C Range Triumph Modifications and Improvements

There are a number of modifications that can be done to improve the reliability and performance of the 'C' Range Triumphs without losing the general character of the bike. I have listed the modifications in the order shown as I feel some are more useful than others. I cannot warrant the success or failure of them. All modifications are of course a personal preference and should be done only after some thought as to what you intend to achieve. It is all too easy to over-modify a machine and reduce its value. Care should be taken not to dispose of or damage parts so that the machine cannot be returned to standard in the future. We too easily forget that we are only temporary custodians of the machines in our ownership. A machine or part can be restored many times but it is only original once!

Engine

Generally the 'C' Range engine is reliable without modification as long as the state of the components such as the main bearings and sludge trap within the crankshaft is known. Weak points are Timing side oil feed which, can be improved by the Devimead conversion offered by several companies. Dynamic balancing will smooth the crankshaft vibration inherent to parallel twins.

The T21 has a different crankshaft than all later machines this crankshaft will fit in later cases but the later cases will not fit the early crankshaft. There are subtle crankcase variations year on year. 350 cc engines until 1968 feature steel con rods while 500 cc machines all have RR.56 Hiduminium alloy rods. Later engines (1969) feature Ball bearing timing and roller drive bearings.

Look for the December 1967 Motor Cycle Mechanics as this details a Race Prepared Tiger 90 and the work done. (8500 rpm and 120 MPH).

Converting 3TA and T90 engines to 500cc to improve performance may initially seem relatively easy but involves replacing the pistons, con-rods, barrels, heads, carb and also the sometimes exhausts, you should first consider fitting the correct sports camshafts and high compression pistons to improve the performance. It is viable to fit the readily available lower compression 3TA pistons (7.5 to 1) if you accept there will be a loss of performance. Please note there are; many variations of cylinder head/valves/camshafts/gearing and only the correct combinations will improve performance. The camshafts all feature three keys to allow some variation in valve timing.

Machines fitted with the distributor (pre 1963) can be converted to the points in the Timing cover if all the suitable components are obtained. Technical Bulletin 13 details this along with other factory approved modifications.

Barrels in original sizes are becoming rare, together with standard pistons. An option is to have the barrels sleeved to standard and then bored to suit the pistons available. Unfortunately this will often double the cost !

Lead Free ...You may need to invest in a lead free conversion if you are intending to use the bike regularly. The Tiger 90 and 100ss having high compression ratios benefit from high-octane fuel and so some octane booster added to standard unleaded does improve performance. The original specification does indicate Austinitic Iron Valve Seats but I do not know the reliability of these with modern fuels.

Filtration ... The standard filtration system relies on wire gauzes in both the sump and oil tank, together with the action of the centrifugal sludge trap in the crankshaft. A modern cartridge type filter will greatly improve filtration; increase oil capacity and oil cooling. Anglo Nihon and Paul Goff do a filter kit; this with a suitably shaped bracket or modification can be fitted neatly under the gearbox attached to the frame by the footrest bolt. I have found replacement spin on filters with less depth, which make this mod very discreet. I have in the past seen magnetic sump traps to replace the crankcase drain, alternatively pop a magnet into the oil tank on a length of copper wire so that it can be removed and examined periodically.

For High Performance engines improving oil cooling should be investigated, this could be done discreetly by fitting a small oil cooler across under the engine. Post 66 machines have greater oil tank capacity.

The Morgo big bore oil pump is a direct replacement for the Triumph unit; this is easily fitted once the timing cover has been removed.

The Oil feed to the rockers can be improved by enlarging the centre hole of the rocker shaft so that the flow is not restricted to the ends (beware this is hardened and a pig to drill). Also be aware that over tightening the oil pipe domed nuts can crush the upper copper washer against the bolt therefore restricting flow. I ease the inside of washer with a triangular file. Access to the bolts becomes restricted once the head steady's are located; locktite is advised.

