CLEARBOX MOTOR

The clearbox motor has been designed especially for use in schools CTD and science project work.

It has a vinually unbreakable polycarbonate gearcase and tough nylon gears. The output shaft is 4 mm diameter and is suitable for Plawcotech, Meccano and Fischertechnik wheels, gears and pullys to be fitted directly to it. A Plawcotech brass adapter boss may also be fitted to this output shaft to enable wooden and plastic wheels, arms, levers and LEGO beams to be attached.

The motor is a standard MJR3L type and the simple press fit allows replacement motors to be fitted should one become damaged.

The motor will operate at voltages of between 3Vdc and 6Vdc. At 6 Vdc the motor will run free at about 6000 RPM. Many factors such as load, volts drop from the supply or wiring, or a lack of available current can affect this speed, so calculations of final drive speed can only be approximate.

The gearbox is a multi-stage spur gear type. Access to the gears is obtained by removing the metal 'U' clip from its groove and withdrawing the end plate and final drive shaft. When changing the gear ratio, spacers are provided to take up the slack on the Drive shaft. A thin spacer is already fitted to the assembled Clearbox and three thick spacers are provided loose in the packet.

The thickness of one thick spacer is equal to two thin spacers and one thin spacer is equal to one intermediate gear.

Changing the gear ratio

After removing the 'U' clip shde the End Plate off the Output shaft and away from the body of the gearbox. Withdraw the output Shaft and as many I0/30 intermediate Gears as necessary to achieve the required ratio.

Reassemble in the reverse order remembering to add spare spacers as previously outlined. For example to remove one intermediate gear you must replace the thm spacer with a thick spacer. To remove two gears one thick and one thin spacer is required and so on With all the gears fitted the speed of the output shaft will be at its slowest. By removing gears the output speed will increase and the torque will decrease·
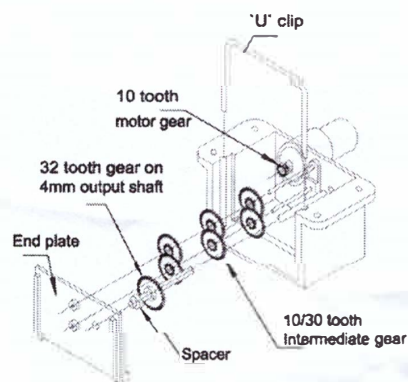
Calculation

The motor will run freely (without load) when supplied with 6 volts at approximately 6000 revs.

The intermediate gear has a reduction of 30 teeth to 10 teeth, i e a 3:1 ratio.

The output shaft gear has 32 teeth, i.e a 3.2:1 ratio.

To calculate the ratio of the whole gear train, the following formula should be used.

Ratio = (3n) x 3.2

Where n= the number of intermediate gears.

For example with 2 intermediate gears fitted

Ratio = (3') x 3.2

= 9 x 3.2

= 28.8 : 1

A motor speed of 6000 rpm would give a <u>theoretical</u> speed of 6000/28.8 rpm.