TITAN ZG 26SC

GB

Instructions

Toni Clark practical scale GmbH

5 years guarantee for TITAN model aircraft engines

More than 20 years experience with TITAN engines plus our quality control allows us to extend the period of guarantee from one to five years. This guarantee covers the engine and the ignition only.

The following conditions must be met to obtain the guarantee:

Guarantee is for the first owner only and is not transferable to any other person.

In the event of any claim, the engine must be returned to us with the original invoice. The serial number on the crankcase must be undamaged, and must not have been removed and reapplied. The serial number is registered by us with the buyers name and the date of purchase.

The only fuel to be used is the petrol oil mixture as specified in the instruction manual. Use of Methanol invalidates the guarantee.

The engine must be used only with the original magneto ignition.

The guarantee is that we replace any defective parts free of all labour and material costs and pay only the return postage and packing. This guarantee covers only the engine and can in no way be construed to cover anything else.

This guarantee does not cover crash and related damage in any form whatsoever.

Congratulations on your purchase of a Titan ZG 26SC

About the biggest problem facing man is that he does not know what he does not know. To resolve this problem requires enormous efforts, however try to avoid so much as possible unnecessary mistakes and please read the following pages carefully. Do not take fright at the amount written here, it is really a list of mistakes many modellers have made and you should at all costs avoid. A reliable running engine stands or falls with the way you instal the engine in your model, and how you handle your engine. It is up to you, to read and carry out these instructions, to have success and be able to get real fun out of the hobby of flying model planes.

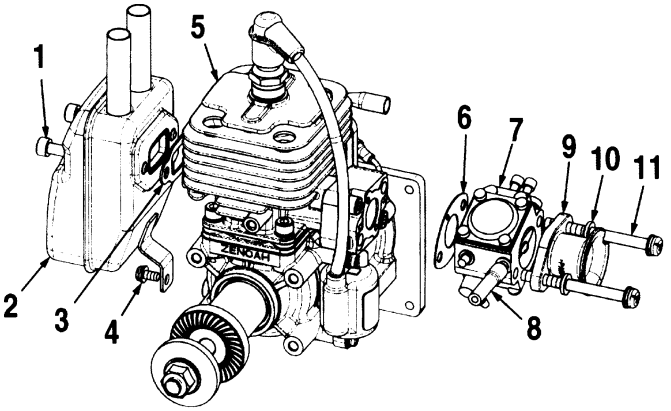
The Titan ZG 26SC is in no way complicated, it is very robust. To ensure your engine reaches you in perfect condition, we have specially trained people to completely strip each engine down and thoroughly check it. This stripping and reassembling takes between 25 and 30 minutes per engine and ensures that you receive an engine that is mechanically sound as can be.

The Titan ZG 26SC is a very powerful engine, the thrust from the propeller is such that you simply cannot afford to take any chances. You take a chance and you run the risk of not only endangering yourself, but other people as well. Take care before each start, double check to see the throttle is not on full power. If you do not have anyone to help, you must anchor your model securely or flick the propeller over from behind the engine, using the other hand to hold the model, this way you are in no danger from the prop. A screwdriver stuck in the ground in front of each wheel is not only useless, it is dangerous!

Do not taxi your model right back to the starting place on your flying field, instead cut the engine and push the model back! Pushing your model back, you may think seems unprofessional. Forget such ideas! You never know, something might go wrong and your model suddenly has full throttle! Should the result be that you have reduced your club chairman's model to its component parts, you can count yourself lucky if it's not the chairman himself, or his dog.

Engine Assembly

Please assemble the carburettor and the silencer according to the drawing below.



1 Silencer screw M5 x 50
2 Silencer
3 Silencer gasket
4 Screw M4 x 6
5 Engine
6 Carburettor gasket
7 Carburettor
8 Tube
9 Intake ram tube
10 Washer
11 Carburettor srew M5 x 55

⚠ **The carburetor screws should not be tightened too much**, a torque of 3,4Nm shut not be exeeded. Otherwise the insulator can crack or deform too strong. The pressure of the crankcase is directed by a hole into the insulator to the Pump diaphragm in the Carburettor. As a result of the deformation the pressure coud get lost and the pump is useless. The engine will run, but without the pump working, problems apear when the tank is under the engine or the tubing is too long.

Engine Installation

Due to the back plate the ZG 26SC is very simple to instal. Use socket head screws, spring washers and crown nuts on a 6 mm plywood firewall. The firewall can be reduced in thickness if it is only slightly larger than the back plate. There is a screw hole pattern on the last page. The Aluminum engine mounting plate can be removed and the engine fixed directly to the firewall. In this case you can cut out the firewall immediatly behind the flywheel and ignition coil, cover this hole on the fuselage side with thin Balsa.

