8.1 Cycle Parts - General

TUNING THE CYCLE PARTS

by Roger Cooper

How many motorcyclists, wishing to improve the performance of their machines, think of tuning the cycle parts rather than the engine? For those not experienced in engine tuning, but nonetheless ethusiastic, this method of improving performance is the best one to start with because it avoids making such mistakes as losing all the low speed performance and good fuel economy—as so often happens when attempting to achieve higher revs and more power.

That is all we are going to say about the engine, except to assume that it is in reasonable order. We are now turning our attention to the more mundane power wasters on a motorcycle.

First remove both driving chains and examine the sides of the sprockets. If there are signs of excessive wear, more on one side than the other, then the chain line is not true. Two sets of circumstances may cause this.

1. The sprockets may be parallel to one another but not in direct line, thus giving the chain a cranked run; or
2. The sprockets may be at an angle to each other, causing the chain to twist or " turn a corner."

The best way of ascertaining which fault is causing the trouble is to lay a straight-edge along the sides of the sprockets in the same way as one would lay a straight-edge along the road wheels to check alignment.

Obviously, as a machine would not be manufactured with misaligned sprockets, it is not correct to start filing bits off until the offending parts fit. Rather one should check carefully into the root cause of the trouble. Perhaps the frame has been bent, or the gear-box tray, cracked at one time, has been carelessly welded and warped—if welded! If not, it may present a true line-up until load is put upon it by the engine driving the bike, whereupon it distorts. This is a most damaging fault because it throws load on many of the related parts, stressing them well beyond their designed limits. The only remedy is careful welding of the crack.

Having established that the chains are in line, care must be paid to the way in which they are tensioned. A Scott will run with the chains very badly adjusted or worn, but it will run far better if they are carefully maintained. To achieve this the chains themselves must be in good order. A 2 to 2½% stretch is enough to render a chain useless for all practical purposes and if a test shows, on a clean, dry, oil-free chain, that this much wear exists, then it is false economy not to replace the chain immediately.

When adjusting chains, remember the golden rule—" Check the tension again after securing **all** the nuts and bolts." This may sound ridiculous if you consider that a chain adjuster is used to position the various components accurately, but it is not so ridiculous if you remember that every time you release the gear-box studs under the tray the box tips forward slightly so that on tightening the studs again you pull it back a little **and tighten the primary chain in doing so.** If you do not check again to establish that a minimum of $\frac{3}{8}$" of slack is evident, **all the way round,** you may well find that the chain is tight and throwing a severe load on the gear-box bearings and engine main bearings. This will not only reduce the freedom of operation but will also drastically reduce the life of the bearings. On the other hand, a chain which is too loose will flail round, hitting various stationary components and causing a large amount of clatter, if no actual damage.

The foregoing comments apply equally well to the mag chain, with one important addition. This light and flimsy component is very prone to seizure, the cause of which can often be traced to the fact that the side plates of the inner chain links have eased off their bushes and jammed between the bush ends and the outer link plates. A repair can sometimes be effected by removing the chain and either gently squeezing or punching these plates back into place—when you have the chain on the bench you will be able to feel which are the tight joints and closer inspection will tell whether or not this is the cause of stiffness.

Another common type of magneto chain seizure is due to rust caused by the ingress of water due in turn to lack of effective lubrication. This can easily be spotted on the bike by the stains on the side plates, around the link joints, as well as the fact that the chain remains bent after leaving the sprockets. The remedy here is to remove the chain and clean it thoroughly, making certain that every link is quite free and that the chain is perfectly dry, both inside and out. It should now be dipped in a bath of molten grease and agitated for several minutes to ensure that the lubricant has permeated right to the heart of the bearings. Dry and refit the chain, and then remember to keep it well soaked in engine oil, even though a lot does run off. If you do this for all the chains you should never again need to remove them for servicing.

The techniques applying to the above hold equally good for the rear chain but be extremely careful to ensure that each adjuster is moved the same amount to preserve wheel alignment (and sprocket alignment, too). Remember also to tighten up the torque arm anchor bolt!!

