A. Engine Model (3GM, 3GMD)

The difference between the engine models 3GM and 3GMD is that a different model of marine gear box is fitted to the same engine body, namely, KBW10-D to 3GM and KM3-A to 3GMD.

Therefore, the items described as 3GM(D) in this service manual are identical for both 3GM and 3GMD engines.
When the items are separately described as 3GM as 3GMD, the description applies specifically to either 3GM or 3GMD.

B. Engine Model Name Plate and Clutch Model Name Plate

To every engine model described in this manual, an engine model name plate and clutch model name plate are fitted as shown in the following figures. In addition, the engine serial number is stamped on the cylinder body.
Specifications of engine and clutch to be shipped are recorded and filed using the numbers marked on the engine model name plate and clutch model name plate.

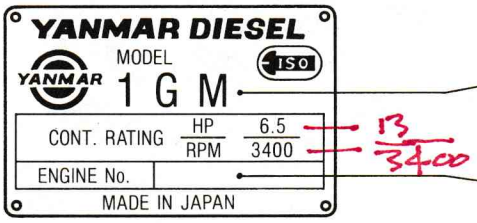
The specifications or components of the engine or clutch may be partially altered to improve performance, and the components involved may not necessarily be interchangeable.
Therefore, when parts are ordered, please furnish the item description in the blank spaces shown in the figures, using the descriptions given on these plates.

B-1 Item descriptions on the model name plates and information to be forwarded to us

[Item descriptions on Model name plates]

[Information to be forwarded to us]

Engine model name plate

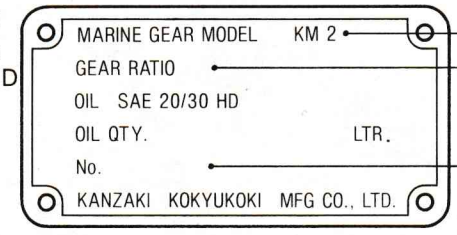


Your engine model: 2GM

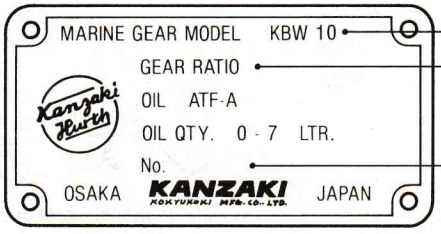
Your engine number: 02013

Clutch model name plate

1GM
2GM
3GMD



3GM
3HM



Your clutch model

Your clutch gear ratio

Your clutch number

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[A] For engine models 1GM, 2GM and 3GMD

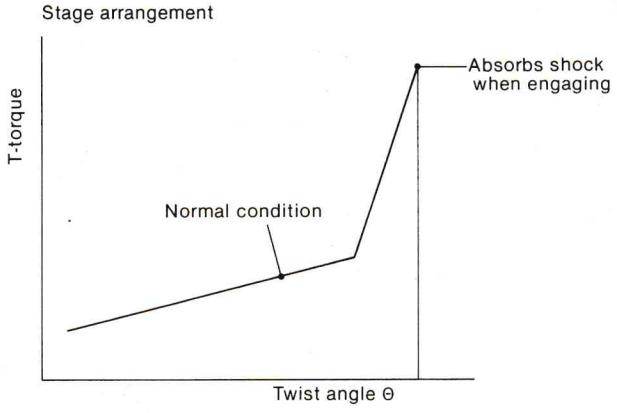
1. Construction

1-1 Construction

This clutch is a cone-type, mechanically operating clutch. When the drive cone (which is connected to the output shaft by the lead spline) is moved forward or backward, its taper contacts the large gear and transfers power to the output shaft.

The construction is simple when compared with other types of clutches, and it serves to reduce the number of components, making for a lighter, more compact unit which can be operated smoothly. Although it is small, the power transmission efficiency is high even under a heavy load. Its durability is high and it is reliable as high grade materials are used for the shaft and gear, and a taper roller bearing is incorporated. Power transmission is smooth as connection with the engine is made through the damper disc.