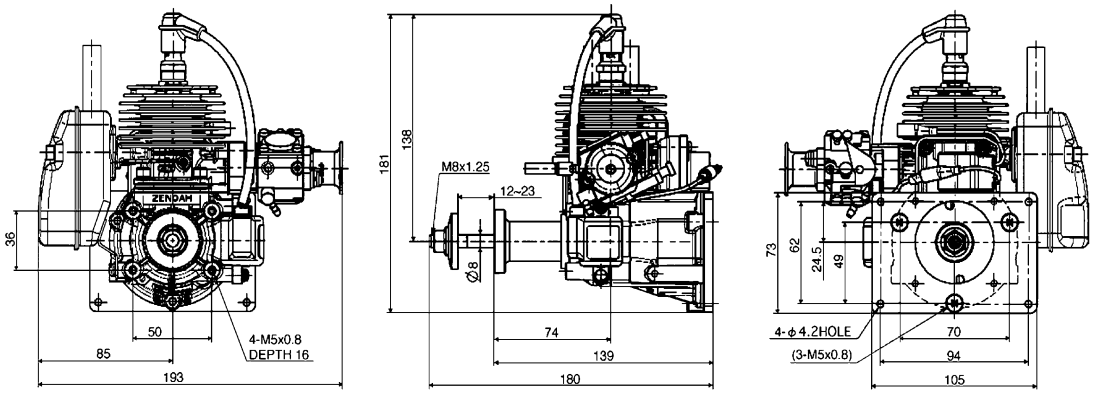
The engine can be mounted on D-Locks. Whether a rigid or soft mounted engine causes more noise depends, very largely on the covering of the fuselage, a very taut silk or nylon and also various plastic film coverings are not ideal, as this acts as a drum skin.

The Titan ZG 26SC can be installed in any position, i.e. upright, inverted or sidewinder, without adversely affectiong performance. The best position is probably inverted. This goes against all glow plug practice, but as we have a real powerhouse on board giving 33,000 volts, combined with the enthusiasm of petrol for burning, starting will not be a problem.

The vibration generated by the ZG 26SC is of a much lower frequency than that of a glow engine ; this is mainly due to the larger mass of the ZG 26SC and the lower RPM. This lower vibration level is beneficial for the servo potentiometer wiper arms and the

reciever crystals. The parts of your model that are most likely to be affected by the vibration from the Titan are those that can be brought into resonance and these are the elevator, rudder and ailerons. The elevator and rudder are more likely to be affected, as these lay directly in the propeller eash. Whenever possible build in a mass balance, should this not be possible, then at least build these surfaces as light as possible and at the same time reasonably stiff. All pushrods must be as light as possible and really stiff. A closed loop system using thin flexible wire is very reliable and effective.

TITAN ZG 26SC Scale 1:4



Engine Cooling

For cooling the Titan ZG 26SC it is not necessary to have a specially large opening in the cowl. But it is essential to ensure, that as much air as possible entering the cowl flows through the finning and around the carburettor, which also needs cold air. Air takes the path of least resistance and will not normally flow through the fins, unless you take positive steps to force it to do so by means of air-ducting. Balsa sheeting and blocks is the best material to use for this. A motor in a large volume cowl, with large air inlets and no form of ducting, is a very poorly cooled engine!

It is essential that the ducting almost makes contact with the engine, so balsa is better than aluminium, for should the latter make contact with the engine, this can easily cause severe radio interference due to metal to metal contact generated noise.

Fuel Tank

With a 500 cc tank the Titan ZG 26 will run at full throttle for about 25 minutes. A 250 cc tank for an aerobatic model will have ample duration.

The felt clunk filter has two important roles i.e. to overcome fuel foaming and to filter out any foreign particles. Always use the cotton felt clunk filter #0060 and no other type. The clunk filter will suck the smallest amount of petrol out of the tank. Omit this felt clunk filter and your engine will draw more air than fuel. Automotive filters and filters sold for glow plug engines are useless.

Fitting a T-piece in the fuel line between the tank and carburettor for tanking will be an obvious mistake to most folks, but we have seen this method of short-circuiting the felt clunk filter in the tank, with the obvious results, more often than one would imagine.

It is better to place the tank rather higher than the carburettor. Petrol will not run out of the carburettor due to the non return valves integrated in the Walbro carburettor. With the tank being higher, the fuel line is filled much quicker. The length of the fuel line is not critical, this enables one to install the tank at the CG or in any other position. The fuel line should be straight and not a switchback, as this may cause air entrapment in the high places.

Tank Nipples

The double sided tank nipple from the clunk filter is best placed in the middle of the tank cap. The single sided nipples are fitted in the middle and at the rear end as shown in the photograph. These two air vent lines must be led forward over the tank and then down into the fuselage floor at the cooling air outlet of the engine cowling. Because the two vent lines are at the rear, there will always be a little air trapped in the top of the fuel tank with a taildragger model. The model then can be turned upside down or stood on it's nose, or with the nose vertically upwards and the fuel cannot run out.

One of these vent lines (does not matter which) is used to fill the tank. For flying or otherwise the two vent lines are partly shut off with two short pieces of fuel tubing that have inserted a 3,5 mm self tapping screw about 15 mm long with the head broken off. Due to the screws coarse thread, enough air can be sucked into the tank, but even during violent stunting no fuel will be lost. The saving in fuel is considerable! This system is simple, well tried and 100% reliable. There is the added advantage, that by filling the tank from the bottom of the fuselage, petrol spilled does not run over the model.

