8.2 Frames and Forks

SOME NOTES ON GIRDER FORKS

by *Paul Myatt*

On investigating the various girder forks fitted to Scotts, some variations in sizes become apparent. These notes, which are certainly not comprehensive, may encourage others to tell what they know.

The steering head bearings used from the early 'thirties onwards (can someone confirm the exact date ? "The Book of the Scott" infers 1933 onwards) were of the cup and ball bearing type, 20 ¼ in. balls used in each bearing. The point to note however is that two different sizes of cups have been used. The earlier type is of 1.987 in. diameter and later this was changed to 2.000 in. diameter. Tom Ward's records show that the diameter was changed in 1935 but he remarks on this point "you never know with Scotts ! " This point is illustrated by the fact that my 1937 Flying Squirrel has the smaller diameter. Both sizes are stocked by Mr. Ward.

The Webb girder forks with the steering damper below the steering-head were fitted to many Scotts with taper-roller head bearings also and were, I believe, basically dimensionally similar to the more familiar pattern with the damper on top. They are, however, of a slightly different type from the later ones, as fitted to machines with the cup and ball type bearings, there being several minor variations apart from the bearings but the important one is that the centres of the adjustable spindles on the girder part are placed at 8½ ins. apart on the earlier forks and 9 ins. apart on the later ones. In both cases the centres of the wheel spindle to the lower of the adjustable spindles are at 16 11/16 ins. (taken by direct measurement).

For both types of Webb forks the centres of the top links are 3 11/16 in. for solo use or 3 3 8 in. for sidecar use. Lower links are 3 9/16 in. centres in both cases.

The Brampton girder forks (i.e. 637 type, not the "Monarch" bottom link type used from 1932, used in 1933-4 vary slightly in dimensions from the Webb forks. For sidecar use 3 3 8 ins. centres top links and 3 11 16 ins. centres lower links were used. I do not have the exact figures for solo use but presumably the lower links would remain the same. The girder section differs in length from the Webb component.

Recent news is that there is now a Koni damper available for Vincent Brampton forks. Members may remember that there was a Woodhead-Monroe conversion available for Scott Bramptons and Webbs so perhaps this Koni might be suitable if the spring rate was right. Can anyone tell us what the Woodhead-Monroe conversion was like to ride ?

(Roger Cooper, a founder member of the Scott Owners' Club and responsible for my introduction to Scotts, fitted one of these conversion units to his 1935 combination (with period "launch" type sidecar) shortly after its purchase and was I remember most enthusiastic. The company concerned was Percival Bros. & Webb Ltd., (I think I'm right in saying there is no connection) who made a fine job including stove-enamelling for £7 10*s*. 0*d*. (£6 12*s*. 6*d*. without).

As Paul says a conventional Woodhead-Monroe unit was utilized (a shrouded coil spring embodying a co-axially mounted velocity-conscious shock absorber). Three different spring rates were offered for Lightweight and Heavyweight machines or sidecar application—*Ed.*).

A TIP FOR VINTAGE OWNERS

by R. Rawlins.

From past experience I have found that assembling the sprung portion of the Scott Plunger forks require more strength and skill than I possess, so I considered it necessary to devise a method more in keeping with my lack of these essentials.

TOOLS REQUIRED 1 Wire Strainer (double ended) 2 pieces thin strong wire—1 piece 30″—34″. 1 piece 24″. 20 gauge. 1 steel ⅜″ rod 7″ long.

METHOD Attach the top spring cap to the tension spring, pass spring through the top spring case and then place the compression spring into position. The two pieces of steel wire are now bent in half and placed over the bottom hook of tension spring Thread the wires through the tube of the sprung portion of the fork having first placed on the bottom compression spring dust cover and pushed up into position. Lay the assembly on the bench, put the ⅜″ steel bar though the wheel spindle holes, extend the wire strainer to its limits, hook one end over the centre of the ⅜″ bar and fasten the short piece of wire to the other end of the strainer then screw in the wire strainer to its limit. It is doubtfull if this will be sufficient to pull the tension spring completely through the fork, so firmly twist the 2nd longer piece of wire round the ⅜″ rod, this will hold the spring while the wire strainer is re-set and then the second go should get the tension spring through the fork. Attach bottom spring cap, ease off the wire strainer until the cap is nearly home, then place a screw driver blade under the cap, remove both pieces of wire, remove screw driver blade and cap snaps into position.

This may sound a little long winded but it is'nt in practise, and only needs a little effort with one hand to turn the wire strainer.

FITTING NORTON FORKS TO A BIRMINGHAM MODEL.

by Tim Massey.

Note: It would seem that there are two patterns of Norton Roadholder fork: the earlier pattern with springs fitted outside the central strut, and a later variety after 1958 with springs inside the strut; there may be other differences. But the springs in either pattern are not visible when the fork is built up. The following refers to the earlier pattern.

Everything seems to fit quite well to my Scott and the machine behaves well on the road—much better, I think, than the original forks.

Wheelbase is reduced by 1¼ inches and now I find I can put on my goggles with both hands! In fairness, though, I must admit the original forks were rather worn, but not dangerously so. But now to the work involved:

First, make sure the forks selected are solo; I made the mistake of getting sidecar forks and had a lot of work converting them. A tip: solo forks have the strut parallel to the tube which fits the head.,

Use the Scott ball races with the Norton fork, but note that the lower ball-race requires a central sleeve to ensure a correct fit - not a difficult job. The top ballrace, I found, fits easily as does the top nut, though this latter may need a spigot turning on it in order to fit inside the Norton top bracket.

Having got the forks on the bike, a stop is needed to prevent the radiator being damaged. This is a device very similar to the existing friction damper on the Scott and is quite easily made from ⅛ inch plate (but take a look at a Norton to get the right idea).

The Scott wheel spindle is okay but needs a new end; grind off the corners of the hexagon end and fit a sleeve which will suit the new forks. The sleeve will need to be a good force fit in the spindle. This takes care of one side of the spindle.

On the opposite side. The fork leg needs to be bushed to suit the Scott spindle. To fit the wheel, it will be found that about ⅛ inch has to be removed from the central boss of each brake back plate. But do this with care so that the wheel remains central.

The brakes themselves are anchored by dural plates attached to the top of each fork leg on the studs which normally are used for the mudguard stay. They are ¼ inch but for safety I tapped mine out to five sixteenths Whit., and made four studs to suit.

A new mudguard stay will now have to be made to fit these same studs after the brake anchor plates; the other mudguard stays fit quite well, except that the stand has to be shortened by about one inch to clear the exhaust pipe on "full bump."

Summing-up: the handlebars fitted the Norton top bracket okay, but the headlamp does not sit very nicely in the bracket and has yet to be dealt with. The steering damper fits quite nicely beneath the fork stop device, and the Scott damper knob and spindle also fit, though the threaded portion has to be threaded a little further along the spindle.

