NEW TO 100cc INTERNATIONAL THE T.K.M. L90TT

Long time Western Australia karters, Mike Sully and Ray Griffith have taken the bit between their teeth and decided to import and distribute the English T.K.M. International class engines into this country. The arrival of this engine adds to the long list of available engines available for this class of racing in this country and to survive in this ultra-competitive an engine has to be good. What we have seen of the T.K.M. thus far seems to indicate that it may well do well on the Australian market place.

Both Griffith and Sully made the long trip across from the West to compete at the NSW State Championships and were rewarded well when Sully placed second with the T.K.M. in the International Heavy class on a borrowed chassis. It was this performance that prompted AUSTRALIAN KART REPORT to ask Ray for an engine to have a look at and measure up.

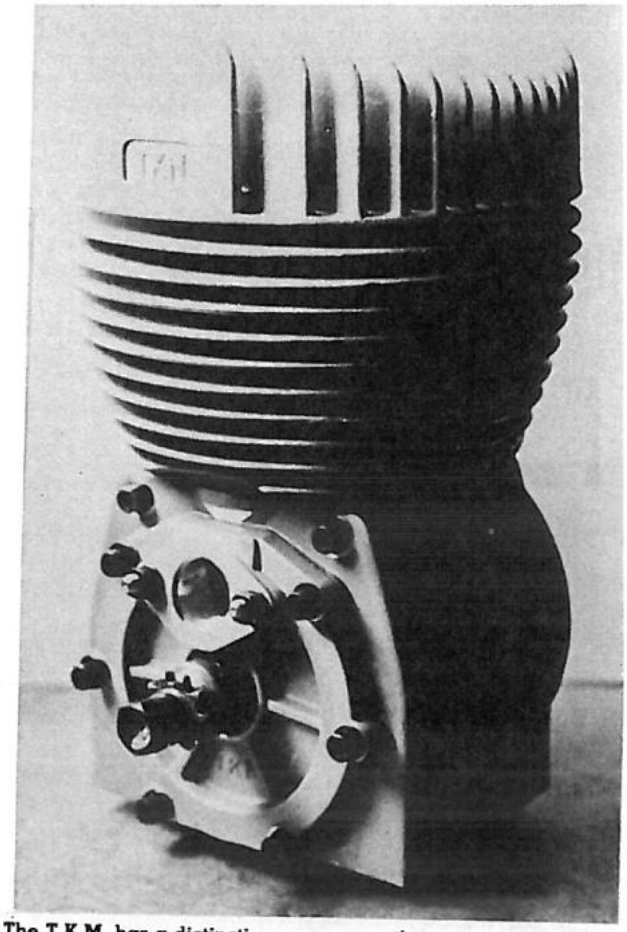
The engine duly arrived and the following result of our close scrutiny shows that the product is well presented and with one exception could be taken out of the box and run competitively in the International class.

The first items checked on our sample engine were the squish clearance and the cylinder head capacity as measured at the top of the plug hole. The squish was on the safe side at .8mm and the head capacity was 8.2cc. This latter figure should certainly give good performance on our tighter Australian circuits and would indicate that it would require only a thicker base gasket to set the engine up for faster circuits.

The little end clearance measured up at .2mm and at this figure would pose no problems for the operator. Also correct was the crankshaft end float at .2mm. The only doubtful measurement taken from the engine being the big end cage side clearance which came out at .4mm. This seemed a little tight to us and we would recommend that if the engine is to be used on fast tracks similar to Oran Park, that this be increased to at least .5mm to be on the safe side.

Piston to bore clearance was measured at .08mm and both the top and the bottom rings were gapped at .25mm. These figures being ideal for good performance.

The port finish was very good with almost all mating surfaces matching well for a production engine. Little would be required in the way of cleaning up the ports for performance.

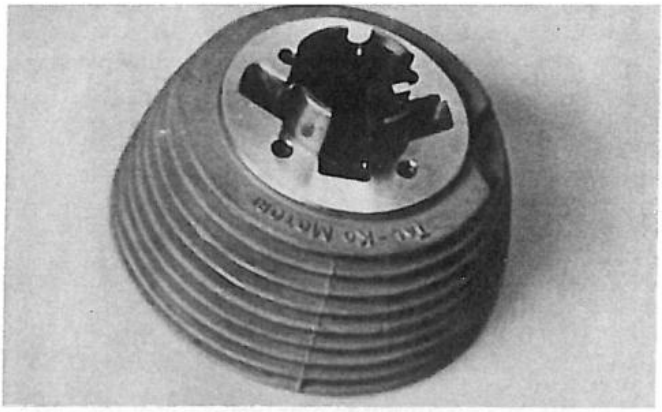


The T.K.M. has a distinctive appearance that sets it apart from the other International engines. The castings in particular are of a very high standard.

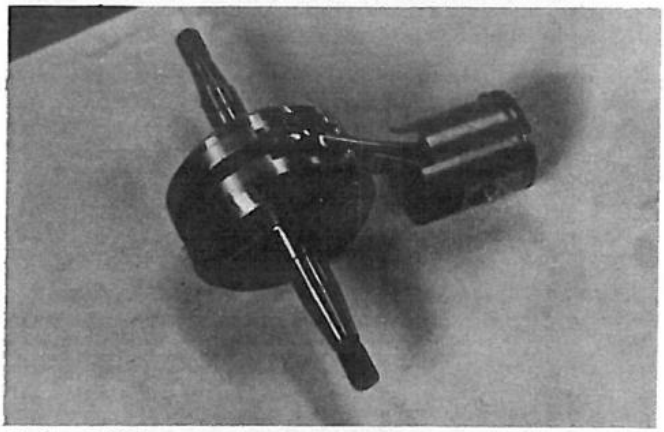
The transfer ports were quite narrow, but very deep and an unusual feature was the boost port opening into the cylinder. The port featured two ears at it's top outside corners, similar to those often used by engine tuners in an effort to increase the mid-range and top end of an engine without sacrificing too much in the way of bottom end pull. We say unusual, because there are few engine manufacturers who go to the trouble to build these little quirks into their resale engines. To realise the effect of this little trick, one of course would have to run the engine and unfortunately we do not have the opportunity.

The engine as presented was a very neat and obviously well made piece of equipment with a very distinctive appearance that has a character of it's own. The quality of the main castings left little to be desired and the machining of these components was of a very high standard.

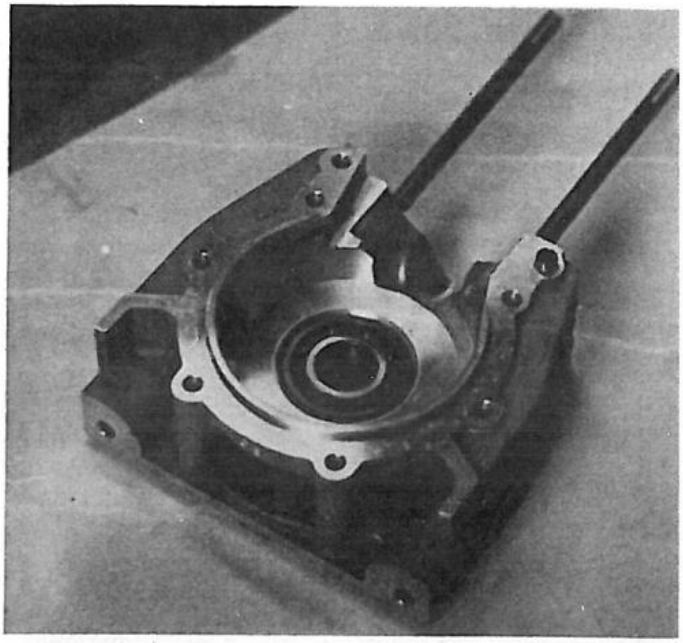
In conclusion, we would think that given the right sort of promotion, the T.K.M. will take it's place firmly on the Australian market. But, the International market is a tough one and before major sales of any engine are to be made for this class, the class itself needs some strong promotion. At most meetings, entries in both International Light and Heavy are noticeably lower, making a competitive market even tougher for those who trouble to import engines.



