

Hans Joachim Pahl

Der

XS 650 Motor

**Aufbau und Funktion
– mit der Elektrik der XS**

**OHC650
ELECTRIC**

YAMAHA

The XS 650 engine Structure and function



Hans Joachim Pahl

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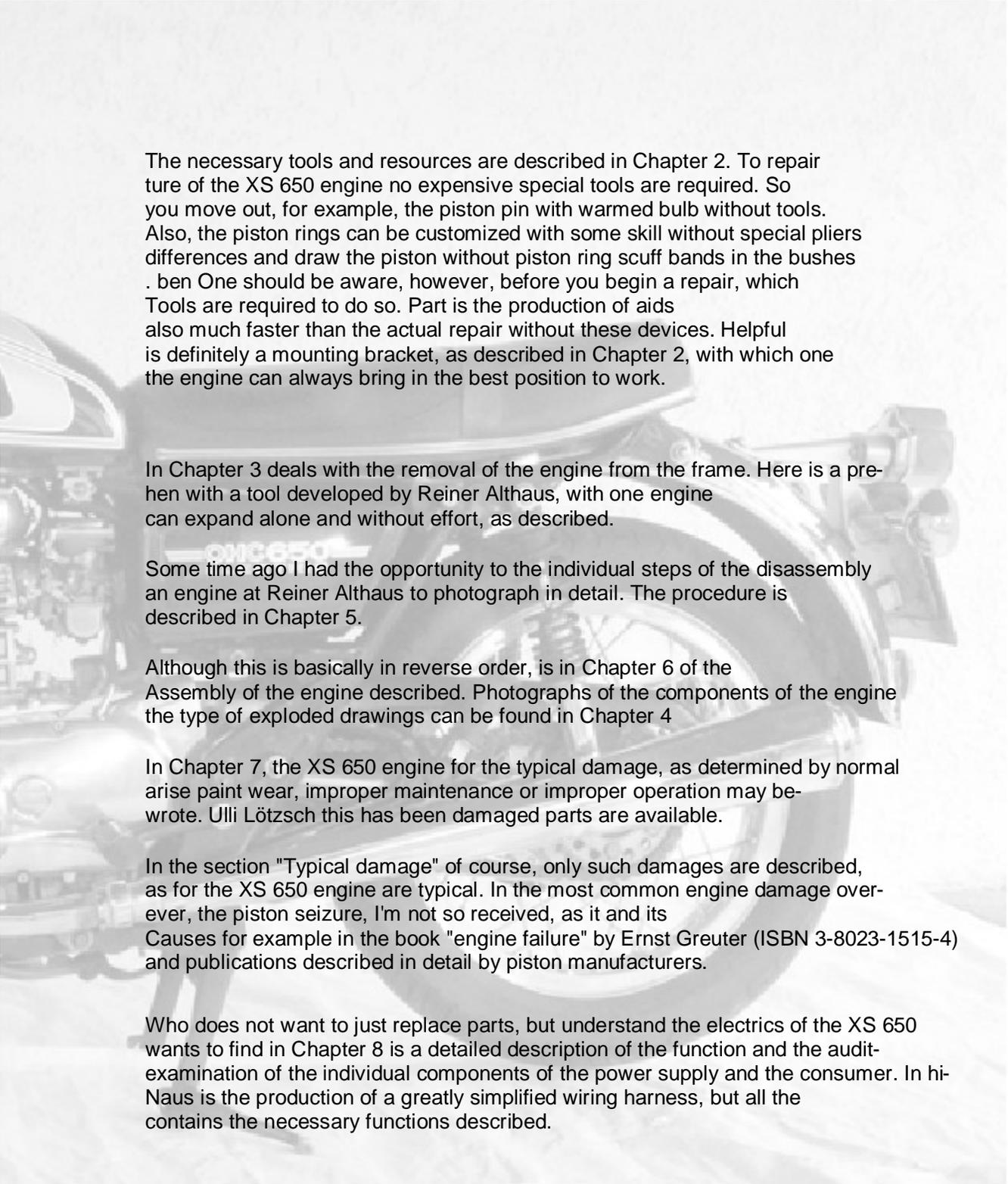
FOREWORD

This book is not a separate workshop manual, but it is intended as a supplement to the original workshop manual, which is now available online, the- . NEN All information in the original workshop manual, such as technical data, the differences between the various versions, wear limits, etc.- are the not repeated here. In the individual chapters, where necessary, on the original workshop manual referenced.