Editor's note: Mr. Massey is to be congratulated on having successfully installed the Norton Roadholders. Having had extended experience with them I can categorically state they are wonderful forks. Now I'm off to do a similar mod.

N.B.: The above notes apply to the current Birmingham Scott—there may be other problems with the Shipley lay-out. Insatiable Scott types (and aren't we all ?) will have seen the brief write-up elsewhere referring to Matt Holder's personal Swift which has been fitted with Norton forks. Wonder how it handles ?

RECONDITIONING BRAMPTON 637 FORKS

Some six years ago, after lengthy bargaining, I purchased a rather dilapidated Scott; believed to be a 1933 Sports Special or Tourer. Among the more dilapidated parts were the forks, and headrace bearings. These latter, were renewed with the aid of Tom Ward's never failing service, but the forks I decided to do myself.

Upon checking the main fork member, the spindle holes were found to be well oval, as were the steering column assembly, head clip and fork spindles. As the early Brampton forks do not feature detachable bushes, renovating the spindle holes was something of a problem. With suitable expanding reamers, it would have been a relatively simple job, but all that I possessed were a plain 7/16 in. reamer, and a rather worn ½ in. one.

I do however possess a 3¼ in. Zyto lathe, and my final solution was to set the parts up on the lathe crosslide, and then bore the oval holes out true. Here the fork girder itself represented the worst problem, but with the aid of a large dural angle bracket and several clamps, the job was at last done, all holes then being ¼ larger than originally made. Four turned bronze bushes, 1½ in. long, ¼ in. and ½ in. bore were driven in, two in each of the housings from opposite sides, then my 7/16 in. and ½ in. reamers used to finish the contracted bores to size. The steering head clip and column were bored and bushed in a similar manner, and the worst part of the job was over.

I decided to make up the new fork spindles from un-hardened silver steel, as it is a very suitable material, tough without being too brittle in it's unhardened state. Another benefit was that this was obtainable in true finished sizes, although not easy to obtain and rather expensive locally. I finally obtained supplies from: K. WHISTON, New Mills, Stockport, SK12 4HL, whose service was very satisfactory.

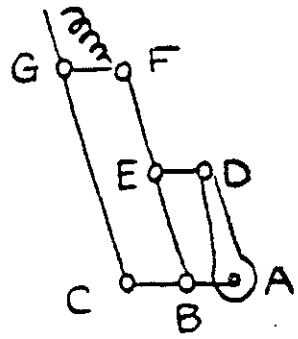
As the Brampton fork design uses spindles with a LH thread on one end and a RH thread on the other, these were another job for the lathe, so I set up the change wheels to obtain the correct thread (26tpi) and screwcut the threads on either end of the material. The spindles were then turned down to a plain diameter for the first ¼ in. either end, the RH threaded end of each spindle being left like this, and the LH end filed to a square for spanner adjustment after assembly.

Assembly of the works provided a few minor headaches due to slight misalignment of the bushes, but finally with further reaming all was well, and the whole assembled and working to my satisfaction. Total cost of the job (materials only) was in the region of 25/6d. Members without a lathe could probably enlist the aid of a friend to do the turning parts, having the worn spindle housings reamed out by a local garage or light engineering firm.

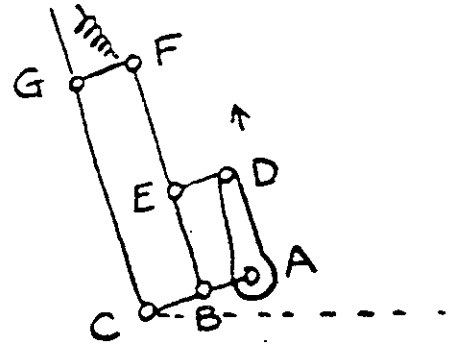
I. Robertson.

BRAMPTON MONARCH FORKS

In the last few years I have had personal experience of many Scotts fitted with Monarch forks; at least two of these had the wrong wheels in. This is a very bad procedure as they are quite different from the standard front hub. The wheels are narrower for a start, but more important the brake back plate has to move independantly of, and at a different angular rotation to the wheel spindle, bottom link, the moving fork or brake anchor arm, as the following diagram shows.



A=FRONT WHEEL SPINDLE
C & B=LINK PINS
G & F=FORK SPINDLES
G F=TOP LINK
E D=BRAKE TORQUE ARM
C A=BOTTOM LINK
G C=REAR GIRDER
F B=FRONT GIRDER
D A=BRAKE PLATE



Any attempt to fit an ordinary wheel and brake plate will either lock the whole fork solid or more usually, "graunch" the whole assembly around. I found this out one day going to our last Stratford rally on a borrowed Scott, the front wheel kept coming loose although the spindle was still tight. What happened was that the movement of the brake plate in relation to the spindle caused the cones to keep coming loose — I gave up at Broadway in the end.

What you must have is a fully floating brake plate which moves about a "top hat" bush and held on to the bush by a substantial "star" washer. The top hat bush is assembled on a hollow spindle, together with the star washer, wheel bearings, oil seals, etc., and the whole lot held between the links by a spindle bolt going through the hollow spindle. All this represented on the diagram by "A".

There are those who say "Brampton Monarchs, lovely ride but no brakes!" Wrong — provided there is no play at the brake plate, top hat, or brake arm, and "Potty Mod 5 (a)" carried out, the brake can be very good. I used one for years on a heavy combination and for racing with no trouble other than bending my forks now and again because of the brake torque. This is easily straightened by mallet or foot (unlike Webb type forks). I suppose it is possible to brace the front fork member, brazing on a webb etc? Has anyone got any ideas of a suitable brake torque arm for Monarchs? I would be pleased to hear from them. Any how . . .

POTTY MOD 5(a) Dead easy! Increase the pressure of the brake back plate onto the top hat, use a very strong star washer and shims, or as I did, DOUBLE UP THE STAR WASHER.

