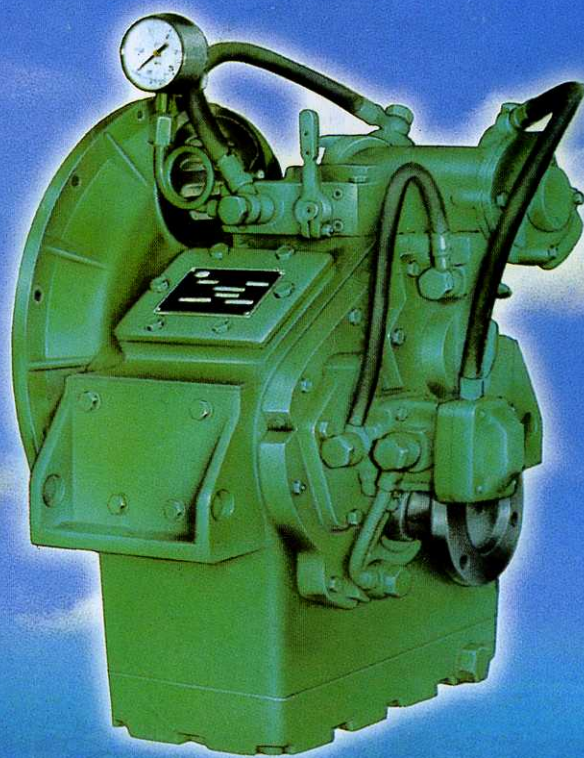


MA 系列

船用齿轮箱

Marine gearbox



杭州前进齿轮箱集团有限公司
(杭州 齿 轮 箱 厂)

HANGZHOUADVANCEGEARBOXGROUPCO.,LTD.
(HANGZHOU GEARBOX WORKS)

使用说明书

SERVICE MANUAL

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FOREWORD

In order to bring into play the function of the gearbox and obtain a long and reliable service, it is advised to study this manual carefully and be familiar with the technical feature and the operation, as well as maintenance.

For model MA100, the cooler is not fixed on the gearbox. When installing the power unit, ought to choose the suitable place for fixing cooler and connecting oil or water pipe correctly according to the mounting dimensions.

In a column order No, x means an alternative part. If need, should be marked when ordering.

Care should be taken that the contents covered in this manual may be somewhat different from the structure of the newly-made products, it is merely due to the improvements of our products in the lapse of time.

SECTION I General

Marine gearbox series MA possess the capabilities of ahead and astern, clutching and dis-clutching, reducing speed and bearing the propeller thrust. They can be coupled with various marine diesel engines according to their Capacity Chart so as to form a complete marine power unit, which is suitable for small boats navigating in inland rivers or in coasts.

The gearbox features are as follows:

1. The hydraulic system built in the gearbox made the operation easy from the bridge with remote control. A unit of pressure delay stepping up is fitted in the hydraulic control system and the clutch is smooth in engagement and thorough in disengagement.

2. Two sets of multiplate clutches are mounted at the output end and easy to dis-and re-assemble and maintain.

3. The housing is integral to ensure its rigidity and the precision for engaging.

4. Both ahead and astern are identical in reduction ratios and can transmit the rated power, especially suitable for boats equipped with twin-engines, which with the same rotation, and twin-propellers.

5. The emergency set is provided to ensure the boat travelling continuously in case of severe hydraulic failure.

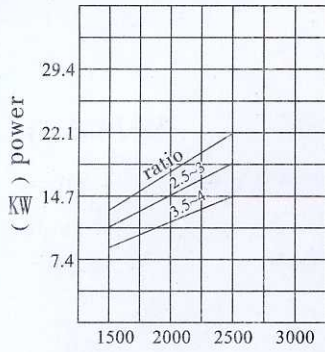
6. Bell housing and flexible input coupling are connected with the engine, so as to be looked-perfectly the whole unit and easily in mounting.

7. The range of the speed reduction ratios is wider as follows. Customer can choose it reasonably in accordance with the data of the engine or the boat and with transmission capacity.

Nominal ratio		1.5:1	2:1	2.5:1	3:1	3.5:1	4:1	4.5:1	5:1	5.5:1
Actual ratio	MA100	1.6:1	2:1	2.55:1	3.11:1	3.59:1	3.88:1			
	MA125		2.03:1	2.46:1	3.04:1	3.57:1	4.05:1	4.39:1	4.7:1	
	MA142		1.97:1	1.52:1	3.03:1	3.54:1	3.95:1	4.5:1	5.06:1	5.47:1

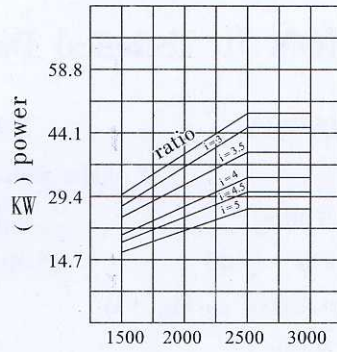


MA100 齿轮箱



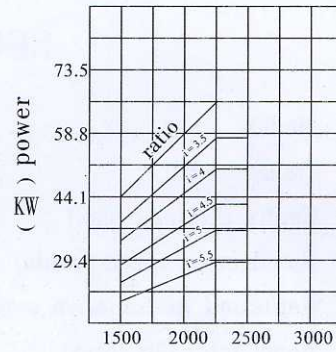
Input speed(r . min⁻¹)

MA125 齿轮箱



Input speed(r . min⁻¹)

MA142 齿轮箱



Input speed(r . min⁻¹)

SECTION II Technical Data

Model	MA100A	MA125A	MA142A
Transmission	3 shafts with 5 helical gears		
Centre distance (mm)	100	125	142
Rated input speed (r/min)	1500 ~ 3000	1500 ~ 3000	1500 ~ 2500
Ratio and transmission capacity (detail as Fig. 1)			
Rated propeller thrust (N)	3000	5500	8500
Permissible inclination angle	10° longitudinally 15° transversely		
Control type	Hydraulic control		
Time for reversing (s)	≤ 10		
Rotational direction of input shaft (facing the output end forward)	Counter-clockwise		
Rotational direction of output at ahead position	Contrary to that of input shaft		
Hydraulic pressure (MPa)	1—1.3		
Initial oil pressure (MPa)	0.15—0.4		
Max. oil temp. (°C)	≤ 80		
Flow of cooling water (L/min) (inlet water temp. ≤ 30°C)	~ 15	~ 25	~ 35
Oil grade	SD/CC30, SAE30; SD/CC40, SAE40 (in summer of the torrid zone)		
Oil capacity (L)	~ 2	~ 4.8	~ 5.8
Type of connected with engine	Flexible coupling		
Overhaul (bearing life) (h)	6000		
Overall dimensions (L × W × H)	289 × 420 × 420	343 × 494 × 485	367 × 560 × 540
Net weight (kg)	~ 60	~ 100	~ 130

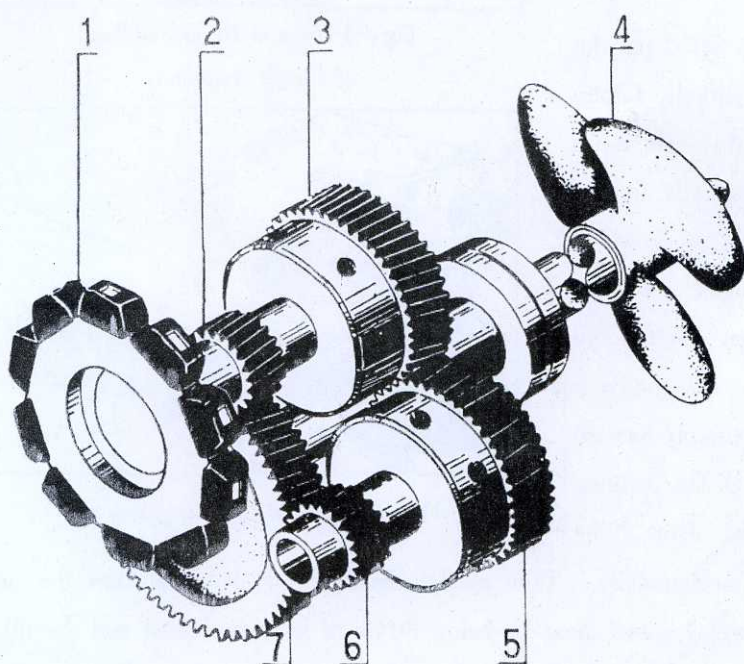
SECTION III Constructional Features and Dis-and Re-assembling of Gearbox

The said gearbox consists of input shaft, transmission shaft, output shaft, housing and hydraulic control system etc. Its principle of transmission as shown in Fig. 2.

The power flow is:

Ahead $1 \rightarrow 3 \rightarrow 2 \rightarrow 7 \rightarrow 4$

Astern $1 \rightarrow 3 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 4$



1. Input coupling
2. Ahead pinion
3. Ahead clutch
4. Output shaft
5. Astern clutch
6. Astern pinion
7. Driven gear

Fig. 2 Diagram for Transmission System

1. Input Shaft Assembly

The input shaft assembly consists of input flange, input shaft, friction plates, piston and gear etc., connected with engine by flexible coupling of which have two types, toothed rubber block and rubber transmission plate, be selected by customers.

The clutch is of wet-type multi-plates and the friction plates are made of powdered alloy and steel separately. In case of any crack on the plate surface, or crushed mark on toothface, or

warp with inclination of over 1.0mm , or worn out so such as its thickness is , for MA142A , the powder plate $\leq 2.4\text{mm}$ and the steel plate $\leq 1.7\text{mm}$, and for MA100 A or MA125A , the powder plate $\leq 1.8\text{mm}$ and the steel plate $\leq 1.3\text{mm}$, they are must be renewed .

When disassembling and inspecting , the clutch housing together with piston , friction plates and input shaft etc . are to be drawn out as shown in Fig. 3 . For reassembling , the clutch housing should be turned while pushed along so that the internal friction plates can be slipped into the clutch bracket in turn .