Narrow but deep transfer ports are a distinctive feature of the T.K.M. engine. Not visable is the opening of the T.T. passage into the cylinder. This is shaped with two ears at its top edge.



Earlier T.K.M. engines featured nylon crank weights. The L90TT has reverted back to aluminium weights.



The T.K.M. is of the normal 3 port T.T. layout and is nicely finished. This shot shows the special rivetted fibre cage main bearings that come as standard equipment.

PARILLA TG14 FOR CLASS AUSTRALIA

WE LOOK AT THE SECOND ENGINE TO BE SUBMITTED FOR THIS NEW CLASS AND COME TO THE CONCLUSION THAT THE YEAR OF 1981 WILL BE INTERESTING .. TO SAY THE LEAST!

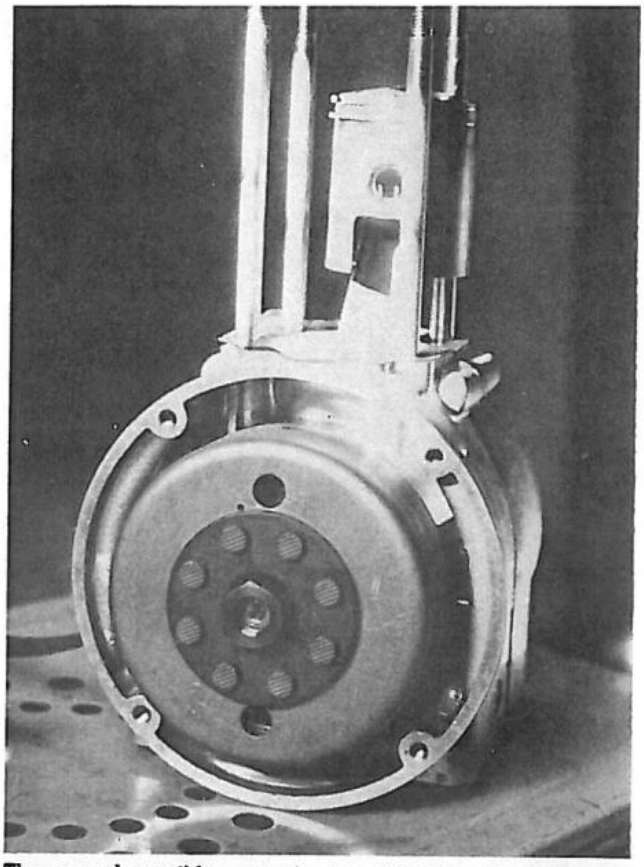
Next year sees the official beginning of the new Class Australia, a subject that this publication has already given a considerable amount of space to. We feel that this space, and more is justified as the class will, we feel be one of the most important steps forward in the world of Sprint Karting....but, be warned, the class will have it's teething problems, so this time, be a little patient with the AKA while they sort these gremlins out of the class. In the long term the hassles will be worth it.

The above paragraph may not seem to have too much to do with a technical inspection of the Parilla TG14. But it is this engine that has prompted me to write those words. The big point that came out of the discussion at the 1980 AKA National conference in regard to the Class Australia was that karting in this country does not want another single make of engine class. With it's completely different layout and different manufacturing techniques, the Parilla and for that matter, the DAP T70A (also up for acceptance) will make the setting up of the class rules a little difficult. If the AKA Technical staff keep it simple we will end up, finally with a good class. But again, it will need the patience of the karter if the class is to be able to get off the ground.

THE ENGINE: The Parilla TG14 has been around almost as long as karting and in the earlier days of Australian karting was one of the first rotary valve engines to hit our shores and was campaigned to many Championship wins in the hands of the likes of Howard Heath and Frank Bird. It was most interesting to look over the latest version of this legendary engine and note the changes that have taken place.

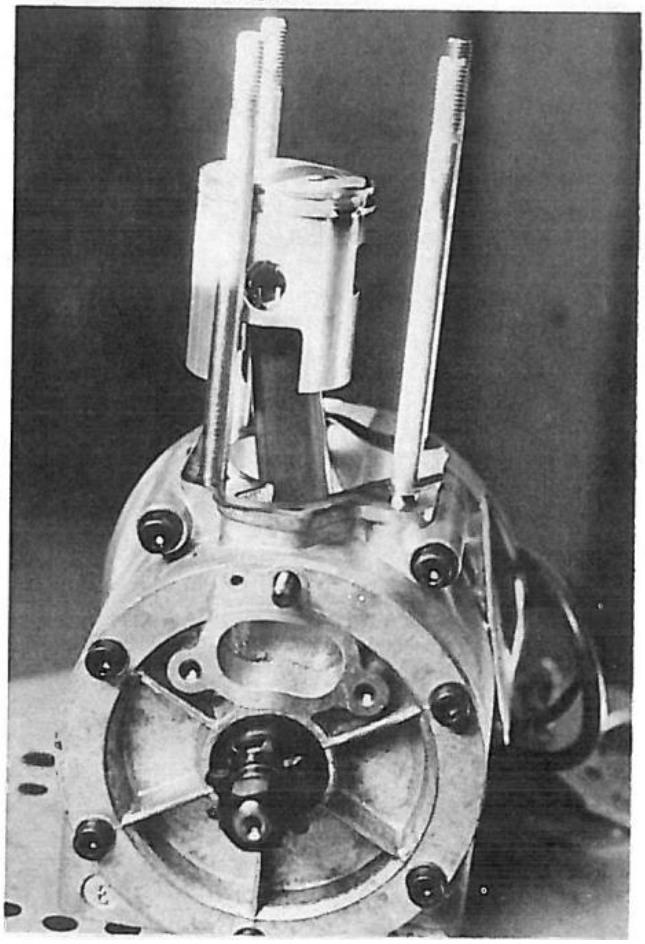
The engine is used in many restricted European classes and for Australia, the cylinder head capacity, measured to the top of the plug hole has been increased to 11cc. This has been achieved by machining the actual combustion chamber to a wider diameter and thus reducing the width of the squish band. The head now resembling that of a production motor cycle. The head on the engine that we inspected measured in at 11.3cc with a squish clearance of .7mm.

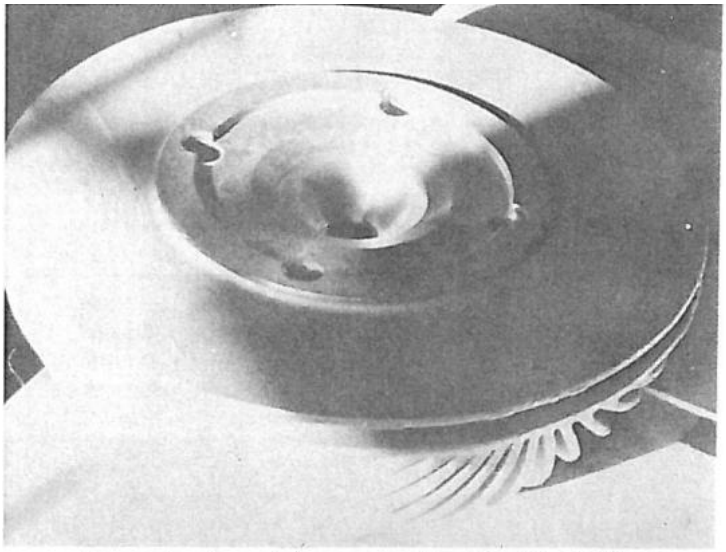
The piston was of the boost port windowed type and was fitted with super rings. The conrod was as in the latest model engines with a silver cage big end and the usual Parilla roller little end set up. Little end side clearance was .3mm and the big end cage side clearance was .45mm. Both measurements being acceptable for performance and durability.