This development is therefore also not for the experienced wrenches made, of course, makes do with the workshop manual alone, but they should help those without much experience repairing their own motor want / need and the basic maintenance, such as ignition and valve beherschen tile set. This applies first of all, the threshold to overcome to open an unknown engine. The original workshop manual contains few illustrations, which are not to color, against which it slightly difficult may be difficult in the construction and operation of the engine to present. Therefore in the present formulation is also how each Assemblies in Chapter 1 and described in great detail with lots of graphics and Photos shows. I have this to show the structure of the assemblies, partially exploded out of the spare parts list and detailed photos of a Section model used, that the German importer for training purposes be- was used.

The original workshop manual assumes that one on an engine in the Originalzustand work. If today, almost 30 years after they built engines were so open an engine, you can hardly safe to assume a motor found on such original condition. Some parts, like for example the coupling or the Timing chain tensioner were changed in some cases more than once. If one of these parts an engine that is now gone, has expanded, then they can also be as- the fit. However you build mismatched parts of different Origin, such as the timing chain tensioner parts together, it may damage come by the timing chain either too tight or not at all excited is, if one follows the description in the original workshop manual.

Before you start to assemble an engine, you should be aware of the Function of all assemblies and always be clear - even during the comenbaus - Check whether the module is working properly.



The necessary tools and resources are described in Chapter 2. To repair the XS 650 engine no expensive special tools are required. So you move out, for example, the piston pin with warmed bulb without tools. Also, the piston rings can be customized with some skill without special pliers differences and draw the piston without piston ring scuff bands in the bushes. One should be aware, however, before you begin a repair, which Tools are required to do so. Part is the production of aids also much faster than the actual repair without these devices. Helpful is definitely a mounting bracket, as described in Chapter 2, with which one the engine can always bring in the best position to work.

In Chapter 3 deals with the removal of the engine from the frame. Here is a prehen with a tool developed by Reiner Althaus, with one engine can expand alone and without effort, as described.

Some time ago I had the opportunity to the individual steps of the disassembly an engine at Reiner Althaus to photograph in detail. The procedure is described in Chapter 5.

Although this is basically in reverse order, is in Chapter 6 of the Assembly of the engine described. Photographs of the components of the engine the type of exploded drawings can be found in Chapter 4

In Chapter 7, the XS 650 engine for the typical damage, as determined by normal arise paint wear, improper maintenance or improper operation may be wrote. Ulli Löttsch this has been damaged parts are available.

In the section "Typical damage" of course, only such damages are described, as for the XS 650 engine are typical. In the most common engine damage over- ever, the piston seizure, I'm not so received, as it and its Causes for example in the book "engine failure" by Ernst Greuter (ISBN 3-8023-1515-4) and publications described in detail by piston manufacturers.

Who does not want to just replace parts, but understand the electrics of the XS 650 wants to find in Chapter 8 is a detailed description of the function and the audit- examination of the individual components of the power supply and the consumer. In hi- Naus is the production of a greatly simplified wiring harness, but all the contains the necessary functions described.

First FUNCTIONAL DESCRIPTION

So as in Germany of an engine-
es "big bike", a two-
cylinder boxer engine was, as it appears in the
KS 601, the "green elephant" of
BMW and Zundapp known in many
len models built was
this in England, the country with the
leading motorcycle industry in the
sixties, the parallel twin. He
by the three major brands tri-
umph, BSA and Norton, but also of
A few people here in Germany be-
known, e.g. Royal Enfield built.

remained, for the recreational vehicle.
Here there was less to longevity
and reliability than on performance
and technical sophistication with which
one in front of his friends impression ma-
Chen could. Four cylinders with equally
many exhaust pipes were standard.
The traffic density was not as
higher than today and there was no general
my Geschwindigkeitsbeschränkun-
gene on country roads, so that the
existing power-quite einset
zen could.