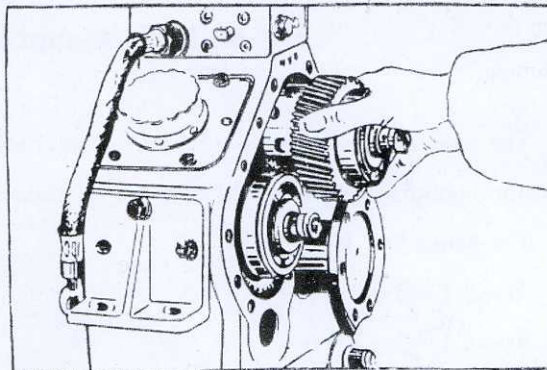


Fig. 3 Dis-and Re-assembling of Clutch Assembly

The emergency set is fitted on the clutch . In case of severe hydraulic failure and not be repaired instantly , use it for engaging the clutch mechanically to ensure travelling . In this case , as shown in Fig. 4 , first stop the engine , remove the rear-end cover of input shaft , and screw two inner-hex screws on the rear end of clutch housing alternatively forward by the wrench to make the piston pressing against the friction plates . Thus , the

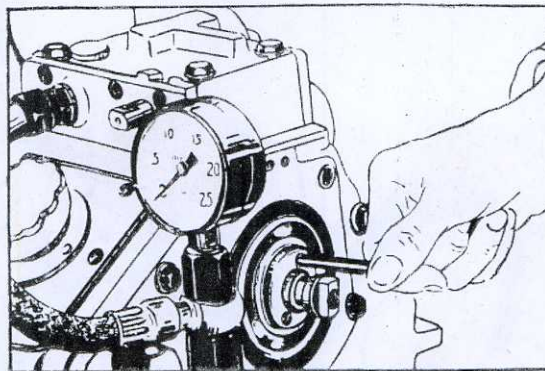


Fig. 4 Using of the Emergency set

clutch could be connected mechanically . Then reassemble the end-cover and start the engine . Note : When starting the engine speed must be below 80 % of its rated speed and the oil level over 20mm of the upper mark on the oil dipstick . When back to the port and to be repaired , the emergency screws should be turned in oppsite direction to be fastened on clutch housing .

2. Transmission Shaft Assembly

Its construction is similar to the input shaft assembly except that there is no coupling at the fore end and the oil pump is driven by the rear end of the transmission shaft . And the parts of both assemblies are available except the transmission shaft and the clutch housing . Its dis-and re-assembling is as same as the input shaft assembly .



3. Output Shaft Assembly

The output shaft and the driven gear are connected in conical fitting with key. The ahead or astern thrust are supported by the bearing at the fore end. According to the customer's request, at the output shaft end, a companion coupling can be fitted, and its hole with allowance is for machining by user according to connecting mode.

When disassembling, first unscrew the fastening nut at the fore end of output shaft, then screw two bolts by the special tool into the holes of driven gear (see Fig. 5) and turn the screw lever of special tool to separate the fore-end bearing and the driven gear from the shaft, and the shaft can be drawn out.

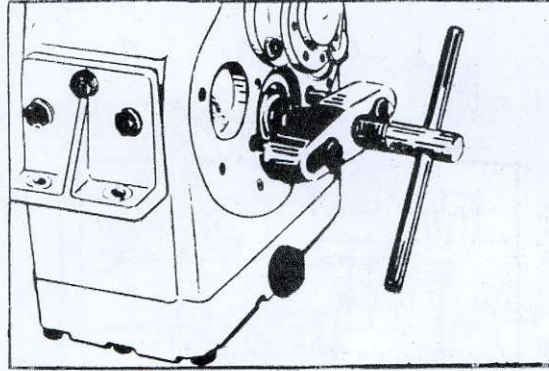


Fig. 5 Detachment of the Driven Gear

When reassembling, both the bearing and the gear are to be fastened on the shaft by means of the nut.

4. Housing Assembly

The housing is designed as a integral and there are a cover at the rear and an inspection hole on the side for observing the mesh condition of clutch or gear. The supports are removable, and can be replaced by user according to the installation condition. In addition, the bell housing is separable from the housing body and can be changed with type of diesel.

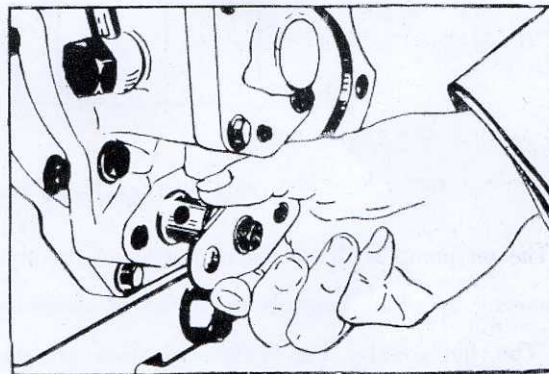


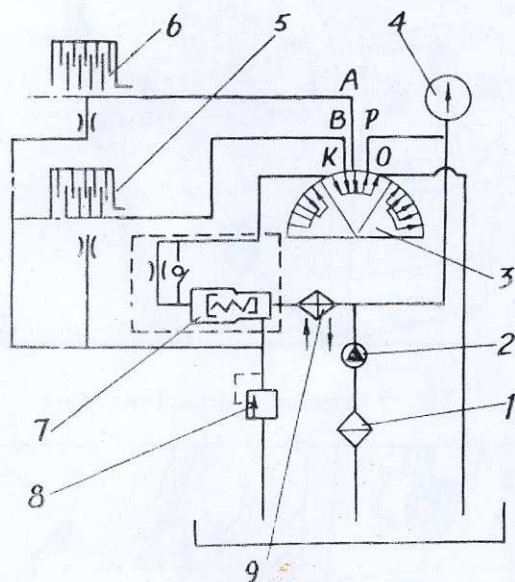
Fig. 6 Detachment of the Oil Filter

Under the pump, there is an oil filter which can be drawn out by unscrewing the two bolts, as shown in Fig. 6.

5. Hydraulic Control System

The hydraulic system consists of oil pump and control valve etc.. The working principle is as shown in Fig. 7, in which the control valve is under idle and the passage is disconnected with holes A, B and K. When the control valve is at AHEAD position (turn the valve lever 45°

ahead), hyd. oil enters into the buffer-valve and the ahead clutch, simultaneous to be opened to P and B, K. When reversing, the control lever should be remained under idle for 2—3 sec. so as to disengage the ahead clutch and then turn the lever to ASTERN position (turn the lever 45° astern), make P connect with A, K, thus engaging the astern clutch. On the contrary, the control lever should be remained under idle for 2—3 sec. then turned to AHEAD position.



1. Filter
2. Pump
3. Control valve
4. Hydraulic pressure gauge
5. Ahead clutch
6. Astern clutch
7. Buffer valve
8. Overflow valve
9. Cooler

Fig. 7 Diagram for Hydraulic System

The oil pump is driven by output shaft directly. The control valve is installed on the top of the housing by which controls the duties of ahead and astern, engaging and disengaging of gearbox. The buffer-valve can make operation pressure raising gradually to ensure the reversing smooth.

There are seal rings on the piston, input shaft and transmission shaft. The rings are with two radial gaps and can be broken in assembling. The break-end of both half ring should be aligned and in pairs for using.

The oil cooler is provided to keep the oil temperature under the permitted limits. Cooling water is offered by the water pump driven by diesel. The temperature of inlet water must be lower than 30°C.

6. Auxiliary Power Take-off (P. T. O) Unit



The P. T. O unit can be assembled at the rear end of input shaft for customer's particular demand as shown in the double-dot line in the diagram of mounting dimension. The data are as following:

Gearbox Model	Triangle belt		Transmission Torque (N·m)
	Type	Qty.	
MA100A	0	2	≤7
MA125A	A	4	≤21
MA142A	A	4	≤21

SECTION IV Installation and Operation

1. Installation

Before installing, a new gearbox is necessary to open the side cover for observing the surfaces of the parts which should be not rusted. The input and output couplings should be ready to rotate freely by hand.

For the gearbox with bell housing, the alignment between the input shaft and the engine flywheel can be easily achieved by fastening their bell housings by means of bolts tightly. If no bell housing, the concentricity between the input coupling of the gearbox without housing and the engine flywheel and the run-out of the end face all should be corrected within 0.13mm as Fig. 8 and 9. The concentricity and the run-out of the end face between the gearbox output flange and the coupling of the stern shaft must not exceed 0.08mm max. Be sure that the complete unit is aligned according to the requirement and then screw all the bolts tightly, and the reamer bolts should be used for connecting the supporters and the common baseplate.

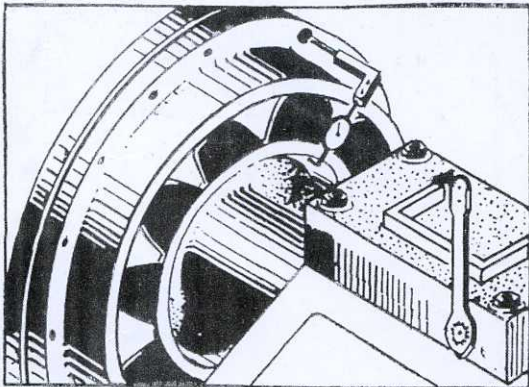


Fig. 8 Correcting the Concentricity between Gearbox and Flywheel

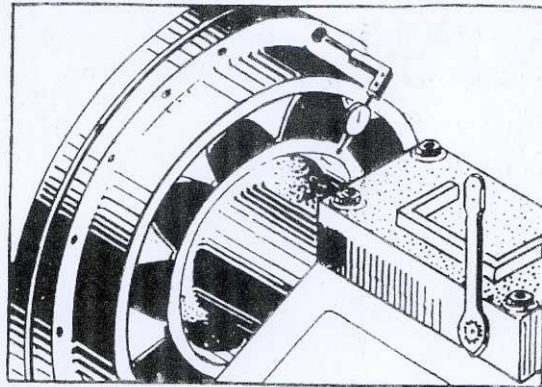


Fig. 9 Correcting the Run-Out of the End Faces between Gearbox and Flywheel

2. Trial Run

After installation, fill in specified oil until the oil level reaches the upper mark on the oil dipstick, and pour less oil into the pump outlet. The oil must be clean, no water and dirt, and it is not permitted to be mixed with other different oil.

After starting the engine, if no pressure indicated on the gauges for one minute, stop the



engine, check, shoot trouble and then start the engine to its rated speed and inspect it again. The gearbox can be put into normal operation after reversing two or three times at 75% rated speed and no abnormal noise.

3. Normal Operation

During the normal operation, when reversing, the engine speed should be reduced below 75% rated speed and let the control lever of the gearbox remain at STOP position for 2—3 sec. except for an emergency.

In order to keep the gearbox running in proper condition, regular inspection and maintenance should be arranged: change the oil after 500—600 running hours and inspect or replace the friction discs after 2,000 running hours. If the gearbox is to be stored or stopped running for long time, the inspection and maintenance are necessary periodically.

4. Adjusting of Initial Hydraulic Pressure

The oil pressure when the control lever is under idle is the initial hydraulic pressure, which should be adjusted at 0.15 — 0.4 MPa due to the different engine speed or the worn out of the oil seal. It can be adjusted by the adjusting bolts on the overflow valve (see Fig. 10) and then tightened by the nut.