I believe light alloy tappet push rod tubes are available that reduce the oil leaks at the seals. Only regular seal changes here will cure the leak. Triumph tried several tube/seal combinations over the years so were aware of the inherent weakness of the design.

Tappets. Mushroom headed; light alloy Allen-key tappets are sometimes available, these ease tappet adjustment. You will need to remove the rocker boxes to fit these. I have found the light alloy nuts strip easily, but can be replaced without removing the rocker boxes. The Tappet Covers are easily lost, ensure that the retaining clip (fitted from 1963) is actually in contact with the cap and indenting the serrations, examine the cap edge and file to suit.

Clutch ... The clutch fitted to the 'C' range is under stressed and reliable Several changes were made over the years and so clutch hubs and main shafts may not be compatible. The Clutch benefits from careful assembly and a rigid cast domed plate (SRM), sometimes available. Belt drive clutches are available for all Triumph models.

Clutch problems are usually the result of wear within the shock absorber and the engagement slots on the clutch hub and basket. Additional problems stem from wear in the release mechanism. Once wear has occurred very little can be done. Replacement is the only solution.

Gearing ... It is possible to increase the gearing by fitting a larger gearbox sprocket but at some loss of acceleration, Ideally you should increase by two teeth to avoid using a chain with a cranked link. This will mean the gearing will increase by 12%, which will be too high for the smaller engines in standard tune. The post 66 bikes have the removable rear sprocket, which could be increased in size (its too small to decrease the size without the chain fouling the fastenings). Combined with a larger gearbox sprocket this would to give a smaller leap in overall gearing. I have found the standard gearing excellent for general use with only prolonged motorway use exposing the low top gear. Alternative gear ratios were supplied in standard, close or wide ratios but the final gearing is the same. I have copy of a technical bulletin; which details the variations.

Early 3 and 5TA's feature plain bushes on the layshaft, consider replacing these with the needle roller bearings as fitted to the Tiger 90 and Tiger 100.

Gaining access to the gearbox sprocket involves removing both the alternator, primary drive and dismantling the clutch. Six small screws often punched and requiring drilling retain the access plate. Special tools are needed for three/four of the operations.

Engine tools are a sometimes available to loan from the TOMCC Branches but I have identified a number of methods of succeeding without these tools.

For Parts advice I recommend Oliver at Tri-Supply. www.trisupply.co.uk

Improving Electrics

Pre 1966 C Range Triumphs will benefit from changing to a 12 Volt System. This can be achieved in several ways. Either by using the 1966 or later wiring scheme, fitting the Zener diode in a suitable location. A heat sink hidden behind the left hand panel neatly re-creates the 1966 location. While the later Zener heat sink is effective it is also visible in its location between the forks. You

can replace the Lucas plate rectifier with a modern encapsulated unit. Ideally you can retain the original rectifier for show using dummy wiring to complete the deception.

Alternatively the excellent Boyer Bransden Power Box or alternative unit can be fitted; there is sufficient space on the back of the battery carrier for this to fit. I have had great success using the Boyer power box without a battery but it only really suitable for a machine used solely during daylight. With the power box it is possible to simplify the wiring, eliminating the ammeter, fuse, ignition switch, Rectifier and Zener, though you will need to arrange an ignition kill switch. If re-wiring later machines consider dummy wiring the Zener diode and other components to retain the appearance of originality.

When re-wiring I recommend using modern 2mm cable and running dedicated earth wires to the headlamp, tail lamp, engine and coils. Carefully crimped, soldered and finished with a little heat shrink tubing the standard British bullet connector is reliable, especially if filled with Vaseline or silicone grease before pressing together, the correct tool is essential. Try to keep to the wiring colours used in the appropriate diagram for the year, as this will help you to trace problems you or the next owner may have later. Generally there is a wiring convention for British Machines and you will soon learn the primary colours.