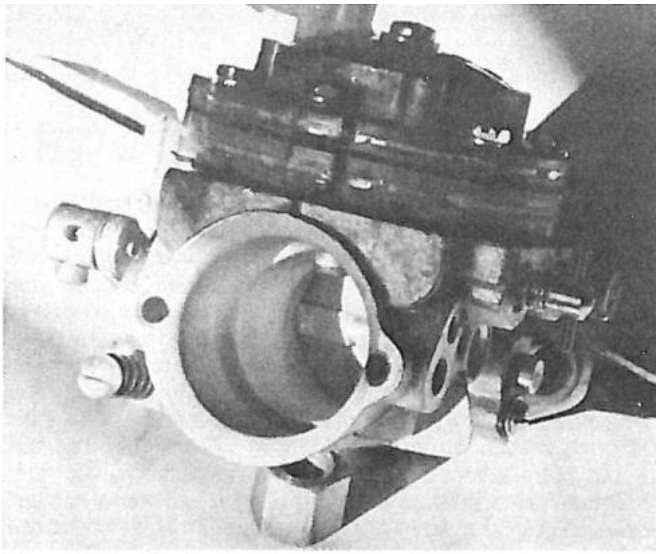
The second possible contender for 1981 Class Australia is the Parilla TG14 shown clearly in this photograph is the external flywheel moto plat ignition.

Below the Parilla has an exceptionally strong looking conrod. Finish was good for the price.





The engine inspected was supplied with this I.A.M.E. bored Tillotson carburettor. Production units will have this carby as standard equipment.



The cylinder head capacity has been increased to 11cc by increasing the diameter of the combustion chamber and reducing the squish area.

The piston to bore clearance measured up at .85 and the top ring gapped in at .3mm while the bottom ring gap was a neat .25mm. The engine we inspected had been run, so these figures would have measured a little tighter when the engine was new. The measurements registered are excellent for a run in engine and would give good performance.

The carburettor supplied with the engine is the I.A.M.E. factory bored 25mm Tillotson. But is was the ignition system that interested us. It is of the Moto Plat variety but is the model with an external flywheel and an internal stator. Timing is achieved by lining up two holes, one on the rotor and one on the stator and then winding the unit back to the desired timing. Almost foolproof and suitable to the beginner karter.

Port and casting finish on the engine inspected was good when one takes into consideration the price of the engine. A total outlay of $448.00 buys the Parilla complete with exhaust system, sprocket, carburettor, ignition, spark plug and engine mounting bolts. The engine inspected was fitted with a neat coil mounting bracket which is available as an extra and worthwhile as it keeps the engine and ignition package as a very neat package.

Whether or not the engine is accepted into class Australia depends solely on the National Technical advisors and the cleaning up of the as cast rule in the proposed rules. We, at AUSTRALIAN KART REPORT would like to see both the Parilla and the DAP engines in the class. Their acceptance will help breed true competition into the class and if the DAP T70A is as well done as the Parilla, then both engines are worthy of our acceptance.

It has been a long time since we have seen engines imported into this country at prices that will attract new karters and keep the already initiated interested. Not only are these engines cheaper to buy, but with their low compression ratio, they will give long and reliable service and this is, we maintain, the most important factor in favour of the new class. To back this up, I.A.M.E. have supplied the Parilla with the latest conrod, super rings and electronic ignition. In other words, you are getting all the goodies in an old package at a low price, not just a "cheapy" engine.

NEXT MONTH we will bring you a full report on the DAP T70A engine. This report will be backed up by a track test of the engine. It may also be possible to track the Parilla at the same time depending on availability of an engine. We have to fit in with the Tech inspections, so we cannot promise this, but we will certainly be trying!

MAINTAINING YOUR CLASS AUSTRALIA PARILLA

Although promised for the June issue of Australian Kart Report this article had to be dropped due to space restrictions. For this we apologise. But now we are able to bring out the second in this series on engine maintenance with the TG14 Parilla for Class Australia being this month's subject.

The TG14 dates back many years and now must be one of the longest running production kart engines in production. It is still used as the base engine for various National classes in Europe and of course has been revived in Australia for our Class Australia. In the hands of such drivers as Anthony Bartolo it still proves highly successful. If maintained correctly it can be both fast and reliable.

TOP END OVERHAUL – A complete top end overhaul on this engine should be carried out every three meetings. This includes the replacement of the piston, rings, little end assembly and the deglazing of the cylinder bore and decoking of the exhaust port and the cylinder bore.

The cylinder bore of the TG14 is particularly long wearing, but should be checked for wear at each top end overhaul.

When reassembling the top end of your TG14 it must be remembered that in class Australia the cylinder head volume is controlled at 11.0cc minimum.

So after torquing the head down, recheck the cylinder head volume. If it is under 11.0cc, extra cylinder base gaskets may be fitted to raise the volume to the legal limit. For every .05mm extra gasket thickness added you will increase the cylinder head volume approximately .1cc.

Also to be checked during reassembly is the piston crown to cylinder head clearance. Failure to do so can cause piston breakage.

COMPLETE OVERHAUL – A complete overhaul of your TG14 engine should be carried out every six race meetings and this includes the replacement of all the previously mentioned top end components plus the connecting rod, the big end bearing, the crank pin, the main bearings, the crankcase seals and all gaskets. It is also wise at this stage to check the rotary valve for both wear and flatness.

The complete overhaul is not complete without replacing all the carburettor gaskets and diaphrams and the carburettor needle and seat. Also at this stage the engine drive sprocket usually requires replacement.

SPECIAL NOTE – The Parilla TG14 crank pin is subject to excessive wear on the top as it is located in the crankshaft. For the serious operator, it is wise to split the crankshaft at every three meetings (at the same time as the top end overhaul) and check the crank pin for wear. If even the smallest of pitting is evident the pin should be replaced along with the big end bearing.

CRANKCASE SEALS – For continued top performance the crankcase seals should be replaced each race meeting. However the seals will function satisfactorily for at least three race meetings and should normally be replaced during each top end overhaul.

CLEARANCES – The following clearance and fit recommendations will provide fast and reliable engine performance.

SQUISH CLEARANCE – .75 to .80mm. Never let the squish clearance drop below .70mm as piston damage may occur.

PISTON TO BORE CLEARANCE .075 to .08mm. Piston to bore clearance should never be allowed to exceed .12mm as piston breakage and excessive bore wear may result.

PISTON RING END GAP – Set at between .15 and .25mm. Never gap rings tighter than .15mm. It is acceptable to fit new rings at up to .4mm end gap but .15 to .25mm end gap will give the best performance. Change rings if end gap exceeds .5mm.

LITTLE END SPACER TO PISTON CLEARANCE – Set at between .2 and .3mm Never fit up at below .2mm.

PISTON PIN TO PISTON FIT – Should be a light finger pressure slide fit. Never fit tight as resultant piston breakage can occur.

CONROD TO CRANKPIN FIT – Ensure that you purchase the correct crank pin with the correct connecting rod. A quick check is to place the conrod/cage/crankpin assembly in the vice, gripping the ends of the crank pin. Then holding the bottom of the rod, 1mm of side movement should be available at the small end of the rod.

BIG END BEARING END CLEARANCE – Should be set at a minimum of .5mm. This figure is better to be excessive as a tight fit will almost certainly cause big end bearing failure.

CRANKSHAFT END FLOAT – using the original main bearings this should be set at .15 to .25mm. If angular contact bearings are used the end float should be set at .025 to .041mm. This is critical when using angular contact bearings as excessive end float will result in excessive up and down movement of the crankshaft with resultant wear and vibration problems.

ROTARY VALVE TO CRANKCASE CLEARANCE – Should be set at .3 to .4mm.

RUNNING IN – The engine should be run in each time a new piston or rings are fitted. When fitting new rings only, run in for 20 minutes at half speed, varying the throttle opening every three seconds and never applying full load to the engine.