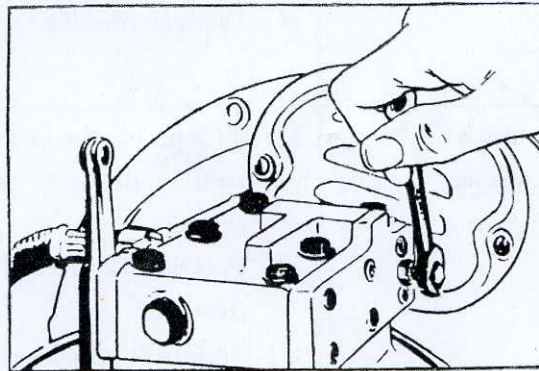


Fig. 10 Adjusting of Initial Hydraulic Pressure

5. Trouble Shootings

General trouble shootings are as shown in following table :

Trouble Shootings

No.	Trouble	Causes	Remedies
1.	Vibration of gearbox	(1) Misalignment at installation (2) Damaged toothed rubber block (3) Loose connecting bolts of couplings (4) Torsional vibration	(1) Readjust it acc. to the manual (2) Renew it (3) Tighten the fittings (4) Readjusting acc. to calculation of torsional vibration
2.	Clutch slipping	(1) Oil level too low or sealing at suction damaged of filter choked (2) Throttling hole in control valve obstructed (3) Stuck friction plates or piston (4) Leakage of sealings	(1) Fill in oil or renew sealings or clean filter (2) Clean the throttling hole (3) Clean and repair (4) Renew the sealings
3.	Turning in company	(1) Friction plates seriously warped or stuck (2) Back spring failure (3) Stuck piston (4) Oil viscosity too high (5) Emergency screws loose out	(1) Repair or renew (2) Renew (3) Clean and repair (4) Use specified oil (5) Turn the screws back, and tighten
4.	Abnormal noise	(1) Damaged toothed rubber block (2) Damaged bearings (3) Loose connecting bolts	(1) Renew (2) Renew (3) Tighten them



No.	Trouble	Causes	Remedies
5.	Excessive oil temperature	(1) Clutch slipping or turning in company (2) Checked cooler (3) No cooling water (4) Oil level too high (5) Cooling water leak into oil	(1) Refer to Item No. 2 and No. 3 (2) Clean (3) Repair (4) Lower the oil level (5) Repair cooler and renew oil

五、零件目录

SECTION V Parts Lists

1. 输入联轴节、输入轴部件(图11)

Input Coupling, Input Shaft Assembly (Fig.11)

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA100A	MA125A	MA142A	
1	闷塞 Plug	100-01-008 125-01-003	1	1	1	
2	联轴节内齿圈 Internal toothed ring	Q05-10-03 Q05-10-04 Q05-10-05 Q05-11-02A Q05-11-02X1A	}1	}1	}1	SAE7 $\frac{1}{2}$ " SAE11 $\frac{1}{2}$ " 配285柴油机 飞轮 For 285 Die- sel flywheel SAE11 $\frac{1}{2}$ " SAE10"
3	联轴节外齿圈 External toothed ring	Q05-10-01 Q05-11-01	1	1	1	
	橡胶传动盘部件 Rubber transmission plate assembly	100-06-000X1	1			
4	齿形橡胶块 Toothed rubber block	Q26-06-01	10	16	16	



序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA100A	MA125A	MA142A	
5	输入法兰 Input flange	100—01—002A 125—01—002A	1	1	1	
6	骨架油封 Oil seal	SPD 45 × 62 × 8 HG 4—692—67 SPD 50 × 68 × 8 HG 4—692—67	1	1	1	
7	前盖 Front cover	100—01—001A 125—01—001A 142—01—001A	1	1	1	
8	单列向心球轴承 Bearing	108GB276—82 208GB276—82	2	2	2	
9	轴用挡圈 Snap ring (for shaft)	35GB894—76 40GB894—76 45GB894—76	1 1	1 1	1 1	
10	孔用挡圈 Snap ring (for hole)	68GB893—76 75GB893—76	1	1	1	
11	垫圈 Washer	8GB93—76 10GB93—76	8	8	8	
12	螺栓 Bolt	M8 × 25GB21—76 M10 × 25GB21—76	8	8	8	
13	轴承外圈止动环 Stop ring for bearing	80GB305—82 90GB305—82 110GB305—82	2	2	2	
14	外圈带止动槽 单列向心球轴承 Bearing	50307GB277—82 50308GB277—82 50408GB277—82	1	1	1	

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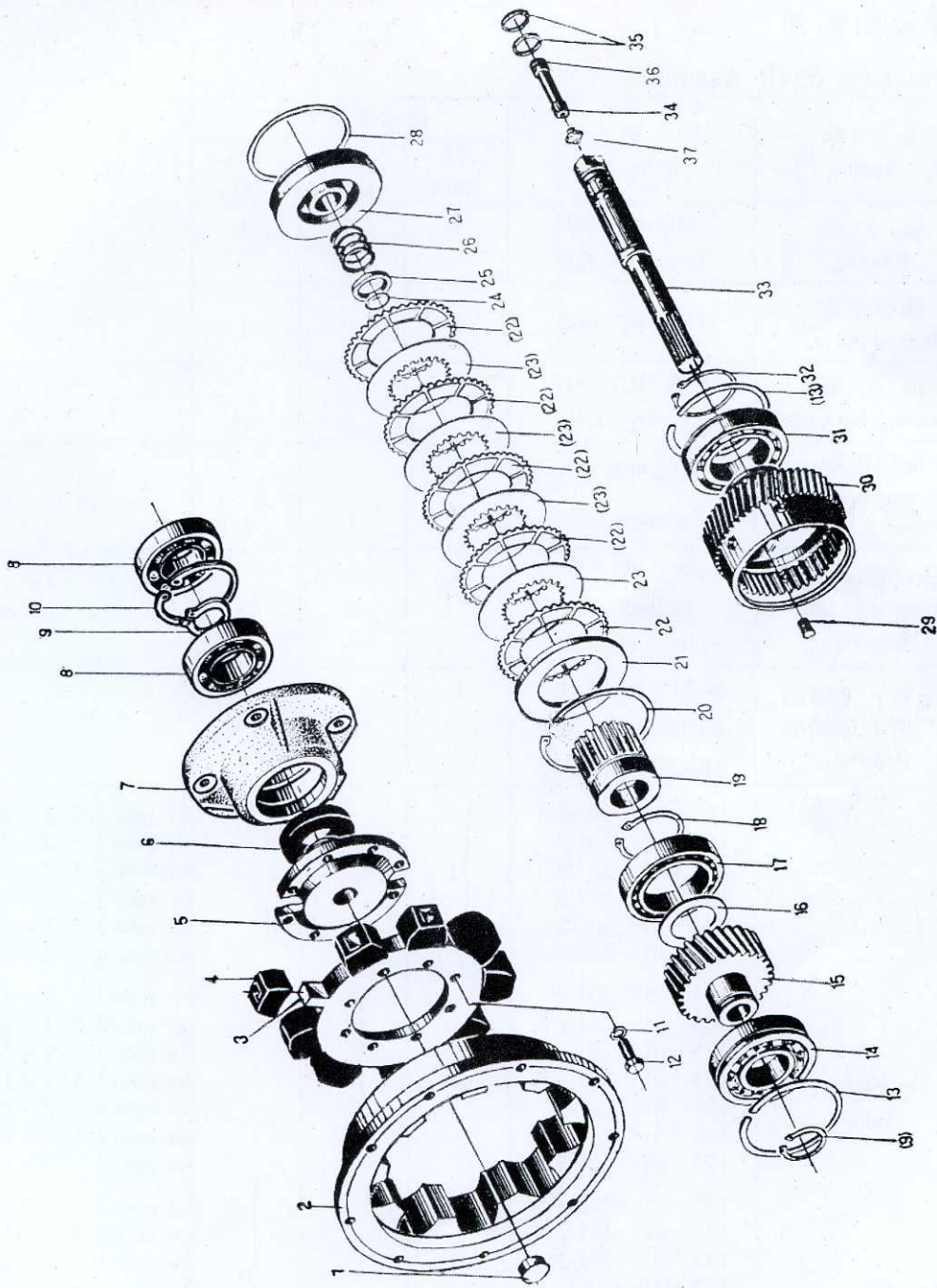
序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA100A	MA125A	MA142A	
15	主动齿轮 Pinion	100-01-201/1.5	}	}		
		100-01-201/2				
		100-01-201/2.5				
		100-01-201/3				
		100-01-201/3.5				
		100-01-201/4				
		125-01-201/2				
		125-01-201/2.5				
		125-01-201/3				
		125-01-201/3.5				
		125-01-201/4				
		125-01-201/4.5				
		125-01-201/5				
		142-01-201/2				
		142-01-201/2.5				
		142-01-201/3				
		142-01-201/3.5				
		142-01-201/4				
142-01-201/4.5						
142-01-201/5						
142-01-201/5.5						
16	隔圈 Spacer	100-01-203	1	1	1	
		125-01-203				
		142-01-203				
17	单列向心球轴承 bearing	110GB276-82	1	1	1	
		111GB276-82				
		212GB276-82				
18	轴用挡圈 Snap ring (for shaft)	50GB894-76	1	1	1	
		55GB894-76				
		60GB894-76				



序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA100A	MA125A	MA142A	
19	离合器座 Clutch bracket	100—01—202 125—01—202 142—01—202	1	1	1	
20	孔用挡圈 Snap ring (for hole)	90GB893—76 130GB893—76	1	1	1	
21	承压板 Thrust plate	100—01—003 142—01—002	1	1	1	
22	外摩擦片 External disc	100—01—009 MB170—01—012	6	8	5	
23	内摩擦片 Internal disc	100—01—010 142—01—006	5	7	4	
24	轴用挡圈 Snap ring (for shaft)	26GB894—76 30GB894—76	1	1	1	
25	挡圈 Snap ring	100—01—011 142—01—007	1	1	1	
26	返回弹簧 Return spring	100—01—007 142—01—005	1	1	1	
27	活塞 Piston	100—01—005 142—01—004	1	1	1	
28	活塞环 Piston ring	100—01—004 142—01—003	1	1	1	
29	螺钉 Screw	M8 × 10GB77—76 M10 × 12GB77—76	2	2	2	
30	传动齿轮 Transmission gear	100—01—102 125—01—102 142—01—102	1	1	1	