It is best to leave a little fuel in the tank at all times

Even when the model is in your home or workshop, it is better not to empty the tank. The remaining fuel will prevent the carburettor diaphragms from drying out and becoming hard. Partially empty the tank only when really necessary, i.e. when the tank is full. To partly empty the tank, just turn the model onto it's back. As long as the self tapping screws are inserted, no pressure can build up in the tank. But with the two vents fully closed, petrol will be forced into the carburettor with an increase of vapour pressure, due to the higher temperature in a dwelling house. The smell of petrol is then unavoidable

Fuel Tubing

Silicone tubing cannot be used for petrol as this is almost destroyed after coming into contact with the fuel. Same with clear PVC tubing, PVC slightly expands, gets hard and will become loose on the nipples, allowing air to enter the petrol with vibration.

Our specially made, thick-wall **Neoprene fuel tubing** is fairly soft and can be sealed perfectly at the nipples with 0.5 mm copper or brass wire, by being wound twice around the tubing and twisted together. Do not be tempted to use nylon tie straps or small Jubilee clips to seal the fuel lines, these straps and clips do not exert pressure right around the tubing, they only serve to pull the tubing into an oval shape on a round nipple. The black fuel tube is very tough and due to having a thick wall, it is not easily kinked.

A good alternative tube is the transparent yellow **Tygon® F-4040** tubing. It is much lighter and does not expand in contact with petrol, also you can see air bubbles in the fuel. You must use more care in laying this Tygon® tube in the model to ensure that there are no sharp bends. This tube is not especially heat resistant, therefore it must not make contact with any hot engine parts.

Fuel

For fuel, you can use normal grade un leaded petrol mixed with a two stroke oil with a ratio of 1:40, but for running in use a larger amount of oil, at a ratio of 1:30 for the first five litres.

The best two stroke oil you can buy is BEL RAY H1R. Using this oil, you can run your ZG 20 with a ratio of 1:50. For running-in use 1:40 for the first 5 litres. The BEL RAY racing oil has a tenfold better lubrication characteristic than mineral oils, achieves more power with minimal carbon build up and has a superb corrosion protection.

TAKE GREAT CARE WHEN HANDLING PETROL:

USE ONLY THE SPECIAL AIRTIGHT RESERVE CANISTERS

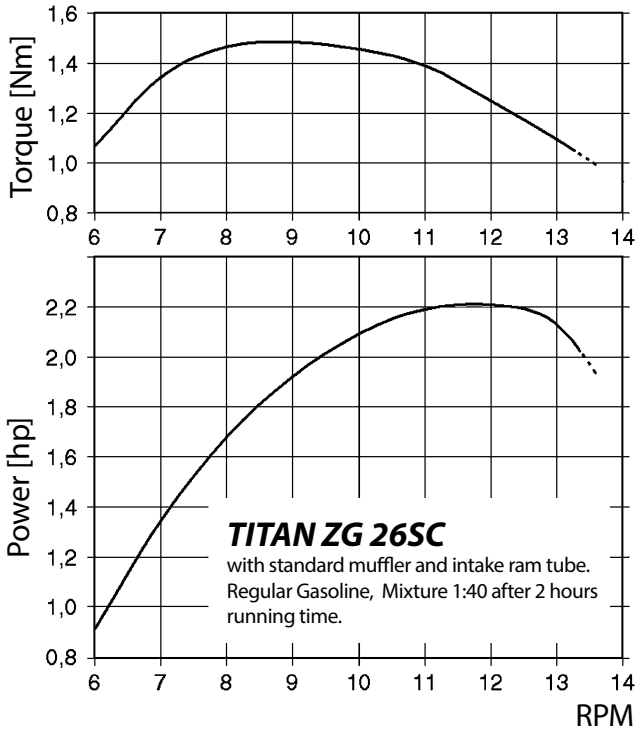
NO SMOKING!

Propeller

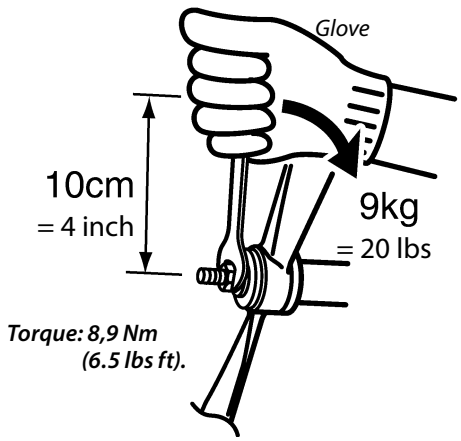
An excellent propeller for the Titan ZG 26SC and slow models is the 18x6" or 18x8" Mens-S, for fast models we recommend the 17x8" or 16x10" Menz-S. Because of the noise don`t use smaller airscrews. The power of the engine peaks at 12000 RPM and many experts recommend to tune the engine on the ground 2000 RPM below that peak. In practice the lost power is more than compensated by the higher efficency of the bigger airscrew. We found out, that a ZG 26SC reaches after running in, with a 18x8" Mens-S about 7400RPM. Our Piper PA18 with about 8Kg maximum weight, equipped with a ZG 26SC with standard muffler and the 18x8" Menz-S, performes from level flight a vertical roll, wich ends in an level flight again. If you want to use bigger airscrews have in mind, that the torque (and the power) decreases under 7000RPM very much. As a result of this use an airscrew which achieves more than 7000 RPM on the ground.

