

## Reversing Gearbox

This gearbox was designed for use with a small twin cylinder, slide valve steam engine of 3/8" bore and stroke. With a small engine, the idea of fitting any form of reversing gear wasn't that appealing. The already small valve travel could very easily almost disappear as all the inevitable play in the various links was taken up to the extent that self starting could not be guaranteed. Apart from having forward and reverse, there is also a neutral position. This is a big advantage as if the propeller gets weeded, neutral can be selected allowing the engine to continue to run, driving the boiler feed pump. It uses a dog clutch to engage forward and sliding gears for reverse.

The gearbox is mounted solidly on the stern tube and any misalignment taken up on the input side. The mounting sleeve shown in the photo is not quite like that drawn.

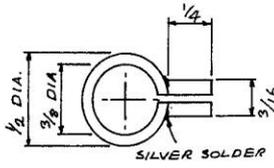
Construction is fairly easy, but does need accuracy, particularly in the hole spacing in the end plates. The only awkward part is the making of the key and keyways. I started off with the keyway in the shaft. Having drilled a 3/64 hole about 1/32 deep at each end, I used a tiny burr to take out the material in between. Although shown as 3/64 wide, anything up to say 1/16 should be OK – just use whatever cutter you have available.

Next the key should be made. I used gauge plate for mine, but mild steel should be perfectly adequate. It is very small, so be careful not to drop it! It should be quite a tight fit in the keyway, but beware. If it is too tight the shaft may be distorted. In my case it was gently squeezed into place in the vice.

The mating slot in the sliding gear looked as if it was going to pose a problem with thoughts of having to make a broach for the job. But before going down that road, I decided to try and file it. A flat needle file with teeth on one of the edges was ground down taking the teeth off both wide faces until it's width matched that of the key (actually a couple of thou wider), then ground on an edge until it would fit in the hole. Only about three quarters of an inch was given the grinding treatment. See the photo 1. Then it only took a few minutes to file out the slot for a fairly easy fit over the key.

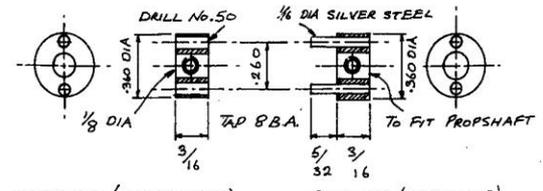
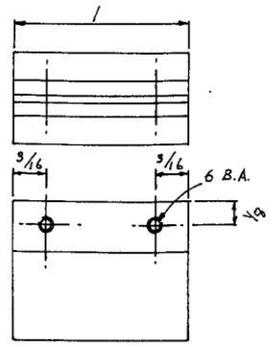
I've made boxes with both home made and commercial gears. To simplify things they are all the same diameter. Although steel is specified, brass should be OK.

In operation, the engine is slowed right down and the gear engaged. If the engine is stopped it is quite likely that the dogs or gears don't line up. It will change gear with the engine flat out – probably hitting 4000 rpm as it goes through neutral – it hasn't broken yet, but is not a good idea!

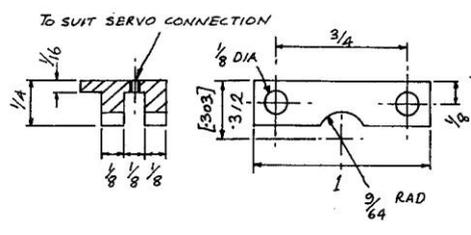


**MOUNTING SLEEVE**  
BRASS

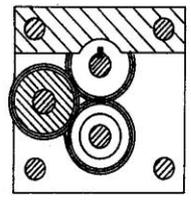
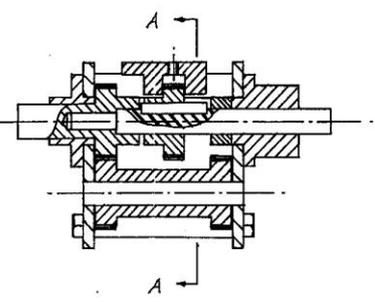
ONE END CLAMPS ONTO THE OUTPUT BEARING, THE OTHER END CLAMPS ROUND THE STERN TUBE



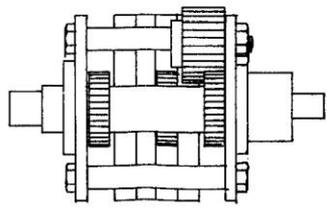
**COUPLING (OUTPUT SHAFT)** BRASS  
**COUPLING (PROPSHAFT)** BRASS



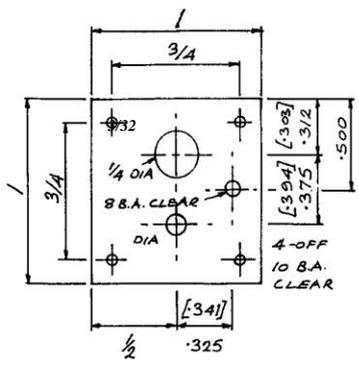
**SELECTOR BLOCK**  
BRASS OR BRONZE



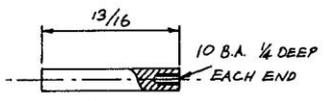
SECTION ON A-A



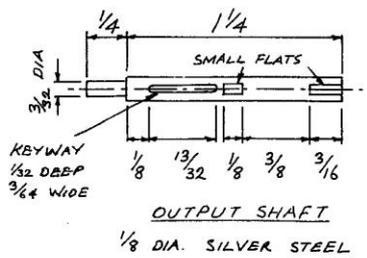
**REVERSING GEARBOX**  
FOR USE WITH SMALL STEAM ENGINES (UP TO 1/2 B.S. D.A. TWIN)