For a new piston run in as above but extend the time to 40 minutes. If the cylinder has been honed or resized further extend the running in time to 60 minutes.

NEXT MONTH we will deal with the maintenance of the fully modified and blue printed Yamaha KT100S as run in Class Australia.

THE NEW ENGINES FROM DAP AND ROTAX

The Reed Valve Stock 100 Class looks like really hotting up in 1984 with the introduction of several new engines into the Class. Both DAP and PCR have been successful in getting the nod from the Technical Advisors for homologation for 1984 and both engines break new ground in reed engine layout. We have not yet had the opportunity to inspect the PCR engine but can now bring you details of both the long and short stroke versions of the new DAP Reed Valve Engines.

The long stroke DAP reed valve engine for next year is labelled the T91 and has a 54mm stroke. The top end includes the cylinder and cylinder head from the ultra successful DAP TT70 and of course utilises a 48.0mm bore.

This top end is fitted to a completely new crankcase and this is where the engine breaks new ground. Where the I.A.M.E. reed valve engines use two identical crankcase halves to form the crankcase complete, the DAP has two separate castings. By going this way DAP have been able to avoid the additional stuffer block required to block off the back of the I.A.M.E. crankcases. This in turn provides for better crankcase compression and also provides a much cleaner crankcase design.

Unfortunately DAP have not seen fit to provide crankcase lubrication drillings for the main bearings. Hopefully the production versions coming into Australia will include these oil holes.

The engine comes set up with the small bore Tillottson carburettor and is fitted with Moto-Plat ignition.

The T92 is the short stroke version of the same engine and has a bore of 50.7 and a stroke of 48.5mm. The crankcases are identical to the T91 but are machined to facilitate the short stroke configuration.

The top half of this engine uses the cylinder and cylinder head from the T81 rotary valve engine. Australia has not seen the T81 for many a year so the following details will prompt the memory.

The T81 arrived in Australia only shortly before the advent of the TT70. Due to the TT70 proving so successful, not too many T81 engines were imported and the engine faded from the scene before any real development was carried out on it. Briefly, it was the TT ported version of the famous T80 engine and in fact was the first of the TT ported DAP engines. The original versions had a 18mm TT port but a later version with a wider TT port was manufactured. This is the cylinder that DAP is now putting to use in the T92.

The T92 is also supplied with the small bore Tillotson carburettor and Moto-Platt ignition.

Also new from DAP is the TT75. This engine is actually a TT70 with the stroke lengthened .5mm. It is reported that this engine shows definite improvement in the mid-range performance segment. It is possible to fit the new long stroke crankshaft to the TT70 and this may prove to be a worthwhile update for current TT70, 72 and 74 owners.

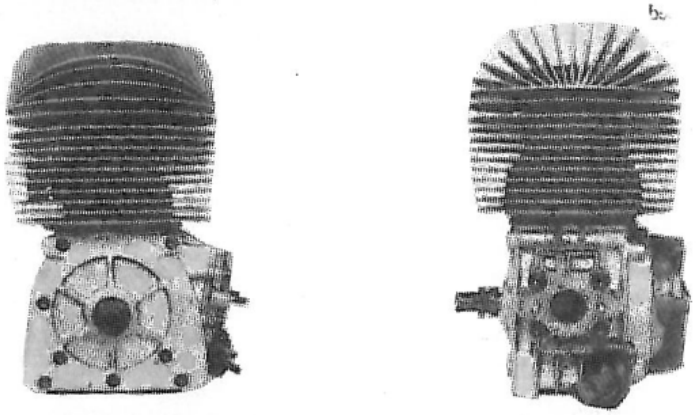
ROTAX — the manufacturers of the famous 125 and 250cc engines so widely used in gearbox Karting in Europe have now entered into the field of 100cc, purpose built kart engines. With the reputation for fine engineering and success in competition that this firm already has, the new R100 Rotax as it is known, will almost certainly be an immediate threat to the establishment.

The engine has a displacement of 99.157cc and this is achieved through a bore of 50.0mm and a stroke of 50.5mm making the engine marginally a long stroker.

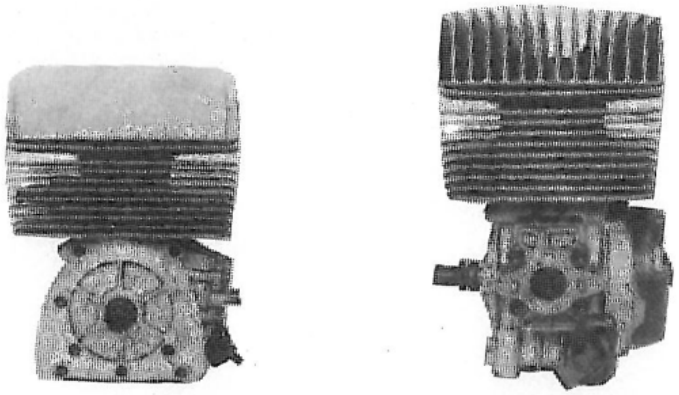
The engine is supplied standard with a 26mm Ibea carburettor and features a four transfer port cylinder layout similar to the 135cc Komet. The port timings are 87.0 degrees for the exhaust and 62.4 degrees for the transfers with the rotary valve opening the inlet at 130 degrees before T.D.C. and closing off at 70 degrees A.T.D.C.

The engine uses a 100mm connecting rod and the cylinder volume to the top of the spark plug hole is 9.28cc. The recommended piston to bore clearance is .9mm and the recommended spark plug is the Bosch W370 S2S. Recommended ignition timing is 2.5mm B.T.D.C.

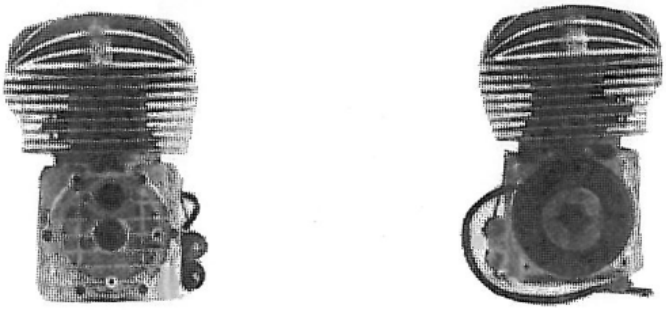
A little hard to believe is the recommended changeover period for the conrod assembly of 15 hours. If this is correct, then the engine would be exceptionally economical to use, to the point of making International class when using this engine one of our most economical classes. However we are extremely sceptical and cannot see, providing the engine turns out competitive power, how it could possibly give this increase in service life over other 100cc International engines. Only time will tell.



The new TT91 DAP Reed Valve Engine should add considerable interest to the Stock 100 Class in 1984.



The T92 is the new short stroke DAP Reed Valve Engine. Note the absence of the rear stuffer block as used on I.A.M.E. engines.



The Rotax R100 will fit nicely into our 100cc International Classes. The engine comes complete with 26mm Ibea slide carburettor.

LOOKING INTO THE ROTAX R100

The name Rotax and the term superkarting has meant the same thing on the European scene for around four years now. With the Rotax R100, Bombardier Rotax are now attempting to make it's brand name the leading light in the 100cc Intercontinental Class overseas.

As is usually the case with anything new in Europe, a few examples will start to appear on the Australian scene. In the South of this country the R100 is coming on the scene and from all reports is by no means slow.