If you want a fast accelerating engine and a smooth transition from idle to full throttle, the biggest usable airscrew is the 18x6" Mens. This is essential for new engines which are not run in.

WARNING: When using props made from thermoplastic such as Nylon or Polyamide, you must realize the real danger of a blade being shed which can happen any time, even when the props are glass or carbon fibre filled. The stress limit of these propellers can be exceeded due to material fatigue, drying out, production faults or mechanically over stressing during ground contact on bad landings.



Propeller fixing



Use the supplied spanner to fix the propeller and try to tighten down to 9 kg. Do not over tighten as the shaft is only M6 where it is screwed directly into the crankshaft. It will shear if you use too much force.

Fixing the propeller with a central nut and a large area hub has proved to be a safe and extremely reliable method, proved over many years. As long as the propeller nut is correctly tightened, it is impossible for the propeller to loosen.

Should the propeller loosen when flicked over, nothing drastic will happen. The propeller may have been compressed with the pressure from the nut, this means you have possibly forgotten to check the nut for tightness occasionally.

It is a different story where propellers are fixed with six screws. This system can be dangerous, the screws loosen and you can still flick the prop over, but in flight, due to the firing stroke and the inertia of the prop the screws are bent backwards and forwards until they all shear, the prop flies off like a boomerang and can cause a lot of damage to the soft human structure that covers our bones. During flight, the propeller nut will not loosen, every firing stroke in effect tightens the propeller nut.

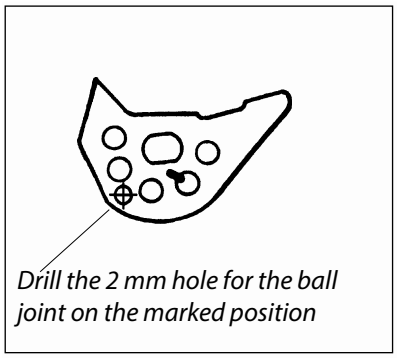
Please do not fit a steel dowel into the propeller hub. The dowel allows you to turn the propeller when the nut is loose. The first indication you will get is the wood propeller will split in half and fly off... can cause a nasty wound.

If you fit a spinner and there is not enough friction between the aluminium spinner back plate and the prop hub, simply cut a disc from 320 grit sanding paper and fit the grit side against the spinner back plate.

Carburettor linkage

Do not remove or disengage the spiral return spring on the throttle lever arm. All play in the throttle linkage will be taken up with the return spring and this spring is also preventing end play and premature wear on the throttle flap. Further, in the unlikely event of the throttle pushrod either breaking, or becoming unhooked, the spring will throttle the engine. Do not worry that the throttle spring will absorb too much servo power. The loading on the servo caused by this spring is relatively small in comparison to the loading on the other servos in flight .

You will notice the Walbro company has thoughtfully providet a row of holes in the throttle lever, unfortunately we cannot use them, they are too big and not in the right place. You must bore an extra hole as shown in the drawing here. Make up the throttle linkage from the balljoints and bellcrank supplied. Use Loctite to secure the nuts fixing the ball joints, taking care to prevent the Loctite entering the ball joints; you will notice there is a threaded hole on the crankcase to take the M4x12 Allen key screw to mount the bellcrang on the engine.



Drill the 2 mm hole for the ball joint on the marked position

⚠ **Never remove the butterfly valve** from the throttle lever shaft so as to ease the fitting or soldering of a larger lever. The reason is, that the manufacturer spreads the end of the small screw, so that removing this screw damages the threaded hole beyond repair, and re fixing the butterfly valve safely is practically impossible. Either the shaft breaks, or the loose-fitting screw drops out and is sucked into the engine, with the result you have a heap of scrap on your hands.

The **choke valve** can be operated with a servo if required. Do not remove the spring and ball bearing selector for locking the choke spindle. A normal servo can overcome the resistance without a lot of effort. With mini servos set the servo throw on the transmitter to the maximum value, i.e. 150% and use a small servo arm.

To prime the engine, the choke butterfly valve must be completely shut and must not catch on the intake ram tube. This means that the intake ram tube must be exactly centred onto the carburettor. Shut the choke butterfly valve, mount the intake ram tube and tighten the two fixing screws. If you now cannot open the choke butterfly valve, you know that you have to readjust and try again.

Carburettor intake tube

The Titan ZG 26SC is delivered with an intake RAM tube for the carburettor. It increases the power and the engine accelerates faster. You should use the intake RAM tube, whenever it is possible!

Should you have mounted onto the carburettor an intake tube which projects throu the cowl, and during level flight and diving the engine runs rich, but by climbing runs normally, the problem is caused by the pressure in the cowl fluctuating. This pressure fluctuation acts on the metering diaphragm; as the pressure increases it depresses the diaphragm causing the engine to run rich.

There are two solutions to this; either reduce front opening in the cowl and/or increase the outlet area; or solder a piece of brass tubing with an inside diameter of two or three milimetres into the hole in the metering cover. This tube must run parallel to the intake tube and be cut off flush to the end of the intake tube. It will now be obvious to you that the engine is drawing air at the same pressure that exists over the metering diaphragm, permitting the engine to run evenly at all attitudes.