All connections will eventually become loose either due to corrosion, heat or metal fatigue, to minimise these failures plan the wiring carefully to reduce the number of connections to an absolute minimum and arrange the wiring to avoid hot spots and excessive flexing. Think of replacing the bullet connectors after ten years and re-wiring after 20 years.

Pay attention to giving wires additional support or insulation where movement and abrasion occurs, the wiring to the coils can short out on the sharp edges of petrol tank over time.

Any change to 12 Volts will need the Bulbs and Horn replaced. On no account feed the Lucas 6V 8H horn with 12 Volts as this will destroy it, with care and time a non working horn can be dismantled, serviced and revived, Taff The Horn is helpful too, Retain the horn with dummy wiring and place a modern version out of sight under the tank.

Alternator. The Lucas RM19; 3 wire alternator and the wiring scheme are not able to provide sufficient charge when running with the dip beam on continually; as is required by European Legislation, up rated alternators are available (approx £60) to improve the situation, an excellent solution when combined with the Boyer power box. For long daylight runs alternate between running with the lights on and then off in order to let the Zener and battery rest. Monitor the ammeter to judge current flow.

Lighting. Improving the lighting is possible by fitting the halogen conversion from Paul Goff and the LED tail light bulbs. Up rated pilot bulbs (21 watts) are also available. If touring on the continent where daytime lights are mandatory I find the 21 watt Pilot a good option as the bulb is small and easy to carry a spare of.

I have also had success with the Neolite headlamp unit supplied by Hitchcocks, this has an excellent beam pattern and intense light provided by the modern Phillips bulb.

Electronic Ignition. Fitting the excellent Boyer Bransden Electronic Ignition is recommended. You should already have changed to 12 Volts to get the best from the system and fitting will be easier if you undertake the two jobs at the same time. The control box fits neatly under the tank between the frame tubes, secured with a large cable tie or tape. The connections to the coils can then be kept short while the location keeps the box and connections dry allowing some cooling air to reach the unit. Setting up the ignition can be time consuming but once done is set for life. I use a little smear of silicone on the adjustable plate to fix the location and loctite on the taper and thread of the magnet holder. Problems with movement of the magnet plate are usually the result of a poor interference fit with the exhaust camshaft.

I have found the crimp on bullets supplied with the ignition kit are distorted by heat and recommend changing these to spade, British bullet or Japanese connectors, soldered in place and carefully insulated. With care it is possible to re-solder the wiring directly to the PCB. Smear silicone on the cover plate flange and fill the wiring entry point to weatherproof everything.

The only fault I have experienced is the unit WILL fail if the battery becomes disconnected or the Zener fails allowing the voltage to rise to exceed the maximum. Regularly check these connections. If the engine stops after a short period of erratic running, the main fuse and ignition box connections are the first things to check. Misfiring at high revs is usually the result of a flat battery. Fitting the power box described above is the best solution.

There is sufficient space within the headlamp shell to carry a complete spare ignition unit.

For Wiring, Tools and components try Vehicle Wiring Products. www.vehicle-wiring-products.eu

Boyer Bransden are at www.boyerbransden.com/index.html

Hitchcocks (Royal Enfield) are at www.hitchcocksmotorcycles.com

Handling

Suspension ... Dual or Variable rate fork springs are available (L P Williams) or could be made for you by a spring specialist. The grade of oil used in the standard pre 68 forks has little effect with no shuttle damping, though Triumph do recommend experimenting with grades. Do not exceed the recommended quantity. The oil has a dual role of lubrication and as a hydraulic stop. It is possible to fit to post 64 machines the shuttle damping fitted as standard on the later machines. The works manual details this modification.

It is not necessary to have the special fork assembly tool, I use a suitably sized jubilee clip to grip the stancion while compressing the spring and then fit the complete unit. The Jubilee clip can then be removed allowing the spring to extend to its normal position. A suitable ‘C’ spanner tool is required to remove tighten the chromed oil seal spring/holder.