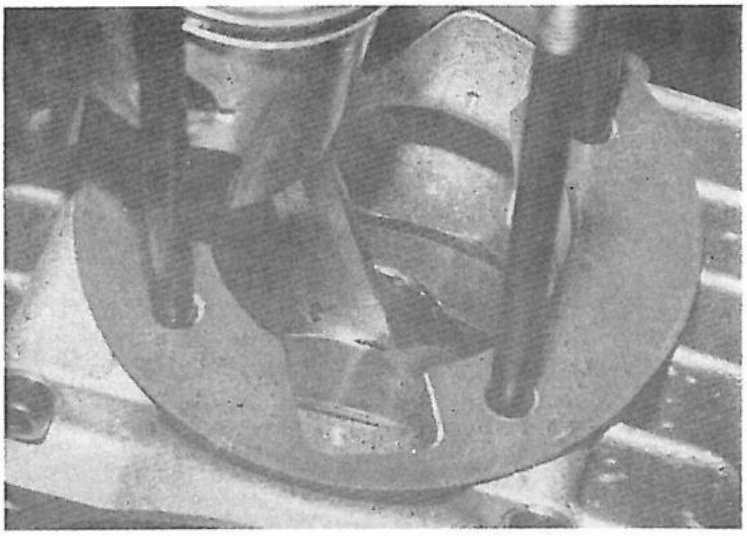
The engine has a 50mm bore and a 50.5mm stroke and the piston and ring assemble runs in a cast iron liner rather than the Nickasil barrel as with the gearbox engines. This should suit 100cc enthusiasts as the liner is in fact reboreable.

The exhaust port timing is 87 degrees and the transfers are all set at 62.5 degrees. This should spell out excellent midrange performance with the divided TT passage offering the necessary top end performance.

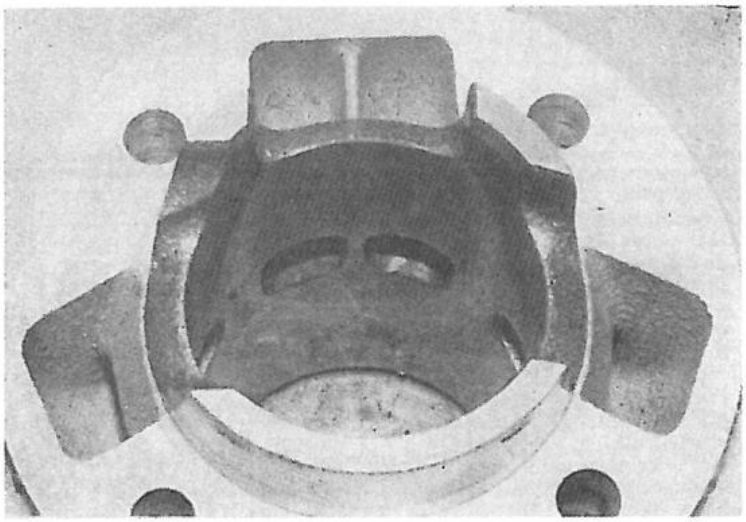
From the accompanying photographs it is easy to see that little effort has been put into port finish. However the castings are of sufficiently high finish so that this lack of hand finishing will have little or no effect on the ultimate performance of the engine.

The connecting rod is also finished as forged. The strength of this unit we cannot vouch for but if it performs as well as the rods in the 125cc engine there should be no problems. Rotax claim a life of 15 hours for the rod assembly!

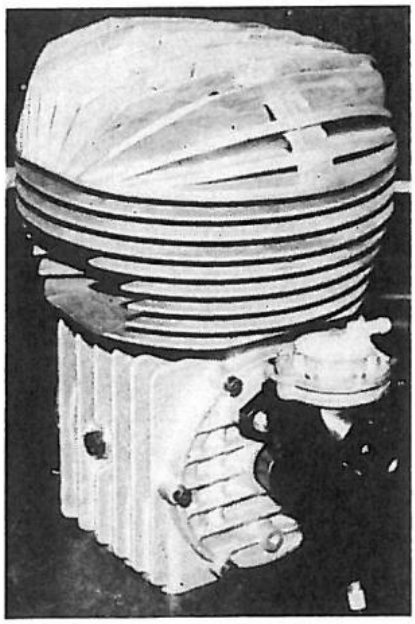
With the already established Rotax reputation in the 125cc and 250cc Superkart arena we have little doubt that if someone in Australia bothers to commercially import the Rotax R100 that it will find a place in our already crowded 100cc International class market.



Port finish is left very much as cast. However it would be very unlikely these minor casting irregularities would affect performance.

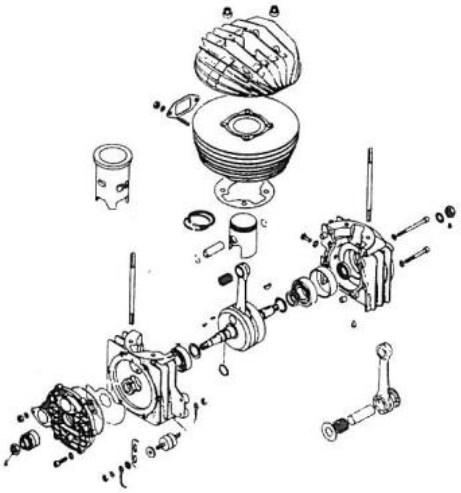


The cylinder port layout features a divided TT passage similar to the DAP T74.



The R100 comes supplied complete with 26mm IBEA carburettor.

Rotax claim 15 hours racing life for this connecting rod. Maybe polishing could further increase this.



This complete breakdown of the Rotax R100 shows the engine to be of conventional design. Note the two windows in the front of the piston.

MAINTAINING YOUR DAP T90 REED

The DAP T90 Reed engine, along with the Komet K55 was the first of the Reed Valve engines to compete in the Australian Stock 100 Class. Since it's inception it has won all bar one of the National Championships for the Class. That is four out of five National Stock 100 titles to it's credit. It is completely different in design to all the other Reed Valve engines and this fact gives it both some advantages and some disadvantages. With proper care and preparation, the T90 is a very serviceable engine and still performs with the best. This has again been proven by it's taking the first two places in the recently staged Greg Waters Travel/Cathay Pacific Stock 100 Series.

Over the years the T90 has progressed through to being the T90R. Regardless of the year model, all T90 engines should b treated the same as far as preparation goes.

TOP END OVERHAUL A complete top end overhaul should be carried out every four meetings. This includes the replacement of the piston, rings, little end assembly plus the deglasing of the cylinder bore and the decoking of the cylinder heat and the exhaust port.

Cylinder bore wear in the T90 is excellent, however it is wise to check the cylinder to piston clearance each time a new piston is to be fitted.

When reassembling the top end there are a few points worth noting. Firstly it is a good idea to replace the original little end set up with the now available recessed steel little end spacers and the little end rollers with the Yamaha KT100S little end cage. Also always replace the piston pin circlips each time they are removed.

Because the engine is running in a controlled head capacity class it is necessary to recheck the cylinder head capacity each time the engine is run.

It is also important to check the squish clearance regularly and at each rebuild as the cylinder liner in all European engines has a tendency to drop in the cylinder.

COMPLETE OVERHAUL A complete overhaul of your DAP T90 should be carried out every eight meetings. This includes the replacement of all the previously mentioned top end components plus the connecting rod, the big end bearing, the crankpin, the big end spacers, the main bearings and the crankcase seals. At this stage the carburettor should be completely overhauled and the reed valves should be replaced.

CRANKCASE SEALS For any person serious about keeping their T90 performing at top level, the crankcase seals should be replaced every second meeting. This operation can be carried out from outside the engine.

REED VALVES Again, for those serious about top level performance, the reed valves should be replaced every four meetings.

SPECIAL – IMPORTANT NOTE The DAP T90 and T90R engines have an inherent problem with the lubrication of the main bearings. This is due to two factors. Firstly, DAP do not drill oil holes through the crankcase castings into the main recess behind the main bearings to allow lubrication flow. Secondly the crankcase is of such a closed design in the interests of performance, there is little cooling to the main bearings. To cure this problem two modifications should be carried out. The first is to drill the necessary oil passages to the back of the main bearings. The second is to fit angular contact bearings in place of the original 6204-C4 bearings. The failure to carry out either of these two modifications will almost certainly result in main bearing failure.

