. Disassemble the valve plug completely.
30. Disassemble the valve and valve sleeve as illustrated.

Socket Plug Disassemble

31. Disassemble the socket plug using rubber hammer and L-wrench, check the o-ring condition.

Cylinder Disassemble

32. Set the nylon sling to the blots on both sides of the cylinder and lift the cylinder. While lifting it, insert the pipe into the tie rod hole and lay it down.
33. Place the cylinder on the front head as illustrated.

Seal Disassemble

34. Remove seals from the front side of the cylinder.

Valve Adjuster Disassemble

35. Remove the valve adjuster with an L-wrench.
36. After removing valve adjuster, check back-up ring and o-ring.

Cylinder Inside Check

37. Check the cylinder inside visually and hand touch.
38. If there are no damages in inside of the cylinder wash the cylinder inside and oil lines using the thinner or benzene clearly. Put hydraulic oil to the seal places of the seal places of the cylinder after drying cylinder inside by pressured air.

Front Head Parts Disassemble

39. Remove two snap rings using snap ring pliers.
40. Remove the rubber plug and front bush pin using hammer and pin.
41. Remove two front bush pin.
42. Using snap ring pliers, remove the rubber plug turning counterclockwise.
43. Remove the stop pin fixed chisel bush and tool retainer with hammer and pin.
    Remove all stop pins using hammer and pin.

Front bush Disassemble

44. Remove the front bush.

Chisel bush Disassemble

45. Prepare the disassembling jig of chisel bush. (pressing pin, disassembling jig, hammer)
    Reset the front head upside-down, insert the disassembling jig to the chisel bush. And place the pressing pin on the disassembling pin.
46. Inserting the disassembling jig put the front head with the bottom up, and insert the disassembling jig to the chisel bush position.
47. Insert the disassembling jig.
48. Remove the chisel bush with hammer or hydraulic pressure under the disassembling jig as it was inserted.
49. Front bush and chisel bush disassembled.

Main Body Assemble

50. Prepare the whole seal kit.

Cylinder Seal Assemble

51. Install the seal kits.
    Inserting way of seal insert the lower side of seal to seal position of cylinder and press the seal lower side using hand and the other hand make the seal as shape of "U" character as next picture. Later on, insert the seal upper side to seal position of cylinder.
52. Install the seal kits
    Inserting dust seal, u-packing and buffering seal to the front side of cylinder as an order. And assemble the back-up ring of buffering seal after leaving it in 60˚C oil for three minutes.
    - Caution: The groove side of u-packing and buffering seal should be assembled to the inside.
53. Inserting back-up ring to buffering seal after inserting buffering seal, the rounded position of back-ring and buffering seal should be assembled as contacting each other.
54. Check the assembled status after seal installation.

Socket Plug Assemble

55. Assemble the socket plug using L-wrench.

Valve Adjuster Assemble

56. Assemble the valve adjuster using L-wrench and spanner.

Seal Retainer Seal Assemble

57. Install one o-ring to outside of the seal retainer after washing the seal retainer with thinner or benzene and dry the seal retainer by pressurized air.
    Install two o-rings and two step seals to inside of the seal retainer, then install the gas seal.
    When installing the step seal, the taper side should be installed to inside of the cylinder and gas seal should be installed to the back head side.

Chisel bush Assemble

58. Insert the chisel bush to front head slowly.
    (1) Put the front head with its cover side up.
    (2) Assembling the chisel bush insert a new chisel bush into the front head and put the assembling jig on it.
    Later on, place the pressing pin on jig and press it using a hammer.
    - After reducing the chisel bush size using liquefied N_2 gas or dry ice, and assemble the chisel bush to the front head.

Front bush Assemble

59. After apply a coat of grease to inside of the front head, assemble the front bush slowly.

Front Head Parts Assemble

60. To prevent to separation of the chisel bush and the front bush from the head, assemble the front bush pin and the stop pin.
61. To prevent to separation of the front bush pin and the stop pin from the front head push the rubber plug and assemble the snap ring.

Cylinder Assemble

62. Hoist the front head to set it with the chisel bush. Apply a coat of grease to inside of the front head.
63. Insert the rock pin to the front head and lift the cylinder with a hoist. Assemble the cylinder by checking the seal and positing the rock pin position.