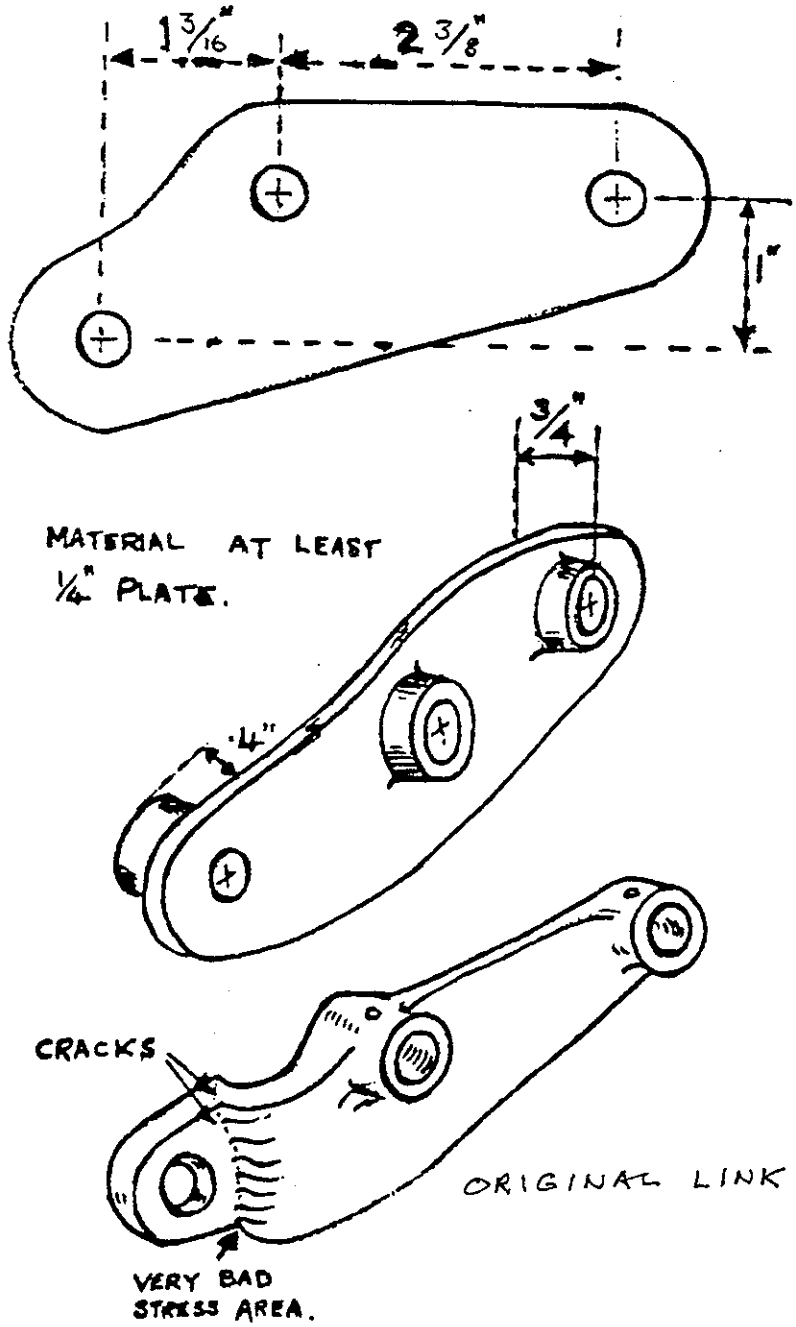
POTTY MOD 5(b) VERY IMPORTANT — YOUR LIFE COULD DEPEND ON IT. This is not an original idea of mine, but was passed on by a Brough Superior Club member. The bottom links have a very bad stress area by the wheel spindle boss.

I have found two with cracks and apparently Brough Superior Club members have found several cracked as shown. So please clean and scrape the paint off your links and examine carefully. Then have them crack-tested — several methods — dye, ultra-violet etc., but "magnaflux" is the best. (Iron filings in a magnetic field) and have your cranks done at the same time, or just carry out Potty Mod 5(b). Make up new bottom links as shown. The finished article is about 25% heavier, which means that at about 150mph you have to screw down the dampers half a turn more!

Use at least $\frac{1}{4}$ inch plate, preferably thicker, but the drawing is based on a $\frac{1}{4}$ inch plate one. Use the dimensions taken from the inside face, braze on 2 x $\frac{1}{2}$ inch approx. bushes (if using $\frac{1}{4}$ inch thick link) (less if thicker), and one bush about 4 inch long on the inside face for the front wheel boss. Use Nickel Sif Bronze No. 2 preferably and stress relieve afterwards. Clean and polish the links afterwards then paint — do not plate. Make sure there are no scores etc., especially on the edges, and radius all corners, edges etc.

Please don't take my measurements as gospel. They were made on a dark day with a rusty 6 inch rule and on very worn and slightly bent links.

Potty Mod. No. 5(b) Improved Bottom Link for Brampton Monarch Forks.

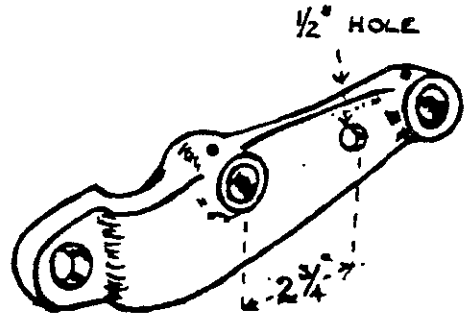


BRAMPTON MONARCH FORKS

I found Potty's article in November's Yowl very interesting—if you do get a good brake on these forks, or the usual Webb type with the anchorage between the blades, you will almost surely bend your forks. Of course, the answer with Webbs is to anchor them by the fork spindle as Potty suggests, by one method or another.

A friend and I rebuilt a 1930 Sprint Special some years ago and although Webbs were available he had a new pair of Monarchs which we fitted. We had no wheel though, and as there was a spare two-speeder back wheel (1925) and sprocket, we had the teeth turned off and used that. I realise now that it was a wicked thing to do, as these wheels had journal bearings we could use it either side. We had a 19" rim fitted to bring it to period and put the brake drum on the left. To put a stop to the fork bending we fixed the anchorage of brake drum as sketch. This had the effect of lifting the steering head up when the brake was applied—very odd until you got used to it. If I remember rightly some of the pre-war Vauxhall cars had a similar arangement. There may well be some disadvantages but I think it would put more weight on the tyre when braking.

I have just examined the machine although in a poor light and can seen no signs of the cracks although after Potty's sketch of the crack area I must give it a good look over.



The two-speeder brake is quite good and although they can sometimes be either on or off at the rear it is quite smooth on the front and the normal anchor centre will just fit in as shewn using the Scott bolt. I would think there are modern wheels similar that could be used. There is a fair amount of metal on the top flange over the brake anchorage hole so this conversion would be satisfactory, the only problem is getting a suitable wheel with an anchor point not more than 2¾".

I have taken the liberty of using a copy of Potty's sketch.