- The drive cone is made from special aluminum bronze which has both higher wear-resistance and durability. The drive cone is connected with the output shaft through the thread spline. The taper angle, diameter of the drive cone, twist angle, and diameter of the thread spline, are designed to give the greatest efficiency, thus ensuring that the drive cone can be readily engaged or disengaged.
- Helical gears are used for greater strength. The intermediate shaft is supported at 2 points to reduce deflection and gear noise.
- The clutch case, mounting flange and side cover are made from an aluminum alloy of special composition to reduce weight. It is also anticorrosive against seawater.
- As the damper disc is fitted to the output shaft, power can be transmitted smoothly. For the damper disc, springs of different strengths are used so that two stages of torque and twist angle are applied. That is, in the first stage, only the weak spring is used, and the strong spring comes into action for a torque higher than a predetermined value. This prevents gear noise due to torsional vibration as well as absorbing shock when engaging.



- The oil level dipstick hole doubles as a breather in addition to being the oil supply port. There is a small clearance between the dipstick and the inside of the dipstick tube which functions as a breather.
- The engagement between the cone and the large gear can be maintained even when the load on the propeller is zero. This is done by the action of the notch and spring joint on the operation lever in the operation device.
  The operation device can still be used without adjusting the remote operation device when the cone is internally worn, because it is compensated for by the spring joint.
- In order to reduce friction on the operation lever shaft, a needle bearing is used to allow smooth operation.

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1-2 Specifications

Model			KM2-A			KM3-A		
For engine models			1GM, 2GM			3GMD		
Clutch			Constant mesh gear with servo cone clutch (wet type)					
Reduction ratio	Forward		2.21	2.62	3.22	2.36	2.61	3.20
	Reverse		3.06	3.06	3.06	3.16	3.16	3.16
Propeller shaft rpm (Forward)	rpm		1540	1298	1055	1441	1303	1062
Direction of rotation	Input shaft		Counter-clockwise, viewed from stern					
	Output shaft	Forward	Clockwise, viewed from stern					
		Reverse	Counter-clockwise, viewed from stern					
Remote control	Control head		Single lever control					
	Cable		Morse, 33-C					
	Clamp		YANMAR made, standard accessory					
	Spring joint		YANMAR made, standard accessory					
Output shaft coupling	Outer diameter		ø100mm (3.93″)					
	Pitch circle diameter		ø78mm (3.07″)					
	Connecting bolt holes		4—ø10.5mm (4—ø0.41″)					
Position of shift lever			Left side, viewed from stern					
Lubricating oil			SAE #10W-30, CC class					
Lubricating oil capacity			0.25ℓ			0.3ℓ		
Dry weight			9.3kg (20.5 lbs)			10.8kg (23.0 lbs)		

Models KM2A and KM3A reduction and reverse gear boxes, shafts and gears are the same except for the following items:

- No. of gear teeth (derives different gear ratios).
- Distance between bearings for input and output shafts.
- Clutch case, mounting flange.

