

PARAMAX 7[®]

Operating and Maintenance Manual

Parallel Shaft and
Right Angle
Speed Reducers

THE
AVAILABLE
SOLUTION

INDEX

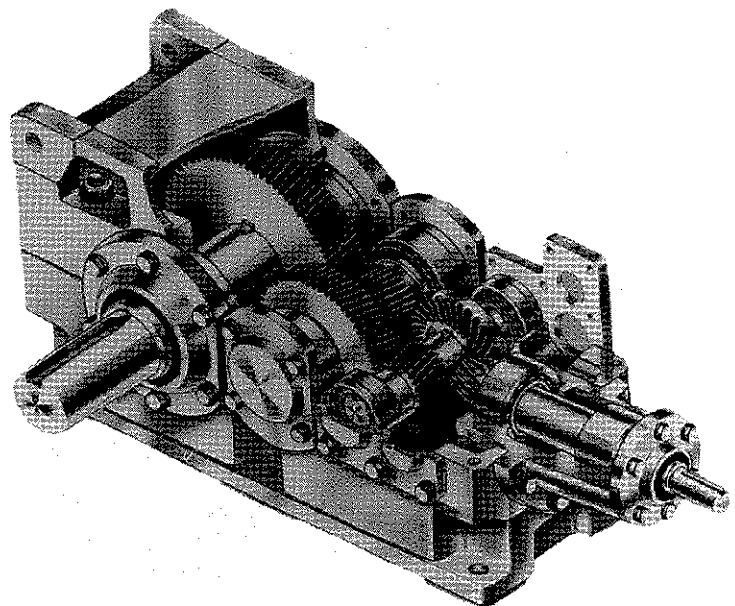
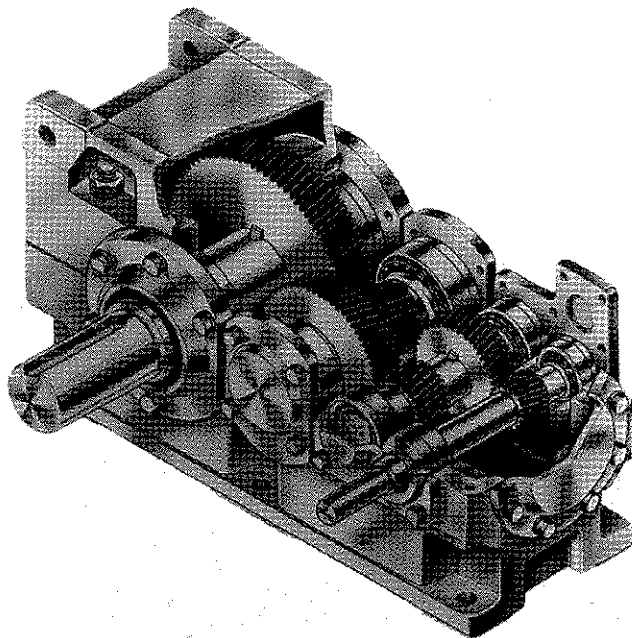
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Paramax 7[®], the 7000 Series Parallel Shaft and Right Angle Speed Reducers are Standardized units available in a variety of sizes and configurations.

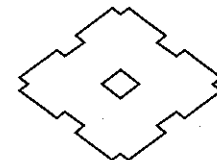
Instructions in this manual apply to all 7000 Series and should be thoroughly reviewed prior to installing and operating the drive.

CONSTRUCTION

1. Refer to figures 1 to 12 for the construction of Paramax 7[®]
2. To assure strength and quiet operation, gear tooth surfaces are heat treated and ground. Gearsets are computer designed with Helical gears used in Parallel Shaft Reducers while Spiral Bevel and Helical gears are used in Right Angle Shaft units.
3. Output shafts are manufactured from high quality, heat treated alloy steel.
4. Roller bearings are used on all shafts. Clearances on all roller bearings are adjusted to rigid tolerances at assembly. Refer to Tables 4 to 6 for bearing identification.
5. For maximum protection against oil leakage, liquid gasket material has been used between mating housing and cover surfaces. Dual lip oil seals are used on input and output shafts. Refer to table 7 for seal identification.
6. An air vent, oil sight gauge, drain plug and provision for lifting is supplied with each unit.



INSTALLATION



INSTALLATION INSTRUCTIONS

1. Care should be taken in handling to prevent damage by striking another object. Severe striking contact could result in internal damage to gears or bearings, broken housings and bent shafts.
2. Floor, wall or ceiling installations are permissible; however, applications such as an installation at a severe tilting angle require a special lubrication system and should be referred to the factory.
3. Mount the reducer on a rigid foundation. This should prevent flexing, vibration or shaft misalignment under normal loading. The gear unit must be level within .002 inch per foot, both front to back and side to side.

COUPLINGS

The performance and life of any coupling depends largely upon how well the coupling is installed. Refer to coupling manufacturer's specific instructions. The correct coupling gap should be provided by shifting the most convenient drive element. A correct coupling gap should be provided to allow the shaft and all components to float freely, to center themselves without restriction and to prevent

4. Drives shipped from the factory mounted on a baseplate with connecting motor have been aligned and checked at assembly. However, misalignment may occur during transportation and handling. The alignment must be rechecked after installation and adjusted if necessary.
5. Care should be taken at installation to ensure that all components are properly shimmed or grouted in place. Failure to shim properly may result in deflections and misalignment when base mounting bolts are tightened which would adversely affect bearings, gears and housing.
6. After careful alignment with motor and driven equipment, securely bolt the reducer in place. Bolts used for installation must be equivalent to SAE Grade 8.

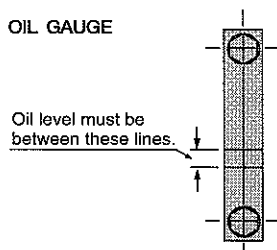
abnormal thrust loading. The recommended gap shown in coupling manufacturer's catalog should be set with the unit input shaft in its neutral or loaded running position. Proper alignment of coupling members is important in preventing undue loading of shafts and bearings, as well as undue loading on the coupling itself.

It is recommended to keep angular and parallel alignment within 0.002".

START-UP INSTRUCTIONS

WARNING: THIS REDUCER IS SHIPPED WITHOUT OIL. REFER TO TABLE 2 FOR RECOMMENDED SELECTION. APPROXIMATE OIL QUANTITY IS SHOWN IN TABLE 3.

1. Add the correct amount of oil to the gear unit. Units equipped with oil lubrication system with or without cooler should have oil pipes, pumps and cooler filled with oil when establishing the correct oil level. Check all lubrication connections.



2. Check that all electrical connections are made and in working order.
3. Check that the mounting bolts are tightened to the proper bolt torque.
4. Check all shaft mounted devices such as: couplings, sheaves, pinions, etc., and make sure they are mounted properly.
5. Check the prime mover's rotation.

6. Install inspection covers and any guard devices for rotating equipment.
7. Check all connecting equipment.
8. When starting the gear unit, it is better to start under as light a load as practical and bring the unit to normal operating speed as slowly as possible. This is done to avoid severe impact and to allow time to observe that the system is working properly. The machinery should be checked frequently for unusual sounds, oil leaks, excessive vibration and excessive heat. If any operating problems develop, shut down immediately and correct the problem before restarting.
9. It is desirable to operate the gear drive at a reduced load of about 50% for two days to allow the gear unit to "run-in."
10. Monitor the oil temperature for about four hours. If the oil temperature exceeds 100 degrees F above ambient, stop the gear unit. First make sure there is free air circulation around the unit. Second, reduce load and allow for a "run-in." In any condition, do not allow the sump oil temperature to exceed 200 degrees F.

LUBRICATION

LUBRICATION INSTRUCTIONS

SUMITOMO MACHINERY CORP. recommends petroleum based lubricants of the extreme pressure type containing sulphur phosphorus additives. For low temperature operations, the lubricant must meet the lubrication

requirements of cold starting and warmer operating conditions, see Table 1. If this cannot be done, a sump heater or synthetic lubricant is required. Please contact Sumitomo Engineering Department.