CON WHITLOCK

BETTER BRAMPTONS
(Part 2)
By Potty

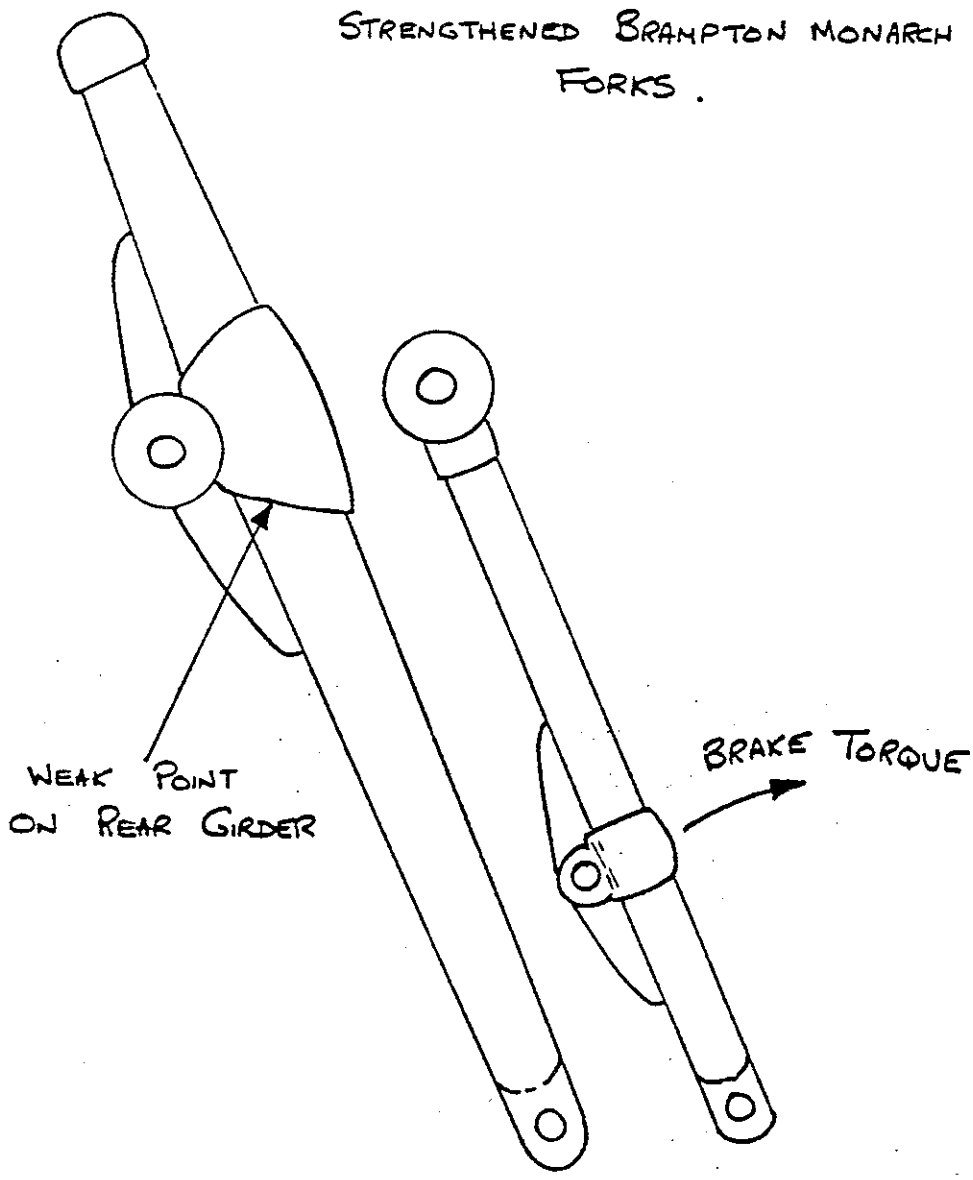
Firstly, let's clear up a couple of points with the first article on Bramptons in last November's Yowl (Vol. 8, No. 8). I forgot to mention that with Potty Mod 5(b), a longer spindle is of course required, because of the thicker bosses on the bottom link. This is no problem, as it is just a piece of rod, threaded at each end. The hollow spindle which goes through this remains the same.

With regard to this last article please make the following amendments, line 2 on page 6 should be Potty Mod 5(b) and not (d) and the bottom illustration on the same page should be captioned "original link". On page 7 the bush is of course .4 of an inch thick and not 4 inch long.

No one in the Scott Club has written to answer my plea on how to strengthen the forks against brake torque reaction, but once again a member of the Brough Superior Club gave me an answer and shown me simple modifications to the lower part of the forks and also informed me that the rear portion is weak just below the top link, all of which brings us to Potty Mod 5(c) STRENGTHENING THE BRAMPTON MONARCH FORKS. Very simple webs made out of thin steel plate are brazed carefully on at the points shown. This mod, if carefully carried out, is hardly noticeable and certainly does not spoil the look of the thing, and just think of the peace of mind it gives you.

POTTY MOD 5(c)

STRENGTHENED BRAMPTON MONARCH FORKS.



V3/2 Feb. 1964

CONVERTING SCOTT/DOWTY TELESCOPIC FORKS TO NORMAL SPRINGING

Have you — in the words of the adwert — 'got that sinking feeling?' Do your forks go flop in the most awkard places, spew oil over the front tyre and refuse to blow up? Are you tired of trying to obtain spare parts to cure the trouble? Fellow sufferers, you can obtain a spring conversion set and end all this.

For just 30/- Panther dealers can supply the parts you need — two springs and two collars which replace the nuts on buffer rods. An excellent article on stripping these forks appeared in a previous YOWL, but for those without this the procedure is quite straightforward.

Remove mudgard, brake cables, and front wheel. Slacken bottom crown fork tube clamp bolts. Carefully pull down tubes using twisting motion, exposing pistons. Secure piston from turning with special spanner. This can be fabricated from a 7/16" box spanner by cutting a ½" wide slot length-wise and filing pegs on the end without the hexagon to fit old slots in screwed piston body. Unscrew each leg in turn. Drain out old oil and wash out bottom sliding members. Unscrew nuts on buffer rods, and replace with round screwed collars supplied in kit. Place springs in bottom fork members and tighten each leg up in turn to main fork body. Considerable effort will be needed in compressing springs enough to enable threads to start; the help of a hefty friend to hold down machine will make this task easier.

After screwing up legs, replace front wheel, mudguard, and brake cables. Tighten tube clamp bolts securely. Unscrew top filler plugs and fill each leg with 1/3rd of a pint sae 20 oil.

V10/4 March 1977

"FERODO" SHOCK ABSORBER AND STEERING DAMPER DISCS FOR SCOTT MOTOR-CYCLES (ALL SHIPLEY MODELS)

Type	Damper	Bore	Thickness	No. per absorber or damper
	ins.	ins.	ins.	
Shock absorber disc	2	7/8	1/8	4
Steering damper disc	3	13/8	1/16	2
Shock absorber disc	3	17/16	1/16	4

Reproduced from an early "Ferodo" catalogue.
Research by K. W. Lack and B. Scholes.