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序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA100A	MA125A	MA142A	
31	外圈带止动槽的 单列向心球轴承 Bearing	50110GB277—82 50210GB277—82 50212GB277—82	1	1	1	
32	轴用挡圈 Snap ring (for shaft)	50GB894—76 60GB894—76	1	1	1	
33	输入轴 Input shaft	100—01—101 125—01—101 142—01—101	1	1	1	
34	分油塞 Dividing oil plug	100—01—103 125—01—103	1	1	1	
35	封油环 Seal ring	100—01—006	2	2	2	
36	压紧螺钉 Fastening bolt	125—01—104		1		
37	铜垫 Copper washer	100—01—104	1		1	



输入联轴节、输入轴部件
Input Coupling, Input Shaft Assembly

2. 传动轴部件

Transmission Shaft Assembly

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
1	轴承 Bearing	100—02—002 125—02—002	1	1	1	
2	碟形弹簧 Dished spring	100—02—003	1		1	
3	轴承座 Bearing housing	100—02—001 142—02—001	1		1	
4	轴用挡圈 Snap ring (for shaft)	35GB894—76 40GB894—76	1	1	1	
5	轴承外圈止动环 Stop ring for bearing	80GB305—82 90GB305—82 110GB305—82	2	2	2	
6	外圈带止动槽的 单列向心球轴承 Bearing	50307GB277—82 50308GB277—82 50408GB277—82	1	1	1	
7	主动齿轮 Pinion	100—01—201/1.5 100—01—201/2 100—01—201/2.5 100—01—201/3 100—01—201/3.5 100—01—201/4 125—01—201/2 125—01—201/2.5 125—01—201/3 125—01—201/3.5 125—01—201/4 125—01—201/4.5 125—01—201/5 142—01—201/2 142—01—201/2.5 142—01—201/3 142—01—201/3.5 142—01—201/4 142—01—201/4.5 142—01—201/5 142—01—201/5.5	} 1	} 1	} 1	for ratio 1.5 Z= 30 for ratio 2 Z= 26 for ratio 2.5 Z= 22 for ratio 3 Z= 19 for ratio 3.5 Z= 17 for ratio 4 Z= 16 for ratio 2 Z= 32 for ratio 2.5 Z= 28 for ratio 3 Z= 24 for ratio 3.5 Z= 21 for ratio 4 Z= 19 for ratio 4.5 Z= 18 for ratio 5 Z= 17 for ratio 2 Z= 37 for ratio 2.5 Z= 31 for ratio 3 Z= 27 for ratio 3.5 Z= 24 for ratio 4 Z= 22 for ratio 4.5 Z= 20 for ratio 5 Z= 18 for ratio 5.5 Z= 17

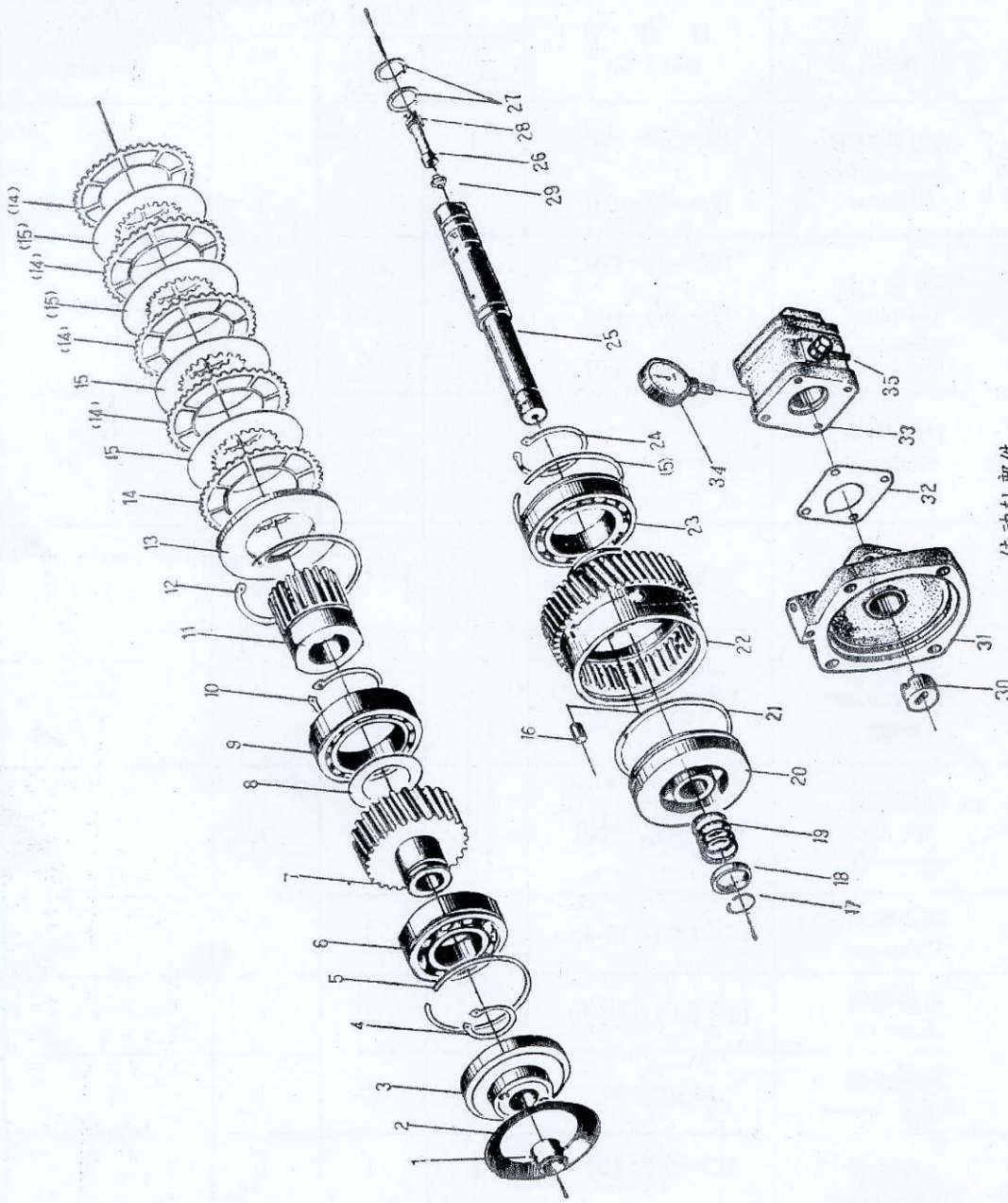


序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
8	隔圈 Spacer	100—01—203	1			
		125—01—203		1		
		142—01—203			1	
9	单列向心球轴承 Bearing	110GB276—82	1			
		111GB276—82		1		
		212GB276—82			1	
10	轴用挡圈 Snap ring (for shaft)	50GB894—76	1			
		55GB894—76		1		
		60GB894—76			1	
11	离合器座 Clutch bracket	100—01—202	1			
		125—01—202		1		
		142—01—202			1	
12	孔用挡圈 Snap ring (for hole)	90GB893—76	1	1		
		130GB893—76			1	
13	承压板 Trust plate	100—01—003	1	1		
		142—01—002			1	
14	外摩擦片 External disc	100—01—009	6	8		
		MB170—01—012			5	
15	内摩擦片 Internal disc	100—01—010	5	7		
		142—01—006			4	
16	螺钉 Screw	M8 × 10GB77—76	2	2		
		M10 × 12GB77—76			2	
17	轴用挡圈 Snap ring (for shaft)	26GB894—76	1	1		
		30GB894—76			1	
18	挡圈 Spacer	100—01—011	1	1		
		142—01—007			1	

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
19	返回弹簧 Return spring	100—01—007	1	1		
		142—01—005			1	
20	活 塞 Piston	100—01—005	1	1		
		142—01—004			1	
21	活 塞 环 Piston ring	100—01—004	1	1		
		142—01—003			1	
22	传动齿轮 Transmission gear	100—02—102	1			
		125—02—102		1		
		142—02—102			1	
23	外圈带止动槽的 单列向心球轴承 Bearing	50110GB277—82	1			
		50210GB277—82		1		
		50212GB277—82			1	
24	轴用挡圈 Snap ring (for shaft)	50GB894—76	1	1		
		60GB894—76			1	
25	传 动 轴 Transmission shaft	100—02—101	1			
		125—02—101		1		
		142—02—101			1	
26	分 油 塞 Dividing oil plug	100—01—103	1		1	
		125—01—103		1		
27	封 油 环 Seal ring	100—01—006	2	2	2	
28	压 紧 螺 钉 Fastening bolt	125—01—104		1		
29	铜 垫 Copper washer	100—01—104	1		1	



序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
30	油泵联轴节 Coupling for oil pump	100—02—005	1			
		125—02—001		1	1	
31	油泵座 Oil pump bracket	100—02—004	1			
		125—04—013		1		
		142—02—002			1	
32	油泵纸垫 Oil pump gasket	125—04—016	1	1	1	
33	油 泵 Oil pump	BB—B6D	1	1	1	
34	压力表 Oil pressure gauge	Y60 0 ~ 2.5MPa				
	油管组件 Oil pipe assembly	Q06—01A—200	1	1	1	
	接头螺钉 Connector	14 × 1.5 Q21—19	6	7	7	
	接头螺钉 Conector	14 × 1.5 Q21—20	1	1	1	
	紫铜垫圈 Copper washer	14Q20—03	16	17	17	
35	工作油管 Hydraulic oil pipe	125—00—100	1	1	1	
		125—00—200	1	1	1	
	润滑油管 Lubricating pipe	100—00—200	1	1	1	