METHOD OF LUBRICATION

TYPE	SIZE	INPUT SPEED : n	
		n < 750 RPM	750 RPM ≤ n ≤ 1800 RPM
Horizontal	7010 to 7110	Oil bath Higher oil level than standard	Oil bath and splash Standard oil level
Vertical	7010 to 7080	Forced lubrication by motor driven pump	Forced Lubrication by shaft driven pump
	7090 to 7110	Forced lubrication by motor driven pump	

LUBRICATION SELECTION

Select a lubricant with appropriate viscosity from Table 1 and 2, considering output speed and ambient temperature.

OIL QUANTITY

Check the oil level gauge while the unit is stationary to determine oil quantity. The approximate oil quantity is shown in Table 3.

LUBRICATION MAINTENANCE

- Lubricant should be drained from a new gear unit after 500 hours of operation. Then the gear unit should be flushed with a flushing oil and refilled to the proper level.
- Under normal operating conditions, the lubricant should be changed every 2,500 hours of operation or every six (6) months, whichever comes first. Under adverse operating conditions such as extreme temperature variation, high moisture or abrasive atmospheres, the lubricant should be changed more frequently. To determine the frequency, have the lubrication checked periodically. SUMITOMO MACHINERY CORP. should be consulted when adverse atmospheric conditions are encountered.
- Every day visually inspect the Sumitomo gear units for oil leaks and listen for unusual sounds. Check any gauges if the drive is so equipped. If anything is amiss, shut down immediately and determine the cause.
- Once a week, check the oil level and add oil as needed. If adding oil is recurrent, or excessive amounts of oil are required, check the gear unit for a leak.
- Once a month, grease seals, bearings, couplings and inspect the lubrication equipment.
- When the lubricant in the gear unit is changed, inspect the lubricant for foreign matter. This will be a good indication of impending problems. Often during "run-in" very small pieces of metallic particles will be present in the oil. They will be removed with the first oil change and their presence will greatly diminish in time. If the gear unit is equipped with a pressure lubrication system, inspect the system completely when the lubricant is changed.

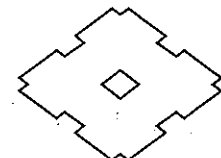


TABLE 1 – SELECTION OF PROPER OIL VISCOSITY

LOW SPEED SHAFT	AMBIENT TEMPERATURE		
	15° to 60° F	32° to 86° F	50° to 120° F
Higher than or equal to 100 RPM	AGMA 3EP	AGMA 4EP	AGMA 5EP
Lower than 100 RPM	AGMA 4EP	AGMA 5EP	AGMA 6EP

**TABLE 2 – RECOMMENDED LUBRICANTS
TYPICAL PRODUCTS**

MANUFACTURER	AGMA GRADE				
	2 EP	3 EP	4 EP	5 EP	6 EP
AMOCO	Permagear EP LUB 68	Permagear EP LUB 100	Permagear EP LUB 150	Permagear EP LUB 220	Permagear EP LUB 320
MOBIL	Mobilgear 626	Mobilgear 627	Mobilgear 629	Mobilgear 630	Mobilgear 632
EXXON	Spartan EP68	Spartan EP100	Spartan EP150	Spartan EP220	Spartan EP320
GULF	EP Lubricant HD68	EP Lubricant HD100	EP Lubricant HD150	EP Lubricant HD220	EP Lubricant HD320
SHELL	Omala 68	Omala 100	Omala 150	Omala 220	Omala 320
TEXACO	Meropa 68	Meropa 100	Meropa 150	Meropa 220	Meropa 320
SUNOCO	Sunep 1050	Sunep 1055	Sunep 1060	Sunep 1070	Sunep 1090

Lubricants above are typical products ONLY and should not be construed as exclusive recommendations.

TABLE 3 – OIL QUANTITY

Unit : Gallon

TYPE	MOUNTING	REDUCTION	SIZE										
			7010	7020	7030	7040	7050	7060	7070	7080	7090	7100	7110
Parallel shaft	Horizontal	Double	1.3	2.1	2.9	4.2	6.3	9.8	14.5	20.9	37	54	77
		Triple	1.6	2.1	3.2	4.5	6.9	11.1	15.9	22.7	41	59	86
		Quadruple	—	—	3.2	4.8	7.4	11.4	16.4	23.8	48	69	96
	Vertical	Double	1.1	1.6	2.4	3.4	4.8	7.4	11.6	16.4	29	42	62
		Triple	1.1	1.6	2.4	3.4	4.8	7.4	11.6	16.1	29	42	62
		Quadruple	—	—	2.4	3.2	5.0	8.2	13.7	18.0	34	52	73
Right angle shaft	Horizontal	Double	—	—	2.4	3.4	5.5	8.5	12.4	17.7	—	—	—
		Triple	—	—	2.9	4.2	6.6	10.6	15.1	21.9	41	58	82
		Quadruple	—	—	—	5.0	7.9	12.2	17.7	25.6	48	67	95
	Vertical	Double	—	—	1.6	2.1	3.2	5.3	7.7	9.8	—	—	—
		Triple	—	—	2.4	3.7	5.3	8.2	14.0	18.2	36	52	71
		Quadruple	—	—	—	4.0	6.1	9.2	14.0	19.0	38	54	78

LONG TERM STORAGE

Long Term Storage preparation is required whenever a reducer is inactive for three (3) months or more.

SHIPPING CONDITION

STANDARD SPECIFICATION: Internal components are coated with a suitable rust preventative for intervals of storage up to three (3) months after ex-factory. External machined surfaces are coated with a suitable petroleum base rust preventative.

LONG TERM STORAGE SPECIFICATION: (This specification is applied at customer request only.) The rust preventative is sprayed into the gearbox. The air vent is replaced

by a sealing plug and attached to the unit when shipping. The rust preventative protects the internal parts against rust for a period of up to six (6) months after ex-factory.

Long term storage specification is also required for transportation by ship.

Shell VSI Circulating Oil #32 is used and recommended by Sumitomo.

PROCEDURE FOR LONG TERM STORAGE

When longer than the above storage time is required, follow the following procedure:

1. Spray the rust preventative into the gearbox and rotate the shaft of the reducer by hand to assure complete coverage.

2. Seal up with a plug instead of the air vent.

3. Repeat steps (1) and (2) every six (6) months.

NOTE: The reducer should be stored in a dry and covered storage area. Do not use a different rust preventative when respraying.

QUANTITY OF RUST PREVENTATIVE (VSI CIRCULATING OIL #32)											
SIZE	7010	7020	7030	7040	7050	7060	7070	7080	7090	7100	7110
Liter	0.3		0.5		1			2		3	4
Gallon	0.08		0.13		0.25			0.5		0.8	1

PROCEDURE FOR START UP AFTER LONG TERM STORAGE

1. Drain the rust preventative but flushing is not necessary.
2. Pour the lubricant through the oil filler or the inspection access.
3. Replace the air vent.

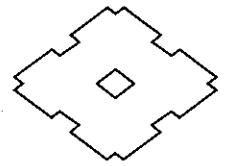
DO NOT OPERATE THE REDUCER WITH THE RUST PREVENTATIVE

ALTERNATIVE METHOD OF LONG TERM STORAGE PREPARATION

As an alternative to the above procedure, it is acceptable to fill the reducer gearcase with the normal operating type oil to a level which completely submerges all the gears

and bearings. The air vent should be plugged and shafts rotated occasionally. When preparing the reducer for use, simply drain the oil to the recommended oil level and replace the air vent.

DISASSEMBLY & REASSEMBLY



DISASSEMBLY

1. Thoroughly review the construction of each component prior to disassembly.
2. Careful handling of each component is required to prevent parts damage.
3. To assure proper clearance in the taper roller bearings and proper tooth contact in the gears, shim (or spacer),

positions should be carefully noted. For accurate reassembly, a matching mark made prior to disassembly is recommended.