Let us now examine the gear-box—a unit which, on a Scott, is renowned for trouble-free performance.

Long suffering though it may be, the gear-box will always respond to careful treatment and maintenance. A few hints on the use of the kick starter may be useful for those who have not studied this item. It is interesting to note that a Scott kick start crank (two-speeders excepted) should not engage until horizontal. Occasionally it **will** engage earlier, but it is dangerous to try to start the engine from this position since the pawl seldom engages fully with the ratchet and may well disengage under load, thus letting you down sharply with a sprained ankle. Before starting, pull in the clutch and turn the crank a couple of times—this also serves to free the clutch plates should they be slightly stuck—and allow the pedal to return only to the horizontal position. Make sure that you feel the ratchet engage with the pawl and turn the engine up to compression, if necessary raising the crank again (but not above horizontal) to engage the next ratchet tooth. Now swing on the starter swiftly, smoothly and with increasing force towards the end of the stroke. Don't jab at it or " kick " it. You can't jolt the engine into motion, it takes time for the works to build up speed and you will only jar and strain everything, including yourself. Another point to note is not to remove your foot at the bottom of the stroke. Let the pedal return against your foot and come to rest on the stop gently. Finally, the quarter of a turn afforded by the Scott kick starter is ample for the job and with a little practice you should be able to start the engine whilst **sitting** in the saddle.

If great difficulty is experienced in persuading the pawl and ratchet to engage securely, it may well be that these are worn. It is not **always** necessary to buy new parts to remedy this; any enterprising amateur mechanic should be able to remove these parts and match them up with the assistance of a fairly coarse oil stone and the effort is well worth while, if only for the sake of preserving the skin on your ankles.

With regard to the tuning of the rest of the gear-box, the main objective is to achieve complete freedom of movement, regardless of the load on the various parts. To ensure this, all the bearings must be in good order. If the bronze bushes are worn, this will throw the shafts out of true and will put undue offset load on the ball bearings, quickly putting an end to their useful life. The lubrication of a Scott gear-box is by no means critical, but an oil of over S.A.E. 50 viscosity will absorb quite a lot of power, without lubricating any more effectively.

Turning to the clutch, there is not much here which can absorb power except clutch slip or clutch drag. Clutch slip wastes more petrol and will be dealt with first.

Clutch slip is usually caused by oil on the plates—if Ferodo—weak springs, or wrong type of springs, or lack of free movement on the withdrawal race, i.e., the plates are not being allowed to bed right home.

Removing oil from the plates is not a tedious job if you are prepared to be bold in your action. You should set fire to them! **Do not**, however, set fire to the sprocket. This is a hardened steel component and its design is such that it warps when heated and will not fit back on its rollers—I know, I've tried it! Burn out all the other Ferodo plates until the insets are almost white and have ceased to smoke. A gas ring, primus stove or blow-lamp is the best means of doing this. The plates will warp slightly but, being soft, are easily trued up again when cold. Hammer all the inserts up tight after burning off and then rub down lightly on emery cloth laid over a dead flat surface.

On re-assembling the clutch it is a good idea to wash the steel plates in petrol, or gunk and water to remove all traces of grease. The 30 rollers should receive only the lightest smear of grease—any excess will only fly off and find its way onto the plates you've just cleaned. It does no harm to run this roller race dry, especially as it is never highly stressed. Provided that the smear of grease is enough to prevent rust, no damage will result.

Make sure the springs are all the same length and tension. Scott clutch springs must be compressed slightly before the nuts will take up on the studs. A very wide bladed screwdriver is best for this job—sufficiently wide to support both sides of the nut at once. Run the nuts down until they are flush with the ends of the studs to make sure that they clear the final drive sprocket. If they are run down further, there is a chance that the clutch will not withdraw properly due to the springs becoming coil bound—i.e., compressing solid.