Piston Assemble

64. Check the piston for rust, cracks or dirt on surface. If there are any scratches on the piston surface, grind the scratched part first. And finish the grinding work by sand paper (#400~#1,000).
65. Wash the piston with a thinner and dry it using pressurized air. Check the piston clearness and apply a coat of hydraulic oil to the piston surface.
66. Before assembling the piston to the cylinder, insert one lower o-ring of the seal retainer to the cylinder
67. Lift the piston coated with grease and fir it to the cylinder body, and lower the piston slowly.

Seal Retainer Assemble

68. Remove the hoist from the piston and set the seal retainer to the piston head. (Insert the piston carefully and completely.)
69. After washing the valve and valve plug well, coat them fully with hydraulic oil. First insert the valve, check if it is moving easily with your finger and then insert the valve plug.

Back Head Assemble

70. After check the damage status of the o-ring to prevent N_2 gas leakage from the back head, exchange for a new o-ring if the o-ring is broken.
71. Assemble the back head to the cylinder with a hoist.

Tie Rod Assemble

72. After assembling the back head, set the four tie rods.
73. After inserting the tie rods, assemble the tie rods into the rod nuts with vice pliers to hold the square parts of the tie rod. Insert the four washers to the upper part of the tie rod. Assemble four hex. Nuts to tie rod loosely.
74. Set a nylon sling to the bolts or eye bolts on both sides of the cylinder and lift the breaker with a hoist to lay it down.
75. Set the main body on wood block and special jig.
76. Tighten the tie rod at specified torque using a power wrench (hammer spanner) and pipe.

Back Head Gas Charging

77. After assembling the tie rods, charge N_2 gas to the back head. Connect the N_2 gas hose to the back head.
    Charge the N_2 gas to the back head at a litter higher pressure than specified pressure.
78. Remove the connecting hose and fix at the specified pressure.
79. After charging N_2 gas, check if gas is leaking using hydraulic oil between the cylinder and the back head.
    Check if gas is leaking out of the back head charging valve4.
    After checking has leakage of the back head charging valve and between the back head and the cylinder, close the charging valve cap.

Silence Bracket Assemble

80. Prepare the low-noise bracket and urethane dampers.
81. Assemble the bottom damper to the bottom bracket.
82. Assemble the urethane plate to the brackets lower and side.
83. Assemble the urethane plate to the middle upper and side brackets.
84. After assembling all urethanes to brackets, stand it vertically for assembly body.
85. In order to assemble the body and the bracket, lift the body with a hoist.
    Lift the body with a hoist, and assemble the body to the bracket slowly.
86. After assembling the body to the bracket, lay down the bracket on wood blocks carefully.
87. Assemble the guide plate and urethane.
    Assemble the guide plate to the bracket.
88. Fasten bolts and nuts using a spanner.
89. After insert the urethane damper to the cover plate, assemble the cover plate to the bracket.
90. Fasten bolts and nuts to cover the plate and the bracket.
91. After fastening bolts, insert the rubber cap to both sides of the bracket.
92. Insert the tool to the main body with hoist.
93. Assemble the tool retainer.
94. Insert the rubber cap to the hole of the tool retainer.
95. Insert the rubber cap to hole in the diagram on the right as shown. (Applying a coat of grease or oil on the outside of the rubber cap will make it easy to insert into the hole.)
96. Push the rubber cap using instruments such as a screwdriver or a long nose ripper according to the numbering order as shown in the diagram and insert the outside diameter of the rubber cap to the bracket hole.
97. After assembling the tool retainer, insert the stop pin and the rubber plug.
98. Insert the rubber cap to the bracket.
99. Assemble rubber cap.
100. Assemble the cover plate to the upper side of the bracket. Fasten the socket bolts using an L-wrench.
101. The breaker completely has been assembled internally and externally. The breaker has been completely assembled internally and externally.

<6> TOOL CLAIM WARRANTY GUIDE

The purpose of this guide is to enable you to advise your customer as to the correct application of Odin Hammer and assist you to resolve complaints immediately as they occur.

When a tool has apparently failed to give satisfactory service life, a visual inspection often quickly resolves the cause and saves transport costs and frustration when warranty is rejected.

How a Hydraulic Breaker Breaks Rock and Concrete.

When the hammer piston strikes the top of a hydraulic breaker, it sends a compressive stress wave down to the working end of the tool. Provided the hydraulic breaker is in contact with the rock or concrete that requires breaking, it is this compressive stress wave which fractures the rock. Immediately following the compressive stress wave, a tensile stress wave is formed due to the hammer piston lifting from the top of the hydraulic breaker. This cycle of compressive and tensile stresses flowing down the tool of repeated for each hammer blow.