4. Maximum precautions must be taken to protect the bearing from dust contamination.

REASSEMBLY

1. Maximum precautions must be taken to prevent entry of foreign matter into the drive housing.
2. Proper clearance in the taper roller bearings and proper tooth contact in the gears can only be assured through accurate rebuilding of the original assembly. In such an event, readjustment may not be necessary, but the position of the shims (or spacers) should be carefully noted.
3. The remnants of liquid gasketing adhering to the mating faces of the gear housing, bearing housing, cover, flange cylinder, oil level gauge, etc. must be completely

removed. After cleaning and close examination of the surface, a new coating of liquid gasketing should be applied for reassembly. The reassembly should be conducted after confirming the alignment position of the shoulder bolts and dowel pins, etc. Recommended liquid gasketing to be used shall be Three Bond 1215 half dry type or equivalent.

4. Nuts and bolts must be securely tightened.
5. A record should be maintained for disassembly and reassembly work.

SEAL REPLACEMENT

1. The following procedure applies to the replacement of standard original equipment seals when the entire reducer is disassembled and coupling hubs, sheaves, pinions, keys, etc. have been removed.
2. New seals will leak if the seal lips are cut or if the seal's rubbing surface on the shaft has been damaged. Seal lips should be protected at all times. Prior to installing the seal on the shaft, clean the shaft but do not use any abrasive material on the rubbing surfaces polished by the seal. If necessary, replace the wear sleeve if the rubbing surface has been damaged.

3. Remove oil sealing compound from the seal bore. Coat the bore with Permatex #2 or equivalent prior to installing the seal. Check the position of the seal lips and garter spring.
4. Carefully work the seal into position. Place a flat ended cylindrical tool against the seal face and drive or press the seal until fully seated.
5. Do not strike the seal directly.

BEARINGS

TABLE 4 – DOUBLE REDUCTION UNIT BEARINGS

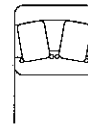
Type	Size	High speed shaft		Intermediate shaft	Slow speed shaft
		Motor side	Opposite side		
Parallel shaft	7010	33206	33206	2 x 33207	2 x 32212
	7020	33207	33207	2 x 33209	2 x 33214
	7030	33208	33208	2 x 32310	2 x 33216
	7040	33210	33210	2 x 32312	2 x 30219
	7050	33211	33211	2 x 32314	2 x 30222
	7060	33213	33213	2 x 32316	2 x 30226
	7070	33216	33216	2 x 32319	2 x 30230
	7080	33218	33218	2 x 32321	2 x 23134
	7090	2 x 30221	22318	2 x 22324	2 x 23138
	7100	2 x 30224	22320	2 x 22328	2 x 23144
	7110	2 x 32032X	22322	2 x 22330	2 x 23148
Right angle shaft	7030	2 x 30309D	22310	2 x 32310	2 x 33216
	7040	2 x 30311D	22312	2 x 32312	2 x 30219
	7050	2 x 30312D	22313	2 x 32314	2 x 30222
	7060	2 x 30314D	22315	2 x 32316	2 x 30226
	7070	2 x 30315D	22316	2 x 32319	2 x 30230
	7080	2 x 30317D	22318	2 x 32321	2 x 23134

Bearing numbering system

2 2 3 1 6

Bore dia. No.
 [Bore dia. No] x 5 = [Bore dia. (mm)]
 ex. 16 x 5 = 80 (mm)

Bearing series
 2xx : Spherical roller bearings



3xx : Tapered roller bearings

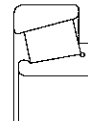


TABLE 5 – TRIPLE REDUCTION UNIT BEARINGS

Type	Size	High speed shaft		Intermediate shaft	Intermediate shaft	Slow speed shaft
		Motor side	Opposite side			
Parallel shaft	7010	33205	33205	2 x 33206	2 x 33207	2 x 32212
	7020	33206	33206	2 x 33207	2 x 33209	2 x 33214
	7030	33206	33206	2 x 32307	2 x 32310	2 x 33216
	7040	33207	33207	2 x 32308	2 x 32312	2 x 30219
	7050	33208	33208	2 x 32309	2 x 32314	2 x 30222
	7060	33210	33210	2 x 32311	2 x 32316	2 x 30226
	7070	33211	33211	2 x 32313	2 x 32319	2 x 30230
	7080	33213	33213	2 x 32315	2 x 32321	2 x 23134
	7090	32314	32314	2 x 22318	2 x 22324	2 x 23138
	7100	32316	32316	2 x 22320	2 x 22328	2 x 23144
	7110	32316	32316	2 x 22322	2 x 22330	2 x 23148
Right angle shaft	7030	2 x 30307D	22308	2 x 32307	2 x 32310	2 x 33216
	7040	2 x 30308D	22309	2 x 32308	2 x 32312	2 x 30219
	7050	2 x 30309D	22310	2 x 32309	2 x 32314	2 x 30222
	7060	2 x 30311D	22312	2 x 32311	2 x 32316	2 x 30226
	7070	2 x 30312D	22313	2 x 32313	2 x 32319	2 x 30230
	7080	2 x 30314D	22315	2 x 32315	2 x 32321	2 x 23134
	7090	*2 x 30317D	*22318	2 x 22318	2 x 22324	2 x 23138
		2 x 30315D	22316			
	7100	*2 x 30319D	*22320	2 x 22320	2 x 22328	2 x 23144
		2 x 30317D	22318			
7110	2 x 30319D	22320	2 x 22322	2 x 22330	2 x 23148	

*Only for ratio 20:1

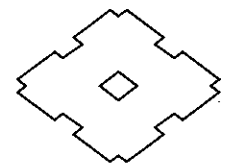


TABLE 6 – QUADRUPLE REDUCTION UNIT BEARINGS

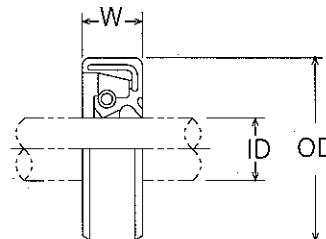
Type	Size	High speed shaft		Intermediate shaft	Intermediate shaft	Intermediate shaft	Slow speed shaft
		Motor side	Opposite side				
Parallel shaft	7030	33205	33205	2 x 33206	2 x 32307	2 x 32310	2 x 33216
	7040	33206	33206	2 x 33207	2 x 32308	2 x 32312	2 x 30219
	7050	33206	33206	2 x 32307	2 x 32309	2 x 32314	2 x 30222
	7060	33207	33207	2 x 32308	2 x 32311	2 x 32316	2 x 30226
	7070	32308	32308	2 x 32309	2 x 32313	2 x 32319	2 x 30230
	7080	32309	32309	2 x 32311	2 x 32315	2 x 32321	2 x 23134
	7090	32212	32212	2 x 32314	2 x 22318	2 x 22324	2 x 23138
	7100	33214	33214	2 x 32316	2 x 22320	2 x 22328	2 x 23144
	7110	33214	33214	2 x 32316	2 x 22322	2 x 22330	2 x 23148
Right angle shaft	7040	2 x 30307D	22308	2 x 33207	2 x 32308	2 x 32312	2 x 30219
	7050	2 x 30307D	22308	2 x 32307	2 x 32309	2 x 32314	2 x 30222
	7060	2 x 30308D	22309	2 x 32308	2 x 32311	2 x 32316	2 x 30226
	7070	2 x 30309D	22310	2 x 32309	2 x 32313	2 x 32319	2 x 30230
	7080	2 x 30311D	22312	2 x 32311	2 x 32315	2 x 32321	2 x 23134
	7090	2 x 30312D	22313	2 x 32314	2 x 22318	2 x 22324	2 x 23138
	7100	2 x 30314D	22315	2 x 32316	2 x 22320	2 x 22328	2 x 23144
	7110	2 x 30314D	22315	2 x 32316	2 x 22322	2 x 22330	2 x 23148