Now we come to the third cause of clutch slip. If the plates are all flat and true they should free off with only a very small amount of end movement of the final plate. The withdrawal mechanism provides for far more movement than is strictly necessary, so there should be no excuse for having perpetual thrust upon it. If the worm lever is just at right angles to the cable when all the free movement is taken up, the remainder of the available travel will free the clutch plates fully. Allow about $\frac{3}{8}$" free movement at the handlebar lever to ensure that no unwanted load will be put upon the withdrawal race.

Sometimes people do not allow this amount of slack in the cable because they are trying to overcome clutch drag. For a time such a practice will work, but in the long run it pays to seek the root cause of the trouble.

A common fault is a spongy operating cable. If the outer casing has become stretched slightly it will tend to compress under load and this compression is taking up vital operating movement. Replacement of the cable is the only real remedy—take care when fitting, to ensure that it is not stretched again. When buying a new cable do not look for one with a heavy duty specification as is recommended for some makes of machine, a medium cable is quite adequate and much lighter to operate. Yet another common fault and one which may baffle newcomers to Scotts more than the old hands, is a buckled clutch plate. A quick check to ascertain this is to listen for the plates rattling when the engine is running, in gear, with the clutch disengaged. If no familiar clatter can be heard, then it is fair to suspect a bent plate. However, before pulling the clutch to pieces, just check visually that the withdrawal mechanism is functioning correctly, and that you are not allowing **too much** free movement (by adjustment of the clutch pins). Set the adjustment up first and then check again. If still tight then strip the plates out and inspect each one thoroughly, trueing them up where necessary. If you have a part Ferodo, part cork clutch, then it is more than likely that the corks are the cause of the trouble. Unlike Ferodo they are soft and compress when squeezed. They are often squeezed quite considerably in a clutch which also has Ferodo plates because the whole assembly must be compressed tightly for the harder inserts to grip. The best remedy is to have the corks replaced before proceeding further. Finally, take a note of the primary chain tension. If too tight this will put a strain on the clutch sprocket and not allow it to run free on the roller race.

Now we are sure that the transmission is functioning at its best, let us turn to the wheels, remembering that it is the rear wheel which receives most of the wear and tear by virtue of carrying more weight than the front and also by transmitting the power.

It is necessary first to ensure that the wheel is a rigid unit, and a true one. Buckling or ovality must be corrected. Spokes are small but very vital parts and if there is any suggestion of weakness or rust, the faulty units should be replaced. Unless one is

experienced in the building of wheels, it pays to let a professional do the work, and for the sake of simplified maintenance, specify stainless steel spokes.

Now the heart of the wheel is the bearing, and it is here that difficulties will be encountered with the older machines. Strip the bearings down if you are not sure of the condition, and examine them. The races, cones, and balls or rollers should be absolutely free from blemish, and, if not, should be replaced, as pitting is a sign that the respective components are past their useful life and will only deteriorate further. When replacing worn cups and cones it is false economy for the sake of a few shillings, not to replace the balls as well!

Wipe out the hub thoroughly and make sure there are no stray balls inside. It is usual to have 9 or 11 uncaged balls in each side of a cup and cone bearing, and with each ball in place there should be a space left which is not quite large enough to take one more ball. This check will not be necessary with a ball journal bearing on which there is no adjustment, or on a taper roller bearing, which is also caged.

When assembling cup and cone, or roller bearings, do not overfill with grease otherwise excessive temperatures will be created and the grease will ooze out—usually onto the brake drum. Sufficient high quality grease to fill each bearing, with a small amount in the hub itself will last for thousands of miles. Adjust the bearings until there is a mere trace of side-play, and after doing up the locknuts check again that wheel spins free and does not stop suddenly without running back in the opposite direction.