A parallel twin is, as the name signifies
says a two-cylinder engine, whose
Piston moves up and down simultaneously be-
cause. This has the advantage of a
high torque at low
Speeds, with the disadvantage of the
strong vibrations throughout the entire
Speed range is bought.

The XS 650 or XS 1 and XS 2, as the
first models were called, ten-
beconsolidated even more towards utility
vehicle. The engine was a conscious-
repeatedly held, no balance shafts,
the first model series even without
Starter.

At low speeds this
Vibrations of some drivers still
as "meaty" feel, while in
higher speed ranges quite
can be distracting. Other Paral-
leltwins, e.g. Kawasaki Z 750, had
Therefore, balancing shafts, the vibration-
tions to reduce to an acceptable level
decorate.

From the outside it was the classic tight-
metallic motorcycle engine, inside
However, there were significant differences:
Engine and transmission are in a com-
mon housing that can be
that in contrast to the British Pa-
ralleltwins is divided horizontally. This
Construction ensures that the engines
at least to some extent in the state of
oil-tight. The overhead cam-
wave is indicated by a roller chain
exaggerated, the stroke / bore ratio
74/75 is not more pronounced

Occurred in the sixties, the
Change of use of the motorcycle-
vehicle, as it only when police

long excursion. Compared to for example The Triumph Bonneville is hereby lost some of torque, which However, the longevity of the motor- is good.

common housing. Such cases are usually divided horizontally, with the crankshaft and transmission shafts in the joint between the two Halves of the housing is located.

Vehicle drives consist of follow- the functional groups: the drive motor, the connection between the Engine and transmission (primary drive

Figure 1-2 shows a schematic representation between the modules of the XS 650 engine. Here he is Term "engine" for both the entire

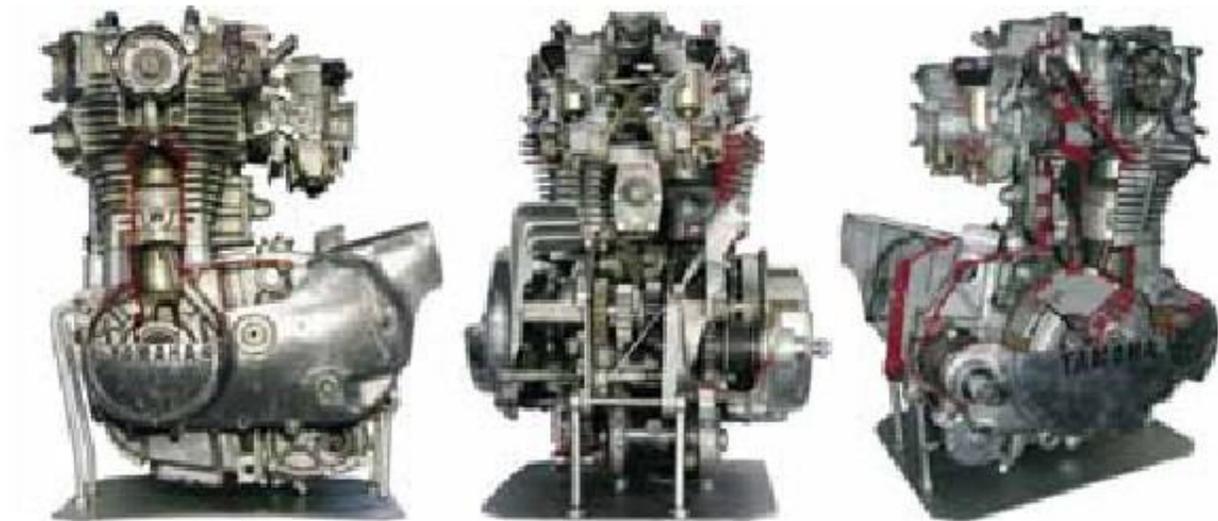


Figure 1-1: Cutaway model of the engine

and coupling), the gearbox for adaptation measurement of engine speed on the chassis speed and the driving resistance, and the secondary drive.