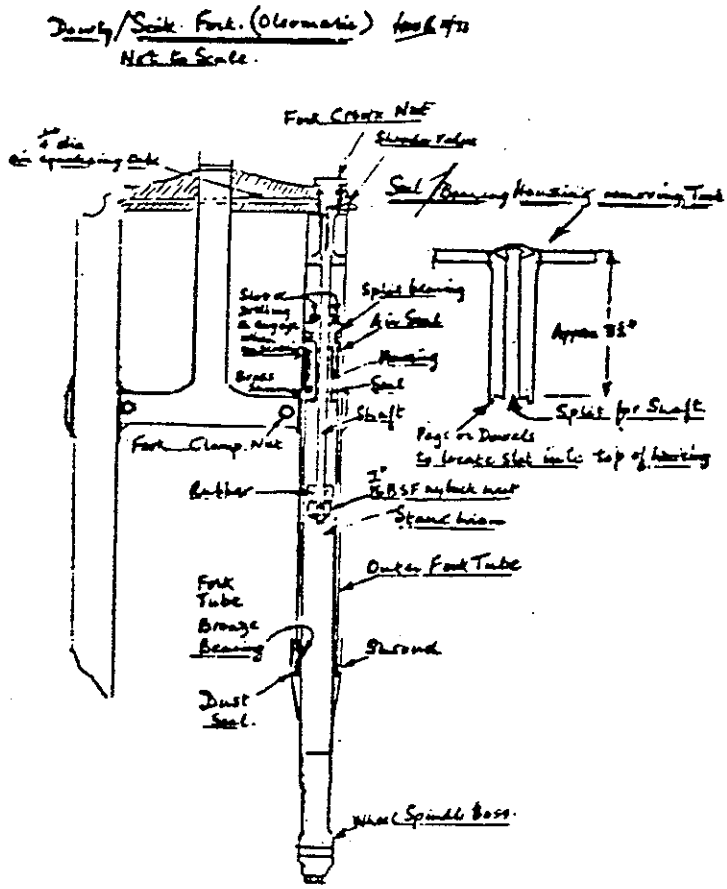
1949 SCOTT — OLEOMATIC FORKS DOWTY

To remove and dismantle:—

Place machine on rear and front frame stands, remove front wheel and mudguards plus stays, remove headlamp and stays. Slacken fork clamp bolts on bottom yoke.

DO NOT SLACKEN TOP NUTS ON FORK CROWN

Grasping one fork leg outer tube firmly with both hands, (when this fails to move stubborn fork tubes, a Jubilee clip tightened around the tube will ofier sufficient extra grip) twist tube at the same time—pulling downwards—the tube should come away from the crown, continue the twist/pulling action until the brass soldered shim under the yoke clamp is completely revealed, lower the tube until the bottom shroud rests on the wheel spindle boss at the bottom of the fork stanchion (allow the shroud to rest on a piece of rag to avoid damaging it, or the wheel boss).



Shifting your attention to the top of the outer tube—revealed is a shaft, held in position by the fork crown nut, there should be no reason to disturb the crown nuts unless you suspect an air leak at the fork top. The shaft houses the damping mechanism fibre bearing and air seal—these slide up and down the shaft with the telescopic action of the fork stanchion INTO which the housing screws—bearing on the inside of the outer tube. Looking down inside the dropped outer tube the top of this housing can be seen, the shaft goes through the centre. The whole housing has to be unscrewed (anti-clockwise) from the inside top of the fork stanchion. This is effected by means of a slot across the top of the housing—or in some cases two $\frac{1}{8}$" drillings in the top face diametrically opposite each other. In either case these will be clearly seen by inspection.

Due to the shaft and the inaccessible position, a normal spanner obviously cannot be used for locating the groove or holes, so a special +001 must be obtained or made (rough dimensions of which are in diagram). The pegs or dowels are located by passing the special box-spanner type tool over the shaft and sliding it down onto the housing top, once located, the exposed part of the tool is turned, unscreweing the housing from the fork stanchion. (At this point the long-famous Scott Owners utterance will be heard "Ah! I see." as the vital parts of the works come to view—promptly followed by the stanchion dropping to the floor usually of an unsuspecting foot, and spewing its contents of oil everywhere. So don't err into this trap.)

The whole stanchion and outer tube can be removed for inspection revealing the loose housing on the shaft. Inspect the plastic seals and the split fibre bearings for wear. It is advisable to renew these if possible, remove the housing trapped on the shaft by the 7/16" B.S.F., self-locking nut. Examine seals at top end of shaft. After removal of the bottom shroud, examine bronze bearings on bottom of outer tubes for wear—these are silver-soldered into position.

Scrupulous cleaning is essential before reassembly. Reassemble in reverse order, then fill each leg with oil when the forks are 1" from the fully closed position. Use a 10/30 multigrade oil. Monograde oils suffer big variations in viscosity relative to temperature—resulting in indifferent fork damping. Fit a new (plastic type) Schrader Valve and inflate forks to the indicated marks on stanchions. (red dots). If you peer under the fork crown yoke a $\frac{1}{4}$" dia. copper tube connects the two legs for equalization of air pressure—If a leak is suspected in this tube (usually indicated by presence of fresh oil) then the fork top nuts will have to be removed and the air inflation valve taken out, in order to drop both fork inner tops (and they must be removed together otherwise damage or fracture of the equalizing tube will result) if an air leak is found at the tube area it must be silver soldered to seal the leak.

SERVICING DOWTY FORKS

This article was extracted from a Panther Dowty Service Sheet, which covered forks fitted to the Panther "Model 60/70" and "Model 100". There were significant differences between the type of Dowty fork fitted to each model, as the article in part illustrates. Scotts used the "Model 100" — type fork, which was fitted to Shipley models from 1947 and on the earliest of the Birmingham models up until about 1957. Thereafter, sprung Dowtys were the order of the day, but that is another story.—Ed.)

The main members consist of two outer tubes (10), clamped by pinch bolts (22) to the fork crown fitting (23) and attached to the handlebar clip lug (2) by spigots on the top internal fittings (7). A steering tube is brazed into the fork crown fitting and passes through a hole in the handlebar clip lug where it is located by means of a lock nut. A substantial high tensile steel pad bolt prevents rotation of the steering tube relative to the handlebar clip lug.

The axle attachment fittings are brazed into the lower sliding tubes. These vary in design on different machines depending on whether the wheel spindle is fixed or of the 'knock-out' type. The tubes carry light alloy pistons, which are glanded to retain pressure. On Mod. 60/70 forks the piston (13) itself is the upper bearing, its point of application being immediately below the sealing gland. On all Mod. 100 forks the upper bearing is made of 'Mintex' (impregnated asbestos anti-friction material). This bearing is split in two halves so that it may be assembled into a groove in the piston above the gland ring. Synthetic rubber sealing rings (14) below the threaded portion of the piston prevent leakage into the cavity between the inner and outer tubes.