Ball journal bearings are even simpler to service. If they show signs of slackness, they are worn and should be replaced. When tapping a new bearing into place, be careful to bring pressure to bear on the appropriate part of it. That is when fitting into the hub, tap the outer ring, and when fitting to a spindle, tap the inner ring. This is to prevent the balls and races from being prematurely damaged. Ball journal bearings should always be fitted dry to prevent grease from finding its way between the surfaces of the race, hub and spindle which are intended to be tight fitting, although if extreme difficulty is experienced in introducing grease through the channels provided it should be possible, with care, to fit one bearing, pack it and the hub with lubricant, and then fit the other bearing (making sure that no stray grease has got into the wrong places), greasing it from the outside when once in place.

Before replacing the brake plate have a good look at the linings and the mechanism. It might be advisable, if these are oily, to clean them in carbon tetrachloride or even replace the linings if very badly oiled. Make sure that the rivets are all tight and countersunk and recessed. Aluminium rivets are especially damaging to brake drums because there is a strong tendency for them to pick up and hold abrasive materials. If in any doubt, have them replaced with copper ones.

In cases where the lever has to be pulled well past the point at which it is at 90 degrees to the operating rod a further investigation is needed. If the linings are not unduly worn and the cause cannot be attributed to anything else, then the shoes may be shimmed out on the cam faces by wrapping a small piece of 18 or 16 s.w.g. mild steel sheet round each shoe end. Be extremely careful about doing this as spongy brakes will result if the shims do not fit firmly. With Enfield wheels, the brake shoes of which have detachable steel end pads, it is a simple matter to remove the pad and fit a washer behind it. In certain extreme cases the cams may be badly worn and the best remedy is a replacement. For those who have irreplaceable parts, a welding process known as Stelliting can be used to build up the faces.

Check that the same bearing is not sloppy and making operation spongy. If necessary, bush the bearing, or, in an emergency fit shim bushes between the existing parts to fill the space. The reason that this little bearing is often slack is the fact that people forget to grease it and the best way of preventing wear is to remember it. Put a couple of spots of oil on the pivot end of the shoes, but not too much or it will be onto the drum in no time.

When fitting the brake plate to the spindle be sure it can be tightened up securely against the bearing without upsetting bearing adjustment, or fouling the drum itself. Run the nut down finger tight and check that the torque arm and the two flats on the spindle are lined up to fit the frame. Now apply the brake hard and tighten the nut down fully. Applying the brake at this stage centres the plate exactly so that the two shoes touch simultaneously, giving maximum efficiency.

TWO-SPEEDER TOOL BOXES

George Reeves

Having noticed at the last Banbury that several two-speed Scotts had tool boxes missing or incorrect type fitted, and having been in the same position, I decided to do something about it. So here is a description of an easily made tool box.

First make a cardboard template to suit frame (Fig. A.) Now mark out template on sheet metal (22 guage) plus distance from front to back plus side (Fig. B.)

Scribe two lines 1 and 2. Fig. B.