Unit as well as from the crankshaft and Camshaft, piston and valve tiltrieb existing unit used.

Is for car and truck it drives This is separate Assemblies, often as an independent Aggregates of different suppliers be obtained.

The actual engine is through a marked blue color marking. The gearbox and Schaltmechanis- mechanism are connected by a green-color marker tion highlighted.

In modern motorcycle engines - and this includes in this sense, the Motor of the XS 650 - are all com- ponents of the drive in a common-

The XS 650 engine is basically very simple design and - with the exception me the starter - on the essentials reduced engine. Thus, for example no training same wave available to the non-

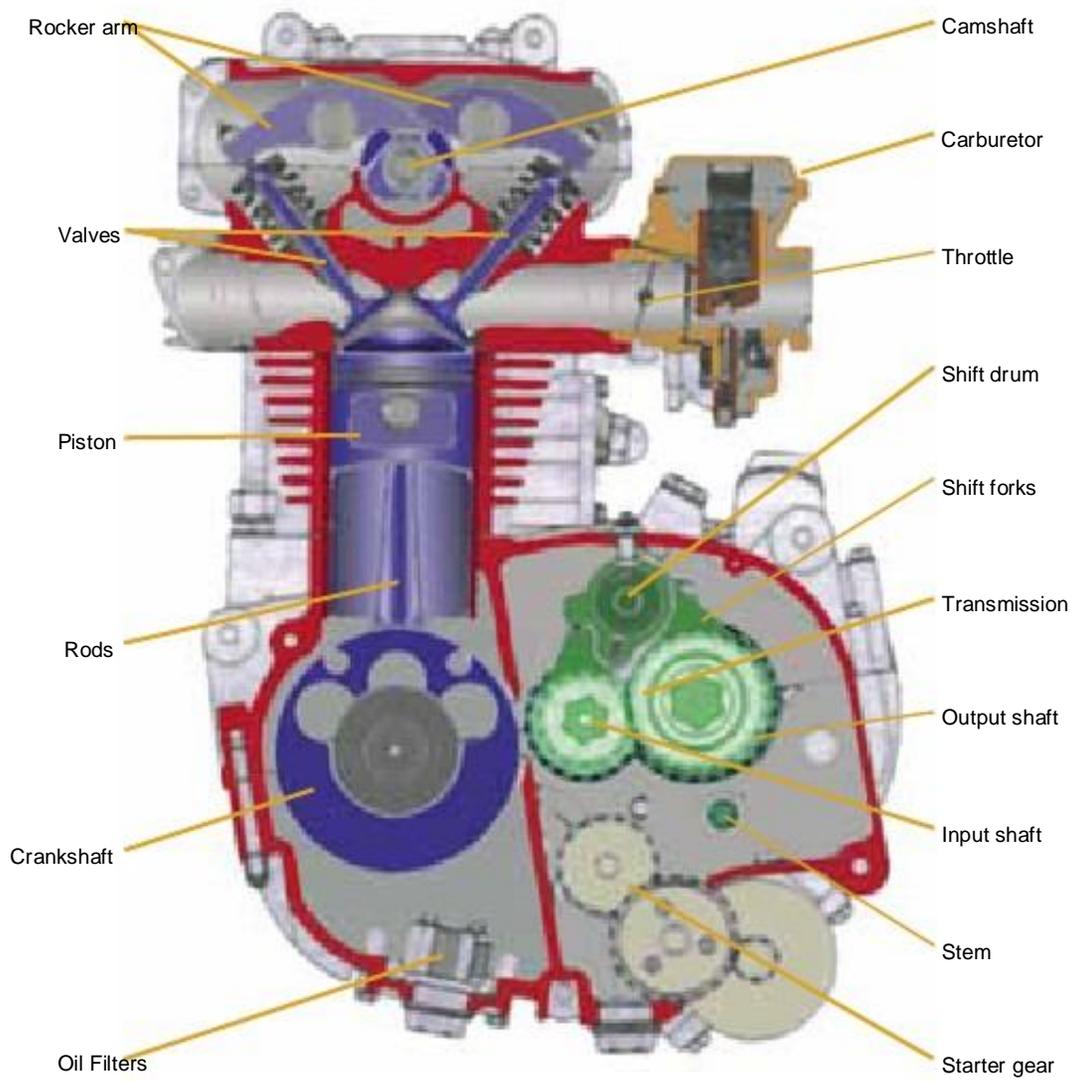


Figure 1-2: Schematic representation of the components of the engine

vibrations of a preventable Parallel-
mitigate wins.

Contrary to the fashion in the 70 years
Ren, there is only one overhead
Camshaft. As a concession to the
Contemporary taste was subsequently one
Starter constructed into which the
over-costly version of its
tragungsteile in contradiction to the otherwise
clear and assigned construction-
tion of the motor is.

During the entire construction of the
Engine durability and repair
friendliness is designed to conceal-
need to transfer parts of the starter
very quickly and pull through this
resulting chips are other
Components affected.

What is the longevity and repair
As options, the XS 650 Mon-
tor designed to be very costly. So
all moving parts, with the exception