Should there still be a problem then the answer lies in the shape of the cowl and the position where the ram tube comes through the cowl.

The air that flows over a body is as a matter of course being forced to accelerate, this acceleration is fairly strong and will cause a sizeable reduction in air pressure in local areas over this body due to differences in the contour. It is clear to most that the models we make use this same induced difference of air pressure between the the top and the bottom of the wings to achieve flight. But many modellers do not realize (yet) how large this difference in the pressure of the air flowing over the cowling can be, especially when the flow is turbulated by a very short radius curve. The resulting turbulent flow can have a very significant effect, large enough to deprive the engine of sufficient air.

We have a slightly forward inclined intake tube shaped from an 45 degree copper water pipe fitting on our Piper PA 18. This intake brought an increase of 200 RPM. However, a club friend tried this out on his PT 17, on the ground his engine ran perfectly; in the air it was a different story: The engine did not run as it should, as soon as the engine was throttled below quarter power it stopped. Our friend then fitted a straight tube and the problem was cured. The reason for this difference is, that the cowl shape of our Piper influences the airflow over the intake. That is to say the accelerated airflow over the cowl lowers the air-pressure and the ram effect of the forward facing intake just compensates for this. Both effects canceling out each other, so the air pressure around the intake stays the same at all speeds. With our friends PT17 there is no cowl and the intake is fully exposed, increase the flying speed increases the pressure at the forward facing intake, this increase of intake-pressure automatically weakens the mixture. Incidentally his straight tube also brought an increase of 200 RPM.

To digress a little, it brings tears to our eyes when we see what our customers get up to with plumbing attacks on the inlet and the exaust. This is not meant to deter you from a sensible modification to your engine, but after each new single step test run your engine and compare the performance against the standard engine. To answer your question why go to the bother with an intake tube: It is this, a correctly constructed intake tube reduces fuel consumption by 30%. The Titan ZG26SC is a piston port induction engine and this system cause blow back at the carburettor, this blow back sprays out unused fuel along your model. Beside the extra power, fitting the intake tube prevents this fuel loss, allows a leaner setting of the carburettor and improves pick up from tickover to full throttle.

Do you have trouble with noise on your flying field? If so, you should not have your carburettor coming through the engine cowl, or the intake tube alone coming through the cowl, as the intake noise is considerable. To silence the intake noise draw the air out of the fuselage or at least from under the cowling.

Drawing the air out of the fuselage means providing an inlet of fresh air, this needs only to be two 8mm diameter holes in the fuselage, these holes must be near the tailplane on both sides of the fuselage on no account place these holes near the wings or in the firewall. Drawing the air out of the fuselage is without doubt the most effective method of silencing the intake noise. Even when you have a too loud propeller and you cannot measure the difference, your ears will notice the markedly lower frequency and the more pleasant sound from the engine.

The intake bend #2587 fits perfectly on the ZG 26SC. Naturally you must now fit piece of fuel tubing long enough to reach into the fuselage, so as to measure the air pressure into the fuselage.

If the intake tube is not long enough to reach into the fuselage, do not attempt to increase the length of the intake tube, but use a piece of card tubing with an inside diameter of at least 45mm and fit this between the intake tube and the inside of the fuselage. Use a piece of foam plastic to seal the intake in the card tube.

The 45mm tube can be as long as you require and can co through a silencer bay in the fuselage.

⚠ **The carburettor must not be allowed to draw heated up air from around the silencer.**

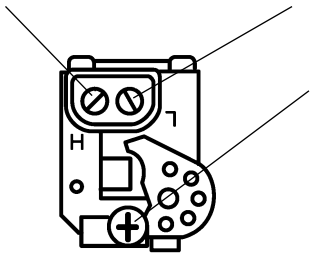
An important point with drawing air out of the fuselage is to fit a filter over the intake tube you have built into the fuselage. This only requires you to cut a piece of kitchen airfilter mat 6x6 cm and fit this over the intake. As you will know, it is the nature of things like small screws and similar to be left inside the fuselage occasionally, these then of course get sucked into the engine!!! This airfilter mat must be glued to a small balsa frame in front ofthe intake tube. The distance from the intake tube to the filter mat must be at least 15mm.

⚠ **Do not fix wire gauze to the intake tube mouth as this will considerable restrict the volume of air drawn into the engine, which will reduce the power output.**

Another possibility to quieten the intake noise is to fit our small intake filter #2350. This has avery smal volume and will not be so effective as taking the air out of the fuselage.

Carburettor setup

The two jet needles are side by side with the letter H and L moulded in the carburettor body. **H= high speed needle. L= low speed needle.**



The large nickel plated **tickover stop screw** is useful for running your engine on the test rig, but in the model it is better removed so that one can stop the engine using the throttle servo.

Basic needle settings	H	L
with silencer and intake trumpet	1 3/8 turns	1 3/8 turns

The two needle settings depend on the propeller size. Adjusting the low speed needle must be very carefully done. For a low RPM tickover it must be on the lean side, for a good acceleration it must be on the rich side. With care a compromise can be found. The acceleration will be improved with the intake trumpet and/or a smaller propeller. A slow acting throttle servo is best, do not slam the throttle open on the test rig, just advance it smoothly.