When fitting the angular contact bearings it is necessary to accurately set the crankshaft end float at .025mm to .05mm. If excessive end float is present when using the angular contact bearings excessive up and down movement of the crankshaft will result.

THE CONNECTING ROD The DAP T90 connecting rod usually gives no trouble. But as an insurance against broken connecting rods for the serious operator, we recommend the fitting of a shot peened and polished connecting rod.

CLEARANCES The following clearance and fit recommendations will give fast and reliable performance providing the above maintenance schedule is adhered to.

SQUISH CLEARANCE Minimum squish clearance is .70mm. Ideally the squish should be set between .70 and .75mm.

PISTON TO BORE CLEARANCE The piston to bore clearance should be set at between .075mm and .08mm.

PISTON RING END GAP The piston ring end gap should be set at a minimum of .15mm. If ring end gap exceeds .5mm the rings should be replaced.

LITTLE END SPACER TO PISTON FIT Should be set at a minimum of .2mm and a maximum of .3mm.

THE PISTON PIN TO PISTON FIT Should be a light finger pressure fit. Never fit tight as piston failure could result.

CONROD TO CRAKNPIN FIT To check this place the conrod, cage and crankpin assembly in the vice, gripping the ends of the crankpin. Then holding the bottom of the conrod steady, 1.0mm of side movement should be available at the little end. If excessive movement is evident the assemble should be replaced. If there is no movement then an incorrect matching of components is the problem.

BIG END CLEARANCE – END CLEARANCE Should be set at a minimum of .55mm. This clearance is better to be excessive as a tight fit will almost certainly result in big end failure.

CRANKSHAFT END FLOAT If using 6204 C4 plain bearings, the crankshaft end float should be set at a minimum of .15mm and a maximum of .3mm. If using angular contact bearings then the minimum should be .025mm and the maximum .05mm.

RUNNING IN THE ENGINE If a new piston or piston rings are fitted to an old bore the engine should be run in at half speed, varying the throttle setting every three or four seconds, but never using full throttle, for a period of 30 minutes. If a new piston and rings are fitted to a new cylinder bore, then the above procedure should be carried out for a period of 60 minutes. In the case of a full engine the engine should also be run in for a period of 60 minutes.

LONG FAST CIRCUITS When racing on a circuit with a length in excess of 800 metres, always count that race meeting as two race meetings. These circuits usually result in longer races and usually produce higher loads on the engine due to higher speeds.

DINO RACING IMPORTS NEW REFO ENGINE

A rather unique 100cc Rotary Valve motor made it's debut at Cockburn's recent Metropolitan Titles. This new engine, the Refo is imported from Europe by Dietmar Rohde of Dino Racing Kart Service and is homologated for the 100cc Intercontinental "A" racing in Europe.

The engine features a bore of 48.5mm and a stroke of 54.0mm which combine to give an out of the box capacity of 99.762cc. This is practically right on the capacity limit for the class and makes no allowance for reboring and honing. But these operations are unlikely to be needed since the cylinder does not use an iron liner. Instead the aluminium cylinder bore is coated directly with a thin layer of diamond hard Nikasil which seems to suffer no wear at all. It should be noted that some of the dominant racing motorcycle engines such as Rotax use this cylinder bore system.

All rotating parts use normal clearances except that the crankshaft end float is set at zero. This is rendered possible by the radial thrust bearings which are used. With this type of bearing the outer races remain in the crankcase halves when the crankshaft is removed.

There are no stuffer plates in the crankshaft flywheels. Instead there are two large counterbalance holes plugged with aluminium and this cures the age old problem of stuffer plates working loose or cracking. The two smaller holes in each flywheel outboard of the counterbalances are thought to be cooling passages designed to allow the wedge shaped rod to pump mixture out towards the main bearings.

There is little unusual about the big end bearing although the crankpin is solid. The connecting rod is nicely finished and is of the knife edge variety, 100mm long and completely polished on all surfaces except the longitudinal recess.

The piston is of conventional design for a long stroke engine of TT configuration and the rings appear to be the typical "Super Rings". But the piston to bore clearance is set at a mere .05mm. This low clearance is made possible due to the excellent heat transfer properties of the Nikasil lined cylinder bore and should reduce piston cracking considerable.

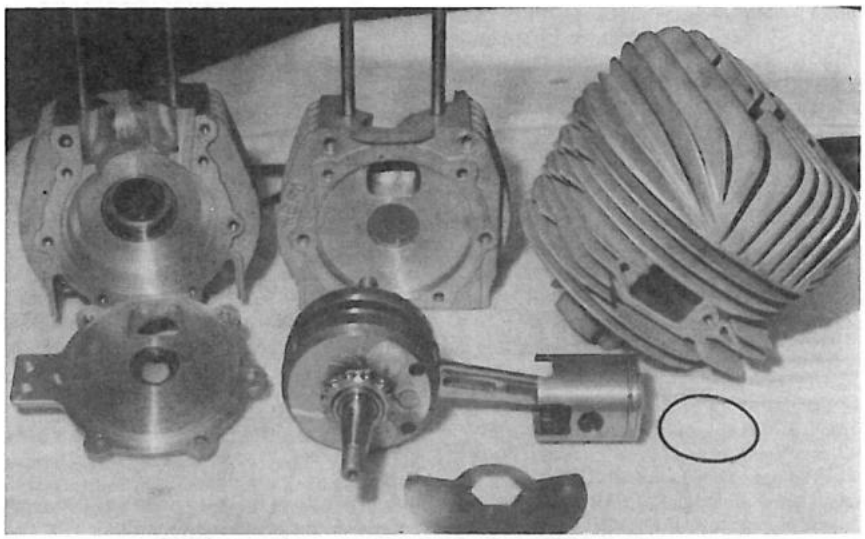
The homologated port timings are: exhaust – 175 degrees, transfer and TT ports – 135 degrees. The exhaust port is very wide and features large ears.

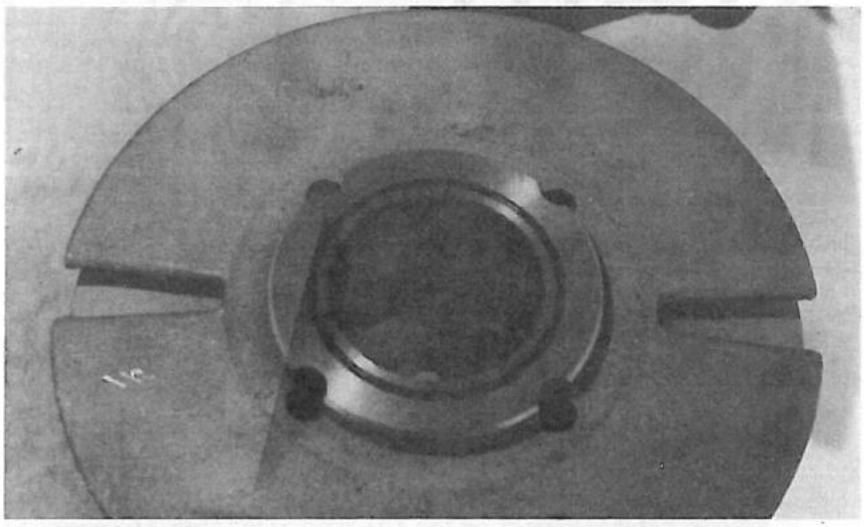
The engine's castings are heavily finned and the barrel fins are provided with relieving recesses to equalise thermal stresses. Despite the heavy finning, the absence of an iron liner leaves the engine still lighter than more conventional engines.

Surprisingly the four hold down studs are fully visible from the outside and are thus fully exposed for cooling. To compensate for this the cylinder head torque is only around half that of more conventional engines and the cylinder head to cylinder sealing is assisted by an elastomeric O-ring.