The lower bearings (18) are brazed into the outer tubes and ingress of foreign matter is prevented by double-lipped scraper rings (20) located by tapered shrouds.

Small diameter tubes (9), brazed to the top internal fittings, pass through the piston centres and carry synthetic rubber cushions (16) at their lower ends.

Mod. 100 forks are provided with synthetic rubber dashpot cushions beneath the top internal fittings, whilst in 60/70 models the dashpot is a recess machined into the top internal fitting.

Synthetic rubber seals (8) prevent air leakage from the top internal fittings which are connected by a pressure balance pipe (1).

The inflation valve (5) is fitted to the near-side top internal fitting. It is threaded to fit the normal motor-cycle pump connection.

Function

The forks are air sprung and oil damped. Air springing has the advantage of allowing considerable deflection for normal surface irregularities whilst maintaining the ability to absorb considerable shocks without excess fork movement.

The movement of the synthetic rubber cushions in oil provides approximately equal and constant damping in both directions without the contact and resultant wear of working parts. These cushions also absorb the shock should the forks extend fully, whilst the oil cushion between the pistons and internal top fittings prevents too rapid closing on compression.

Inflation and adjustment to load

A red dot is positioned on the front of each lower sliding tube. When correctly inflated to the load, the bottom edges of the shrouds should coincide with the red dots with rider or riders in position.

To obtain the correct adjustment, over-inflate the fork slightly by removing the inflation valve dust cap and coupling an ordinary tyre pump to the valve. The rider should then sit on the machine, keeping his feet on the footrests and maintaining balance from some convenient support. Air should then be released in small quantities by depressing the stem of the inflation valve until the bottom of the shrouds line up with the red dots. Replace the dust cap on the inflation valve.

It will be seen from the above that the forks can, without fear of error, be correctly adjusted for solo, sidecar, or pillion riding.

Inflation valve

The inflation valve is fitted with a special core designed to open at low pressure and fitted with oil resisting rubber seatings. *Under no circumstances* should a normal type valve insert be used as the action of the oil would rapidly destroy the natural rubber seatings. Dowty Valve Cores can be obtained from your Dealer or direct from the manufacturers.

Topping up

Topping up becomes necessary only if 'bottoming' occurs in spite of correct inflation. Scrupulous cleanliness is essential.

Remove inflation valve dust cap, depress valve stem and allow all air to escape. The forks will close.

Rest the crank case on a block so that the forks are 1in. from the fully closed position. Unscrew the filler plugs and fill each leg with one of the recommended oils (See 'FILLING'). Replace and tighten filler plugs.

Remove the block from beneath the crank case and depress the inflation valve, thus allowing surplus oil to drain off and the forks to close completely.

Carry out air inflation procedure, adjust to the load, and replace valve dust cap.

Filling

Forks are supplied correctly filled and inflated. When filling, it is important that the recommended grade of oil be used as its viscosity does not change appreciably over a wide range of temperatures. Consequently there is little or no alteration in its damping characteristics.

The recommended oils are:—

Mobiloil Arctic	Essolube 30
Castrolite	Motorine D
Single Shell	

The procedure for filling is exactly the same as described under "TOPPING-UP," except that more oil will be required.

Unless dirt has been allowed to enter with the oil during filling or topping up, the oil need never be changed during the life of the machine.

Greasing

The bottom bearings in each leg should be greased weekly. Six shots with the grease gun should be given to each greaser, situated at the back of the outer tubes, at the lowest bearings. Only clean high grade grease should be used. Vent holes are provided in the sides of the outer tubes below the fork crown; these allow surplus grease to escape.

Nuts and screws

Periodically check the tightness of all nuts and screws to ensure completely efficient working. It is particularly important that the steering tube pad bolt is really tight, otherwise the fork may become misaligned.

Adjusting steering head race

Slacken both the clamp bolts on the fork crown fitting and the pad bolt on the handlebar clip plug. Adjust steering head nut as required. Retighten pad bolt hard and clamp bolts on completion of adjustment.

Removing and replacing front wheel (Fixed Spindle Type)

Place a suitable block under the crank case so that the forks are fully extended and the wheel is clear of the ground. Disconnect the brake cable at the brake drum. Slacken the nuts locating the axle cap on the brake drum side Screw back the axle nut about two complete turns. Remove both

axle caps, supporting the wheel with one hand as it comes clear of the forks.

To replace the wheel, screw up the nuts locating the axle caps to finger tightness only. Tighten the axle nut on the brake drum side so that the wheel is held tightly against the side of the axle fitting. Now tighten axle cap on this side only. Lift the machine off the block and bounce the fork a few times on the ground. Tighten near side axle cap, replace brake cable and adjust.

The object of the procedure explained in the preceding paragraph is to ensure that the lower tubes of the forks slide freely in the outer tubes. It will be noticed that a small clearance for this purpose is allowed between the shoulder on the nearside axle ferrule and the axle fitting. With knock-out spindle wheels, the fork should also be bounced before tightening axle nut and clamp bolt to ensure correct alignment.

Dismantling forks

In the unlikely event of dismantling or major fork repairs being required, the owner is advised to employ his Dealer to carry out the work, as the changing of sealing rings calls for great care. However, if this course is impracticable and the fork is rapidly losing air pressure, proceed as follows:—

First check the inflation valve for leakage. If there is no evidence of air escaping, the forks will have to be dismantled. An air escape from either piston sealing ring will be indicated first by oil leakage, which will appear at the vent in the outer tube. This will be easily distinguishable from surplus grease.

Place a block under the crank case to allow the forks to extend fully. Remove front wheel as previously described. Remove mudguard stay bolts and detach mudguards. Depress inflation valve stem, allowing all air to escape.

Slacken pinch bolts on the fork crown fitting. Grasp the outer tube firmly with both hands at a point below the fork crown fitting and rotate gently, backwards and forwards, at the same time pulling downwards until the brass ring on the tube is clear of the fitting. The top internal fittings will then be fully exposed. Still holding the outer tube in one hand, push the inner tube upwards until the edge of the shroud is resting on the axle fitting, exposing the piston.

Grasp the axle fitting firmly and engage a peg spanner in the holes in the top of the piston. (The spanner for this purpose may be obtained from your Dealer.) Unscrew the piston and gently withdraw the inner and outer tubes together, leaving the piston on the central stop tube. Slide the outer tube off the inner tube and remove screws and greaser from the shroud, together with the rubber locating and scraper rings. Empty the oil from the tube.

Remove the lock nut and washer at the end of the stop tube, at the same time taking care not to bend the tube. The complete piston may now be removed. On Mod. 100 forks the two halves of the 'Mintex' bearing are now detached, allowing the gland ring and metal spacer to be withdrawn.