OIL SEALS

TABLE 7 – OIL SEAL DIMENSIONS [ID x OD x W (MM)]

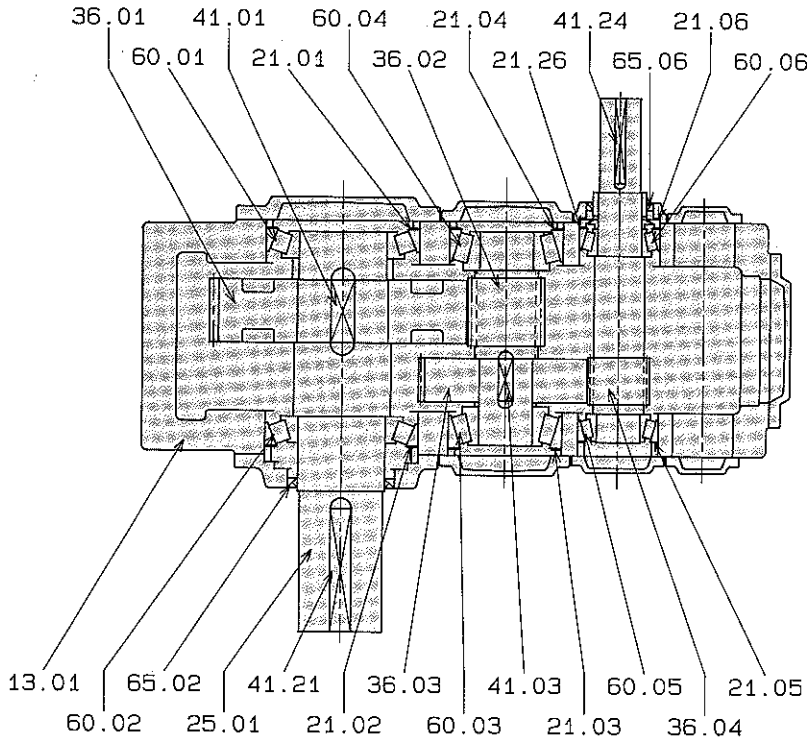
Size	Slow speed shaft	High speed shaft					
		Parallel shaft			Right angle shaft		
		Double	Triple	Quadruple	Double	Triple	Quadruple
7010	70 x 90 x 12	40 x 52 x 8	35 x 47 x 7	—	—	—	—
7020	80 x 100 x 12	45 x 62 x 9	40 x 52 x 8	—	—	—	—
7030	90 x 110 x 13	50 x 65 x 9	40 x 52 x 8	35 x 47 x 7	50 x 65 x 9	40 x 52 x 8	—
7040	115 x 140 x 15	60 x 80 x 12	45 x 62 x 9	40 x 52 x 8	50 x 65 x 9	45 x 62 x 9	40 x 52 x 8
7050	130 x 160 x 14	70 x 90 x 12	50 x 65 x 9	40 x 52 x 8	55 x 72 x 9	50 x 65 x 9	40 x 52 x 8
7060	130 x 160 x 14	80 x 100 x 12	60 x 80 x 12	45 x 62 x 9	65 x 85 x 13	50 x 65 x 9	45 x 62 x 9
7070	150 x 180 x 14	80 x 100 x 12	70 x 90 x 12	50 x 65 x 9	70 x 90 x 12	55 x 72 x 9	50 x 65 x 9
7080	170 x 200 x 16	90 x 110 x 13	80 x 100 x 12	55 x 72 x 9	80 x 100 x 12	65 x 85 x 13	50 x 65 x 9
7090	210 x 250 x 15	100 x 120 x 12	70 x 90 x 12	55 x 72 x 9	—	*80 x 100 x 12 70 x 90 x 12	55 x 72 x 9
7100	240 x 270 x 15	110 x 130 x 13	80 x 100 x 12	65 x 85 x 13	—	*90 x 110 x 13 80 x 100 x 12	65 x 85 x 13
7110	265 x 290 x 16	125 x 150 x 13	90 x 110 x 13	65 x 85 x 13	—	90 x 110 x 13	65 x 85 x 13

*Only for ratio 20:1



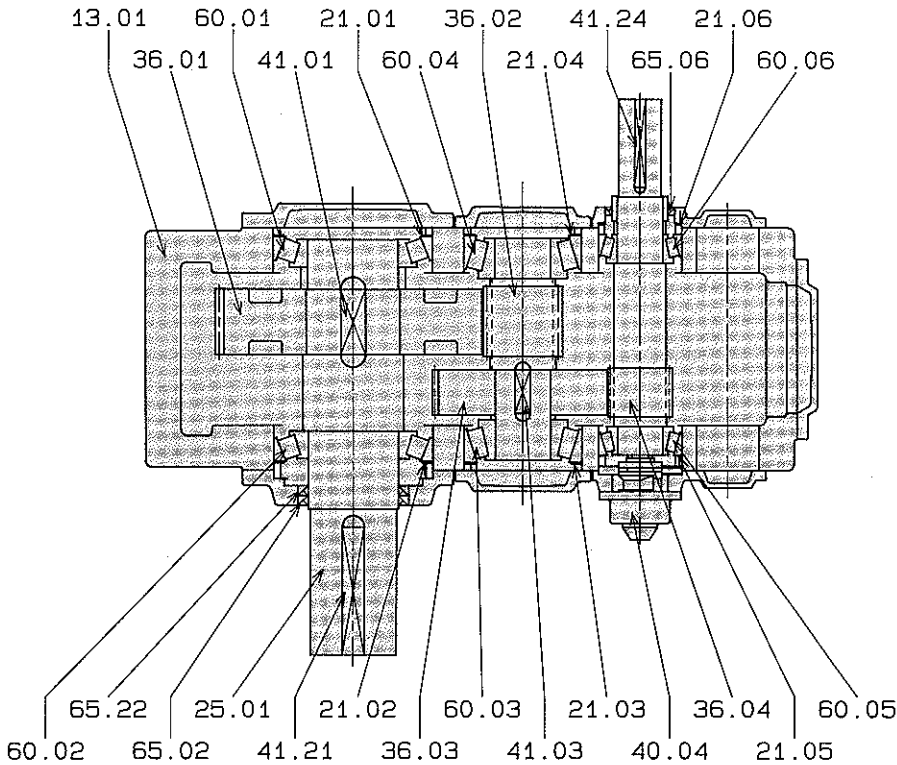
CONSTRUCTION DRAWINGS

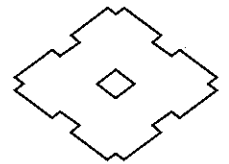
**FIG. 1 - Parallel Shaft
Horizontal - Double Reduction**