Fork Judder if present will be caused by worn sintered bronze bushes, replace these as a matter of course.

The rear shocks were factory fitted with 145lb Springs, these are suitable for pillion passengers, changing to 90lb Springs as indicated in the Performance Bulletin will improve the handling for solo riding/racing.

Frame ... The pre 67 C Range Frame has several issues, all early bikes benefit from the 65 frame brace and tank if these can be sourced, or welding in a brace as in 1966, all the bikes up to 67 have a tendency to shimmy when cornering especially when not on the throttle. This is because of the lack of support for the swing arm. I have seen two early Tiger 90's modified to the 67 swing arm arrangement by having additional plates welded to the frame with later swing arm parts. This is a serious conversion which will be difficult to do well and difficult to undo later. Please don't do this if the bike is in good condition buy a post 1968 bike instead where its all been sorted for you.

Tyres ... Unfortunately there is little Tyre choice in the 18 inch size (3.25 - 3.5) I have happily used Dunlop K82's for several years. Replace any Tyre you suspect to be over 10 years old or obviously cracked, your life is at stake! Always assess the rim for corrosion inside, check the spoke locations before fitting a new tyre and use a new tape. Discard any tube that has been repaired, I don't want to experience a blow out at any speed! I have found Michelin tubes if available hold their air better than other makes. The factory recommended carefully balancing wheels for high-speed work.

Bearings ... Sealed bearings are usually available to replace the open wheel bearings, A good bearing supplier will be able to advise if you can provide a sample. It is a good idea to have suitable drifts made to drive the bearings in squarely and without damage. I pop the bearings in the freezer overnight and heat the hub with a hot air gun to ease fitting. Bearing Locktite is a good idea if you suspect there has been a problem.

Brakes

Early C Range machines can be fitted with the fully floating brake shoes, part numbers W1406 and W1407. Look carefully at the floating shoe slipper as this often becomes indented and ineffective. A common modification is to fit the twin leading shoe brake from the later bikes, this will greatly improve performance but at the loss of originality. It should be possible to modify the standard plate to twin leading design internally as there is room within the hub. This could be done on a spare plate and its components without committing.

The standard brake is quite adequate for normal riding if serviced and set up properly. Have the drum skimmed, the linings replaced with modern compound and then machined to fit. Ask to have the linings biased to improve the servo action and ensure the linings are chamfered on the leading and trailing edges. Check the springs are in good condition and that the surface of the drum is not contaminated with grease or oil.

After assembly, loosen the fixed anchor point and the spindle nut, apply the brake hard and while maintaining pressure tighten the spindle nut and then the anchor. This procedure will position the shoes at the optimum position. Try to ensure the operating arm is at right angles to the cable when the brake is applied and the handlebar lever is not flexing on the bar.

This will all help to maximise the performance of the standard unit, but even I admit that at speeds above 60 mph it can get a bit exciting !

Carbs

New replacement units in both monoblock and concentric styles are available from various sources. Plunger choke versions are available by request. Better still is to renew the jets and internals of the original carb. Look up the manual to find the size and jet requirements you need. Please don't throw the original carb away as these are very difficult to find. Clean it and pack it away in an air-tight container. Worn units can be re-sleeved and reconditioned to keep the authenticity.

Contact Hitchcocks Royal Enfield for Amal Carb Spares. www.hitchcocksmotorcycles.com

Notes

My bikes have been in my ownership for 20 years. I often tour on my 1966 Tiger 90 and recently completed a 3000 mile trip in the USA. My enjoyment is in researching the machines, improving them gradually, searching for and remaking the elusive parts that they have lost. Improving reliability so that I enjoy riding them and letting others try them too. Important to me is retaining the look and character of the Triumph, promoting old machines in general to a younger generation, and preserving but not destroying our British motorcycling heritage.

Justin James The Tiger 90 Man.

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