Exactly the same procedure is repeated with the other leg of the forks.

Wash all parts in clean paraffin. Do not dry the parts with a cloth as however clean it may appear there is always the probability of small particles of grit adhering to it.

Examine carefully the lips of the piston sealing rings and if they are chipped, however slightly, they must be replaced. If there is evidence of extensive or deep scoring in either outer tube, it should be replaced. Such scoring is caused invariably by dirt being introduced into the fork

during filling or topping up. so the importance of cleanliness will be realised. Scoring cannot occur in normal usage and even after many thousands of miles have been covered the tubes will retain their original polished appearance.

It will be noted that the working portion of the forks may be dismantled without removing the fork crown or handlebar clip lug from the machine. Thus it is not necessary to disturb the steering head race adjustment or the balance pipe unit.

Reassembling forks

Insert the rubber scraper ring into the top of the shroud with the longer lip of the ring downwards towards the axle fitting. Place the soft rubber locating ring over the scraper ring, sliding the shroud over the inner sliding tube. Introduce the outer tube over the inner tube and slide the shroud into position, locating it by replacing the screws and greaser. Place new gland ring and spacer in position on the piston and locate with 'Mintex' bearing or circlip according to type of fork. Smear the diameter of the ring with good quality lubricating grease. The static rubber sealing rings at the threaded end of the piston should be similarly treated. Replace the piston in position on the centre tube and attach the rubber out-stop, washer, and locknut. Smear a little grease around the static sealing ring on the top internal fitting.

Fill the inner tube with one of the recommended brands of oil. Hold the outer and inner tubes by the axle fitting, pass them up through hole in fork crown fitting, and screw in the piston with the peg spanner. Take care, during this operation, that the lip of the piston sealing ring is not damaged on the edge of the hole in the fork crown fitting.

Gently force the outer tube upwards until the top edge butts on the flange of the top internal fitting. Rotate the tube so that the vent hole faces ouwards. Proceed in he same manner with the alternate leg, finally tightening pinch bolts and replacing mudguard and wheel. Topping up and inflation to load completes the operation.

Tools required for dismantling

1. Pliers.
2. Screwdriver.
3. Adjustable Spanner.
4. Peg Spanner (for dismantling piston).

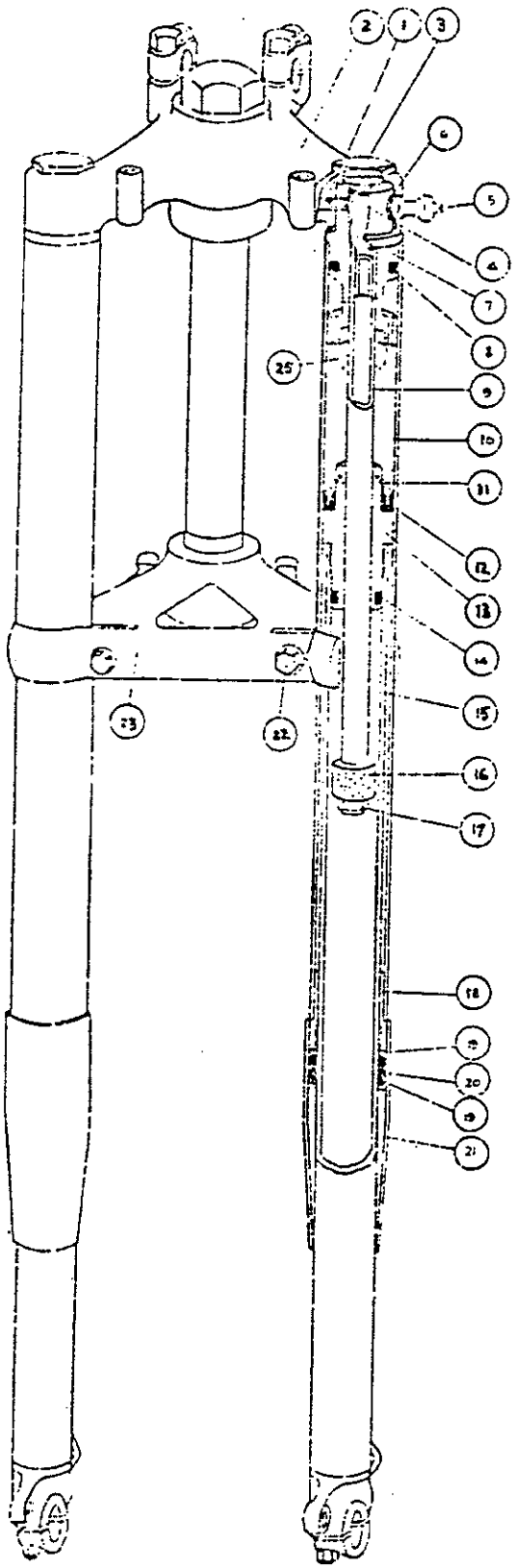
Some Dimensions of Dowty Forks fitted to various Motor-cycles

Type of Fork	A	B	C	D	E
Standard Dowty Pattern	6.875	1.2515	same	28.4	3.9
Velo: MOV, MAC, MSS, KSS, KTS	6.687	1.063	1.063	26.85	3.5
Panther 65/75	6.75	1.00	1.063	27.6	3.9
Panther 100	6.968	1.3185	1.187	28.4	3.9 or 4.65†
Scott	7.522	1.251	same	27.98	4.26

All dimensions are shown in inches. †Reversible lug for side-car trail.

A = Overall length of Head.
B = Diameter of Steering Column top.
C = Diameter of Steering Column bottom.
D = Length of Fork Leg from Crown Nut to Wheel Spindle centre line.
E = Forward position of Wheel Spindle from Vertical centre line through Steering Column.

(*These dimensions were supplied by member Ernie Scott.*)



Key

1. Pipe, Pressure Balance.
2. Clip, Handle Bar Lug.
3. Plug Filler.
4. Static Seal, Filler Plug.
5. Valve, Inflation.
6. Seal, Inflation Valve.
7. Internal Fitting Top.
8. Static Seal, Internal Fitting Top.
9. Tube, Carrying Buffer.
10. Tube, Outer.
11. Ring, Retaining Piston Seal
12. Seal, Piston.
13. Piston.
14. Static Seal, Piston.
15. Tube, Inner Sliding.
16. Cushion, Rubber.
17. Locknut, Cushion.
18. Bearing Lower.
19. Ring, Locating Scraper.
20. Ring, Scraper.
21. Shroud Taper.
22. Bolt, Pinch.
23. Crown, Fork Fitting.
24. Bolt, Steering Tube Pinch.
25. Cushion, Dashpot.