传动轴部件
Transmission Shaft Assembly



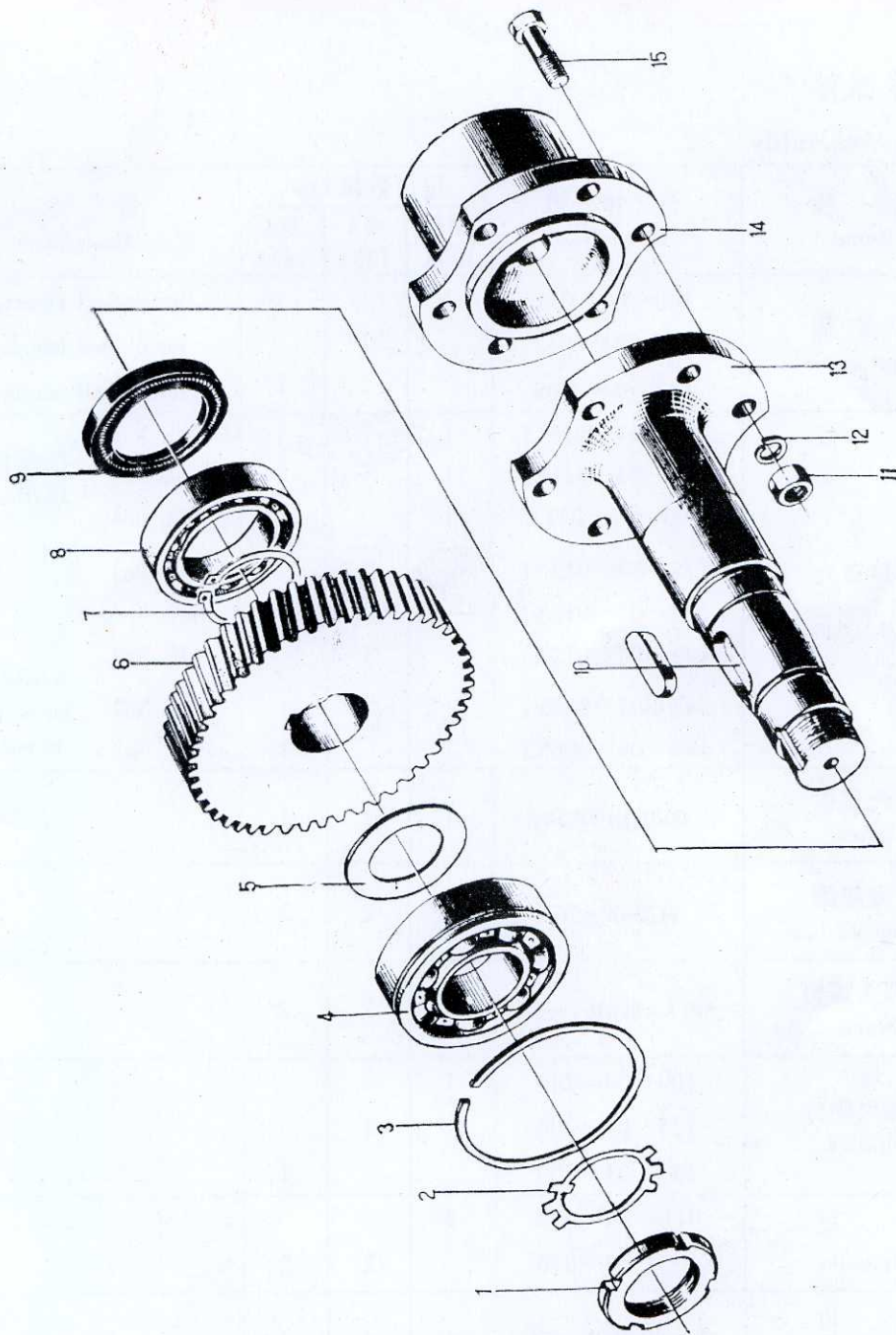
3. 输出轴部件

Output Shaft Assembly

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
1	圆螺母 Nut	M33 × 1.5GB812—76 M39 × 1.5GB812—76 M45 × 1.5GB812—76	1	1	1	
2	止动垫圈 Lock washer	33GB858—76 39GB858—76 45GB858—76	1	1	1	
3	轴承外圈止动环 Stop ring for bearing	80GB305—82 110GB305—82 120GB305—82	1	1	1	
4	外圈带止动槽的 单列向心球轴承 Bearing	50307GB277—82 50408GB277—82 50409GB277—82	1	1	1	
5	隔圈 Spacer	100—01—203 125—01—203 142—01—203	1	1	1	
6	从动齿轮 Driven gear	100—03—002/1.5 100—03—002/2 100—03—002/2.5 100—03—002/3 100—03—002/3.5 100—03—002/4 125—03—001/2 125—03—001/2.5 125—03—001/3 125—03—001/3.5 125—03—001/4 125—03—001/4.5 125—03—001/5 142—03—002/2 142—03—002/2.5 142—03—002/3 142—03—002/3.5 142—03—002/4 142—03—002/4.5 142—03—002/5 142—03—002/5.5	} 1	} 1	} 1	for ratio 1.5 Z= 48 for ratio 2 Z= 52 for ratio 2.5 Z= 56 for ratio 3 Z= 59 for ratio 3.5 Z= 61 for ratio 4 Z= 62 for ratio 2 Z= 65 for ratio 2.5 Z= 69 for ratio 3 Z= 73 for ratio 3.5 Z= 75 for ratio 4 Z= 77 for ratio 4.5 Z= 79 for ratio 5 Z= 80 for ratio 2 Z= 73 for ratio 2.5 Z= 78 for ratio 3 Z= 82 for ratio 3.5 Z= 85 for ratio 4 Z= 87 for ratio 4.5 Z= 90 for ratio 5 Z= 91 for ratio 5.5 Z= 93

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序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
7	轴承外圈止动环 Stop ring for bearing	40GB305—82	1			
	轴用挡圈 Snap ring (for shaft)	50GB894—76 55GB894—76		1	1	
8	单列向心短圆柱滚子轴承 Bearing	2108GB283—81 2110GB283—81 2111GB283—81	1	1	1	
9	双口型骨架油封 Oil seal	SD45 × 68 × 12 HG4—692—67 SD55 × 80 × 12 HG4—692—67 SD60 × 90 × 12 HG4—692—67	1	1	1	
10	平键 Key	12 × 35GB1096—79 14 × 55GB1096—79	1	1	1	
11	螺母 Nut	M10GB52—76 M12GB52—76	6	6	6	
12	弹簧垫圈 Spring washer	10GB93—76 12GB93—76	6	6	6	
13	输出轴 Output shaft	100—03—001 125—03—003 142—03—001	1	1	1	
14	推进器联轴节 Companion coupling	100—03—003X1 125—F2—001 142—F1—001	1	1	1	
15	螺栓 Bolt	M10 × 40GB27—76 M12 × 50GB27—76	6	6	6	



输出轴部件
Output Shaft Assembly

4. 箱体部件

Housing Assembly

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks	
			MA 100A	MA 125A	MA 142A		
1	前盖板 Front cover	100—04—011	1			for no bell housing	
		125—04—012		1		for no bell housing	
		142—04—008			1	for no bell housing	
	联接罩壳 Bell housing	100—04—011X1	1			SAE No3	根据订货 选用。
		100—04—011X2	1			SAE No5	
		100—04—011X	1			SAE No4	
		125—04—012X1		1		SAE No3	Available according to order
		125—04—012X2		1		SAE No4	
		125—04—012X3		1		SAE No2	
		142—04—008X1			1	SAE No2	
142—04—008X2			1	SAE No3			
2	罩壳盖板 Cover	0601A—0018	1	1	1		
3	弹簧垫圈 Spring washer	6GB93—76	2	2	2		
4	半园头螺钉 Screw	M6 × 10GB67—76	2	2	2		
5	油标尺组件 Dipstick	100—04—240 125—04—200 142—04—200	1	1	1		
6	支架 Supporter	100—04—013 125—04—010	2	2	2		
7	铆钉 Rivet	2 × 4GB827—76	4	4	4		
8	铭牌 Name plate	Q25—01—01	1	1	1		



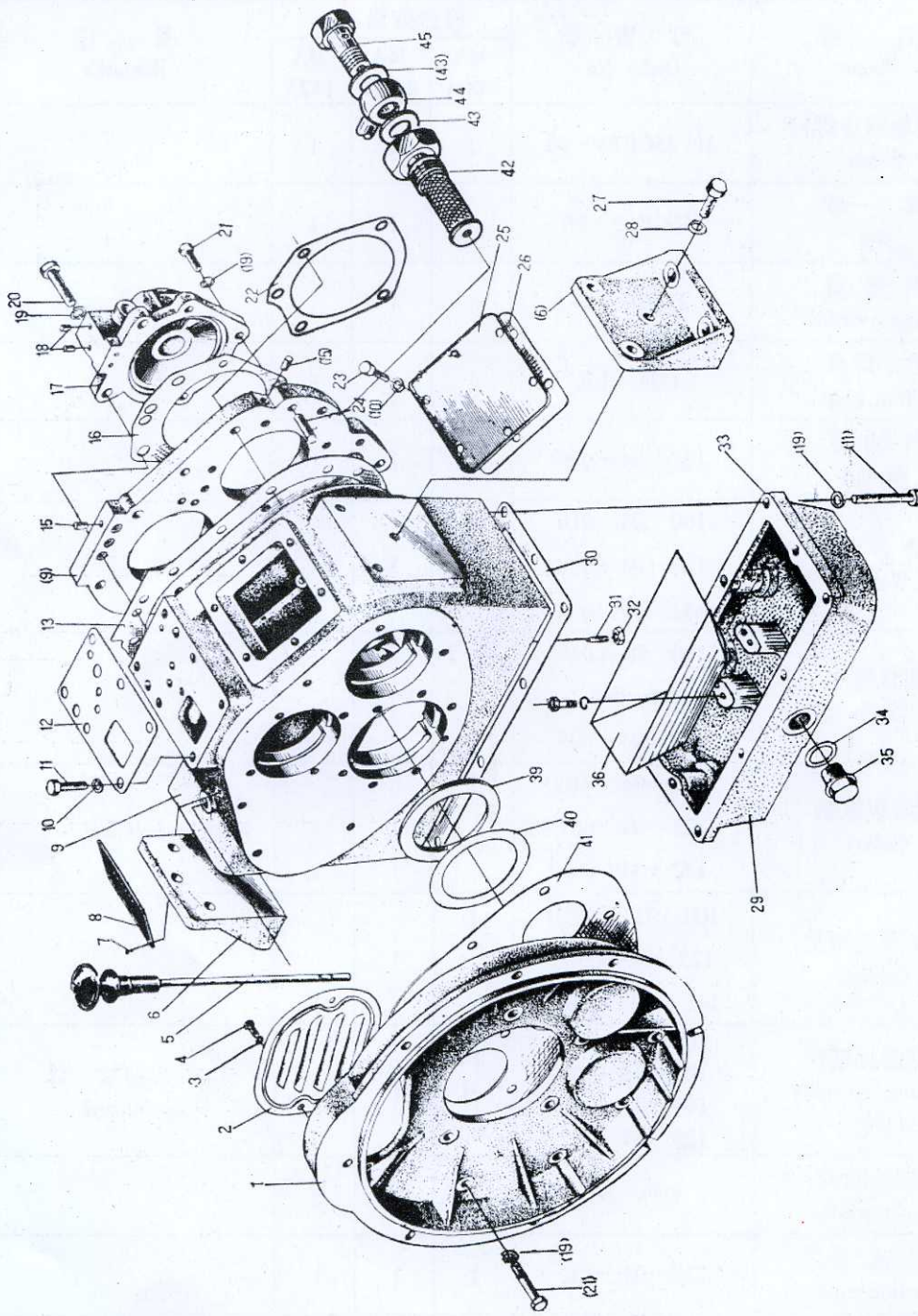
序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
9	箱体 Housing	100—04—100 125—04—100 142—04—100	1	1	1	
10	平垫圈 Washer	B8GB97—76	12	8	8	
11	六角螺栓 Bolt	M8 × 50GB30—76 M8 × 55GB30—76 M8 × 30GB30—76	16	6 6 6	6 12	
12	操纵阀纸垫 Gasket	100—04—004	1	1	1	
13	后箱盖纸垫 Gasket	100—04—005A 125—04—001 142—04—001A	1	1	1	
15	闷塞 Plug	φ7Q21—25	2	2	2	
16	输入轴后端盖纸垫 Gasket	100—04—007 125—04—003 142—04—003	1	1	1	
17	输入轴后端盖 End cover	100—04—006 100—04—006X1 125—04—002 125—04—002X 142—04—002 142—04—002X	1 1	1 1	1 1	for P. T. O for P. T. O for P. T. O
18	闷塞 Plug	Q06—03—15 φ7Q21—25	2	2	2	
19	弹簧垫圈 Spring washer	8GB93—76	36	45	30	