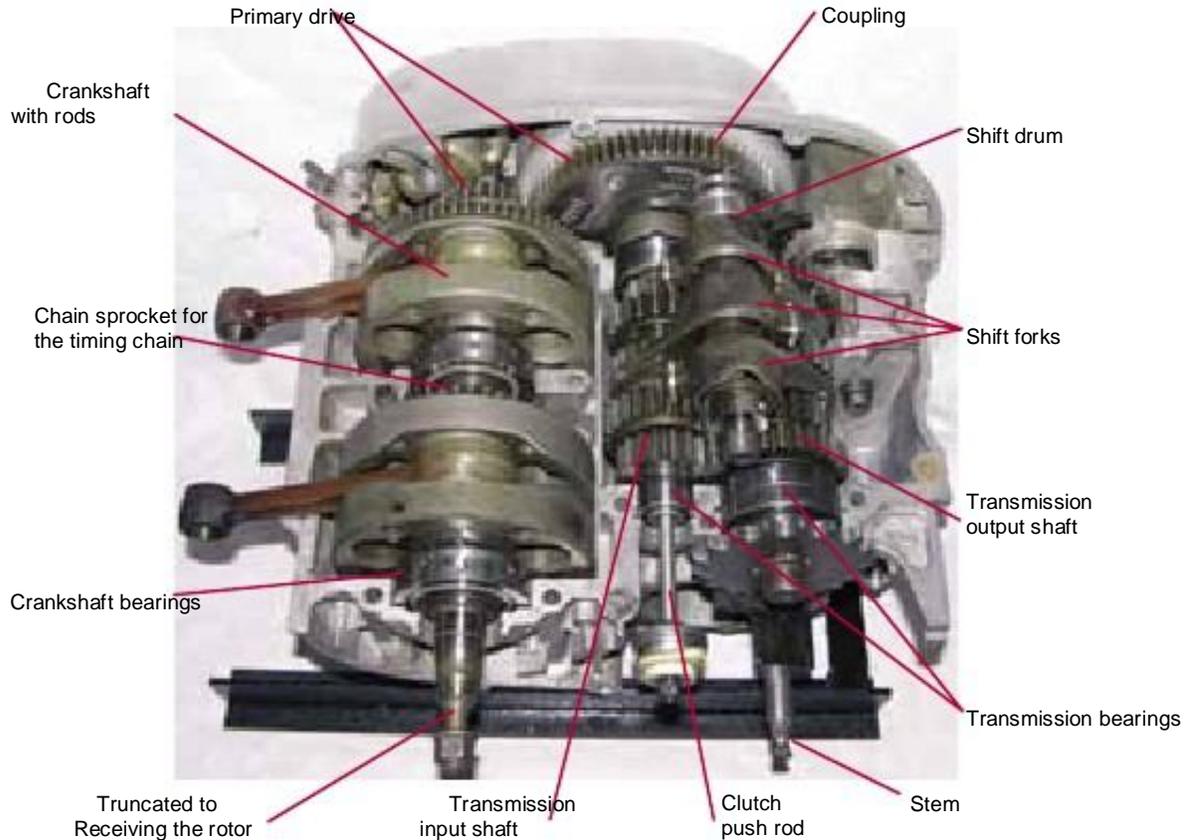


Figure 1-3: Crankshaft, primary drive, clutch, shift mechanism and transmission

me the kick starter shaft in bearings stored. Mileage of 200,000 km without in-depth repairs are With regular maintenance and possible a possible overhaul of the engine worthwhile in any case, because all one Wear-out parts of the underlying can be exchanged and then a like new restored is.

The Figure 1-3 shows the crankshaft, the primary drive with the clutch, and the transmission with the Schaltmechanismus after lifting the upper part of the Motor housing.

The crankshaft with a total of four Main bearings located in a line with the two transmission shafts, each with an NP-hard and floating bearings.

The primary drive and the clutch and the oil pump on the right are Mon-Tor site arranged. The end of the switch-wave, which carries the shifter is - unlike British motorcycles specified on the left side of engine - tries orders, while the actual Switching mechanism on the right-Mo Tor site is located. Centrally above the Ge-waves is the shift gear shaft with the Shift forks in a needle bearing on the left motor and a ball bearing vertically mounted in the upper Motor housing portion stored.

1.1 Engine

Below are the individual building groups of the engine, whose design and Operation described in detail.

Components of the "engine", the crank-wave with the four main camps, the Connecting rods and pistons, the Ven-valves and the valve train (Figure 1-4).

1.1.1 CRANKSHAFT, PISTONS

The crankshaft is a so-called "Built", consisting of individual parts, separable crankshaft. In the Figure tions 1-5 and 1-6 on the following Sides of the crankshaft is in pieces the basis of an exploded view of the spare parts list together and in-assembled state on the basis of a photo

depicted. Disassembly and re-Assemble the crankshaft is possible only with a press, as in Engine rebuilders to Is available. Since the cutting and Assemble with a usual Chen automobile workshop available to ste-existing resources is not possible, let I can not detail here on the matter. Information on the crankshaft can be found in the original workshop manual from Be-te 154th

The crankshaft is in four main bearings stored, of which the right, driven-sided camp with a backup ring axially secured in the housing sphere stock is. The other three main bearings are axially movable roller bearings, the outer rings by single-pin are positioned fixed so that the oil holes of the bearing outer rings with the Oil drilling in the lower housing part are aligned.