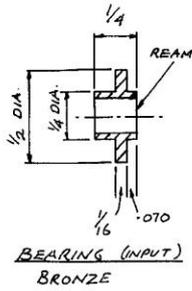
**END PLATES 2-OFF**  
16 swg BRASS OR STEEL



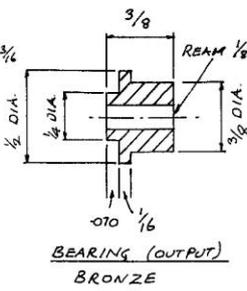
**SPACERS 4-OFF**  
1/8 DIA. MILD STEEL



**OUTPUT SHAFT**  
1/8 DIA. SILVER STEEL

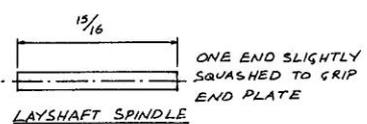


**BEARING (INPUT)**  
BRONZE

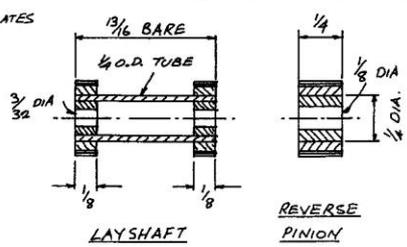


**BEARING (OUTPUT)**  
BRONZE

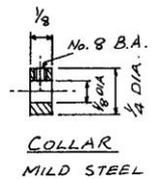
BEARINGS ARE SOFT SOLDERED TO THE END PLATES



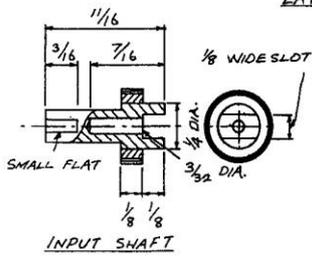
**LAYSHAFT SPINDLE**  
3/32 DIA. SILVER STEEL



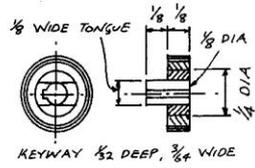
**REVERSE PINION**



**COLLAR**  
MILD STEEL



**INPUT SHAFT**



**SLIDING GEAR / DOG**

**GEARS**

IMPERIAL:- 40 D.P. .375 P.C.D. 15 TEETH  
METRIC:- M 0.5 10mm P.C.D. 20 TEETH  
WHERE DIMENSIONS FOR METRIC GEARS DIFFER FROM THE IMPERIAL ONES, THEY ARE SHOWN IN BRACKETS [ ].  
IN THE GENERAL ARRANGEMENT, GEARS ARE SHOWN AS MACHINED FROM SOLID. IN THE DETAIL DRAWINGS, THEY ARE SHOWN AS BEING FABRICATED. IF FABRICATED CONSTRUCTION IS USED, SOFT SOLDERING SHOULD BE ADEQUATE ALTHOUGH SILVER SOLDERED JOINTS WOULD BE PREFERABLE.

**MATERIALS:-** BUSHES IN LAYSHAFT & REVERSE PINION - BRONZE  
INPUT SHAFT & CENTER OF SLIDING GEAR - SILVER STEEL  
GEARS - LAYSHAFT - BRASS; OTHERS - MILD STEEL  
IF USING COMMERCIAL GEARS, THERE MAY BE NO CHOICE BUT TO USE WHATEVER IS AVAILABLE.  
THE WIDTH OF COMMERCIAL GEARS MAY BE LESS THAN THE 1/8 CALLED FOR, IN WHICH CASE THE GEAR CAN BE CENTERED WITHIN THE 1/8 DIMENSION AND 2-GEARS WITHIN THE 1/4 WIDE ONE.



Photo1

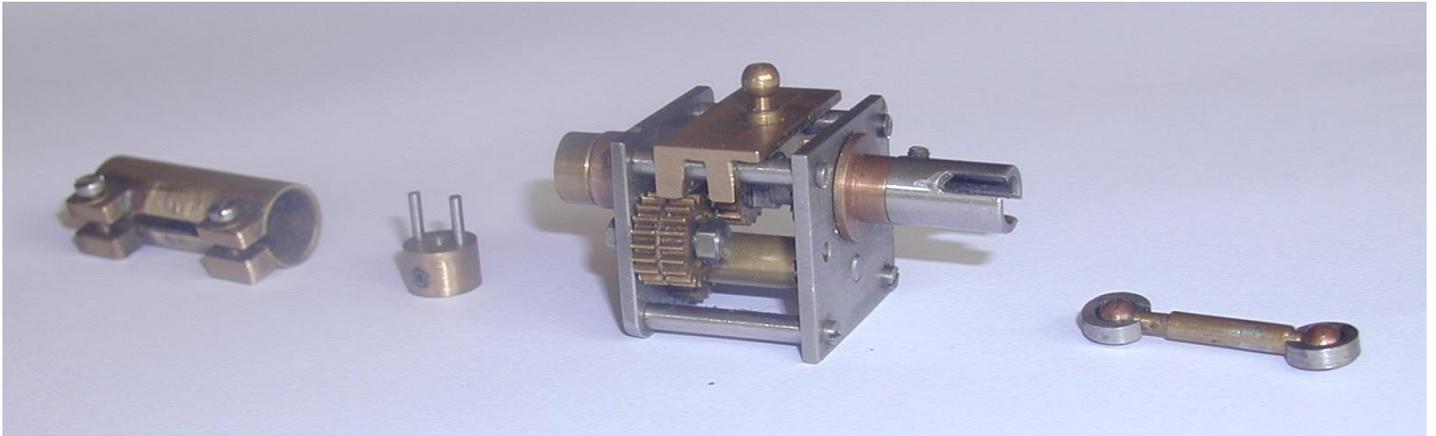


Photo 2