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序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
20	六角螺栓 Bolt	M8 × 35GB30—76 M8 × 45GB30—76	2	2	2	
21	六角螺栓 Bolt	M8 × 25GB30—76 M10 × 30GB30—76	27	11	6 21	
22	油泵座纸垫 Gasket	100—04—008A 125—04—009A 142—04—007A	1	1	1	
23	螺栓 Bolt	M8 × 12GB30—76	6	10	10	
24	销 Pin	8 × 25GB118—76 8 × 30GB118—76	2	2	2	
25	侧盖板 Side cover	100—04—003 125—04—015 142—04—013	1	1	1	
26	侧盖板纸垫 Gasket	100—04—001	1	1		
	连接板纸垫 Gasket	125—04—011		1	2	
27	六角螺栓 Bolt	M10 × 25GB30—76 M10 × 30GB30—76	6	22	10	
28	弹簧垫圈 Spring washer	10GB93—76	6	22	39	
29	底壳 Bottom cover	100—04—014Bx 100—04—014B 125—04—005A 125—04—005Ax	1 1	1 1	1 1	带 X 为平板式, 选用件, 用于 $i \leq 3:1$ X means an alternative Part for $i \leq 3:1$
30	底壳纸垫 Gasket	100—04—009 125—04—004	1	1	1	



序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100A	MA 125A	MA 142A	
31	圆柱端紧定螺钉 Screw	M6 25GB75—76	1	1	1	
32	螺母 Nut	M6GB52—76	1	1	1	
34	铜垫圈 Copper washer	22Q20—03	1	1	1	
35	放油螺塞 Drain plug	Q21—15	1	1	1	
36	挡油罩 Shroud	125—04—006		1	1	
39	垫圈 Washer	100—04—010	1			
		125—04—008		1		
		142—04—004			1	
40	调整垫片 Shim	100—04—015	0—2			
		404—0033		1—2		
		142—04—005			1—2	
41	前盖板纸垫 Gasket	100—04—012	1			}for no bell housing
		125—04—007		1		
142—04—006				1		
	联接罩壳纸垫 Gasket	100—04—012X1	1			
		125—04—007X		1		
		142—04—006X1			1	
42	滤清器焊接件 Welding assembly of filter	100—05—105 100—05—101 100—05—102 125—04—301	}1	1	1	4 件焊接成一体 as integral
43	紫铜垫圈 14 Copper washer	Q21—03	2	2	2	
44	吸油管 Suction pipe	125—04—302	1	1	1	
45	接头螺钉 Connector	Q21—19	1	1	1	



箱体部件
Housing Assembly



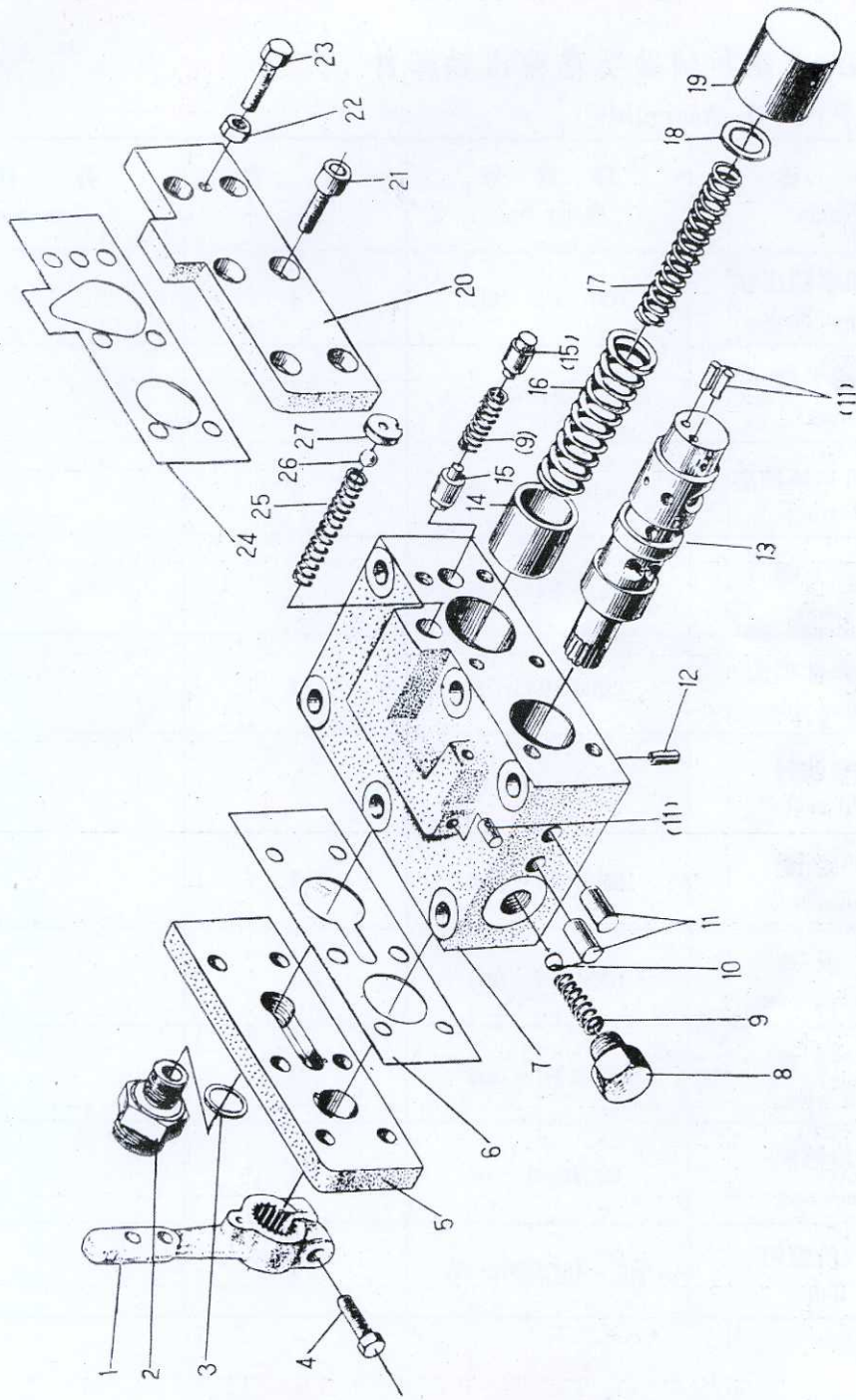
5. 操纵阀部件

Hydraulic Control System

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA100A	MA125A	MA142A	
1	操纵手柄 Handle	Q06—03—13	1	1	1	
2	接头 Pipe connector	100—00—003	1			
	接头螺钉 Bolt	Q21—19		1	1	
3	铜垫圈 Copper washer	14Q20—03	1	2	2	
4	六角螺栓 Bolt	M6 × 15GB30—76	1	1	1	
5	前盖 Front cover	Q06—03—05	1	1	1	
6	前盖纸垫 Gasket	Q06—03—06	1	1	1	
7	阀体 Valve body	Q06—03—01	1	1	1	
8	弹簧座 Spring seat	Q06—03—14	1	1	1	
9	弹簧 Spring	0.8 × 6 × 20 JB272—60	1	1	1	
10	钢球 Steel ball	6GB308—77	1	1	1	
11	闷塞 Plug	Φ7Q21—14	2	2	2	
(11)	闷塞 Plug	Q06—03—15	4	4	4	
12	弹性销 Pin	4 × 10GB879—76	1	1	1	

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序号 No.	名 称 Name	订 货 号 Order No.	每台数量 Qty.			备 注 Remarks
			MA100A	MA125A	MA142A	
13	操 纵 阀 Shifting valve	Q06—03—02	1	1	1	
14	控 制 阀 Control valve	Q06—03—12	1	1	1	
15	溢 流 阀 Overflow valve	Q06—03—10	2	2	2	
16	延 时 大 弹 簧 Spring	Q06—03—11	1	1	1	
17	延 时 小 弹 簧 Spring	Q06—03—09	1	1	1	
18	平 垫 圈 Washer	B8GB97—76	0—2	0—2	0—2	
19	延 时 阀 Delay valve	Q06—03—08	1	1	1	
20	后 盖 板 Rear cover	Q06—03—03	1	1	1	
21	内六角螺栓 Bolt	M6 × 12GB70—76	12	12	12	
22	螺 母 Nut	M6GB54—76	1	1	1	
23	六角螺栓 Bolt	M6 × 15GB30—76	1	1	1	
24	后盖纸垫 Gasket	Q06—03—04	1	1	1	
25	圆柱弹簧 Spring	0.5 × 7 × 50 JB272—60	1	1	1	
26	钢 球 Steel ball	8GB308—77	1	1	1	
27	单向阀座 Valve seat	Q06—03—07	1	1	1	