The cylinder head capacity is set at 8.5cc and the minimum squish clearance is .75mm with a squish angle of 17 degrees.

The crankcase is heavily stuffed while the transfer passages are not particularly large so as to assist with the low end torque of the engine.

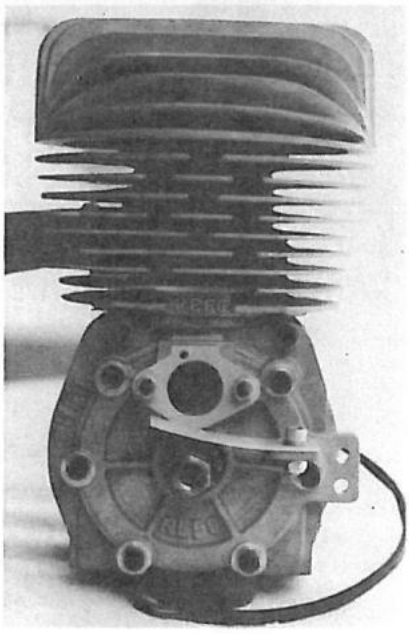




Recommended ignition timing is 2.4mm B.T.D.C.

Several nice features include a teflon carburettor protector attached to a cast lug, a teflon carburettor gasket and a nicely polished inlet tract.

At it's first out the engine did not win due to several "race incidents". Run on a Dino Sport chassis it was declared by race winner, Ray Smith as the engine to beat with it's excellent torque and abililty to pull top end performance!



Top: The internals of the Refo engine feature Nikasil coated cylinder liner, radial thrust main bearings and plugged crankshaft counterweights among it's less orthodox features.

Centre: Note the cylinder sealing O-Ring and the cutaway fins to reduce possible cylinder distortion.

Right: The conventional external appearance of the Refo belies it's ultra-modern design.

MINARELLI – NEW TO THE 100cc SCENE

Mac-Minarelli have been involved with producing racing two stroke engines for many years and it was their 125cc rotary valve gearbox engine that landed England's Kurt Luby in hot water with the RAC due to a homologation mix up earlier this year. There was nothing wrong with the engine, just the homologation system. However the Minarelli products now starting to trickle into this country are destined for free engine classes and will not strike similar problems here.

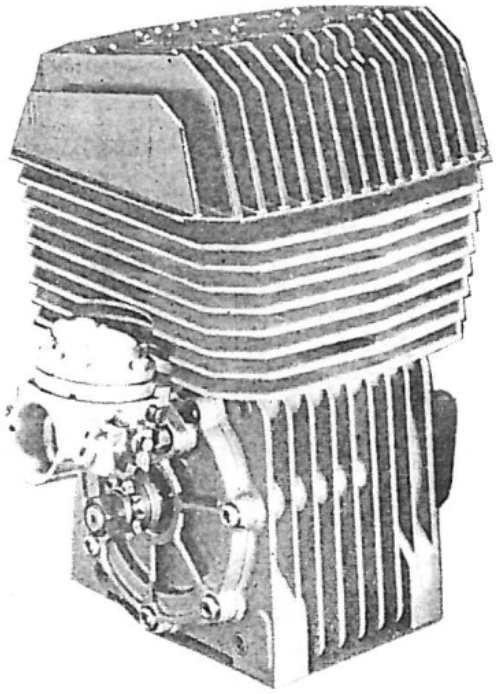
What is new about Minarelli is their 100cc International class engine. Like Rotax, Minarelli have now ventured into the already crowded 100cc kart engine market with a purpose built 100cc kart engine. But where Rotax went the popular long stroke route, Minarelli have settled on a 50mm bore and 50mm stroke layout. The engine strikes no real new ground and is conventional in layout and uses similar port timings to the 50mmx50mm PCR engine. The conrod length, like the PRC is 96mm and big end and main bearings are of the conventional pattern.

It is interesting though that the engine is almost identical in appearance to the now defunct Zip 100cc kart engine. This makes us wonder if Minarelli have simply purchased the Zipies or if in fact they were the original manufacturer of the Zip engine.

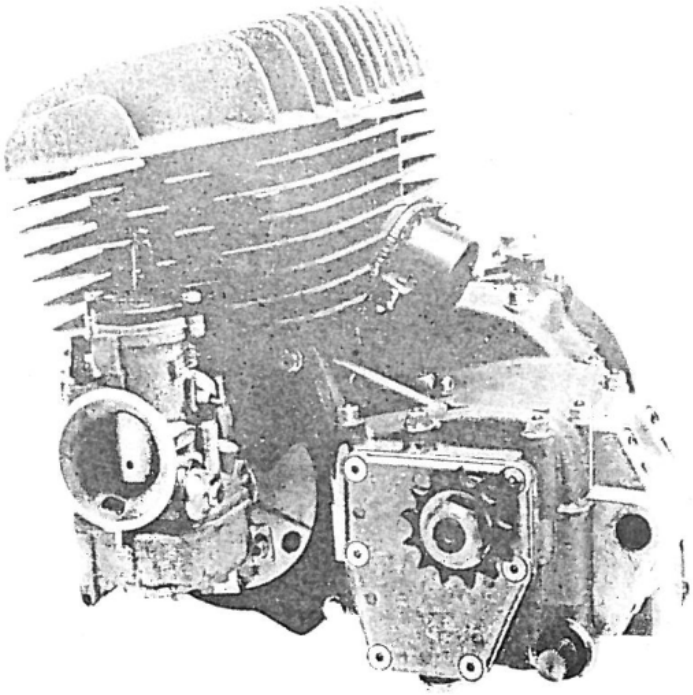
If the Minarelli is in fact the Zip engine, then with a little development and refinement it should, in the future prove to be a competitive unit. The Zip engine showed promise but Zip never seemed to bother to put any real effort into the engine, concentrating instead on their Superkart products.

The new engine, designated the K100V has already been campaigned in England by Frank Crankshaw on a Luby manufactured Phoenix Kart and was successful in scoring a second placing in the third round of the important British Super One Series in the 100cc International class. Although not the fastest engine in the field it proved reliable in a race of attrition.

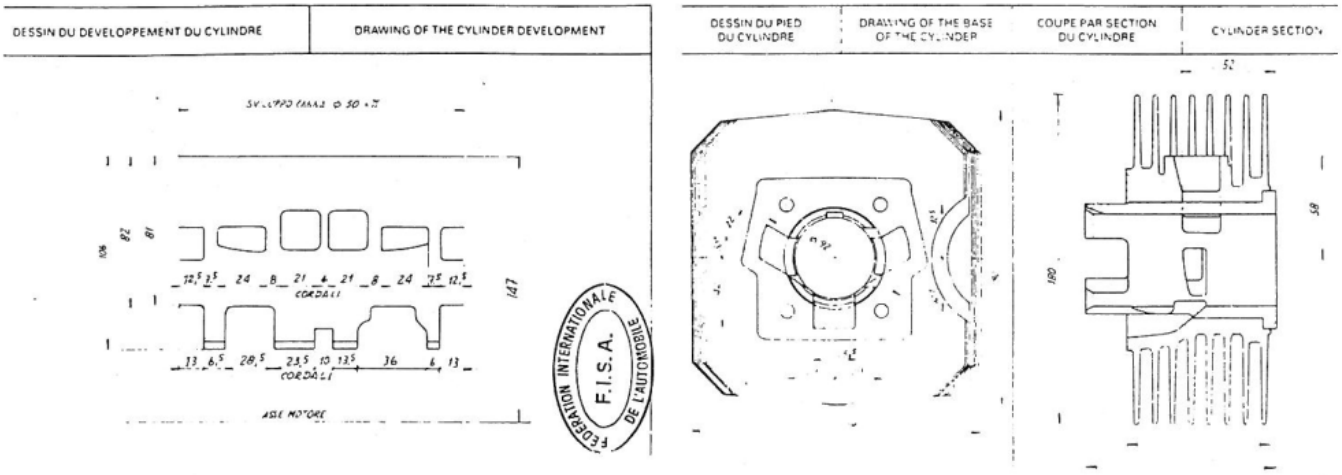
We had reported that the 125cc Minarelli Superkart engine was banned from the British Superkart competition. The final outcome has been that the engine will be legal as from November 1, 1984.