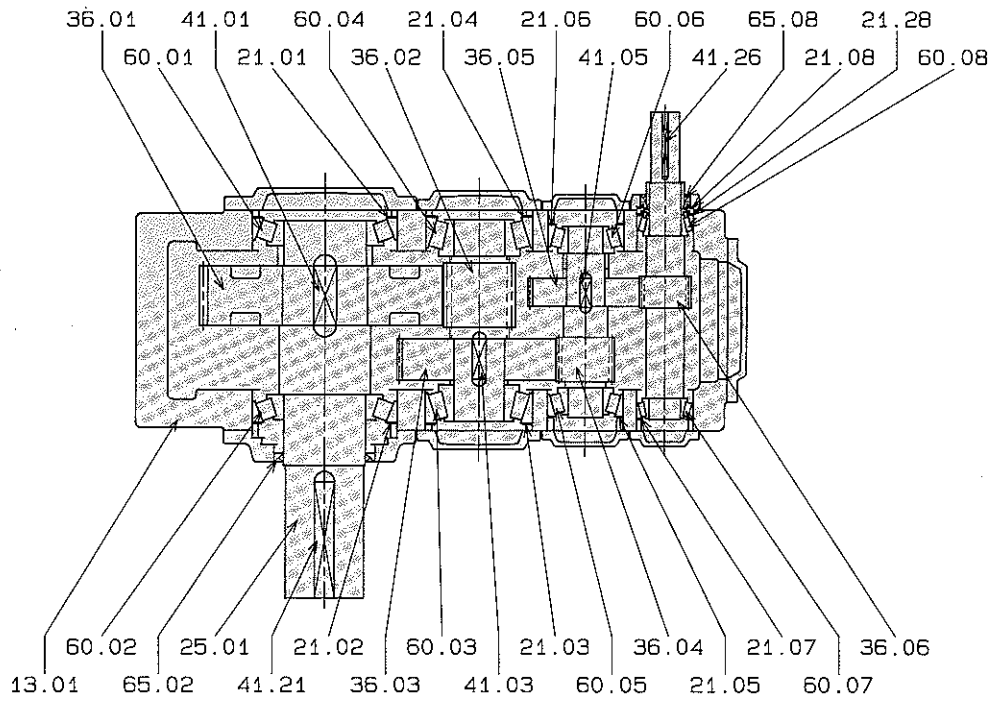
Ref. No.	Part Name
13.01	Housing
21.01	Shim
21.02	Shim
21.03	Shim
21.04	Shim
21.05	Shim
21.06	Shim
21.26	Shim
25.01	Low Speed Shaft
36.01	Helical Gear
36.02	Helical Pinion Shaft
36.03	Helical Gear
36.04	Helical Pinion Shaft
40.04	Oil Pump
41.01	Key
41.03	Key
41.21	Key
41.24	Key
60.01	Bearing
60.02	Bearing
60.03	Bearing
60.04	Bearing
60.05	Bearing
60.06	Bearing
65.02	Oil Seal
65.06	Oil Seal
65.22	Oil Seal

**FIG. 2 - Parallel Shaft
Vertical - Double Reduction**



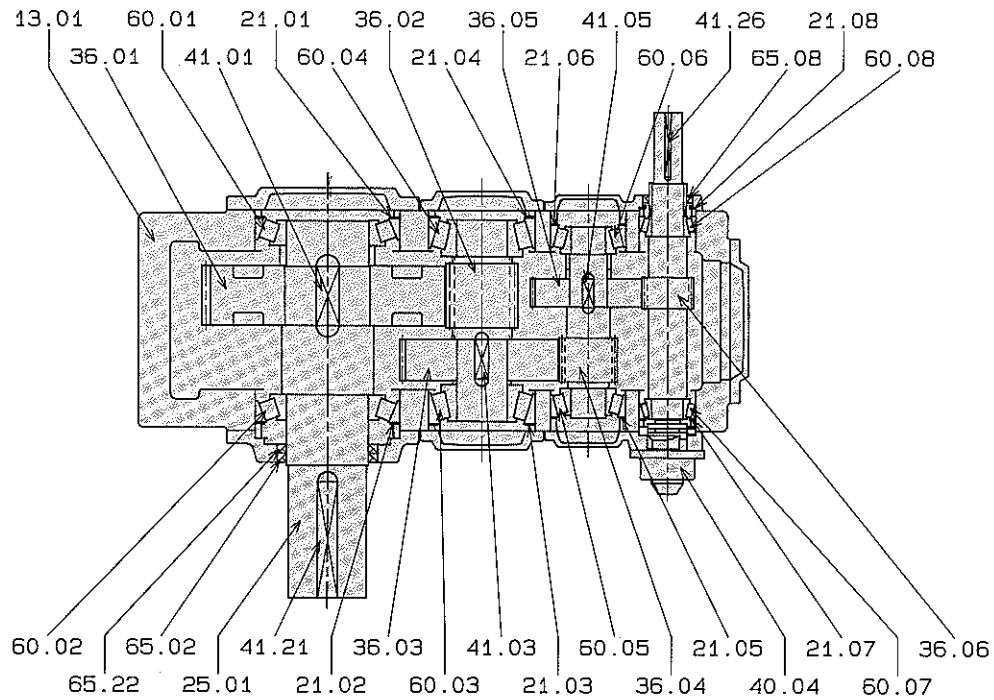


**FIG. 3 - Parallel Shaft
Horizontal - Triple Reduction**

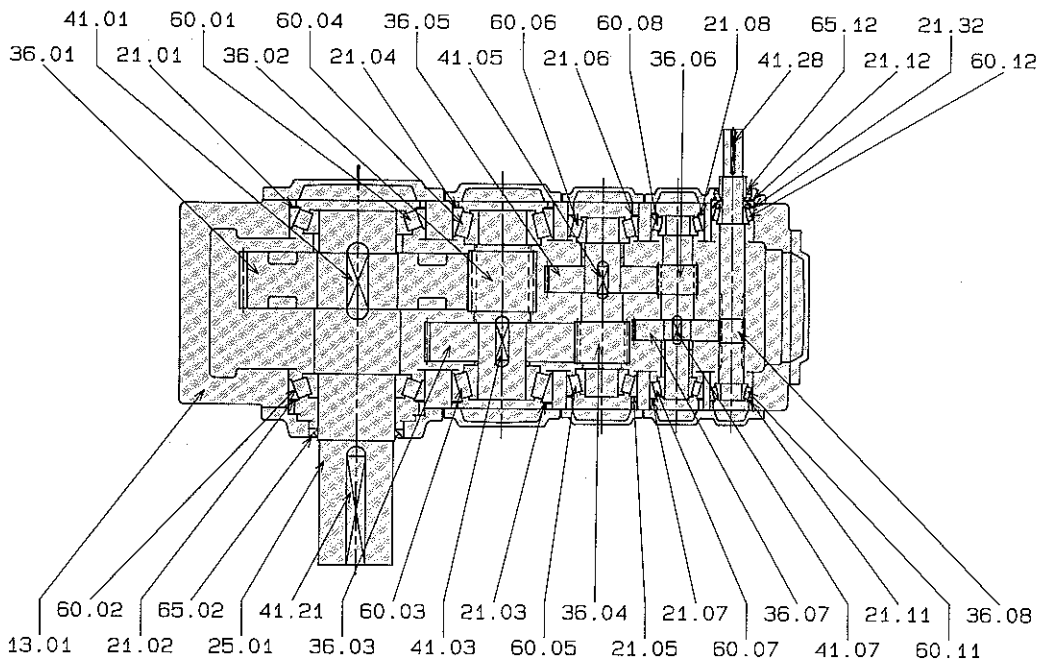


Ref. No.	Part Name
13.01	Housing
21.01	Shim
21.02	Shim
21.03	Shim
21.04	Shim
21.05	Shim
21.06	Shim
21.07	Shim
21.08	Shim
21.28	Shim
25.01	Low Speed Shaft
36.01	Helical Gear
36.02	Helical Pinion Shaft
36.03	Helical Gear
36.04	Helical Pinion Shaft
36.05	Helical Gear
36.06	Helical Pinion Shaft
40.04	Oil Pump
41.01	Key
41.03	Key
41.05	Key
41.21	Key
41.26	Key
60.01	Bearing
60.02	Bearing
60.03	Bearing
60.04	Bearing
60.05	Bearing
60.06	Bearing
60.07	Bearing
60.08	Bearing
65.02	Oil Seal
65.08	Oil Seal
65.22	Oil Seal