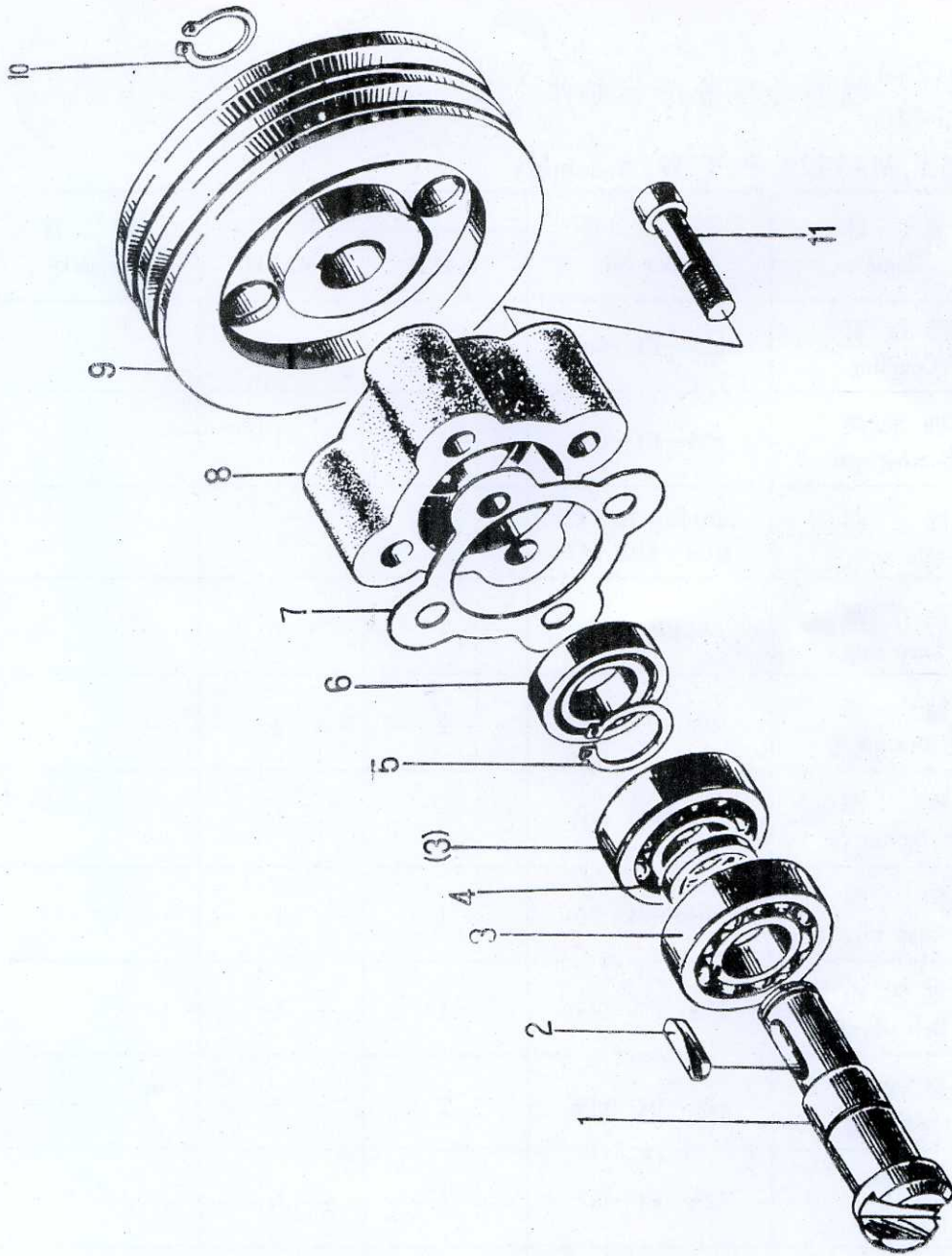


操纵阀部件
Hydraulic Control System

6. MA100A 齿轮和辅助功率输出轴部件

MA100A P.T.O. Assembly

标号 No.	名称 Name	订货号 Order No.	数量 Qty.	备注 Remarks
1	辅助功率输出轴 Output Shaft	100—F1—002	1	
2	普通平键 Key	5 × 20GB1096—79	1	
3	单列向心球轴承 Bearing	104GB276—82	2	
4	隔圈 Spacer	100—F1—005	1	
5	轴用弹性挡圈 Spring ring	20GB894—76	1	
6	骨架油封 Oil seal	PG20 × 35 × 10	1	
7	纸垫 Gasket	100—F1—004	1	
8	轴承座 Bearing seat	100—F1—001	1	
9	皮带轮 Belt wheel	100—F1—003	1	
10	轴用挡圈 Snap ring	18GB894—76	1	
11	内六角螺钉 Bolt	M8 × 45GB70—76	4	

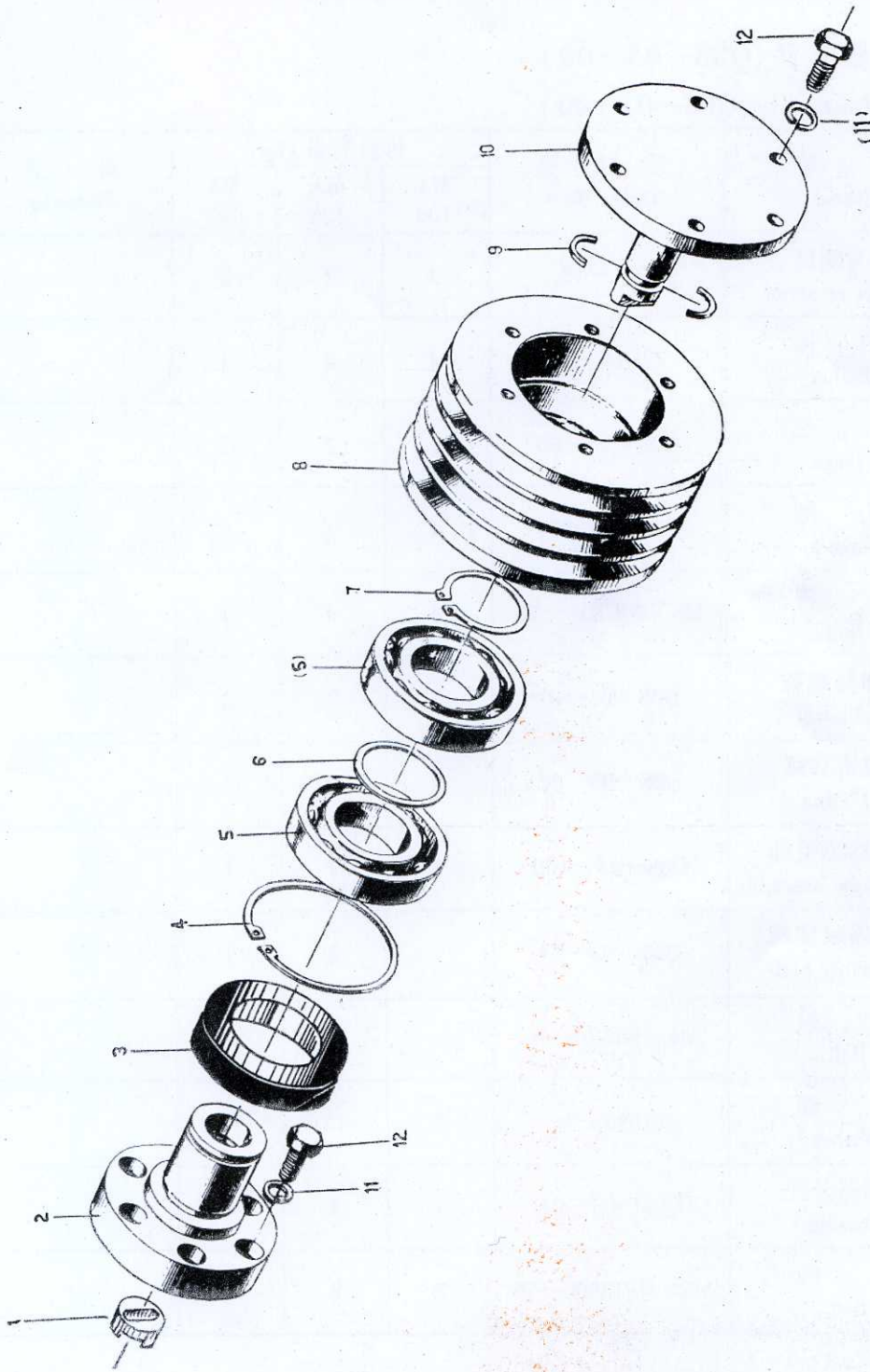


MA100A 齿轮箱辅助功率输出轴部件
MA100A P. T. O. Assembly

7. MA125A 辅助功率输出轴部件
MA142A

MA125A, MA142A P. T. O. Assembly

标号 No.	名 称 Name	订 货 号 Order No.	每台数量 Qty.		备 注 Remarks
			MA125	MA142	
1	连接套 Coupling	125—F1—007	1	1	
2	轴承座 Bearing seat	125—F1—001	1	1	
3	油 封 Oil seal	SPD45 × 70 × 12 HG4—692—67	1	1	
4	挡 圈 Snap ring	68GB893—76	1	1	
5	轴 承 Bearing	108GB276—82	2	2	
6	隔 圈 Spacer	125—F1—004	1	1	
7	挡 圈 Snap ring	40GB894—76	1	1	
8	皮 带 轮 Belt wheel	125—F1—006	1	1	
9	封油环 Seal ring	100—01—006	2	2	
10	连接法兰 Flange	125—F1—005	1	1	
11	垫 圈 Washer	8GB93—76	12	12	
12	螺 栓 Bolt	M8 × 20GB21—76	12	12	