Headstock Bearings

Dear Tom,

Doug Kephart's excellent and detailed article on the difficulties of finding suitable headstock bearings for his Birmingham Scott reminds me of the problems I encountered when I started my current 1930 Sprint Special rebuild.

The bare frame (No. 17) that I bought from Len Parry was just that, totally bare, and so I needed taper roller headstock bearings as soon as I started my first 'dry' trial assembly. I measured the O.D. of the fork stem, and went confidently off to the bearing stockist for a pair of bearings.

To my horror there was nothing to fit! Anything that fitted the headstock had an I.D. far too small for the fork stem. After phoning around various other bearing specialists, all told me the same story. The bearings I wanted had been obsolete for at least ten years.

One firm, Burton Engineering Supplies, of Burton-on-Trent, Staffs (Tel: 0283 36088) very kindly offered to make me a pair of special bearings, grinding out the I.D. to the 1⅛" that I needed for the medium-weight Webb forks. As can be imagined, this is an awkward and slow grinding job, and the finished job then needs ultrasonic cleaning to make absolutely sure that no debris remains in the bearing. The list price of the bearings was £25.00 each, machining and cleaning £15.00 each, giving a total of £80 plus VAT, a staggering and painful final bill of £94.00. OUCH!

A few months later I was discussing the affair with my daughter's boyfriend, who rides a KTM in motocross. Headstock bearings take a terrible hammering in that sport and rapidly get indentations in the bearing tracks, giving horrible notchy steering. As a result he has to regularly replace his headstock bearings. Surprisingly, he had faced similar problems to me, but when he told me the solution I could have kicked myself....

All I can say to anyone in a similar position is to go to your nearest Ford dealer and have a look at Escort or Orion rear wheel bearings. These make a superb answer to the problem, having a total of 20 rollers (!) in each bearing, and a thickness of only 16mm.

It is necessary to make bushes and spacers to fit, as the I.D. is well in excess of 1⅛", but that of course is a much simpler and cheaper procedure than having 'specials' made up. They are *very* cheap compared to bearing specialist's prices!

I suspect, but cannot confirm, that they could also probably be used to replace the cup and loose ball bearings of Super Squirrels and post 1934 Flying Squirrels. (Why on earth did the factory stop fitting taper roller headstocks after 1933?)

I hope this information will be of assistance.

Brian Marshall,
Aslockton,
Notts.

Welding stressed frame and fork items

Dear Tom,
Further to recent letters from John Kidd, Peter Maddox and John Goss ('Grasshopper') about repair techniques, I would like to add a few observations of my own.

Ten years ago I did a full-time one-year college course which was for a City and Guilds 389 Motorcycle Mechanics, combined with a BTEC (First) in Motor Vehicle Engineering. I did a fair bit of welding (theory and practice) in that year, and in the following year I did a part-time City and Guilds Welding and Fabrication course; so I am pretty well acquainted with the appropriate technology.

The big problems when dealing with vintage and veteran motor cycle frame and fork components are not knowing exactly what they are made of, and not knowing what stresses, strains, fatigue and internal corrosion are lurking within apparently sound components. It follows that whatever techniques we use for repair MUST be as gentle as possible whilst still being safe. Achieving this can be remarkably difficult, even on an apparently simple repair, and over the past 35 years of 'messing about with bikes' I have come to some very firm conclusions on the best ways to do things.

If I had access to non-destructive testing facilities things might be very different, but I don't, and so past experience and 'rule of thumb' have to be used, in combination with what I learned at college.

I do not believe, for instance, in MIG welding or indeed any form of arc welding on old frame or fork components, because I think that the intense localised heating can very easily weaken old metal. Just remember that steel is being melted, and that the component being repaired or modified is also being melted at the point of the welded repair. To give a prime example, many an enthusiast has arc-welded expensive Reynolds 531 tubing when building specials, and then been either horrified, maimed, or killed when the tubing has snapped near to the weld, due to embrittlement; and that is new, known, metal!

Traditional brazing is much safer, due to the lower temperatures involved, BUT, as John Kidd so rightly points out, it is necessary to have a fit between the two components that includes a capillary gap, so as to achieve a good 'wetted' area for the molten brass to flow onto for a strong joint, and this is often difficult or impossible to achieve, especially when there is no traditional lug involved.

So, what is the answer? I personally think that sif-bronze welding is almost always the best technique to use. It is somewhat stronger than brazing, and its great attraction for me is that it has a very useful 'plastic' state between solid and 'runny' molten, which enables the welder to build up strengthening fillets and radii that cannot be achieved with brazing.

Sif-bronze welding is carried out with an oxy-acetylene torch, and it is very important to know exactly what you are doing with the torch, or more harm will be done to the component under repair. Normally we are trying to avoid upsetting the metallurgy of the component under repair, and this means trying to avoid adding or reducing carbon from the metal. If the oxy-acetylene flame has an excess of oxygen the excess will combine with carbon at the surface of the metal and remove it as carbon dioxide. Similarly, if the flame has an excess of acetylene, it will add carbon to the metal at the weld, causing steel to become 'carburized', that is harder (but more brittle). Obviously we normally wish to avoid both these events, and so the flame has to be

carefully adjusted to be neutral. (Actually you do need an oxidising flame when welding brass, but I won't go into that here whilst talking about steel and iron components.)

Gradual pre-heating of the components to be sif-bronze welded is useful, to avoid distortion and I normally use a butane or propane torch for that, rather than the oxy-acetylene flame. Plenty of sif-flux powder is added to the joint and to the welding rod, and the joint then gradually eased up to the correct temperature using as small a nozzle as possible on the torch so as to avoid sudden excessive heat input. Considerable skill is needed to avoid putting too much heat into the repair, and only practice can give that ability.

Cooling down afterwards is equally problematical, as John Kidd remarks, because sudden cooling, even that caused by simply removing the welding torch and allowing cooling in the air, is a 'quench' and can cause problems with some materials. the answer is a very slow, controlled cooling, and probably the easiest way to achieve this at home is to build a charcoal 'barbecue' with some old bricks and a bag of charcoal. Get it lit well before the welding is carried out so that it is good and hot, and get the repaired component directly onto the fire the second you stop welding, and then pile up the hot charcoal over the repair. It can then be left for several hours to slowly burn itself out, thus avoiding 'quench' cooling. DO NOT BLOW AIR INTO YOUR FIRE DURING THIS TIME. There is a big temptation to turn the garden hose onto a newly welded repair so that you can inspect it straight away and carry out more work, but DON'T DO IT!

I cannot over emphasise the safety aspect of all this, both that of the repair and having the correct eye protection and clothing when welding, to say nothing of ventilation when welding etc., etc., etc.... Please don't try it without plenty of tuition and training. SAFETY FIRST.

Brian Marshall,
Aslockton, Nottingham.