If you use the engine without the intake trumpet both needles have to be opened slightly more and the fuel consumption increases.

The longer the intake trumpet the better the engine turns larger props. Instead of the supplied intake trumpet our aluminium intake trumpet #0800 can be substituted for this.

The optimum adjustment of the two needles is best done by flying the model and checking the spark plug colour when the plug is still hot after a fairly long stretch with full throttle, then landing the model and immediately checking the spark plugs colour, the colour should be a light brown or possibly grey. The engines should not be allowed to run at tickover before this test, if the low speed is too rich then the spark plug will be black and oily, if the low speed is too lean then the plug will have a white or glassy appearance.

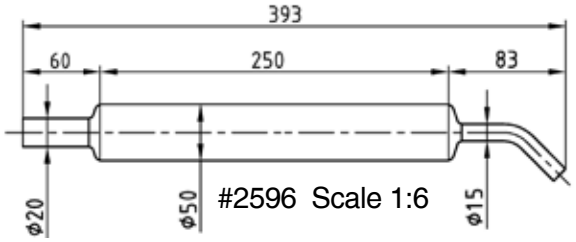
Silencer

The supplied silencer is very good in comparison with larger engines or to some glow plug types.

Tighten down the screws after the first flight with the screws still being hot.

The various headers and stainless silencers for the ZG 23SL also fit the Titan ZG 26SC. We were amazed at the phenomenal power increase by fitting the high performance silencer #2596. The power increase is 40% above the standard supplied silencer. So fitted is the ZG 26SC very quiet and has a very pleasant sound. Acceleration is constant right through the throttle range, and also the mid throttle position is excellent. The complete silencer system, including the „S" form stainless Funtana header #2571, and the Teflon tube and spring clamps, weighs just 150 grams more than the standard silencer. The tuninglengh varieds between 230mm and 260mm depending on the used prop.

Silencer #2593 fixed with the Mount #2594



#2596 Scale 1:6

#2596

STARTING

The Titan ZG26SC has a very small flywheel. The weight of the propeller plays an important part, so fitting a large propeller for the first test run will help make starting easier.

⚠ **The propeller must be fixed so that as the first signs of compression are felt the propeller should be at about eleven o'clock, that is to say shortly behind the vertical position. The important thing now is to turn the propeller to one o'clock and start from there.**

Put on a thick glove, the throttle at quarter open, your helper holds the model securely, shut the choke, suck in a few times **very quickly**, holding the propeller firmly as it goes over TDC. Should you have removed the choke one evening to relieve boredom, then I would like to ask you to use a cork with a slit cut into it to choke the engine, the reason being that nowadays the so called lead-free petrol contains some very unpleasant additives such as Benzol which on no account should come into contact with your skin. However, starting, through the small flat on the choke butterfly or the slit in the cork, the petrol is pumped into the carburettor and the air/petrol mixture is sucked into the engine crankcase by turning the engine over vigorously, too slow and the petrol runs out of the carburettor when it is hanging down or inclined downwards. It is necessary to suck in vigorously whatever way the engine is installed, this produces a fairly strong flow of mixture into the combustion chamber. Put another way, it is not proof enough that the engine is sufficiently primed by your sucking in when the fuel starts dripping out of the carburettor, instead it must be so that you have sucked enough of the fuel into the engine and the engine has pumped this up to the combustion chamber. You can hear when the engine is well primed, it sounds slightly squelchy.

⚠ **The Titan ZG26SC if dry will tend to kick back. The cure is to prime the engine well by sucking in enough until the plug is wet, two or three flicks and the engine should then run. The Titan ZG62SL will never kick back when it is wet enough.** Should you be determined to take out the plug, it should be wet, with a dry plug the 26 will not start, a dry plug means you are going to get a hefty clout sooner or later from the engine kicking back. Should you have flooded the engine somewhat, it does not matter a bit, just open the throttle and after some more attempts the engine will fire and run. It is not a good idea to remove the plug anymore than absolutely necessary.

Open the choke and start the engine by placing the fingers on the propeller blade right against the hub with the propeller at one o'clock and try turning the propeller just with the wrist action with your fingers staying on the propeller from one to nine o'clock. If after say twenty attempts the engine does not fire, either you are too timid or the engine is nor primed enough. So suck in once more and try again. Should your engine just fire once and not run in spite of really brutally hitting the propeller, your mistake is you let go of the propeller to soon or you hit the propeller too near the TDC means you have forgotten the forgoing paragraph. It is a common failing that many modellers cannot start the engine without being able to feel the resistance of the compression first, it is as if they turn until the compression is felt and then think they can start the engine with sheer force.

IMPORTANT:

When the engine as described here only fires once and refuses to run for a few times and you have in the meantime discovered your mistake, you have burnt off nearly all the fuel in the engine, which means you now run the risk of a kick back, unless you prime the engine again by sucking in before attempting a second time to start. This one time firing is caused by the magneto set up. What happens is that the first magnet is already leaving the coil core with the propeller against the compression. You hit the propeller and the capacitor in the system is not being fully charged until the very last moment, when the last magnet is actually leaving the coil core. This causes a very late ignition (far after TDC), with the effect that the engine does not impart enough energy to bring the piston over the next compression cycle. It is no use, you can hit the propeller as hard as you like, as quick as you like, there is only one spark per revolution and when this spark is too late, due to your hitting the propeller at the compression, it is all a waste of time.