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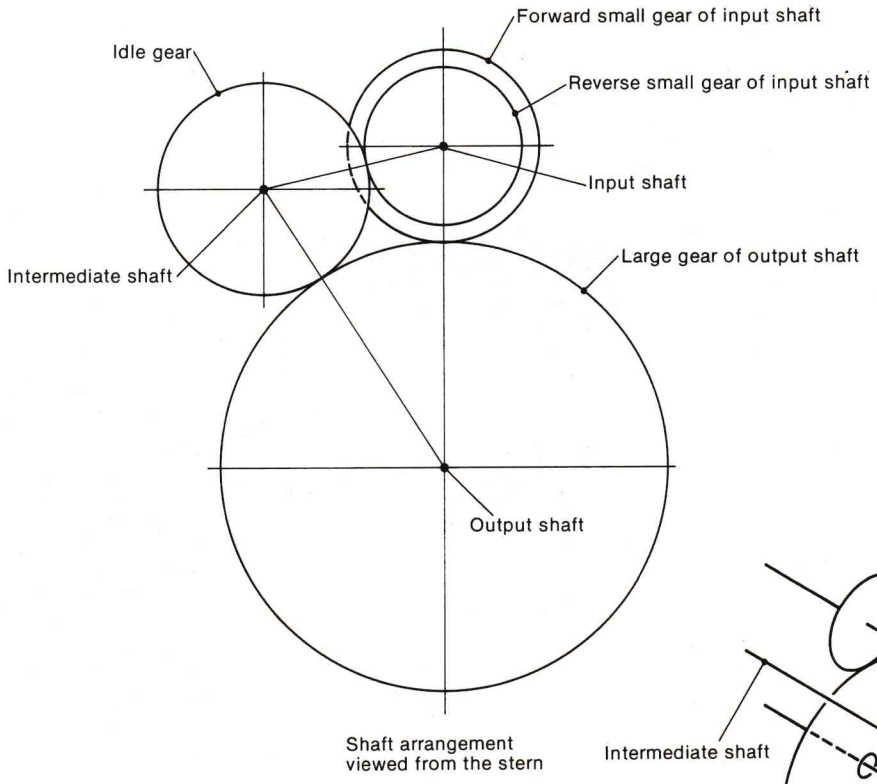
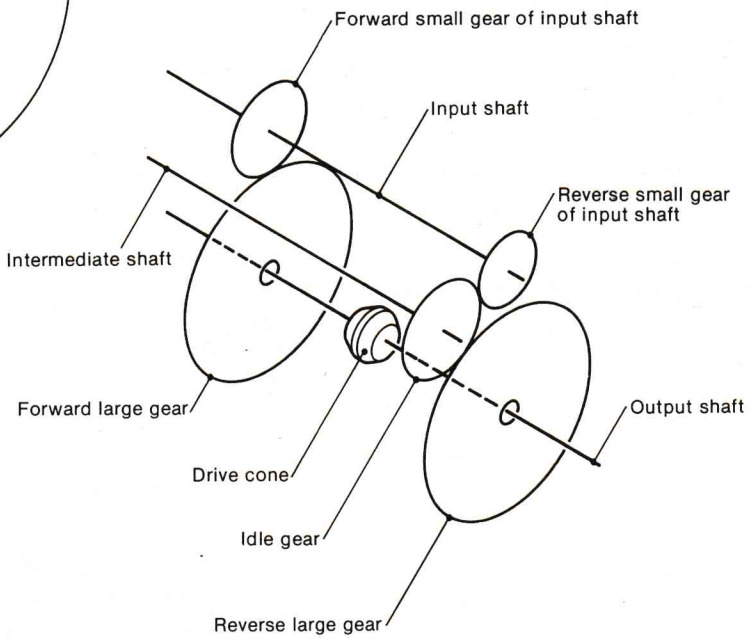
1-3 Power transmission system

1-3.1 Arrangement of shafts and gears



Shaft arrangement viewed from the stern



1-3.2 Reduction ratio

Forward

Model	No. of teeth of forward small gear Zif	No. of teeth of forward large gear Zof	Reduction ratio Zof/Zif
KM2-A	24	53	53/24 = 2.21
	21	55	55/21 = 2.62
	18	58	58/18 = 3.22
KM3-A	25	59	59/25 = 2.36
	23	60	60/23 = 2.61
	20	64	64/20 = 3.20

Reverse

Model	No. of teeth of reverse small gear Zir	No. of teeth of intermediate shaft gear Zi	No. of teeth of reverse large gear Zdr	Reduction ratio Zi/Zir•Zdr/Zi
KM2-A	18	26	55	55/18 = 3.06
KM3-A	19	26	60	60/19 = 3.16