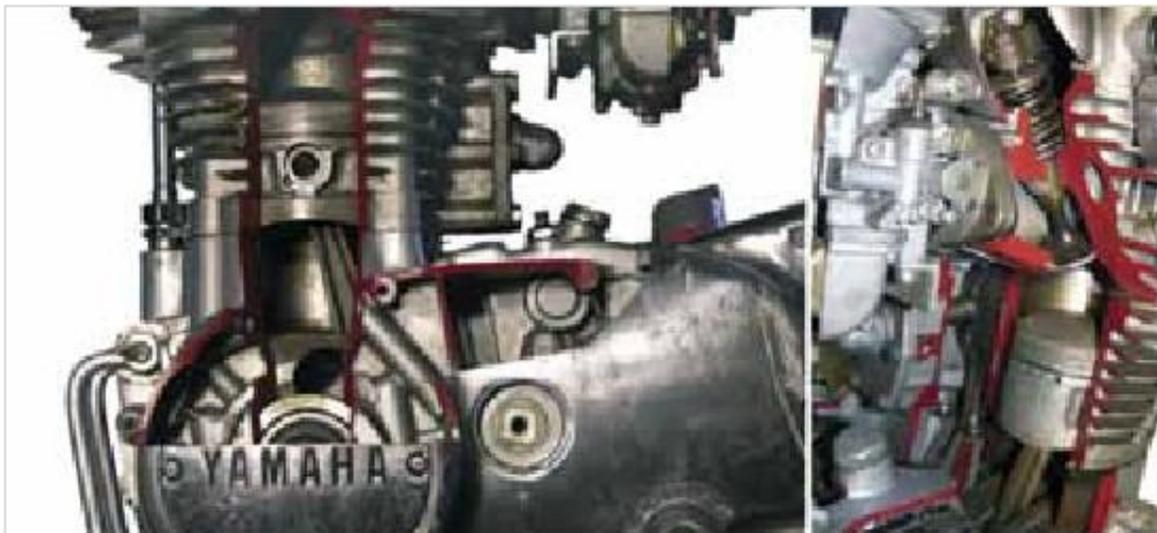


Figure 1-4: Crankshaft with connecting rods and pistons, rocker arms and right inlet valve

Figures 1-7 and 1-8 on the next two pages show the medium-sized main bearings of the crankshaft with the drive sprocket of the timing chain in the

The middle. The roles are performed in cages and compared to the inner rings of the Lager in the axial direction can not be displaced Lich, while the outer rings on the