You can easily get used to the starting method required. I start my engine without excessive force but merely by placing the fingers on the front side of the propeller and close by the hub with the propeller at two o'clock, I then turn the propeller by flicking the hand only from the wrist. Should it be that I have failed to get enough petrol into the engine and it kicks back my fingers simply slip off the propeller without hurt, almost. Do not be tempted to place your fingers at back edge of the propeller. The left hand should be pressing down somewhere on the top of the engine cowl to stop the model being moved as the piston approaches TDC. The right hand fingers must be kept on the propeller from two o'clock until nine o'clock is reached. To prevent your fingers slipping from the propeller, you must really press hard against the propeller blade, use middle and index fingers. Just use the hand and wrist for flicking over the propeller, the forearm should be more or less stationary.

Running in the engine

This is the critical time in an engine's life. Do not use the glow-engines method of a really rich set needle valve on a test stand on half power, rather set the needles on the Titan ZG 26SC to a normal position and **fly** the new engine with very short periods of full throttle and long periods of tickover. You will of course ensure that the mixture setting is not on the lean side. Avoid letting the engine run at half or three quarter throttle for long periods. After the first tank full you can increase gradually the full throttle periods. After five tank fulls you can fly full throttle for as long as you wish.

Experience has shown the power steadily increases over the first thirty flights, and even after this time, the power will increase from season to season, due to the build-up of carbon deposits on the piston crown and on the combustion chamber walls. This carbon build-up increases the compression ratio. Because the engine is designed for an extraordinary long life span, even when mineral based two stroke oils are used, the designers had chosen a relatively low compression ratio to allow for a considerable amount of carbon build-up. So "don't worry" about carbon build-up and as long

as it is not in the piston ring groove, do not remove it, instead "be happy" about the extra power!

It is far better to break in the engine in a model with the engine cowling fitted. Due to the unequal temperature distribution around the cylinder, because of the unequal cooling airflow, the cylinder always tends to slightly distort. A new piston ring, with his special surface treatment, can easily adjust to this condition. During the first hour of running in, the piston ring will continually get polished and thereby it's surface becomes harder. An engine, that has been run in on the test stand, must run for a considerable longer length of time, until it has settled down to the new and almost always completely different temperature distribution under the models engine cowling.

Maintenance

The Titan ZG 26SC requires almost no servicing. The Walbro carburettors are superbly reliable and never give trouble when left alone. Never use compressed air anywhere on your carburettor or it will never be of any use afterwards. Never remove the fine stainless steel gauze filter in the carburettor for any reason. When you have followed our advice and fitted a cotton felt clunk filter, there will never be any dirt in the carburettor, but there may well be fine cotton fibres over the small gauze filter (this is the sole reason for this filter). Every five years or so, you can remove these fibres carefully with a toothpick, or tweezers.

Be careful adjusting the two needles, when screwing in these needles go very carefully to find the null point, so soon as you feel the first sign of resistance stop immediately, if you screw these needles in with force you will widen the hole in the body and then your carburettor is scrap. If your engine suddenly decides not to start never try adjusting the two needles they just cannot help you, the cause of the problem always lays somewhere else.

If your engine is difficult to start after the hibernation, suck fresh petrol into the carb to loosen the thick oil left after the petrol has evaporated, and let this stand for a few days and you will find the engine will run again without any adjustment of the needle valves.

Those who may wish to control the tightness of the fixing screws should note the torque loading in the following table. Absolutely critical are the four cylinder fixing screws. These screws must never be really tightened down as the gasket between the cylinder and crankcase will be squeezed out rather like toothpaste and the corners of the cylinder flange will be forced downwards. This will distort the cylinder and you will notice that when the engine is hot the piston will have the tendency to hang up at BTD, the engine will not have a good tickover and power will be down in full throttle and the cylinder can be thrown in the dustbin. This can easily happen to modellers who make a habit of really tightening down screws on new engines just to make sure. If you do not possess a torque meter or you have no feel for tightening screws, then please leave the cylinder screws alone.

Spark Plug

Use only the resistor plug supplied, i.e. NGK R BMR 7A, the gab is 25 thou, or 0,7 mm

Screening the HT-Cable - for and against

You will notice the HT-cable is not screened; but the engine is fitted with a resistor plug, the R denotes this. The interference from the magneto has been found to be considerably lower than that of a battery ignition system, so the resistor plug is normally sufficient to prevent interference.

For quick acting PCM radio gear and 2,4 Ghz it is not neccesary to screen the HT-cable, but it is not a disadvantage if it is made correctly.

We offer a screening service for the HT-cable (Order Nr. #0047). Please send us just the ignition coil! A seperate sreening set is also available (Order Nr. #0044).