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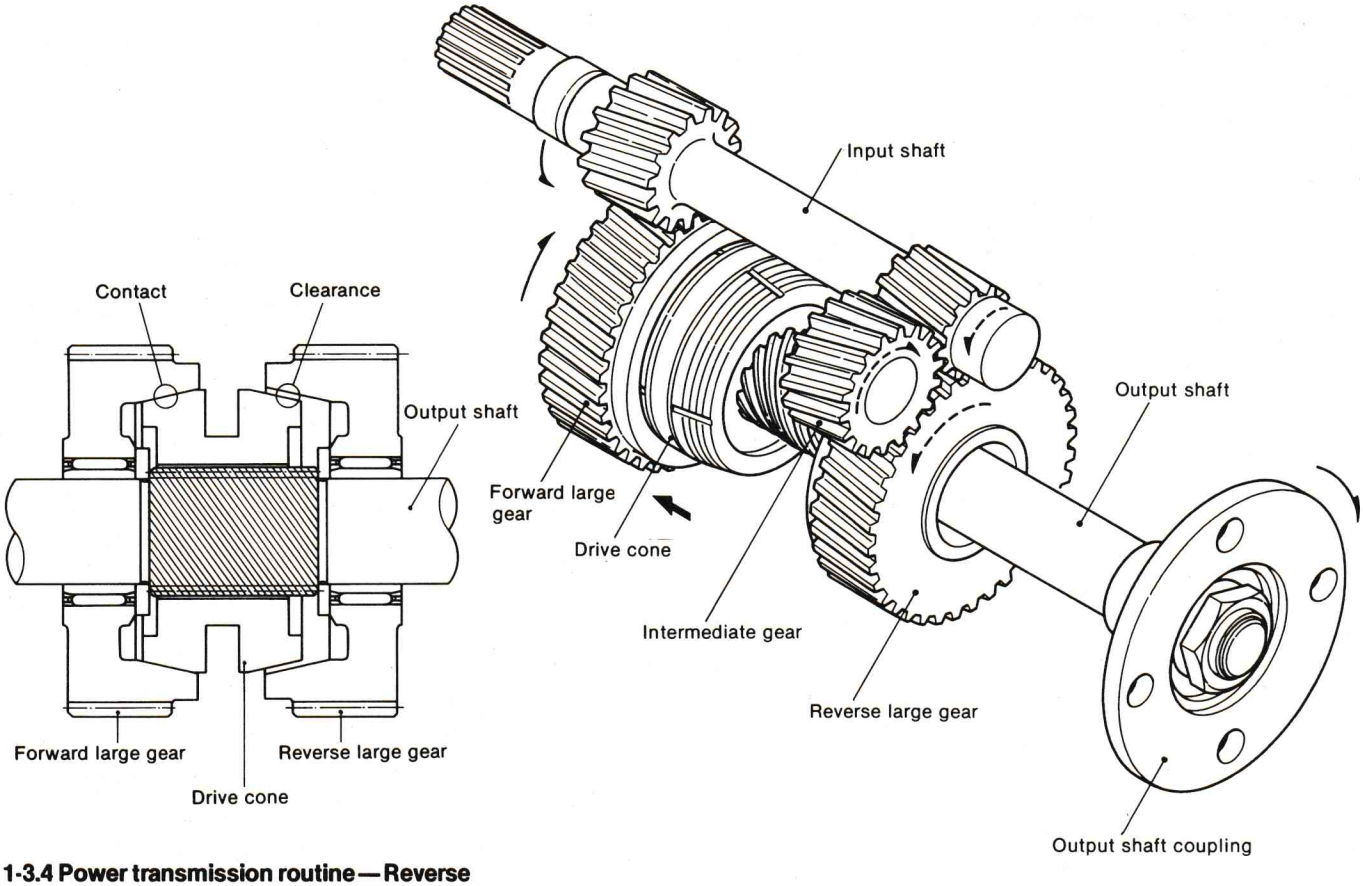
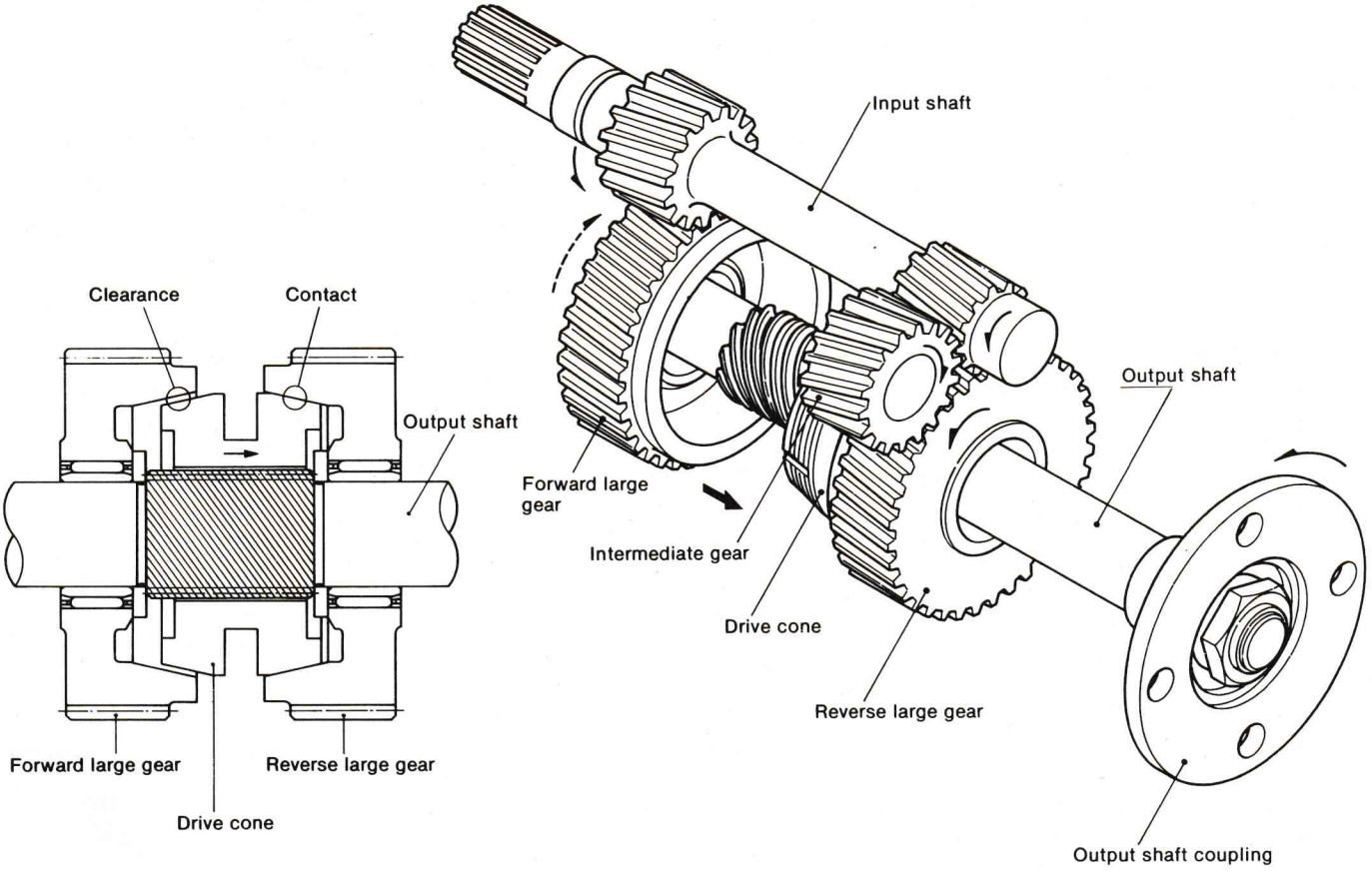
1-3.3 Power transmission routine—Forward



1-3.4 Power transmission routine—Reverse



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