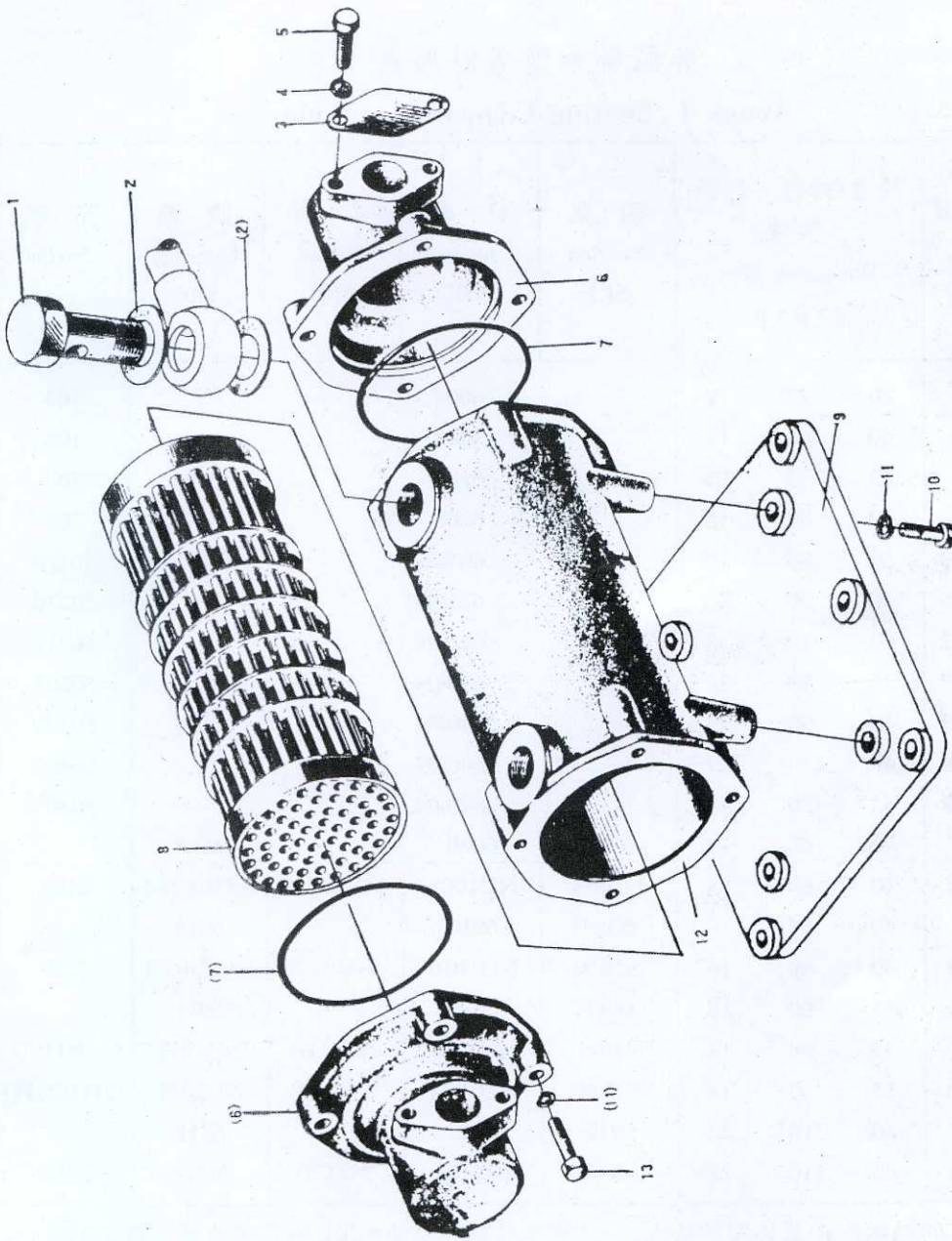


MA125A 齿轮箱辅助功率输出轴部件
MA142A
MA125A, MA142A P.T.O. Assembly

8. 冷却器部件 (Q08—03—00)

Cooler Assembly (Q08—03—00)

序号 No.	名称 Name	订货号 Order No.	每台数量 Qty.			备注 Remarks
			MA 100	MA 125	MA 142	
1	接头螺钉 Connector screw	Q21—19	2	2	2	
2	垫圈 Washer	22Q20—03	4	4	4	
3	法兰 Flange	Q08—03—06	2	2	2	
4	垫圈 Washer	8GB93—76	4	4	4	
5	螺栓 Bolt	M8 × 20GB30—76	4	4	4	
6	冷却器端盖 End cover	Q08—03—01	2	2	2	
7	O型密封圈 “O” ring	Q08—03—02	2	2	2	
8	冷却器芯组件 Cooling tube assembly	Q08—03—100	1	1	1	
9	冷却器联接板 Connecting plate	Q08—03—04		1	1	
10	螺栓 Bolt	M6 25GB30—76		4	4	
11	垫圈 Washer	6GB93—76	8	12	12	
12	冷却器外壳 Housing	Q08—03—03	1	1	1	
13	螺栓 Bolt	M6 × 40GB900—76	8	8	8	



冷却器部件
Cooler Assembly

附一

各国轴承型号对照表

Annex 1. Bearing Comparative Table

序号 No.	中 国 China GB	尺寸(内径×外径 × 宽度) Dimension Size d×D×B			瑞 典 Sweden SKF	日 本 Japan NSK	法 国 France SNK	西 德 Germany FAG	苏 联 Soviet Г П З
1	104	20	42	12		6004			104
2	108	40	68	15		6008			108
3	207	35	72	15		6207			207
4	208	40	80	18		6208			208
5	50110	50	80	16		6010N			50110
6	50210	50	90	20		6210N			50210
7	50212	60	110	22		6212N			50212
8	50307	35	80	21		6307N			50307
9	50308	40	90	23		6308N			50308
10	50408	40	110	27		6408N			50408
11	50409	45	120	29		6409N			50409
12	108	40	68	15	6008	6008		6008	
12*	2108	40	68	15	N1008	NU1008	N1008NB	NU1008M	2108
13	110	50	80	16	6010	6010		6010	
13*	2110	50	80	16	N1010	NU1010	N1010B	NU1010M	2110
14	211	55	90	18	6011	6011		6011	
14*	2111	55	90	18	N1011	NU1011	N1011B	NU1011	2111
15*	32111	55	90	18	N1011	NU1011	N1011B	NU1011	32111(2111)
16	212	60	110	22	6212	6212		6212	
16*	2212	60	110	22	N212	NU212	N212B	N212	2212

说明: 带 * 的轴承应在其外圈外径上, 1/2 宽度处钻一个 $\phi 6$ 深 2 的穴坑或磨一条宽 6 深 2 的弦槽。

Note: The bearing on mark "*" should be drilled a hole of $\phi 6$ with depth 2 or ground a groove of width 6 with depth 2 at its 1/2 width.



附二

可配套的柴油机参考表*

Annex 2. Coupled Diesel Information*

齿轮箱型号 Gearbox Model	减速比 Ratio	柴 油 机 Diesel		柴 油 机 制 造 厂 Diesel Manufacturer	
		型 号 Model	Ps/(r · min ⁻¹)		
MA100A	≤ 4 : 1	285C	18/2400	中国	China
		195C	12/2000	中国	China
		275C	14/2600	中国	China
		MH1700 (OMH1700)	13/1800	日本	Kvbot Ltd.
		3MF—2L	18/2200	日本	Mitsubishi Heavy Industries Ltd.
		2T	12/1400	日本	Yanmar Diesel Engine Co. Ltd.
		3T75Z	20/2800	日本	Yanmar Diesel Engine Co. Ltd.
		2Z—1	22.5/2600	日本	Mitsubishi Heavy Industries Ltd.
	≤ 3 : 1	290C	20/2000	中国	China
		UM2AB1	23/2700	日本	Isuzu Motors Ltd.
		KE130—1	23/2500	日本	Mitsubishi Motors Co. Ltd.
		3BH	18/1800	日本	Yanmar Diesel Engine Co. Ltd.
		MD2	25/2500	瑞典	Volvo
	≤ 2 : 1	MH2600 (OMH2600)	20/1800	日本	Kubota Ltd.
		F2L912W	30/2500	日本	Mitsubishi Motors Co. Ltd.
4MF—2L		24/2200	日本	Mitsubishi Heavy Industries Ltd.	
2SM		17/1500	日本	Yanmar Diesel Engine Co. Ltd.	
3EH15		15/1440	日本	Yanmar Diesel Engine Co. Ltd.	

杭州前进齿轮箱集团有限公司

齿轮箱型号 Gearbox Model	减速比 Ratio	柴 油 机 Diesel		柴 油 机 制 造 厂	
		型 号 Model	Ps/(r · min ⁻¹)	Diesel Manufacturer	
MA100A	≤ 2 : 1	2D94—2	30/2500	日本 Japan	Komatsu Ltd.
		295C	24/2000		中国 China
MA125A	≤ 2.5 : 1	495C	48/2000		中国 China
		M3D115AN	37/1600		日本久保田铁工 Japan
	≤ 3.5 : 1	485C	44/2000		中国 China
		490C	40/2000		中国 China
		F3L912	47/2300	日本 Japan	Mitsui—Deutz Diesel Engine Co.
		4K—5	39/1800	日本 Japan	Mitsubishi Heavy Industries Ltd.
	≤ 5 : 1	2105C	24/1500		中国 China
		2100C	22/1500		中国 China
		390C	26/2000		中国 China
		295C	24/2000		中国 China
MH226		25/1800		日本久保田铁工 Japan	
UMC240		51/3000	日本 Japan	Isuzu Motors Ltd.	
MA142A	≤ 3 : 1	695C	72/2000		中国 China
		6105C	72/2000		中国 China
		MH6FT	55/1400		日本久保田铁工 Japan
		M5D115AN	65/1600		日本久保田铁工 Japan
		6ZC—3	60/1600	日本 Japan	Mitsubishi Heavy Industries Ltd.
	6CHS—T	55/1440	日本 Japan	Yanmar Diesel Engine Co. Ltd.	
	4 : 1	X4105C	48/1500		中国 China
4105C		60/2000		中国 China	
2135C		40/1500		中国 China	
2E105C		40/2000		中国 China	



齿轮箱型号 Gearbox Model	减速比 Ratio	柴 油 机 Diesel		柴 油 机 制 造 厂 Diesel Manufacturer
		型 号 Model	Ps/(r · min ⁻¹)	
MA142A	4 : 1	F5L912	79/2300	日本 Mitsui—Deutz Diesel Engine Japan Co.
		M4D115AN	50/1600	日本久保田铁工 Japan
		6ZA—3	45/1500	日本 Mitsubishi Heavy Industries Japan Ltd.
		VK98 × 102	72/2000	
	5 : 1	495C	48/2000	中国 China
		485C	44/2000	中国 China
		490C	40/2000	日本久保田铁工 Japan
		MH336	35/1800	中国 China
		M3D115AN	37/1600	日本久保田铁工 Japan
		F3L912	47/2300	日本 Mitsui—Deutz Diesel Engine Japan Co.
		4K—5	39/1800	日本 Mitsubishi Heavy Industries Japan Ltd.
	2100	32/1500	中国 China	
	5.5 : 1	295C	36/2000	中国 China
		2105	24/1500	中国 China
		VK92 × 95	42/2200	中国 China

* 说明: “可配套” 仅指柴油机功率与齿轮箱的传递能力相当, 至于联接尺寸部分, 除备有外形安装尺寸图中标明的与SAEJ617C 飞轮罩壳和 SAEJ620d 飞轮相匹配的输入联轴节与联接罩壳及平板式橡胶联轴节外, 其它联接需作特殊订货, 并提供有关设计资料。

* Note: “Coupled” only means the diesel power is suitable to the capacity of gearbox. About the dimension of connecting, except the input coupling and bell housing coupled with SAEJ617C flywheel housing and SAEJ620d flywheel as well as rubber transmission plate as shown in diagram of mounting dimension, other should be order specially with which designed data concerned.



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