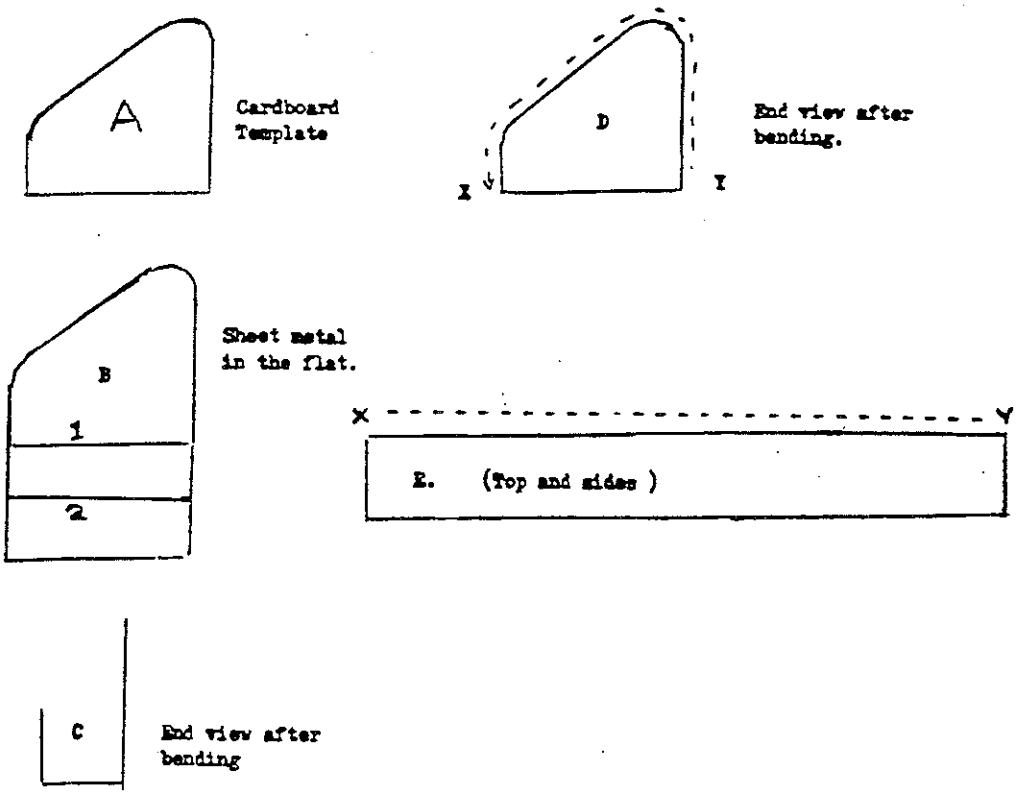
Bend along lines you now have fig. C after bending.

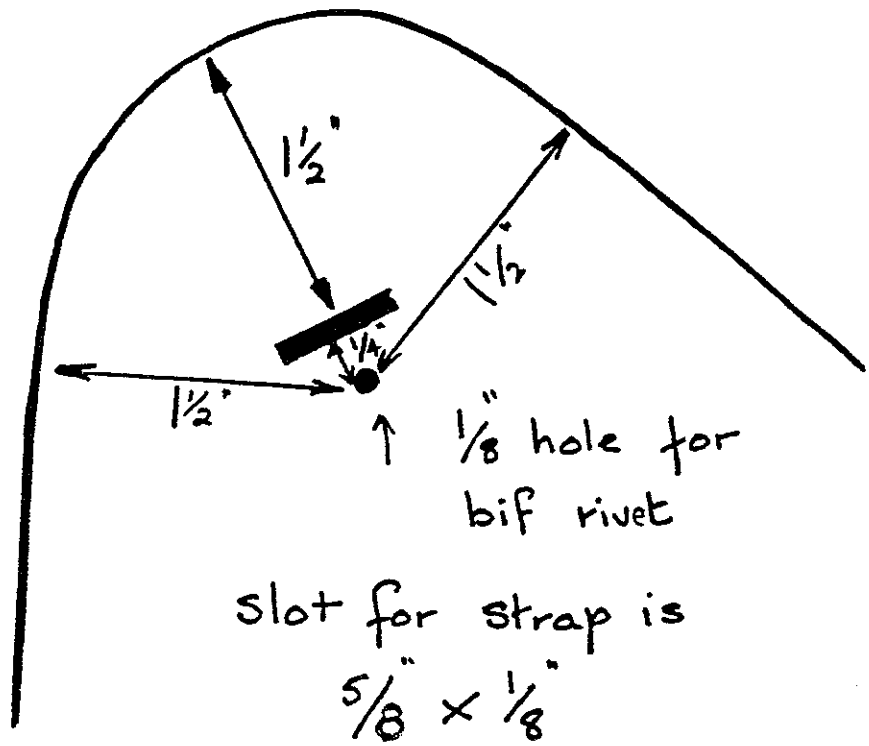
Cut a strip of metal equal to dotted line Fig. D and width equal to distance from front to back Fig. E.

Bend to shape and get a welder to butt weld along the edges. Clean up weld.

Make lid to suit, flange the edge over about ¼ inch and fit with hinge and fastening strap.

2 Speeder Toolbox.





SCOTT TOOLBOXES

Commode

I have had a few enquiries recently about toolboxes.