The Minarelli K100V, 100cc International engine is very similar in appearance to the once produced Zip 100cc engine.

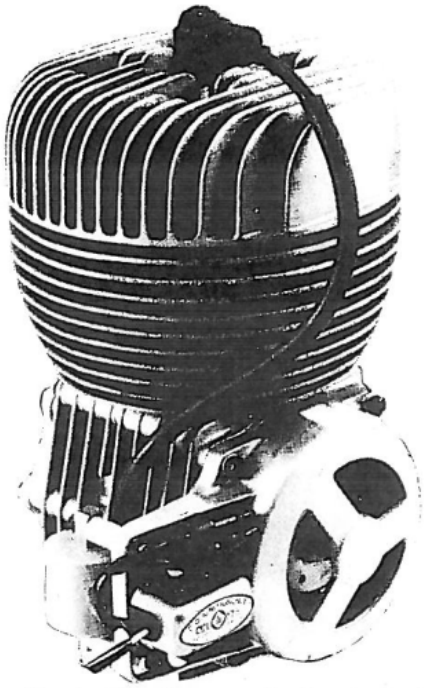


The Minarelli K125V is beginning to infiltrate the Australian Superkart scene.



These homologation drawings show the conventional layout of the Minarelli K100V.

YAMAHA'S KT100A-2 THE SHORT STROKE SCREAMER



The giant Yamaha concern has been involved in karting now since about 1978 and although the largest proportion of their kart engine production is concerned with piston port motors they do cater for the more enthusiastic competitor with a range of rotary valve engines.

Their first effort in the early 1980's was the short stroke (52x46) KT100A. They then went all conventional with the KT100AX long stroke engine and although this engine showed a lot of promise it never quite made the grade in top level competition. However it was a very strong and reliable engine and has proven popular with the club type competitor who wants to stay away from the restricted classes.

However Yamaha is not a firm to take it lying down and their latest development for the 100cc International class is the KT100 A2 which returns to the original KT100A bore and stroke layout of 52mm bore and 46mm stroke, the same as is used for the ever popular KT100S. But there is more that is not conventional in the A2 than just the bore and stroke dimensions.

Externally the engine is hard to pick from the long stroke AX and when you move inside the engine the top end is conventional 100cc TT type layout. But due to the short stroke Yamaha have been able to make use of the large bore to provide unusually large port areas. This in itself is unusual for a Yamaha rotary valve motor. The engine is also much better finished off than was the AX.

Moving to the crankcases one finds again a situation of much improved finish with a large well angles inlet tract. The rotary valve is the usual reinforced Yamaha type with a marking on the centre to show the operator which way the valve fits correctly. Finish in the valve area is second to none.

The conrod is a diminutive looking little item. But when one realises that it is the same conrod as Yamaha fit to their 135cc engine and then relates this to the proven reliability of Yamaha connecting rods there is little doubt that they have done their homework correctly. The rod is located laterally at the big end eye as in common Yamaha practice. This leaves the little end fully floating and relieves the piston of any location loads.

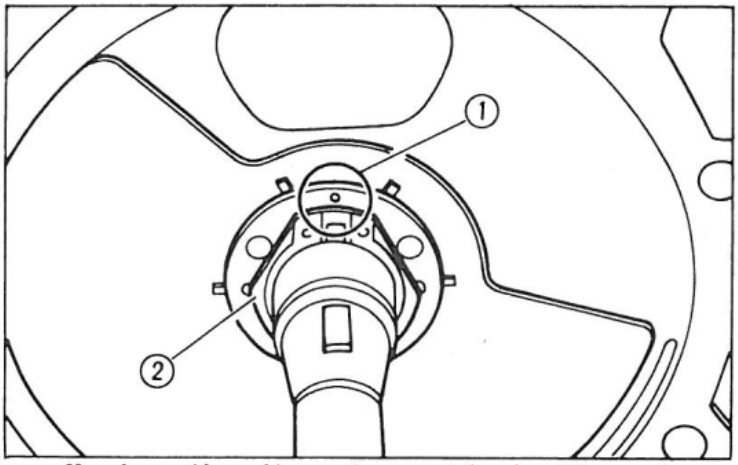
The crankshaft is a very interesting item indeed. It features very small diameter crankwheels. In fact they have a diameter of only 82mm against the more normal 86 to 88mm used in most 100cc engines. This we believe has been done to enhance bottom end performance.

The cylinder features fairly wide port timings with an exhaust duration of 176° and boost and transfer duration of 132°. Combined with the large port areas it would be expected that the performance would be more in the top end of the rev range!

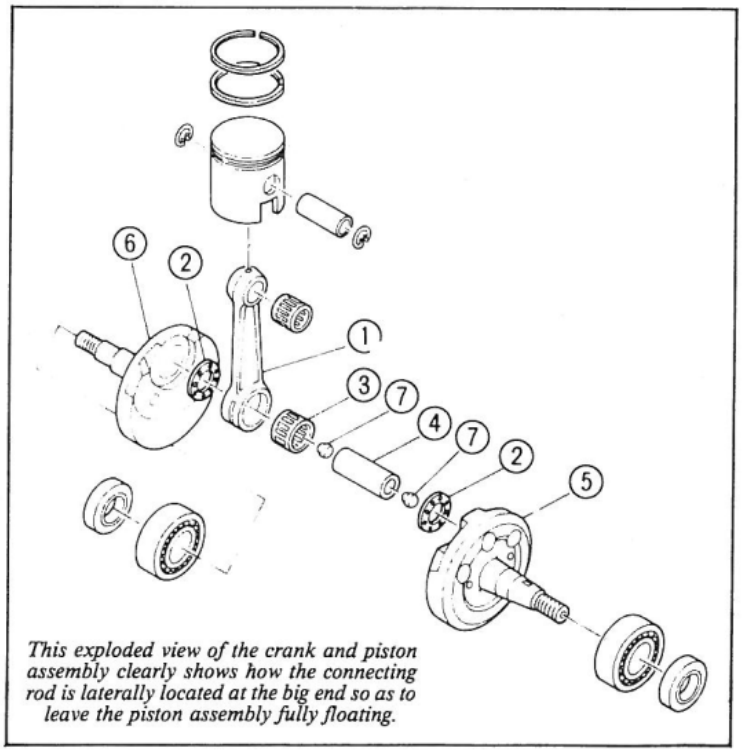
By courtesy of Yamaha Motor Australia we have been able to give the A2 a run and despite the wild port timings can report that the engine pulls strongly in the lower revolution range. In fact the bottom end power of the engine is it's strongest feature. We ran the engine fitted with a 25.5mm Ibea slide carburettor and would suggest probably a 27mm version to get the best performance from this engine so strong is it's low end power. Another feature that impressed us about the engine was it's out and out smoothness. It is unbelievably smooth right throughout the power range. Yamaha engines are noted for their durability and this smoothness must add to that reliability record.

At Orange we recorded a best time of 33.8 seconds with the engine which is around .4 of a second off the pace. However with a little more sorting we feel that the engine would be competitive. We had the engine geared to 10 to 85 and were using an 80.5cm pipe. It was felt that a 84 tooth rear sprocket would have been better with even a shorter pipe.

The A2 is an interesting development of the Yamaha theme and well worth consideration for the International classes.



Yamaha provide markings to show correct location of Rotary valve.



This exploded view of the crank and piston assembly clearly shows how the connecting rod is laterally located at the big end so as to leave the piston assembly fully floating.