Obviously, anything that interferes with the 'strength' if the compressive stress wave during service, for example 'free running' or bending of the hydraulic breaker due to leverage, will result in loss of breaker efficiency of up to 80% and possible fatigue failure of the tool itself.

Cause and Effect of Fatigue

The continuous cycle of compressive and tensile stresses in the hydraulic breaker, even under correct operating conditions, create fatigue stress in the tool which can lead to the fatigue of a hydraulic breaker before it is worn out. Again, anything which interferes with the cycle of compressive and tensile stresses will also increase the level of fatigue stresses being applied to the hydraulic breaker and thus increase the risk of early fatigue failure of the tool.

1. The main cause of increased fatigue stress in a hydraulic breaker is any form of side pressure during service which creates bending. Thus utilizing the tool as a lever, using the incorrect driving angle or attempting to break ground using the pull of the machine are all detrimental to the life of a hydraulic breaker and should be avoided.
2. Other causes of increased fatigue stress in a hydraulic breaker include.
    a) Free running
    In general, this is any situation where the hammer piston strikes the top of the hydraulic breaker, but the working end is not in proper contact with the rock or concrete to be broken. This includes jobs where the tool slides off the work and also when breakthrough of thin concrete slabs or boulders occurs.
    b) Cold
    Low temperature causes a hydraulic breaker to be more susceptible to fatigue failure. Tools should be warmed before use.
    c) Mechanical and thermal damage
    Any form of damage to the surface of a hydraulic breaker renders it more liable to suffer fatigue failure. Thus all care must be exercised to prevent accidental gouging, or contact welding ('galling' or 'pick-up') due to contact between the tool and chuck bushing through the lack of lubrication or excessive leverage.
    d) Lubrication
    Care must be taken to avoid metal to metal contact that, as a result of galling or pick-up, could cause deep damage marks which, in turn, lead to the formation of fatigue cracks and eventual failure of the demolition tool. Ensure that the shank of the demolition tool is well lubricated before locating in the machine. Molybdenum disulphide grease is recommended for this application at three hourly intervals or as per manufacturers instruction.
    e) A rusty demolition tool is more likely to suffer fatigue failure, thus keep tools well-greased and sheltered from the weather when not in use.

Hydraulic breaker Fatigue Failure

A hydraulic breaker fatigue failure will generally occur approximately 4"(100mm) either side of the chuck front face (see Pic.3)

Another slightly less common failure area can fall approximately 8" (200mm) from the working end, subject to nature of use.

The fracture face itself will normally exhibit a semi-circular polished area with the remainder being of a rougher appearance (see Pic.4)

The polished semi-circular area in pic4 is the fatigue area and generally starts from a damage mark or other stress raiser no the outside of the hydraulic breaker and spreads inwards. The fatigue area slowly widens until the stresses being applied to the demolition tool cause sudden failure of the remaining section.
Generally, the size of the fatigue area indicates the level of stress applied to the tool, i.e. the smaller the fatigue area, the higher the stress level, although it must be borne in mind that once initiation of a fatigue crack has taken place, if requires a lower stress level to cause it to grow.

Typical Failures (guide to warranty claims)
Padley & Venables demolition tools are manufactured from first class materials and then heat treated to produce a fatigue and wear resistant tool.

Thus when a tool has apparently failed to give a satisfactory service life, a brief visual inspection can often give a quick indication of the cause.

Pic. 5
Typical fractures caused by excessive bending / leverage if the demolition tool. Warranty claims rejected.

Pic. 6
Typical of high stress fracture, usually caused by using the machine to "pull". Warranty claims rejected.

Pic. 7
Typical fracture caused by levering tool whilst buried in the burden. Warranty claims rejected.

Wear
Wear is influenced by ground conditions, but as a general guide the following applies.

Pic. 8
Blank tools worn more than 1/3 diameter or moils and chisels worn back more than 2(51mm) of working end classed as reasonable life. Warranty claims rejected.

Pic. 9
Mushrooming: this is caused by driving the chisel or point into hard dense material for too long a period of time without penetration. This generates intense heat, softening the point, thus causing it to "mushroom". This is not a manufacturing fault. Warranty claims rejected.

Pic. 10
Note fatigue lines originate from internal point, not other outer diameter. Very rare failure type due to steel defect. 100% warranty accepted.

Pic. 11
Tool head point run out.

(A) Due to user careless.
Warranty claims rejected.

(B) Due to material or heat treatment fault.
100% warranty accepted.