**FIG. 4 - Parallel Shaft
Vertical - Triple Reduction**

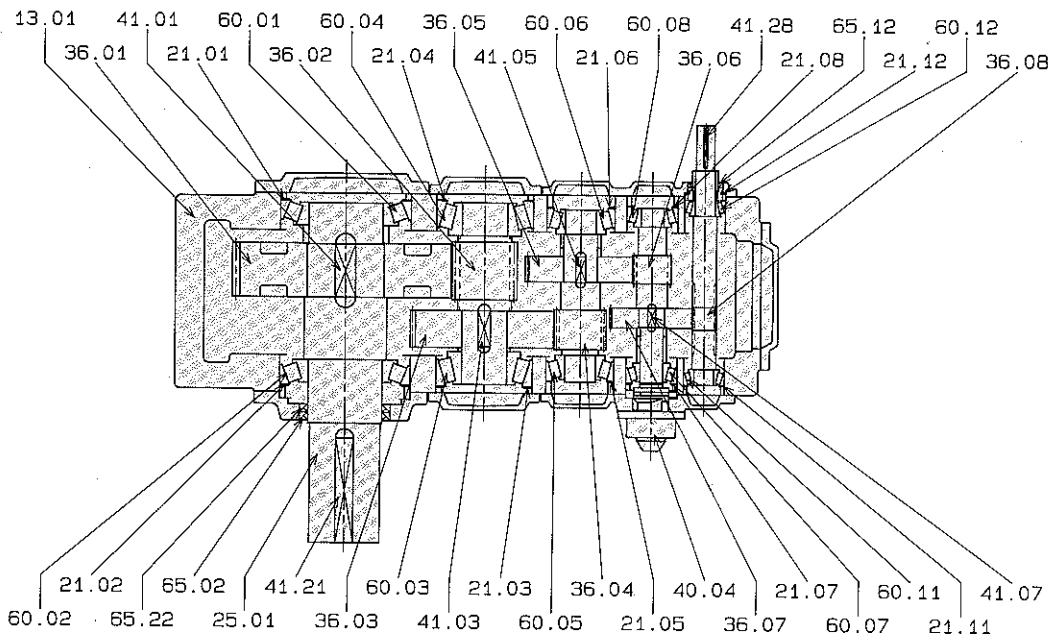


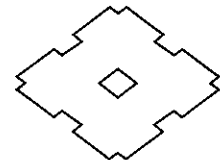
**FIG. 5 - Parallel Shaft
Horizontal - Quadruple Reduction**



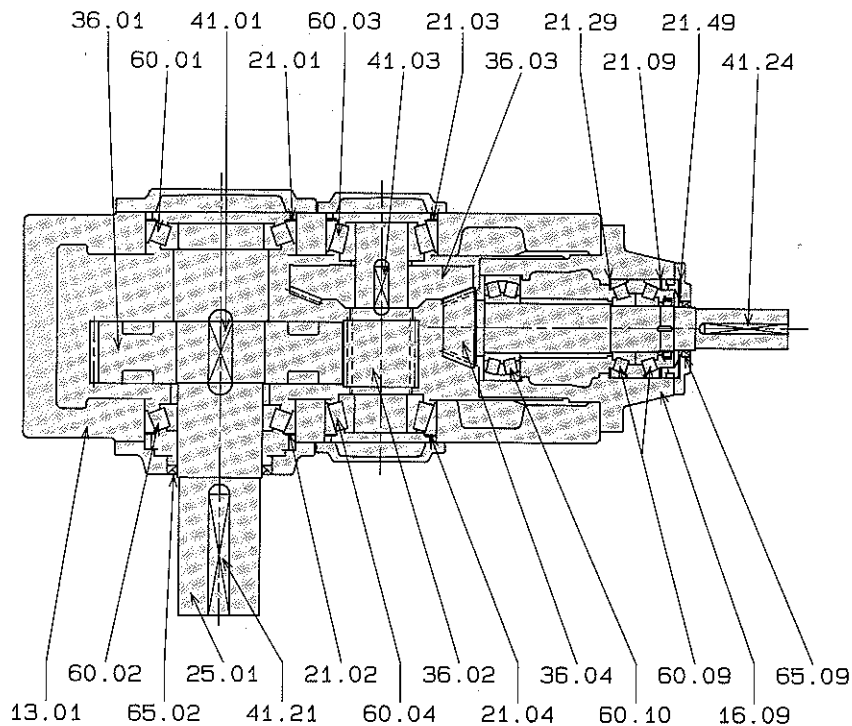
Ref. No.	Part Name
13.01	Housing
21.01	Shim
21.02	Shim
21.03	Shim
21.04	Shim
21.05	Shim
21.06	Shim
21.07	Shim
21.08	Shim
21.11	Shim
21.12	Shim
21.32	Shim
25.01	Low Speed Shaft
36.01	Helical Gear
36.02	Helical Pinion Shaft
36.03	Helical Gear
36.04	Helical Pinion Shaft
36.05	Helical Gear
36.06	Helical Pinion Shaft
36.07	Helical Gear
36.08	Helical Pinion Shaft
40.04	Oil Pump
41.01	Key
41.03	Key
41.05	Key
41.07	Key
41.21	Key
41.28	Key
60.01	Bearing
60.02	Bearing
60.03	Bearing
60.04	Bearing
60.05	Bearing
60.06	Bearing
60.07	Bearing
60.08	Bearing
60.11	Bearing
60.12	Bearing
65.02	Oil Seal
65.12	Oil Seal
65.22	Oil Seal