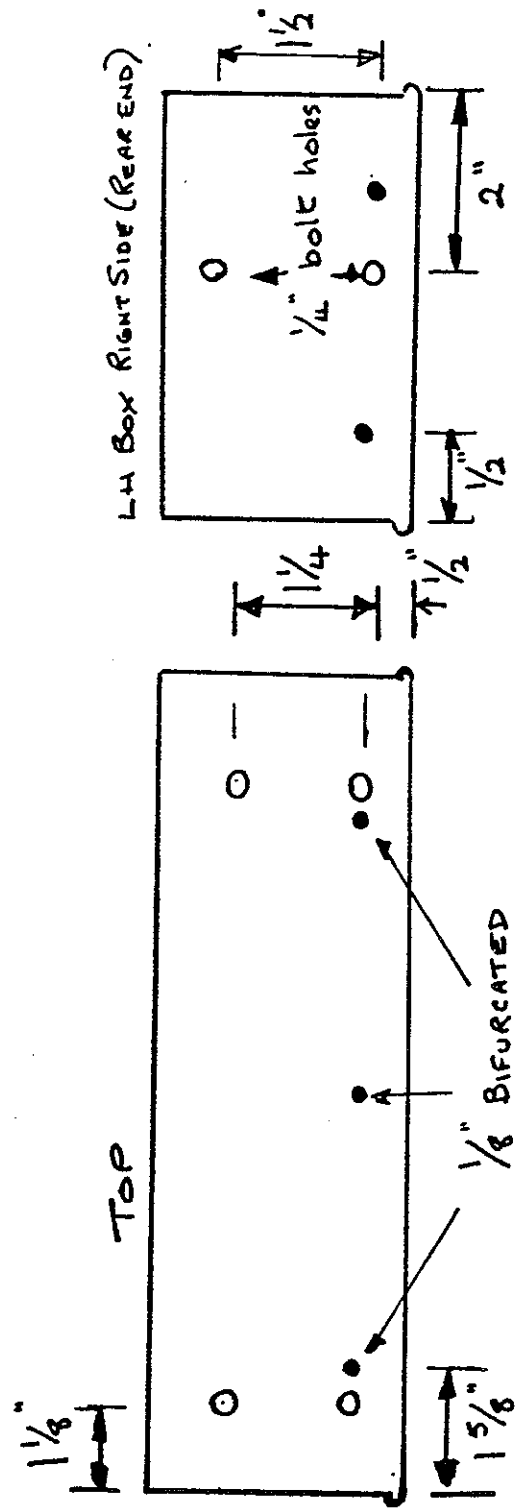
(1). Fixing inserts in the square-type boxes and attaching boxes to the square-type carriers as supplied by the Club. (Both inserts and toolboxes for at least six different leather-fronted boxes are still available from the Spares Secretary.)

I am aware that the boxes might vary but the drawings shown with these notes were made from a genuine box fitted on a carrier at the works to a new bike in 1938.

The square carrier was available as an optional extra, priced at £1. 5s. 0d. (£1.25), from 1929, dropping to only £1 by the mid 1930's. It was fitted as standard to 1929-1934 Flying Squirrel de luxe models. Pre-1929 carriers seem to be similar to (if not the same as) the two-speeder ones.

(2). Super-type boxes as supplied by the Spares Secretary require drilling, slotting, and a leather strap to be provided. Again there are variations but the drawing shows dimensions from a 1925 and 1929 toolbox, but I am aware that two-strap-fixed lids are fitted to some bikes. Transfers also varied from the all-gold one to the small and medium coloured limit gauges.

The hole at the back of the toolbox to take the Bif rivet for the other half of the strap is set ½ inch down, but two holes in line with the strap is much better.



Clips are for each Box

2 x 5/8 wide 15 SWG ¼" centres.

1 x ¾ wide 15 SWG ½" "

15 SWG Support Plates Fitted Inside Box.

¼" Hex Bolts 26 TPI. Black Finish.