On our webpages is a step by step instruction to screen the ignition by yourself:

http://www.toni-clark.com/ftp/Abschirmen_Zuendkabel_mit_Gummistecker.pdf

⚠ **If your engine is mounted up side down and the HT-cable projects out of the cowl, you have to check the contact between the ignition cable and the spring after every "headstand"**. The engine will run perfectly in this condition, but you will realize that this gap between the HT-wire and spring clip will give rise to a small spark outside of the cylinder head; this extra sparking will surely cause interference, thereby defeating the original purpose. A PCM radio will also be affected by this extra sparking. This can easily be checked with an Ohmmeter. Measure the resistance between the spring contact and the crankcase, you should get a reading of around 2,1 kΩ. An infinity reading indicates an open circuit.

VERY IMPORTANT

⚠ **If you have a fast PCM radio or 2,4 Ghz do not screen the HT-cable, but use the fail-safe and programme it so that in the event of interference the engine will be throttled to a reliable tickover.** If you can programme the time lapse, then make this half a second. This way the fail safe becomes an early warning system. For a fast PCM system the time between two sparks at tickover speed is long enough to get a complete cycle of information to the RX without any interference from the ignition. This simply means at tickover you have normal range, although the ignition is not screened. If you have a problem with your radio gear, for example the TX output is down, or the RX is off tune, or the RX aerial is in poor position for good reception, or someone else has switched on his TX on your frequency (but hopefully has not extended his antenna), the fail-safe is actuated at a closer range than it would have been activated without the ignition noise, and throttles the engine. At this moment you get full control again. If you leave the throttle stick at full power, the RPM will begin to increase again, causing the fail-safe sequence to start from the beginning again, as long as the interference continues, or you close the throttle yourself. With a little luck you can then land the model and find out what went wrong.

To fly an unscreened HT-lead with a fast acting PCM radio can be compared with a sensible driver, that always has a filled reserve canister in the boot. To screen the ignition and use PCM is the same sort of nonsense, as a driver tipping the contents of his reserve canister into the tank at the beginning of his journey, just to increase the distance he can drive. But if he ends in a traffic jam, the fuel consumption is drastically increased, in spite of the extra fuel from the reserve canister the tank will be suddenly empty - as well as the reserve canister...!

NB. There is a great deal of difference between PCM radios. This difference lies mainly in the length of time needed for each cycle of information to transferred to the RX. With slow acting PCM you must screen the HT-lead and plug cap as shown on the sheet from Multiplex supplied with each engine. It is obvious that with a well screened HT-cable, the safety of an early warning system from the fail safe is lost. When the fail safe is triggered by something that reduces the range to about 300 meters, you will not have an early warning at about 200 meters, which would have allowed you to return for a landing. Due to the screening of the HT-lead, the range has not been reduced to what it would be without screening, therefore throttling the engine will bring no increase in range. Your model is now going to crash with a throttled down engine.

By the way, it is technically impossible to shut off the fail-safe with a PCM radio. The fail-safe is an integral part of the system, that cannot be removed. Should the fail-safe be activated by interference or a loss of range, you have several pre-programmable options. This means you can programme the radio as to what will happen, for example the length of time elapse, this is usually from 0,25 up to 1 second. During this time the servos will stay in the last correctly received position before they move to your programmed fail-safe position. With fail-safe on or off you always get full control again in the moment the receiver gets a good signal. With the fail safe shut off the servos stay at the last correctly received position and will stay there until either the model

crashes or the receiver has once more a satisfactory signal from the transmitter. With fail safe in and the engine throttled by fail safe, the ignition noise will disapear due to the low rpm and you have a reasonable chance to save the model. Also you get prior warning, when something is not quite right.

Just imagine, your model is just about to take off, someone else switches on his transmitter, this is on your frequency and your model is now heading straight for the bystanders at full power. You will be greatly relieved if your PCM immediately switches the engine to idle.....or?

I can strongly advise you to fly only with a double receiver battery pack. Experience has taught me that this is something never to fly without. The double battery pack I use is with two separate plugs, two separate switches and the batteries separated with diodes. You use a servo socket on the receiver for the second plug.

Install the receiver battery and servos away from the engine. In certain cases the interference does not come through the receiver aerial, but through the wiring from the servos and battery. Most cases of interference are not caused by the ignition, but by vibration through metal to metal generated noise or from a servo pot wiper that has suddenly developed a fault.

⚠ **Insulate all metal pushrods from the engine with Nylon ball joints.**

Receiver aerial

In many radio instructions it states, that one should lay the aerial in a straight line. This is only OK when the Rx aerial is parallel to the Tx aerial and not pointing directly to the Tx as is mainly the case in take off and landing. When the Rx aerial points directly at the Tx this causes the reception to drop to its lowest value. The answer is simple: lay the aerial straight in the fuselage but bend up the last 25 cm to form a right angle and fix the aerial in this position securely. You can of course have this 25 centimetre vertical element straight out of the Rx case and the rest laid flat along the fuselage. If your fuselage is short, then you can have this vertical element along the fins king post. A vertical piano wire aerial on a model owes its better performance to being bent over with the airstream.

The best solution is the ultra modern double receiver system "DDS 10" from "ACT europe". Here the aerials are laid in a straight line 90 degrees to each other and any attitude of the model has no noticeable effect on the range.

Thank you for taking the trouble to read carefully what I have written here. Have fun with your Titan ZG 26SC.

Gerhard Reinsch and Rene Neumann,

English translation by Toni Clark.

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Instructions Titan ZG 26SC

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