**FIG. 6 - Parallel Shaft
Vertical - Quadruple Reduction**



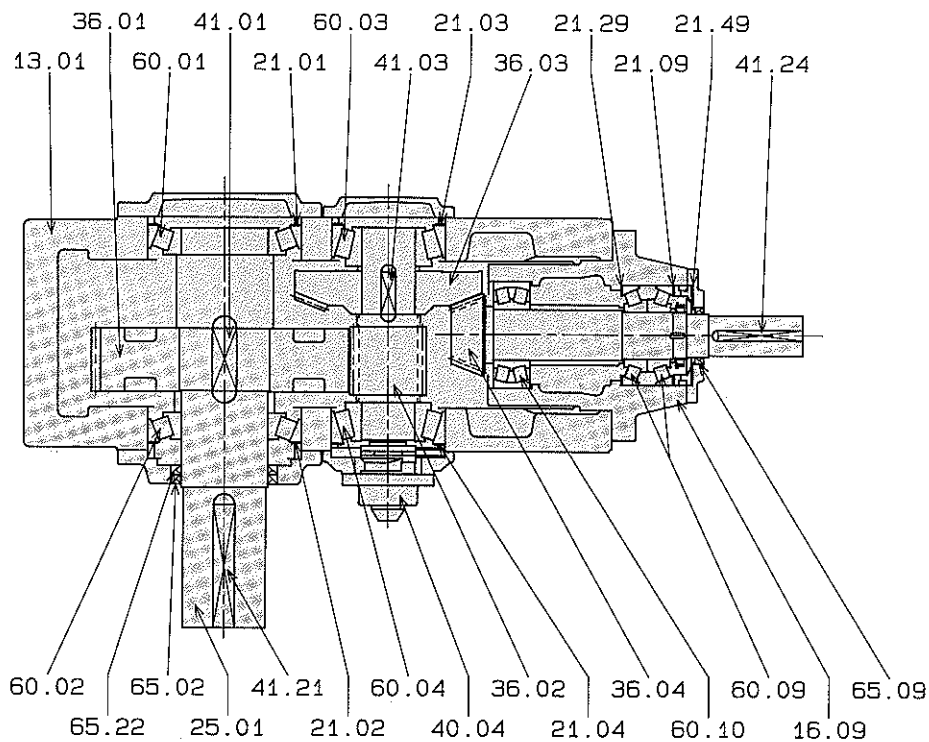


**FIG. 7 - Right Angle Shaft
Horizontal - Double Reduction**

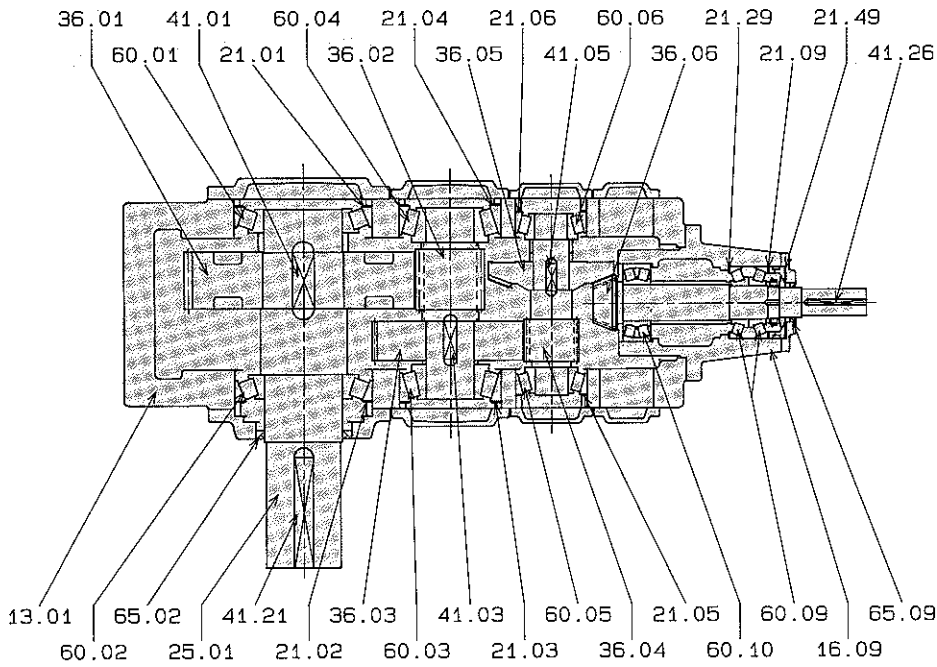


Ref. No.	Part Name
13.01	Housing
16.09	Bearing Housing
21.01	Shim
21.02	Shim
21.03	Shim
21.04	Shim
21.09	Shim
21.29	Shim
21.49	Shim
25.01	Low Speed Shaft
36.01	Helical Gear
36.02	Helical Pinion Shaft
36.03	Bevel Gear
36.04	Bevel Pinion Shaft
40.04	Oil Pump
41.01	Key
41.03	Key
41.21	Key
41.24	Key
60.01	Bearing
60.02	Bearing
60.03	Bearing
60.04	Bearing
60.09	Bearing
60.10	Bearing
65.02	Oil Seal
65.09	Oil Seal
65.22	Oil Seal

**FIG. 8 - Right Angle Shaft
Vertical - Double Reduction**

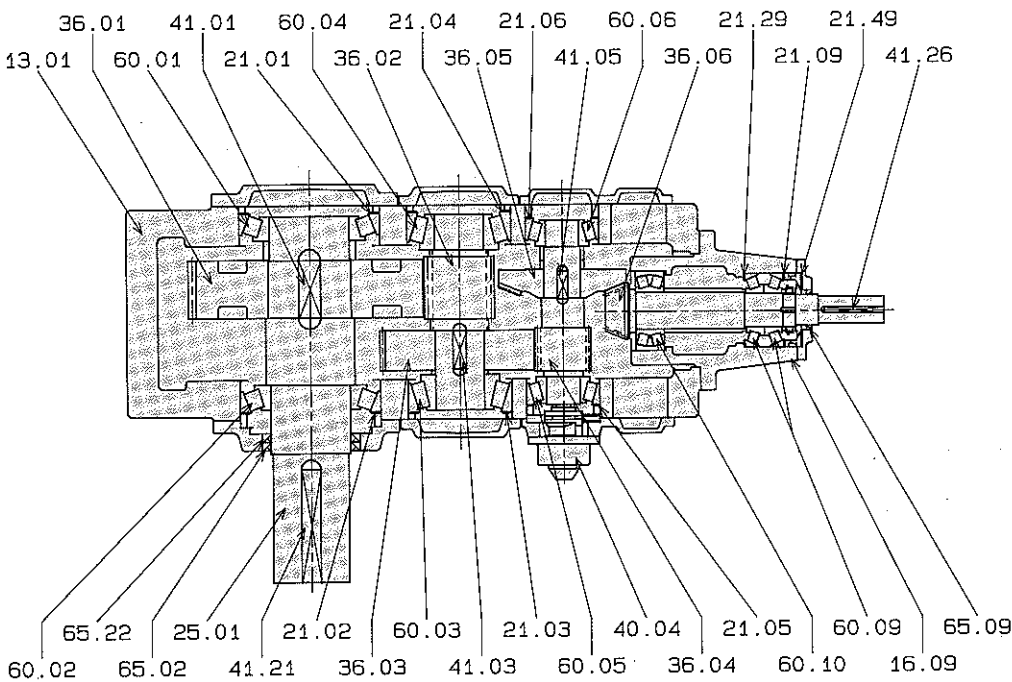


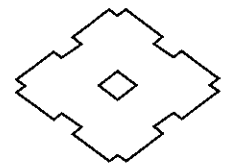
**FIG. 9 - Right Angle Shaft
Horizontal - Triple Reduction**



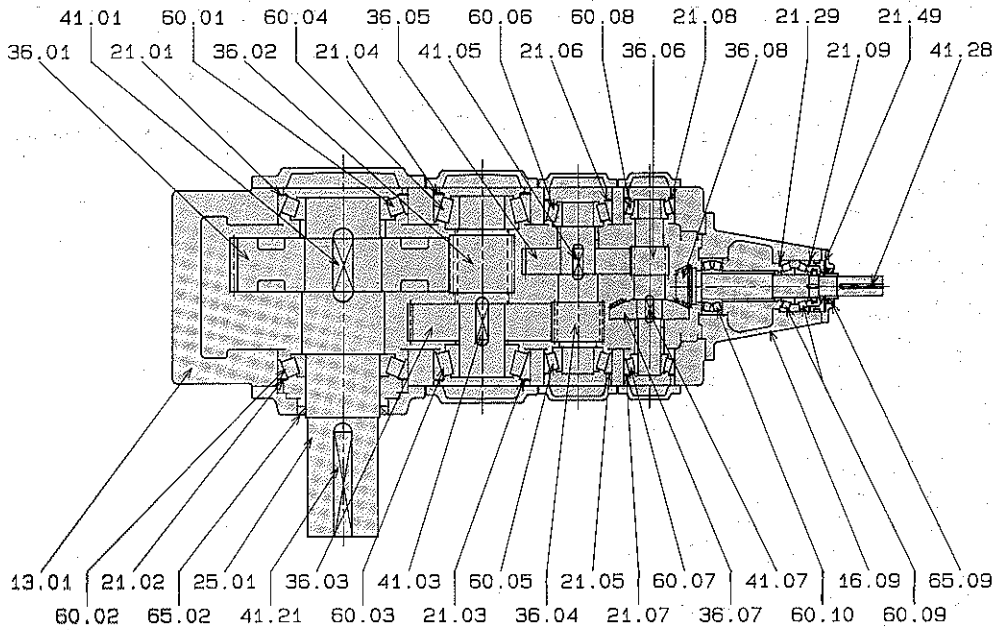
Ref. No.	Part name
13.01	Housing
16.09	Bearing Housing
21.01	Shim
21.02	Shim
21.03	Shim
21.04	Shim
21.05	Shim
21.06	Shim
21.09	Shim
21.29	Shim
21.49	Shim
25.01	Low Speed Shaft
36.01	Helical Gear
36.02	Helical Pinion Shaft
36.03	Helical Gear
36.04	Helical Pinion Shaft
36.05	Bevel Gear
36.06	Bevel Pinion Shaft
40.04	Oil Pump
41.01	Key
41.03	Key
41.05	Key
41.21	Key
41.26	Key
60.01	Bearing
60.02	Bearing
60.03	Bearing
60.04	Bearing
60.05	Bearing
60.06	Bearing
60.09	Bearing
60.10	Bearing
65.02	Oil Seal
65.09	Oil Seal
65.22	Oil Seal