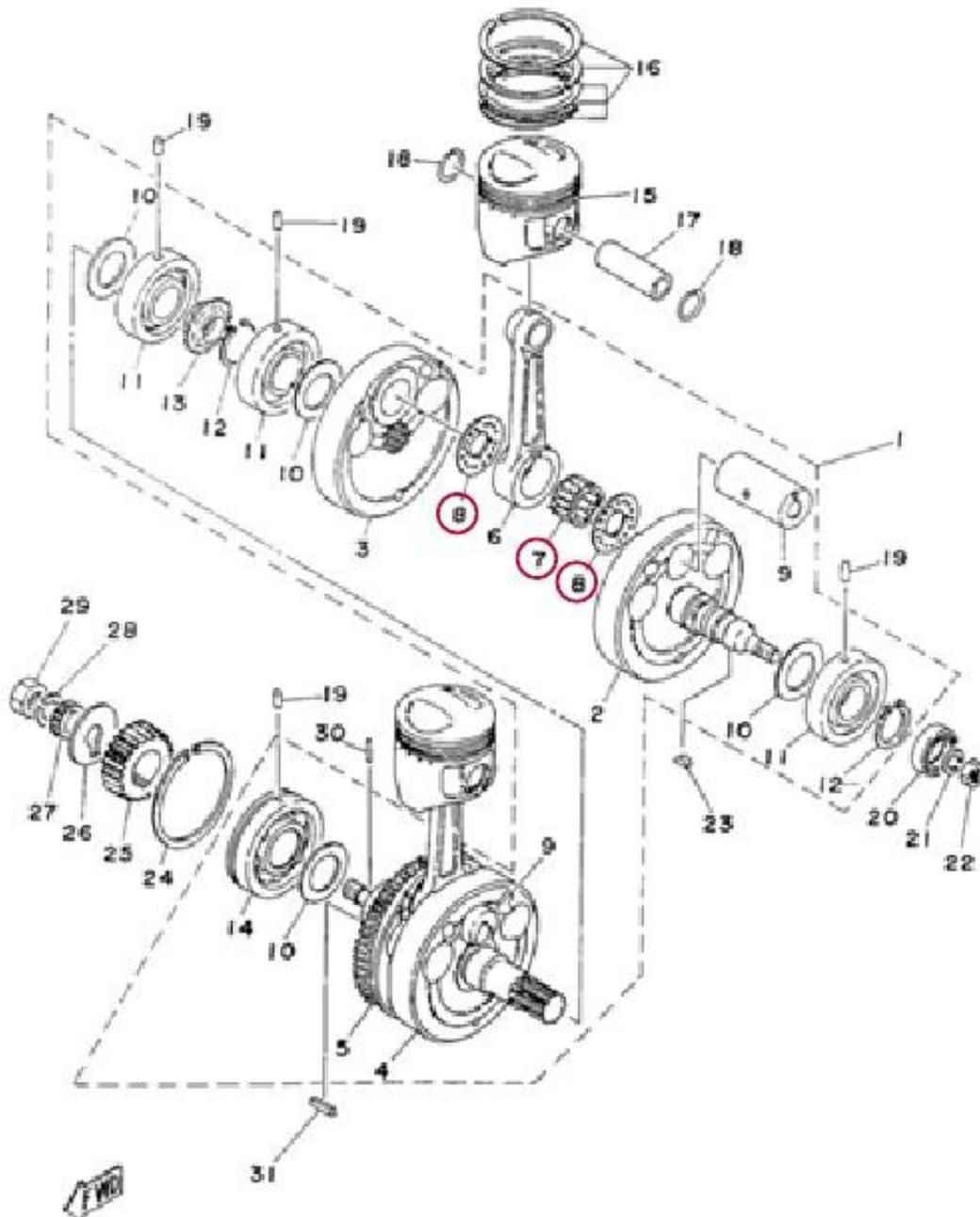


Figure 1-5: Crankshaft and pistons

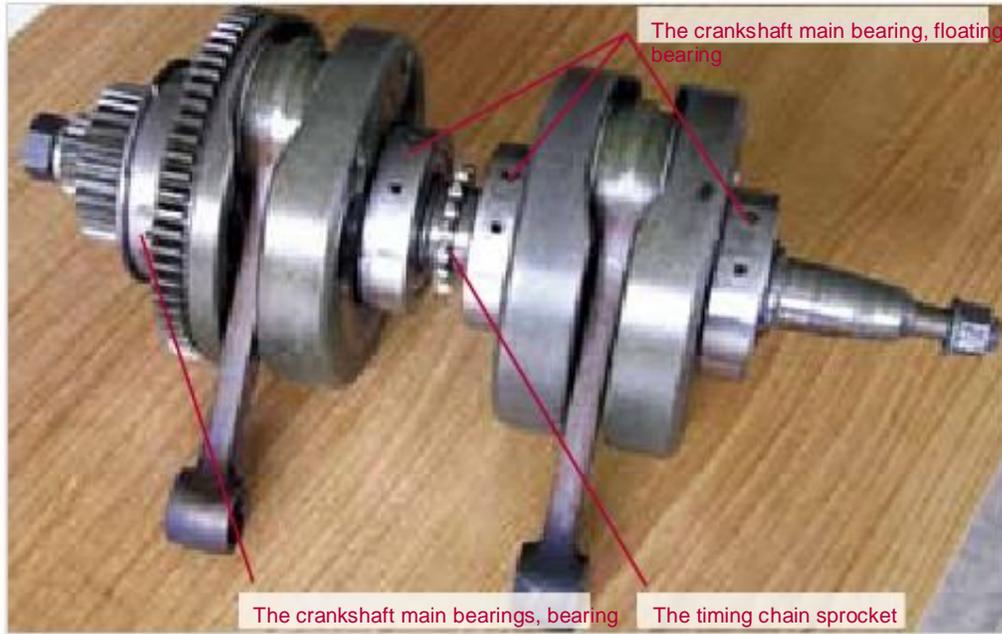


Figure 1-6: Crankshaft

Roles in the axial direction to various ben, are the thermal expansion of the Crankshaft offset.

Is on the left of Figure 1-9 Main bearing crankshaft with the completed outer ring and made a part the tapered crankshaft stump to Recording of the alternator rotor to . see The inner ring of the bearing is in the axial direction by a snap ring

fixes. Furthermore, in the picture 1-9 of the pressed-in crankpin of the linken to see connecting rod, and two facili-deterioration holes, through which the Weight of the crank pin caused Compensate for imbalance.

The two figures 1-10 and 1-11 show the output side of the crankshaft with the gear of the starter gear (Item 1 in Figure 1-11). To see clearly



Figure 1-7: Mean bearing the KW
The cam chain drive sprocket



Figure 1-8: Mean bearing the KW
shifted the outer ring of the right camp