**FIG. 10 - Right Angle Shaft
Vertical - Triple Reduction**

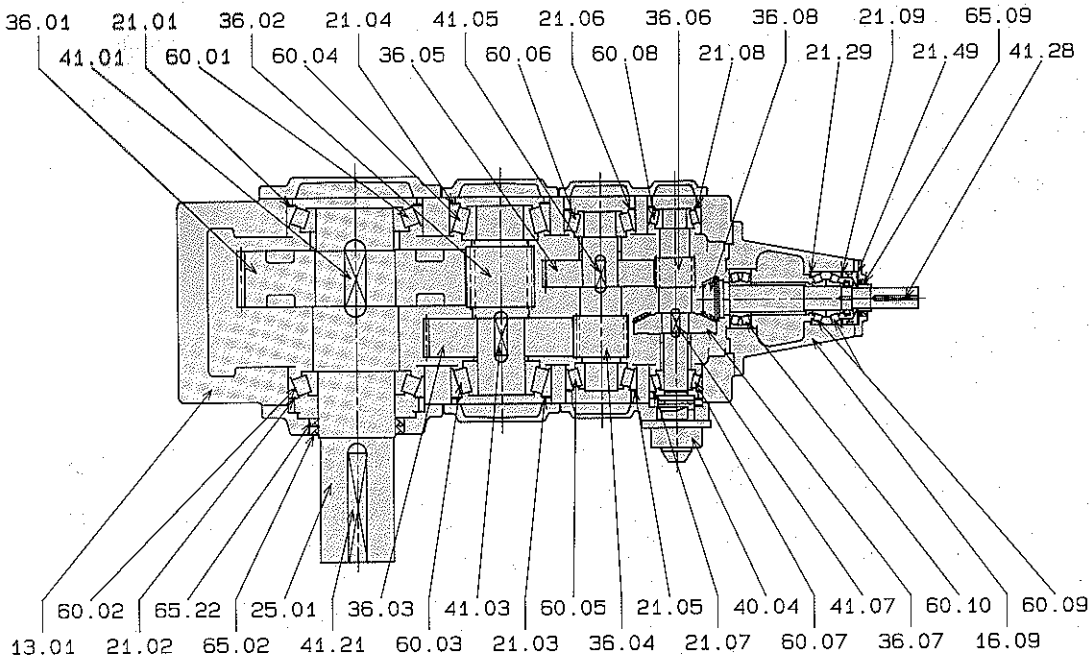




**FIG. 11 – Right Angle Shaft
Horizontal – Quadruple Reduction**

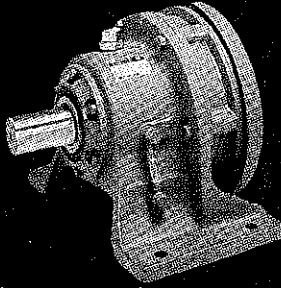


**FIG. 12 – Right Angle Shaft
Vertical – Quadruple Reduction**

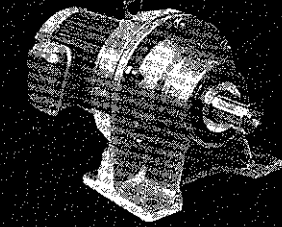


Ref. No.	Part Name
13.01	Housing
16.09	Bearing Housing
21.01	Shim
21.02	Shim
21.03	Shim
21.04	Shim
21.05	Shim
21.06	Shim
21.07	Shim
21.08	Shim
21.09	Shim
21.29	Shim
21.49	Shim
25.01	Low Speed Shaft
36.01	Helical Gear
36.02	Helical Pinion Shaft
36.03	Helical Gear
36.04	Helical Pinion Shaft
36.05	Helical Gear
36.06	Helical Pinion Shaft
36.07	Bevel Gear
36.08	Bevel Pinion Shaft
40.04	Oil Pump
41.01	Key
41.03	Key
41.05	Key
41.07	Key
41.21	Key
41.28	Key
60.01	Bearing
60.02	Bearing
60.03	Bearing
60.04	Bearing
60.05	Bearing
60.06	Bearing
60.07	Bearing
60.08	Bearing
60.09	Bearing
60.10	Bearing
65.02	Oil Seal
65.09	Oil Seal
65.22	Oil Seal

SM-CYCLO

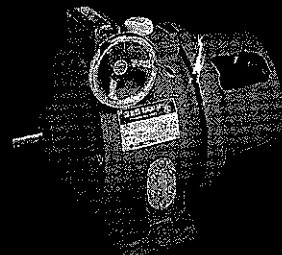


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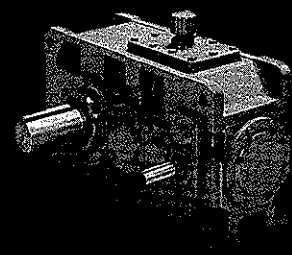
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SM-BEIER DRIVE



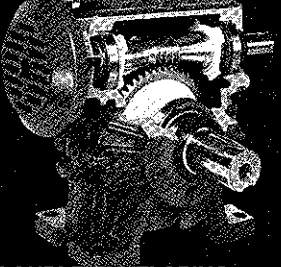
ADJUSTABLE SPEED
VISCIOUS TRACTION

PARAMAX 7



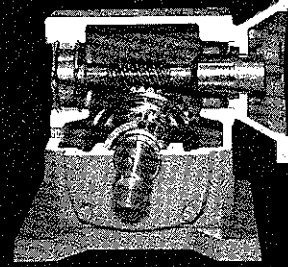
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& RIGHT ANGLE REDUCERS

SM-HEDCON



DOUBLE-ENVELOPING
WORM GEAR REDUCER

SM-ULYSSES



WORM GEAR REDUCER

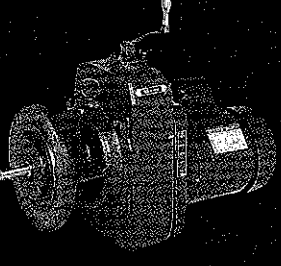
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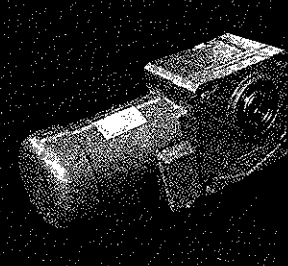
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DRY TRACTION

SM-HYPONIC



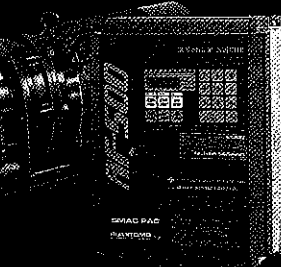
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SUMITOMO MACHINERY
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Power Transmission Products

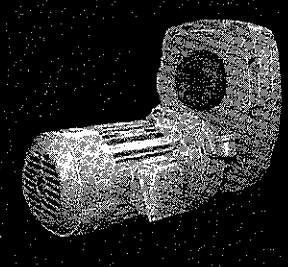
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SMAC-PAC AF-500



AC INVERTER

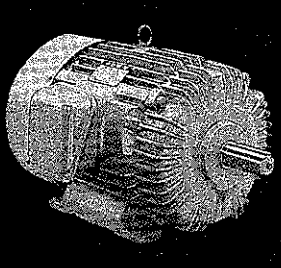
BUDDY BOX



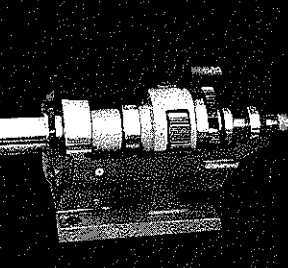
SHAFT MOUNTED
GEARMOTOR

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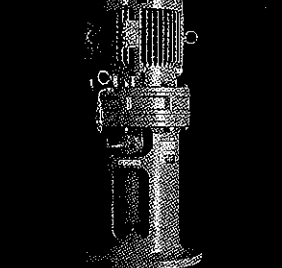


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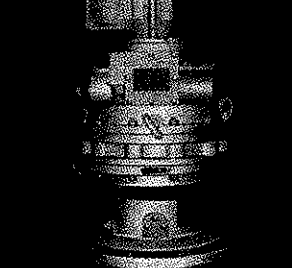
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